POLYMER HANDBOOK

FOURTH EDITION

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J. BRANDRUP, E. H. IMMERGUT, and E. A. GRULKE

Associate Editors

A. ABE
D. R. BLOCH

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Preface

The purpose of the *Polymer Handbook* is to bring together the data and constants needed in theoretical and experimental polymer research. All polymer researchers have experienced the frustration of searching for data in the ever-expanding polymer literature and know the difficulties involved in trying to locate a particular constant that is buried in a long journal article. The contributors to this Handbook have taken on the arduous task of searching the literature and compiling the data and constants that polymer chemists, polymer physicists, and polymer engineers are likely to need.

The 520 and odd tables in this Handbook are divided into eight sections. The first lists the IUPAC nomenclature rules for polymers and the International System of Units. Although several naming conventions exist in the technical literature, IUPAC names permit a consistent listing of all polymers. Section II contains data and constants needed for polymer synthesis, kinetic mechanisms, and thermodynamic studies of polymerization and depolymerization reactions. Sections III and IV contain physical constants of monomers, solvents, and oligomers. Section V lists the physical constants of many important commercial polymers. Section VI and VII cover the solid state properties of polymers and the properties of polymer solutions. Section VIII of the Handbook lists the commonly used abbreviations or acronyms for polymers and Chemical Abstract Registry Numbers, and gives suggestions for electronic data searching for polymer information. This section should also be consulted in the few cases where contributors have not used IUPAC nomenclature.

As in the previous editions, the *Polymer Handbook* concentrates on synthetic polymers, poly(saccharides) and derivatives, and oligomers. Few data on biopolymers are included. Spectroscopic data as well as data needed by engineers and designers, such as mechanical and rheological data, are minimized, since many excellent compilations exist elsewhere. Only fundamental constants and parameters that refer to the polymer molecule, that describe the solid state of polymer molecules, or that describe polymer solutions, were compiled. Constants that depend on processing conditions or on sample history were not emphasized, as they can be found in existing plastics handbooks and encyclopedias.

A critical evaluation of the values published in the literature was not attempted, since such a task would have required an inordinate amount of time and a sizable staff. Therefore, the users of this Handbook should consult the original literature for details when in doubt about the validity of any data. (The authors of the individual tables were nevertheless requested to eliminate obviously erroneous data from otherwise complete compilations.)

The Fourth Edition revisions have focused on data generated in the ten years since the publication of the Third Edition. Therefore, a completely revised *Polymer Handbook* has been prepared. We have added new tables and incorporated a large amount of new data into existing tables. As a result, the Fourth Edition contains approximately twenty-five percent more data, and the number of pages has increased from about 1850 in the Third Edition to about 2250.

We hope that this new edition will be as useful to the polymer research community as the three earlier editions and that many of the *Polymer Handbook*'s previous users will also obtain the Fourth Edition for their laboratory and library.

The publisher plans a CD-ROM for the *Polymer Handbook* in the near future. We would be grateful if our contributors and users send us any new data they accumulate in the course of their research, and any errors, misprints, omissions and other flaws. We will pass on such data to the publisher, for the polymer database, and for future editions of this Handbook.

We would like to thank all of the contributors to the *Polymer Handbook* for their help and continued patience. The staff at John Wiley, especially Carla Fjerstad, Shirley Thomas, and Jacqueline Kroschwitz, have provided excellent help and support in getting all the work done. We hope that the outstanding efforts of all these people will find due appreciation among the users of this Handbook.

July, 1998

J. Brandrup
E. H. Immergut
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SECTION I

NOMENCLATURE RULES—UNITS

Nomenclature

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A. INTRODUCTION

Macromolecular (polymer) nomenclature has an almost 50-year history. As early as 1949 there existed a Subcommission on Nomenclature within the International Union of Pure and Applied Chemistry (IUPAC) under the chairmanship of Maurice L. Huggins. The Subcommission was part of the IUPAC Commission on Macromolecules, chaired then by Herman F. Mark. Other notable pioneers in polymer science, Jan Joseph Hermans, Otto Kratky, Harry W. Melville, and George J. Smets, were members of the Commission.

The Subcommission produced its first official report in 1952. It recognized then, what is just as true today, that the practice in the field of small molecules of providing rigorous definitions is impractical for polymers. The latter consist of molecules not necessarily exactly of the same size, chemical composition, or structure. The differences result from the presence of end groups, branches, variation in orientation of monomeric units, and irregularity in the sequence of different types of units.

The American Chemical Society (ACS) Division of Polymer Chemistry established its Nomenclature Committee in 1963 to try to unify earlier attempts to name polymers in some coherent way. Their first major project resulted in a structure-based nomenclature for regular linear polymers, first published in ACS Polymer Preprints in 1967, adopted by Chemical Abstracts in 1968, and incorporated in IUPAC recommendations in 1975 [1].

When the IUPAC Commission on Macromolecules was elevated to become the IUPAC Division of Macromolecular Chemistry, the latter in turn established its Commission on Macromolecular Nomenclature in 1968.

The Commission in the course of its nearly 30 years of existence produced a series of major documents that have shaped modern nomenclature and terminology of polymer science. The recommendations are being published in the IUPAC official journal, Pure and Applied Chemistry, and occasionally are republished in the form of a "Compendium" which groups all the currently valid documents in a single volume. The Commission published its "Compendium of Macromolecular Nomenclature" in 1991 [2]. The book, which IUPAC has designated the "Purple Book", in analogy to other IUPAC books ("Blue" – organic, "Red" – inorganic, "Orange" – analytical, "Green"– physical, and "Gold" – overall chemistry), has the two most basic macromolecular nomenclature recommendations: "nomenclature of regular single-strand organic polymers" and "source-based nomenclature for copolymers". In more recent years, the Commission extended that basic nomenclature to double-strand (ladder and spiro) organic polymers, irregular and crosslinked polymers, and polymer blends and interpenetrating networks.

In this article, the basic structure-based and source-based nomenclature of polymers is explained and illustrated in some detail. The continuing use of common and semisystematic nomenclature with reference to specific tables in this Handbook is highlighted. The current Chemical Abstracts (CA) index names [3] are compared and contrasted with the IUPAC practice and typical names employed in the polymer journals and textbooks.

B. IUPAC RECOMMENDATIONS

Since polymers, unlike low-molecular-weight compounds, have no uniform structure and are mixtures of macromolecules of different length and different structural

arrangement, their graphical representation and their names require a special approach.

Often enough, the structure of the polymer has not been sufficiently characterized and the researcher cannot draw its chemical structure. Consequently, no name of the polymer reflecting its structure is possible.

A polymerization reaction for a polymer formed from a monomer such as vinyl chloride can schematically be represented by

$$nCH_2{=}CHCl \rightarrow \text{-}(CH_2\text{-}CHCl)\text{-}_n$$

That shows an idealized product. In fact, however, the polymer consists of long-chains of various lengths. The repeating units, $-CH_2-CHCl-$, are not necessarily all uniquely oriented and joined in a regular fashion as shown in the idealized structure above. In addition to "head-to-tail" links

$$\text{-}CH_2\text{-}CHCl\text{-}CH_2\text{-}CHCl\text{-}$$

other links such as "head-to-head"

$$\text{-}CHCl\text{-}CH_2\text{-}CH_2\text{-}CHCl\text{-}$$

and "tail-to-tail"

$$\text{-}CH_2\text{-}CHCl\text{-}CHCl\text{-}CH_2\text{-}$$

can occur, and the exact sequence of all these repeating units usually is not known.

This becomes even more complicated when a copolymer is derived from more than one monomer, such as styrene and methyl acrylate, which contribute two constitutional or monomeric units:

They can combine into a polymeric chain, resulting in many types such as unspecified, statistical, random, alternating, periodic, block, or graft copolymers.

Because the exact structure of the polymer is not always known, two systems of naming polymers exist:

source-based nomenclature,
structure-based nomenclature.

1. Source-Based Nomenclature

1.1. Homopolymers Homopolymers are derived from only one species of monomer, which may be the actual starting reactant (or source), or be a hypothetical monomer if the homopolymer is formed by a modification of another homopolymer.

The name of the polymer is formed by attaching the prefix "poly" to the name of the actual or assumed monomer, or the starting reactant (source), from which the polymer is derived.

Examples: poly(acrylic acid)
polyacrylonitrile
polybutadiene
polyethylene
poly(methyl methacrylate)
poly(methyl vinyl ether)
polystyrene
poly(tetrafluoroethylene)
poly(vinyl alcohol)
poly(vinyl acetate)
poly(vinyl chloride)
poly(vinylidene dichloride)

Parentheses are used when the name of the monomer consists of two or more words, and when the monomer has substituents.

These are all olefinic type reactants, from which two carbon atoms originally linked by a double bond form a bivalent group:

$$R\text{-}CH{=}CH\text{-}R^1 \rightarrow \text{-}CHR\text{-}CHR^1\text{-}$$

where R and R^1 represent a hydrogen atom or a substituent group. Many of these are joined, in turn, to each other but their exact orientation or sequence is seldom known.

On the other hand, different polymers derived from a single monomer and having identical constitutional units can still be differentiated by additional information, such as average molecular weight and other chemical and physical characteristics.

1.2. Copolymers For copolymers, the names of monomers are cited after the prefix "poly". In addition, an italicized connective (infix) is placed between the names of monomers to denote the kind of sequential arrangement by which the constitutional (monomeric) units, derived from each monomer, are related in the structure [4].

Seven types of sequence arrangements are listed with their corresponding connectives:

Type	Connective
unknown or unspecified	*-co-*
statistical (obeying known statistical laws)	*-stat-*
random (obeying Bernoullian distribution)	*-ran-*
alternating (for two monomeric units)	*-alt-*
periodic (ordered sequence of more than two)	*-per-*
block (linear arrangement of blocks)	*-block-*
graft (side blocks chains connected to main chain)	*-graft-*

Examples: poly[styrene-*co*-(methyl methacrylate)]
poly(styrene-*stat*-acrylonitrile-*stat*-butadiene)
poly[ethylene-*ran*-(vinyl acetate)]
poly[(ethylene glycol)-*alt*-(terephthalic acid)]
poly[formaldehyde-*per*-(ethylene oxide)-*per*-(ethylene oxide)]
polystyrene-*block*-polybutadiene
polybutadiene-*graft*-polystyrene

The names of the monomers are those common or semisystematic names that are encountered most often in the literature of polymer science. The order of citation of monomers in copolymer names is arbitrary.

An equally acceptable alternative scheme for naming copolymers utilizes the prefix "copoly", followed by citation of the names of the monomers, separated by an oblique stroke (a solidus). Parentheses are not needed to enclose monomer names consisting of two or more words.

Examples: copoly(styrene/methyl methacrylate)
stat-copoly(styrene/acrylonitrile/butadiene)
ran-copoly(ethylene/vinyl acetate)
alt-copoly(ethylene glycol/terephthalic acid)
per-copoly(formaldehyde/ethylene oxide/ethylene oxide)
block-copoly(styrene-butadiene)
graft-copoly(butadiene-styrene)

1.3. Nonlinear Macromolecules and Macromolecular Assemblies Most recently, the source-based nomenclature has been extended for non-linear macromolecules and macromolecular assemblies [5]. The non-linear macromolecules comprise branched, graft, comb, star, cyclic, and network macromolecules. The macromolecular assemblies comprise polymer blends, interpenetrating polymer networks, and polymer–polymer complexes.

The following italicized qualifiers can be used as both prefixes (e.g., *blend-*, *net-*) and infixes (connectives) (e.g., *-blend-*, *-net-*) to designate the skeletal structure of non-linear macromolecules or macromolecular assemblies:

Type	Connective
cyclic	*cyclo*
branched, unspecified	*branch*
short-chain-branched	*sh-branch*
long-chain-branched	*l-branch*
branched with branch point of functionality *f*	*f-branch*
comb	*comb*
star	*star*
star with *f* arms	*f-star*
network	*net*
crosslink	*ι* (Greek iota)
polymer blend	*blend*
interpenetrating polymer network	*ipn*
semi-interpenetrating polymer network	*sipn*
polymer–polymer complex	*compl*

In naming non-linear homopolymer molecules, the italicized prefix for the skeletal structure of the macromolecule is placed *before* the source-based name of the constituent linear chain.

Assemblies of macromolecules held together by non-covalent bonds are named by a combination of the names of the constituent macromolecules with an italicized connective between them.

Examples: polystyrene-*comb*-polyacrylonitrile
comb-poly(styrene-*stat*-acrylonitrile)
polystyrene-*comb*-[polyacrylonitrile; poly(methyl methacrylate)]
4-*star*-polystyrene
star-(polyA-*block*-polyB-*block*-polyC)
star-(polyA; polyB; polyC)
star-(polyacrylonitrile; polystyrene) (M_r 100000 : 20000)
net-polystyrene-*ι*-divinylbenzene
net-poly[styrene-*alt*-(maleic anhydride)]-*ι*-(ethylene glycol)
polystyrene-*blend*-poly(2,6-dimethylphenol)
poly(methyl methacrylate)-*blend*-poly(*n*-butyl acrylate)
(*net*-polystyrene)-*sipn*-poly(vinyl chloride)
[*net*-poly(styrene-*stat*-butadiene]-*ipn*-[*net*-poly(ethyl acrylate)

2. Structure-Based Nomenclature

2.1. Regular Single-Strand Organic Polymers For regular organic polymers which have only one species of constitutional repeating unit (CRU) in a single sequential arrangement and consist of single strands only, the name is

poly(constitutional repeating unit),

wherein the repeating group is named as a bivalent organic group according to the IUPAC nomenclature rules for organic compounds [1]. Each such repeating group can consists of simple or substituted subunits such as:

$-CH_2-$	methylene
$-CH_2CH_2-$	ethylene
$-CH{=}CH-$	vinylene
$-CH_2CH_2CH_2CH_2CH_2CH_2-$	hexane-1,6-diyl
$-CHCl-CH_2-$	1-chloroethylene
$-COCH_2-CH_2-$	1-oxopropane-1,3-diyl
$-COCH_2CH_2CH_2CH_2CO-$	adipoyl
	1,4-phenylene
	cyclohexane-1,4-diyl
$-O-$	oxy
$-S-$	thio
$-SO_2-$	sulfonyl
$-NH-$	imino
$-N(CH_3)-$	methylimino
$-NHNH-$	hydrazo
	piperidine-1,4-diyl
$-SiH_2-$	silanediyl
$-Si(CH_3)_2-$	dimethylsilanediyl

Before the total constitutional repeating unit (CRU) can be given a unique name, a single preferred CRU must be selected.

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For instance, in a polymer such as

it is immediately evident that a three-atom group (oxygen, chlorine-substituted methylene group, and methylene group) are being regularly repeated. Yet, the CRU can be identified in at least three ways

To obtain a unique name based on a preferred CRU, several rules have to be applied. Rules have been developed to specify both seniority among subunits, that is, the point at which to begin writing the CRU, and also the direction in which to move along the chain from left to right to reach the end of the chain.

The order of seniority among the types of bivalent groups that are parts of the chain of a single-strand polymer is

a. heterocycles, e.g., piperidine-1,4-diyl:

   thiophene-2,5-diyl:

b. heteroatomic acyclic groups, e.g., oxy: –O–, sulfonyl: $-SO_2-$, imino: –NH–

c. carbocycles, e.g., 1,4-phenylene:

   cyclobutane-1,3-diyl:

d. carbon-containing acyclic groups, e.g., 1-chloroethylene: $-CHCl-CH_2-$
   propane-1,3-diyl: $-CH_2-CH_2-CH_2-$

Within each structural type, the seniority is established by further criteria:

a. for heterocycles, a ring system containing nitrogen is senior to a system containing a hetero atom other than nitrogen, with further descending order of seniority governed by the greatest number of rings in the ring system, the largest individual ring in the ring system, the largest number of hetero atoms, and the greatest variety of hetero atoms;
b. for heteroatomic acyclic chains, oxygen is senior to sulfur, sulfur to nitrogen, nitrogen to phosphorus, phosphorus to silicon, silicon to germanium, etc.;
c. for carbocycles, a three-ring system is senior to a two-ring system, a two-ring system containing two 6-membered rings is senior to one containing a 5- and a 6-membered rings, a fused two-ring system (two atoms common to both rings) is senior to a spiro two-ring system (one atom in common), and an unsaturated ring is senior to a saturated ring of the same size;
d. for carbon-only acyclic chains, seniority is determined first by length, then by the number of substituents, by the ascending order of locants, and, finally, by the alphabetical order of the names of the substituent groups.

In all cases, the basic seniority rules apply only to those atoms or groups of atoms that are in the main chain. The kinds of substituents on the main chain (whether acyclic carbon-only groups, or hetero-atom-containing groups, or any ring systems) do not affect the selection of the CRU, unless identical basic subunits in the chain have to be further differentiated by the number of substituents and their alphabetical order, but not by the type of the substituent.

If completely identical subunits are separated by other subunits, the direction of citation is determined by the shorter part between them.

The preferred CRU is the one beginning with the subunit of highest seniority. To establish direction, one proceeds from this subunit to the neighboring subunit of the same or next in seniority. In the example of a poly(chloroethylene oxide), shown above, where a regularly repeating structure has been assumed, the subunit of the highest seniority is the oxygen atom and the subunit next in seniority is a substituted $-CH_2-CH_2-$. The substituted subunit, $-CHCl-CH_2-$, is oriented in such a way that the substituent, chlorine atom, is assigned the lowest locant (1 rather than 2). The CRU is written to read from left to right. Thus, the preferred CRU is

and the polymer

is named

poly[oxy(1-chloroethylene)]

The second example:

poly[(methylimino)methyleneimino-1,3-phenylene]

illustrates a polymer whose CRU starts with a substituted nitrogen atom and proceeds through the shortest path to the unsubstituted nitrogen atom and then through a carbocycle.

The chemical structure of the CRU is enclosed in parentheses or brackets. While dashes representing chemical bonds may be omitted within the formula unless necessary for clarity, at the ends of the CRU, dashes must be shown. They are drawn across the enclosing marks.

The third example:

poly(pyridine-3,5-diylcarbonyloxymethylene)

shows a polymer, whose CRU starts with a heterocycle and then proceeds through a substituted carbon atom to a hetero atom.

If the end groups of the chain are known, they may be specified by adding prefixes to the polymer name, with the symbol α denoting the left-hand end group and the symbol ω denoting the other end group.

Example:

α-(trichloromethyl)-ω-chloropoly(1,4-phenylenemethylene)

The following table compares and contrasts structure-based and source-based names of some common polymers.

Structure	Structure-based name	Source-based or trivial name
$\text{-}(CH_2CH_2)\text{-}_n$	Poly(methylene)	Polyethylene
$\text{-}(CH(CH_3)CH_2)\text{-}_n$	Poly(propylene)	Polypropene
$\text{-}(C(CH_3)_2CH_2)\text{-}_n$	Poly(1,1-dimethylethylene)	Polyisobutylene
$\text{-}(C(CH_3)=CHCH_2CH_2)\text{-}_n$	Poly(1-methyl-1-butenylene)	Polyisoprene
$\text{-}(CH(C_6H_5)CH_2)\text{-}_n$	Poly(1-phenylethylene)	Polystyrene
$\text{-}(CH(Cl)CH_2)\text{-}_n$	Poly(1-chloroethylene)	Poly(vinyl chloride)
$\text{-}(CH(CN)CH_2)\text{-}_n$	Poly(1-cyanoethylene)	Polyacrylonitrile
$\text{-}(CH(OCOCH_3)CH_2)\text{-}_n$	Poly(1-acetoxyethylene)	Poly(vinyl acetate)
$\text{-}(CF_2CH_2)\text{-}_n$	Poly(1,1-difluoroethylene)	Poly(vinylidene fluoride)
$\text{-}(CF_2CF_2)\text{-}_n$	Poly(difluoromethylene)	Polytetrafluoroethylene
	Poly[(2-propyl-1,3-dioxane-4,6-diyl)methylene]	Poly(vinyl butyral)
$\text{-}(C(CH_3)(COOCH_3)CH_2)\text{-}_n$	Poly[1-(methoxycarbonyl)-1-methylethylene]	Poly(methyl methacrylate)
$\text{-}(OCH_2CH_2)\text{-}_n$	Poly(oxyethylene)	Poly(ethylene oxide)
	Poly(oxy-1,4-phenylene)	Poly(phenylene oxide)
$\text{-}(NH-C(=O)-(CH_2)_5)\text{-}_n$	Poly[imino(1-oxohexane-1,6-diyl)]	Poly(ε-caprolactam)
	Poly(oxyethyleneoxyterephthaloyl)	Poly(ethylene terephthalate)
$\text{-}(NH-C(=O)(CH_2)_4C(=O)-NH(CH_2)_6)\text{-}_n$	Poly(iminoadipoyliminohexamethylene)	Poly(hexamethylenediamine-*alt*-adipic acid) *or* poly(hexamethylene adipamide)
	Poly[(2,5-dioxotetrahydrofuran-3,4-diyl)(1-phenylethylene)]	Poly(maleic anhydride-*alt*-styrene)

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2.2. Regular Double-Strand Organic Polymers In a double-strand polymer, the macromolecules consist of an uninterrupted sequence of rings with adjacent rings having two or more atoms in common (a ladder polymer) or one atom in common (a spiro polymer).

As for a single-strand polymer, a single preferred constitutional repeating unit (CRU) must be selected in order to obtain a unique name [6]. The CRU is usually a tetravalent group denoting attachment to four atoms and is named according to the usual rules of organic nomenclature. Again, the name of the polymer is in the form of

poly(constitutional repeating unit)

Since the polymer has a sequence of rings, in order to identify a preferred CRU, the rings must be broken by observing the following criteria in decreasing order of priority:

a. minimize the number of free valences in the CRU,
b. maximize the number of most preferred hetero atoms in the ring system,
c. retain the most preferred ring system, and
d. choose the longest chain for acyclic CRU.

Further decisions are based on the seniority of ring systems (indicated in the preceding section), on the orientation of the CRU to give the lowest free valence locant at the lower left of the structural diagram, and on placing the acyclic subunits, if any, on the right side of the ring system within the CRU.

For a polymer consisting of adjacent 6-membered saturated carbon rings:

the name of the preferred CRU, which in this case is an acyclic chain of four carbon atoms with four free valences at each atom (the lowest at the lower left), is

poly(butane-1,4 : 3,2-tetrayl)

The free valence locants are always placed just in front of the corresponding ending of the tetravalent unit and are cited in the order

lower-left, upper-left : upper-right, lower-right

that is, in a clockwise direction, the left locants being separated from the right locants by a colon.

For a more complex ladder polymer consisting of an alternating sequence of 6-membered sulfur-containing rings and keto-group containing carbocycles, with two atoms in common at each junction:

the name based on the preferred CRU is

poly(1,4-dithiin-2,3 : 5,6-tetrayl-5,6-dicarbonyl)

Here, by applying the seniority of the rings system, the heterocycle was left intact, but the carbocycle was broken. That left two bivalent acyclic subunits (carbonyl groups), which according to the rule, have been placed on the right side of the cyclic subunit, with attachments as in the original polymer.

Another, still more complex ladder polymer, derived from the polycondensation of 1,4,5,8-naphthalenetetracarboxylic dianhydride with 1,2,4,5-benzenetetramine:

poly[(7-oxo-7*H*,10*H*-benz[*de*]imidazo[4′,5′ : 5,6]benzimidazo [2,1-*a*]isoquinoline-3,4:10,11-tetrayl)-10-carbonyl]

illustrates a six-ring system with four free valences oriented in such a way that the lowest free valence locant is at lower left. It is followed within the total CRU by an acyclic group at the upper right side of the diagram.

For a polymer consisting of regularly repeating adjacent cyclohexane and 1,3-dioxane rings in a spiro sequence (one atom in common at each junction):

the preferred CRU and the name are:

poly(2,4,8,10-tetraoxaspiro[5.5]undecane-3,3:9,9-tetrayl-9,9-diethylene)

2.3. Regular Single-Strand Inorganic and Coordination Polymers The names of inorganic and coordination polymers are based on the fundamentals developed for organic polymers [7]. As in the nomenclature of organic polymers, these rules apply to structural representations

which may at times be idealized and do not take into account irregularities, chain imperfections, or random branching.

A constitutional repeating unit (CRU) is selected and named. However, because of the basic difference between the organic and inorganic nomenclature, the subunits of the CRU are not named as bivalent groups, but as inorganic or coordination groups indicating covalent and/or coordinate bonding.

The name of the polymer is the name of the CRU prefixed by the term "poly", "*catena*", or other structural indicator. In order to arrive at the preferred CRU, seniorities of the constitutent subunits are considered as well as the preferred direction for the sequential citation.

The constituent subunit of the highest seniority must contain one or more central atoms; bridging groups between central atoms in the backbone of the polymer are of lower seniority. This is consistent with the principle of coordination nomenclature which puts the emphasis on the coordination center.

Examples of homoatomic backbones are

catena-poly[dimethyltin]

catena-poly[(difluorosilicon)(dimethylsilicon)]

More common coordination polymers consist of a mononuclear central atom with a bridging ligand. The CRU of such a polymer cites the central atom first, which is prefixed by its associated non-bridging ligands, followed in turn by the name of the bridging ligand prefixed by the Greek letter μ:

catena-poly[(ammine-chlorozinc)-μ-chloro]

catena-poly[(dihydro-boron)-μ-(dimethylamido)]

Multiple bridging ligands between the pair of central atoms are cited in alphabetic order. Italicized element symbols indicating the coordinating atoms in bridging ligands are cited in the order of direction of the CRU and are separated by a colon:

catena-poly[copper-[μ-chloro-bis-μ-(diethyl disulfide-*S*:*S*′)]-copper-μ-chloro]

2.4. Regular Quasi-Single-Strand Coordination Polymers In a regular quasi-single-strand coordination polymer, the preferred CRU has one terminal constituent subunit connected through a single atom to the next CRU [7]. Such polymers are named as single-strand coordination polymers:

catena-poly[palladium-di-μ-chloro]

catena-poly[silicon-di-μ-thio]

catena-poly[platinum(μ-bromo-μ-chloro)]

catena-poly[titanium-tri-μ-chloro]

2.5. Irregular Single-Strand Organic Polymers Irregular polymers are named by placing the prefix "poly" before the structure-based names of the constitutional units, collectively enclosed in parentheses or brackets, with the individual constitutional units separated by an oblique stroke (a solidus) [8]. The stroke indicates the irregular or unknown sequential arrangement of these units. The dashes at each end of the formula are drawn *fully inside* the enclosing marks to denote that these are not necessarily terminal bonds of the macromolecule.

For instance, a partially hydrolyzed poly(vinyl acetate) containing units:

is represented graphically and named:

poly(1-acetoxyethylene/1-hydroxyethylene)

A copolymer of vinyl chloride and styrene joined head-to-tail is

poly(1-chloroethylene/1-phenylethylene)

A chlorinated polyethylene consisting of units

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is shown and named as

$$\left(\text{CHCl}/\text{CCl}_2/\text{CH}_2\right)_n$$

poly(chloromethylene/dichloromethylene/methylene)

C. USE OF COMMON AND SEMISYSTEMATIC NAMES

The main purpose of chemical nomenclature is to identify a chemical species by means of written or spoken words for a useful communication among chemists. A systematic nomenclature arose from the need to provide a relationship between the structure and the name. In other words, the reader should be able to deduce and identify the structure from the name.

Traditional names, however, not necessarily based on structures, have been widely used for many common compounds. These are the so-called common, trivial, or semisystematic names, which are satisfactory for communication within a given special chemical field.

It was earlier stated that in the macromolecular nomenclature IUPAC is recommending the use of common and semisystematic names for monomers in the source-based polymer names. The structure-based names, on the other hand, are more related to the structural characteristic of the polymers. But even there, IUPAC allows for a limited number of common names for such substituent groups as "allyl" and "vinyl", and for bivalent groups such as "adipoyl" and "terephthaloyl".

The authors in this *Handbook* for the most part are using the IUPAC-recommended names, or very close variants thereof. On the other hand, in some compilations such as "Crystallographic Data for Various Polymers" (in Section VI), the author provides an excellent introduction and explanation of the names used. For some structure-based names, reflecting constitutional repeating units (CRU), especially for those with a center of symmetry, the naming of linking bivalent groups begins with the central subunit and proceeds in both directions. The IUPAC method selects the most senior bivalent group and proceeds naming from left to right.

Examples:

$$\left(\text{O}-\underset{\underset{\text{O}}{\|}}{\text{C}}-\text{O}-p-\text{C}_6\text{H}_4-\text{SO}_2-p-\text{C}_6\text{H}_4\right)_n$$

Handbook name: poly(4,4′-sulfonyldiphenylene carbonate)

IUPAC name: poly(oxycarbonyloxy-1,4-phenylenesulfonyl-1,4-phenylene)

2. $$\left(\text{O}-\text{CH}_2\text{CH}_2-\text{O}-\text{CH}_2\text{CH}_2-\text{O}-\underset{\underset{\text{O}}{\|}}{\text{C}}-\text{CH}_2\text{CH}_2-\underset{\underset{\text{O}}{\|}}{\text{C}}\right)_n$$

Handbook name: poly(oxydiethylene succinate)

IUPAC name: poly(oxyethyleneoxyethyleneoxysuccinyl)

In no case, there is any misunderstanding in either case as to which structure is associated with each name.

Abbreviations and acronyms are also extensively used in the chemical literature for monomers, polymers, as well as for additives, modifiers, and fillers. Their extensive list is provided in Section VIII of this Handbook.

As is clearly stated there, the same abbreviation is often used for different monomers and polymers, and the same polymer may have different abbreviations or acronyms.

Examples:

1.	DPP	diphenyl phthalate
		dipropyl phthalate
2.	PVA	poly(vinyl alcohol)
		poly(vinyl acetate)
3.	trioctyl phosphate	TOF
		TOP
4.	polyacrylonitrile	PAC
		PAN

The IUPAC policy [9] on the use of abbreviations in the chemical literature states that there are great advantages in defining all abbreviations in a single conspicuous place in each paper, preferably near the beginning of the paper in a single list. An alternative is to define each abbreviation fully the first time it appears in the text. No abbreviations should be used in the titles of publications. A chapter of this Handbook contains a set of abbreviations recognized by international organizations.

D. CHEMICAL ABSTRACTS (CA) INDEX NAMES

Chemical Abstracts Service (CAS), the publisher of printed Chemical Abstracts (CA) and corresponding products and services in microform, online databases, CD-ROM, and World Wide Web also names the polymers, selected for inclusion in the CAS Chemical Registry System and in the *CA Chemical Substance Indexes*, in two ways:

a. in terms of the component monomer(s) from which they are prepared
b. in terms of the final structure of the resulting polymer.

There are definitive rules that govern when each type of structure is recorded and named [3]. The *primary*, comprehensive representation of polymers by CAS is by citation of the component monomer(s) because, in many cases, the structure of the final polymer is either not known or is not described in sufficient detail by the author.

When the polymer structure is well documented by the author or can be confidently assumed, because one and only one structure is chemically possible, then a *supplementary* representation with a corresponding systematic name is added to the CAS Registry System and included in the printed indexes and online files.

The chemical nomenclature used by CAS has developed in parallel, and generally in accordance, with the rules and recommendations published by IUPAC. However, their rules of systematic nomenclature do not necessarily lead to a unique name for each compound, but do lead to an unambiguous one. This causes no difficulty in normal scientific communication, but is unacceptable in a formal, rigidly controlled, alphabetic listing such as the CA Chemical Substance Index.

The CA index names must not only be unambiguous, unique, and totally reproducible, but also selected so as to bring the names of structurally related substances into juxtaposition in the alphabetic index. CAS has always recognized that, while a unique name is needed for an index and for substance identification, the use of such invariant name in scientific papers is neither practicable nor desirable.

In this section, it is intended to highlight the characteristics of the CA index names for polymers and compare them with some of the typical names used in the scientific community.

a. IUPAC rules have been adapted to the specific needs of a highly ordered alphabetical index.
b. Most common names were eliminated and exceptional treatment for various classes of substances was discontinued.
c. A single preferred name is determined for each identifiable substance.
d. A strict order of precedence of chemical functions and compound classes is followed to determine the preferred "index heading parent".
e. A total name is "inverted" by citing first the *index heading parent* (usually, basic skeleton name with a locant and suffix denoting the principal function), followed by the *comma of inversion*, the *substituents*, and the *modification* (derivative of the principal function), e.g., 2-propenoic acid, 2-methyl-, methyl ester

As mentioned above, most common names, including those still sanctioned by IUPAC, have been replaced by fully systematic names. The following is a short list of most common monomers with both common names and CA Index names:

Common	CA Index names (inverted form)
acrylamide	2-propenamide
acrylic acid	2-propenoic acid
acrylonitrile	2-propenamide
adipic acid	hexanedioic acid
ε-caprolactam	2*H*-azepin-2-one, hexahydro-
ε-caprolactone	2-oxepanone
ethylene glycol	1,2-ethanediol
ethylene oxide	oxirane
fumaric acid	2-butenedioic acid, (*E*)-
glycolic acid	acetic acid, hydroxy-
hydroquinone	1,4-benzenediol
isophthalic acid	1,3-benzenedicarboxylic acid
lactic acid	propanoic acid, 2-hydroxy-
maleic acid	2-butenedioic acid, (*Z*)-
maleic anhydride	2,5-furandione
melamine	1,3,5-triazine-2,4,6-triamine
methacrylic acid	2-propenoic acid, 2-methyl-
methyl acrylate	2-propenoic acid, methyl ester
phthalic anhydride	1,3-isobenzofurandione
propylene oxide	oxirane, methyl-
styrene	benzene, ethenyl-
terephthalic acid	1,4-benzenedicarboxylic acid
vinyl alcohol	ethenol
vinyl chloride	ethene, chloro-
vinylidene chloride	ethene, 1,1-dichloro-

Similarly, commonly named substituent and multiplying groups have their systematic equivalents in CA Indexes:

adipoyl	1,6-dioxo-1,6-hexanediyl
allyl	2-propenyl
tert-butyl	1,1-dimethylethyl
ethylene	1,2-ethanediyl
hexamethylene	1,6-hexanediyl
isopropyl	1-methylethyl
succinyl	1,4-dioxo-1,4-butanediyl
vinyl	ethenyl
vinylene	1,2-ethenediyl

Homopolymers are described by the term "homopolymer" cited in the *modification* under the monomer name in the index. In the structural diagram derived from the CAS Registry System records, the structure of the monomer is enclosed in parentheses followed by a subscript "x". The corresponding empirical formula is also expressed in a similar way.

Examples:

1. Poly(methacrylic acid):
   $(CH_2{=}\underset{\underset{CH_3}{|}}{CH}{-}COOH)_x$
   $(C_4H_6O_2)_x$
   CA name: 2-Propenoic acid, 2-methyl-, homopolymer
2. Polystyrene:
   $(CH_2{=}\underset{\underset{C_6H_5}{|}}{CH})_x$
   $(C_8H_8)_x$
   CA name: Benzene, ethenyl-, homopolymer
3. Poly(11-aminoundecanoic acid):
   $(H_2N{-}(CH_2)_{10}{-}COOH)_x$
   $(C_{11}H_{23}NO_2)_x$
   CA name: Undecanoic acid, 11-amino-, homopolymer

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4. Poly(lactic acid):

$$(CH_3-\underset{\underset{OH}{|}}{CH}-COOH)_x$$

$(C_3H_6O_3)_x$

CA name: Propanoic acid, 2-hydroxy-, homopolymer

Copolymers formed from two or more monomers are described by the term "polymer with" (followed by the other monomers in alphabetical order) cited in the *modification* under each monomer name. In the structural diagram derived from the CAS Registry System records, the structures of monomers, separated by a period or periods, are enclosed in parentheses followed by a subscript "*x*". The corresponding empirical formulas are similarly expressed. The descriptors *alternating, block,* and *graft* are cited whenever applicable.

Examples:

1. Butadiene-vinyl ethyl ether copolymer:

   $(CH_2{=}CH{-}CH{=}CH_2{\cdot}CH_2{=}CH{-}O{-}CH_2CH_3)_x$

   $(C_4H_8O{\cdot}C_4H_6)_x$ (in Formula Index order)

   CA names: 1,3-Butadiene, polymer with ethoxyethene
   Ethene, ethoxy-, polymer with 1,3-butadiene

2. Isophthalic acid-terephthalic acid-ethylene glycol polyester:

   $(HOOC\text{-}m\text{-}C_6H_4{-}COOH{\cdot}HOOC\text{-}p\text{-}C_6H_4{-}COOH{\cdot}OH{-}(CH_2)_2{-}OH)_x$

   $(C_8H_6O_4{\cdot}C_8H_6O_4{\cdot}C_2H_6O_2)_x$

   CA names: 1,3-Benzenedicarboxylic acid, polymer with 1,4-benzenedicarboxylic acid and 1,2-ethanediol
   1,4-Benzenedicarboxylic acid, polymer with 1,3-benzenedicarboxylic acid and 1,2-ethanediol
   1,2-Ethanediol, polymer with 1,3-benzenedicarboxylic acid and 1,4-benzenedicarboxylic acid

Telomers are named as copolymers with the term "telomer with" cited in the *modification* under both the monomer (taxogen) and the chain-transfer agent (telogen). In the structural representation, the monomer is enclosed in parentheses with a subscript "*x*", followed by the telogen structure. The corresponding empirical formula is expressed in the same way.

Examples:

1. Vinylpyrrolidone homopolymer terminated with mercaptopropionic acid:

$(C_6H_9NO)_x{\cdot}C_3H_6O_2S$

   CA names: 2-Pyrrolidinone, 1-ethenyl-, telomer with 3-mercaptopropanoic acid
   Propanoic acid, 3-mercapto-, telomer with 1-ethenyl-2-pyrrolidinone

2. Acrylic acid-vinyl choride copolymer terminated with carbon tetrachloride:

   $(CH_2{=}CH{-}COOH{\cdot}Cl{-}CH{=}CH_2)_x{\cdot}CCl_4$

   $(C_3H_4O_2{\cdot}C_2H_3Cl)_x{\cdot}CCl_4$

   CA names: 2-Propenoic acid, telomer with chloroethene and tetrachloromethane
   Ethene, chloro-, telomer with 2-propenoic acid and tetrachloromethane
   Methane, tetrachloro-, telomer with chloroethene and 2-propenoic acid

Structural repeating units (SRU), equivalent to IUPAC constitutional repeating units (CRU), are selected and named for polymers that have well documented regular structure, or can confidently be assumed. Assumptions are made for

a. polyamides formed from a dibasic acid (ester or halide) and a diamine; from an amino acid (ester or halide); from a lactam;
b. polyesters formed from a dibasic acid (anhydride, ester, or halide) and a dihydric alcohol (phenol); from a hydroxy acid (ester, halide); from a lactone;
c. polycarbonates formed from carbonic acid (ester, dihalide) and a dihydric alcohol (phenol);
d. polyurethanes formed from a diisocyanate and a dihydric alcohol (phenol).

The structural repeating unit is named by citation of one or more multivalent radicals of regular substitutive nomenclature. The selection of the preferred SRU, its orientation, and the construction of the name, proceeding from left to right, follows the same rules as those in the IUPAC recommendations for the CRU. In CA names, however, the names of the radicals are fully systematic, as explained and contrasted above. The empirical formula is enclosed in parentheses followed by a subscript "*n*".

Examples:

1. Nylon 11:

$$\left(NH-\overset{\overset{O}{\|}}{C}-(CH_2)_{10}\right)_n$$

$(C_{11}H_{21}NO)_n$

CA name: Poly[imino(1-oxo-1,11-undecanediyl)]

2. Poly(ethylene adipate):

$$\left(O-CH_2-CH_2-O-\overset{\overset{O}{\|}}{C}-(CH_2)_4-\overset{\overset{O}{\|}}{C}\right)_n$$

$(C_8H_{12}O_4)_n$

CA name: Poly[oxy-1,2-ethanediyloxy(1,6-dioxo-1,6-hexanediyl)]

3. Poly(ether ether ketone) (PEEK):

$(C_{19}H_{12}O_3)_n$

CA name: Poly(oxy-1,4-phenyleneoxy-1,4-phenylenecarbonyl-1,4-phenylene)

Poly(alkylene glycols) and their ethers and esters are indexed in CA as structural repeating units with the specified end groups, if aplicable.

Examples:

1. Poly(ethylene glycol):
   $H\text{-}(O\text{-}CH_2\text{-}CH_2)_n\text{-}OH$
   CA name: Poly(oxy-1,2-ethanediyl), α-hydro-ω-hydroxy-
2. Poly(trimethylene glycol) dimethyl ether:
   $CH_3\text{-}(O\text{-}CH_2\text{-}CH_2\text{-}CH_2)_n\text{-}O\text{-}CH_3$
   CA name: Poly(oxy-1, 3-propanediyl), α-methyl-ω-methoxy-
3. Poly(tetramethylene glycol) diacrylate:
   $CH_2{=}CH\text{-}C(O)\text{-}(O\text{-}CH_2\text{-}CH_2\text{-}CH_2\text{-}CH_2)_n\text{-}O\text{-}C(O)\text{-}CH{=}CH_2$
   CA name: Poly(oxy-1, 4-butanediyl), α-(1-oxo-2-propenyl)-ω-[(1-oxo-2-propenyl)oxy]-

E. POLYMER CLASS NAMES

In most textbooks, handbooks, encyclopedias, and indexes to polymer nomenclature, information on polymer is grouped under polymer class names. The following is a list of such terms extracted from these sources.

Acrylic Polymers
Alkyd resins
Aminoplasts
Coumarone-indene-resins
Epoxy resins
Fluoropolymers
Phenolic resins
Polyacetals
Polyacetylenes
Polyacrylics
Polyalkylenes
Polyalkenylenes
Polyalkynylenes
Polyamic acids
Polyamides
Polyamines
Polyanhydrides
Polyarylenealkenylenes
Polyarylenealkylenes
Polyarylenes
Polyazomethines
Polybenzimidazoles
Polybenzothiazoles
Polybenzoxazinones
Polybenzoxazoles
Polybenzyls
Polycarbodiimides
Polycarbonates
Polycarboranes
Polycarbosilanes
Polycyanurates
Polydienes
Polyester-polyurethanes
Polyesters
Polyetheretherketones
Polyether-polyurethanes
Polyethers
Polyhydrazides
Polyimidazoles
Polyimides
Polyimines
Polyisocyanurates
Polyketones
Polyolefins
Polyoxadiazoles
Polyoxides
Polyoxyalkylenes
Polyoxyarylenes
Polyoxymethylenes
Polyoxyphenylenes
Polyphenyls
Polyphosphazenes
Polypyrroles
Polypyrrones
Polyquinolines
Polyquinoxalines
Polysilanes
Polysilazanes
Polysiloxanes
Polysilsesquioxanes
Polysulfides
Polysulfonamides
Polysulfones
Polythiazoles
Polythioalkylenes
Polythioarylenes
Polythioethers
Polythiomethylenes
Polythiophenylenes
Polyureas
Polyurethanes
Polyvinyl acetals
Polyvinyl butyrals
Polyvinyl formals
Vinyl polymers

These classes are not mutually exclusive, some are relatively generic and some more specific. Some of them

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could be grouped and arranged in a hierarchy, e.g.,

- Polyacetals
  - Polyvinyl acetals
    - polyvinyl butyrals
    - polyvinyl formals
- Polyesters
  - polycarbonates
- Polyethers
  - epoxy resins
  - polyetheretherketones
  - polyoxyalkylenes
    - polyoxymethylenes
  - polyoxyarylenes
    - polyoxyphenylenes

Some are synonymous or near synonymous, e.g., polyalkenylenes and polydienes, polyalkynylenes and polyacetylenes, polyethers and polyoxides, polythioethers and polysulfides.

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Units

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A. Introduction I-13
B. International Units I-13
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A. INTRODUCTION

The International System of Units (1) is used in this Handbook as far as possible, since this system has become obligatory in many European countries and since it is supported by the National Bureau of Standards (2) and the American Society for Testing and Materials (3). Only cursory information is given here for units needed in this Handbook. Detailed information may be found in the following References:

1. "SI-units and recommendations for the use of their multiples and of certain other units", ISO 1000–1973.
2. "The International System of Units (SI)", Eds. C. H. Page, P. Vigoreux, Natl. Bur. Std. Spec. Publ., 1981, 330.
3. "Standard Metric Practice Guide", ASTM E-380–85.
4. Manual of Symbols and Terminology for Physicochemical Quantities and Units; Pergamon Press, Oxford 1979 (Pure Appl. Chem., **51**, 1 (1979).
5. F. S. Conant, using the SI units, Polym. Eng. Sci., **17**, 222 (1977) (further references).

B. INTERNATIONAL UNITS

Quantity	SI-unit	Selection of multiples of the SI-unit	Accepted units used with SI	Units accepted temporarily	Non SI units that should not be used
Length	m (metre)	km, cm, mm, μm, nm		$1\,Å = 10^{-10}$ m	$1\,\mu = 10^{-6}$ m
Area	m^2	km^2, dm^2, cm^2, mm^2			
Volume	m^3	dm^3, cm^3, mm^3	litre (l, L) ($1\,l = 1\,dm^3$)		
Time	s (second)	ks, ms, μs, ns	d, h, min		
Frequency	Hz (hertz)	THz, GHz, MHz, kHz			
Mass	kg (kilogram)	Mg, g, mg, μg	t		$1\gamma = 10^{-9}$ kg
Density	kg/m^3	mg/m^3; kg/dm^3; g/cm^3	t/m^3; kg/l		
Force	N (newton)	MN, kN, mN, μN			1 dyn = 10^{-5} N; pond, kilopond
Pressure	Pa (pascal) or N/m^2	GPa, MPa, kPa, mPa, μPa		1 bar = 10^5 Pa 1 atm = 101325 Pa	$1\ \text{Torr} = \frac{101325}{760}\ \text{Pa} = 133.32\ \text{Pa}$
Stress	Pa or N/m^2	GPa; MPa or N/mm^2; kPa			
Viscosity (dynamic)	Pa s	mPa s			poise; 1 P = 0.1 Pa s
Viscosity (kinematic)	m^2/s	mm^2/s			stokes; $1\,St = 1\,cm^2/s$
Surface tension	N/m	mN/m			dyn/cm
Energy, work, heat	J (joule)	TJ, GJ, MJ, kJ, mJ	Electronvolt (eV) $1\,eV \approx 1.602 \times 10^{-19}$ J		$1\,erg = 10^{-7}$ J 1 cal = 4.1868 J
Power	W (watt)	GW, MW, kW, mW, μW			
Temperature	K (kelvin), °C				1°K = 1 K
Thermal conductivity	W/mK				0.86 kcal/(m h grd)
Heat capacity	J/K	kJ/K			
Specific heat	J/(kg K)	kJ/(kg K)			
Entropy	J/K	kJ/K			
Amount of substance	mol (mole)				Mole
Electrical resistance	Ω				
Electrical conductivity	S (1/Ω)				

C. SI-PREFIXES

Factor	Prefix	Symbol	Factor	Prefix	Symbol
10^{18}	exa	E	10^{-1}	deci	d
10^{15}	peta	P	10^{-2}	centi	c
10^{12}	tera	T	10^{-3}	milli	m
10^{9}	giga	G	10^{-6}	micro	μ
10^{6}	mega	M	10^{-9}	nano	n
10^{3}	kilo	k	10^{-12}	pico	p
10^{2}	hecto	h	10^{-15}	femto	f
10^{1}	deca	da	10^{-18}	atto	a

D. CONVERSION FACTORS

Length	m	in	ft	yd	thou or mil
1 m	1	3.937×10^{1}	3.281	1.094	3.937×10^{4}
in	2.540×10^{-2}	1	8.333×10^{-2}	2.778×10^{-2}	1.0×10^{3}
ft	3.048×10^{-1}	12	1	3.333×10^{-1}	1.2×10^{4}
yd	9.144×10^{-1}	36	3	1	3.6×10^{4}
thou or mil	2.540×10^{-5}	1.0×10^{-3}	8.334×10^{-5}	2.778×10^{-5}	1

Area	m^2	sq. in	sq. ft	sq. yd	ar
$1\,m^2$	1	1.550×10^{3}	1.076×10^{1}	1.196	1.0×10^{-2}
sq. in	6.452×10^{-4}	1	6.994×10^{-3}	7.716×10^{-4}	6.452×10^{-6}
sq. ft	9.290×10^{-2}	1.440×10^{2}	1	1.111×10^{-1}	9.290×10^{-4}
sq. yd	8.361×10^{-1}	1.296×10^{3}	9	1	8.361×10^{-3}
ar	1.0×10^{2}	1.550×10^{5}	1.076×10^{3}	1.196×10^{2}	1

Volume	m^3	l (lit)	cu. in	cu. ft	cu. yd	gal (US)	gal (UK)
$1\,m^3$	1	10^{3}	6.102×10^{4}	3.531×10^{1}	1.308	2.642×10^{2}	2.20×10^{2}
l (lit)	10^{-3}	1	6.102×10^{1}	3.531×10^{-2}	1.308×10^{-3}	2.642×10^{-1}	2.20×10^{-1}
cu. in	1.639×10^{-5}	1.639×10^{-2}	1	5.787×10^{-4}	2.143×10^{-5}	4.329×10^{-3}	3.605×10^{-3}
cu. ft	2.832×10^{-2}	2.832×10^{1}	1.728×10^{3}	1	3.703×10^{-2}	7.481	6.229
cu. yd	7.646×10^{-1}	7.645×10^{2}	4.666×10^{4}	2.7×10^{1}	1	2.020×10^{2}	1.682×10^{2}
gal (US)	3.785×10^{-3}	3.785	2.310×10^{2}	1.337×10^{-1}	4.951×10^{-3}	1	8.327×10^{-1}
gal (UK)	4.546×10^{-3}	4.546	2.774×10^{2}	1.605×10^{-1}	5.946×10^{-3}	1.201	1

Mass	kg	lbm	ton (UK) (long ton)	cwt (UK) (long cwt)	ton (US) (short ton)	ounce	grain
1 kg	1	2.205	9.842×10^{-4}	1.968×10^{-2}	1.102×10^{-3}	3.527×10^{1}	1.543×10^{4}
lbm	4.536×10^{-1}	1	4.464×10^{-4}	8.929×10^{-3}	5.0×10^{-4}	1.6×10^{1}	7.0×10^{3}
ton (metric)	1×10^{3}	2.205×10^{3}	9.842×10^{-1}	19.68	1.102	3.527×10^{4}	1.543×10^{7}
ton (UK)	1.016×10^{3}	2.240×10^{3}	1	2.0×10^{1}	1.120	3.584×10^{4}	1.568×10^{7}
cwt (UK)	5.080×10^{1}	1.120×10^{2}	5.0×10^{-2}	1	5.600×10^{-2}	1.792×10^{3}	7.840×10^{5}
ton (US)	9.072×10^{2}	2.0×10^{3}	8.929×10^{-1}	1.786×10^{1}	1	3.2×10^{4}	1.4×10^{7}
ounce	2.835×10^{-2}	6.250×10^{-2}	2.790×10^{-5}	5.580×10^{-4}	3.125×10^{-5}	1	4.375×10^{2}
grain	6.480×10^{-5}	1.429×10^{-8}	6.378×10^{-8}	1.276×10^{-6}	7.143×10^{-8}	2.286×10^{-3}	1

Density	kg/m^3	$Mg/m^3 = g/cm^3$	lbm/cu.ft	lbm/cu.in	lbm/gal (UK)	lbm/gal (US)
$1\,kg/m^3$	1	1.0×10^{-3}	6.243×10^{-2}	3.613×10^{-5}	1.002×10^{-2}	8.345×10^{-3}
$Mg/m^3 = g/cm^3$	1.0×10^{3}	1	6.243×10^{1}	3.613×10^{-2}	1.002×10^{1}	8.345
lbm/cu. ft	1.602×10^{1}	1.602×10^{-2}	1	5.789×10^{-4}	1.605×10^{-1}	1.337×10^{-1}
lbm/cu. in	2.768×10^{4}	2.768×10^{1}	1.728×10^{3}	1	2.774×10^{2}	2.310×10^{2}
lbm/gal (UK)	9.978×10^{1}	9.978×10^{-2}	6.229	3.605×10^{-3}	1	8.327×10^{-1}
lbm/gal (US)	1.198×10^{2}	1.198×10^{-1}	7.480	4.329×10^{-3}	1.201	1

Force	N (kg m/s^2)	kgf, kp	lbf	dyn	tonf (UK) (long ton)	tonf (US) (short ton)
1 N	1	1.020×10^{-1}	2.248×10^{-1}	1.0×10^{5}	1.004×10^{-4}	1.124×10^{-4}
kp	9.807	1	2.205	9.807×10^{5}	9.842×10^{-4}	1.102×10^{-3}
lbf	4.448	4.536×10^{-1}	1	4.448×10^{5}	4.464×10^{-4}	5.0×10^{-4}
dyn	1.0×10^{-5}	1.020×10^{-6}	2.248×10^{-6}	1	1.004×10^{-9}	1.124×10^{-9}
tonf (UK)	9.964×10^{3}	1.016×10^{3}	2.240×10^{3}	9.964×10^{8}	1	1.120
tonf (US)	8.896×10^{3}	9.072×10^{2}	2.0×10^{3}	8.896×10^{8}	8.929×10^{-1}	1

Pressure	Pa	kPa	MPa (N/mm^2)	bar	p/cm^2	kp/m^2	at†	atm†	Torr†	Psi (lbf/sq. in)†
1 Pa (= 1 N/m^2)	1	10^{-3}	10^{-6}	10^{-5}	1.02×10^{-2}	1.02×10^{-1}	1.02×10^{-5}	9.87×10^{-6}	7.50×10^{-6}	1.450×10^{-4}
1 kPa	10^{3}	1	10^{-3}	10^{-2}	1.02×10^{1}	1.02×10^{2}	1.02×10^{-2}	9.87×10^{-3}	7.50	1.450×10^{-1}
1 MPa (=1 N/mm^2	10^{6}	10^{3}	1	10^{1}	1.02×10^{4}	1.02×10^{5}	1.02×10^{1}	9.87	7.50×10^{3}	1.450×10^{2}
1 bar (= 0.1 MPa)	10^{5}	10^{2}	10^{-1}	1	1.02×10^{3}	1.02×10^{4}	1.02	9.87×10^{-1}	7.50×10^{2}	1.450×10^{1}
1 p/cm^2 †	9.81×10^{1}	9.81×10^{-2}	9.81×10^{-5}	9.81×10^{-4}	1	10^{1}	10^{-3}	9.68×10^{-4}	7.36×10^{-1}	1.422×10^{-2}
1 kp/m^2 †	9.81	9.81×10^{-3}	9.81×10^{-6}	9.81×10^{-5}	10^{-1}	1	10^{-4}	9.68×10^{-5}	7.36×10^{-2}	1.422×10^{-3}
1 at (= 1 kp/cm^2)†	9.81×10^{4}	9.81×10^{1}	9.81×10^{-2}	9.81×10^{-1}	10^{3}	10^{4}	1	9.68×10^{-1}	7.36×10^{2}	1.422×10^{1}
1 atm (= 760 Torr)†	1.01325×10^{5}	1.01325×10^{2}	1.01325×10^{-1}	1.013	1.033×10^{3}	1.033×10^{4}	1.033	1	7.60×10^{2}	1.470×10^{1}
1 Torr (= 1/760 atm)†	1.33×10^{2}	1.33×10^{-1}	1.33×10^{-4}	1.33×10^{-3}	1.36	1.36×10^{1}	1.36×10^{-3}	1.32×10^{-3}	1	1.934×10^{-2}
Psi (lbf/sq. in)	6.895×10^{3}	6.895	6.895×10^{-3}	6.895×10^{-2}	7.031×10^{-5}	7.031×10^{-6}	7.031×10^{-2}	6.805×10^{-2}	5.171×10^{-1}	1

† Non SI units.

Stress	Pa	N/mm^2	kp/cm^2 †	kp/mm^2 †	Psi (lbf/sq. in)†
1 Pa (= 1 N/m^2)	1	10^{-6}	1.02×10^{-5}	1.02×10^{-7}	1.450×10^{-4}
1 N/mm^2(= 1 MPa)	10^{6}	1	1.02×10^{1}	1.02×10^{-1}	1.450×10^{2}
1 kp/cm^2 (= 1 at)†	9.81×10^{4}	9.81×10^{-2}	1	10^{-2}	1.422×10^{1}
1 kp/mm^2 †	9.81×10^{6}	9.81	10^{2}	1	1.422×10^{3}
Psi lbf/sq. in	6.895×10^{3}	6.895×10^{-3}	7.031×10^{-2}	7.031×10^{-4}	1

Non SI units.

Viscosity (dynamic)	Pa s (N s/πm^2) (kg/(s m))	mPa s (mN s/m^2)	cP	kp s/m^2	kp h/m^2	lbm/(ft s)	lbm/(ft h)	lbf s/sq. ft
1 Pa s	1	1.0×10^{3}	1.0×10^{3}	1.020×10^{-1}	2.833×10^{-5}	6.720×10^{-1}	2.419×10^{3}	2.089×10^{-2}
mPa s	1.0×10^{-3}	1	1	1.020×10^{-4}	2.833×10^{-8}	6.720×10^{-4}	2.419	2.089×10^{-5}
cP	1.0×10^{-3}	1	1	1.020×10^{-4}	2.833×10^{-8}	6.720×10^{-4}	2.419	2.089×10^{-5}
kp s/m^2	9.807	9.807×10^{3}	9.807×10^{3}	1	2.778×10^{-4}	6.590	2.372×10^{4}	2.048×10^{-1}
kp h/m^2	3.530×10^{4}	3.530×10^{7}	3.530×10^{7}	3.60×10^{3}	1	2.372×10^{4}	8.540×10^{7}	7.373×10^{2}
lbm/(ft s)	1.488	1.488×10^{3}	1.488×10^{3}	1.518×10^{-1}	4.215×10^{-5}	1	3.60×10^{3}	3.103×10^{-2}
lbm/(ft h)	4.134×10^{-4}	4.134×10^{-1}	4.134×10^{-1}	4.215×10^{-5}	1.171×10^{-8}	2.778×10^{-4}	1	8.634×10^{-6}
lbf s/sq. ft	4.788×10^{1}	4.788×10^{4}	4.788×10^{4}	4.882	1.356×10^{-3}	3.217×10^{1}	1.158×10^{5}	1

Viscosity (kinematic)	m^2/s	mm^2/s	m^2/h	cSt	sq. ft/s	sq. ft/h
1 m^2/s	1	1.0×10^{6}	3.60×10^{3}	1.0×10^{6}	1.076×10^{1}	3.875×10^{4}
mm^2/s	1.0×10^{-6}	1	3.60×10^{-3}	1.0	1.076×10^{-5}	3.875×10^{-2}
m^2/h	2.778×10^{-4}	2.778×10^{2}	1	2.778×10^{2}	2.990×10^{-3}	1.076×10^{1}
cSt	1.0×10^{-6}	1.0	3.60×10^{-3}	1	1.076×10^{-5}	3.875×10^{-2}
sq. ft/s	9.290×10^{-2}	9.290×10^{4}	3.345×10^{2}	9.290×10^{4}	1	3.60×10^{3}
sq. ft/h	2.581×10^{-5}	2.581×10^{-1}	9.290×10^{-2}	2.581×10^{1}	2.778×10^{-4}	1

Surface tension	N/m (kg/s^2)	mN/m	kgf/m (kp/m)	dyn/cm
1 N/m	1	1.0×10^3	1.020×10^{-1}	1.0×10^3
mN/m	1.0×10^{-3}	1	1.020×10^{-4}	1.0
kp/m	9.807	9.807×10^3	1	9.807×10^3
dyn/cm	1.0×10^{-3}	1.0	1.020×10^{-4}	1

Energy	J (N m) (kg m^2/s^2)	kW h	kgf m kp m	Ps h	lbf ft	erg	HP h	kcal	BTU[a]
1 J	1	2.778×10^{-7}	1.020×10^{-1}	3.777×10^{-7}	7.376×10^{-1}	1.0×10^7	3.725×10^{-7}	2.388×10^{-4}	9.478×10^{-4}
kW h	3.60×10^6	1	3.671×10^5	1.360	2.655×10^6	3.60×10^{13}	1.341	8.598×10^2	3.412×10^3
kp m	9.807	2.724×10^{-6}	1	3.704×10^{-6}	7.233	9.807×10^7	3.653×10^{-6}	2.342×10^{-3}	9.295×10^{-3}
PS h	2.648×10^6	7.355×10^{-1}	2.70×10^5	1	1.953×10^6	2.648×10^{13}	9.863×10^{-1}	6.324×10^2	2.510×10^3
lbf ft	1.356	3.766×10^{-7}	1.363×10^{-1}	5.120×10^{-7}	1	1.356×10^7	5.051×10^{-7}	3.238×10^{-4}	1.285×10^{-3}
erg	1.0×10^{-7}	2.778×10^{-14}	1.020×10^{-8}	3.777×10^{-14}	7.375×10^{-8}	1	3.725×10^{-14}	2.388×10^{-11}	9.478×10^{-11}
HP h	2.685×10^6	7.457×10^{-1}	2.737×10^5	1.014	1.980×10^6	2.685×10^{13}	1	6.412×10^2	2.544×10^3
kcal	4.187×10^3	1.163×10^{-3}	4.269×10^2	1.581×10^{-3}	3.088×10^3	4.187×10^{10}	1.560×10^{-3}	1	3.968
BTU	1.055×10^3	2.931×10^{-4}	1.076×10^2	3.985×10^{-4}	7.782×10^2	1.055×10^{10}	3.930×10^{-4}	2.520×10^{-1}	1

[a] British thermal unit.

Heat	J (N m) (kg m^2/s^2)	kcal	BTU	CHU[a]
1 J	1	2.388×10^{-4}	9.478×10^{-4}	5.262×10^{-4}
kcal	4.187×10^3	1	3.968	2.203
BTU	1.055×10^3	2.520×10^{-1}	1	5.552×10^{-1}
CHU	1.900×10^3	4.539×10^{-1}	1.80	1
W h	3.60×10^3	8.598×10^{-1}	3.412	1.894

[a] Centigrade heat unit.

Power	W (J/s) (kg m^2/s^3)	kgf m/s kp m/s	PS HP (metr)	HP	erg/s	ft lbf/s	kcal/h	BTU/h
1 W	1	1.020×10^{-1}	1.360×10^{-3}	1.341×10^{-3}	1.0×10^7	7.376×10^{-1}	8.598×10^{-1}	3.412
kp m/s	9.807	1	1.333×10^{-2}	1.315×10^{-2}	9.807×10^7	7.233	8.432	3.346×10^1
PS	7.355×10^2	7.5×10^1	1	9.863×10^{-1}	7.355×10^9	5.425×10^2	6.324×10^2	2.510×10^3
HP	7.457×10^2	7.604×10^1	1.014	1	7.457×10^9	5.50×10^2	6.412×10^2	2.544×10^3
erg/s	1.0×10^{-7}	1.020×10^{-8}	1.360×10^{-10}	1.341×10^{-10}	1×10^{-8}	7.375	8.598×10^{-8}	3.412×10^{-7}
ft lbf/s	1.356	1.383×10^{-1}	1.843×10^{-3}	1.818×10^{-3}	1.356×10^7	1	1.166	4.626
kcal/h	1.163	1.186×10^{-1}	1.581×10^{-3}	1.560×10^{-3}	1.163×10^7	8.578×10^{-1}	1	3.968
BTU/h	2.931×10^{-1}	2.988×10^{-2}	3.985×10^{-4}	3.930×10^{-4}	2.931×10^6	2.162×10^{-1}	2.520×10^{-1}	1

Thermal conductivity	W/m K (kg m/(s^3 K))	kcal/(m h °C)	BTU/(ft h °F)	BTU/(in h °F)	BTU in/ (sq. ft h °F)
1 W/(m K)	1	8.598×10^{-1}	5.778×10^{-1}	4.815×10^{-2}	6.933
kcal/(m h °C)	1.163	1	6.720×10^{-1}	5.60×10^{-2}	8.064
BTU/(ft h °F)	1.731	1.488	1	8.333×10^{-2}	1.2×10^1
BTU/(in h °F)	2.077×10^1	1.786×10^1	1.2×10^1	1	1.44×10^2
BTU in/(sq. ft h °F)	1.442×10^{-1}	1.24×10^{-1}	8.333×10^{-2}	6.944×10^{-3}	1

Specific heat, heat capacity	J/kg K (m^2/(s^2 K))	kJ/(kg K)	kcal/(kg °C)	BTU/(lbm °F)
1 J/(kg K)	1	1.0×10^{-3}	2.389×10^{-4}	2.389×10^{-4}
kJ/(kg K)	1.0×10^3	1	2.389×10^{-1}	2.389×10^{-1}
kcal/(kg °C)	4.187×10^3	4.187	1	1.0
BTU/(lbm °F)	4.187×10^3	4.187	1.0	1
Wh/(kg K)	3.60×10^3	3.60	8.598×10^{-1}	0.8598

E. CONVERSION TABLE FOR SI vs. ENGLISH–AMERICAN UNITS

	SI to English–American unit	English–American unit to SI
Length		
	$1\,\mathrm{m} = 1.0936\,\mathrm{yd} = 3.28\,\mathrm{ft}$ $= 39.37\,\mathrm{in}$ $1\,\mathrm{mm} = 0.03937\,\mathrm{in}$	$1\,\mathrm{yd} = 3\,\mathrm{ft} = 0.9144\,\mathrm{m}$ $1\,\mathrm{ft} = 12\,\mathrm{in} = 0.3048\,\mathrm{m}$ $1\,\mathrm{in} = 25.4\,\mathrm{mm}$
Mass, weight		
	$1\,\mathrm{kg} = 2.2046\,\mathrm{lb}$	$1\,\mathrm{lb} = 0.45359\,\mathrm{kg}$
Force		
	$1\,\mathrm{N} = 1(\mathrm{kgm})/\mathrm{s}^2 = 2.248 \times 10^{-1}\,\mathrm{lbf}$	$1\,\mathrm{lbf} = 4.448\,\mathrm{N}$
Pressure		
	$1\,\mathrm{Pa} = 1\,\mathrm{N/m^2} = 1.450 \times 10^{-4}\,\mathrm{lbf/in^2}$ $= 2.953 \times 10^{-4}\,\mathrm{in\ Hg}$ $= 4.015 \times 10^{-3}\,\mathrm{in\ H_2O}$ $1\,\mathrm{bar} = 10^5\,\mathrm{Pa} = 1.450 \times 10^1\,\mathrm{lbf/in^2}$ $= 2.953 \times 10^1\,\mathrm{in\ Hg}$ $= 4.015 \times 10^2\,\mathrm{in\ H_2O}$	$1\,\mathrm{lbf/in^2} = 1\,\mathrm{psi} = 6.89475 \times 10^3\,\mathrm{Pa}$ $= 6.89475 \times 10^{-2}\,\mathrm{bar}$ $1\,\mathrm{in\ Hg} = 3.38638 \times 10^3\,\mathrm{Pa}$ $= 3.38638 \times 10^{-2}\,\mathrm{bar}$ $1\,\mathrm{in\ H_2O} = 2.49089 \times 10^2\,\mathrm{Pa}$ $= 2.49089 \times 10^{-3}\,\mathrm{bar}$
Tension, stress		
	$1\,\mathrm{N/mm^2} = 1.450 \times 10^2\,\mathrm{lbf/in^2}$	$1\,\mathrm{lbf/in^2} = 6.89475 \times 10^{-3}\,\mathrm{N/mm^2}$
Dynamic viscosity		
	$1\,\mathrm{Pa\,s} = (\mathrm{N\,s})/\mathrm{m^2} = 2.089 \times 10^{-2}\,(\mathrm{lbf\,s})/\mathrm{ft^2}$ $= 1\,\mathrm{kg/(m\,s)} = 6.72 \times 10^{-1}\,\mathrm{lbf/(ft\,s)}$	$1\,(\mathrm{lbf\,s})/\mathrm{ft^2} = 4.78802 \times 10^1\,\mathrm{Pa\,s}$ $1\,\mathrm{lb/(ft\,s)} = 1.488\,\mathrm{Pa\,s}$
Kinematic viscosity		
	$1\,\mathrm{m^2/s} = 1.076 \times 10^1\,\mathrm{ft^2/s}$	$1\,\mathrm{ft^2/s} = 9.29 \times 10^{-2}\,\mathrm{m^2/s}$
Energy, quantity of heat		
	$1\,\mathrm{J} = 1\,\mathrm{W\,s} = 1\,\mathrm{N\,m} = 7.376 \times 10^{-1}\,\mathrm{ft\,lbf}$ $1\,\mathrm{kJ} = 9.478 \times 10^{-1}\,\mathrm{BTU}$	$1\,\mathrm{ft\,lbf} = 1.35582\,\mathrm{J}$ $1\,\mathrm{BTU} = 1.05506\,\mathrm{kJ}$
Power, heat flow rate		
	$1\,\mathrm{W} = 1\,\mathrm{Nm/s} = 7.367 \times 10^{-1}\,(\mathrm{ft\,lbf})/\mathrm{s}$ $= 1\,\mathrm{J/s} = 4.425 \times 10^1\,(\mathrm{ft\,lbf})/\mathrm{min}$ $= 3.412\,\mathrm{BTU/h}$	$1\,(\mathrm{ft\,lbf})/\mathrm{s} = 1.35582\,\mathrm{W}$ $1\,(\mathrm{ft\,lbf})/\mathrm{min} = 2.25969 \times 10^{-2}\,\mathrm{W}$ $1\,\mathrm{BTU/h} = 2.93072 \times 10^{-1}\,\mathrm{W}$
Specific heat capacity		
	$1\,\mathrm{J/(kg\,K)} = 2.388 \times 10^{-4}\,\mathrm{BTU/(lb/°F)}$ $1\,\mathrm{J/(m^3\,K)} = 1.491 \times 10^{-5}\,\mathrm{BTU/(ft^3\,°F)}$	$1\,\mathrm{BTU/(lb\,°F)} = 4.1868 \times 10^3\,\mathrm{J/(kg\,K)}$ $1\,\mathrm{BTU/(ft^3\,°F)} = 6.71 \times 10^4\,\mathrm{J/(m^3\,K)}$
Thermal conductivity		
	$1\,\mathrm{W/(m\,K)} = 6.933\,(\mathrm{BTU\,in})/(\mathrm{ft^2\,h\,°F})$ $= 5.778 \times 10^{-1}\,\mathrm{BTU/(ft\,h\,°F)}$ $= 4.815 \times 10^{-2}\,\mathrm{BTU/(in\,h\,°F)}$	$1\,(\mathrm{BTU\,in})/(\mathrm{ft^2\,h\,°F}) = 1.442 \times 10^{-1}\,\mathrm{W/(m\,K)}$ $1\,\mathrm{BTU/(ft\,h\,°F)} = 1.7307\,\mathrm{W/(m\,K)}$ $1\,\mathrm{BTU/(in\,h\,°F)} = 2.07689 \times 10^1\,\mathrm{W/(m\,K)}$

	SI to English–American unit	English–American unit to SI
Heat flux density		
	$1\,\mathrm{W/m^2} = 3.17 \times 10^{-1}\,\mathrm{BTU/(ft^2\,h)}$	$1\,\mathrm{BTU/(ft^2\,h)} = 3.1546\,\mathrm{W/m^2}$
	$= 2.201 \times 10^{-3}\,\mathrm{BTU/(in^2\,h)}$	$1\,\mathrm{BTU/(in^2\,h)} = 4.54263 \times 10^{2}\,\mathrm{W/m^2}$
Heat transfer coefficient		
	$1\,\mathrm{W/(m^2\,K)} = 1.761 \times 10^{-1}\,\mathrm{BTU/(ft^2\,h\,^\circ F)}$	$1\,\mathrm{BTU/(ft^2\,h\,^\circ F)} = 5.678\,\mathrm{W/(m^2\,K)}$
Thermal resistance		
	$1\,(\mathrm{m^2\,K})/\mathrm{W} = 5.678\,(\mathrm{ft^2\,h\,^\circ F})/\mathrm{BTU}$	$1\,(\mathrm{ft^2\,h\,^\circ F})/\mathrm{BTU} = 1.761 \times 10^{-1}\,(\mathrm{m^2/K})/\mathrm{W}$
Temperature		
	$1\,\mathrm{K} = 1\,^\circ\mathrm{C} = 1.8\,^\circ\mathrm{F}$	$1\,^\circ\mathrm{F} = 5.55\bar{5} \times 10^{-1}\,\mathrm{K} = 5.55\bar{5} \times 10^{-1}\,^\circ\mathrm{C}$
	Conversion:	
	$T_\mathrm{C} = \frac{5}{9}(T_\mathrm{F} - 32)$	$T_\mathrm{F} = \frac{9}{5}T_\mathrm{C} + 32$
	$T_\mathrm{K} = \frac{5}{9}T_\mathrm{F} + 255.372$	$T_\mathrm{F} = \frac{9}{5}(T_\mathrm{K} - 255.372)$

T_C – Temperature in celsius (°C); T_F – Temperature in fahrenheit (°F); T_K – Temperature in kelvin (K).

SECTION II

POLYMERIZATION AND DEPOLYMERIZATION

Decomposition Rates of Organic Free Radical Initiators

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A. INTRODUCTION

The decomposition of most organic free radical initiators follows first order kinetics. With certain peroxides, however, higher order decompositions are observed. Generally, the higher order reaction is caused by a reaction of radicals with the initiator (induced decomposition). The value of the rate for unimolecular decomposition may be determined either by extrapolation of the rate back to zero initiator concentration or by use of a monomer or other radical "trap". Some of the peroxides may also decompose by non-radical routes. Acids, bases, and polar solvents favor ionic intermediates. Koenig (296) presents an excellent discussion of azo and peroxide decomposition pathways.

Decomposition rate (k_d) data in these tables are reported for first order kinetics:

$$dL/dt = k_d L$$

where I is the initiator concentration (mol/l) and t is the time (s). The decomposition rate constant k_d is related to half-life ($t_{1/2}$) by the following equation:

$$t_{1/2} = 0.693/k_d$$

Fig. 1 relates k_d in s^{-1} to half-life for the range of k_d found in the tables.

For some of the initiators listed, the enthalpy (ΔH^*) is given (Note h) rather than the Arrhenius activation energy (E_a). The two quantities are related by the equation $E_a = \Delta H^* + RT$, where R is the gas constant (in kJ/mol-deg.) and T is the absolute temperature (94). Assuming that k_d is linear with respect to $1/T$ and that the activation energy, E_a, and the decomposition rate constant, k_d, for one temperature are known, k_d for any temperature can be calculated from the following expression:

$$\log k_2 = \log k_1 - \frac{E_a(T_2 - T_1)}{2.303R(T_2T_1)}$$

Where given by the author, the overall equation for k_d in terms of the frequency factor (A) and activation energy (E_a) has been included. Thus for any temperature (converted to K) the k_d may be calculated:

$$k_d = A\exp(-E_a/RT)$$

Although a wide range of initiators is reported in the tables, the author admits that the compilation is far from complete. There are several purposeful omissions: (a) azo compounds, where the azo group is part of a ring structure – these recombine almost exclusively; (b) compounds that decompose at appreciable rates only above 200 degrees. Neither class would be expected to be useful initiators. The data have been arranged into seven tables. Within each table the individual initiators are listed according to the following criteria:

1. Initiators:
   (a) according to increasing number of carbon atoms;
   (b) alphabetically (neglecting trivial prefixes), for compounds containing equal number of carbons;
   (c) miscellaneous initiators are listed alphabetically in Table 7.
2. For each initiator, solvents are listed alphabetically.
3. For a given solvent, all measurements reported by one investigator are listed in a series, with the activation energy listed opposite the lowest temperature.

Abbreviations: DMSO – dimethyl sulfoxide; DMAC – dimethylacetamide; DMF – dimethylformamide; THF – tetrahydrofuran; DCB – 1,2-dichlorobenzene.

Figure 1. Relationship of half life to rate constant (k_d) (half lives are to the right of each vertical line)

B. TABLES OF DECOMPOSITION RATES OF ORGANIC FREE RADICAL INITIATORS

TABLE 1. AZONITRILES

Number of C atoms	Initiator	Solvent	T (°C)	k_d (s^{-1})	E_a (kJ/mol)	Notes	Refs.
5	*N*-Acetyl *N'*-α-cyanoethyl diimide	Toluene	60.8	2.46×10^{-5}	110.2		322
			68.6	5.45×10^{-5}			322
			82.0	2.49×10^{-4}			322
	2-Cyano-2-propyl-azo-formamide	Chlorobenzene	100	1.5×10^{-5}			93
		Toluene	100	2.1×10^{-5}	144.3		93
			110	6.8×10^{-5}			93
			104	1.9×10^{-5}		a	339
		Xylene	100	2.1×10^{-5}	144.3		93
			120	2.4×10^{-4}			93
	2-(Carbamoylazo)isobutyronitrile	Toluene	104	1.93×10^{-5}		a	340
8	*N*-Acetyl *N'*-α-cyanocyclopentyl-diimide	Toluene	65.7	1.82×10^{-5}	120.3		322
			76.8	7.29×10^{-5}			322
			91.5	3.65×10^{-4}			322
	2,2'-Azo-bis-isobutyronitrile (2,2'-azo-bis-2-methylpropionitrile)	Acetic acid	79.9	1.43×10^{-4}			146
			79.9	1.48×10^{-4}		v_2	146
			79.9	1.62×10^{-4}		v_3	146
			80	1.52×10^{-4}		a	62
			82	1.50×10^{-4}		a	2
			82	1.49×10^{-4}		a	175
		Acetonitrile	79.9	1.25×10^{-4}			146
			79.9	1.24×10^{-4}		v_2	146
		tert-Amyl alcohol	80.2	1.40×10^{-4}			61
		Aniline	80.2	1.68×10^{-4}			61
		Benzene	40.0	5.44×10^{-7}	128.4	a,t_2	69
			45.2	1.12×10^{-6}		a,t_2	69
			50.0	2.64×10^{-6}		a,t_2	69
			55.0	5.19×10^{-6}		a,t_2	69
			60.5	1.16×10^{-5}		a,t_2	69
			69.5	3.78×10^{-5}		a,t_2	69

TABLE 1. *cont'd*

Number of C atoms	Initiator	Solvent	T (°C)	k_d (s^{-1})	E_a (kJ/mol)	Notes	Refs.
8 (*cont'd*)	2,2'-Azo-bis-isobutyronitrile	Benzene	40	4.83×10^{-7}	123.4		66
			50	2.085×10^{-6}			66
			60	8.45×10^{-6}			66
			70	3.166×10^{-5}			66
			78	8.023×10^{-5}			66
		Benzene or Toluene	37	2.83×10^{-7}	128.9		39
			43	7.35×10^{-7}			39
			50	2.16×10^{-6}			39
			60	9.15×10^{-6}			19
			100	1.52×10^{-3}			39
			T (K)	1.58×10^{15}	$\exp[-128.9/RT]$		39
		n-Butanol	82	1.54×10^{-4}		a	175
			82	1.55×10^{-4}		a	2
		Isobutanol	82	1.66×10^{-4}		a	2,175
			80.2	$(1.67-1.76) \times 10^{-4}$			61
		Di-*n*-butyl phthalate	80	2.64×10^{-4}	122.2	y_4	236
			90	6.47×10^{-4}		y_4	236
			100	1.78×10^{-3}		y_4	236
			110	4.88×10^{-3}		y_4	236
			120	1.43×10^{-2}		y_4	236
			127	2.48×10^{-2}		y_{16}	236
			137	5.43×10^{-2}		y_{16}	236
			145	1.24×10^{-1}		y_{32}	236
			80	2.22×10^{-4}			375
			90	4.23×10^{-4}			375
			100	1.99×10^{-3}			375
			110	5.3×10^{-3}			375
			120	1.48×10^{-2}			375
		Carbon tetrachloride	40	2.15×10^{-7}	128.4	a,t_2	69
			60	4.00×10^{-6}		a,t_2	69
			77	1.21×10^{-4}		a	62
		Chlorobenzene	64	1.93×10^{-5}			344
			82	1.93×10^{-4}			344
			101	1.93×10^{-3}			344
			T (K)	2.89×10^{15}	$\exp[-130.23/RT]$		344
		Cyclohexanone	82	1.43×10^{-4}		a	2,175
		Dichloroethane	70	2.01×10^{-5}			293
				1.64×10^{-5}		m_8	293
		Dichloroethane: propionitrile (1 : 1)	70	1.94×10^{-5}			293
		Diethylene glycol monobutylether	66.82	2.442×10^{-5}			26
		DMF	71.2	6.2096×10^{-5}			294
		DMF	60	6.45×10^{-4}			355
		DMF/methyl methacrylate (9/1)	60	5.55×10^{-4}			355
		(8/2)	60	5.10×10^{-4}			355
		(7/3)	60	5.10×10^{-4}			355
		(6/4)	60	5.30×10^{-4}			355
		(5/5)	60	5.65×10^{-4}			355
		(4/6)	60	5.35×10^{-4}			355
		(3/7)	60	5.65×10^{-4}			355
		(2/8)	60	6.25×10^{-4}			355
		(1/9)	60	6.50×10^{-4}			355
		N,N-Dimethylaniline	66.82	3.483×10^{-5}			26
			72.27	6.914×10^{-5}			26
			80	1.83×10^{-4}		a	62
		Dioxane/Water (80/20) pH 7.0	65.3	2.53×10^{-5}	141.0		186
			70.0	3.20×10^{-5}			186
			75.0	8.5×10^{-5}			186
			80.0	1.62×10^{-4}			186
		Dioxane/Water (80/20) pH 10.7	75.0	1.72×10^{-4}			186
		Dodecanethiol	80	1.46×10^{-4}		a	62

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TABLE 1. *cont'd*

Number of C atoms	Initiator	Solvent	T (°C)	k_d (s^{-1})	E_a (kJ/mol)	Notes	Refs.
8 (*cont'd*)	2,2′-Azo-bis-isobutyronitrile	Ethyl acetate	40	4.7×10^{-7}	128.5	a,t_2	69
			60	9.36×10^{-6}		a,t_2	69
		Ethyl acetate/ $SnCl_4$ (1 : 1)	T (K)	8.56×10^{15}	exp[− 127.4/RT]		290
		Glycerol/DMF 95/5, (v/v)	71.2	2.6054×10^{-5}			294
		Maleimide (solid state)	65	4.97×10^{-5}		a	185
			72	2.07×10^{-4}		a	185
		Methyl methacrylate	50	9.7×10^{-7}		a	289
			50	7.5×10^{-6}		a,v_{20}	289
			60	7.20×10^{-4}			355
			70	3.1×10^{-5}			216
			70	1.27×10^{-4}		v_4	216
		Nitrobenzene	80	1.98×10^{-4}	132.2	a	226
			100	2.24×10^{-3}		a	226
		1-Nitrobutane	82	1.45×10^{-4}		a	2,175
		Propionitrile/$SnCl_4$ (1 : 1)	T (K)	9.10×10^{15}	exp[− 127.0/RT]		290
		Propylene carbonate	72.27	5.821×10^{-5}			26
		Styrene	50	2.97×10^{-6}	127.6	a	132
			70	4.72×10^{-5}		a	132
			T (K)	1.29×10^{15}	exp[− 127.6/RT]		132
			68.4	3.8×10^{-5}			234
		Toluene	60.00	9.03×10^{-6}		c,m_3	291
			60	9.8×10^{-6}			290
			65	1.9×10^{-5}		a	339
			70	4.0×10^{-5}	121.3		47
			80.4	1.55×10^{-4}			47
			90.0	4.86×10^{-4}			47
			100.0	1.60×10^{-3}			47
			105.0	2.61×10^{-3}			47
			69.8	3.8×10^{-5}	142.3		61
			80.2	$(1.72–1.60) \times 10^{-4}$			61
			80.3	1.30×10^{-4}		m_2	234
		Toluene/$SnCl_4$ (1 : 1)	60	4.0×10^{-5}			290
		Xylene	50	2.0×10^{-6}		a	175
			77	9.46×10^{-5}		a	175
			82	1.44×10^{-4}		a	175
			80	1.53×10^{-4}	131.0	a	62
			80	1.50×10^{-4}		a,t_4	62
			82	1.45×10^{-5}		a	2
		o-Xylene	85	2.751×10^{-4}	131.8		332
			95	9.581×10^{-4}			332
			105	2.782×10^{-3}			332
			T (K)	3.16×10^{15}	exp[− 131.8/RT]		332
		Water	50	1.56×10^{-6}			285
	3,6-Dicyano-3,6-dimethyl-1,2-diazacyclohexene-1	Dichloromethane	− 6.06	4.60×10^{-4}	88.8	h	252
			0.03	1.14×10^{-3}			252
			2.52	1.64×10^{-3}			252
	2,2′-Azo-bis[2-(hydroxymethyl)-propionitrile	Methyl cellosolve	77	1.93×10^{-5}		a	339
9	*N*-Acetyl *N*′-α-cyanocyclohexyl-diimide	Toluene	82.0	5.21×10^{-5}	114.8		322
			92.8	1.70×10^{-4}			322
			100.6	3.74×10^{-4}			322
10	*N*-Acetyl *N*′-α-cyanocycloheptyl-diimide	Toluene	59.4	4.44×10^{-5}	112.0		322
			66.1	9.82×10^{-5}			322
			79.6	4.51×10^{-4}			322
	4,4′-Azo-bis-(4-cyanopentanol)	Acetone	70	4.26×10^{-5}		m_7	305
	4,4′-Azo-bis-(4-cyanovaleric acid)	Acetone	70	4.58×10^{-5}		m_7	305
	1,1′-Azo-bis-1-cyclobutanenitrile	Mesitylene	130.4	5.20×10^{-5}	134.3		101
			141.6	1.60×10^{-4}			101
		Xylene	120.4	2.05×10^{-5}			101
	2,2′-Azo-bis-2-methylbutyronitrile	Toluene	69.8	2.3×10^{-5}	129.7		61
			80.2	$8.4–9.0 \times 10^{-5}$			61
		Xylene	80	9.97×10^{-5}	123.0	a	62

TABLE 1. *cont'd*

Number of C atoms	Initiator	Solvent	T (°C)	k_d (s^{-1})	E_a (kJ/mol)	Notes	Refs.
10 (*cont'd*)	2,2′-Azo-bis-2-ethylpropionitrile	Nitrobenzene	80	8.3×10^{-5}	143.1	a	226
			100	1.08×10^{-3}		a	226
	2,2′-Azo-bis-2-methylbutyronitrile	Cyclohexanone	79.9	1.06×10^{-4}	131.6	h	336
			90.0	3.71×10^{-4}			336
			100.1	1.27×10^{-3}			336
		Chlorobenzene	66	1.93×10^{-5}			344
			84	1.93×10^{-4}			344
			104	1.93×10^{-3}			344
			T (K)	1.38×10^{15}	$\exp[-129.93/RT]$		344
		Ethanol	80.0	1.05×10^{-4}	119.8	h	336
			90.0	3.23×10^{-4}			336
			100.0	9.87×10^{-4}			336
		Ethylbenzene	80.0	8.22×10^{-5}	134.9	h	336
			90.0	2.94×10^{-4}			336
			100.0	1.02×10^{-3}			336
		Toluene	67	1.9×10^{-5}		a	339
	N-benzoyl *N*′-α-cyanoethyldiimide	Toluene	69.2	1.31×10^{-5}	127.9		322
			83.2	7.96×10^{-5}			322
			90.0	1.744×10^{-4}			322
	4-Bromophenyl-azo-2-methyl-2-propionitrile	DCB	160	2.85×10^{-5}			329
	4-Bromophenyl-azo-(methyl-propanedinitrile)	DCB	80	2.4×10^{-5}	145.0		329
			85	4.8×10^{-5}			329
			90	9.4×10^{-5}			329
			T (K)	7.23×10^{16}	$\exp[-145.0/RT]$		329
	4-Nitrophenyl-azo-2-methyl-2-propionitrile	DCB	160	2.3×10^{-5}			329
	4-Nitrophenyl-azo-2-(methyl-propanedinitrile)	DCB	80	3.1×10^{-5}	139.1		329
			85	6.0×10^{-5}			329
			90	1.14×10^{-4}			329
			T (K)	1.35×10^{16}	$\exp[-139.1/RT]$		329
	Phenyl-azo-2-methyl-2-propionitrile	DCB	160	5.65×10^{-5}			329
		DMF	160	6.9×10^{-5}			329
		1,2,4-Trimethylbenzene	160	5.35×10^{-5}			329
	Phenyl-azo-2-(methyl-propanedinitrile)	DCB	80	4.45×10^{-5}	123.2		329
			85	8.0×10^{-5}			329
			90	1.42×10^{-4}			329
			T (K)	8.48×10^{13}	$\exp[-123.2/RT]$		329
	Phenyl-azo-2-(methyl-propanedinitrile)	DCB	80	2.4×10^{-5}	145.0		329
			85	4.8×10^{-5}			329
			90	9.4×10^{-5}			329
			T (K)	7.23×10^{16}	$\exp[-145.0/RT]$		329
11	4-Bromophenyl-azo-2-(ethyl-propanedinitrile)	DCB	80	1.85×10^{-5}	142.9		329
			85	3.65×10^{-5}			329
			90	7.05×10^{-5}			329
			T (K)	3.00×10^{16}	$\exp[-142.9/RT]$		329
	4-Methoxyphenylazo-2-(methylpropanedinitrile)	Butanol	85	2.9×10^{-4}	110		331
		Chlorobenzene	85	9.5×10^{-5}	71		331
		DCB	85	8.35×10^{-5}	115		331
		Decane	85	3.8×10^{-5}	142		331
		DMSO	85	4.87×10^{-4}	114		331
		Heptane	85	5.15×10^{-5}	136		331
		Hexanol	85	1.6×10^{-4}	102		331
		Octane	85	4.4×10^{-5}	140		331
		Octanol	85	1.5×10^{-4}	112		331
		Propanol	85	3.1×10^{-4}	103		331
		Toluene	85	6.75×10^{-5}	137		331
	4-Methoxyphenyl-azo-2-(methylpropanedinitrile)	Chlorobenzene	78.1	5.76×10^{-5}	71.5		330
			85.3	9.52×10^{-5}			330
			90.2	1.307×10^{-4}			330
		DCB	75.0	2.73×10^{-5}	116		330
			85.1	8.35×10^{-5}			330
			95.1	2.236×10^{-4}			330
			104.9	6.397×10^{-4}			330

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TABLE 1. *cont'd*

Number of C atoms	Initiator	Solvent	T (°C)	k_d (s^{-1})	E_a (kJ/mol)	Notes	Refs.
11 (*cont'd*)	4-Methoxyphenyl-azo-2-(methylpropanedinitrile)	DCB	T (K)	5.67×10^{12}	exp[− 116/RT]		330
			80	4.7×10^{-5}	114.8		329
			85	8.1×10^{-5}			329
			90	1.38×10^{-4}			329
			T (K)	2.94×10^{12}	exp[− 114.8/RT]		329
	Phenyl-azo-2-(2-methyl-butyronitrile)	DCB	160	5.0×10^{-5}			329
		DMF	160	5.2×10^{-5}			329
		1,2,4-Trimethylbenzene	160	5.05×10^{-5}			329
	4-Tolyl-azo-2-(methyl-propanedinitrile)	DCB	80	4.5×10^{-5}	117.7		329
			85	7.9×10^{-5}			329
			90	1.365×10^{-5}			329
			T (K)	1.21×10^{13}	exp[− 117.7/RT]		329
12	4,4′-Azo-bis-(1-bromo-4-cyanopentane)	Toluene	T (K)	1.0×10^{11}	exp[− 104.7/RT]		307
	4,4′-Azo-bis-4-cyano-pentanoic acid	Water	69	1.9×10^{-5}		a	339
			80	8.97×10^{-5}	142.3	a	62
	4,4′-Azo-bis-(4-cyanopentanol)	Di-*n*-butyl phthalate	80	2.55×10^{-4}			375
			90	7.99×10^{-4}			375
			100	2.81×10^{-3}			375
			110	8.99×10^{-3}			375
			120	2.6×10^{-2}			375
			130	5.2×10^{-2}			375
	1,1′-Azo-bis-1-cyclo-pentanenitrile	Toluene	80.3	7.45×10^{-5}	141.4		101
			89.2	2.43×10^{-4}			101
			95.1	5.18×10^{-4}			101
	2,2′-Azo-bis-2-cyclopropyl-propionitrile (mp 64–65)	Toluene	44.2	3.50×10^{-5}	117.2	w	57
			49.5	7.53×10^{-5}		w	57
			59.2	2.68×10^{-4}		w	57
	2,2′-Azo-bis-2-cyclopropyl-propionitrile (mp 76–77)	Toluene	44.2	3.90×10^{-5}	108.8	w	57
			49.5	8.17×10^{-5}		w	57
			59.3	2.46×10^{-4}		w	57
	2,2′-Azo-bis-2,3-dimethylbutyronitrile	Toluene	69.8	2.6×10^{-5}	133.9		61
			80.2	1.02×10^{-4}			61
	2,2′-Azo-bis-2-methyl-valeronitrile	Toluene	69.8	4.2×10^{-5}	138.1		61
			80.2	$(1.65–1.74) \times 10^{-4}$			61
	4-Bromophenyl-azo-2-(isopropylpropanedinitrile)	DCB	80	1.4×10^{-5}	142.0		329
			85	2.80×10^{-5}			329
			90	5.4×10^{-5}			329
			T (K)	1.73×10^{16}	exp[− 142.0/RT]		329
	2,6-Dimethylphenyl-azo-2-methylpropanedinitrile	DCB	60.1	3.06×10^{-5}	130.5		330
			70.0	1.177×10^{-4}			330
			80.6	4.594×10^{-4}			330
			84.5	7.320×10^{-4}			330
			T (K)	2.06×10^{17}	exp[− 130.5/RT]		330
13	*N*-Benzoyl *N*′-α-cyanocyclo-pentyl diimide	Toluene	76.7	1.62×10^{-5}	131.9		322
			82.0	3.17×10^{-5}			322
			98.4	2.252×10^{-4}			322
	4-Bromophenyl-azo-isobutylpropanedinitrile	DCB	80	1.12×10^{-4}	141.6		329
			85	2.21×10^{-4}			329
			90	4.26×10^{-4}			329
			T (K)	1.19×10^{17}	exp[− 141.6 kJ/RT]		329
	4-Bromophenyl-azo-2-(2-*tert*-butylpropionitrile)	DCB	160	4.85×10^{-5}			329
	4-Nitrophenyl-azo-2-(2-*tert*-butylpropionitrile)	DCB	160	1.8×10^{-5}			329
	Phenyl-azo-2-(2-*tert*-butyl-propionitrile)	DCB	160	9.35×10^{-5}			329
		1,2,4-Trimethylbenzene	160	9.65×10^{-5}			329
		Hexamethyl-phosphoramide	160	9.5×10^{-5}			329
14	2,2′-Azo-bis-2-cyclobutyl-propionitrile (mp 38–42)	Toluene	80.5	1.51×10^{-4}		w	104
	2,2′-Azo-bis-2-cyclobutyl-propionitrile (mp 81.5–82.5)	Toluene	80.5	1.51×10^{-4}		w	104

TABLE 1. *cont'd*

Number of C atoms	Initiator	Solvent	T (°C)	k_d (s^{-1})	E_a (kJ/mol)	Notes	Refs.
14 (*cont'd*)	1,1′-Azo-bis-1-cyclohexane nitrile	Chlorobenzene	79.97	8.42×10^{-6}	140.2		179
			100.12	1.107×10^{-4}			179
		DMSO	80	1.01×10^{-5}	135.6	h	135
			85	2.01×10^{-5}			135
			90	3.89×10^{-5}			135
			95	6.83×10^{-5}			135
		Nitrobenzene	100	1.14×10^{-4}			226
		Toluene	80.3	6.5×10^{-6}	121.3		101
			95.2	5.44×10^{-5}			101
			102.4	1.26×10^{-4}			101
			88	1.9×10^{-5}		a	339
		Xylene	77	5.31×10^{-6}		a	175
	2,2′-Azo-bis-2,4-dimethyl-valeronitrile	Toluene	51	1.9×10^{-5}	121	a	343
			68	1.9×10^{-4}		a	343
			T (K)	6.98×10^{14}	exp[− 121/RT]		343
		Xylene	77	5.77×10^{-4}		a	175
	Dimethyl-4,4′-azo-bis-cyano-pentanoate (meso)	DMAC	77.9	1.43×10^{-4}	133.9	a	205
			85.0	3.76×10^{-4}		a	205
			90.2	6.80×10^{-4}		a	205
			99.7	2.05×10^{-3}		a	205
	(n_{D+})		77.6	1.46×10^{-4}	133.5	a	205
			85.9	4.03×10^{-4}		a	205
			90.0	6.90×10^{-4}		a	205
			99.2	2.04×10^{-3}		a	205
	(n_{D-})		77.9	1.49×10^{-4}	133.5	a	205
			85.4	3.90×10^{-4}		a	205
			90.2	6.95×10^{-4}		a	205
			99.0	1.97×10^{-3}		a	205
	4,4′-Azo-bis-4-cyano-l-methyl-piperidine	DMSO	80	9.7×10^{-6}	136.4	h	135
			85	1.75×10^{-5}			135
			90	3.64×10^{-5}			135
			95	6.47×10^{-5}			135
	2,2′-Azo-bis-2-propylbutyronitrile	Nitrobenzene	80	2.55×10^{-4}	128.9	a	226
			100	2.72×10^{-5}		a	226
	2,2′-Azo-bis-2,3,3-trimethylbutyro-nitrile (mp 114–116)	Toluene	79.9	7.42×10^{-5}	146.4	w	57
			89.0	2.59×10^{-4}		w	57
	2,2′-Azo-bis-2,3,3-trimethylbutyro-nitrile (mp 116–118)	Toluene	79.9	1.05×10^{-4}	125.5	w	57
			88.9	3.09×10^{-4}		w	57
	2,2′-Azo-bis-2-methylhexylnitrile	Toluene	80.2	1.58×10^{-4}			61
	2,2′-Azo-bis-2,4-dimethylvaleronitrile	Toluene	69.8	1.98×10^{-4}	121.3		61
			80.2	7.1×10^{-4}			61
	2,2′-Azo-bis-2,4-dimethylvaleronitrile (mp 56–57)	Toluene	59.7	8.05×10^{-5}	121.3	w	57
			69.9	2.89×10^{-4}		w	57
	2,2′-Azo-bis-2,4-dimethylvaleronitrile (mp 74–76)	Toluene	69.8	1.98×10^{-4}	121.3	w	57
			80.2	7.1×10^{-4}		w	57
	2,2′-Azo-bis-2-isopropylbutyronitrile	Toluene	80.5	1.01×10^{-4}			50
	N-(4-Chlorobenzoyl) *N*′-α-cyanocyclohexyl diimide	Toluene	79.1	8.6×10^{-6}	132.7		322
			86.4	2.01×10^{-5}			322
			99.7	1.044×10^{-4}			322
	N-(l-Cyanocyclohexyl)-pentamethyleneketenimine	Chlorobenzene	100	3.85×10^{-5}		p,z (l)	299
			100	2.07×10^{-5}		p,z (3950)	299
		Cumene	100	3.93×10^{-5}		p,z (1)	299
			100	1.42×10^{-5}		p,z (3950)	299
		Toluene	100	3.10×10^{-5}		p,z (1)	299
			100	1.83×10^{-5}		p,z (3950)	299
		tert-Butylbenzene	100	2.39×10^{-5}		p,z (l)	299
			100	1.22×10^{-5}		p,z (3950)	299
	2-Phenyl-azo-2,4-dimethyl-4-methoxyvaleronitrile	Xylene	122	1.9×10^{-5}			339
15	*N*-Benzoyl *N*′-α-cyanocyclo-heptyl diimide	Toluene	74.6	6.43×10^{-5}	122.8		322
			82.8	1.781×10^{-4}			322
			89.2	3.519×10^{-4}			322

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TABLE 1. *cont'd*

Number of C atoms	Initiator	Solvent	T (°C)	k_d (s^{-1})	E_a (kJ/mol)	Notes	Refs.
15 (*cont'd*)	*N*-(4-Methoxybenzoyl) *N'*-α-cyanocyclohexyldiimide	Toluene	80.8	7.1×10^{-6}	142.8		322
			87.9	1.71×10^{-5}			322
			101.2	9.73×10^{-5}			322
	N-(4-Methylbenzoyl) *N'*-α-cyanocyclohexyl diimide	Toluene	81.4	1.06×10^{-5}	134.1		322
			87.3	2.20×10^{-5}			322
			101.9	1.255×10^{-4}			322
	N-Phenylacetyl *N'*-α-cyano-cyclohexyl diimide	Toluene	74.3	3.08×10^{-5}	133.9		322
			82.9	9.76×10^{-5}			322
			91.2	2.77×10^{-4}			322
	4-Cyano-1-methylpiperidine-4,4'-azo-4'-cyano-1,1'-dimethylpiperidinium nitrate	DMSO	80	1.76×10^{-5}	132.6	h	135
			85	3.31×10^{-5}			135
			90	6.23×10^{-5}			135
			95	1.156×10^{-4}			135
16	4,4'-Azo-bis-4-cyano-1,1'-dimethyl-piperidinium nitrate	DMSO	80	2.84×10^{-5}	124.7	h	135
			85	5.11×10^{-5}			135
			90	9.87×10^{-5}			135
			95	1.626×10^{-4}			135
	4,4'-Azo-bis(4-cyanopentanoyl)bis-2-aminoethanol	DMF	65	1.76×10^{-5}			357
			69	2.85×10^{-5}			357
			74	4.66×10^{-5}			357
		DMAC	65	1.73×10^{-5}			357
			69	2.73×10^{-5}			357
			74	4.53×10^{-5}			357
	1,1'-Azo-bis-1-cycloheptane-nitrile	Acetic acid	69.5	3.28×10^{-4}			101
		Toluene	48.9	2.69×10^{-5}	115.1		101
			58.9	9.72×10^{-5}			101
			67.3	2.69×10^{-4}			101
	2,2'-Azo-bis-(4-methoxy-2,4-dimethylvaleronitrile)	Toluene	30	1.9×10^{-5}		a	343
			47	1.9×10^{-4}		a	343
			T (K)	1.03×10^{15}	$\exp[-115/RT]$		343
	2,2'-Azo-bis-2-methylheptylonitrile	Toluene	80.0	1.63×10^{-4}			50
		Xylene	80.0	1.78×10^{-4}	126.4	a	62
	1,1'-Azo-bis-1-(2-methylcyclohexane)-nitrile	Toluene	80.2	7.43×10^{-6}			101
	1,1'-Azo-bis-1-cyclohexane-carbonitrile	Xylene	80	4.7×10^{-6}	166.9	a	62
	2,2'-Azo-bis-cyclopentylpropio-nitrile (mp 72.2–74.5)	Toluene	80.5	1.31×10^{-4}		w	104
	2,2'-Azo-bis-2-cyclopentyl-propionitrile (mp 96.3–97.6)	Toluene	80.5	1.30×10^{-4}		w	104
	2,2'-Azo-bis-2,4,4-trimethyl-valeronitrile (mp 67.5–69)	Toluene	40	1.175×10^{-4}	113.5	w	50
			50	4.45×10^{-4}		w	50
	2,2'-Azo-bis-2,4,4-trimethylvalero-nitrile (mp 94.5–95.5)	Toluene	40	6.95×10^{-5}	121.3	w	50
			50	2.89×10^{-4}		w	50
	2,2'-Azo-bis-2-isopropyl-3-methyl-butyronitrile	Toluene	80.5	$(1.325 \pm 0.35) \times 10^{-4}$			50
18	1,1'-Azo-bis-1-cyano-4,4' -dimethyl cyclohexane	DMSO	80	1.51×10^{-5}	132.2	h	135
			85	2.79×10^{-5}			135
			90	5.40×10^{-5}			135
			95	9.77×10^{-5}			135
	2,2'-Azo-bis-2-cyclohexyl-propionitrile	Toluene	80.3	8.3×10^{-6}			61
			80.5	2.27×10^{-4}			104
	1,1'-Azo-bis-1-cyclooctanenitrile	Toluene	36.6	5.35×10^{-5}	108.4		101
			45.4	1.45×10^{-4}			101
			49.7	2.60×10^{-4}			101
20	4,4'-Azo-bis(4-cyanopentanoyl)bis-2-(2-aminoethoxy)ethanol	DMF	65	1.77×10^{-5}			357
			69	2.90×10^{-5}			357
			74	4.90×10^{-5}			357
		DMAC	65	1.74×10^{-5}			357
			69	2.83×10^{-5}			357
			74	4.65×10^{-5}			357
	2,2'-Azo-bis-2-benzylpropionitrile	Toluene	80	1.16×10^{-4}			54

TABLE 1. *cont'd*

Number of C atoms	Initiator	Solvent	T (°C)	k_d (s^{-1})	E_a (kJ/mol)	Notes	Refs.
20 (*cont'd*)	2,2′-Azo-bis-2-isobutyl-4-methyl-valeronitrile	Toluene	60.1	3.78×10^{-4}			50
			80.5	5.28×10^{-3}			50
	2,2′-Azo-bis-2-(4-chlorobenzyl)-propionitrile	Toluene	80	8.8×10^{-5}			54
	2,2′-Azo-bis-2-(4-nitrobenzyl)-propionitrile	Toluene	80	1.00×10^{-4}			54
22	1,1′-Azo-bis-1-cyclodecanenitrile	Toluene	50.8	5.40×10^{-5}			101
			60.2	1.70×10^{-4}			101
			69.5	5.69×10^{-4}			101
34	4,4′-Azo-bis-(4-cyanopentanyl)-bis(heptadecafluorododecanoate)	Di-*n*-butyl phthalate	90	9.86×10^{-4}			375
			100	2.11×10^{-3}			375
			110	4.4×10^{-3}			375
			120	1.1×10^{-2}			375
			130	1.42×10^{-2}			375

TABLE 2. MISCELLANEOUS AZO-DERIVATIVES

Number of C atoms	Initiator	Solvent	T (°C)	k_d (s^{-1})	E_a (kJ/mol)	Notes	Refs.
2	1,1′-Azo-bis-formamide	DMF	86.0	1.56×10^{-5}		c_2	268
			100.3	5.73×10^{-5}		c_2	268
			115.3	1.14×10^{-4}		c_2	268
		DMSO	86.0	5.48×10^{-6}		c	268
			100.3	2.72×10^{-5}		c	268
			115.3	1.01×10^{-4}		c	268
		Formamide	86.0	9.25×10^{-5}			268
			115.3	$\sim 2.0 \times 10^{-3}$			268
		Hexamethyl-phosphoramide	115.3	3.83×10^{-5}			268
4	Methyl-azo-3-propene	Vapor	163.3	5.88×10^{-4}	148	h	298
			169.8	1.110×10^{-3}			298
			182.8	3.36×10^{-3}			298
			T (K)	3.2×10^{14}	$\exp[-148/RT]$		298
5	2,3-Diazobicyclo[2,2,1]hept-2-ene	Isooctane	131.5	5.44×10^{-6}	157.7		180
			142.3	1.82×10^{-5}			180
			164.1	1.66×10^{-4}			180
			180.8	8.35×10^{-4}			180
		Toluene	164.1	1.64×10^{-4}			180
6	2,2′-Azo-bis-propane	Vapor	250	7.67×10^{-3}	171.1	a	110
			260	1.67×10^{-2}		a	110
			270	3.35×10^{-2}		a	110
			280	6.52×10^{-2}		a	110
			290	1.28×10^{-1}		a	110
	3,3′-Azo-bis-1-propene	Vapor	142.65	3.88×10^{-4}	151.3		319
			152.68	1.10×10^{-3}			319
			167.12	4.45×10^{-3}			319
	2,2′-Dichloro-2,2′-azo-bis-propane	Diphenyl ether	158.5	1.03×10^{-4}	138.3	h,u_4	297
			167.9	4.54×10^{-4}		u_4	297
			178.5	8.08×10^{-4}		u_4	297
		Silicone oil	185	4.8×10^{-4}			240
			199	2.1×10^{-3}			240
			221	1.6×10^{-2}			240
	Methyl-azo-1,1-dimethyl-2-propene (*cis*)	Acetone	−13.89	3.62×10^{-5}	96.8	h	252
			−5.04	1.70×10^{-4}			252
			4.00	6.82×10^{-4}			252
	(*trans*)	*p*-Diisopropyl-Benzene	114.55	1.02×10^{-4}	147.9	h	252
			123.83	2.68×10^{-4}			252
			133.33	8.44×10^{-4}			252
	Perfluoroazo-2-propane	Vapor	T (K)	5.01×10^{16}	$\exp[-189.0/RT]$		360

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TABLE 2. *cont'd*

Number of C atoms	Initiator	Solvent	T (°C)	k_d (s^{-1})	E_a (kJ/mol)	Notes	Refs.
6 (*cont'd*)	1-Propyl-azo-3′-propene	Vapor	101.32	1.10×10^{-6}	149.2	v_{21}	298
			114.10	5.60×10^{-6}		v_{21}	298
			126.02	2.11×10^{-5}		v_{21}	298
			T (K)	6.3×10^{14}	exp[− 149.2/RT]		298
	Triazobenzene	Nitrobenzene	105	3.5×10^{-7}	140.2		45
			115	1.20×10^{-6}			45
			130	6.25×10^{-6}			45
			145	2.50×10^{-5}			45
		Tetralin	105	4.0×10^{-7}	136.0		45
			115	1.34×10^{-6}			45
			130	6.01×10^{-6}			45
			145	2.47×10^{-5}			45
7	*tert*-Butyl-azo-3-propene	Vapor	80.88	2.13×10^{-6}	124.9	v_{21}	298
			90.90	7.27×10^{-6}		v_{21}	298
			106.81	3.89×10^{-5}		v_{21}	298
			T (K)	5.4×10^{12}	exp[− 124.9/RT]	v_{21}	298
8	2,2′-Azo-isobutyramide	Water	88	1.9×10^{-5}		a	342
	Azo-bis-isobutyramidine	Water	60	3.15×10^{-5}		q_2	288
			60	2.80×10^{-5}		q_3	288
		Chloroform	60	7.1×10^{-6}			184
		DMSO	70	3.68×10^{-6}			21
		Methanol	60	1.45×10^{-6}			184
	Azo-bis-isobutyramidine 2HCl (AIBA)	Water (pH 1.9)	50	8.3×10^{-6}	126.5		341
			60	3.42×10^{-5}			341
		Water (pH 5.8)	50	8.0×10^{-6}	124.4		341
			60	3.22×10^{-5}			341
		Water (pH 9.5)	50	4.7×10^{-6}	151.7		341
			60	2.53×10^{-5}			341
		Water	60.0	3.70×10^{-5}	128.9	h	233
			70.0	1.33×10^{-4}			233
			75.0	2.58×10^{-4}			233
			80.0	5.13×10^{-4}			233
	AIBA	Water	40.15	2.49×10^{-6}	122.6	h	237
			50.05	9.79×10^{-6}			237
			60.20	4.03×10^{-5}			237
			70.10	1.52×10^{-4}			237
			100.10	4.96×10^{-3}			237
			70	1.52×10^{-4}			21
	AIBA-kaolin adduct	Water	50.0	1.37×10^{-5}	133.9	h	233
			60.0	6.16×10^{-5}			233
			70.0	2.28×10^{-4}			233
			80.0	9.53×10^{-4}			233
	AIBA-bentonite adduct	Water	50.0	1.80×10^{-5}	126.4	h	233
			55.0	3.97×10^{-5}			233
			65.0	1.53×10^{-4}			233
			70.0	3.21×10^{-4}			233
			80.0	1.04×10^{-3}			233
	Azo-bis(2-amidinopropane) 2HCl	Methanol	50	1.45×10^{-5}			356
		Water	50	8.1×10^{-6}			356
	2,2′-Azo-bis(2-amidinopropane) 2HCl	Water	56	1.93×10^{-5}		a	340
	Azo-bis-isobutyramidine $2HNO_3$	DMSO–cumene	60	4.86×10^{-5}			21
			70	1.53×10^{-4}			21
	2,2′-Azo-bis-isobutane	Vapor	160	1.9×10^{-5}		a	339
			180	5.01×10^{-5}		m_4	221
			190	1.53×10^{-4}		m_4	221
			210	1.05×10^{-3}		m_4	221
			174.8	6.8×10^{-5}			243
			188.3	1.75×10^{-4}			243
			188.8	1.14×10^{-4}		m_4	243
	2,2′-Azo-bis-isobutane	Diphenyl ether/iso-quinoline (90/10)	165	2.782×10^{-5}	176.6	h	171
			175	8.74×10^{-5}			171
			185	2.513×10^{-4}			171
			190	4.143×10^{-4}			171

TABLE 2. *cont'd*

Number of C atoms	Initiator	Solvent	T (°C)	k_d (s^{-1})	E_a (kJ/mol)	Notes	Refs.
8 (*cont'd*)	2,2′-Azo-bis-isobutane	Diphenyl ether/iso-	195	6.731×10^{-4}			171
		quinoline (90/10)	200	1.093×10^{-3}			171
	2,2′-Dimethoxy-2,2′- azopropane	Diphenyl ether	150.1	4.02×10^{-5}	171.8		297
			159.9	1.50×10^{-4}			297
			174.6	6.67×10^{-4}			297
	2,2′-Dimethylmercapto-2,2′-	Diphenyl ether	125.0	3.40×10^{-4}	84.6	h,u_5	297
	azopropane		135.0	7.10×10^{-4}		u_5	297
			145.0	1.15×10^{-3}		u_5	297
	Isopropyl-azo-l,1-dimethyl-2-	Acetone	−25.09	6.30×10^{-5}	91.3	h	252
	propene (*cis*)		−16.65	2.87×10^{-4}			252
			−8.20	1.10×10^{-3}			252
	(*trans*)	Diisopropylbenzene	97.41	1.15×10^{-4}	137.8	h	252
			106.06	3.19×10^{-4}			252
			115.06	9.22×10^{-4}			252
	2,2′-Azo-bis(2-methylpropane)	Vapor	160	1.93×10^{-5}		a	340
9	2-(4-Bromophenyl-azo)-2-	DCB	130	1.62×10^{-4}	130		325
	nitropropane		135	2.59×10^{-4}			325
			140	4.30×10^{-4}			325
			T (K)	1.1×10^{13}	exp[−130/RT]		325
	tert-Butyl-azo-l,l-dimethyl-	Diisopropylbenzene	73.72	8.69×10^{-5}	112.3	h	252
	2-propene (trans)		80.31	1.83×10^{-4}			252
			87.08	3.80×10^{-4}			252
	2-(4-Nitrophenylazo)-2-nitro-	DCB	130	1.00×10^{-4}	134		325
	propane		140	2.44×10^{-4}			325
			145	4.06×10^{-4}			325
			T (K)	1.1×10^{13}	exp[−134/RT]		325
	α-Phenylethyl-azo-methane	Diphenyl ether	151	4.35×10^{-5}	161.5		149
			161	1.16×10^{-4}			149
			171	3.48×10^{-4}			149
		Hexadecane	161	1.20×10^{-4}			149
10	2,2′-Diacetylthio-2,2′-azopropane	Diphenyl ether	130.0	1.33×10^{-4}	151.3	h	297
			140.0	4.40×10^{-4}			297
			149.4	1.19×10^{-5}			297
	2,2′-Diacetoxy-2,2′-azopropane	Diphenyl ether	190.0	8.23×10^{-5}	171.4	h	297
			200.1	2.61×10^{-4}			297
			210.3	6.38×10^{-4}			297
		Silicone oil	258	1.46×10^{-2}			240
	Azo-bis(1,1-dimethyl-2-propene)						
	(*trans*)	Xylene	42.03	5.95×10^{-5}	109.4	h	252
			49.98	1.73×10^{-4}			252
			57.39	4.54×10^{-4}			252
	Azo-bis-(1,1-dimethyl)-2-propyne	Xylene	41.32	5.37×10^{-5}	111.9	h	252
	(*trans*)		48.20	1.30×10^{-4}			252
			57.19	4.39×10^{-4}			252
	2,2′-Azo-bis-2-methylbutane	Ethylbenzene	180.0	1.36×10^{-4}	176.4	h	336
			190.0	3.89×10^{-4}			336
			200.0	1.03×10^{-3}			336
		Isoamyl alcohol	180.0	1.14×10^{-4}	176.0	h	336
			190.0	3.51×10^{-4}			336
			200.0	9.26×10^{-4}			336
	2,2′-Azo-bis-2-methylbut-3-ene	*n*-Decane	44.90	6.73×10^{-5}	107.3	h	278
			55.44	2.631×10^{-4}			278
			63.74	7.045×10^{-4}			278
	2,2′-Azo-bis-2-(methylcarboxy)-	Water	50	3.51×10^{-6}			285
	propane						
	2,2′-Azo-bis-methyl-2-methyl-	Collidine	80	1.67×10^{-4}		a	226
	propionate	1,2-Dichlorobenzene	80	1.44×10^{-4}		a	226
		Diethyl oxalate	80	1.52×10^{-4}		a	226
		Ethylene glycol	80	1.24×10^{-4}		a	226
		Nitrobenzene	80	1.61×10^{-4}	129.3	a	226
			100	1.73×10^{-3}		a	226
	2,2′-Azo-bis-methyl-2-methyl-	Undecane	80	1.04×10^{-4}		a	226
	propionate	Xylene	80	1.09×10^{-4}	149.8	a	62

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TABLE 2. *cont'd*

Number of C atoms	Initiator	Solvent	T (°C)	k_d (s^{-1})	E_a (kJ/mol)	Notes	Refs.
10 (*cont'd*)	*N,N'*-Azo-piperidine	Silicone oil	181	1.7×10^{-3}			240
			228	4.3×10^{-2}			240
	2-(4-Methoxyphenylazo)-2-nitropropane	DCB	135	7.4×10^{-5}	153		325
			140	1.30×10^{-4}			325
			150	3.67×10^{-4}			325
			T (K)	2.5×10^{15}	exp[$-153/RT$]		325
	Dimethyl 2,2'-azo-isobutyrate	Acetic acid	40	8.61×10^{-7}		a	326
			50	3.16×10^{-6}		a	326
			60	1.56×10^{-5}		a	326
			70	5.49×10^{-5}		a	326
		Acetonitrile	40	5.44×10^{-7}		a	326
			50	2.68×10^{-6}		a	326
			60	1.01×10^{-5}		a	326
			70	3.57×10^{-5}		a	326
		Benzene	50	2.22×10^{-6}		a	326
			60	8.85×10^{-6}		a	326
			70	3.27×10^{-5}		a	326
		Cyclohexane	40	2.89×10^{-7}		a	326
			50	1.38×10^{-6}		a	326
			60	5.85×10^{-6}		a	326
			80	2.22×10^{-5}		a	326
	Dimethyl-2,2'-azo-isobutyrate	Methanol	40	6.86×10^{-7}		a	326
			50	3.12×10^{-6}		a	326
			60	1.44×10^{-5}		a	326
		Methanol/$SnCl_4$	40	1.20×10^{-6}		a	326
			50	4.46×10^{-6}			326
			60	1.98×10^{-5}		a	326
		Methanol/$ZnCl_2$	60	1.51×10^{-5}		a	326
		Paraffin	99.2	1.02×10^{-3}			240
		Toluene	60	8.9×10^{-6}			290
			60	8.11×10^{-6}	131.6		340
			66	1.93×10^{-5}		a	340
			70	3.17×10^{-5}			340
			80	1.19×10^{-4}			340
		Toluene/$SnCl_4$	60	1.63×10^{-4}			290
	2,3,7,8-Tetraazahexacyclo-[7.4.1.0^{4,12}.0^{6,11}.0^{10,13}]tetradeca-2,7-diene	Acetonitrile-d_3	215	1.18×10^{-5}	188.7	x_1	174
			230	6.65×10^{-5}		x_1	174
			250	3.40×10^{-4}		x_1	174
11	2-(2,6-Dimethylphenylazo)-2-nitropropane	DCB	135	9.0×10^{-5}			325
			140	1.44×10^{-4}			325
			150	3.86×10^{-4}			325
			T (K)	4.8×10^{13}	exp[$-138/RT$]		325
	α-Phenylethyl-azo-2-propane	Diphenyl ether/benzoquinone	143.2	1.50×10^{-4}			220
		Diphenyl ether	143.0	1.54×10^{-4}		t_{13}	310
			152.0	4.24×10^{-4}		t_{13}	310
			165.5	1.570×10^{-3}		t_{13}	310
12	Azo-bis-isobutanoldiacetate	Cyclohexane	170.0	4.86×10^{-5}			189
			180.0	1.27×10^{-4}			189
			189.0	3.47×10^{-4}			189
			199.0	1.01×10^{-3}			189
	Azo-bis-(1-carbomethoxy-3-methyl-propane)	Benzene	36	3.05×10^{-7}			68
			45	1.31×10^{-6}			68
			55	4.54×10^{-6}			68
			65	1.82×10^{-5}			68
		Carbon tetrachloride	45	7.18×10^{-7}			68
			55	3.79×10^{-6}			68
			65	1.02×10^{-5}			68
	4,4'-Azo-bis-(4-cyanopentanoic acid) (meso)	DMAC	77.6	1.33×10^{-4}	133.5	a	205
			85.3	3.70×10^{-4}		a	205
			90.9	7.17×10^{-4}		a	205
			99.8	2.02×10^{-3}		a	205

TABLE 2. *cont'd*

Number of C atoms	Initiator	Solvent	T (°C)	k_d (s^{-1})	E_a (kJ/mol)	Notes	Refs.
12 (*cont'd*)	4,4′-Azo-bis-(4-cyanopentanoic acid)						
	($n_{D\pm}$)		77.9	1.53×10^{-4}	134.3	a	205
			85.8	4.11×10^{-4}		a	205
			90.1	7.00×10^{-4}		a	205
			99.1	2.09×10^{-3}		a	205
	(n_{D+})		78.0	1.55×10^{-4}	134.3	a	205
			85.4	4.05×10^{-4}		a	205
			90.0	6.98×10^{-4}		a	205
			99.0	2.00×10^{-3}		a	205
	(n_{D-})		77.7	1.51×10^{-4}	134.3	a	205
			86.0	4.34×10^{-4}		a	205
			90.5	7.33×10^{-4}		a	205
			99.7	2.24×10^{-3}		a	205
	2,2-Azo-bis-(ethyl-2-methyl-propionate)	Chlorobenzene	70	4.13×10^{-5}	123.0	a	139
			92.6	5.93×10^{-4}		a	139
		Nitrobenzene	80	1.56×10^{-4}		a	226
	2,2-Azo-bis-[2-methyl-*N*-(2-hydroxyethyl) propionamide]	Water	86	1.9×10^{-5}		a	342
	Azo-bis-(*N,N′*-dimethyleneisobutyr-amidine) $2HNO_3$	DMSO	60	2.06×10^{-4}			21
			70	6.64×10^{-4}			21
			75	1.08×10^{-3}			21
		DMSO–cumene	70	6.97×10^{-4}			21
		DMSO–tetralin	60	2.13×10^{-4}			21
	Azo-bis-(*N,N′*-dimethylene isobutyramidine) 2HCl	Water	44	1.9×10^{-5}		a	339
	Azo-bis-(*N,N′*-dimethyleneisobutyr-amidine)	DMSO	80	1.79×10^{-4}			21
		DMSO–cumene	75	8.04×10^{-5}			21
			80	1.39×10^{-4}			21
			85	2.6×10^{-4}			21
		DMSO–tetralin	60	1.09×10^{-5}			21
		Methanol	61	1.9×10^{-5}		a	339
	tert-Butyl(2,2,4-trimethyl-2-pentyl)diazene	Diphenyl ether	155	1.61×10^{-4}	159.6	h	314
			165.7	4.75×10^{-4}			314
			180.0	1.98×10^{-3}			314
	α-Cumyl-azo-isopropane	Diphenyl ether	120.0	1.06×10^{-4}			310
			135.0	5.94×10^{-4}			310
			143.0	1.421×10^{-3}			310
	2,2′-Dicyclopropyl-2,2′-azopropane	Diphenyl ether/ isoquinoline (90/10)	145.0	7.56×10^{-5}	158.2	h	171
			150.0	1.273×10^{-4}			171
			155.0	2.147×10^{-4}			171
			160.0	3.771×10^{-4}			171
			165.0	6.07×10^{-4}			171
			170.0	1.033×10^{-3}			171
	Di-(2-hydroxyethyl)-2,2′-azo-bis-isobutyrate	Dioxane	60	1.61×10^{-5}	125.7		292
			70	5.88×10^{-5}			292
			80	2.02×10^{-4}			292
		DMF	60	1.53×10^{-5}	129.9		292
			70	5.62×10^{-5}			292
			80	2.0×10^{-4}			292
		Toluene	60	1.62×10^{-5}	129.9		292
			70	5.83×10^{-5}			292
			80	2.066×10^{-4}			292
	2,2′-Azo-bis[*N*-(2-hydroxyethyl)-2-methylpropionamidine] 2HCl	Water	58	1.93×10^{-5}		a	339
	2,2′-Azo-bis[2-(imidazoline-2-yl)-propane 2HCl	Methanol	50	4.83×10^{-5}			356
		Water	50	4.02×10^{-5}			356
	2,2′-Azo-bis[2-(imidazoline-2-yl)-propane	Methanol	50	4.7×10^{-6}			356
14	2,2′-Azo-bis-(2-cyclobut-1-enylpropane)	*n*-Decane	39.21	1.286×10^{-4}	112.3	h	278
			50.71	5.678×10^{-4}			278
			58.95	1.762×10^{-3}			278

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TABLE 2. *cont'd*

Number of C atoms	Initiator	Solvent	T (°C)	k_d (s^{-1})	E_a (kJ/mol)	Notes	Refs.
14 (*cont'd*)	2,2′-Azo-bis-(2-methylhex-3-ene)	*n*-Decane	39.25	5.33×10^{-5}	115.2	h	278
			49.52	2.256×10^{-4}			278
			58.95	7.584×10^{-4}			278
	Di-(2-chloroethyl)-2,2′-azo-bis-isobutyrate	Dioxane	60	1.56×10^{-5}	129.9		292
			70	5.55×10^{-5}			292
			80	1.9672×10^{-4}			292
		DMF	60	1.25×10^{-5}	134.1		292
			70	4.902×10^{-5}			292
	Di-(2-chloroethyl)-2,2′-azo-bis-isobutyrate		80	1.9125×10^{-4}			292
		Toluene	60	1.666×10^{-5}	129.9		292
			70	5.018×10^{-5}			292
			80	1.99×10^{-4}			292
	1,1′-bis-(4-Chlorophenyl) azomethane	Diphenyl ether	145.56	2.30×10^{-4}	146.6	h	297
			155.56	7.60×10^{-4}			297
			165.56	1.49×10^{-3}			297
			175.56	4.40×10^{-3}			297
	Di-(2-hydroxypropyl)-2,2′-azo-bis-isobutyrate	Dioxane	60	1.80×10^{-5}	121.5		292
			70	7.6×10^{-5}			292
			80	2.22×10^{-4}			292
		DMF	60	1.97×10^{-5}	121.5		292
			70	6.55×10^{-5}			292
			80	2.30×10^{-4}			292
		Toluene	60	1.90×10^{-5}	121.5		292
			70	7.72×10^{-5}			292
			80	2.365×10^{-4}			292
	2,2′,3,3,3′,3′-Hexamethyl-2,2′-azo-butane	Diphenyl ether	170.0	2.37×10^{-4}	156.7	h	297
			180.0	5.29×10^{-4}			297
			190.0	1.00×10^{-3}			297
	1,1′-Diphenyl-azo-methane	Diphenyl ether	145.0	1.72×10^{-4}	119.0	h	297
			155.0	4.93×10^{-4}			297
			165.0	1.12×10^{-3}			297
			175.0	2.34×10^{-3}			297
	2,2′-Azo-bis[2-methyl-*N*-(phenylmethyl)propionamidine] 2HCl	Water	53	1.93×10^{-5}		a	339
	2,2′-Azo-bis[2-(4-methylimidazoline-2-yl)-propane	Methanol	50	1.23×10^{-5}			356
	2,2′-Azo-bis[2-(4-methylimidazoline-2-yl)-propane 2HCl	Methanol	50	7.48×10^{-5}			356
		Water	50	6.73×10^{-5}			356
	2,2′-Azo-bis[2-(3,4,5-trihydropyrimidine-2-yl)propane	Methanol	50	1.1×10^{-6}			356
	2,2′-Azo-bis[2-(3,4,5-trihydropyrimidine-2-yl)propane 2HCl	Methanol	50	7.8×10^{-6}			356
		Water	50	5.9×10^{-6}			356
15	1-Methylcyclopentyl-azo-α-cumene	*tert*-Butyl benzene	88.3	5.00×10^{-5}	132.0	h	327
			107.3	4.95×10^{-4}			327
			117.6	1.43×10^{-3}			327
16	1,1′-Azo-bis-1-chloro-1-phenylethane	Acetophenone	74.8	8.6×10^{-4}			240
			83	1.95×10^{-3}			240
		Benzophenone	67.8	2.8×10^{-4}			240
			86.2	3.3×10^{-3}			240
			98.2	1.40×10^{-2}			240
		Paraffin	94.5	2.4×10^{-3}			240
			112.3	5.2×10^{-2}			240
			120.5	1.03×10^{-1}			240
			129.3	1.6×10^{-1}			240
			137	5.0×10^{-1}			240
		Toluene	64	1.8×10^{-4}			240
			74	7.2×10^{-4}			240
			64	1.79×10^{-4}	135.1	a	239
			74	7.20×10^{-4}		a	239
	1,1′-Azo-bis-1-chloro-1-(3-bromophenyl)ethane	Toluene	59	1.64×10^{-4}	131.8	a	239
			69	6.64×10^{-4}		a	239
	1,1′-Azo-bis-1-chloro-1-(4-bromophenyl)ethane	Toluene	59	1.77×10^{-4}	127.2	a	239
			69	6.75×10^{-4}		a	239

TABLE 2. *cont'd*

Number of C atoms	Initiator	Solvent	T (°C)	k_d (s^{-1})	E_a (kJ/mol)	Notes	Refs.
16 (*cont'd*)	1,1′-Azo-bis-1-chloro-1-(4-chlorophenyl)ethane	Toluene	59	1.97×10^{-4}	118.8	a	239
			69	6.93×10^{-4}		a	239
	2,2′-Azo-bis-(2-cyclopent-1-enylpropane)	*n*-Decane	39.21	9.98×10^{-5}	116.9	h	278
			49.52	4.593×10^{-4}			278
			58.95	1.528×10^{-3}			278
	1,1′-Azo-bis-1,1-dicyclopropylethane	Diphenyl ether/ isoquinoline (90/10)	120	6.33×10^{-5}	149.0	h	171
			130	2.03×10^{-4}			171
			140	6.07×10^{-4}			171
			150	1.695×10^{-3}			171
	2,2′-Azo-bis-{2-methyl-*N*-[1,1-(bis-hydroxymethyl)-2-hydroxyethyl] propionamide}	Water	80	1.9×10^{-5}		a	342
	2,2′-Azo-bis-{2-methyl-*N*-[1,1-(bis-hydroxymethyl)ethyl] propionamide}	Water	82	1.9×10^{-5}		a	342
	2,2′-Azo-bis[2-(4,4-dimethylimidazoline-2-yl) propane	Methanol	50	9.3×10^{-6}			356
	2,2′-Azo-bis[2-(4,4-dimethyl-imidazoline-2-yl)propane 2HCl	Methanol	50	9.55×10^{-5}			356
		Water	50	9.30×10^{-5}			356
	2,2′-Azo-bis[2-(4,5-dimethyl-imidazoline-2-yl)propane 2HCl	Methanol	50	9.21×10^{-5}			356
		Water	50	8.94×10^{-5}			356
	2,2′-Azo-bis[2-(4,5,6,7-tetrahydro-1H-1,3-diazepine-2-yl)propane 2HCl	Methanol	50	1.23×10^{-5}			356
		Water	50	1.04×10^{-5}			356
	2,2′-Azo-bis-(2,2,4-trimethyl-pentane)	Diphenyl ether	110	1.9×10^{-5}		a	339
	1,1′-Azo-bis-1-phenylethane	Dodecane	97.3	3.175×10^{-5}			26
	1,1′-Azo-bis-1-phenylethane	Ethylbenzene	100.4	$(5.45 \pm 0.05) \times 10^{-5}$	136.4		107,98
		Toluene	110.3	$(1.69 \pm 0.01) \times 10^{-4}$			107,98
		Ethylbenzene	105.02	8.473×10^{-5}			152
			105.28	9.02×10^{-5}			183
	(1,1'-d_2)		105.28	7.62×10^{-5}			183
	(1,1,1,1′,1′,1′-d_6)		105.02	7.623×10^{-5}			152
		N-Methyl-*N*-benzyl aniline	97.3	4.135×10^{-5}			26
		N-Methyl propionamide	97.3	3.688×10^{-5}			26
		Diphenylmethane	97.3	3.995×10^{-5}			26
		Propylene carbonate	97.3	3.294×10^{-5}			26
	tert-Butyl-(2,2,4,6,6-pentamethyl-4-heptyl)-diazine	Diphenyl ether	140.0	1.93×10^{-4}	141.6	h	314
			150.1	5.29×10^{-4}			314
			164.8	2.18×10^{-3}			314
	1,1′-Di-(3-chlorophenyl)-1,1′-azo-ethane	*p*-Cymene	95	4.13×10^{-5}	122.3	h	266,313
			105	1.218×10^{-4}			266,313
	1,1′-Di-(4-chlorophenyl)-1,1′-azo-ethane	*p*-Cymene	85	1.45×10^{-5}	134.1	h	266.313
			95	4.82×10^{-5}			266,313
			105	1.650×10^{-4}			266,313
	α,α-Diethylbenzyl-azo-3-pentane	Diphenyl ether	120.05	7.8×10^{-5}			310
			130.0	2.63×10^{-4}			310
			139.0	7.38×10^{-4}			310
			147.0	1.906×10^{-3}			310
	1,1'-Di-(3-fluorophenyl)-1,1′-azo-ethane	*p*-Cymene	105	1.121×10^{-4}			266,313
	1,1′-Di-(4-fluorophenyl)-1,1′-azo-ethane	*p*-Cymene	85	5.5×10^{-6}	147.0	h	266,313
			95	2.35×10^{-5}			266,313
			105	7.85×10^{-5}			266,313
	Di-(3-hydroxybutyl)-2,2′-azo-bis-isobutyrate	Dioxane	60	2.22×10^{-5}	117.3		292
			70	7.84×10^{-5}			292
			80	2.413×10^{-4}			292
		DMF	60	1.83×10^{-5}	121.5		292
			70	7.69×10^{-5}			292
			80	2.424×10^{-4}			292

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TABLE 2. *cont'd*

Number of C atoms	Initiator	Solvent	T (°C)	k_d (s^{-1})	E_a (kJ/mol)	Notes	Refs.
16 (*cont'd*)	Di-(3-hydroxybutyl)-2,2′-azo-bis-isobutyrate	Toluene	60	2.43×10^{-5}	117.3		292
			70	8.18×10^{-5}			292
			80	2.461×10^{-4}			292
	Di-(4-hydroxybutyl)-azo-bis-isobutyrate	Dioxane	60	2.12×10^{-5}	125.7		292
			70	6.57×10^{-5}			292
			80	2.539×10^{-4}			292
		DMF	60	1.97×10^{-5}	125.7		292
			70	6.19×10^{-5}			292
			80	2.50×10^{-4}			292
		Toluene	60	2.59×10^{-5}	121.5		292
			70	6.66×10^{-5}			292
			80	2.628×10^{-4}			292
	1,1′-Bis-(4-methoxyphenyl)-azo-methane	Diphenyl ether	145.0	2.23×10^{-4}	145.0	h	297
			155.0	5.67×10^{-4}			297
			165.0	1.61×10^{-3}			297
			175.0	3.79×10^{-3}			297
	2,2′,4,4,4′,4′-Hexamethyl-2,2′-azo-pentane	Diphenyl ether	130.2	1.82×10^{-4}	132.8	h	297
			140.0	4.51×10^{-4}			297
			150.0	1.28×10^{-3}			297
	1-Methylcyclohexyl-azo-α-cumene	*tert*-Butylbenzene	102.2	2.58×10^{-4}	131.1	h	327
			113.1	9.81×10^{-4}			327
			122.0	2.20×10^{-3}			327
	1,1′-Diphenyl-1,1′-azo-ethane	*p*-Cymene	95	2.74×10^{-5}	124.0	h	266,313
			105	8.21×10^{-5}			266,313
	2-(Phenylazo)-2-propyl perbenzoate	Chlorobenzene	10	4.5×10^{-4}			372
			35	1.9×10^{-3}			372
		Chloroform-d	10	5.1×10^{-4}			372
		Chlorotoluene	10	6.4×10^{-4}			372
	(1-Phenylethyl)-azo-diphenylmethane	Ethylbenzene	58	1.9×10^{-5}		a	339
	1,1′-Bis(*p*-tolyl)-azo-methane	Diphenyl ether	145.0	2.00×10^{-4}	145.4	h	297
			155.0	4.69×10^{-4}			297
			165.0	1.22×10^{-3}			297
			175.0	3.45×10^{-3}			297
17	3,7-Diphenyl-1,2-diaza-1-cyclo-heptene	Xylene	61.0	3.80×10^{-5}			138
			70.0	1.34×10^{-4}			138
			80.0	4.27×10^{-4}			138
			89.3	1.59×10^{-3}			138
			100.2	4.04×10^{-3}			138
			80	4.26×10^{-4}		a	44
			100.2	3.94×10^{-3}		a	44
18	1,1′-Azo-bis-cumene	Benzene	58.91	1.94×10^{-4}		v_5	217
		tert-Butylbenzene	60	1.03×10^{-4}			333
			60	4.03×10^{-5}		z (1256)	333
			60	4.44×10^{-6}		z (3890)	333
		Chlorobenzene	55	8.50×10^{-5}			280
			55	6.88×10^{-5}		z (1013)	280
			55	4.42×10^{-5}		z (4154)	280
		Cumene	55	8.10×10^{-5}			280
			55	6.75×10^{-5}		z (1013)	280
			55	3.83×10^{-5}		z (4154)	280
			60	1.16×10^{-4}			333
			60	4.73×10^{-5}		z (1256)	333
			60	7.23×10^{-6}		z (3890)	333
		Dodecane	60.23	1.47×10^{-4}			217
		n-Octane	60	1.14×10^{-4}			333
			60	4.44×10^{-5}		z (1256)	333
			60	8.32×10^{-6}		z (3890)	333
		Toluene	40.04	9.46×10^{-6}		h	217
			49.52	4.33×10^{-5}			217
			59.42	1.62×10^{-4}			217
			69.23	5.80×10^{-4}			217
			41.0	9.6×10^{-6}	122.8		309
			44.8	1.98×10^{-5}			309
			58.5	1.280×10^{-4}			309

TABLE 2. *cont'd*

Number of C atoms	Initiator	Solvent	T (°C)	k_d (s^{-1})	E_a (kJ/mol)	Notes	Refs.
18 (*cont'd*)	1,1′-Azo-bis-4-bromocumene	Toluene	42.8	2.72×10^{-5}	117.7		309
			48.6	6.28×10^{-5}			309
			58.0	2.189×10^{-4}			309
	1,1′-Azo-bis-3-chlorocumene	Toluene	36.0	8.8×10^{-6}	115.9		200
			42.8	2.46×10^{-5}			200
			48.2	5.55×10^{-5}			200
			61.1	2.796×10^{-4}			200
	1,1′-Azo-bis-4-chlorocumene	Toluene	36.0	1.11×10^{-5}	112.5		200
			42.8	2.90×10^{-5}			200
			48.2	6.52×10^{-5}			200
	1,1′-Azo-bis-1-chloro-1-(4-tolyl)-ethane	Acetophenone	74.8	2.1×10^{-3}			240
			79.5	3.0×10^{-3}			240
			86	7.4×10^{-3}			240
		Paraffin	105	1.66×10^{-3}			240
			109.5	2.5×10^{-2}			240
			126	6.4×10^{-2}			240
			135.5	1.7×10^{-1}			240
		Toluene	59	1.03×10^{-4}			240
			69	4.0×10^{-4}			240
			59	1.03×10^{-4}	126.8	a	239
			69	3.93×10^{-4}			239
	2,2′-Azo-bis[2-(4-ethyl-4-methyl-imidazoline-2-yl)propane 2HCl	Methanol	50	6.80×10^{-5}			356
		Water	50	7.38×10^{-5}			356
	2,2′-Azo-bis[2-(4-ethyl-5-methyl-imidazoline-2-yl)propane 2HCl	Methanol	50	9.48×10^{-5}			356
		Water	50	1.1×10^{-4}			356
	2,2′-Azo-bis[2-(5,5-dimethyl-3,4,5-tri-hydropyrimidine-2-yl)propane	Methanol	50	9×10^{-7}			356
	2,2′-Azo-bis[2-(5,5-dimethyl-3,4,5-tri-hydropyrimidine-2-yl)propane 2HCl	Methanol	50	8.0×10^{-6}			356
		Water	50	7.9×10^{-6}			356
	1,1′-Azo-bis-4-fluorocumene	Toluene	36.0	5.7×10^{-6}	115.9		200
			42.8	1.31×10^{-5}			200
			48.2	2.94×10^{-5}			200
			61.1	1.880×10^{-4}			200
	1,1′-Di-3-trifluoromethyl-phenyl)-1,1′-azo-ethane	*p*-Cymene	95	4.13×10^{-5}	134.9	h	266,313
			105	1.357×10^{-4}			266,313
	1,1′-Azo-bis-(2-methoxyphenyl)-ethane	*p*-Cymene	84.6	1.69×10^{-5}	135.6	h	266
			95	6.11×10^{-5}			266,313
			105	1.975×10^{-4}			266,313
	1,1′-Azo-bis-(2-methoxyphenyl)-ethane	Ethylbenzene	106.06	2.29×10^{-5}		a	300
			113.81	5.52×10^{-5}		a	300
			133.66	4.87×10^{-4}		a	300
	1,1′-Azo-bis-(3-methoxyphenyl)-ethane	*p*-Cymene	95	1.53×10^{-5}	171.8	h	266,313
			105	6.91×10^{-5}			266,313
	1,1′-Azo-bis-(4-methoxyphenyl)-ethane	*p*-Cymene	95	3.56×10^{-5}	126.5	h	266,313
			105	1.090×10^{-4}			266,313
	1,1′-Azo-bis-1-(4-methoxyphenyl)-ethane	Ethylbenzene	100.4	$(7.15 \pm 0.1) \times 10^{-5}$	149.8		98
			110.3	$(2.48 \pm 0.02) \times 10^{-4}$			98
	1,1′-Azo-bis-1-phenylpropane	Ethylbenzene	100.4	$(2.35 \pm 0.1) \times 10^{-5}$	135.1		98
			110.3	$(7.2 \pm 0.2) \times 10^{-5}$			98
	2,2′-Azo-bis-2-phenyl-hexafluoro-propane	Toluene	45.0	8.36×10^{-6}	137.2	h	173
			50.0	2.16×10^{-5}			173
			55.0	4.92×10^{-5}			173
			60.0	8.81×10^{-5}			173
			67.0	2.46×10^{-4}			173
			43.8	6.3×10^{-5}	115.5		42
			53.8	2.4×10^{-4}			42
	1,1′-Dimethyl-azo-cyclooctane	Benzene	130.0	1.09×10^{-4}	145.8	h	327
			140.0	3.05×10^{-4}			327
			150.0	8.96×10^{-4}			327
	1,1′-Diphenyl-azo-cyclopropane	Benzene	165.0	9.6×10^{-5}	135.3	h	323
			175.0	2.21×10^{-4}			323
			185.0	5.09×10^{-4}			323
		Ethylbenzene	170.0	1.67×10^{-4}			323
			180.0	3.48×10^{-4}			323

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TABLE 2. *cont'd*

Number of C atoms	Initiator	Solvent	T (°C)	k_d (s^{-1})	E_a (kJ/mol)	Notes	Refs.
18 (*cont'd*)	3,8-Diphenyl-1,2-diaza-1-cyclooctene	Tetralin	143	9.52×10^{-5}	153.6		137
			151	2.09×10^{-4}			137
			165	8.77×10^{-4}			137
			173	1.82×10^{-3}			137
	1,1′-Di-(3-tolyl)-1,1′-azo-ethane	*p*-Cymene	105	8.17×10^{-5}			266,313
	1,1′-Di-(4-tolyl)-1,1′-azo-ethane	*p*-Cymene	95	3.06×10^{-5}	126.5	h	266,313
			105	9.35×10^{-5}			266,313
19	Phenyl-azo-diphenylmethane	Decalin	124.5	3.44×10^{-5}	142.3		46
			144.5	2.69×10^{-4}			46
	2-(2-Phenyl-4-methylpentyl)-azo-2-(4-methylpentane)	Diphenyl ether	103.0	1.17×10^{-4}			310
			110.0	2.52×10^{-4}			310
			120.0	8.51×10^{-4}			310
			130.0	2.611×10^{-3}			310
20	1,1′-Azo-bis-1-acetoxy-1-phenylethane	Paraffin	131	3.2×10^{-2}			240
			142	4.3×10^{-2}			240
			149.5	8.0×10^{-2}			240
	1,1′-Azo-bis-1,1-dicyclopropyl-butane	Diphenyl ether/ isoquinoline (90/10)	120.0	4.26×10^{-5}	159.0	h	171
			125.0	7.94×10^{-5}			171
			130.0	1.49×10^{-4}			171
			135.0	2.697×10^{-4}			171
			140.0	4.774×10^{-4}			171
			147.0	1.055×10^{-3}			171
	9-Azo-bis-decalin (*cis*)	Ethylbenzene	180.0	1.41×10^{-4}	175.1	h	335
			190.0	3.95×10^{-4}			335
			200.0	1.05×10^{-3}			335
	(*trans*)		180.0	1.90×10^{-4}	175.1	h	335
			190.0	5.35×10^{-4}			335
			200.0	1.41×10^{-3}			335
	α,α′-Azo-bis(α-methylbenzyl) diacetate	Dichlorobenzene	65	1.86×10^{-5}			366
			70	4.00×10^{-5}			366
			80	1.592×10^{-4}			366
			90	5.525×10^{-4}			366
	Azo-bis-4-methylcumene	Cumene	55	8.86×10^{-5}			280,333
			55	7.54×10^{-5}		z (1013)	280,333
			55	4.47×10^{-5}		z (4154)	280,333
		Toluene	41.0	1.33×10^{-5}	120.7		309
			49.5	5.02×10^{-5}			309
			58.5	1.690×10^{-4}			309
	2,2′-Azo-bis[2-(4-ethyl-5-isopropyl-imidazoline-2-yl)propane 2HCl	Methanol	50	7.72×10^{-5}			356
		Water	50	1.01×10^{-4}			356
	2,2′-Azo-bis-2-(4-tolyl)-propane	Toluene	36.0	8.4×10^{-6}	110.0		200
			42.8	1.62×10^{-5}			200
			61.1	2.08×10^{-4}			200
	1,1′-Azo-bis-1,1,1-tricyclopropyl-methane	Diphenyl ether/ isoquinoline (90/10)	105.0	7.89×10^{-5}	143.5	h	171
			110.0	1.374×10^{-4}			171
			115.0	2.36×10^{-4}			171
			120.0	4.58×10^{-4}			171
			125.0	7.76×10^{-4}			171
			130.0	1.38×10^{-3}			171
			135.0	2.39×10^{-3}			171
		Decalin/ isoquinoline (90/10)	118.5	3.60×10^{-4}			171
		Isoquinoline	118.5	3.30×10^{-4}			171
		Cumene/ isoquinoline (90/10)	118.5	445×10^{-4}		h	171
	1,1′-Di-(4-ethylphenyl)-1,1-azo-ethane	*p*-Cymene	95	3.02×10^{-5}	125.3		266,313
			105	9.14×10^{-5}		a	266,313
	1,1′-Diphenyl-azo-butane	Ethylbenzene	93.88	1.67×10^{-5}		a	300
			105.68	6.96×10^{-5}		a	300
			119.55	3.39×10^{-4}		h	300
	1,1′-Diphenyl-azo-cyclobutane	Ethylbenzene	63.2	8.2×10^{-6}	122.3		323
			73.8	3.5×10^{-5}			323
			79.1	6.9×10^{-5}			323
			87.7	1.69×10^{-4}		b,h	323

TABLE 2. *cont'd*

Number of C atoms	Initiator	Solvent	T (°C)	k_d (s^{-1})	E_a (kJ/mol)	Notes	Refs.
20 (*cont'd*)	(−)-(*s*)-1,1′-Diphenyl-1-methyl-azo-methane	Cumene	106.0	8.26×10^{-6}	149.2	b	318
			127.9	1.18×10^{-4}			318
	2,2′-Azo-bis(2-methyl-*N*-phenyl-propionamidine) 2HCl	Water	45	1.93×10^{-5}		a	339
	2,2′-Azo-bis[*N*-(4-chlorophenyl)-2-methylpropionamidine] 2HCl	Water	45.5	1.93×10^{-5}		a	339
	2,2′-Azo-bis[*N*-(4-hydroxyphenyl)-2-methylpropionamidine] 2HCl	Water	47.5	1.93×10^{-5}		a	339
22	1,1′-Azo-bis-1-phenyl-3-methylbutane	Ethylbenzene	100.4	7.6×10^{-5}	139.3		98
			110.3	2.42×10^{-4}			98
	1,1′-Azo-bis-4-ethylcumene	Toluene	42.8	1.29×10^{-5}	108.9		309
			48.6	3.29×10^{-5}			309
			58.0	1.240×10^{-4}			309
	1,1′-Azo-bis-4-isopropylcumene	Toluene	42.8	1.13×10^{-5}	124.4		309
			51.2	4.26×10^{-5}			309
			58.0	1.078×10^{-4}			309
	1,1′-Diisopropyl-1,1′-diphenyl-azo-ethane	Ethylbenzene	50	3.52×10^{-5}	113.6	h	324
	1,1′-Diphenyl-azo-cyclopentane	Benzene	29.5	3.16×10^{-4}	103.1		323
			40.0	1.24×10^{-3}			323
			50.0	4.68×10^{-3}			323
	2,2′-Azo-bis[2-methyl-*N*-(phenyl-methyl)propionamidine] 2HCl	Water	52	1.93×10^{-5}		a	339
	2,2′-Azo-bis[2-(4-methyl-4-isobutyl-imidazoline-2-yl)propane 2HCl	Methanol	50	5.54×10^{-5}			356
		Water	50	7.08×10^{-5}			356
	2,2′-Azo-bis[2-(4-methyl-5-isobutyl-imidazoline-2-yl)propane 2HCl	Methanol	50	7.72×10^{-5}			356
		Water	50	9.78×10^{-5}			356
	2,2′-Azo-bis[2-(4-ethyl-5-propyl-imidazoline-2-yl)propane 2HCl	Methanol	50	1.06×10^{-4}			356
		Water	50	1.41×10^{-4}			356
24	1,1′-Azo-bis-4-*tert*-butylcumene	Toluene	42.8	1.16×10^{-5}	123.6		309
			48.6	2.58×10^{-5}			309
			58.0	1.080×10^{-4}		h	309
	α,α′-Azo-bis(α-methylbenzyl)-dimethacrylate	Dichlorobenzene	65	3.65×10^{-5}			366
			70	7.98×10^{-5}			366
			80	2.313×10^{-4}			366
			90	1.344×10^{-3}			366
	Bis(2,2,4,6,6-pentamethyl-4-heptyl)diazine	Diphenyl ether	100.1	3.03×10^{-4}	125.7		314
			109.2	7.62×10^{-4}			314
			125.0	3.90×10^{-3}		h	314
	1,1′-Diphenyl-azo-cyclohexane	Benzene	45.5	2.52×10^{-5}	125.7		323
			54.0	8.74×10^{-5}			323
			69.7	7.12×10^{-4}			323
25	3-Bromophenyl-azo-triphenyl-methane	Toluene	53.8	1.14×10^{-4}	125.1		42
			64.0	4.58×10^{-4}			42
	4-Bromophenyl-azo-triphenyl-methane	Toluene	53.35	1.05×10^{-4}	117.2		52
			64.30	4.28×10^{-4}			52
	4-Hydroxyphenyl-azo-triphenyl-methane	Acetic acid	54.00	1.42×10^{-4}	133.9		52
			64.00	6.2×10^{-4}			52
		Pyridine	54.00	1.52×10^{-4}	133.9		52
			64.00	6.7×10^{-4}			52
		Toluene	54.00	1.70×10^{-4}	121.3		52
			64.00	6.4×10^{-4}			52
	2-Nitrophenyl-azo-9-phenylfluorene	Toluene	45.45	1.01×10^{-4}	119.7		75
			55.55	3.71×10^{-4}			75
	4-Nitrophenyl-azo-9-phenylfluorene	Toluene	45.45	2.06×10^{-4}	111.7		75
			55.55	7.53×10^{-4}			75
	2,4-Dinitrophenyl-azo-9-phenyl-fluorene	Toluene	55.55	2.06×10^{-4}	119.2		75
			64.94	6.92×10^{-4}			75
	2-Nitrophenyl-azo-triphenylmethane	Toluene	64.94	1.46×10^{-4}	123.8		75
			75.06	5.26×10^{-4}			75
	3-Nitrophenyl-azo-triphenylmethane	Toluene	53.8	5.8×10^{-5}	110.9		42
			64.0	1.99×10^{-4}			42
		Benzene	60	9.92×10^{-5}			263
		tert-Butylbenzene	60	9.18×10^{-5}			263

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TABLE 2. *cont'd*

Number of C atoms	Initiator	Solvent	T (°C)	k_d (s^{-1})	E_a (kJ/mol)	Notes	Refs.
25 (*cont'd*)	3-Nitrophenyl-azo-triphenylmethane	Cumene	60	1.04×10^{-4}			263
		Ethylbenzene	60	1.10×10^{-4}			263
		Octane	60	1.01×10^{-4}			263
		Toluene	45	1.25×10^{-5}			263
			60	1.22×10^{-4}			263
	4-Nitrophenyl-azo-triphenylmethane	Benzene	60	1.09×10^{-4}			263
		tert-Butylbenzene	60	9.7×10^{-5}			263
			60	4.03×10^{-5}		z (1256)	263
			60	4.44×10^{-6}		z (3890)	263
		Chlorobenzene	55	8.50×10^{-5}			333
			55	6.88×10^{-5}		z (1013)	333
			55	4.42×10^{-5}		z (4154)	333
		Cumene	55	8.10×10^{-5}			333
			55	6.75×10^{-5}		z (1013)	333
			55	2.62×10^{-5}		z (6180)	333
			60	1.15×10^{-4}			263
			60	4.73×10^{-5}		z (1256)	263
			60	7.23×10^{-6}		z (3890)	263
		Decane	50	2.017×10^{-5}			168,263
			60	9.988×10^{-4}			168,263
			70	3.350×10^{-4}			168
			77.5	1.16×10^{-3}			168
		1-Decene	60	1.038×10^{-4}			168
		Dodecane	50	1.933×10^{-5}			168,263
			60	9.166×10^{-5}			168,263
			70	3.250×10^{-4}			168
		1-Eicosene	60	7.60×10^{-5}			168
		Heptane	50	2.716×10^{-5}			168
			60	1.043×10^{-4}			168,263
			70	3.900×10^{-4}			168
		Hexadecane	50	1.716×10^{-5}			168,263
			60	8.133×10^{-5}			168,263
			70	2.966×10^{-4}			168
			77.5	1.09×10^{-3}			168
		1-Hexadecene	60	8.25×10^{-5}			168
		Hexane	50	2.750×10^{-5}			168,263
			60	1.195×10^{-4}			168,263
		1-Hexene	60	1.143×10^{-4}			168
		Nonane	50	2.200×10^{-5}			168,263
			60	9.900×10^{-5}			168,263
			70	3.710×10^{-4}			168
		Octadecane	60	7.780×10^{-5}			168,263
			70	2.783×10^{-4}			168
		1-Octadecene	60	7.58×10^{-5}			168
		Octane	60	1.015×10^{-4}			168,263
			70	3.650×10^{-4}			168
			77.5	1.78×10^{-3}			168
		1-Octene	60	1.123×10^{-4}			168
		Pentane	50	3.600×10^{-5}			168,263
			60	1.280×10^{-4}			168,263
		Tetradecane	50	1.866×10^{-5}			168,263
			60	8.800×10^{-5}			168,263
			70	3.116×10^{-4}			168
	4-Nitrophenyl-azo-triphenylmethane	1-Tetradecene	60	9.02×10^{-5}			168
		Toluene	64.94	2.58×10^{-4}	123.0		75
			75.06	9.19×10^{-4}			75
			53.35	5.7×10^{-5}	113.0		52
			64.30	2.25×10^{-4}			52
	2,4-Dinitrophenyl-azo-triphenyl-methane	Toluene	75.06	1.90×10^{-4}	122.6		75
			84.98	6.13×10^{-4}			75
	Phenyl-azo-triphenylmethane	Acetic acid	43.30	5.7×10^{-5}	117.2		52
			64.00	8.4×10^{-4}			52
		Anisole	25.0	2.58×10^{-6}	120.5	b,h	103

TABLE 2. *cont'd*

Number of C atoms	Initiator	Solvent	T (°C)	k_d (s^{-1})	E_a (kJ/mol)	Notes	Refs.
25 (*cont'd*)	Phenyl-azo-triphenylmethane	Anisole	50.2	1.31×10^{-4}		b	103
			74.7	3.03×10^{-3}		b	103
			25.0	3.0×10^{-6}	118.3		114
			74.5	2.9×10^{-3}			114
			80.1	6.8×10^{-3}			114
			85.9	1.1×10^{-2}			114
		Benzene	25.0	4.29×10^{-6}	112.1	b,h	103
			49.6	1.24×10^{-4}			103
			74.7	3.12×10^{-3}		b	103
			50	1.37×10^{-4}			263
		Benzonitrile	25.0	2.62×10^{-6}	121.3	b,h	103
			50.3	1.56×10^{-4}		b	103
			74.7	3.14×10^{-3}			103
		tert-Butylbenzene	50	1.33×10^{-4}			263
			50	3.83×10^{-5}		z (1140)	263
			50	9.53×10^{-6}		z (4265)	263
		Chlorobenzene	25.0	3.77×10^{-6}	118.4	b,h	103
			49.6	1.67×10^{-4}		b	103
			74.7	3.93×10^{-3}		b	103
		Cumene	50	1.50×10^{-4}			263
			50	6.82×10^{-5}		z (1140)	263
			50	7.65×10^{-6}		z (4265)	263
		Cyclohexane	25.0	4.22×10^{-6}	102.5	h	103
			49.6	9.90×10^{-5}		b	103
			74.7	1.75×10^{-3}		b	103
		Decane	60	5.72×10^{-4}			263
		Dodecane	60	5.35×10^{-4}			263
		Diethyl malonate	25.1	3.1×10^{-6}	116.6		114
			74.5	2.8×10^{-3}			114
			80.1	5.9×10^{-3}			114
			85.9	1.0×10^{-2}			114
		Ethylbenzene	50	1.58×10^{-4}			263
		Heptane	60	6.60×10^{-4}			263
		Hexadecane	60	4.76×10^{-4}			263
		Hexane	60	7.60×10^{-4}			263
		Nitrobenzene	25.0	2.6×10^{-6}	118.7		114
			74.5	3.0×10^{-3}			114
			80.1	5.8×10^{-3}			114
			85.9	9.8×10^{-3}			114
		Octane	50	1.59×10^{-4}			263
			50	7.53×10^{-5}		z (1140)	263
			50	1.17×10^{-5}		z (4265)	263
			60	6.41×10^{-4}			263
		Pyridine	53.35	1.74×10^{-4}	129.7		52
			64.00	8.0×10^{-4}			52
		Tetradecane	60	4.99×10^{-4}			263
		Toluene	43.8	6.3×10^{-5}	115.5		42
			53.8	2.4×10^{-4}			42
			45	9.23×10^{-5}			263
			50	1.73×10^{-4}			263
			45.45	8.48×10^{-5}	122.6		75
			55.55	3.51×10^{-4}			75
			43.30	6.0×10^{-5}	113.0		52
			53.35	2.25×10^{-4}			52
			53.3	2.25×10^{-4}	113.0		46
26	2,2′-Azo-bis[2-(4-ethyl-5-propyl-imidazoline-2-yl)propane 2HCl	Methanol	50	9.75×10^{-5}			356
		Water	50	1.33×10^{-4}			356
	Azo-bis-diphenylmethane	Toluene	54.0	1.01×10^{-4}			107,312
			64.0	3.40×10^{-4}	111.3		46,107,312
	1,1′-Bis-biphenyl-azo-methane	Diphenyl ether	135.0	1.23×10^{-4}	134.1	h	297
			145.0	3.58×10^{-4}			297
			155.0	7.76×10^{-4}			297
			165.0	2.09×10^{-3}			297
	1,1′-Azo-bis-1-(4-tolyl)-cyclohexane	Toluene	36.0	8.7×10^{-6}	107.1		200

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TABLE 2. *cont'd*

Number of C atoms	Initiator	Solvent	T (°C)	k_d (s^{-1})	E_a (kJ/mol)	Notes	Refs.
26 (*cont'd*)	1,1′-Azo-bis-1-(4-tolyl)-cyclohexane	Toluene	42.8	2.01×10^{-5}			200
			61.1	2.009×10^{-4}			200
	1,1′-Diisopropyl-2,2′-dimethyl-1,1′-Diphenyl-azo-propane	Ethylbenzene	50.0	6.24×10^{-5}			324
			60.0	2.49×10^{-4}			324
			70.0	7.77×10^{-4}			324
	4-Methoxyphenyl-azo-triphenyl-methane	Toluene	54.00	2.13×10^{-4}	117.2		52
			64.00	7.6×10^{-4}			52
	1,1′-Diphenyl-azo-cycloheptane	Benzene	16.2	1.65×10^{-4}			323
			24.8	5.52×10^{-4}			323
			33.4	1.66×10^{-3}			323
			41.1	4.52×10^{-3}			323
	3-Tolyl-azo-triphenylmethane	Benzene	50	1.30×10^{-4}			263
		tert-Butylbenzene	50	1.30×10^{-4}			263
		Cumene	50	1.51×10^{-4}			263
		Ethylbenzene	50	1.72×10^{-4}			263
		Octane	45	8.9×10^{-5}			263
		Toluene	43.8	7.4×10^{-5}	113.8		42
			53.8	2.77×10^{-4}			42
			45	9.74×10^{-5}			263
			50	1.81×10^{-4}			263
	4-Tolyl-azo-triphenylmethane	Benzene	50	1.26×10^{-4}			263
		tert-Butylbenzene	50	1.35×10^{-4}			263
		Cumene	50	1.40×10^{-4}			263
		Ethylbenzene	50	1.62×10^{-4}			263
		Octane	45	8.6×10^{-5}			263
		Toluene	43.30	6.9×10^{-5}	100.4		52
			53.35	2.25×10^{-4}			52
			45	9.3×10^{-5}			263
			50	1.52×10^{-4}			263
27	4-Acetaminophenyl-azo-triphenyl-methane	Toluene	54.00	1.46×10^{-4}	125.5		52
			64.00	5.9×10^{-4}			52
28	1,1′-Azo-bis-1,2-diphenyl-ethane (meso)	Ethylbenzene	96.56	2.75×10^{-5}	138.5	a,h	162
			106.47	9.03×10^{-5}		a	162
			115.28	2.42×10^{-4}		a	162
	(D,L)		96.56	3.22×10^{-5}	138.9	a,h	162
			106.47	1.04×10^{-4}		a	162
			115.28	2.84×10^{-4}		a	162
30	1,1′-Dibutyl-1,1′-diphenyl-azo-pentane	Ethylbenzene	50.0	5.05×10^{-5}	108.9	h	324
			60.0	2.03×10^{-4}			324
			70.0	6.24×10^{-4}			324
34	1,1′-Azo-bis-(1,3-diphenyl-pentane)	Bromobenzene	89.7	1.5×10^{-5}			311
		Xylene	118.8	5.6×10^{-4}			311
40	3,10,13,20-Tetraphenyl-1,2,11,12-tetra-aza-l,11-cycloeicosadiene	Xylene	110	7.20×10^{-5}	145.6		38
			120	2.30×10^{-4}			38
			130	6.90×10^{-4}			38
44	3,12,15,24-Tetraphenyl-1,2,13,14-tetra-aza-1,13-cyclotetracosadiene	Ethylbenzene	112.95	8.761×10^{-5}			158
		Xylene	110.8	8.9×10^{-5}	126.4		48
			119.8	2.2×10^{-4}			48
			110	7.63×10^{-5}	143.9		38
			120	2.46×10^{-4}			38
			130	7.12×10^{-4}			38
	Poly[oxyethylenexoxy-(1-oxo-2,2-dimethylethylene)-azo-(2-oxo-1,1-dimethyl-ethylene)	*o*-Xylene	85	2.106×10^{-4}	124.0		332
			95	7.312×10^{-4}			332
			105	1.995×10^{-3}			332
			T (K)	1.99×10^{14}	$\exp[-124.0/RT]$		332

TABLE 3. ALKYL PEROXIDES

Number of C atoms	Initiator	Solvent	T (°C)	k_d (s^{-1})	E_a (kJ/mol)	Notes	Refs.
2	Methyl peroxide	Vapor	T (K)	1.6×10^{15}	exp[− 147.7/RT]		72
		Methanol	T (K)	4.1×10^{15}	exp[− 153.9/RT]		225
4	Ethyl peroxide	Styrene	60	1.2×10^{-9}	147.3		92
		Vapor	140.2	1.75×10^{-4}	131.8	a	127
			147.8	3.60×10^{-4}		a	127
			160.0	1.08×10^{-3}		a	127
			176.5	3.78×10^{-3}		a	127
			184.5	7.16×10^{-3}		a	127
			145.9	6.69×10^{-4}			187
			145.9	5.02×10^{-4}		t_8	187
		Vapor (toluene)	200	3.58×10^{-2}	132.6		87
			210	6.76×10^{-2}			87
			218	1.47×10^{-1}			87
			226	2.23×10^{-1}			87
			234	3.86×10^{-1}			87
			245	6.43×10^{-1}			87
5	2,4-Pentanedione peroxide	Triethyl phosphate	100	1.9×10^{-6}	92	a	337
			115	6.1×10^{-6}		a	337
			125	1.4×10^{-5}		a	337
6	Propyl peroxide	Vapor	146.5	2.50×10^{-4}	132.2	a	128
			155.3	6.00×10^{-4}		a	128
			166.8	1.95×10^{-3}		a	128
			175.4	4.10×10^{-3}		a	128
	Isopropyl peroxide	Styrene	60	$6. \times 10^{-10}$	154.8		92
7	Allyl *tert*-butylperoxide	Toluene	130	5.76×10^{-5}	139.1	h,m_6	321
			140	1.785×10^{-4}			321
			150	4.800×10^{-4}			321
			160	1.270×10^{-3}			321
	Dimethylaminomethyl *tert*-butyl peroxide		110	5.5×10^{-5}	134.5		303
			120	1.9×10^{-4}			303
			130	4.76×10^{-4}			303
8	*tert*-Butyl peroxide	Acetic acid	115	1.2×10^{-5}	139.7	h	192
			120	2.19×10^{-5}			192
			125	2.98×10^{-5}			192
			130	6.29×10^{-5}			192
		Acetonitrile	95	9.53×10^{-7}			208
			125	3.89×10^{-5}		d	208
			115	1.19×10^{-5}	129.7	h	192
			120	2.21×10^{-5}			192
			125	3.47×10^{-5}			192
			130	5.63×10^{-5}			192
		Benzene	80	7.81×10^{-8}	142.3	m_2,u_2	129
			130	$(2.48-3.04) \times 10^{-5}$		m_2,u_2	129
			100	8.8×10^{-7}	146.9	a	126,337
			100	8.75×10^{-7}			197
			115	5.66×10^{-6}		a	126,337
			130	3.00×10^{-5}		a	126,337
			120	1.39×10^{-5}		z (0.98)	33
			120	7.6×10^{-6}		z (864)	33
			120	7.5×10^{-6}		z (1620)	33
			120	3.7×10^{-6}		z (3480)	33
			120	1.10×10^{-5}	147.7	h	192
			125	1.99×10^{-5}			192
			130	3.22×10^{-5}			192
			135	6.19×10^{-5}			192
		Benzhydrol	125	8.7×10^{-5}			140
		tert-Butanol	120	1.41×10^{-5}	143.5	h	192
			125	2.49×10^{-5}			192
			130	4.30×10^{-5}			192
			135	7.32×10^{-5}			192
		2-Butanol	125	4.8×10^{-5}			140
		n-Butyl mercaptan	125	1.5×10^{-5}			140
		Tri-*n*-butylamine	125	$(1.7 \pm 0.3) \times 10^{-5}$			64
			135	$(4.2 \pm 0.4) \times 10^{-5}$			64

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TABLE 3. *cont'd*

Number of C atoms	Initiator	Solvent	T (°C)	k_d (s^{-1})	E_a (kJ/mol)	Notes	Refs.
8 (*cont'd*)	*tert*-Butyl peroxide	Tri-*n*-butylamine	145	$(1.60 \pm 0.21) \times 10^{-4}$			64
			T (K)	2.8×10^{14}	exp[− 146.4/RT]		123
		tert-Butylbenzene	125	$(1.5 \pm 0.2) \times 10^{-5}$			64
			135	$(5.0 \pm 0.3) \times 10^{-5}$			64
			145	$(1.51 \pm 0.22) \times 10^{-4}$			64
			T (K)	2.8×10^{14}	exp[− 146.4/RT]		123
			125	2.10×10^{-6}		u_1	301
			125	2.49×10^{-6}		s	301
			125	2.03×10^{-6}		s,t_6	301
		Carbon tetrachloride	120	9×10^{-6}		z (0.98)	33
			120	2.4×10^{-6}		z (1930)	33
			120	2.3×10^{-6}		z (2890)	33
			120	8.6×10^{-7}		z (5525)	33
			125	1.40×10^{-6}		u_1,t_6	301
		Chlorobenzene	150	4.45×10^{4}			346
			121	1.93×10^{-5}			344
			141	1.93×10^{-4}			344
			164	1.93×10^{-3}			344
			T (K)	4.20×10^{15}	exp[− 153.46/RT]		344
		Cumene	125	$(1.6 \pm 0.1) \times 10^{-5}$			64
			135	$(5.2 \pm 0.3) \times 10^{-5}$			64
			145	$(1.56 \pm 0.13) \times 10^{-4}$			64
			T (K)	2.8×10^{14}	exp[− 146.4/RT]		123
		Cyclohexane	95	2.48×10^{-7}	170.7	h	208
			120	6.3×10^{-6}			192
			125	1.52×10^{-5}			192
			130	2.59×10^{-5}			192
			135	4.64×10^{-5}			192
		Cyclohexanol	125	2.4×10^{-5}			140
		Cyclohexene	120	7.6×10^{-6}	156.1	h	192
			125	1.38×10^{-5}			192
			130	2.81×10^{-5}			192
			135	4.41×10^{-5}			192
			120	8.3×10^{-6}		z (0.98)	33
			120	6.2×10^{-6}		z (1275)	33
			120	3.77×10^{-6}		z (2890)	33
			120	2.65×10^{-6}		z (5725)	33
		Cyclohexylamine	125	5.50×10^{-5}	157.3	h	143
		Decane	80	1.39×10^{-8}			270
			110	2.01×10^{-6}			270
			130	2.48×10^{-5}			270
			115	3.00×10^{-6}	163	a	337
			130	2.16×10^{-5}		a	337
			140	6.66×10^{-5}		a	337
		Dodecane	80	1.29×10^{-8}			270
			110	1.87×10^{-6}			270
			130	2.44×10^{-5}			270
		Dimethylaniline	120	9.6×10^{-6}			192
			125	1.89×10^{-5}			192
			130	3.41×10^{-5}			192
			135	5.84×10^{-5}			192
		Ethyl benzoate	120	1.07×10^{-5}	148.5	h	192
			125	1.92×10^{-5}			192
			130	3.39×10^{-5}			192
			135	5.90×10^{-5}			192
		N-Ethylcyclohexyl amine	125	4.01×10^{-5}			143
		Heptane	80	1.44×10^{-8}			270
			110	2.19×10^{-6}			270
		Hexadecane	80	1.07×10^{-8}			270
			110	1.82×10^{-6}			270
			130	2.33×10^{-5}			270
		Hexane	80	1.64×10^{-8}			270
			110	2.17×10^{-6}			270

TABLE 3. *cont'd*

Number of C atoms	Initiator	Solvent	T (°C)	k_d (s^{-1})	E_a (kJ/mol)	Notes	Refs.
8 (*cont'd*)	*tert*-Butyl peroxide	2-Methyl-2-butanol	120	1.26×10^{-5}	149.4	h	192
			125	2.34×10^{-5}			192
			130	4.47×10^{-5}			192
			135	6.80×10^{-5}			192
		Methyl methacrylate	T (K)	2.8×10^{14}	$\exp[-146.4/RT]$		123
		N-Methylpipendine	125	1.54×10^{-5}			143
		Mineral oil	T (K)	1.31×10^{15}	$\exp[-154.6/RT]$		376
		Nonane	80	1.36×10^{-8}			270
			110	2.01×10^{-6}			270
			130	2.54×10^{-5}			270
		Norbornanol	125	4.4×10^{-5}			140
		Nujol	125	7.8×10^{-7}		u	301
		Octane	80	1.48×10^{-8}			270
			110	2.19×10^{-6}			270
		2-Octanol	125	5.5×10^{-5}			140
		Piperidine	125	3.49×10^{-5}			143
		1-Propanol	125	2.8×10^{-5}			140
		Styrene	T (K)	2.8×10^{14}	$\exp[-146.4/RT]$		123
		Tetradecane	80	1.12×10^{-8}			270
			110	1.82×10^{-6}			270
			130	2.38×10^{-5}			270
		Tetrahydrofuran	120	9.7×10^{-6}	155.2	h	192
			125	1.84×10^{-5}			192
			130	3.39×10^{-5}			192
			135	5.76×10^{-5}			192
			125	1.5×10^{-5}			140
		Toluene	100	6.82×10^{-7}			197
			120	1.34×10^{-5}		z (0.98)	33
			120	9.5×10^{-6}		z (2000)	33
			120	8.0×10^{-6}		z (2850)	33
			120	5.7×10^{-6}		z (5170)	33
			125	1.6×10^{-5}			140
			125	1.62×10^{-5}			143
			T (K)	1.30×10^{16}	$\exp[-158.3/RT]$		376
		Triethylamine	120	7.9×10^{-6}	169.9	h	192
			125	1.69×10^{-5}			192
			130	3.15×10^{-5}			192
			135	5.55×10^{-5}			192
		Vapor (acetone)	127.5	7.4×10^{-6}			238
			131	1.13×10^{-5}			238
			146	6.0×10^{-5}			238
			151.5	1.03×10^{-4}			238
			162	3.6×10^{-4}			238
			167	5.2×10^{-4}			238
			145	1.3×10^{-4}	165.3		125
			T (K)	5.9×10^{16}	$\exp[-165.3/RT]$		125
		Vapor (carbon tetrachloride)	150	8.58×10^{-4}		l	130
		Vapor (chloroform)	150	1.167×10^{-3}		l	130
		Vapor (dichloro-difluoromethane)	150	$>(2.00 \times 10^{-4})$			130
		Vapor (trichloro ethylene)	150	2.35×10^{-3}		l	130
		Vapor (methylene chloride)	150	1.017×10^{-3}		l	130
		Vapor (3-pentanone)	145	1.5×10^{-4}	165.3		125
			T (K)	6.8×10^{16}	$\exp[-165.3/RT]$		125
		Vapor (silicon tetrafluoride)	160	1.05×10^{-3}	113.0	a,i(2.6)	117
			160	1.25×10^{-3}		a,i(33)	117
			160	1.27×10^{-3}		a,i(100)	117
		Vapor (toluene)	148	9.0×10^{-5}			88
			158	2.5×10^{-4}			88
		Vapor	103.2	5.6×10^{-7}			227
			111.9	2.03×10^{-6}			227

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TABLE 3. *cont'd*

Number of C atoms	Initiator	Solvent	T (°C)	k_d (s^{-1})	E_a (kJ/mol)	Notes	Refs.
8 (*cont'd*)	*tert*-Butyl peroxide	Vapor	120.2	6.39×10^{-6}			227
			129.5	1.98×10^{-5}			227
			138.5	6.00×10^{-5}			227
			145.4	1.24×10^{-4}			227
			125	1.1×10^{-5}			64
			135	3.6×10^{-5}			64
			145	1.15×10^{-4}			64
			129.6	1.64×10^{-5}			86
			141.0	6.28×10^{-5}			86
			152.5	2.25×10^{-4}			86
			166.8	8.92×10^{-4}			86
			130	1.82×10^{-5}	159.0	a	96
			140	5.75×10^{-5}		a	96
			150	1.75×10^{-4}		a	96
			160	4.88×10^{-4}		a	96
			170	1.35×10^{-3}		a	96
			129	1.97×10^{-5}			88
			138	4.3×10^{-5}			88
			149	1.30×10^{-4}			88
			152	1.62×10^{-4}			88
			139.7	6.0×10^{-5}	163.6		63
			147.2	1.43×10^{-4}			63
			154.6	3.22×10^{-4}			63
			159.8	5.53×10^{-4}			63
			T (K)	3.2×10^{16}	$\exp[-163.6/RT]$		63
			145	1.3×10^{-4}	161.5		125
			T (K)	1.9×10^{16}	$\exp[-161.5/RT]$		175,125
			149.5	1.79×10^{-4}	156.5	i(37-132)	83
			160	4.00×10^{-4}	154.8	a,i(2.6)	117
			160	4.53×10^{-4}		a,i(33)	117
			160	4.83×10^{-4}		a,i(100)	117
			130	1.91×10^{-5}	156.7	u_3	277
			140	5.95×10^{-5}		u_3	277
			150	1.78×10^{-4}		u_3	277
			160	4.96×10^{-4}		u_3	277
		Vapor (He)	280	7.7	154.8	i(10)	111
			290	1.51×10^{1}		i(10)	111
			300	2.77×10^{1}		i(10)	111
			310	4.87×10^{1}		i(10)	111
			320	8.34×10^{1}		i(10)	111
			330	1.38×10^{2}		i(10)	111
			340	2.13×10^{2}		i(10)	111
			350	3.22×10^{2}		i(10)	111
		KBr pellets	109	3.8×10^{-7}	159.0	h	241
			127	2.96×10^{-5}			241
			149	4.4×10^{-4}			241
	tert-Butyl 2-chloro-1,1-dimethylethyl-peroxide	Cumene	120	8.82×10^{-6}			363
			130	2.80×10^{-5}			363
			140	9.26×10^{-5}			363
			150	2.78×10^{-4}			363
	sec-Butyl peroxide	Toluene	100	2.7×10^{-6}			197
		Vapor	100	1.5×10^{-6}			197
	Butyl peroxide	Decane	80	1.43×10^{-8}		t_6	270
		Dodecane	80	1.17×10^{-8}		t_6	270
		Heptane	80	2.04×10^{-8}		t_6	270
		Hexadecane	80	8.8×10^{-9}		t_6	270
		Octane	80	1.58×10^{-8}		t_6	270
		Styrene	60	3.3×10^{-9}	142.3		92
		Tetradecane	80	9.6×10^{-9}		t_6	270
	Bromo-*tert*-butyl peroxide	Chlorobenzene	150	3.63×10^{-4}			346
	Chloro-*tert*-butyl peroxide	Chlorobenzene	150	4.15×10^{-4}			346
	Bis(chloro-*tert*-butyl) peroxide	Chlorobenzene	150	3.11×10^{-4}			346
	2-*tert*-Butyl peroxy-2-methyl-1-propanol	Chlorobenzene	150	1.16×10^{-3}			346

TABLE 3. *cont'd*

Number of C atoms	Initiator	Solvent	T (°C)	k_d (s^{-1})	E_a (kJ/mol)	Notes	Refs.
8 (*cont'd*)	2-*tert*-Butyl peroxy-2-methyl-1-propanol-d_1	Chlorobenzene	150	1.23×10^{-3}			346
	1-Hydroxybutyl-*n*-butyl peroxide	α-Methylstyrene	79.4	1.7×10^{-5}	102.9		32
			99.4	1.06×10^{-4}			32
			109.9	2.9×10^{-4}			32
	1-Hydroxyisobutyl-isobutyl peroxide	α-Methylstyrene	79.4	3.7×10^{-5}	83.7	c	32
			99.4	2.0×10^{-4}		c	32
			109.9	4.8×10^{-4}		c	32
	1-Hydroxyisobutyl-1-di-isobutyl-1,1-d_2 peroxide	α-Methylstyrene	99.5	6.9×10^{-5}	89.5		25
			109.8	1.8×10^{-4}			25
			122.0	4.2×10^{-4}			25
	Dimethylaminomethyl-*tert*-amyl peroxide	Styrene	110	4.9×10^{-5}	130.7	t_{11}	303
			120	1.19×10^{-4}		t_{11}	303
			130	3.76×10^{-4}		t_{11}	303
	Diethylaminomethyl-*tert*-butyl peroxide	Styrene	110	4.1×10^{-5}	132.4	t_{11}	303
			120	1.35×10^{-4}		t_{11}	303
			130	3.25×10^{-4}		t_{11}	303
	N-Piperidinomethyl-*tert*-butyl peroxide	Styrene	110	5.5×10^{-5}	130.7	t_{11}	303
			120	2.66×10^{-4}		t_{11}	303
			130	4.16×10^{-4}		t_{11}	303
9	*tert*-Butyl *tert*-amyl peroxide	Cumene	110	3.86×10^{-6}			363
			120	1.287×10^{-5}			363
			130	4.30×10^{-5}			363
			140	1.406×10^{-4}			363
10	*tert*-Amyl peroxide	Bulk	125	5.7×10^{-5}			202
			132.2	1.15×10^{-4}			202
		Chlorobenzene	108	1.93×10^{-5}			344
			128	1.93×10^{-4}			344
			150	1.93×10^{-3}			344
			T (K)	4.02×10^{15}	$\exp[-148.35/RT]$		344
		Decalin	125	2.8×10^{-5}			202
		Octane	125	3.0×10^{-5}			202
		Triethylamine	125	3.5×10^{-5}			202
		Vapor	132.2	7.2×10^{-5}	154.8–171.5	i(200–225)	63
			136.7	1.15×10^{-4}		i(200–225)	63
			142.2	2.16×10^{-4}		i(200–225)	63
			149.2	4.8×10^{-4}		i(100–200)	63
			136.7	1.34×10^{-4}		i(440–610)	63
			142.2	2.41×10^{-4}		i(440–610)	63
			149.7	5.61×10^{-4}		i(440–610)	63
	tert-Butyl 1,1-dimethylbutyl peroxide	Cumene	110	4.38×10^{-6}			363
			120	1.537×10^{-5}			363
			130	4.99×10^{-5}			363
			140	1.544×10^{-4}			363
	tert-Butyl 1,1,2-trimethylpropyl peroxide	Cumene	110	7.07×10^{-6}			363
			120	2.374×10^{-5}			363
			130	7.62×10^{-5}			363
			140	2.308×10^{-4}			363
	2-Methyl-2-*tert*-butyl-peroxyacetate	Chlorobenzene	150	4.12×10^{-4}			346
	Ethyl 2-*tert*-butylperoxymethyl-propenoate	Triisopropylbenzene	127.5	1.63×10^{-4}		c_2	353
			130	1.95×10^{-4}		c_2	353
			132.5	2.16×10^{-4}		c_2	353
			135	2.56×10^{-4}		c_2	353
			137.5	3.47×10^{-4}		c_2	353
			140	3.92×10^{-4}		c_2	353
			142.5	4.68×10^{-4}		c_2	353
			145	5.37×10^{-4}		c_2	353
			147.5	6.30×10^{-4}		c_2	353
			150	7.76×10^{-4}		c_2	353
11	Apocamphane-1- formyl peroxide	Benzene	80	2.3×10^{-4}			244
12	2,2-Bis(*tert*-butylperoxybutane)	Benzene	85	3.0×10^{-6}	151	a	337
			100	1.9×10^{-5}		a	337
			115	9.36×10^{-5}		a	337

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TABLE 3. *cont'd*

Number of C atoms	Initiator	Solvent	T (°C)	k_d (s^{-1})	E_a (kJ/mol)	Notes	Refs.
12 (*cont'd*)	*tert*-Butyl 1,1,3,3-tetramethylbutyl peroxide	Cumene	110	1.085×10^{-5}			363
			120	3.73×10^{-5}			363
			130	1.141×10^{-4}			363
			140	3.40×10^{-4}			363
	1-Hydroxy-1-hydroperoxy-dicyclohexyl peroxide	Benzene	85	9.6×10^{-6}		a,c_2	337
			100	5.1×10^{-5}		a,c_2	337
			115	1.9×10^{-4}		a,c_2	337
			130	5.2×10^{-4}		a,c_2	337
	Di-(1-hydroxycyclohexyl)-peroxide	Chlorobenzene	105	$\sim 1.9 \times 10^{-5}$			344
			120	$\sim 1.9 \times 10^{-4}$			344
	Diisopropylaminomethyl-*tert*-amyl peroxide	Styrene	110	3.9×10^{-5}	132.4	t_{11}	303
			120	1.21×10^{-4}		t_{11}	303
			130	3.0×10^{-4}		t_{11}	303
	1-Phenylethyl *tert*-butyl peroxide	Chlorobenzene	129.2	3.09×10^{-5}			282
13	*tert*-Butylα-cumyl peroxide	*tert*-Butylbenzene	138	1.48×10^{-4}		a	80
			158	9.62×10^{-4}		a	80
		Chlorobenzene	115	1.93×10^{-5}			344
			136	1.93×10^{-4}			344
			159	1.93×10^{-3}			344
			T (K)	1.17×10^{15}	$\exp[-146.98/RT]$		344
		Cumene	138	1.44×10^{-4}		a	80
			158	8.88×10^{-4}		a	80
			125	3.04×10^{-5}			352
		Dodecane	128	4.44×10^{-5}	146.4	a	80
			138	1.39×10^{-4}		a	80
			148	3.21×10^{-4}		a	80
			158	8.88×10^{-4}		a	80
	tert-Butyl *p*-chlorocumyl peroxide	Cumene	125	2.42×10^{-5}			352
	tert-Butyl *p*-nitrocumyl peroxide	Cumene	125	2.20×10^{-5}			352
14	*tert*-Butyl 1,1-dimethyl-2-phenyl-ethyl peroxide	Cumene	110	4.35×10^{-6}			363
			120	1.458×10^{-5}			363
			130	4.70×10^{-5}			363
			140	1.463×10^{-4}			363
	1,1-Di-(*tert*-butylperoxy)-cyclohexane	Benzene	93	1.9×10^{-5}		a	338
	Ethyl-3,3-di-*tert*-butylperoxy)-butyrate	Benzene	111	1.9×10^{-5}		a	338
	1-[4-(Dimethylamino)phenyl]-ethyl *tert*-butyl peroxide	Chlorobenzene	100.4	1.82×10^{-6}	151.7		282
			110.8	6.97×10^{-6}			282
			120.9	2.18×10^{-5}			282
			129.2	6.18×10^{-5}			282
			129.2	5.22×10^{-5}		m_2	282
	tert-Butyl *p*-methoxycumyl peroxide	Cumene	125	3.72×10^{-5}			352
	tert-Butyl *p*-methylcumyl peroxide	Cumene	125	3.22×10^{-5}			352
	tert-Butyl *m*-methoxycumyl peroxide	Cumene	125	2.84×10^{-5}			352
	Bis(1,1,2,2-tetramethylpropyl) peroxide	Cumene	125	4.84×10^{-4}			352
15	2-[4-(Dimethylamino)phenyl]-propyl *tert*-butyl peroxide	Chlorobenzene	129.2	1.51×10^{-4}		m_2	282
16	1,1-Di-(*tert*-amylperoxy)-cyclohexane	Benzene	90	1.9×10^{-5}		a	338
	tert-Butyl 3-isopropenyl-cumyl peroxide	Chlorobenzene	104	1.93×10^{-5}			344
			126	1.93×10^{-4}			344
			152	1.93×10^{-3}			344
			T (K)	1.161×10^{13}	$\exp[-128.33/RT]$		344
	2,5-Dimethyl-2,5-di(*tert*-butyl-peroxy)-hexane	Benzene	115	1.15×10^{-5}	166.9	a	126,337
			130	6.86×10^{-5}		a	126,337
			145	4.75×10^{-4}		a	126,337
		Chlorobenzene	115	1.93×10^{-5}			344
			134	1.93×10^{-4}			344
			156	1.93×10^{-3}			344
			T (K)	1.68×10^{16}	$\exp[-155.49/RT]$		344
	2,5-Dimethyl-2,5-di(*tert*-butyl-peroxy)-3-hexyne	Benzene	115	3.91×10^{-6}	156.9	a	126,337
			130	2.35×10^{-5}		a	126,337
			145	1.14×10^{-4}		a	126,337
			160	6.17×10^{-4}		a	126,337

TABLE 3. *cont'd*

Number of C atoms	Initiator	Solvent	T (°C)	k_d (s^{-1})	E_a (kJ/mol)	Notes	Refs.
16 (*cont'd*)	2,5-Dimethyl-2,5-di(*tert*-butylperoxy)-3-hexyne	Chlorobenzene	120	1.93×10^{-5}			344
			141	1.93×10^{-4}			344
			164	1.93×10^{-3}			344
			T (K)	1.90×10^{15}	exp[− 150.67/RT]		344
17	*n*-Butyl-4,4-bis(*tert*-butylperoxy)-valerate	Dodecane	100	5.83×10^{-6}		a	8
			115	3.53×10^{-5}		a	8
			130	2.91×10^{-4}		a	8
	1,1-Bis-(*tert*-butylperoxy)-3,3,5-trimethylcyclohexane	Benzene	85	6.9×10^{-6}	138	a	337
			100	5.05×10^{-5}		a	337
			115	2.71×10^{-4}		a	337
18	Cumyl peroxide	Benzene	115	2.05×10^{-5}	159	a	337
			130	1.05×10^{-4}		a	126,337
			145	6.86×10^{-4}		a	126,337
		tert-Butylbenzene	158	1.72×10^{-3}		a	80
		Chlorobenzene	112	1.93×10^{-5}			344
			132	1.93×10^{-4}			344
			154	1.93×10^{-3}			344
			T (K)	9.24×10^{15}	exp[− 152.67/RT]		344
		Cumene	T (K)	4.31×10^{14}	exp[− 144.3/RT]		67
			138	2.57×10^{-4}		a	80
			158	1.52×10^{-3}		a	80
		Dodecane	128	8.75×10^{-5}		a	80
			138	2.31×10^{-4}		a	80
			148	5.37×10^{-4}		a	80
			158	1.83×10^{-3}		a	80
		Diisopropylcarbinol	138	3.16×10^{-4}		a	80
		Neat	150	3.98×10^{-3}		a	371
			155	4.81×10^{-3}		a	371
			160	9.63×10^{-3}		a	371
			165	1.16×10^{-2}		a	371
	Bicyclo[2.2.2]octane-1-formyl peroxide	Carbon tetrachloride	30	1.71×10^{-4}			244
				1.73×10^{-3}		n	244
				1.68×10^{-4}		v_1	244
		Chlorobenzene	30	6.20×10^{-4}			244
		Cyclohexane	30	6.1×10^{-5}			244
		Isooctane	30	5.0×10^{-5}			244
		Toluene	30	3.66×10^{-4}			244
20	α,α′-Bis(*tert*-butylperoxy)-diisopropyl benzene	Benzene	115	1.9×10^{-5}	147	a	337
			125	4.91×10^{-5}		a	337
			130	9.61×10^{-5}		a	337
		Chlorobenzene	114	1.93×10^{-5}			344
			134	1.93×10^{-4}			344
			156	1.93×10^{-3}			344
			T (K)	7.65×10^{15}	exp[− 152.69 kJ/RT]		344
		Neat	155	3.61×10^{-3}		a	371
			160	4.44×10^{-3}		a	371
			165	4.62×10^{-3}		a	371
24	2,5-Dimethyl-2,5-di-(2-ethylhexanoylperoxy) hexane	Benzene	68	1.9×10^{-5}		a	338

TABLE 4. ACYL PEROXIDES

Number of C atoms	Initiator	Solvent	T (°C)	k_d (s^{-1})	E_a (kJ/mol)	Notes	Refs.
4	Acetyl peroxide	Acetic acid	55.2	2.8×10^{-6}	126.4	d,e	106,176
			64.9	9.9×10^{-6}		d,e	106,176
			75.2	3.75×10^{-5}		d,e	106,176
			85.2	1.30×10^{-4}		d,e	106,176
			73.2	2.62×10^{-5}		a	100

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Table 4. *cont'd*

Number of C atoms	Initiator	Solvent	T (°C)	k_d (s^{-1})	E_a (kJ/mol)	Notes	Refs.
4 (*cont'd*)	Acetyl peroxide	Benzene	35	9.5×10^{-7}			68
			55	3.14×10^{-6}			68
			65	1.27×10^{-5}			68
			50	1.1×10^{-6}	134	a	337
			70	2.39×10^{-5}		a	126,337
			85	1.73×10^{-4}		a	126,337
			70	2.38×10^{-5}		a	16
			60.3	5.0×10^{-6}			4
			80	8.7×10^{-5}			20
			55.2	2.6×10^{-6}	135.1	c,e	106,176
			64.9	1.07×10^{-5}		c,e	106,176
			75.2	4.65×10^{-5}		c,e	106,176
			85.2	1.62×10^{-4}		c,e	106,176
		n-Butanol	60.3	3.4×10^{-5}			4
		sec-Butanol	60.3	3×10^{-5}			4
		tert-Butanol	60.3	3.1×10^{-6}	133.9		4
			80.3	4.9×10^{-5}			4
		Carbon tetrachloride	26	1.08×10^{-7}			68
			46	4.84×10^{-7}			68
			65	2.11×10^{-6}			68
			80	5.5×10^{-5}			20
		Chloroform	80.3	~ 5			4
		Cyclohexane	55.2	2.1×10^{-6}	131.4	c,e	106,176
			64.9	8.3×10^{-6}		c,e	106,176
			75.2	3.60×10^{-5}		c,e	106,176
			85.2	1.27×10^{-4}		c,e	106,176
		Cyclohexene	60	4.5×10^{-6}	133.5		20
			70	1.77×10^{-5}			20
			80	7.0×10^{-5}			20
			90	2.28×10^{-4}			20
			100	7.61×10^{-4}			20
		Cyclopentene	70	1.60×10^{-5}	137.2		20
			80	7.0×10^{-5}			20
			90	2.55×10^{-4}			20
			100	7.25×10^{-4}			20
		Cumene	80	7.6×10^{-5}			20
		Decane	80	6.85×10^{-5}			168
		n-Dodecane	60	2.3×10^{-6}			70
			80	6.15×10^{-5}			168
		Ethanol	60.3	1.01×10^{-4}	129.7		4
			80.3	1.40×10^{-3}			4
		Heptane	80	7.72×10^{-5}			168
		Hexadecane	80	5.39×10^{-5}			168
		n-Hexane	60	3.4×10^{-6}			70
		1-Hexene	70	2.35×10^{-5}	132.6		20
			80	8.7×10^{-5}			20
			90	3.05×10^{-4}			20
			100	9.83×10^{-4}			20
		2-Methyl-1-pentene	80	9.0×10^{-5}	126.8		20
			90	3.12×10^{-4}			20
			100	9.81×10^{-4}			20
		n-Octadecane	60	1.9×10^{-6}			70
		n-Octane	60	2.9×10^{-6}			70
			80	7.34×10^{-5}			168
		Isooctane	60	2.9×10^{-6}			70
			55.2	2.35×10^{-6}	134.7	c,e	106,176
			64.9	9.4×10^{-6}		c,e	106,176
			75.2	4.03×10^{-5}		c,e	106,176
			85.2	1.49×10^{-4}		c,e	106,176
		1-Pentene	70	2.45×10^{-5}			20
			80	9.4×10^{-5}			20
			90	3.22×10^{-4}			20
		Propionic acid	64.9	1.4×10^{-5}			106,176
			85.2	1.66×10^{-4}		d,e	106,176

Table 4. *cont'd*

Number of C atoms	Initiator	Solvent	T (°C)	k_d (s^{-1})	E_a (kJ/mol)	Notes	Refs.
4 (*cont'd*)	Acetyl peroxide	*n*-Tetradecane	60	2.0×10^{-6}			70
			80	5.90×10^{-5}			168
		Toluene	60.3	5×10^{-6}	129.7		4
			55.2	2.7×10^{-6}	133.9	c,e	106,176
			64.9	1.14×10^{-5}		c,e	106,176
			75.2	4.70×10^{-5}		c,e	106,176
			85.2	1.59×10^{-4}		c,e	106,176
			73.2	3.06×10^{-5}	138.1	a	100
			85.5	1.72×10^{-4}		a	100
			90	7.33×10^{-5}	129.7	a	113
		Vapor (toluene)	88.0	3.12×10^{-4}	123.4		105
			134.7	3.1×10^{-2}			105
			150.7	1.18×10^{-1}			105
			161.7	2.77×10^{-1}			105
			170.7	6.10×10^{-1}			105
			184.2	1.76			105
6	Propionyl peroxide	Acetic acid	65.0	3.8×10^{-5}	123.0	c,e	51
			85.0	4.3×10^{-4}		c,e	51
		Acetic anhydride	65.0	3.5×10^{-5}	128.9	d,e	51
			85.0	4.5×10^{-4}		c,e	51
		Benzene	65.0	1.88×10^{-5}	129.3	c,e	51
			85.0	2.40×10^{-4}		c,e	51
			50	2.72×10^{-6}	127.6	a	126,337
			70	4.30×10^{-5}		a	126,337
			85	2.89×10^{-4}		a	126,337
		Benzonitrile	65.0	3.9×10^{-5}	130.5	d,e	51
			85.0	5.1×10^{-4}		d,e	51
		Dioxane	65.0	4.5×10^{-5}	116.7	c,e	51
			85.0	4.5×10^{-4}		c,e	51
		n-Hexane	65.0	1.50×10^{-5}	123.8		51
			85.0	1.72×10^{-4}			51
		Isooctane	65.0	9.8×10^{-6}	130.5	c,e	51
			86.5	1.44×10^{-4}		c,e	51
		Nitrobenzene	65.0	3.7×10^{-5}	120.9	c,e	51
			85.0	4.1×10^{-4}			51
		Toluene	65.0	1.87×10^{-5}	130.1		51
			85.0	2.54×10^{-4}			51
		Vapor	65.0	1.0×10^{-5}	125.5		51
			85.0	1.6×10^{-4}			51
			99.4	8×10^{-4}	125.5		85
			134.4	2.6×10^{-2}			85
			152.2	1.22×10^{-1}			85
			176.4	8.0×10^{-1}			85
			190.9	2.33			85
			T (K)	2.5×10^{-4}	$\exp[-125.5/RT]$		85
	2-Iodopropionyl peroxide	Acetone	56	2.19×10^{-4}		s	77
		Benzene	62.5	$(2.40-2.81) \times 10^{-4}$		s	77
			62.5	7.12×10^{-4}		n,s	77
			62.5	$(2.36 \pm 0.07) \times 10^{-4}$	108.8	p	77
		n-Butyl vinyl ether	62.5	2.47×10^{-4}		s	77
		Cyclohexene	62.5	2.7×10^{-4}		s	77
		95% Ethanol	62.5	4.0×10^{-4}		s	77
	Perfluoropropionyl peroxide	Freon 113	20	2.19×10^{-5}	100.1	h	283
			30	8.50×10^{-5}			283
			40	3.26×10^{-4}			283
			T (K)	1.8×10^{9}	$\exp[-83.8/RT]$		304
		Isooctane	T (K)	1.5×10^{17}	$\exp[-121.5/RT]$		304
	2,2,3,3-Tetrafluoropropionyl peroxide	Freon 113	25	2.26×10^{-4}	86.3	h	283
			35	7.17×10^{-4}			283
8	*tert*-Butyl permaleic acid	Acetone	87	1.9×10^{-5}		a	338
	Butyryl peroxide	Acetic acid	65.0	4.7×10^{-5}	125.1	c,e	51
			85.0	5.6×10^{-4}		c,e	51
		Acetic anhydride	65.0	4.3×10^{-5}			51
			85.0	5.5×10^{-4}		c,e	51

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Table 4. *cont'd*

Number of C atoms	Initiator	Solvent	T (°C)	k_d (s^{-1})	E_a (kJ/mol)	Notes	Refs.
8 (*cont'd*)	Butyryl peroxide	Benzene	65.0	2.24×10^{-5}	131.4	d,e	51
			85.0	3.02×10^{-4}		c,e	51
		Benzonitrile	65.0	4.3×10^{-5}	131.4	d,e	51
			85.0	5.8×10^{-4}			51
		Dioxane	65.0	4.6×10^{-5}	116.3	c,e	51
			85.0	4.6×10^{-4}		c,e	51
		Hexane	65.0	1.14×10^{-5}	131.4	c,e	51
			85.0	1.53×10^{-4}		c,e	51
		Isooctane	65.0	1.11×10^{-5}	133.5	c,e	51
			85.0	1.56×10^{-4}		c,e	51
		Toluene	65.0	2.14×10^{-5}	130.5	d,e	51
			85.0	2.87×10^{-4}		c,e	51
		Vapor	65.0	1.6×10^{-5}	123.8		51
			85.0	2.0×10^{-4}			51
			96.7	8.6×10^{-4}	123.8		85
			127.4	1.5×10^{-2}			85
			158.9	3.0×10^{-1}			85
			178.9	1.27			85
			T (K)	1.9×10^{-4}	$\exp[-123.8/RT]$		85
	Isobutyryl peroxide	Acetonitrile	40	6.81×10^{-4}		m_3	167
		Benzene	20	1.6×10^{-5}	109	a	337
			30	6.75×10^{-5}		a	337
			40	2.59×10^{-4}		a	337
			40	2.38×10^{-4}		m_3	167
			40	2.40×10^{-4}			148,244
		Benzonitrile	40	4.2×10^{-4}			148
		tert-Butanol	40	2.51×10^{-4}			148
		Carbon tetrachloride	40	7.8×10^{-5}			148
			45	1.58×10^{-4}			148
			50	3.05×10^{-4}			148
			55	5.61×10^{-4}			148
			60	7.67×10^{-4}			148
		Chlorobenzene	40	1.73×10^{-4}			148
			23	1.93×10^{-5}			344
			39	1.93×10^{-4}			344
			57	1.93×10^{-3}			344
			T (K)	3.37×10^{14}	$\exp[-109.06/RT]$		344
		Chloroform	40	7.5×10^{-5}			148
		Cyclohexane	40	4.5×10^{-5}			148
			40	4.70×10^{-5}			167
		Fluorobenzene	40	1.23×10^{-4}			148
		Isooctane	25	3.35×10^{-6}	114.2		84
			35	1.54×10^{-5}			84
			45	6.14×10^{-5}			84
			55	2.26×10^{-4}			84
			T (K)	2.8×10^{14}	$\exp[-114.2/RT]$		84
			40	3.2×10^{-5}			148
		Isopropanol	40	3.05×10^{-4}			148
		Nitrobenzene	40	5.80×10^{-4}			148
		Nujol	40	4.63×10^{-5}			167
		Tetralin	40	1.75×10^{-4}			148
		Toluene	40	1.43×10^{-4}			148
		Vapor	40	$\sim 1 \times 10^{-5}$			167
		p-Xylene	40	1.40×10^{-4}			148
	Cyclopropane formyl peroxide	Carbon tetrachloride	64.5	4.4×10^{-6}			34
			70.4	9.3×10^{-6}			34
			77.8	2.31×10^{-5}			34
	Diacetyl succinoyl diperoxide	Styrene	60	5.2×10^{-6}	125.5		215
			73.5	2.3×10^{-5}			215
			85	9.3×10^{-5}			215
	Succinoyl peroxide	Acetone	70	2.80×10^{-5}	99.6	a	126,337
			85	1.21×10^{-4}		a	126,337
			100	4.36×10^{-4}		a	126,337

Table 4. *cont'd*

Number of C atoms	Initiator	Solvent	T (°C)	k_d (s^{-1})	E_a (kJ/mol)	Notes	Refs.
9	Acetyl benzoyl peroxide	Chlorobenzene	70	2×10^{-5}			155
			96	5.12×10^{-4}		z(25),v_{13}	284
			96	4.08×10^{-4}		z(19),v_{13}	284
10	5-Bromo-2-thenoyl peroxide	Carbon tetrachloride	75	1.53×10^{-5}		a,m_1	232
	4-Bromo-2-thenoyl peroxide	Carbon tetrachloride	75	1.14×10^{-5}		a,m_1	232
	5-Chloro-2-thenoyl peroxide	Carbon tetrachloride	75	1.58×10^{-5}		a,m_1	232
	α-Chloropropionyl m-chlorobenzoyl-peroxide	Acetonitrile	41	3.05×10^{-5}		m_3	167
		Cyclohexane	41	1.51×10^{-5}		m_3	167
	Cyclobutane formyl peroxide	Carbon tetrachloride	65	5.15×10^{-5}			34
			70	$8.95, 6.63 \times 10^{-5}$			34
			75	1.41×10^{-4}			34
	Cyclopropane acetyl peroxide	Carbon tetrachloride	14	9.45×10^{-5}			34
			25	$9.75, 10.57 \times 10^{-4}$			34
			44.5	5.01×10^{-5}	101.7		24
			56.5	2.64×10^{-4}			24
			44.5	$6.5\text{-}8.0 \times 10^{-4}$		n	24
	Diacetyladipoyl diperoxide	Styrene	60	6.6×10^{-6}			215
			73.5	4.73×10^{-5}			215
			85	1.84×10^{-4}			215
	Difuroyl peroxide	styrene	50	7.0×10^{-7}	125.7	h	287
			60	2.9×10^{-6}			287
			70	1.03×10^{-5}			287
	2,2,3,3,4,4,5,5-Octafluoropentanoyl peroxide	Freon 113	20	3.29×10^{-5}	100.6	h	283
			30	1.27×10^{-4}			283
			40	5.01×10^{-4}			283
	Perfluoro-2-(2-ethoxysulfinic acid) propionyl peroxide	Freon 113	T (K)	2.8×10^{14}	$\exp[-95.1/RT]$		304
	Pivaloyl peroxide	Carbon tetrachloride	10	1.9×10^{-4}			244
	2-Thenoyl peroxide	Carbon tetrachloride	75	2.21×10^{-5}		a,m_1	232
	3-Thenoyl peroxide	Carbon tetrachloride	75	2.14×10^{-5}		a,m_1	232
11	Benzoyl isobutyryl peroxide	Acetonitrile	41	4.06×10^{-4}			167
		Cyclohexane	41	1.63×10^{-5}			167
			70	3.05×10^{-4}			167
			40	1.45×10^{-5}	112.5	h,j	164
			50	5.398×10^{-5}		j	164
			60	1.924×10^{-4}		j	164
			70	6.872×10^{-4}		j	164
	m-Chlorobenzoyl isobutyryl peroxide	Acetonitrile	41	1.03×10^{-3}			167
		Cyclohexane	40	3.486×10^{-5}	111.3	h,j	164
			50	1.362×10^{-4}		j	164
			41	4.40×10^{-5}			167
	p-Chlorobenzoyl isobutyryl peroxide	Cyclohexane	50	1.029×10^{-4}		j	164
			55	1.651×10^{-4}			164
			60	3.21×10^{-4}			164
			65	5.638×10^{-4}			164
	p-Fluorobenzoyl isobutyryl peroxide	Cyclohexane	55	1.117×10^{-4}			164
			60	2.038×10^{-4}			164
			65	4.893×10^{-4}			164
			70	9.603×10^{-4}			164
	5-Methyl-bis-2-thenoyl peroxide	Carbon tetrachloride	75	2.92×10^{-5}		a	232
	p-Nitrobenzoyl isobutyryl peroxide	Cyclohexane	40	8.1×10^{-5}			164
			45	1.336×10^{-4}			164
			50	2.889×10^{-4}			164
			55	4.725×10^{-4}			164
			60	8.921×10^{-4}			164
12	β-Allyloxypropionyl peroxide	Toluene	70	2.01×10^{-5}		a	191
			80	8.62×10^{-5}		a	191
			90	2.53×10^{-4}		a	191
		p-Xylene	70	2.32×10^{-5}		a	191
			80	8.88×10^{-5}		a	191
			90	2.95×10^{-4}		a	191
	m-Chlorobenzoyl 2-methyl-butanoyl peroxide	Acetic acid	40	1.60×10^{-3}			256
		Acetonitrile	40	1.72×10^{-3}			256

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Table 4. *cont'd*

Number of C atoms	Initiator	Solvent	T (°C)	k_d (s^{-1})	E_a (kJ/mol)	Notes	Refs.
12 (*cont'd*)	*m*-Chlorobenzoyl 2-methyl-butanoyl peroxide	2-Butanol	40	9.0×10^{-4}			256
		Carbon tetrachloride	40	1.32×10^{-4}			256
		Cyclohexane	40	6.0×10^{-5}			256
	Cyclobutane acetyl peroxide	Carbon tetrachloride	65	1.37×10^{-5}			34
			70	$2.13, 3.08 \times 10^{-5}$			34
			75	3.83×10^{-5}			34
	Cyclopentane formyl peroxide	Carbon tetrachloride	40	1.50×10^{-5}			34
			45	2.55×10^{-5}			34
			50	4.96×10^{-5}			34
			55	$8.17, 7.85 \times 10^{-5}$			34
	Hexanoyl peroxide	Toluene	77	1.186×10^{-4}			209
	5-Hexenoyl peroxide	Toluene	60.1	1.06×10^{-5}	129.3	c	209
			70.4	4.15×10^{-5}		c	209
			76.4	8.59×10^{-5}		c	209
			85.0	2.668×10^{-4}		c	209
	4-Methoxybenzoyl isobutyryl-peroxide	Cyclohexane	55	5.465×10^{-5}			164
			60	1.024×10^{-4}			164
			65	1.876×10^{-4}			164
			70	3.208×10^{-4}			164
	4-Methylbenzoyl isobutyryl-peroxide	Cyclohexane	40	9.61×10^{-6}		j	164
			50	3.619×10^{-5}		j	164
			60	1.305×10^{-4}		j	164
			70	4.772×10^{-4}		j	164
	4-Methyl-2-thenoyl peroxide	Carbon tetrachloride	75	2.92×10^{-5}		a,m_1	232
	5-Methyl-2-thenoyl peroxide	Carbon tetrachloride	75	4.21×10^{-5}		a,m_1	232
	Perfluoro-2-furnanacetyl peroxide	Freon 113	T (K)	1.2×10^{11}	$\exp[-77.1/RT]$		304
	Perfluoro-2-propoxypropionyl-peroxide	Freon 113	T (K)	4.4×10^{14}	$\exp[-98.5/RT]$		304
		perF–ether mix.	T (K)	8.9×10^{16}	$\exp[-110.2/RT]$		304
	Perfluoro-2-*n*-propoxypropionyl-peroxide	Freon 113	20	4.81×10^{-5}	100.1	h	283
			30	1.96×10^{-4}			283
			40	7.16×10^{-4}			283
	Perfluoro-2-iso-propoxypropionyl-peroxide	Freon 113	20	8.32×10^{-5}	102.7	h	283
			30	3.43×10^{-4}			283
			40	1.34×10^{-3}			283
14	2-Azidobenzoyl peroxide	Benzene	50	2.5×10^{-5}		d_2	161
			80	9.4×10^{-4}		d_2	161
	Benzoyl peroxide	Acetic acid	75	7.53×10^{-5}		a,r	74
		Acetone	50	2.25×10^{-6}	111.3	a	126
			70	2.63×10^{-5}		a	126
			85	1.34×10^{-4}		a	126
			100	5.83×10^{-4}		a	126
		Acetonitrile	70	1.76×10^{-5}		t_1	124
		Acetophenone	70	1.15×10^{-5}	126.4	a	5
			80	4.32×10^{-5}		a	5
			94.5	2.30×10^{-4}		a	5
		Allyl alcohol	80	3.80×10^{-4}		a,r	74
		Anisole	30	1.42×10^{-7}		a	109
		Benzaldehyde	80	5.50×10^{-5}		a,r	74
			90	1.71×10^{-4}		a,r	74
		Benzene	25	6.4×10^{-5}		p_2	279
			30	4.80×10^{-8}	116.3	a	109
			55	1.14×10^{-6}		a,r	74
			60	2.76×10^{-6}		a,r	74
			60	2.0×10^{-6}	124.3	m_2	14
			80	2.5×10^{-5}		m_2	14
			70	1.38×10^{-5}		a	213
			78	2.30×10^{-5}		c	230
			78	1.67×10^{-5}		t_9	230
			79.8	3.48×10^{-5}			170
			80	4.8×10^{-5}			20
			66	7.72×10^{-6}	129.7	a	131
			72.5	1.87×10^{-5}		a	131
			78	3.77×10^{-5}		a	131
			70	1.17×10^{-5}	133.9	a	73

Table 4. *cont'd*

Number of C atoms	Initiator	Solvent	T (°C)	k_d (s^{-1})	E_a (kJ/mol)	Notes	Refs.
14 (*cont'd*)	Benzoyl peroxide	Benzene	75	2.62×10^{-5}		a	73
			80	4.39×10^{-5}		a	73
			80	3.27×10^{-5}		a,b_2	347
			50.8	4.28×10^{-7}	123.8	a,t_2	69
			54.9	8.53×10^{-7}		a,t_2	69
			60.9	1.66×10^{-6}		a,t_2	69
			65.6	3.22×10^{-6}		a,t_2	69
			71.0	5.94×10^{-6}		a,t_2	69
			75.8	1.19×10^{-5}		a,t_2	69
			70	1.27×10^{-5}	130	a	337
			85	8.94×10^{-5}		a	126,337
			100	4.96×10^{-4}		a	126,337
			70	1.03×10^{-5}		a,m_2	16
			70	1.18×10^{-5}		t_1	124
			75	1.48×10^{-5}	128.0		12
			75	1.66×10^{-5}	124.3	m_3	12
			85	4.7×10^{-5}			12
			85	5.5×10^{-5}		m_3	12
			100	2.28×10^{-4}			12
			100	2.56×10^{-4}		m_3	12
			79	2.58×10^{-5}		a,t_6	120
			80	3.35×10^{-5}		a	7
		Benzyl alcohol	80	4.44×10^{-4}		a,r	74
		Bromobenzene	80.2	8.15×10^{-5}			231
				2.19×10^{-5}		t_9	231
				3.84×10^{-5}	m_1		231
				3.55×10^{-5}	m_3		231
				4.34×10^{-5}	m_5		231
		Butanol	80	6.06×10^{-4}		a,r	74
		Butanone	80	4.64×10^{-5}		a,r	74
		Di-*n*-butyl phthalate	117	2.78×10^{-3}	120.1	y_{16}	236
			127	7.44×10^{-3}			236
			137	1.72×10^{-2}			236
			147	3.89×10^{-2}			236
		Carbon tetrachloride	75	1.07×10^{-5}		a,r	74
			79	1.69×10^{-5}		t_6,a	121
		Chlorobenzene	70	1.35×10^{-5}		t_1	124
			80	4.64×10^{-5}		a,r	74
			80.2	2.85×10^{-5}			231
			80.2	2.36×10^{-5}		t_9	231
			80.2	3.52×10^{-5}		c,m_1	231
			80.2	2.62×10^{-5}		c,m_3	231
			71	1.93×10^{-5}			344
			91	1.93×10^{-4}			344
			113	1.93×10^{-3}			344
			T (K)	6.94×10^{13}	$\exp[-122.35/RT]$		344
		Chloroform	30	5.47×10^{-8}		a	109
		Cumene	80	3.69×10^{-5}		a,r	74
			85	6.39×10^{-5}		a,r	74
			90	1.19×10^{-4}		a,r	74
			30	7.30×10^{-8}		a	109
			45	1.85×10^{7}	120.5		67
			60	1.45×10^{-6}			67
			80	1.70×10^{-5}			67
			T (K)	1.20×10^{13}	$\exp[-120.5/RT]$		67
			100	2.5×10^{-4}		a,t_7	122
		Cyclohexane	80	7.72×10^{-5}		a,r	74
		Decane	80	2.53×10^{-5}			270
		Decalin	80	2.26×10^{-4}		a,r	74
		Dioxane	70	1.30×10^{-5}		t_1	74
			80	6.72×10^{-4}		a,r	74
			80	4.20×10^{-4}		a,r	6
			80	4.18×10^{-5}		a,m_1	232

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Table 4. *cont'd*

Number of C atoms	Initiator	Solvent	T (°C)	k_d (s^{-1})	E_a (kJ/mol)	Notes	Refs.
14 (*cont'd*)	Benzoyl peroxide	Ethanol	25	3.02×10^{-8}		a	351
			40	2.77×10^{-7}		a	351
			50	4.72×10^{-7}		a	351
		Ethylbenzene	30	3.61×10^{-8}		a	109
			75	1.81×10^{-5}		a,r	74
			80	3.33×10^{-5}		a,r	74
			85	5.56×10^{-5}		a,r	74
			90	1.01×10^{-4}		a,r	74
			80	3.15×10^{-5}		c	239
		90% Formic acid	80	6.94×10^{-4}		a,r	74
		n-Heptane	80	3.11×10^{-5}		a,r	74
			80	2.71×10^{-5}			270
			130	5.73×10^{-3}		z (1500)	377
			135	1.02×10^{-2}		z (1500)	377
			140	1.54×10^{-2}		z (1500)	377
			145	2.25×10^{-2}		z (500)	377
			145	2.22×10^{-2}		z (1000)	377
			145	2.21×10^{-2}		z (1500)	377
			145	2.12×10^{-2}		z (2000)	377
			150	3.47×10^{-2}		z (1500)	377
			155	5.21×10^{-2}		z (1500)	377
			160	7.87×10^{-2}		z (1500)	377
		Hexadecane	80	2.51×10^{-5}			270
		Hexane	80	2.85×10^{-5}			270
		Isooctane	80	2.79×10^{-5}			270
			80	2.70×10^{-5}		m_2	308
		Isopropylbenzene	80	3.34×10^{-5}		c	229
		Methyl acetate	49.2	6.28×10^{-7}	123.8	a,t_2	69
			53.9	1.0×10^{-6}		a,t_2	69
		Methylcyclohexane	80	5.25×10^{-5}		a,r	74
		4-Methyl-2pentanone	80	4.28×10^{-5}		a,r	74
		α-Methylstyrene	70	3.02×10^{-5}		a	213
		Mineral oil	80	2.89×10^{-5}		m_2	308
		Neat	105	7.22×10^{-3}		a	371
		Nitrobenzene	80	4.58×10^{-5}		a,r	74
			30	6.61×10^{-8}	117.6	a	109
		PEG 400	25	5.01×10^{-7}		a	351
			40	5.73×10^{-6}		a	351
			50	1.15×10^{-5}		a	351
			70	1.15×10^{-4}		a	351
		90% aq. PEG 400	25	3.65×10^{-7}		a	351
			40	5.35×10^{-6}		a	351
			50	1.15×10^{-5}		a	351
			70	1.15×10^{-4}		a	351
		80% aq. PEG 400	25	2.77×10^{-7}		a	351
			40	3.09×10^{-6}		a	351
			50	7.29×10^{-6}		a	351
			70	1.15×10^{-4}		a	352
		70% aq. PEG 400	25	1.71×10^{-7}		a	351
			40	2.11×10^{-6}		a	351
			50	5.01×10^{-6}		a	351
			70	1.15×10^{-4}		a	351
		n-Pentanol	80	1.48×10^{-4}		a,r	74
		Phenol	80	6.25×10^{-4}		a,r	74
		Propionic acid	80	3.19×10^{-5}		a,r	74
		Propylene glycol	25	3.25×10^{-8}		a	351
			40	1.51×10^{-7}		a	351
			50	3.16×10^{-7}		a	351
		Styrene	34.8	3.89×10^{-8}		a	10
			49.4	5.28×10^{-7}		a	10
			61.0	2.58×10^{-6}		a	10
			74.8	1.83×10^{-5}		a	10
			100.0	4.58×10^{-4}		a	10

Table 4. *cont'd*

Number of C atoms	Initiator	Solvent	T (°C)	k_d (s^{-1})	E_a (kJ/mol)	Notes	Refs.
14 (*cont'd*)	Benzoyl peroxide	Poly(styrene)	56.4	3.8×10^{-7}		a	17
			64.6	1.47×10^{-6}		a	17
			76.7	9.27×10^{-6}		a	17
			83.4	2.50×10^{-5}		a	17
			98.5	1.41×10^{-4}		a	17
			70.9	2.86×10^{-6}		a	15
			80.1	1.11×10^{-5}		a	15
			89.5	3.33×10^{-5}		a	15
		Tetradecane	80	2.64×10^{-5}			270
		Tetralin	80	3.72×10^{-5}		a,r	74
		Toluene	30	4.94×10^{-8}	120.5	a	109
			49.0	6.0×10^{-7}	123.8	a,t_2	69
			55.1	1.31×10^{-6}		a,t_2	69
			60.2	2.83×10^{-6}		a,t_2	69
			65.1	5.69×10^{-6}		a,t_2	69
			70.3	1.10×10^{-5}		a,t_2	69
			60.00	2.24×10^{-6}		e,m_3	291
		Poly(vinylchloride)	64.6	6.3×10^{-7}		a	17
			76.7	5.11×10^{-6}		a	17
			83.4	1.44×10^{-5}		a	17
			98.5	9.33×10^{-5}		a	17
		Styrene	50	7×10^{-7}	125.7		287
			60	7.7×10^{-6}			287
			70	9.9×10^{-6}			287
		p-Xylene	80	3.10×10^{-5}		c	229
	3-Bromobenzoyl peroxide	Benzene	60	1.1×10^{-6}			116
			80	1.22×10^{-5}			116
			80	2.60×10^{-5}		a	7
		Dioxane	80	2.57×10^{-5}		a,m_1	6,232
	4-Bromobenzoyl peroxide	Dioxane	80	3.23×10^{-5}		a,m_1	6,232
	4-*tert*-Butylbenzoyl peroxide	Dioxane	80	6.06×10^{-5}		a,m	232
	2-Chlorobenzoyl peroxide	Acetophenone	80	3.88×10^{-4}	123.0	a	5
		Benzene	80	3.12×10^{-4}		a	7
	3-Chlorobenzoyl peroxide	Acetophenone	80	2.85×10^{-5}	128.4	a	5
		Dioxane	80	2.63×10^{-5}		a,m_1	6
	4-Chlorobenzoyl peroxide	Acetophenone	80	3.83×10^{-5}	127.2	a	5
		Benzene	80	2.17×10^{-5}		a	7
			50	6.2×10^{-7}	128.9	a	126
			85	6.64×10^{-5}		a	126
			100	3.86×10^{-4}		a	126
		Dioxane	80	3.62×10^{-5}		a,m_1	6
		Styrene	34.8	8.3×10^{-8}		a	10
			49.4	8.3×10^{-7}		a	10
			61.0	3.33×10^{-6}		a	10
			74.8	2.22×10^{-5}		a	10
			100.0	4.17×10^{-4}		a	10
	Cyclohexane formyl peroxide	Benzene	30	9.64×10^{-5}	84.5	a,h	219
			35	1.46×10^{-4}			219
			40	3.10×10^{-4}			219
			45	5.11×10^{-4}			219
			50	7.77×10^{-4}			219
		Carbon tetrachloride	35	6.6×10^{-5}			148
			45	2.11×10^{-4}			148
			50	4.45×10^{-4}			148
			60	1.30×10^{-3}			148
			35	2.87×10^{-5}			34
			40	$5.22, 5.29 \times 10^{-5}$			34
			45	9.67×10^{-5}			34
	Cyclopentane acetyl peroxide	Carbon tetrachloride	65	1.48×10^{-5}			34
			70	3.20×10^{-5}			34
			75	4.97×10^{-5}			34
	Diacetylsebacoyl diperoxide	Carbon tetrachloride	60	1.04×10^{-5}		x_1	215
			73.5	5.20×10^{-5}		x_1	215
			85	2.30×10^{-4}		x_1	215

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Table 4. *cont'd*

Number of C atoms	Initiator	Solvent	T (°C)	k_d (s^{-1})	E_a (kJ/mol)	Notes	Refs.
14 (*cont'd*)	2,4-Dichlorobenzoyl peroxide	Benzene	70	9.70×10^{-5}		a,j	16
			70	1.24×10^{-4}		a,k	16
			50	1.08×10^{-5}	117.6	a	126,337
			70	1.37×10^{-4}		a	126,337
			85	7.69×10^{-4}		a	126,337
		Styrene	34.8	3.88×10^{-6}		a	10
			49.4	2.39×10^{-5}		a	10
			61.0	7.78×10^{-5}		a	10
			74.8	2.78×10^{-4}		a	10
			100.0	4.17×10^{-3}		a	10
	2,2,3,3,4,4,5,5,6,6,7,7-Dodeca-fluoroheptanoyl peroxide	Freon 113	30	1.14×10^{-4}	100.6	h	283
			40	4.06×10^{-4}			283
	Heptanoyl peroxide	Toluene	77	1.24×10^{-4}		a	19
	6-Heptenoyl peroxide	Toluene	70	5.33×10^{-5}		a,k	19
			70	5.01×10^{-5}		a,j	19
			77	1.07×10^{-4}		a,j	19
			85	2.88×10^{-4}		a,k	19
	2-Iodobenzoyl peroxide	Chloroform	22	1.86×10^{-3}			82
	2-Iodobenzoyl 4-nitrobenzoyl peroxide	Acetone	25	3.0×10^{-4}			78
		Acetonitrile	25	2.1×10^{-4}			78
		Benzene	25	5.7×10^{-5}			78
		Carbon tetrachloride	25	3.4×10^{-5}			78
		Chloroform	25	2.8×10^{-4}			78
		Nitrobenzene	25	6.2×10^{-4}			78
	3-Methylbenzoyl peroxide	Dioxane	80	4.38×10^{-5}		a,m_1	232
	4-Methylbenzoyl peroxide	Dioxane	80	6.11×10^{-5}		a,m_1	232
	2-Nitrobenzoyl peroxide	Acetophenone	59.3	5.80×10^{-5}	119.7	a	5
			80	1.34×10^{-3}		a	5
		Methyl iodide	24.95	1.78×10^{-5}	81.2	h	82
			45.05	1.50×10^{-4}			82
	3-Nitrobenzoyl peroxide	Acetophenone	80	3.80×10^{-5}	126.4	a	5
	4-Nitrobenzoyl peroxide	Acetophenone	80	4.33×10^{-5}	126.8	a	5
	3,5-Dinitrobenzoyl peroxide	Acetophenone	80	1.87×10^{-5}	130.5	a	5
	Perfluoroheptanoyl peroxide	Freon 113	20	3.01×10^{-5}	98.0		283
			30	1.11×10^{-4}			283
			40	4.20×10^{-4}			283
15	Benzoyl phenylacetyl peroxide	Benzene	20	1.10×10^{-4}	90.8		222
			25	2.05×10^{-4}			222
			25	3.15×10^{-4}		v_1	222
			25	6.38×10^{-4}		n	222
			30	3.88×10^{-4}			222
			35	6.67×10^{-4}			222
	4-*tert*-Butylbenzoyl isobutyryl peroxide	Cyclohexane	55	6.543×10^{-5}		t_{10}	164
			60	1.171×10^{-4}		t_{10}	164
			65	2.663×10^{-4}		t_{10}	164
			70	5.016×10^{-4}		t_{10}	164
	3-Cyanobenzoyl benzoyl peroxide	Dioxane	80	2.73×10^{-2}		a,m_1	6
	3-Methoxybenzoyl benzoyl peroxide	Dioxane	80	4.82×10^{-2}		a,m_1	6
	4-Methoxybenzoyl benzoyl peroxide	Dioxane	80	7.57×10^{-5}		a,m_1	6
	4-Methoxybenzoyl 3-bromobenzoyl peroxide	Dioxane	80	4.43×10^{-2}		a,m_1	6
	4-Methoxybenzoyl-3,5-dinitro-benzoyl peroxide	Benzene	51	1.02×10^{-5}			108
		Nitrobenzene	51	9.61×10^{-4}			108
			51	1.67×10^{-3}		t_5	108
	4-Methoxybenzoyl 4-nitrobenzoyl peroxide	Benzene	70	2.08×10^{-5}		a	89
			70	8.03×10^{-5}		a	89
16	3,5-Dibromo-4-methoxybenzoyl peroxide	Benzene	60	9.5×10^{-7}			95
			60	6.1×10^{-7}			116
			80	9.4×10^{-6}			116
	Caprylyl peroxide	Benzene	50	3.44×10^{-6}	128.9	a	126
			70	5.78×10^{-5}		a	126
			85	3.78×10^{-4}		a	126

Table 4. *cont'd*

Number of C atoms	Initiator	Solvent	T (°C)	k_d (s^{-1})	E_a (kJ/mol)	Notes	Refs.
16 (*cont'd*)	Caprylyl peroxide	Mineral oil	T (K)	9.8×10^{15}	exp[− 140.1/RT]		1
	p-(Chloromethyl)benzoyl peroxide	Acetone	70	2.07×10^{-5}			307
			70	1.82×10^{-5}		m_7	307
		THF	70	1.15×10^{-5}			307
		Toluene	70	8.8×10^{-6}			307
	3-Cyanobenzoyl peroxide	Dioxane	80	1.70×10^{-2}		a,m_1	6
	4-Cyanobenzoyl peroxide	Acetophenone	80	2.43×10^{-5}		a	5
		Dioxane	80	2.03×10^{-5}		a,m_1	6
	Cycloheptane formyl peroxide	Carbon tetrachloride	35	7.85×10^{-5}			34
			40	$1.63, 1.34 \times 10^{-5}$			34
			45	2.02×10^{-4}			34
	Cyclohexane acetyl peroxide	Carbon tetrachloride	65	1.27×10^{-5}			34
			70	2.76×10^{-5}			34
			75	3.61×10^{-5}			34
			54.4	3.1×10^{-6}			24
			64.3	1.19×10^{-5}			24
			71.8	2.95×10^{-5}			24
	2-Ethyl-4-methyl-2-pentenoyl peroxide	Mineral oil	T (K)	7.1×10^{16}	exp[− 138.4/RT]		1
	2-Ethylhexanoyl peroxide	Mineral oil	T (K)	1.2×10^{14}	exp[− 106.4/RT]		1
	2-Ethyl-2-hexenoyl peroxide	Mineral oil	T (K)	1.6×10^{16}	exp[− 136.3/RT]		1
	2-Iodophenylacetyl peroxide	Acetone	0	2.60×10^{-5}			79
		Chloroform	0	3.98×10^{-5}		c,e,q	79
		Toluene	0	1.3×10^{-5}		q	79
	2-Methoxybenzoyl peroxide	Acetophenone	50	6.0×10^{-5}	113.8	a	5
			80	2.15×10^{-3}		a	5
	3-Methoxybenzoyl peroxide	Acetophenone	80	6.42×10^{-5}	120.9	a	5
		Dioxane	80	5.75×10^{-5}		a,m_1	6
	4-Methoxybenzoyl peroxide	Acetophenone	80	1.56×10^{-4}	120.1	a	5
		Dioxane	80	1.18×10^{-4}		a,m_1	6
	2-Methylbenzoyl peroxide	Acetophenone	70	9.02×10^{-5}	126.4	a	5
	3-Methylbenzoyl peroxide	Acetophenone	80	4.70×10^{-5}	126.4	a	5
		Dioxane	80	4.40×10^{-5}		a,m_1	6
	4-Methylbenzoyl peroxide	Acetophenone	80	5.92×10^{-5}	125.1	a	5
		Dioxane	80	6.13×10^{-5}		a,m_1	6
	Endo-norbornane-2-carbonyl-peroxide	Carbon tetrachloride	44.5	6.1×10^{-6}		j	23
			53.9	2.83×10^{-5}		j	23
			65.9	1.25×10^{-4}		j	23
			44.5	9.1×10^{-6}		j,m_2	23
			53.9	4.33×10^{-5}		j, m_2	23
			65.9	1.28×10^{-4}		j,m_2	23
	Exo-norbornane-2-carbonyl-peroxide	Carbon tetrachloride	44.5	4.68×10^{-5}		j	23
			53.9	2.05×10^{-4}		j	23
			65.9	8.18×10^{-4}		j	23
			44.5	7.2×10^{-5}		j, m_2	23
			53.9	1.60×10^{-4}		j,m_2	23
			65.9	8.48×10^{-4}		j, m_2	23
	Endo-norbornene-5-carbonyl-peroxide	Carbon tetrachloride	44.5	6.30×10^{-5}		j	23
			53.9	1.21×10^{-4}		j	23
			65.9	7.18×10^{-4}		j	23
			445	2.22×10^{-5}		j,m_2	23
			53.9	4.52×10^{-5}		j,m_2	23
			65.9	2.37×10^{-4}		j,m_2	23
	Exo-norbornene-5-carbonyl-peroxide	Carbon tetrachloride	44.5	6.58×10^{-5}		j	23
			53.9	1.21×10^{-4}		j	23
			65.9	8.42×10^{-4}		j	23
			44.5	2.58×10^{-5}		j,m_2	23
			53.9	1.20×10^{-4}		j,m_2	23
			65.9	7.10×10^{-4}		j,m_2	23
	Dioctanoyl peroxide	*n*-Heptane	70	1.70×10^{-5}		z (1500)	377
			80	7.01×10^{-5}		z (500)	377
			80	6.80×10^{-5}		z (1000)	377

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Table 4. *cont'd*

Number of C atoms	Initiator	Solvent	T (°C)	k_d (s^{-1})	E_a (kJ/mol)	Notes	Refs.
16 (*cont'd*)	Dioctanoyl peroxide	*n*-Heptane	80	6.27×10^{-5}		z (1500)	377
			80	6.01×10^{-5}		z (2000)	377
			80	5.77×10^{-5}		z (2500)	377
			90	2.13×10^{-4}		z (1500)	377
			95	3.80×10^{-4}		z (1500)	377
			100	6.79×10^{-4}		z (1500)	377
	Dioctanoyl peroxydicarbonate	Chlorobenzene	63	1.93×10^{-5}			344
			80	1.93×10^{-4}			344
			100	1.93×10^{-3}			344
			T (K)	2.30×10^{15}	$\exp[-129.05/RT]$		344
	Phenylacetyl peroxide	Acetonitrile	20	1.02×10^{-3}			167
		Benzene	20	4.76×10^{-4}			167
		Carbon tetrachloride	20	1.86×10^{-4}			167
		Cyclohexane	20	1.60×10^{-4}			167
		Styrene	0	7.8×10^{-5}			316
		Toluene	0	2.50×10^{-5}	96.2	f,u_1	59
			18	3.34×10^{-4}		f,u_1	59
	Triptoyl peroxide	Benzene	80	1.42×10^{-4}			102
			80	1.4×10^{-4}			244
18	Apocamphoyl peroxide	Benzene	80	2.3×10^{-4}			102
	cis-5-*tert*-Butylcyclohexylformyl-*m*-chlorobenzoyl peroxide	Acetonitrile	40	5.9×10^{-3}			256
		2-Butanol	40	4.4×10^{-3}			256
		Carbon tetrachloride	40	6.7×10^{-4}			256
		Cyclohexane	40	4.4×10^{-4}			256
	trans-4-*tert*-Butylcyclohexylformyl-*m*-chlorobenzoyl peroxide	Acetonitrile	40	4.2×10^{-3}			256
		2-Butanol	40	2.8×10^{-3}			256
		Carbon tetrachloride	40	6.5×10^{-4}			256
		Cyclohexane	40	3.9×10^{-4}			256
	5-*tert*-Butylthenoyl peroxide	Carbon tetrachloride	75	4.03×10^{-5}		a,m_1	232
	Cinnamoyl peroxide	Styrene	50	1.20×10^{-5}			316
			70	1.67×10^{-4}			316
	Dibenzoyl succinoyl diperoxide	Unknown	70	7.7×10^{-6}	125.5	x_1	214
			75	1.42×10^{-5}		x_1	214
			85	5.4×10^{-5}		x_1	214
	Nonanoyl peroxide	Mineral oil	T (K)	8.4×10^{14}	$\exp[-127.1/RT]$		1
	Isononanoyl peroxide (3,5,5-trimethylhexanoyl peroxide)	Benzene	50	6.1×10^{-6}	126	a	337
			70	8.02×10^{-5}		a	337
			85	5.30×10^{-4}		a	337
			60	1.9×10^{-5}		a	338
		Chlorobenzene	59	1.93×10^{-5}			344
			77	1.93×10^{-4}			344
			96	1.93×10^{-3}			344
			T (K)	2.84×10^{15}	$\exp[-128.34/RT]$		344
		n-Heptane	60	5.28×10^{-6}		z (1500)	377
			70	2.06×10^{-5}		z (1500)	377
			80	9.53×10^{-5}		z (1)	377
			80	9.10×10^{-5}		z (500)	377
			80	8.62×10^{-5}		z (1000)	377
			80	8.24×10^{-5}		z (1500)	377
			80	7.86×10^{-5}		z (2000)	377
			80	7.46×10^{-5}		z (2500)	377
			90	2.52×10^{-4}		z (1500)	377
			100	8.81×10^{-4}		z (1500)	377
			120	6.98×10^{-3}		z (1500)	377
			125	1.27×10^{-2}		z (1500)	377
			130	2.15×10^{-2}		z (1500)	377
			135	2.60×10^{-2}		z (1500)	377
			140	5.71×10^{-2}		z (1500)	377
			145	8.62×10^{-2}		z (1500)	377
			150	1.17×10^{-1}		z (1500)	377
	2-Nonenoyl peroxide	Mineral oil	T (K)	1.6×10^{15}	$\exp[-128.8/RT]$		1

Table 4. *cont'd*

Number of C atoms	Initiator	Solvent	T (°C)	k_d (s^{-1})	E_a (kJ/mol)	Notes	Refs.
18 (*cont'd*)	3-Nonenoyl peroxide	Mineral oil	T (K)	3.7×10^{14}	exp[$-108.0/RT$]		1
	2-Phenylpropionyl peroxide	Cyclohexane	55.8	6.8×10^{-6}			258
		On silica	49.4	7.5×10^{-5}			258
		Styrene	70	5.5×10^{-5}			316
19	Dibenzoyl itaconyl diperoxide	Unknown	70	5.63×10^{-4}	83.7	x_2	214
				1.87×10^{-5}	115.1	x_2	214
			75	8.63×10^{-4}		x_2	214
				3.62×10^{-5}		x_2	214
			85	1.69×10^{-3}		x_2	214
				1.00×10^{-4}		x_2	214
	Dibenzoyl α-methylsuccinoyl-diperoxide	Unknown	70	2.74×10^{-4}	82.8	x_2	214
				1.26×10^{-5}	116.3	x_2	214
			75	4.26×10^{-4}		x_2	214
				2.40×10^{-5}		x_2	214
			85	9.60×10^{-4}		x_2	214
				8.7×10^{-5}		x_2	214
20	Decanoyl peroxide	Benzene	60	1.53×10^{-5}	127.2	a	126,337
			70	5.67×10^{-5}		a	126,337
			85	3.80×10^{-4}		a	126,337
		Chlorobenzene	63	1.93×10^{-5}			344
			80	1.93×10^{-4}			344
			100	1.93×10^{-3}			344
			T (K)	3.64×10^{15}	exp[$-130.48/RT$]		344
		Mineral oil	T (K)	2.7×10^{15}	exp[$-131.9/RT$]		1
	Dioctanoyl α-bromosuccinoyl-diperoxide	Unknown	70	1.52×10^{-4}	96.2	x_2	214
				1.82×10^{-5}	126.4	x_2	214
			75	2.74×10^{-4}		x_2	214
				3.83×10^{-5}		x_2	214
			85	6.97×10^{-4}		x_2	214
				1.15×10^{-4}		x_2	214
	Dioctanoyl α-chlorosuccinoyl-diperoxide	Unknown	70	2.02×10^{-4}	95.4	x_2	214
				2.42×10^{-5}	126.4	x_2	214
			75	3.23×10^{-4}		x_2	214
				4.83×10^{-5}		x_2	214
			85	8.50×10^{-4}		x_2	214
	Dioctanoyl α-chlorosuccinoyl-diperoxide	Unknown	85	1.58×10^{-4}		x_2	214
	4-Ethyl-2-octenoyl peroxide	Mineral oil	T (K)	8.2×10^{14}	exp[$-127.4/RT$]		1
21	Dioctanoyl itaconoyl diperoxide	Unknown	70	3.23×10^{-4}	92.9	x_2	214
				2.80×10^{-5}	127.6	x_2	214
			75	5.47×10^{-4}		x_2	214
				5.60×10^{-5}		x_2	214
			85	1.28×10^{-3}		x_2	214
				1.92×10^{-4}		x_2	214
	Dioctanoyl α-methyl succinoyl-diperoxide	Unknown	70	5.48×10^{-4}	96.2	x_2	214
				5.88×10^{-5}	131.0	x_2	214
			75	9.58×10^{-4}		x_2	214
				1.06×10^{-4}		x_2	214
			85	2.61×10^{-3}		x_2	214
				3.84×10^{-4}		x_2	214
22	Benzoyl 2-[*trans*-2-(3-nitrophenyl)-vinyl]benzoyl peroxide	Chlorobenzene	70	1.87×10^{-4}		t_9	175
	Benzoyl 2-[*trans*-2-(4-nitrophenyl)-vinyl]benzoyl peroxide	Chlorobenzene	70	1.18×10^{-4}		t_9	175
		THF	70	6.2×10^{-5}		t_9	175
	Benzoyl 2-[*trans*-2-(4-nitrophenyl)-vinyl]-4-nitrobenzoyl peroxide	Chlorobenzene	70	1.54×10^{-5}		t_9	175
	Benzoyl 2-[*trans*-2-(phenyl)vinyl]-benzoyl peroxide	Chlorobenzene	35	9.42×10^{-5}	84.5	h,t_9	175
			70	3.02×10^{-3}		t_9	175
		Methanol	35	9.77×10^{-4}		t_9	175
	4-Benzylidenebutyryl peroxide	Acetophenone	50	7.92×10^{-5}	99.6		133
			55	1.45×10^{-4}			133
			65	4.13×10^{-4}			133
			T (K)	1.07×10^{12}	exp[$-99.6/RT$]		133
			55	1.38×10^{-4}	98.7	m_2	133

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Table 4. *cont'd*

Number of C atoms	Initiator	Solvent	T (°C)	k_d (s^{-1})	E_a (kJ/mol)	Notes	Refs.
22 (*cont'd*)	4-Benzylidenebutyryl peroxide	Acetophenone	65	4.02×10^{-4}		m_2	133
			T (K)	7.14×10^{11}	exp[$-98.7/RT$]	m_2	133
		Benzene	50	2.40×10^{-5}	91.2	h	194
			60	6.80×10^{-5}			194
			70	1.845×10^{-4}			194
		Carbon tetrachloride	60	3.47×10^{-5}	112.5	m_2	133
			70	1.06×10^{-4}		m_2	133
			T (K)	1.42×10^{13}	exp[$-112.5/RT$]	m_2	133
		Nitrobenzene	60	3.38×10^{-4}			133
		Propylene carbonate	40	7.36×10^{-5}	89.5		133
			50	2.13×10^{-4}			133
			T (K)	5.93×10^{10}	exp[$-89.5/RT$]		133
			50	2.08×10^{-4}		m_2	133
			40	7.23×10^{-5}	82.0	h	194
			50	2.093×10^{-4}			194
			60	5.117×10^{-4}			194
		Toluene	70	1.64×10^{-4}			133
	4-*tert*-Butylbenzoyl peroxide	Dioxane	80	6.08×10^{-2}		a,m_1	6
	cis-4-*tert*-Butylcyclohexane formyl-peroxide	Butane	40	1.25×10^{-5}		z (0.98)	145
			40	1.69×10^{-5}		z (1010)	145
		Carbon tetrachloride	40.0	$(8.65 \pm 0.35) \times 10^{-5}$	76.1	h	35
			45.45	$(1.32 \pm 0.04) \times 10^{-4}$			35
			50.7	$(2.35 \pm 0.05) \times 10^{-4}$			35
	trans-4-*tert*-Butylcyclohexane formyl-peroxide	Carbon tetrachloride	40.0	$(4.25 \pm 0.23) \times 10^{-5}$	81.6	h	35
			44.7	$(7.10 \pm 0.38) \times 10^{-5}$			35
			48.9	$(1.14 \pm 0.04) \times 10^{-4}$			35
	trans-4-(4-Chlorobenzylidene)-butyryl peroxide	Benzene	50	2.10×10^{-5}	95.0	h	194
			60	6.56×10^{-5}			194
			70	1.75×10^{-4}			194
		Propylene carbonate	40	5.33×10^{-5}			194
			50	1.448×10^{-4}			194
			60	2.791×10^{-4}			194
	trans-4-(4-Fluorobenzylidene)-butyryl peroxide	Benzene	50	2.67×10^{-5}	94.1	h	194
			60	8.44×10^{-5}			194
			70	2.119×10^{-4}			194
		Propylene carbonate	40	6.53×10^{-5}			194
			50	1.685×10^{-4}			194
			60	4.540×10^{-4}			194
	1-Naphthoyl peroxide	Benzene	54.6	1.01×10^{-4}			170
			59.9	1.86×10^{-4}			170
			64.5	3.0×10^{-4}			170
	4-Nitrobenzoyl-2-[*trans*-2-(4-nitro-phenyl)vinyl] benzoyl peroxide	Chlorobenzene	70	6.06×10^{-5}		t_9	175
	2-Phenylisovaleryl peroxide	Acetonitrile	55.0	2.27×10^{-5}			258
		Cyclohexane	55.0	6.4×10^{-6}			258
		On silica	50	2.56×10^{-4}		n_2	258
	5-Phenylpenta-2,4-dienoyl-peroxide	Styrene	70	2.18×10^{-4}			316
	5-Phenylpentanoyl peroxide	Acetophenone	77	2.37×10^{-4}			133
		Benzene	77	1.054×10^{-5}	127.6	h,m_2	194
		Carbon tetrachloride	70	2.76×10^{-5}	130.1	m_2	133
			77	7.19×10^{-5}		m_2	133
			85	1.87×10^{-4}		m_2	133
			T (K)	1.76×10^{15}	exp[$-130.1/RT$]	m_2	133
		Propylene carbonate	60	4.41×10^{-5}			133
			60	2.80×10^{-5}		m_2	133
24	Dibenzoyl 2-bromosebacoyl-diperoxide	Unknown	70	4.80×10^{-4}	87.9	x_2	214
				3.87×10^{-5}	110.8	x_2	214
			75	7.64×10^{-4}		x_2	214
				7.22×10^{-5}		x_2	214
			85	2.00×10^{-3}		x_2	214
				2.02×10^{-4}		x_2	214
	Dioctanoyl 2-bromosebacoyl-diperoxide	Unknown	70	6.46×10^{-4}	99.6	x_2	214
				5.23×10^{-5}	129.7	x_2	214
			75	1.171×10^{-3}		x_2	214

Table 4. *cont'd*

Number of C atoms	Initiator	Solvent	T (°C)	k_d (s^{-1})	E_a (kJ/mol)	Notes	Refs.
24 (*cont'd*)	Dioctanoyl 2-bromosebacoyl-diperoxide	Unknown		1.08×10^{-4}		x_2	214
			85	3.00×10^{-3}		x_2	214
				3.72×10^{-4}		x_2	214
	Lauroyl peroxide	Benzene	30	2.56×10^{-7}		a	99
			40	4.91×10^{-7}			68
			50	2.19×10^{-6}			68
			60	9.17×10^{-6}			68
			70	2.86×10^{-5}			68
			60	1.51×10^{-5}	127.2	a	126,337
			70	5.58×10^{-5}		a	126,337
			85	3.75×10^{-4}		a	126,337
			70	4.33×10^{-5}		a,j	16
		Carbon tetrachloride	40	2.91×10^{-7}			68
			50	1.15×10^{-6}			68
			60	4.75×10^{-6}			68
			70	1.87×10^{-5}			68
		Chlorobenzene	61	1.93×10^{-5}			344
			79	1.93×10^{-4}			344
			99	1.93×10^{-3}			344
			T (K)	3.92×10^{14}	$\exp[-123.37/RT]$		344
		Ethyl acetate	40	6.03×10^{-7}			68
			50	2.70×10^{-6}			68
			61	1.05×10^{-5}			68
			70	3.99×10^{-5}			68
		Ethyl ether	30	1.97×10^{-6}		a	99
		Mineral oil	T (K)	2.2×10^{16}	$\exp[-137.9/RT]$		1
		Styrene	34.8	2.06×10^{-7}		a	10
			49.4	2.25×10^{-6}		a	10
			61.0	1.42×10^{-5}		a	10
			74.8	1.00×10^{-4}		a	10
			100.0	2.39×10^{-3}		a	10
			50	3.1×10^{-6}	121.1		287
			60	1.20×10^{-5}			287
			65	2.22×10^{-5}			287
			70	4.32×10^{-5}			287
	trans-4-(4-Methoxybenzylidene)-butyryl peroxide	Benzene	50	2.03×10^{-4}			194
	trans-4-(4-Methylbenzylidene)-butyryl peroxide	Benzene	50	6.58×10^{-5}	90.4	c,h	194
			60	1.815×10^{-4}		c	194
			70	4.729×10^{-4}		c	194
26	2-Phenoxybenzoyl peroxide	Acetophenone	65	8.18×10^{-5}	121.3	a	5
28	Myristoyl peroxide	Benzene	70	3.38×10^{-5}		a	16
36	Menthylphthaloyl peroxide	Dioxane	55	1.15×10^{-4}			65
x	Aliphatic polymeric diacyl peroxide	Chlorobenzene	75	9.04×10^{-5}		v_{14}	302
			75	9.00×10^{-5}		v_{15}	302
			80	1.720×10^{-4}		v_{15}	302

TABLE 5. HYDROPEROXIDES AND KETONE PEROXIDES

Number of C atoms	Initiator	Solvent	T (°C)	k_d (s^{-1})	E_a (kJ/mol)	Notes	Refs.
4	*sec*-Butyl hydroperoxide	Toluene	172.0	2.65×10^{-5}			199
			182.3	4.9×10^{-5}			199
	tert-Butyl hydroperoxide	Benzene	130	3×10^{-7}	138	a	337
			145	1.6×10^{-6}		a	337
			160	6.6×10^{-6}		a	337
			154.5	4.29×10^{-6}	170.7	h	76
			161.7	9.27×10^{-6}			76
			169.3	2.0×10^{-5}			76
			174.6	4.0×10^{-5}			76

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Table 4. *cont'd*

Number of C atoms	Initiator	Solvent	T (°C)	k_d (s^{-1})	E_a (kJ/mol)	Notes	Refs.
24 (*cont'd*)	Dioctanoyl 2-bromosebacoyl-diperoxide	Unknown		1.08×10^{-4}		x_2	214
			85	3.00×10^{-3}		x_2	214
				3.72×10^{-4}		x_2	214
	Lauroyl peroxide	Benzene	30	2.56×10^{-7}		a	99
			40	4.91×10^{-7}			68
			50	2.19×10^{-6}			68
			60	9.17×10^{-6}			68
			70	2.86×10^{-5}			68
			60	1.51×10^{-5}	127.2	a	126,337
			70	5.58×10^{-5}		a	126,337
			85	3.75×10^{-4}		a	126,337
			70	4.33×10^{-5}		a,j	16
		Carbon tetrachloride	40	2.91×10^{-7}			68
			50	1.15×10^{-6}			68
			60	4.75×10^{-6}			68
			70	1.87×10^{-5}			68
		Chlorobenzene	61	1.93×10^{-5}			344
			79	1.93×10^{-4}			344
			99	1.93×10^{-3}			344
			T (K)	3.92×10^{14}	$\exp[-123.37/RT]$		344
		Ethyl acetate	40	6.03×10^{-7}			68
			50	2.70×10^{-6}			68
			61	1.05×10^{-5}			68
			70	3.99×10^{-5}			68
		Ethyl ether	30	1.97×10^{-6}		a	99
		Mineral oil	T (K)	2.2×10^{16}	$\exp[-137.9/RT]$		1
		Styrene	34.8	2.06×10^{-7}		a	10
			49.4	2.25×10^{-6}		a	10
			61.0	1.42×10^{-5}		a	10
			74.8	1.00×10^{-4}		a	10
			100.0	2.39×10^{-3}		a	10
			50	3.1×10^{-6}	121.1		287
			60	1.20×10^{-5}			287
			65	2.22×10^{-5}			287
			70	4.32×10^{-5}			287
	trans-4-(4-Methoxybenzylidene)-butyryl peroxide	Benzene	50	2.03×10^{-4}			194
	trans-4-(4-Methylbenzylidene)-butyryl peroxide	Benzene	50	6.58×10^{-5}	90.4	c,h	194
			60	1.815×10^{-4}		c	194
			70	4.729×10^{-4}		c	194
26	2-Phenoxybenzoyl peroxide	Acetophenone	65	8.18×10^{-5}	121.3	a	5
28	Myristoyl peroxide	Benzene	70	3.38×10^{-5}		a	16
36	Menthylphthaloyl peroxide	Dioxane	55	1.15×10^{-4}			65
x	Aliphatic polymeric diacyl peroxide	Chlorobenzene	75	9.04×10^{-5}		v_{14}	302
			75	9.00×10^{-5}		v_{15}	302
			80	1.720×10^{-4}		v_{15}	302

TABLE 5. HYDROPEROXIDES AND KETONE PEROXIDES

Number of C atoms	Initiator	Solvent	T (°C)	k_d (s^{-1})	E_a (kJ/mol)	Notes	Refs.
4	*sec*-Butyl hydroperoxide	Toluene	172.0	2.65×10^{-5}			199
			182.3	4.9×10^{-5}			199
	tert-Butyl hydroperoxide	Benzene	130	3×10^{-7}	138	a	337
			145	1.6×10^{-6}		a	337
			160	6.6×10^{-6}		a	337
			154.5	4.29×10^{-6}	170.7	h	76
			161.7	9.27×10^{-6}			76
			169.3	2.0×10^{-5}			76
			174.6	4.0×10^{-5}			76

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TABLE 5. *cont'd*

Number of C atoms	Initiator	Solvent	T (°C)	k_d (s^{-1})	E_a (kJ/mol)	Notes	Refs.
4 (*cont'd*)	*tert*-Butyl hydroperoxide	Benzene	172.3	1.09×10^{-5}			199
			182.6	3.1×10^{-5}			199
		Chlorobenzene	171	1.93×10^{-5}			344
			199	1.93×10^{-4}			344
			231	1.93×10^{-3}			344
		Cumene	182.6	8.1×10^{-5}		c	199
		Cyclohexane	100	1.2×10^{-7}			199
			172	1.41×10^{-4}		c	199
		Dodecane	86.1	1.32×10^{-6}	128.4	b	41
			98.5	5.55×10^{-6}		b	41
		Heptane	172	1.41×10^{-4}			199
		n-Octane	149.8	8×10^{-6}	163.2	f	118
			159.9	2.5×10^{-5}		f	118
			169.6	6.9×10^{-5}		f	118
			179.6	1.82×10^{-5}			118
		Toluene	100	5.7×10^{-8}			199
			172.5	9.2×10^{-6}			199
			181.5	2.69×10^{-5}			199
			192.6	8.3×10^{-5}			199
			204.5	1.52×10^{-4}		c	199
			214.9	3.24×10^{-4}			199
		Vapor	570	3.4×10^{1}			188
			670	4.95			188
			773	8.4×10^{1}			188
			873	5.66×10^{2}			188
			973	2.58×10^{3}			188
	tert-Butyl hydroperoxide/cobalt 2-Ethyl hexanoate	Chlorohenzene	0	1.01×10^{-3}			190
			0	8.29×10^{-5}		v_{10}	190
			0	5.40×10^{-4}		v_7	190
			25	2.3×10^{-3}			198
			25	1.1×10^{-3}		v_1	198
	tert-Butyl hydroperoxide/cobalt stearate		45	1.4×10^{-3}			198
			45	1.0×10^{-3}		v_1	198
	Methyl ethyl ketone peroxides	Benzene	100	1.3×10^{-5}	101	a	337
			115	4.80×10^{-5}		a	337
			130	1.60×10^{-4}		a	337
		Ethyl acetate	70	1.28×10^{-6}			13
5	*tert*-Amyl hydroperoxide	Chlorobenzene	153	1.93×10^{-5}			344
			190	1.93×10^{-4}			344
			228	1.93×10^{-3}			344
6	Acetone cyclic diperoxide	Benzene	135.5	6.25×10^{-7}	147.1	h	286
			145.5	2.09×10^{-6}			286
			165.0	1.41×10^{-5}			286
		Toluene	165.0	1.37×10^{-5}			286
	3,3,6,6-Tetramethyl-1,2,4,5-tetroxane	Benzene	135.5	6.25×10^{-7}			373
			140.5	1.19×10^{-6}			373
			145.5	2.09×10^{-6}			373
			150.5	2.83×10^{-6}			373
			165.0	1.41×10^{-5}			373
		Toluene	165.0	1.37×10^{-5}			373
		Vapor	130.1	1.8×10^{-6}			365
			150.1	3.4×10^{-6}			365
			170.1	3.5×10^{-6}			365
			177.1	4.6×10^{-6}			365
			185.1	1.3×10^{-5}			365
			194.1	2.4×10^{-5}			365
			207.1	8.5×10^{-5}			365
			215.1	1.66×10^{-4}			365
			250.1	4.88×10^{-4}			365
	Cyclohexyl hydroperoxide	Benzene	70	0		a	91
		Benzene/styrene (50/50)	70	1.27×10^{-3}		a	91
		Cyclohexane	130	2.38×10^{-3}		a	91
			140	1.16×10^{-2}		a	91
			150	3.20×10^{-2}		a	91

TABLE 5. *cont'd*

Number of C atoms	Initiator	Solvent	T (°C)	k_d (s^{-1})	E_a (kJ/mol)	Notes	Refs.
6 (*cont'd*)	Cyclohexyl hydroperoxide	Benzene	80	Reaction order varies from 1.5 to 2.0			119
		Cyclohexane	80	Reaction order varies from 1.5 to 2.0			119
		Cyclohexene	80	Reaction order varies from 1.5 to 2.0			119
		Dimethylheptadiene	80	Reaction order varies from 1.5 to 2.0			119
		1-Octene	80	Reaction order varies from 1.5 to 2.0			119
7	Benzyl hydroperoxide	Styrene	60	9×10^{-6}		c_3	276
			60	1.8×10^{-5}		c_4	276
8	1,4-Dimethylcyclohexane-hydroperoxide	1,4-Dimethylcyclohexane	120	1.4×10^{-5}	137.2	c	224
	1,1,3,3-Tetramethylbutyl-hydroperoxide	Benzene	130	1.7×10^{-5}	134	a	337
			145	7.41×10^{-5}		a	337
			160	2.83×10^{-4}		a	337
		Chlorobenzene	135	1.93×10^{-5}			344
			153	1.93×10^{-4}			344
			173	1.93×10^{-3}			344
	2,5-Dimethyl-2,5-di(hydroperoxy)hexane	Benzene	130	2.7×10^{-6}	113	a	337
			145	1.0×10^{-5}		a	337
			160	3.16×10^{-5}		a	337
	n-Octyl hydroperoxide	White oil	150	9.29×10^{-5}	112.5	a	177
	2,4,4-Trimethylpentyl-2-hydroperoxide	White oil	150	9.29×10^{-5}	112.5	a	177
$(8)_x$	Poly(phenyleneethyl hydroperoxide)/manganese resinate	Chlorobenzene	26	2.00×10^{-4}	46.0	t_3	212
			30	2.75×10^{-4}		t_3	212
			35	3.67×10^{-4}		t_3	212
9	Cumene hydroperoxide	Benzene	115	4×10^{-7}	122	a	337
			130	1.7×10^{-6}		a	337
			145	6.6×10^{-6}		a	337
		Chlorobenzene	159	1.93×10^{-5}			344
			193	1.93×10^{-4}			344
			253	1.93×10^{-3}			344
		Cumene	110	2.742×10^{-6}			367
			120	5.194×10^{-6}			367
			132	9.305×10^{-6}			367
			T (K)	2.10×10^{11}	$\exp[-80.0/RT]$		367
		Mesitylene			98.7		58
		Styrene			101.3		58
		Toluene	125	9×10^{-6}			199
			139	3×10^{-5}			199
			182.3	6.45×10^{-5}			199
		White oil	150	1.34×10^{-4}	121.3	a	177
	Cumyl hydroperoxide	Acetone-d_6	−33.0	7.0×10^{-5}	62.0		264
			−23.0	2.28×10^{-4}			264
			−12.0	1.21×10^{-3}			264
			−18.0	8.3×10^{-5}	110.2	t_{14}	264
			−8.0	4.23×10^{-4}		t_{14}	264
			−3.0	1.65×10^{-3}		t_{14}	264
10	*p*-Cymene hydroperoxide	*p*-Cymene	110	5.500×10^{-6}			367
			120	1.200×10^{-5}			367
			132	2.089×10^{-5}			367
			T (K)	1.23×10^{12}	$\exp[-85.48/RT]$		367

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TABLE 5. *cont'd*

Number of C atoms	Initiator	Solvent	T (°C)	k_d (s^{-1})	E_a (kJ/mol)	Notes	Refs.
10 (*cont'd*)	Decalin hydroperoxide	Acetic acid	130	5.5×10^{-4}			228
		Chlorobenzene	130	10% in 3 h			228
		Decalin	130	1.41×10^{-5}	124.3		228
		1,2-Dichlorobenzene	130	4.48×10^{-5}	176.4		228
		Ethylene glycol	130	1.65×10^{-4}	117.2		228
		Nitrobenzene	130	4.73×10^{-5}			228
		Pyridine	130	$(2.31-2.89) \times 10^{-4}$			228
	Pinane hydroperoxide	Benzene	130	7.08×10^{-6}	123.8	a	18
			145	2.72×10^{-5}		a	18
			160	9.17×10^{-5}		a	18
	2-Phenylbutyl 2-hydroperoxide	*sec*-Butylbenzene	110	2.944×10^{-6}			367
			120	6.611×10^{-6}			367
			132	1.089×10^{-5}			367
			T (K)	4.06×10^{12}	$\exp[-87.15/RT]$		367
	1-Phenyl-2-methylpropyl-hydroperoxide	Benzene	133.8	3.18×10^{-6}	122.2	h	76
			143.9	8.95×10^{-6}			76
			153.9	2.0×10^{-5}			76
			163.7	4.03×10^{-5}			76
			174	9.77×10^{-5}			76
	1-Phenyl-2-methylpropyl-2-hydroperoxide	Benzene	144.2	5.04×10^{-6}	125.5	h	76
			154.5	1.21×10^{-5}			76
			165.6	2.92×10^{-5}			76
			176.0	6.97×10^{-5}			76
	Tetralin hydroperoxide	Poly(butene)	170	2.17×10^{-3}	78.2	t_3	71
		n-Butyl stearate	170	1.47×10^{-4}	125.5	t_3	71
		2-Ethyl-1-hexene	130	1.08×10^{-4}	82.8	e,t_3	71
			170	1.26×10^{-3}		t_3	71
		1-Hexadecene	170	7.92×10^{-4}	117.2	t_3	71
		Mineral oil	135.6	4.2×10^{-5}	131.4	t_3	71
			150.6	1.00×10^{-4}		e,t_3	71
			170	4.82×10^{-4}		t_3	71
		n-Octadecane	170	2.54×10^{-4}	119.2	t_3	71
		Isooctane	170	$1\ 31 \times 10^{-4}$		t_3	71
		Octyl ether	170	1.45×10^{-3}	121.3	t_3	71
		Poly(propylene)	170	2.50×10^{-3}		t_3	71
		n-Tetradecane	170	2.32×10^{-4}		t_3	71
		Tetralin	T (K)	2.27×10^{9}	$\exp[-102.1/RT]$		112
		2,2,4-Trimethyl-1-pentene	170	1.67×10^{-3}		t_3	71
		white oil	150	1.34×10^{-4}	121.3		177
$(10)_n$	Poly(cumyleneethylhydroperoxide) (MW 1100)	Toluene	130	2.79×10^{-5}			210
			140	4.0×10^{-5}			210
			150	5.78×10^{-5}			210
11	2,2-Bis(*tert*-butyldioxy)propane	Cumene	90	2.16×10^{-6}			361
			100	9.14×10^{-6}			361
			110	2.97×10^{-5}			361
			120	9.56×10^{-5}			361
	1-Methoxy-1-(*tert*-butylperoxy) cyclohexane	Cumene	80	4.79×10^{-6}			348
			90	1.898×10^{-5}			348
			100	6.57×10^{-5}			348
			110	2.139×10^{-4}			348
	sec-Butyltoluene hydroperoxide	*sec*-Butyl toluene	100	4.111×10^{-6}			367
			110	8.194×10^{-6}			367
			120	1.9555×10^{-5}			367
			T (K)	1.02×10^{16}	$\exp[-110.2/RT]$		367
12	2,2-Di-(*tert*-butylperoxy)butane	Chlorobenzene	98	1.93×10^{-5}			344
			116	1.93×10^{-4}			344
			136	1.93×10^{-3}			344
			T (K)	9.30×10^{16}	$\exp[-154.08/RT]$		344
	2,2-Bis(*tert*-butyldioxy)butane	Cumene	100	1.84×10^{-5}			361
	Diisopropylbenzene monohydroperoxide	Chlorobenzene	150	1.93×10^{-5}			344
			182	1.93×10^{-4}			344
			218	1.93×10^{-3}			344
	1-Methoxy-1-(*tert*-amylperoxy) cyclohexane	Cumene	80	7.82×10^{-6}			348
			90	3.07×10^{-5}			348

TABLE 5. *cont'd*

Number of C atoms	Initiator	Solvent	T (°C)	k_d (s^{-1})	E_a (kJ/mol)	Notes	Refs.
12 (*cont'd*)	1-Methoxy-1-(*tert*-amylperoxy) cyclohexane	Cumene	100	1.058×10^{-4}			348
			110	3.450×10^{-4}			348
13	1-Methoxy-1-(*tert*-hexylperoxy) cyclohexane	Cumene	80	8.34×10^{-6}			348
			90	3.17×10^{-5}			348
			100	1.120×10^{-4}			348
			110	3.653×10^{-4}			348
	1,1-Bis(*tert*-butylperoxy)-cyclopentane	Cumene	80	4.98×10^{-6}			349,364
			90	1.80×10^{-5}			349,364
			100	6.67×10^{-5}			349,364
			110	2.17×10^{-4}			349,364
	2,2-Bis(*tert*-butyldioxy)-3-methyl-butane	Diphenylmethane	90	1.08×10^{-5}			358
			100	3.75×10^{-5}			358
			110	1.29×10^{-4}			358
			120	4.11×10^{-4}			358
		Cumene	100	3.17×10^{-5}			361
14	1,1-Bis(*tert*-butylperoxy)-cyclohexane	Cumene	80	3.47×10^{-6}			349,350
			90	1.45×10^{-5}			349,350
			100	5.06×10^{-5}			349,350
			110	1.62×10^{-4}			348,349,350
		Chlorobenzene	94	1.93×10^{-5}			344
			113	1.93×10^{-4}			344
			134	1.93×10^{-3}			344
			T (K)	3.47×10^{15}	$\exp[-142.4/RT]$		344
		n-Dodecane	100	3.51×10^{-5}			364
		n-Hexadecane	100	3.15×10^{-5}			364
		n-Hexane	100	3.82×10^{-5}			364
		n-Nonane	100	3.62×10^{-5}			364
	1,1-Bis(*tert*-butylperoxy)-2-methyl-cyclopentane	Cumene	80	1.55×10^{-5}			349
			90	5.82×10^{-5}			349
			100	1.85×10^{-4}			349
			110	6.00×10^{-4}			349
	1,1-Diphenylethyl hydroperoxide	Chlorobenzene	90	2.0×10^{-9}			374
			110	1.007×10^{-6}			374
			130	1.034×10^{-6}			374
			150	1.223×10^{-6}			374
			T (K)	1.38×10^{8}	$\exp[-105.4/RT]$		374
15	1-Methoxy-1-(*tert*-octylperoxy)-cyclohexane	Cumene	70	5.9×10^{-6}			348
			80	2.30×10^{-5}			348
			90	8.18×10^{-5}			348
			100	2.840×10^{-4}			348
	1,1-Bis(*tert*-butylperoxy)-2-methyl-cyclohexane	Cumene	80	1.29×10^{-5}			349
			90	4.51×10^{-5}			349
			100	1.43×10^{-4}			349
			110	4.58×10^{-4}			349
16	1,1-Bis(*tert*-amylperoxy)-cyclohexane	Cumene	80	5.34×10^{-6}			348
			90	2.02×10^{-5}			348
			100	7.32×10^{-5}			348
			110	2.44×10^{-4}			348
	1,1-Bis(*tert*-butylperoxy)-cyclooctane	Cumene	90	1.11×10^{-5}			364
			100	4.15×10^{-5}			364
			110	1.36×10^{-4}			364
			120	4.24×10^{-4}			364
17	1,1-Bis(*tert*-butylperoxy)-2-*n*-propyl-cyclohexane	Cumene	80	1.20×10^{-5}			349
			90	4.19×10^{-5}			349
			100	1.38×10^{-4}			349
	1,1-Bis(*tert*-butylperoxy)-2-isopropylcyclohexane	Cumene	70	2.59×10^{-5}			349
			80	4.86×10^{-5}			349
			90	1.98×10^{-4}			349
			100	7.46×10^{-4}			349
	1,1-Bis(*tert*-butylperoxy)-3,3,5-trimethylcyclohexane	Cumene	80	3.82×10^{-6}			349,364
			90	1.50×10^{-5}			349,364
			100	5.31×10^{-5}			349,364
			110	1.75×10^{-4}			349,364

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TABLE 5. *cont'd*

Number of C atoms	Initiator	Solvent	T (°C)	k_d (s^{-1})	E_a (kJ/mol)	Notes	Refs.
17 (*cont'd*)	1,1-Bis(*tert*-butylperoxy)-3,3,5-trimethylcyclohexane	Chlorobenzene	85	1.93×10^{-5}			344
			105	1.93×10^{-4}			344
			128	1.93×10^{-3}			344
			T (K)	7.59×10^{13}	$\exp[-127.52/RT]$		344
	n-Butyl 4,4-di-(*tert*-butylperoxy) valerate	Chlorobenzene	102	1.93×10^{-5}			344
			121	1.93×10^{-4}			344
			143	1.93×10^{-3}			344
			T (K)	1.91×10^{15}	$\exp[-143.51/RT]$		344
18	1,1-Bis(*tert*-hexylperoxy)-cyclohexane	Cumene	80	5.38×10^{-6}			348
			90	2.06×10^{-5}			348
			100	7.48×10^{-5}			348
			110	2.48×10^{-4}			348
20	1,1-Bis(*tert*-butylperoxy)-cyclododecane	Cumene	90	8.14×10^{-6}			364
			100	3.22×10^{-5}			364
			110	9.93×10^{-5}			364
22	1,1-Bis(*tert*-octylperoxy)-cyclohexane	Cumene	80	1.513×10^{-5}			348
			90	5.62×10^{-5}			348
			100	1.983×10^{-4}			348
			110	6.26×10^{-4}			348
31	2,2-Bis[4,4-di-(*tert*-butylperoxycyclohexyl)propane	Chlorobenzene	87	1.93×10^{-5}			344
			106	1.93×10^{-4}			344
			128	1.93×10^{-3}			344
			T (K)	8.79×10^{14}	$\exp[-135.56/RT]$		344

TABLE 6. PERESTERS AND PEROXYCARBONATES

Number of C atoms	Initiator	Solvent	T (°C)	k_d (s^{-1})	E_a (kJ/mol)	Notes	Refs.
4	Dimethyl peroxalate	Pentane	25	1.7×10^{-5}			203
5	*tert*-Butyl percarbamate	Chlorobenzene	90	6.6×10^{-6}			141
	tert-Butyl performate	Chlorobenzene	130.8	5.43×10^{-5}	159.0	h	218
			140.8	1.70×10^{-4}			218
			140.6	1.80×10^{-4}		m_2	218
			140	2.12×10^{-3}	64.0	v_8	218
			140	5.06×10^{-4}		v_1	218
		4-Chlorotoluene	140.6	1.61×10^{-4}			218
			140	1.62×10^{-3}		v_8	218
		Cumene	140.6	1.77×10^{-4}		b	218
			140	1.02×10^{-3}		b,v_6	218
6	Isobutyl peracetate	α-Methylstyrene	79.5	1.36×10^{-5}	115.2		253
			88.4	3.61×10^{-5}			253
			92.8	5.58×10^{-5}			253
	n-Butyl peracetate	α-Methylstyrene	64	$\sim 9.6 \times 10^{-3}$		g_2,v_{16}	253
			64	8.2×10^{-3}		g_2,v_{17}	253
			64	6.5×10^{-4}		g_2,v_{18}	253
			64	1.2×10^{-3}		g_2,v_{19}	253
			79.6	1.57×10^{-5}	101.0		253
			87.8	3.27×10^{-5}			253
			92.6	5.38×10^{-5}			253
	sec-Butyl peracetate	α-Methylstyrene	88.2	1.79×10^{-5}	104.3		253
			92.8	3.19×10^{-5}			253
			99.4	5.37×10^{-5}			253
	tert-Butyl peracetate	*tert*-Amyl alcohol	75	2.8×10^{-6}			193
		Benzene	85	1.2×10^{-6}			193
			85	2.18×10^{-6}	151.9	a	126,337
			100	1.54×10^{-5}		a	126,337
			115	1.02×10^{-4}		a	126,337
			130	5.69×10^{-4}		a	126,337
		n-Butanol	75	2.65×10^{-5}			193

TABLE 6. *cont'd*

Number of C atoms	Initiator	Solvent	T (°C)	k_d (s^{-1})	E_a (kJ/mol)	Notes	Refs.
6 (*cont'd*)	*tert*-Butyl peracetate	2-Butanol	75	1.13×10^{-4}		c	193
			75	5.3×10^{-5}		t_7	193
			75	4×10^{-7}		m_3	193
		Chlorobenzene	60	2.31×10^{-8}	159.0	a,h	81
			100	1.93×10^{-5}			344
			119	1.93×10^{-4}			344
			139	1.93×10^{-3}			344
			T (K)	1.57×10^{16}	exp[$-149.36/RT$]		344
		Decane	100	1.5×10^{-5}	134		337
			115	7.91×10^{-5}			337
			125	2.45×10^{-4}			337
			100	1.95×10^{-5}			270
		Dodecane	100	1.78×10^{-5}			270
		Hexadecane	100	1.55×10^{-5}			270
		Hexane	130.1	5.08×10^{-4}			169
		Octane	100	2.07×10^{-5}			270
		Paraffin	130.1	3.13×10^{-4}			169
		Tetradecane	100	1.55×10^{-5}			270
	tert-Butyl trichloroperacetate	Chlorobenzene	60	1.19×10^{-5}	125.9	a,h	81
			66.8	2.75×10^{-5}	126.8	h	28
			77.0	1.00×10^{-4}			28
	Diethyl peroxydicarbonate	*tert*-Butanol	45	1.25×10^{-5}	133.9–138.1	c	18
			55	5.7×10^{-5}		c	18
		2,2′-Oxydiethylene bis(allyl carbonate)	40	6.94×10^{-6}	127.2	a	90
			50	2.86×10^{-5}		a	90
			60	1.28×10^{-4}		a	90
	Diethyl peroxalate	Pentane	25	2.6×10^{-5}			203
7	*tert*-Amyl peracetate	Chlorobenzene	90	1.93×10^{-5}			344
			108	1.93×10^{-4}			344
			129	1.93×10^{-3}			344
			T (K)	4.13×10^{15}	exp[$-141.1/RT$]		344
	tert-Butyl methoxyperacetate	Ethylbenzene	40.0	2.2×10^{-4}	104.7	a,h	315
			39.6	1.94×10^{-4}	103.9	h	328
			50.2	8.24×10^{-4}			328
			60.1	2.35×10^{-3}			328
	tert-Butyl peracrylate	Benzene	90	1.12×10^{-5}	86.2	a	211
			100	1.51×10^{-5}		a	211
			110	4.85×10^{-5}		a	211
	tert-Butylperoxy isopropyl	Chlorobenzene	98	1.93×10^{-5}			344
			117	1.93×10^{-4}			344
			137	1.93×10^{-3}			344
			T (K)	2.49×10^{16}	exp[$-150.15/RT$]		344
	tert-Butyl perpropionate carborate	Benzene	80	1.53×10^{-6}		a	213
			90	6.04×10^{-6}		a	213
		Decane	100	1.82×10^{-5}			270
		Dodecane	100	1.78×10^{-5}			270
		Hexadecane	100	1.58×10^{-5}			270
		α-Methylstyrene	70	3.02×10^{-7}		a	213
			90	4.85×10^{-6}		a	213
		Octane	100	2.03×10^{-5}			270
		Tetradecane	100	1.68×10^{-5}			270
8	*tert*-Butyl 2-acetoxyperacetate	Ethylbenzene	91.8	2.73×10^{-5}		b	328
	tert-Butyl cyclopropane-percarboxylate	*n*-Dodecane	113.0	5.48×10^{-5}			255
		n-Hexadecane	102.6	1.28×10^{-5}	153.8	h	255
			113.0	4.92×10^{-5}			255
		2,2,4-Trimethyl-pentane	102.6	1.71×10^{-5}	146.2	h	255
			113.0	6.19×10^{-5}			255
			120.4	1.505×10^{-4}			255
	tert-Butyl ethoxyperacetate	Ethylbenzene	40.0	2.96×10^{-4}	105	a	315
			40.6	2.89×10^{-4}	102.7	m_2,h	328
			46.0	5.58×10^{-4}			328
			55.6	1.94×10^{-3}			328

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TABLE 6. *cont'd*

Number of C atoms	Initiator	Solvent	T (°C)	k_d (s^{-1})	E_a (kJ/mol)	Notes	Refs.
8 (*cont'd*)	*tert*-Butyl heptafluoroperoxy-butyrate	Benzene	65.0	1.56×10^{-5}		v_{24}	370
			70.0	3.09×10^{-5}		v_{24}	370
			75.0	5.27×10^{-5}		v_{24}	370
			80.0	9.08×10^{-5}		v_{24}	370
			60.0	9.5×10^{-6}		v_{25}	370
			65.0	1.61×10^{-5}		v_{25}	370
			70.0	2.70×10^{-5}		v_{25}	370
			75.0	5.23×10^{-5}		v_{25}	370
			80.0	9.18×10^{-5}		v_{25}	370
			60.0	9.6×10^{-6}		v_{26}	370
			65.0	1.93×10^{-5}		v_{26}	370
			70.0	3.57×10^{-5}		v_{26}	370
			75.0	6.35×10^{-5}		v_{26}	370
		Methanol	10.0	7.19×10^{-5}			369
			15.0	9.37×10^{-5}			369
			19.6	1.304×10^{-4}			369
			30.0	2.604×10^{-4}			369
		Methoxybenzene	55.0	5.01×10^{-5}			370
			60.2	8.56×10^{-5}			370
			65.0	1.378×10^{-4}			370
			70.0	2.444×10^{-4}			370
		Nitrobenzene	40.0	3.26×10^{-5}			370
			45.0	6.36×10^{-5}			370
			50.0	9.31×10^{-5}			370
		Octane	85.0	5.1×10^{-6}			370
			90.0	9.5×10^{-6}			370
			95.0	1.75×10^{-5}			370
			100.0	3.41×10^{-5}			370
		Pyridine	30.0	2.74×10^{-5}			370
			40.0	7.66×10^{-5}			370
			50.0	1.868×10^{-4}			370
		Toluene	65.0	1.88×10^{-5}			369
			75.0	4.66×10^{-5}			369
			80.0	7.06×10^{-5}			369
			85.0	1.203×10^{-4}			369
	tert-Butyl methoxyperpropionate	Ethylbenzene	40.3	4.30×10^{-3}			328
	tert-Butyl perisobutyrate	Benzene	78	3.77×10^{-5}		a	37
			70	6.69×10^{-5}	140.6	a	126,337
			85	5.33×10^{-5}		a	126,337
			100	3.50×10^{-4}		a	126,337
		Bulk	70	4.12×10^{-5}		a	37
		Chlorobenzene	90.6	8.13×10^{-5}	140.6	h	136
			100.7	2.75×10^{-4}			136
			110.0	8.92×10^{-4}			136
			79	1.93×10^{-5}			344
			98	1.93×10^{-4}			344
			118	1.93×10^{-3}			344
			T (K)	2.07×10^{15}	$\exp[-135.16/RT]$		344
		Cumene	90.6	6.9×10^{-5}	133.1	h	136
			100.7	2.35×10^{-4}			136
			110.0	6.57×10^{-4}			136
		Decane	70	4.7×10^{-6}	122	a	337
			85	2.6×10^{-5}		a	337
			100	1.55×10^{-4}		a	337
			100	1.46×10^{-4}			270
		Dodecane	100	1.56×10^{-4}			270
		Hexadecane	100	1.47×10^{-4}			270
		Iso-octane	103.4	2.16×10^{-4}			251
		Nujol	103.4	2.23×10^{-4}			251
		Octane	100	1.59×10^{-4}			270
		Tetradecane	100	1.52×10^{-4}			270
	tert-Butyl percrotonate	Benzene	100	2.5×10^{-5}	138	a	337
			115	1.50×10^{-4}		a	337
			130	7.39×10^{-4}		a	337

TABLE 6. *cont'd*

Number of C atoms	Initiator	Solvent	T (°C)	k_d (s^{-1})	E_a (kJ/mol)	Notes	Refs.
8 (*cont'd*)	*tert*-Butyl permaleic acid	Acetone	70	2.7×10^{-6}	113	a	337
			85	1.6×10^{-5}		a	337
			101	6.77×10^{-5}		a	337
	tert-Butyl permethacrylate	Benzene	90	1.92×10^{-5}	137.0	a	211
			100	7.66×10^{-5}		a	211
			110	1.92×10^{-4}		a	211
	tert-Butyl peroxyisopropyl carbonate	Benzene	90	6.64×10^{-6}		a	9
			100	2.21×10^{-5}		a	9
			110	6.87×10^{-5}		a	9
	Cyclohexyl peracetate	α-Methylstyrene	88.6	1.63×10^{-5}	109.4		253
			93.0	2.30×10^{-5}			253
			99.3	4.75×10^{-5}			253
	Diisopropyl peroxalate	Pentane	25	6.0×10^{-5}			203
	Diisopropyl peroxydicarbonate	Benzene	54.0	5.0×10^{-5}		m_2	60
		Di-*n*-butyl phthalate	77	1.39×10^{-3}		y_{16}	236
			87	4.09×10^{-3}		y_{16}	236
			97	1.25×10^{-2}		y_{16}	236
			107	3.54×10^{-2}		y_{16}	236
			117	7.98×10^{-2}		y_{16}	236
		Decane	35	6.3×10^{-6}	113	a	337
			45	2.7×10^{-5}		a	337
			60	1.85×10^{-4}		a	337
		Ethylbenzene	54.3	4.5×10^{-5}			60
			54.3	5.2×10^{-5}		m_2	60
		Mineral spirits	30	2×10^{-6}	113	a	337
			45	1.8×10^{-5}		a	337
			60	1.28×10^{-4}		a	337
			75	7.55×10^{-4}		a	337
		2,2′-Oxydiethylene-bis(allyl carbonate)	40	6.39×10^{-6}	117.6	a	90
			50	2.28×10^{-5}		a	90
			60	9.44×10^{-5}		a	90
		Toluene	50	3.03×10^{-5}		a	90
	Ethyl *tert*-butyl peroxalate	Benzene	45	4.48×10^{-5}	112.5	c,h	31
			55	1.63×10^{-4}			31
			65	5.93×10^{-4}			31
9	*tert*-Butyl 2-acetoxyperpropionate	Ethylbenzene	91.4	3.60×10^{-4}			328
	tert-Butyl 5-bromo-2-perthenoate	Carbon tetrachloride	99.2	2.24×10^{-6}	143.5	a	176
			112.0	1.18×10^{-5}		a	176
			124.5	4.30×10^{-5}		a	176
	tert-Butyl 5-chloro-2-perthenoate	Carbon tetrachloride	99.2	2.29×10^{-6}	143.5	a	176
			112.0	9.56×10^{-6}		a	176
			124.5	4.42×10^{-5}		a	176
	tert-Butyl cyclobutane-percarboxylate	*n*-Hexadecane	102.6	4.33×10^{-5}			255
		2,2,4-Trimethyl-pentane	92.9	1.21×10^{-5}	150.4	h	255
			102.6	4.84×10^{-5}			255
			113.0	1.668×10^{-4}			255
	tert-Butyl 2,2-dimethyl-3-bromoperpropionate	Cyclohexane	55	9.50×10^{-6}	118.2	h,t_6	320
			65	3.58×10^{-5}		t_6	320
			75	1.23×10^{-4}		t_6	320
	tert-Butyl 2,2-dimethyl-3-chloroperpropionate	Cyclohexane	55	3.55×10^{-6}	128.6	h,t_6	320
			65	1.48×10^{-5}		t_6	320
			75	5.65×10^{-5}		t_6	320
	tert-Butyl 2,2-dimethyl-3-iodoperpropionate	Cyclohexane	55	2.91×10^{-5}	116.9	h,t_6	320
			75	3.76×10^{-4}		t_6	320
	tert-Butyl isopropoxyperacetate	Ethylbenzene	40.0	4.8×10^{-4}	100.6	a,h	315
			39.9	4.22×10^{-4}	98.9	h,m_2	328
			49.9	1.39×10^{-3}			328
			55.3	2.68×10^{-3}			328

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TABLE 6. *cont'd*

Number of C atoms	Initiator	Solvent	T (°C)	k_d (s^{-1})	E_a (kJ/mol)	Notes	Refs.
9 (*cont'd*)	*tert*-Butyl 1-methylcyclopropyl-percarboxylate	2,2,4-Trimethylpentane	102.6	2.30×10^{-5}	133.7	h	255
			113.0	7.47×10^{-5}			255
	Di-(*tert*-butylperoxy)-carbonate	Chlorobenzene	99.95	6.72×10^{-5}	133.1		27
			110.1	2.13×10^{-4}			27
			120.1	6.05×10^{-4}			27
		1,2-Dichlorobenzene	120.1	5.98×10^{-4}			27
		Cumene	99.95	6.72×10^{-5}			27
		Isopropyl ether	99.95	2.76×10^{-4}			27
	tert-Butylperoxy isopropyl carbonate	Benzene	85	3.3×10^{-6}	138	a	337
			100	2.2×10^{-5}		a	337
			115	1.36×10^{-4}		a	337
	tert-Butyl perpivalate	Benzene	50	9.77×10^{-6}	119.7	a	126,337
			70	1.24×10^{-4}		a	126,337
			85	7.64×10^{-4}		a	126,337
			50	1.03×10^{-5}			359
			55	1.94×10^{-5}			359
			60	3.92×10^{-5}			359
			65	7.31×10^{-5}			359
			70	1.30×10^{-4}			359
		Chlorobenzene	48.9	8.4×10^{-6}		k	249
			58.6	3.35×10^{-5}	125.5	h	28
			64.3	7.01×10^{-5}			28
			57	1.93×10^{-5}			344
			75	1.93×10^{-4}			344
			94	1.93×10^{-3}			344
			T (K)	7.09×10^{14}	$\exp[-123.59/RT]$		344
			74.8	2.79×10^{-4}			28
			60	3.85×10^{-5}	128.0	a,h	81
			60.6	4.00×10^{-5}		t_9	156
			74	1.93×10^{-4}		t_9	156
		Cumene	45	3.53×10^{-6}	106.7	h	160
			55	1.73×10^{-5}			160
			60	2.95×10^{-5}			362
			65	4.53×10^{-5}			160
			64.6	5.81×10^{-5}	115.5		159
			75.6	2.10×10^{-4}			159
			84.6	5.94×10^{-4}			159
			70.3	1.11×10^{-4}			267
		Cyclohexane	55	1.03×10^{-5}	122.8	h	320
			65	4.02×10^{-5}			320
			75	1.45×10^{-4}			320
		Decane	50	4.1×10^{-6}	117	a	337
			70	5.52×10^{-5}		a	337
			80	2.18×10^{-4}			270
		Dioxane/water (90/10)	60.6	6.26×10^{-5}		t_9	156
		Dodecane	80	2.38×10^{-4}			270
		Hexadecane	80	2.39×10^{-4}			270
		Hexane	55	8.42×10^{-6}			359
			60	1.59×10^{-5}			359
			65	3.39×10^{-5}			359
			70	6.19×10^{-5}			358
		Heptane	80	2.33×10^{-4}			270
		Isooctane	60.6	1.97×10^{-5}		t_9	165
			73.9	8.82×10^{-5}		t_9	165
		Mineral spirits	55	1.01×10^{-5}			359
			60	2.15×10^{-5}			359
			65	4.14×10^{-5}			359
			70	7.58×10^{-5}			359
			75	1.47×10^{-4}			359
			T (K)	3.56×10^{14}	$\exp[-123/RT]$		376
		Octane	80	2.34×10^{-4}			270
		Tetradecane	80	2.27×10^{-4}			270
	tert-Butyl perpivalate-d_6	Chlorobenzene	60.6	3.24×10^{-5}		t_9	156
			74.0	1.57×10^{-4}		t_9	156

TABLE 6. *cont'd*

Number of C atoms	Initiator	Solvent	T (°C)	k_d (s^{-1})	E_a (kJ/mol)	Notes	Refs.
9 (*cont'd*)	*tert*-Butyl perpivalate-d_6	Dioxane/water (90/10)	60.6	5.05×10^{-5}		t_9	156
		Isooctane	60.6	1.62×10^{-5}		t_9	165
			73.9	8.82×10^{-5}		t_9	165
	tert-Butyl 2-perthenoate	Carbon tetrachloride	99.2	3.3×10^{-6}	147.3	m_2	176
			112.0	1.66×10^{-5}		m_2	176
			124.5	6.87×10^{-5}		m_2	176
	tert-Butyl 1-pyrollidine-percarboxylate	Chlorobenzene	90	7.59×10^{-5}			141
	tert-Butyl *N*-succinimido-percarboxylate	Acetonitrile	100	9.9×10^{-4}			142
		Benzene	100	3.79×10^{-5}	113.4	h,m_2	142
		Chlorobenzene	90	1.32×10^{-5}			141
			100	4.91×10^{-5}		m_2	142
		Cumene	90	3.3×10^{-6}			141
		Cyclohexane	100	1.10×10^{-5}		t_9	142
		Cyclohexene	100	9.0×10^{-6}			142
		Methanol	100	6.00×10^{-3}			142
		Methylene chloride	90	9.24×10^{-5}			141
		Nitrobenzene	100	3.41×10^{-4}		m_2	142
10	*tert*-Amyl perpivalate	Benzene	51	1.9×10^{-5}		a	338
		Chlorobenzene	55	1.93×10^{-5}			344
			72	1.93×10^{-4}			344
			91	1.93×10^{-3}			344
			T (K)	4.12×10^{15}	exp[$-127.76/RT$]		344
		Cumene	50	1.05×10^{-5}			362
			60	3.51×10^{-5}			362
			70	1.309×10^{-4}			362
			80	4.239×10^{-4}			362
	Di-(*sec*-butyl)peroxy-dicarbonate	Decane	35	6.9×10^{-6}	113	a	337
			45	2.6×10^{-5}		a	337
			60	1.80×10^{-4}		a	337
		Chlorobenzene	47	1.93×10^{-5}			344
			63	1.93×10^{-4}			344
			82	1.93×10^{-3}			344
			T (K)	3.19×10^{15}	exp[$-123.85/RT$]		344
		Mineral spirits	30	2×10^{-6}	113	a	337
			40	1.0×10^{-5}		a	337
			60	1.34×10^{-4}		a	337
	Di-*n*-butyl peroxydicarbonate	Chlorobenzene	49	1.93×10^{-5}			344
			65	1.93×10^{-4}			344
			83	1.93×10^{-3}			344
			T (K)	7.00×10^{15}	exp[$-126.65/RT$]		344
	tert-Butyl 2-acetoxy-2-methyl perpropionate	Ethylbenzene	74.7	1.98×10^{-4}		m_2	328
			80.7	4.37×10^{-4}			328
			90.8	1.25×10^{-3}			328
	tert-Butyl *tert*-butoxyperacetate	Ethylbenzene	40.3	2.91×10^{-4}			328
	tert-Butyl 4-carbomethoxy-perbutyrate	Cumene	99.8	1.65×10^{-5}	151.3	h	257
			116.6	1.38×10^{-4}			257
			129.9	6.83×10^{-4}			257
	tert-Butyl cyclopentyl-percarboxylate	*n*-Hexadecane	113.0	3.02×10^{-4}			255
		2,2,4-Trimethyl-pentane	92.9	2.47×10^{-5}	140.8	h	255
			102.6	8.87×10^{-5}			255
			113.0	2.89×10^{-4}			255
	tert-Butyl peroxydiethyl acetate	Chlorobenzene	75	1.93×10^{-5}			344
			93	1.93×10^{-4}			344
			113	1.93×10^{-3}			344
			T (K)	2.45×10^{15}	exp[$-134.00/RT$]		344
	tert-Butyl 2,2-dimethylperbutenoate	Cumene	42.42	9.04×10^{-5}	100.7	h	274
			50.30	2.349×10^{-5}			274
			57.95	5.660×10^{-5}			274
	tert-Butyl 2,2-dimethylperbutyrate	Cumene	44.85	1.874×10^{-5}			274
			50.10	3.609×10^{-5}			274
			60.20	1.306×10^{-4}			274

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TABLE 6. *cont'd*

Number of C atoms	Initiator	Solvent	T (°C)	k_d (s^{-1})	E_a (kJ/mol)	Notes	Refs.
10 (*cont'd*)	Di(*tert*-butylperoxy)-oxalate	Benzene	35.0	6.77×10^{-5}	106.7	c,h	30
			45.0	2.61×10^{-4}		c	30
			55.0	9.3×10^{-4}		c	30
		tert-Butanol	25.0	1.83×10^{-5}			197
		Decane	41	1.75×10^{-4}			270
		Dodecane	41	1.81×10^{-4}			270
		Octane	41	1.79×10^{-4}			270
		n-Pentane	37.8	1.01×10^{-4}			197
		Tetradecane	41	1.71×10^{-4}			270
		Styrene	35	5.5×10^{-5}	75.3		215
			45	1.71×10^{-4}			215
			55	6.01×10^{-4}			215
	tert-Butyl 5-methyl-7-perthenoate	Carbon tetrachloride	99.2	4.6×10^{-6}	137.7	a,m_2	176
			112.0	1.94×10^{-5}		a,m_2	176
			124.5	7.95×10^{-5}		a,m_2	176
	β-Methyl-β-phenyl-β-peroxy-propiolactone	Carbon tetrachloride	106.8	5.65×10^{-6}	131.8	h,v_9	195
			126	4.59×10^{-5}			195
			134	9.71×10^{-5}		c,v_9	195
	Bis(2-nitro-2-methylpropyl)-peroxy-dicarbonate	Toluene	50	2.22×10^{-5}		a	90
	1-Phenylethylperacetate	Benzene	100	1.14×10^{-4}	138.7	h	259
11	*tert*-Butyl 4-chloroperbenzoate	Phenyl ether	100.0	3.89×10^{-6}	164.4	a	53
			110.1	1.85×10^{-5}		a	53
			120.2	6.39×10^{-5}		a	53
			130.9	2.42×10^{-4}		a	53
		Carbon tetrachloride	80	4.2×10^{-7}			354
	tert-Butyl-*N*-(2-chlorophenylperoxy)-carbamate	Toluene	87.0	3.5×10^{-5}	157.3	h	36
			95.5	1.48×10^{-4}			36
			103.3	3.3×10^{-4}			36
	tert-Butyl-*N*-(3-chlorophenylperoxy)-carbamate	Toluene	78.0	2.6×10^{-5}	115.5	h	36
			87.0	7.8×10^{-5}			36
			96.6	2.03×10^{-4}			36
			102.7	4.62×10^{-4}			36
	tert-Butyl-*N*-(4-chlorophenylperoxy)-carbamate	Toluene	73.0	5.57×10^{-5}	119.7	h	36
			78.5	1.42×10^{-4}			36
			87.0	2.75×10^{-4}			36
			92.5	5.37×10^{-4}			36
	tert-Butyl cyclohexylperoxy-carboxylate	*n*-Hexadecane	92.9	6.70×10^{-5}	136.6	h	255
			102.6	2.046×10^{-4}			255
		2,2,4-Trimethyl-pentane	82.2	1.57×10^{-5}	135.8	h	255
			92.9	6.13×10^{-5}			255
			102.6	2.046×10^{-4}			255
			113.0	6.58×10^{-4}			255
	tert-Butyl-*N*-(2,5-dichlorophenyl-peroxy) carbamate	Toluene	88.0	2.75×10^{-5}	128.9	h	36
			95.0	5.58×10^{-5}			36
			103.3	1.48×10^{-4}			36
			114.5	4.82×10^{-4}			36
	tert-Butyl 2,2-dimethylperpentanoate	Cyclohexane	55	1.66×10^{-5}	120.7	h	320
			65	6.31×10^{-5}			320
			75	2.23×10^{-4}			320
		Cumene	45	6.2×10^{-6}	105.4	h	160
			55	2.15×10^{-5}			160
	tert-Butyl 5-ethyl-2-perthenoate	Carbon tetrachloride	99.2	5.39×10^{-6}	130.5		176
			112.0	2.12×10^{-5}			176
			124.5	7.91×10^{-5}			176
	tert-Butyl 2-iodoperbenzoate	Chlorobenzene	85.0	4.02×10^{-5}			134
			102.4	2.58×10^{-4}			134
			118.8	1.32×10^{-3}			134
	tert-butyl 4-nitroperbenzoate	Phenyl ether	110.1	7.56×10^{-6}	172.8		53
			120.2	3.19×10^{-5}			53
			130.9	1.11×10^{-4}			53
			141.5	3.92×10^{-4}			53
		Carbon tetrachloride	80	2.9×10^{-7}			354
	tert-Butyl 3,5-dinitroperbenzoate	Carbon tetrachloride	80	1.1×10^{-7}			354

TABLE 6. *cont'd*

Number of C atoms	Initiator	Solvent	T (°C)	k_d (s^{-1})	E_a (kJ/mol)	Notes	Refs.
11 (*cont'd*)	*tert*-Butyl-*N*-(3-nitrophenylperoxy)-carbamate	Toluene	78.0	8.4×10^{-6}	133.1	h	36
			88.7	2.43×10^{-5}			36
			98.0	1.01×10^{-4}			36
			106.0	2.36×10^{-4}			36
	tert-Butyl-*N*-(4-nitrophenylperoxy)-carbamate	Toluene	73.0	6.4×10^{-6}	113.8	h	36
			87.0	3.11×10^{-5}			36
			98.0	8.75×10^{-5}			36
			106.0	2.38×10^{-4}			36
	tert-Butyl perbenzoate	Acetic acid	100.0	3.83×10^{-5}	130.1	a	56
			110.0	1.14×10^{-4}		a	56
		Benzene	100	1.07×10^{-5}	145.2	a	126,337
			115	6.22×10^{-5}		a	126,337
			130	3.50×10^{-4}		a	126,337
			110.0	3.50×10^{-5}	144.3	a	56
			119.4	1.04×10^{-4}		a	56
			130.0	3.30×10^{-4}		a	56
		Bromobenzene	119.4	1.37×10^{-4}		a	56
		n-Butanol	90.0	9.27×10^{-5}	120.5	a	56
			100.0	2.70×10^{-4}		a	56
		n-Butyl acetate	110.0	1.06×10^{-4}	123.4	a	56
			119.4	2.67×10^{-4}		a	56
			110.0	3.61×10^{-5}	148.5	a,m_2	56
			1194	1.10×10^{-4}		a,m_2	56
		tert-Butylbenzene	119.4	1.03×10^{-4}		a	56
		n-Butyl ether	100.0	7.80×10^{-5}	99.2	a	56
			110.0	1.80×10^{-4}		a	56
		Carbon tetrachloride	80	8.8×10^{-7}			354
		Chlorobenzene	110.0	3.83×10^{-5}	141.8	a	56
			119.4	1.11×10^{-4}		a	56
			120	1.31×10^{-4}		m_2	22
			135	6.74×10^{-4}		m_2	22
			150	3.12×10^{-3}		m_2	22
			103	1.93×10^{-5}			344
			122	1.93×10^{-4}			344
			142	1.93×10^{-3}			344
			T (K)	2.23×10^{16}	$\exp[-151.59/RT]$		344
		4-Chlorotoluene	110.0	3.25×10^{-5}	144.3	c	55
			119.4	9.80×10^{-5}		c	55
			130.0	3.06×10^{-4}		c	55
			60	3.85×10^{-7}	140.2	a,h	81
		Cumene	79.6	7.21×10^{-5}			272
			85.0	1.320×10^{-6}			345
			99.3	9.37×10^{-6}			345
			115.0	5.81×10^{-5}			345
			130.2	3.24×10^{-4}			345
		Decane	100	1.4×10^{-5}	134	a	337
			115	8.05×10^{-5}		a	337
			130	3.56×10^{-4}		a	337
			115	6.77×10^{-5}			270
		Dodecane	115	6.44×10^{-5}			270
		Ethylbenzene	119.4	1.07×10^{-4}		a	56
		Heptane	115	7.21×10^{-5}			270
		Hexadecane	115	5.97×10^{-5}			270
		Methyl benzoate	119.4	7.80×10^{-5}		a	56
		Octane	115	7.06×10^{-5}			270
		Phenyl ether	100.0	6.94×10^{-6}	156.9	a	53
			110.1	2.28×10^{-5}		a	53
			120.2	9.00×10^{-5}		a	53
			130.9	2.92×10^{-4}		a	53
		Tetradecane	115	6.03×10^{-5}			270
		Trimethylbenzene	T (K)	2.62×10^{16}	$\exp[-152.0/RT]$		376
		Xylene	119.4	1.09×10^{-4}	141.4	a	56
			130.0	3.42×10^{-4}		a	56

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TABLE 6. *cont'd*

Number of C atoms	Initiator	Solvent	T (°C)	k_d (s^{-1})	E_a (kJ/mol)	Notes	Refs.
11 (*cont'd*)	*tert*-Butyl-*N*-(4-bromophenylperoxy)-carbamate	Toluene	70.8	3.32×10^{-5}	177.6	h	36
			79.8	1.04×10^{-4}			36
			84.0	1.75×10^{-4}			36
			96.0	7.70×10^{-4}			36
	tert-Butyl percarboxycyclohexane	Chlorobenzene	100.1	2.75×10^{-4}	131.0	h	181
			111.4	9.65×10^{-4}			181
			120.0	2.39×10^{-3}			181
		Cumene	79.6	1.86×10^{-5}		z (l)	163
			79.6	1.42×10^{-5}		z (2030)	163
			79.6	1.15×10^{-5}		z (4050)	163
	tert-Butyl per-2-methylphenylacetate	Isooctane	60.6	6.60×10^{-5}		m_2	165
			73.9	3.233×10^{-4}		m_2	165
	tert-Butyl-*N*-(phenylperoxy) carbamate	Toluene	51.2	3.4×10^{-6}	139.7	h	36
			67.7	2.31×10^{-5}			36
			77.7	1.15×10^{-4}			36
			90.7	6.41×10^{-4}			36
		Chlorobenzene	T (K)	1.51×10^{16}	$\exp[-136.0/RT]$		40
	tert-Hexyl peroxypivalate	Cumene	40	2.39×10^{-6}			362
			50	8.83×10^{-6}			362
			60	3.37×10^{-5}			362
			70	1.226×10^{-4}			362
			80	4.166×10^{-4}			362
	1,1,2-Trimethylpropyl perpivalate	Cumene	40	3.6×10^{-6}			362
			50	1.59×10^{-5}			362
			60	5.14×10^{-5}			362
			70	1.921×10^{-4}			362
	Cumyl peracetate	Carbon tetrachloride	100	4.68×10^{-5}		c	271
		Toluene	100	3.43×10^{-5}		p	271
12	*tert*-Amyl peroxybenzoate	Chlorobenzene	99	1.93×10^{-5}			344
			118	1.93×10^{-4}			344
			139	1.93×10^{-3}			344
			T (K)	8.38×10^{15}	$\exp[-147.02/RT]$		344
	4-Bromocumyl perpropionate	Benzene	70	1.48×10^{-6}	129.7	a	213
			80	5.73×10^{-6}		a	213
			90	1.81×10^{-5}		a	213
		α-Methylstyrene	70	1.99×10^{-6}	121.3	a	213
			80	4.93×10^{-6}		a	213
			90	1.55×10^{-5}			213
	tert-Butyl bicyclo[2.2.1]lheptane-2-percarboxylate	Cumene	85	1.16×10^{-6}	155.2	h	160
			100	1.02×10^{-5}	160		
			110	3.76×10^{-5}			160
			110	4.6×10^{-5}	150.2	h	223
			120	1.56×10^{-4}			223
			130	4.99×10^{-4}			223
	tert-Butyl endo-bicyclo[2.2.1]-heptane percarboxylate	Chlorobenzene	94.0	1.75×10^{-5}	137.2	h	147
			101.9	6.20×10^{-5}			147
			109.6	1.7×10^{-4}			147
			120.5	5.72×10^{-4}			147
			94.5	9.69×10^{-5}			147
			101.9	1.96×10^{-5}			182
			111.9	6.53×10^{-5}			182
			100.1	4.61×10^{-5}	149.0	h	181
			111.4	1.96×10^{-4}			181
			120.0	5.40×10^{-4}			181
		Cumene	94.0	1.87×10^{-5}	154.0	h	147
			101.9	5.30×10^{-5}			147
			109.6	1.10×10^{-4}			147
			120.3	4.3×10^{-4}			147
			94.5	5.27×10^{-5}	130.1	h	182
			101.9	1.12×10^{-4}			182
			111.9	3.57×10^{-4}			182
	tert-Butyl exo-bicyclo[2.2.11]-heptane-2-percarboxylate	Chlorobenzene	94.5	8.86×10^{-5}			182
			101.9	2.28×10^{-4}			182
			112.1	8.85×10^{-4}			182

TABLE 6. *cont'd*

Number of C atoms	Initiator	Solvent	T (°C)	k_d (s^{-1})	E_a (kJ/mol)	Notes	Refs.
12 (*cont'd*)			96.0	1.33×10^{-4}			147
			100.1	1.90×10^{-4}	129.3	h	181
			111.4	6.79×10^{-4}			181
			120.0	1.64×10^{-3}			181
		Cumene	84.4	2.19×10^{-5}	129.3	h	147
			94.7	7.29×10^{-5}			147
			100.1	1.37×10^{-4}			147
			108.6	3.6×10^{-4}			147
			113.5	6.19×10^{-4}			147
			94.5	6.05×10^{-5}	131.4	h	182
			101.9	1.53×10^{-4}			182
			112.1	4.72×10^{-4}			182
	tert-Butyl endo-bicyclo[2.2.1]-hept-5-ene-2-percarboxylate	Cumene	94.5	3.11×10^{-5}	136.4	h	182
			101.9	7.35×10^{-5}			182
			112.0	2.48×10^{-4}			182
	tert-Butyl exo-bicyclo[2.2.1]-hept-5-ene-2-percarboxylate	Chlorobenzene	94.5	5.59×10^{-5}			182
			101.9	$1\ 25 \times 10^{-4}$			182
			112.1	5.00×10^{-4}			182
		Cumene	94.5	4.48×10^{-5}	138.1	h	182
			101.9	1.18×10^{-4}			182
			112.1	3.97×10^{-4}			182
	tert-Butyl 4-bromophenoxyperacetate	Ethylbenzene	70.5	2.6×10^{-4}		a	315
	tert-Butyl 4-chlorophenoxyperacetate	Ethylbenzene	70.5	2.9×10^{-4}		a	315
	tert-Butyl 3-chlorophenylperacetate	Chlorobenzene	79.6	4.05×10^{-5}	123.0	h	178
			90.7	1.44×10^{-4}			178
			100.5	4.38×10^{-4}			178
		Cumene	79.6	2.98×10^{-5}		z (0.98)	207
			79.6	1.99×10^{-5}		z (6090)	207
	tert-Butyl 4-chlorophenyl peracetate	Chlorobenzene	79.6	8.44×10^{-5}	117.2	h	178
			90.7	2.95×10^{-4}			178
			100.5	8.19×10^{-4}			178
		Cumene	79.6	6.54×10^{-5}		z (0.98)	207
			79.6	4.45×10^{-5}		z (6090)	207
	tert-Butylcycloheptyl percarboxylate	*n*-Hexadecane	92.9	1.801×10^{-4}	121.5	h	255
			102.6	5.17×10^{-4}			255
		2,2,4-Trimethylpentane	92.9	1.703×10^{-4}	125.7	h	255
			102.6	5.07×10^{-4}			255
	tert-Butyl 2,4-dichlorophenoxy-peracetate	Ethylbenzene	70.5	9.4×10^{-5}		a	315
	tert-Butyl 2,2-diethyl perbutyrate	Cumene	45	1.23×10^{-5}	100.3	h	160
			55	4.92×10^{-5}			160
			65	1.46×10^{-4}			160
	tert-Butyl per-2-ethylhexanoate	Benzene	72	1.9×10^{-5}		a	338
		Chlorobenzene	72	1.93×10^{-5}			344
			91	1.93×10^{-4}			344
			113	1.93×10^{-3}			344
			T (K)	1.54×10^{14}	exp[− 124.90/RT]		344
	tert-Butyl 2-methoxy-2-methyl-perpropionate	Chlorobenzene	− 14.0	2.05×10^{-5}	86.3	m_2	275
			− 7.0	6.73×10^{-5}		m_2	275
			− 1.0	1.67×10^{-4}		m_2	275
			15.0	1.28×10^{-3}		m_2	275
	tert-Butyl 4-methoxyperbenzoate	Phenyl ether	100.0	1.07×10^{-5}	149.8	a	53
			110.1	4.17×10^{-5}		a	53
			120.2	1.28×10^{-4}		a	53
			130.9	4.28×10^{-4}		a	53
	tert-Butyl peroxy-2-methyl-benzoate	Chlorobenzene	96	1.93×10^{-5}			344
			115	1.93×10^{-4}			344
			136	1.93×10^{-3}			344
			T (K)	8.56×10^{15}	expr[− 145.97/RT]		344
	tert-Butyl 4-methoxyperbenzoate	Carbon tetrachloride	80	1.0×10^{-6}			354
	tert-Butyl 4-methylperbenzoate	Phenyl ether	100.0	9.42×10^{-6}	151.0	a	53
			110.1	3.19×10^{-5}		a	53
			120.2	1.06×10^{-4}		a	53

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TABLE 6. *cont'd*

Number of C atoms	Initiator	Solvent	T (°C)	k_d (s^{-1})	E_a (kJ/mol)	Notes	Refs.
12 (*cont'd*)	*tert*-Butyl 4-methylperbenzoate	Phenyl ether	130.9	3.25×10^{-4}		a	53
	tert-Butyl 2-methyl-2-*tert*-butylperoxyperpropionate	Benzene	9.0	6.66×10^{-5}	78.8	m_2	275
			19.0	1.99×10^{-4}			275
			30.0	6.94×10^{-4}			275
			42.0	2.43×10^{-3}			275
	tert-Butyl 2-methylsulfonyl perbenzoate	Chlorobenzene	105	6.68×10^{-6}			22
			120	5.57×10^{-5}			22
			135	2.76×10^{-4}			22
			150.6	2.05×10^{-3}			22
	tert-Butyl 2-(methylthio)perbenzoate	Chlorobenzene	60	8.08×10^{-4}	95.0	a,h	97
			39.4	2.59×10^{-5}		b	134
			50.1	2.42×10^{-4}		c	134
			50.2	1.88×10^{-4}		m_2	134
			69.8	1.96×10^{-3}			134
	tert-Butyl 4-(methylthio)perbenzoate	Chlorobenzene	120.4	1.75×10^{-4}			134
	tert-Butyl 4-nitrophenoxyperacetate	Ethylbenzene	70.5	6.7×10^{-5}	129.9	a,h	315
	tert-Butyl 4-nitrophenylperacetate	Chlorobenzene	79.6	2.5×10^{-5}	124.7	h	178
			90.7	8.9×10^{-5}			178
			100.5	2.83×10^{-4}			178
			80	3.77×10^{-5}			169
		Decane	77.5	6.30×10^{-6}			168
	tert-Butyl 4-nitrophenylperacetate	Dodecane	77.5	5.81×10^{-6}			168
			100	1.31×10^{-4}			168
		Hexadecane	77.5	5.11×10^{-6}			168
		Octane	77.5	6.42×10^{-6}			168
			100	1.60×10^{-4}			168
		Tetradecane	77.5	5.56×10^{-6}			168
	Di-*tert*-butyl per-2-chlorosuccinoate	Unknown	105	2.74×10^{-4}	102.9	x_2	214
				1.22×10^{-5}	143.5	x_2	214
			115	5.90×10^{-4}		x_2	214
				3.83×10^{-5}		x_2	214
			125	1.52×10^{-3}		x_2	214
				1.00×10^{-4}		x_2	214
	tert-Butyl peroctoate	Benzene	70	1.4×10^{-5}	130	a	337
			85	8.55×10^{-5}		a	337
			100	4.55×10^{-4}		a	337
		Decane	70	6.9×10^{-6}	130	a	337
			85	4.39×10^{-5}		a	337
			100	2.64×10^{-4}		a	337
	Di-*tert*-butyl persuccinoate	Styrene	105	1.93×10^{-5}	154.8	x_1	215
			115	6.7×10^{-5}		x_1	215
			125	2.53×10^{-4}		x_1	215
	tert-Butyl phenoxyperacetate	Ethylbenzene	70.5	4.4×10^{-4}	113.1	a,h	315
	tert-Butyl phenylperacetate	Chlorobenzene	60	6.79×10^{-6}	120.1	a,h	81
			77.0	6.85×10^{-5}	117.6	h	28
			88.6	2.45×10^{-4}		m_2	28
			79.6	1.05×10^{-4}	116.7	h	178
			90.7	3.53×10^{-4}			178
			100.5	1.003×10^{-3}			178
			79.6	1.07×10^{-4}		z (0.98)	157
			79.6	9.1×10^{-5}		z (4050)	157
			79.6	1.02×10^{-4}		z (0.98)	163
			79.6	9.0×10^{-4}		z (4050)	163
			85.0	1.945×10^{-4}		m_2	165
		Cumene	79.6	6.6×10^{-5}		z (0.98)	157
			79.6	5.6×10^{-5}		z (4050)	157
			79.6	6.78×10^{-5}		z (0.98)	163,207
			79.6	4.73×10^{-5}		z (6090)	163,207
			79.61	1.1×10^{-5}			274
		Decane	77.5	3.00×10^{-5}			168
		Dodecane	77.5	2.75×10^{-5}			168
		Hexadecane	77.5	2.60×10^{-5}			168
		Isooctane	85.0	1.08×10^{-4}			165
			95.2	3.527×10^{-4}			165

TABLE 6. *cont'd*

Number of C atoms	Initiator	Solvent	T (°C)	k_d (s^{-1})	E_a (kJ/mol)	Notes	Refs.
12 (*cont'd*)	*tert*-Butyl phenylperacetate	Octane	77.5	3.11×10^{-5}			168
		Paraffin oil	85.0	1.150×10^{-4}			165
		Tetradecane	77.3	2.66×10^{-5}			168
	tert-Butyl 2-propylperpenten-2-oate	Cumene	94.9	2.78×10^{-5}	137.2	h	172
	(*cis*)		100.1	5.4×10^{-5}		z (0.98)	172
			100.1	4.26×10^{-5}		z (1100)	172
			100.1	2.31×10^{-5}		z (4000)	172
			110.1	1.72×10^{-4}			172
	(*trans*)	Cumene	94.9	2.47×10^{-5}	143.9	h	172
			100.1	4.7×10^{-5}		z (0.98)	172
			100.1	3.13×10^{-5}		z (1100)	172
			100.1	1.42×10^{-5}		z (3830)	172
			110.1	1.64×10^{-4}			172
	tert-Butyl 2,2,3,3-tetramethyl-perpropionate	Cumene	42.2	8.76×10^{-6}	114	h	267
			54.9	5.84×10^{-5}			267
			70.3	3.36×10^{-4}			267
	tert-Butyl thiophenylperacetate	Ethylbenzene	70.5	3.8×10^{-4}		a	315
	tert-Butyl per-*o*-toluate	Benzene	97	1.9×10^{-5}		a	338
	tert-Butyl per-paratoluate	Cumene	84.0	1.660×10^{-6}			345
			99.3	1.139×10^{-5}			345
			115.0	6.77×10^{-5}			345
	tert-Butyl-*N*-(3-tolylperoxy)-carbamate	Toluene	64.0	4.58×10^{-5}	102.9	h	36
			70.7	9.17×10^{-5}			36
			78.0	2.03×10^{-4}			36
			88.5	5.78×10^{-4}			36
	tert-Butyl 2,4,5-trichloro-phenoxyperacetate	Ethylbenzene	70.5	5.8×10^{-5}		a	315
	4-Chlorocumyl perpropionate	Benzene	70	1.46×10^{-6}	129.3	a	213
			80	5.68×10^{-6}		a	213
			90	1.79×10^{-5}		a	213
		α-Methylstyrene	70	1.50×10^{-6}	118.8	a	213
			80	4.54×10^{-6}		a	213
			90	1.47×10^{-5}		a	213
	Cumyl perpropionate	Benzene	70	2.60×10^{-6}	101.7	a	213
			80	6.15×10^{-6}		a	213
			90	1.90×10^{-5}		a	213
		α-Methylstyrene	70	6.31×10^{-6}	106.7	a	213
			80	1.71×10^{-5}		a	213
			90	4.94×10^{-5}		a	213
	4-Iodocumyl perpropionate	Benzene	70	1.37×10^{-6}	133.1	a	213
			80	5.76×10^{-6}		a	213
			90	1.79×10^{-5}		a	213
		α-Methylstyrene	70	1.54×10^{-6}	125.5	a	213
			80	4.96×10^{-6}		a	213
			90	1.62×10^{-5}		a	213
	4-Nitrocumyl perpropionate	Benzene	70	1.36×10^{-6}	133.5	a	213
			80	5.32×10^{-6}		a	213
			90	1.78×10^{-5}		a	213
		α-Methylstyrene	70	1.35×10^{-6}	124.7	a	213
			80	4.07×10^{-6}		a	213
			90	1.43×10^{-5}		a	213
	1,1,3-Trimethylbutyl perpivalate	Cumene	40	4.80×10^{-6}			362
			50	1.77×10^{-5}			362
			60	6.18×10^{-5}			362
			70	2.344×10^{-4}			362
13	*tert*-Amyl per-2-ethylhexanoate	Benzene	70	1.9×10^{-5}		a	338
		Chlorobenzene	73	1.93×10^{-5}			344
			91	1.93×10^{-4}			344
			111	1.93×10^{-3}			344
			T (K)	1.77×10^{15}	$\exp[-132.11/RT]$		344
	Benzyl(*tert*-butylperoxy)oxalate	Benzene	45	3.65×10^{-5}	111.3	c,h	31
			55	1.33×10^{-4}		c	31
			65	4.69×10^{-4}		c	31

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TABLE 6. *cont'd*

Number of C atoms	Initiator	Solvent	T (°C)	k_d (s^{-1})	E_a (kJ/mol)	Notes	Refs.
13 (*cont'd*)	*tert*-Butyl benzyloxyperacetate	Ethylbenzene	40.0	1.3×10^{-4}	100.6	a,h	315
			40.0	1.45×10^{-4}	101.8	h,m_2	328
			51.0	5.03×10^{-4}			328
			60.7	1.62×10^{-3}			328
	tert-Butyl benzylthioperacetate	Ethylbenzene	40.0	2.60×10^{-5}	108.1	h,m_2	328
			60.0	3.31×10^{-4}			328
			70.0	1.14×10^{-3}			328
	tert-Butyl bicyclo[2.2.2]octane-1-percarboxylate	Cumene	65	7.5×10^{-6}	119.2	h	160
			75	2.82×10^{-5}			160
			85	8.47×10^{-5}			160
			80	5.1×10^{-5}	120.1	h	223
			90	1.67×10^{-4}			223
			100	4.86×10^{-4}			223
	tert-Butyl endo-bicyclo[2.2.1]-2-methylheptane-2-percarboxylate	Cumene	75	7.35×10^{-5}	126.8	h	206
			80	1.39×10^{-4}			206
			85	2.64×10^{-4}			206
			90	4.81×10^{-4}			206
			95	8.41×10^{-4}			206
	tert-Butyl exo-bicyclo[2.2.1]-2-methylheptane-2-percarboxylate	Cumene	60	7.78×10^{-5}	116.7	h	206
			65	1.44×10^{-4}			206
			70	2.75×10^{-4}			206
			75	4.89×10^{-4}			206
			80	8.93×10^{-4}		c	206
	tert-Butyl 1,4-dimethylcyclohexane-1-percarboxylate (*cis*)	Cumene	60.0	7.52×10^{-5}	115.2	h	206
			70.0	2.66×10^{-4}			206
			80.0	8.49×10^{-4}		c	206
	(*trans*)	Cumene	60.0	6.93×10^{-5}	116.3	c,h	206
			70.0	2.52×10^{-4}		c	206
			80.0	7.79×10^{-4}			206
	tert-Butyl 3-methoxyphenyl-peracetate	Chlorobenzene	79.6	9.9×10^{-5}	122.2	h	178
			90.7	3.45×10^{-4}			178
			100.5	1.051×10^{-3}			178
	tert-Butyl 4- methoxyphenyl-peracetate	Chlorobenzene	56.0	4.57×10^{-5}	105.4	h	178
			60.3	9.9×10^{-5}			178
			70.2	3.06×10^{-4}			178
			79.3	7.99×10^{-4}			178
			48.9	1.93×10^{-5}		k	249
		Cumene	60	6.85×10^{-5}		z (0.98)	207
			60	5.31×10^{-5}		z (4050)	207
			79.6	5.942×10^{-4}	207		
		Decane	77.5	2.52×10^{-4}			168
		Dodecane	77.5	2.60×10^{-4}			168
		Ethylbenzene	70.5	1.4×10^{-3}	104.8	a,h	315
		Isooctane	60.5	4.72×10^{-5}			169
		Octane	77.5	2.53×10^{-4}			168
		Paraffin oil	60.5	4.20×10^{-5}			169
		Tetradecane	77.5	2.68×10^{-4}			168
	tert-Butyl 4-methylphenyl peracetate	Chlorobenzene	70.4	8.67×10^{-5}	110.9	h	178
			79.6	2.37×10^{-4}			178
			90.7	7.95×10^{-4}			178
		Cumene	79.6	1.649×10^{-4}		z (0.98)	207
			79.6	1.180×10^{-4}		z (6080)	207
		Decane	77.5	9.08×10^{-5}			168
		Dodecane	77.5	8.57×10^{-5}			168
		Ethylbenzene	70.5	7.2×10^{-4}		a	315
		Hexadecane	77.5	1.032×10^{-4}			168
		Octane	77.5	8.83×10^{-5}			168
		Tetradecane	77.5	7.75×10^{-5}			168
	Di-*tert*-butyl perglutarate	Styrene	105	2.65×10^{-5}		x_1	215
			115	1.06×10^{-4}		x_1	215
			125	3.00×10^{-4}			215
	tert-Butylperoxy 2-ethylhexyl-carbonate	Chlorobenzene	99	1.93×10^{-5}			344
			117	1.93×10^{-4}			344
			137	1.93×10^{-3}			344

TABLE 6. *cont'd*

Number of C atoms	Initiator	Solvent	T (°C)	k_d (s^{-1})	E_a (kJ/mol)	Notes	Refs.
13 (*cont'd*)	*tert*-Butylperoxy 2-ethylhexyl-carbonate	Chlorobenzene	T (K)	4.07×10^{16}	exp[− 151.72/RT]		344
	tert-Butyl 2-phenylperpropionate	Cumene	40.7	7.88×10^{-6}			273
			60.1	8.44×10^{-5}			273
			80.1	8.10×10^{-4}			273
	tert-Butyl 2,2,4,4-tetra-methylperbutyrate	Cumene	40.8	6.15×10^{-6}	111	h	267
			54.7	3.82×10^{-5}			267
			70.7	2.73×10^{-4}			267
	tert-Butylthiobenzylperacetate	Ethylbenzene	40.0	2.62×10^{-5}	100.6	a,h	315
	tert-Butyl peroxy-3,5,5-tri-methylhexanoate	Chlorobenzene	95	1.93×10^{-5}			344
			114	1.93×10^{-4}			344
			135	1.93×10^{-3}			344
			T (K)	1.94×10^{15}	exp[− 140.78/RT]		344
	4-Nitrobenzyl(*tert*-butylperoxy)-oxalate	Benzene	45	1.30×10^{-5}	116.7	c,h	31
			55	4.89×10^{-5}		c	31
			65	1.89×10^{-4}		c	31
14	*tert*-Amylperoxy 2-ethylhexyl-carbonate	Chlorobenzene	95	1.93×10^{-5}			344
			113	1.93×10^{-4}			344
			134	1.93×10^{-3}			344
			T (K)	2.22×10^{16}	exp[− 148.41/RT]		344
	tert-Butyl di-*tert*-butylperacetate	Cumene	54.7	4.38×10^{-6}	125.3	h	245
			70.2	3.56×10^{-5}			245
			85.4	2.44×10^{-4}			245
	tert-Butyl 2-carbomethoxyphenyl-peracetate	Cumene	70.8	1.48×10^{-5}	116.9	h	257
			85.4	8.07×10^{-5}			257
			101.0	4.38×10^{-4}			257
	tert-Butyl 2-(4-chlorophenoxy)-2-methylperpropionate	Ethylbenzene	40.0	7.2×10^{-4}		a	315
	tert-Butyl 2-(4-chlorophenyl)-2-methylperpropionate	Acetonitrile	50.0	2.55×10^{-4}			265
		Benzene	50.0	2.03×10^{-4}			265
		Dodecane	50.0	7.98×10^{-5}	108.1	h	265
			60.0	2.68×10^{-4}			265
			67.0	6.36×10^{-4}			265
		Hexadecane	50.0	8.00×10^{-5}			265
			60.0	2.56×10^{-4}			265
			67.0	5.96×10^{-4}			265
		Octane	50.0	8.10×10^{-5}			265
			60.0	2.65×10^{-4}			265
			67.0	5.95×10^{-4}			265
	tert-Butyl α-methylpercinnamate	Cumene	99.6	1.23×10^{-4}	128.0	f,h	150
	(*cis*)		109.8	3.70×10^{-4}		f	150
	(*trans*)	Cumene	99.6	3.5×10^{-5}	125.5	f,h	150
			109.8	1.03×10^{-4}		f	150
	tert-Butyl 2-methyl-2-phenylper-propionate	Chlorobenzene	34.1	3.26×10^{-5}			249
		Cumene	39.7	5.63×10^{-5}			249
	tert-Butyl perneodecanoate	Benzene	47	1.9×10^{-5}			338
		Chlorobenzene	46	1.93×10^{-5}			344
			64	1.93×10^{-4}			344
			84	1.93×10^{-3}			344
			T (K)	1.52×10^{14}	exp[− 115.47/RT]		344
	tert-Butyl 2-(4-nitrophenyl)-2-methylperpropionate	Acetonitrile	50.0	7.50×10^{-5}	105.2	h	265
		Benzene	50.0	6.40×10^{-5}			265
		Dodecane	50.0	2.63×10^{-5}			265
			60.0	9.27×10^{-5}			265
			67.0	2.03×10^{-4}			265
		Octane	67.0	1.98×10^{-4}			265
	tert-Butyl permesitoate	Cumene	84.0	1.464×10^{-5}			345
			99.3	9.94×10^{-5}			345
			115.0	6.7×10^{-5}			345
	tert-Butyl 1-phenylcyclo-propylpercarboxylate	*n*-Dodecane	113.0	8.67×10^{-5}			255
		Ethylbenzene	120.0	2.49×10^{-4}	147.5	h,t_1	323
			130.0	7.49×10^{-4}		t_1	323
			140.0	2.22×10^{-3}		t_1	323

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TABLE 6. *cont'd*

Number of C atoms	Initiator	Solvent	T (°C)	k_d (s^{-1})	E_a (kJ/mol)	Notes	Refs.
14 (*cont'd*)	*tert*-Butyl 1-phenylcyclo-propylpercarboxylate	2,2,4-Trimethyl pentane	102.6	2.53×10^{-5}	141.2	h	255
			113.0	8.96×10^{-5}			255
			120.4	2.04×10^{-4}			255
	tert-Butyl phenyldimethylperacetate	Chlorobenzene	60	9.6×10^{-4}	109.2	c,h	81
		Isooctane	40.6	2.95×10^{-5}		t_9	165
			60.6	3.059×10^{-4}		t_9	165
			60.6	4.064×10^{-4}		m_2	165
	tert-Butyl 2-phenyl-3-perbutenoate	Chlorohenzene	60	2.9×10^{-3}	96.2	c,h	81
	tert-Butyl 4-phenyl-3-perbutenoate	Chlorobenzene	60	1.15×10^{-4}	98.3	c,h,g	81
	tert-Butyl 2-phenyl-2-methyl-perpropionate	Acetonitrile	50.0	3.08×10^{-4}			265
		Benzene	50.0	2.18×10^{-4}			265
		Benzophenone	60	7.73×10^{-4}			334
		Benzyl benzoate	60	7.92×10^{-4}			334
		Butyl phthalate	60	6.5×10^{-4}			334
		Chlorobenzene	60	7.00×10^{-4}			334
		Cumene	60	5.25×10^{-4}			334
		Dodecane	50.0	8.77×10^{-5}	109.3	h	265
			60.0	3.00×10^{-4}			265
			67.0	7.13×10^{-4}			265
			60	2.88×10^{-4}			334
		Hexadecane	60	3.53×10^{-4}			334
		Methyl benzoate	60	7.55×10^{-4}		t_{12}	334
		Octyl phthalate	60	5.70×10^{-4}			334
		Toluene	60	5.66×10^{-4}			334
	tert-Butyl 4-vinylphenylperacetate	Cumene	70.9	5.54×10^{-5}	116.5	h,k	254
			85.4	3.00×10^{-4}		k	254
			100.3	1.48×10^{-3}			254
	Dibenzyl peroxalate	Pentane	25	6.7×10^{-5}			203
	Di-*tert*-butyl adipate	Styrene	105	3.50×10^{-5}	151.0	x_1	215
			115	1.23×10^{-4}		x_1	215
			125	3.05×10^{-4}		x_1	215
	Dicyclohexyl peroxydicarbonate	Benzene	50	5.4×10^{-5}		c	201
		Chlorobenzene	44	1.93×10^{-5}			344
			60	1.93×10^{-4}			344
			77	1.93×10^{-3}			344
			T (K)	3.3×10^{16}	$\exp[-129.0/RT]$		344
		α-Methylstyrene	50	5.9×10^{-5}			201
		Mineral spirits	45	2.78×10^{-5}	117	a	337
			50	5.58×10^{-4}		a	337
			60	2.07×10^{-4}		a	337
	4-Methoxybenzyl (*tert*-butylperoxy)-oxalate	Benzene	45	6.69×10^{-5}	109.6	c,h	31
			55	2.48×10^{-4}		c	31
			65	8.27×10^{-4}		c	31
	1-Methyl-1-phenylethyl 2,2-dimethyl-peroxyporpionate	Cumene	40	6.91×10^{-6}			368
			50	2.80×10^{-5}			368
			60	1.032×10^{-4}			368
			70	3.57×10^{-4}			368
15	*tert*-Amyl perneodecanoate	Benzene	45	1.9×10^{-5}		a	338
		Chlorobenzene	43	1.93×10^{-5}			344
			61	1.93×10^{-4}			344
			81	1.93×10^{-3}			344
			T (K)	1.47×10^{14}	$\exp[-114.38/RT]$		344
	Dibenzoyl monopercarbonate	Benzene	60.00	8.05×10^{-5}	116.5	h	280
	tert-Butyl 1-adamantyl-percarboxylate	Cumene	45	5.15×10^{-5}	115.5	h	160
			55	2.05×10^{-5}			160
			65	7.40×10^{-5}			160
			64.6	6.87×10^{-5}	116.7	h	159
			74.6	2.44×10^{-4}			159
			84.6	7.78×10^{-4}			159
			60	5.4×10^{-5}	124.7	h	223
			70	2.12×10^{-4}			223
			80	7.20×10^{-4}			223

TABLE 6. *cont'd*

Number of C atoms	Initiator	Solvent	T (°C)	k_d (s^{-1})	E_a (kJ/mol)	Notes	Refs.
15 (*cont'd*)	*tert*-Butyl 4-(carboethoxy)-phenoxyperacetate	Ethylbenzene	70.5	1.6×10^{-4}		a	315
	tert-Butyl α,β-dimethyl-percinnamate (*cis*)		95.0	1.02×10^{-4}	118.8	a,h	151
			103.2	2.29×10^{-4}		a	151
			110.1	5.15×10^{-4}		a	151
	(*trans*)		85.1	3.9×10^{-5}	122.6	a,h	151
			95.0	1.17×10^{-4}		a	151
			103.7	2.84×10^{-4}		a	151
			110.0	6.05×10^{-4}		a	151
			110.0	7.90×10^{-4}		a,v_6	151
	tert-Butyl 1-pernaphthoate	Chlorobenzene	110.1	8.69×10^{-5}			154
	tert-Butyl 2,2-dimethyl-3-phenylthio perpropionate	Cyclohexane	55	1.63×10^{-5}	116.9	h,t_6	320
			65	1.61×10^{-5}			320
			75	1.98×10^{-4}		t_6	320
	tert-Butyl 2-(4-methoxyphenyl)-2-methylperpropionate	Acetonitrile	50	1.675×10^{-3}			265
		Benzene	50	9.96×10^{-4}			265
		Dodecane	40	1.49×10^{-4}	93.0	h	265
			50	4.21×10^{-4}			265
			57	1.028×10^{-3}			265
		Octane	50	4.18×10^{-4}			265
	tert-Butyl 1-phenylcyclo-*n*-Dodecane butylpercarboxylate	52.3	7.89×10^{-5}			255	
		Ethylbenzene	60.0	3.62×10^{-4}		t_1	323
		n-Hexadecane	52.3	8.80×10^{-5}			255
		2,2,4-trimethyl pentane	52.3	7.69×10^{-5}	110.6	h	255
			61.6	2.46×10^{-4}			255
	tert-Butyl 4-*tert*-butylperbenzoate	Chlorobenzene	100.1	3.81×10^{-5}			134
			119.8	4.50×10^{-4}			134
			135.9	2.38×10^{-3}			134
	Di-*tert*-butyl perpimelate	Styrene	105	4.45×10^{-5}	150.6	x_1	215
			115	1.05×10^{-4}		x_1	215
			125	5.06×10^{-4}		x_1	215
	tert-Butyl 2-(4-tolyl)-2-methylperpropionate	Acetonitrile	50.0	6.00×10^{-4}			265
		Benzene	50.0	3.85×10^{-4}			265
		Dodecane	50.0	1.90×10^{-4}	100.6	h	265
			60.0	5.58×10^{-4}			265
			67.0	1.320×10^{-3}			265
		Octane	60.0	5.43×10^{-4}			265
	tert-Butyl triisopropylperacetate	Cumene	24.8	5.32×10^{-6}	111.5	h	267
			41.6	6.84×10^{-5}			267
			55.2	3.78×10^{-4}			267
	1,1-Dimethyl-2-phenylethyl-perpivalate	Cumene	40	4.56×10^{-6}			362
			50	1.833×10^{-5}			362
			60	6.1×10^{-5}			362
			70	2.51×10^{-4}			362
	1-Phenylethyl 4-methoxyperacetate	Benzene	99.7	3.50×10^{-4}	134.1	h	259
	1-Phenylethyl 3-nitroperbenzoate	Benzene	100	5.97×10^{-4}	136.2	h	259
	1-Phenylethyl 4-nitroperbenzoate	Benzene	100	4.10×10^{-4}	146.2	h	259
	1-Phenylethyl perbenzoate	Benzene	100	4.03×10^{-4}	123.6	h	259
16	Dibenzyl peroxydicarbonate	Benzene	40	2.0×10^{-5}	117	a	337
			50	6.25×10^{-5}		a	337
			60	2.67×10^{-4}		a	337
	Di-*tert*-butyl 2-iodoperisophthalate	Chlorobenzene	68.4	8.24×10^{-5}	93.9	h	248
			85.4	4.45×10^{-4}			248
			101.6	1.68×10^{-3}			248
	Di-*tert*-butyl perphthalate	Benzene	100	1.1×10^{-5}	159	a	337
			115	7.81×10^{-5}		a	337
			130	4.81×10^{-4}		a	337
		Di-*n*-butyl phthalate	100	1.08×10^{-5}	155.0	h	269
			115	7.8×10^{-5}			269
			130	4.8×10^{-4}			269
		Chlorobenzene	107	1.93×10^{-5}			344
			125	1.93×10^{-4}			344
			146	1.93×10^{-3}			344
			T (K)	9.39×10^{16}	$\exp[-157.85/RT]$		344

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TABLE 6. *cont'd*

Number of C atoms	Initiator	Solvent	T (°C)	k_d (s^{-1})	E_a (kJ/mol)	Notes	Refs.
16 (*cont'd*)	Di-*tert*-butyl perphthalate	Cumene	99.9	8.34×10^{-6}	140.8	h	269
			115.0	4.68×10^{-5}			269
			130.1	2.60×10^{-4}			269
	tert-Butyl 1-phenyl-1-cyclo-pentane percarboxylate	Ethylbenzene	60.0	1.52×10^{-3}		t_1	323
	tert-Butyl 2,3-dimethyl-2-phenylperbutyrate	Ethylbenzene	50	4.30×10^{-5}			324
	Cumyl *N*-phenylperoxy carbamate	Xylene	T (K)	1.26×10^{14}	$\exp[-117.6/RT]$		40
	Dibenzyl peroxydicarbonate	Toluene	50	2.92×10^{-5}		a	90
	Di-*tert*-butyl perphthalate	Benzene	100	1.08×10^{-5}	157.7	a	126
			115	7.83×10^{-5}		a	126
			130	4.80×10^{-4}		a	126
	Di-*tert*-butyl persuberate	Styrene	115	7.86×10^{-5}	159.0	x_1	215
			125	2.81×10^{-4}		x_1	215
	tert-Butyl 1-phenylcyclopentyl-percarboxylate	2,2,4-Trimethyl-pentane	43.5	1.184×10^{-4}	103.5	h	255
			52.3	3.51×10^{-4}			255
	1,1,3,3-Tetramethylbutyl-per-2-ethylhexanoate	Benzene	60	1.9×10^{-5}	101	a	337
			70	5.30×10^{-5}		a	337
			80	1.38×10^{-4}		a	337
	2-Phenylazo-2-propylperbenzoate	Chlorobenzene	10	4.5×10^{-4}			260
			35	1.9×10^{-3}			260
		p-Chlorotoluene	10	6.4×10^{-4}			260
		Chloroform-d_1	10	5.1×10^{-4}			260
	1-Phenylethyl 4-dimethyl-aminoperbenzoate	Benzene	100	2.16×10^{-3}	111.5	h	259
17	Di-*tert*-butylperhomoterephthalate	Cumene	79.6	2.38×10^{-5}			272
		Toluene	70.6	9.44×10^{-6}	122.3	h	272
			80.3	2.80×10^{-5}			272
			100.5	3.09×10^{-4}			272
	tert-Butyl 1-phenylcyclo-hexanepercarboxylate	Ethylbenzene	60.0	1.90×10^{-3}			323
		2,2,4-Trimethyl-pentane	43.5	1.27×10^{-4}	107.7	h	255
			52.3	3.91×10^{-4}			255
			61.6	1.218×10^{-3}			255
	tert-Butyl 2-(phenylthio)perbenzoate	Acetone	25	1.89×10^{-5}		m_2	22
			40	1.22×10^{-4}		m_2	22
		Acetonitrile	25	1.01×10^{-4}		m_2	22
			40	5.44×10^{-4}		m_2	22
		tert-Butanol	25	5.26×10^{-5}		m_2	22
			40	3.24×10^{-4}		m_2	22
		Chlorobenzene	39.3	4.98×10^{-5}		b	134
			53.8	5.23×10^{-4}			134
			53.8	4.58×10^{-4}		m_2	134
			70.0	2.62×10^{-3}			134
			25	1.76×10^{-5}		m_2	22
			40	1.03×10^{-4}		m_2	22
		Cyclohexane	25	9.8×10^{-7}		m_2	22
			40	6.9×10^{-6}		m_2	22
		DMSO	25	1.11×10^{-4}		m_2	22
			40	6.02×10^{-4}		m_2	22
		Ethanol	25	2.31×10^{-4}		m_2	22
			40	1.65×10^{-3}		m_2	22
		Isopropanol	25	1.33×10^{-4}		m_2	22
			40	7.25×10^{-4}		m_2	22
		Methanol	25	8.21×10^{-4}		m_2	22
			40	4.75×10^{-3}		m_2	22
	tert-Butyl dibenzothiophene-4-per-carboxylate	Chlorobenzene	105	2.79×10^{-5}	128.0	h	22
			119.4	1.29×10^{-4}			22
			135.1	6.07×10^{-4}			22
	Di-*tert*-butyl perazelate	Styrene	105	5.13×10^{-5}	154.8		215
			115	1.20×10^{-4}			215
			125	5.10×10^{-4}			215
		Chlorobenzene	98	1.93×10^{-5}			344
			116	1.93×10^{-4}			344
			137	1.93×10^{-3}			344
			T (K)	1.35×10^{16}	$\exp[-147.95/RT]$		344

TABLE 6. *cont'd*

Number of C atoms	Initiator	Solvent	T (°C)	k_d (s^{-1})	E_a (kJ/mol)	Notes	Refs.
18	*tert*-Butyl 4-benzoylperbenzoate	Benzene	25	1.84×10^{-4}		p_2	279
		Chlorobenzene	110	2.88×10^{-5}			279
	tert-Butyl diphenylperacetate	Chlorobenzene	60	4.44×10^{-4}	101.7	a,h	81
		Cumene	40.3	2.75×10^{-5}	104.6	h	136
			49.6	9.81×10^{-5}			136
			59.9	3.10×10^{-4}			136
			70.4	1.04×10^{-3}			136
		Decane	77.5	1.66×10^{-3}			168
		Dodecane	77.5	1.688×10^{-3}			168
		Hexadecane	77.5	1.632×10^{-3}			168
		Octane	77.5	1.651×10^{-3}			168
		tetradecane	77.5	1.627×10^{-3}			168
	2,4,4-Trimethylpentyl-2-perneodecanoate	Chlorobenzene	40	1.93×10^{-5}			344
			57	1.93×10^{-4}			344
			76	1.93×10^{-3}			344
			T (K)	3.97×10^{14}	$\exp[-115.79/RT]$		344
	α,ω-Di-*O*,*O*-*tert*-butyl-(bis-persuccinyl)ethylene glycol	Ethylbenzene	95	2.68×10^{-6}	147.5		306
			105	9.10×10^{-6}			306
			115	2.97×10^{-5}			306
	tert-Butyl l-phenyl-1-cyclo-heptanepercarboxylate	Ethylbenzene	60.0	2.75×10^{-3}			323
	Di-*tert*-butyl *p*-phenylene-diperacetate	Cumene	70.9	3.69×10^{-5}	112.7	h,k	254
			85.4	2.08×10^{-4}		k	254
			100.3	8.83×10^{-4}		k	254
	tert-Butyl 2-(phenylthiomethyl)-perbenzoate	Chlorobenzene	98.7	4.64×10^{-5}	134.7	h	154
			120.1	4.20×10^{-4}			154
	tert-Butyl thioxanthone-4-per-carboxylate	Chlorobenzene	120	1.89×10^{-4}	156.5	h,m_2	22
			135	1.15×10^{-3}		m_2	22
	Di-*tert*-butyl persebacate	Styrene	105	5.10×10^{-5}	154.8	x_1	215
			115	1.20×10^{-4}		x_1	215
			125	5.00×10^{-4}		x_1	215
	Di-(2-ethylhexyl)peroxy-dicarbonate	Benzene	40	1.9×10^{-5}		a	338
		Chlorobenzene	47	1.93×10^{-5}			344
			64	1.93×10^{-4}			344
			83	1.93×10^{-3}			344
			T (K)	1.83×10^{15}	$\exp[-122.45/RT]$		344
		Decane	30	5.3×10^{-6}	105	a	337
			45	3.31×10^{-5}		a	337
			60	2.32×10^{-4}		a	337
		Mineral spirits	40	1.3×10^{-5}	126	a	337
			50	6.14×10^{-5}		a	337
			60	2.31×10^{-4}		a	337
	Di-*n*-heptyl persuccinate	Styrene	60	6.1×10^{-6}	131.0	x_1	215
			73.5	3.85×10^{-5}		x_1	215
			85	1.70×10^{-4}		x_1	215
19	*tert*-Butyl diphenylmethyl-peracetate	Chlorobenzene	60	1.9×10^{-3}	103.3	a,h	81
	tert-Butyl diphenylperglycidate (*cis*)	Cumene	60.0	2.8×10^{-5}	112.1	h	204
			70.0	5.5×10^{-5}			204
			80.0	1.68×10^{-4}			204
	(*trans*)	Cumene	60.0	1.6×10^{-5}	117.2	h	204
			70.0	3.9×10^{-5}			204
			80.0	1.20×10^{-4}			204
	tert-Butyl 2,2-diphenylperpropionate	Chlorobenzene	34.1	7.76×10^{-5}			249
	tert-Butyl 4-hydroxy-3,5-di-(*tert*-butyl)perbenzoate	Benzene	100	3.18×10^{-5}		c,e	246
		Carbon tetrachloride	100	3.60×10^{-5}		c,e	246
	tert-Butyl 4-(4-methylbenzoyl)-perbenzoate	Benzene	25	1.45×10^{-4}		p_2	279
		Chlorobenzene	110	3.03×10^{-5}			279

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TABLE 6. *cont'd*

Number of C atoms	Initiator	Solvent	T (°C)	k_d (s^{-1})	E_a (kJ/mol)	Notes	Refs.
19 (*cont'd*)	*tert*-Butyl α-phenylpercinnamate	Cumene	99.6	1.52×10^{-4}	136.8	h	150
	(*cis*)		109.8	4.41×10^{-4}			150
	(*trans*)	Cumene	99.6	8.2×10^{-5}	133.9	h	150
			109.8	2.59×10^{-4}			150
	Cumyl perneodecanoate	Benzene	39	1.9×10^{-5}		a	338
		Chlorobenzene	39	1.93×10^{-5}			344
			56	1.93×10^{-4}			344
			75	1.93×10^{-3}			344
			T (K)	3.12×10^{14}	exp[− 114.59/RT]		344
20	Di-*n*-heptyl peradipate	Styrene	60	1.02×10^{-5}	133.1	x_1	215
			73.5	6.57×10^{-5}		x_1	215
			85	2.98×10^{-4}		x_1	215
	tert-Butyl 2-carbobenzoxy-phenylperacetate	Cumene	71.0	8.84×10^{-6}	129.5	h	257
			85.4	5.46×10^{-5}			257
			102.4	4.23×10^{-4}			257
	tert-Butyl 2-methyl-2-phenyl-perhexanoate	Ethylbenzene	50	5.01×10^{-5}			324
	α,ω-Di-*O,O-tert*-butyl-(bis-persuccinyl)diethylene glycol	Ethylbenzene	95	2.34×10^{-6}	155.0	h	306
			105	8.88×10^{-6}			306
			115	3.27×10^{-5}			306
21	*tert*-Butyl 8-(phenylthio)-1-pernaphthoate	Chlorobenzene	50	3.83×10^{-5}	99.2	h,m_2	154
			70	3.44×10^{-4}		m_2	154
			70	3.12×10^{-4}			154
			80	9.82×10^{-4}		m_2	154
	tert-Butyl 4-(2,4,6-trimethyl-benzoyl)perbenzoate	Benzene	25	1.34×10^{-4}		p_2	279
		Chlorobenzene	110	1.80×10^{-5}			279
22	*tert*-Butyl 2,2-diphenyl-3,3-dimethylperbutanoate	Toluene (?)	30	2.76×10^{-5}	114.8	j_2	250
			39.7	1.15×10^{-4}		j_2	250
			50	5.45×10^{-4}		k	250
	Di-*tert*-butyl 2-thiophenyl-perisophthalate	Chlorobenzene	12.1	1.68×10^{-4}	73.7	h	248
			25.0	6.45×10^{-4}			248
			40.0	3.09×10^{-3}			248
	2,5-Dimethylhexyl 2,5-di(peroxybenzoate)	Benzene	100	1.87×10^{-5}	154.0	a	126,337
			115	1.25×10^{-4}		a	126,337
			130	7.14×10^{-4}		a	126,337
	Di-(4-*tert*-butylcyclohexyl)-peroxydicarbonate	Chlorobenzene	48	1.93×10^{-5}			344
			64	1.93×10^{-4}			344
			82	1.93×10^{-3}			344
			T (K)	7.44×10^{15}	exp[− 126.39/RT]		344
23	*tert*-Butyl 2,6-di(phenylthio)-perbenzoate	Chlorobenzene	40.1	7.07×10^{-5}			154
	tert-Butylperoxy stearyl carbonate	Chlorobenzene	98	1.93×10^{-5}			344
			117	1.93×10^{-4}			344
			137	1.93×10^{-3}			344
			T (K)	3.94×10^{16}	exp[− 151.59/RT]		344
	tert-Butyl 2,4,6-tri-*tert*-butyl-perbenzoate	Cumene	70.4	5.84×10^{-6}			345
			84.0	3.54×10^{-5}			345
			99.3	2.67×10^{-4}			345
			115.0	1.656×10^{-3}			345
24	*tert*-Butyl triphenylperacetate	Chlorobenzene	34.9	7.8×10^{-4}			153
		Cumene	25.7	1.7×10^{-4}	100.8	h	153
			34.9	5.8×10^{-4}			153
			45.5	2.3×10^{-3}			153
	Di-*tert*-butyl 2,3-diphenyl-persuccinate	Cumene	70.1	9.83×10^{-5}	125.5	c,h	196
			79.9	3.29×10^{-4}		c	196
			90.0	1.20×10^{-3}		c	196
	Di-*n*-heptyl persebacate	Styrene	60	1.17×10^{-5}	131.0	x_1	215
			73.5	7.13×10^{-5}		x_1	215
			85	3.03×10^{-5}		x_1	215
	2,5-Dimethyl-2,5-bis(2-ethyl-hexanoylperoxy)hexane	Benzene	60	6.7×10^{-6}	142	a	337
			70	2.92×10^{-5}		a	337
			80	1.14×10^{-4}		a	337
		Chlorobenzene	68	1.93×10^{-5}			344
			86	1.93×10^{-4}			344

TABLE 6. *cont'd*

Number of C atoms	Initiator	Solvent	T (°C)	k_d (s^{-1})	E_a (kJ/mol)	Notes	Refs.
24 (*cont'd*)	2,5-Dimethyl-2,5-bis(2-ethylhexanoylperoxy)hexane	Chlorobenzene	106	1.93×10^{-3}			344
			T (K)	2.19×10^{15}	exp[− 130.88/RT]		344
25	*tert*-Butyl 2-(2,2-diphenylvinyl)-perbenzoate	Chlorobenzene	90.0	1.32×10^{-4}			175
			90.3	7.45×10^{-5}		t_9	175
			100.0	3.27×10^{-4}			175
			105.5	4.64×10^{-4}		t_9	175
			119.3	1.54×10^{-3}		t_9	175
		Cyclohexane	90.0	3.5×10^{-5}			175
		Methanol	90.4	2.3×10^{-3}		t_9	175
	tert-Butyl 2-percarboxybenzalfluorene	Chlorobenzene	90	3.75×10^{-4}			175
		Methanol	90	2.47×10^{-3}			175
26	α,ω-Di-*O,O*-caprylyl-(bis succinyl)ethylene glycol	Ethylbenzene	65	1.48×10^{-5}	120.7	h	306
			75	4.10×10^{-5}			306
			85	2.19×10^{-4}			306
			95	6.92×10^{-4}			306
30	α,ω-Di-*O,O*-caprylyl-(bis-persuccinyl)triethylene glycol	Ethylbenzene	65	2.74×10^{-5}	116.9		306
			75	8.47×10^{-5}			306
			85	2.95×10^{-4}			306
			95	8.92×10^{-4}			306
	Dimyristyl peroxydicarbonate	Chlorobenzene	48	1.93×10^{-5}			344
			65	1.93×10^{-4}			344
			84	1.93×10^{-3}			344
			T (K)	2.82×10^{15}	exp[− 124.10/RT]		344
34	Dicetyl peroxydicarbonate	Chlorobenzene	48	1.93×10^{-5}			344
			65	1.93×10^{-4}			344
			84	1.93×10^{-3}			344
			T (K)	3.02×10^{15}	exp[− 124.30/RT]		344
36	α,ω-Di-*O,O*-heptanoyl-(bis-perphthaloyl)triethylene glycol	Ethylbenzene	65	5.02×10^{-5}	124.4		306
			75	1.420×10^{-4}			306
			85	5.19×10^{-4}			306
			95	1.410×10^{-3}			306
42	α,ω-Di-*O,O*-caprylyl-(bis-persuccinyl)nonaethylene glycol	Ethylbenzene	65	1.66×10^{-5}	116.9		306
			75	6.57×10^{-5}			306
			85	1.78×10^{-4}			306
			95	9.72×10^{-4}			306
46	α,ω-Di-*O,O*-heptanoyl-(bis-perphthaloyl)tridecaethylene glycol	Ethylbenzene	75	1.130×10^{-4}	122.3		306
			85	3.50×10^{-4}			306
			95	8.80×10^{-4}			306
50	α,ω-Di-*O,O*-caprylyl-(bis-persuccinyl)tridecaethylene glycol	Ethylbenzene	65	1.28×10^{-5}	128.2		306
			75	4.46×10^{-5}			306
			85	1.91×10^{-4}			306

TABLE 7. MISCELLANEOUS INITIATORS

Initiator	Solvent	T (°C)	k_d (s^{-1})	E_a (kJ/mol)	Notes	Refs.
Acetyl cyclohexyl sulfonyl peroxide	Benzene	30	1.4×10^{-5}	147	a	337
		40	9.42×10^{-5}		a	337
		45	2.10×10^{-4}		a	337
N-(1-Cyanocyclohexyl)pentamethylene keteneimine	Chlorobenzene	80.0	3.25×10^{-6}			179
		89.2	1.007×10^{-5}			179
		100.1	4.025×10^{-5}			179
Dibenzyl hyponitrite	Paraffin	61.5	6.5×10^{-4}			240
		68.5	3.7×10^{-3}			240
		75.5	8.3×10^{-3}			240
		80.5	1.45×10^{-2}			240
		132	8.7×10^{-1}			240

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TABLE 7. *cont'd*

Initiator	Solvent	T (°C)	k_d (s^{-1})	E_a (kJ/mol)	Notes	Refs.
Di-*tert*-butyl hyponitrite	*tert*-Butanol	65	4.68×10^{-4}			317
	n-Butyl ether	65	4.50×10^{-4}			317
	Ethanol (95%)	65	3.93×10^{-4}			317
	Isooctane	45	2.72×10^{-5}	116.9	h	317
		55	1.07×10^{-4}			317
		65	4.00×10^{-4}			317
		75	1.330×10^{-3}			317
	Nujol	65	5.17×10^{-4}			317
Peroxybenzoylnitrate	Vapor	7.6	2.79×10^{-6}	69.1	h	261
		19.9	1.05×10^{-5}			261
		30.4	2.02×10^{-5}			261
		40.6	3.64×10^{-5}			261
		50.1	1.21×10^{-4}			261
		60.5	2.74×10^{-4}			261
		T (K)	1×10^{7}	$\exp[-69.1/RT]$		261
	Vapor + NO	18.1	8.18×10^{-5}	108.5	h	261
		30.4	3.62×10^{-4}			261
		40.6	1.42×10^{-3}			261
		T (K)	1.6×10^{15}	$\exp[-108.5/RT]$		261
	Vapor + NO	30.4	1.34×10^{-5}	79.2	h	261
		50.2	7.22×10^{-5}			261
		68.5	3.41×10^{-4}			261
		T (K)	6.3×10^{-8}	$\exp[-79.2/RT]$		261
2,3-Dimethyl-2,3-diphenylbutane	Chlorobenzene	237	1.93×10^{-5}			344
		259	1.93×10^{-4}			344
		284	1.93×10^{-3}			344
		T (K)	7.34×10^{18}	$\exp[-230.19/RT]$		344
3,4-Dimethyl-3,4-diphenylhexane	Chlorobenzene	201	1.93×10^{-5}			344
		226	1.93×10^{-4}			344
		254	1.93×10^{-3}			344
		T (K)	1.45×10^{15}	$\exp[-180.32/RT]$		344
1,4-Dimethyl-1,4-diphenyl-tetrazene-2	Benzophenone	121	3.3×10^{-4}			240
		149	3.45×10^{-3}			240
	Cumene	120	2.3×10^{-4}			240
		130	6.5×10^{-4}			240
		140	1.67×10^{-3}			240
	Paraffin	164.2	2.6×10^{-2}			240
		174.3	5.6×10^{-2}			240
		186	1.43×10^{-1}			240
		194	2.5×10^{-1}			240
	Silicone oil	126	3.7×10^{-4}			240
		139	1.92×10^{-3}			240
Potassium persulfate	0.1 M NaOH	50	9.5×10^{-7}	140.2	a	242
		60	3.16×10^{-6}		a	242
		70	2.33×10^{-5}		a	242
		80	9.16×10^{-5}		a	242
		90	3.5×10^{-4}		a	242
	Water (pH 3)	50	1.66×10^{-6}		a	242
	Water	80	6.89×10^{-5}		a,v_{11}	115
		80	5.78×10^{-5}		a,v_{11}	115
		40	1.65×10^{-2}	83.4	d_3,v_{22}	262
		50	4.02×10^{-2}		d_3,v_{22}	262
		60	1.08×10^{-1}		d_3,v_{22}	262
		50	3.78×10^{-3}	121.5	d_3,v_{23}	262
		60	2.18×10^{-2}		d_3,v_{23}	262
		70	5.01×10^{-2}		d_3,v_{23}	262
		50	1.1×10^{-6}			262
1-Pentanesulfonylazide	Diphenyl ether	166	4.46×10^{-4}			166
1,4-Butanedisulfonyl azide	Diphenyl ether	163	5.02×10^{-4}			166
1,6-Hexanedisulfonyl azide	Diphenyl ether	163	5.02×10^{-4}			166
1,9-Nonanedisulfonyl azide	Diphenyl ether	150	8.84×10^{-5}			166
		160	2.25×10^{-4}			166
		170	4.45×10^{-4}			166
1,10-Decanedisulfonyl azide	Diphenyl ether	163	4.45×10^{-4}			166
1,4-Dimethylcyclohexane-α,α′-disulfonyl azide	Diphenyl ether	163	4.82×10^{-4}			166

m-Xylene-α,α′-disulfonyl azide	Diphenyl ether	163	6.09×10^{-4}			166
p-Xylene-α,α′-disulfonyl azide	Diphenyl ether	163	5.78×10^{-4}			166
Benzenesulfonyl azide	Naphthalene	110	3.6×10^{-6}	152.3		235
		120	1.07×10^{-5}			235
		125	1.97×10^{-5}			235
		130	3.41×10^{-5}			235
		175	6.08×10^{-5}			235
p-Bromobenzenesulfonyl azide	Naphthalene	120	1.36×10^{-5}			235
p-Chlorobenzenesulfonyl azide	Naphthalene	120	1.15×10^{-5}			235
p-Methoxybenzenesulfonylazide	Naphthalene	120	1.31×10^{-5}			235
p-Nitrobenzenesulfonyl azide	Naphthalene	120	1.60×10^{-5}			235
p-Toluenesulfonyl azide	1,4-Dichlorobutane	145	1.70×10^{-4}			166
	Dimethyl terephthalate	155	3.23×10^{-4}			166
	Diphenyl ether	130	3.30×10^{-5}			166
		145	1.44×10^{-4}			166
		155	3.43×10^{-4}			166
	Hexanoic acid	155	2.97×10^{-4}			166
	Naphthalene	120	1.12×10^{-5}			235
	Nitrobenzene	155	3.97×10^{-4}			166
	1-Octanol	155	3.63×10^{-4}			166
	Tetradecane	155	3.80×10^{-4}			166
p-Toluenesulfonyl-*p*-tolylsulfone	Acetonitrile	29.3	3.9×10^{-5}	103.8	h	144
		39.1	1.45×10^{-4}			144
		49.3	5.4×10^{-4}			144
	Dioxane	29.3	2.1×10^{-5}	115.5	h	144
		39.5	1.01×10^{-4}			144
		49.3	3.9×10^{-4}			144

C. NOTES

a k_d converted to s^{-1} from author's units
b k_d values for several concentrations averaged
b_2 analyzed from nonisothermal conditions
c k_d increases with increasing initiator concentration
c_2 rate non-linear
c_3 hydroperoxide concentration 7.83×10^{-3} mol/l
c_4 hydroperoxide concentration 2.50×10^{-3} mol/l
d k_d decreases with increasing initiator concentration
d_2 after 1st half life; rate slower initially
d_3 rate is second order: units are 1/mol sec.
e k_d listed is for lowest initiator concentration
f k_d is extrapolated value for zero initiator concentration
g $k_d \neq$ has been corrected for induced decomposition
g_2 corrected for uncatalysed reaction ($7 \times 10^{-5}\ s^{-1}$)
h ΔH (not E_a)
i pressure (number gives mbar)
j iodometric analysis
j_2 manometer measurement
k infrared analysis
l k_d is limiting value with respect to additive concentration
m_1 3,4-dichlorostyrene added to minimize induced decomposition
m_2 styrene added to minimize induced decomposition
m_3 methyl methacrylate added to minimize induced decomposition
m_4 isobutene added to minimize induced decomposition
m_5 acenaphthalene added to minimize induced decomposition
m_6 1 mol/l α-methylstyrene added to minimize induced decomposition
m_7 butadiene added to minimize induced decomposition
m_8 acrylonitrile added to minimize induced decomposition
n trichloroacetic acid added
n_2 3.2 wt.% or about 0.1 monolayer
o addition of trichloroacetic acid did not affect k_d
p degassed
p_2 photochemical benzophenone added: 6.56×10^{17} quants/min @ 366 nm
q addition of trichloroacetic acid increased k_d several fold
q_2 pH 2.90
q_3 pH 7.05
r not inhibited, but initiator concentration low enough (0.01–0.09 M) so that higher order decomposition is unimportant
s solvent not degassed
t_1 2,6-di-*tert*-butylphenol added to inhibit induced decomposition
t_2 α,α-diphenyl-β-picrylhydrazyl added to inhibit induced decomposition
t_3 phenyl-α-naphthylamine added to inhibit induced decomposition
t_4 tetrachloroquinone added to inhibit induced decomposition
t_5 1,3,5-trinitrobenzene added to inhibit induced decomposition
t_6 I_2 added to inhibit induced decomposition
t_7 O_2 added to inhibit induced decomposition
t_8 5–20% NO_2 added to inhibit decomposition

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t_9 galvanoxyl added to inhibit induced decomposition
t_{10} α,γ-bisdiphenylene-β-phenylallyl added to inhibit induced decomposition
t_{11} α-naphthylamine added to minimize induced decomposition
t_{12} 2,3′,5′,6′-tetra-*tert*-butyl indophenoxy added
t_{13} benzoquinone added
t_{14} 2,6-di-*tert*-butyl-4-methylphenol added
u_1 in absence of oxygen
u_2 from initiation data
u_3 in multisurface reaction vessel
u_4 rate reduced when nujol layer used to exclude Hg vapor
u_5 rate increased when nujol layer used to exclude Hg vapor
v_1 acetic acid added
v_2 $CuCl_2$ added
v_3 CuCl added
v_4 0.1 mol $AgClO_4$/mol AIBN added
v_5 3.9 mol thiophenol added
v_6 *tert*-butyl mercaptan added
v_7 2.5 mol cyclohexane added
v_8 $\sim 4 \times 10^{-2}$ mol pyridine added
v_9 2×10^{-2} mol pyridine added
v_{10} 2.5 mol cumene added
v_{11} buffered with sodium pyrophosphate
v_{12} saturated with ethyl acetate
v_{13} 3.11 mol CCl_4 present
v_{14} peroxide in P(MMA)
v_{15} peroxide in P(sty.)
v_{16} 0.26 mol piperidine
v_{17} 0.24 mol triethylamine
v_{18} 0.21 mol *N,N*-diethylaniline
v_{19} 0.22 mol pyridine
v_{20} 0.9 mol $ZnCl_2$
v_{21} in presence of ^{15}NO
v_{22} 0.12 mol 18 crown 6 added
v_{23} 0.24 mol diglyme added
v_{24} 0.02 M pyridine added
v_{25} 0.10 M pyridine added
v_{26} 0.10 M 2,6-lutidine added
w stereoisomers
x_1 actual rate divided by 2 because of two identical peroxide groups
x_2 each peroxide group has different k_d
y measured in differential scanning calorimeter: subscript is heating rate in deg/min
z pressure (in bar)

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Propagation and Termination Constants in Free Radical Polymerization

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A. INTRODUCTION

In free radical polymerization the propagation and termination rate constants describe the reactions

$$P_n^{\bullet} + M \xrightarrow{k_p} P_{n+1}^{\bullet} \quad (A1)$$

$$2P_n^{\bullet} \xrightarrow{k_t} \text{dead polymer} \quad (A2)$$

where $P_n^{\bullet}$ is a propagating chain of any length n and M is the monomer. The rate constants are defined by the following equations:

$$R_p = -\frac{d[M]}{dt} = k_p[P^{\bullet}][M] \quad (A3)$$

$$R_t = -\frac{d[P^{\bullet}]}{dt} = k_t[P^{\bullet}]^2 \quad (A4)$$

where

$$[P^{\bullet}] = \sum_{n=1}^{\infty} [P_n^{\bullet}] \quad (A5)$$

The rate constants k_p and k_t have usually been assumed to be independent of chain length. In this chapter termination constants depending on the length of the polymer radicals are also reported. In American literature the right hand side of (A4) is written as $2k_t[P^{\bullet}]^2$. In this chapter the definition given in Eq. (A4) has been used.

Simultaneous determination of absolute values of both k_p and k_t from a single experiment has not been reported. In practice, the ratio k_p^2/k_t is determined from measurements of molecular weight as a function of rate of polymerization for a low conversion polymerization or from measurements of initiation rate and polymerization rate in a low conversion. The ratio k_p/k_t is determined from nonsteady-state measurements of the average lifetime, τ, of the growing polymer chain in a photochemically initiated polymerization. This lifetime may be defined by noting that the concentration of chains present must be related to their average lifetime and rate of disappearance by

$$[P^{\bullet}]/\tau = R_t \quad (A6)$$

which, from (A3) and (A4), yields

$$\frac{k_p}{k_t} = \frac{\tau R_p}{[M]} \quad (A7)$$

By combining the separately determined ratios, k_p^2/k_t and k_p/k_t, the individual propagation and termination rate constants may be calculated. Alternatively, the rate of initiation, R_i, may be measured as the rate of initiator disappearance and equated to R_t. This gives (from (A6) and (A3))

$$k_p = \frac{R_p}{R_i \tau [M]} \quad (A8)$$

There is a large degree of imprecision inherent in measuring τ and in combining data from different experiments, which helps to explain the scatter in the data tabulated here.

Figure 1. Arrhenius plots of all bulk polymerization data for styrene for k_p (•) and k_t (+). Solid lines are least squares obtained by assuming all points to be of equal value.

Figure 2. Arrhenius plots of all bulk polymerization data for methyl methacrylate for k_p (•) and k_t (+). Solid lines are least squares obtained by assuming all points to be of equal value. The line for k_t is not shown since a horizontal line for a temperature independent k_t could be a better representation.

The two monomers styrene and methyl methacrylate have been so extensively studied that their data are presented as Arrhenius plots (Figs. 1 and 2). Because of the influence of solvents on the rates, only data of bulk polymerizations are shown. It remains a wide scatter, which should serve as a warning against casual acceptance of any single number. Solid lines are the least squares that have been calculated assuming all points to be of equal value.

For the termination rate of methyl methacrylate the least-squares line results in a positive slope and is not shown. In this case a temperature-independent k_t could be a better representation of the experiments.

The pulse laser polymerization (PLP) method has been developed as a new method of obtaining k_p. In the PLP method, the value of k_p can be estimated from the degree of polymerization of polymer formed, ν_p, a knowledge of the monomer concentration, [M], and t_f the time between pulses:

$$\nu_p = k_p[M]t_f \qquad \text{(A9)}$$

The reproducibility of the PLP method has been recognized by an IUPAC Working Party on Modeling of Kinetic and Process of Polymerization, which is establishing a critical review of the literature values of k_p.

Classification of the methods for the determination of rate constants

The tabulated data refer to seven different methods.

Method A uses the following four methods for the measurement of the lifetime τ:

A1 – rotating sector or a "flashing" laser
A2 – flow through a tube with spatially separated light and dark sections
A3 – spacial intermittent polymerization (SIP)
A4 – intermittent illumination method

Method B effectively measures only a single decrease (increase), in the radical concentration by the following methods:

B1 – dilatometry
B2 – dielectric constant
B3 – interferomety
B4 – temperature change
B5 – viscosity
B6 – light scattering
B7 – monomer pressure

B8 – cathetometer
B9 – inhibitor
B10 – scavenger

Method C uses electron spin resonance (ESR) for the determination of the radical concentration

Method D refers to values obtained in emulsion polymerization by application of the Smith–Ewart theory

Method E refers to recalculated values

Method F uses pulse laser photopolymerization (PLP) method

F1 – PLP
F2 – PLP-GPC (MWD)
F3 – PLP-MALDI TOF (-GPC)

Method G refers to the method of measuring molecular weight (MW) and molecular weight distribution (MWD) by

G1 – gel permeation chromatography (GPC)
G2 – high performance liquid chromatography (HPLC)

B. TABLES OF PROPAGATION AND TERMINATION CONSTANTS

TABLE 1. DIENES

Monomer	k_p (l/mol/s)	k_t ($\times 10^{-6}$) (l/mol/s)	Temp. (°C)	Method	Remarks	Refs.
1-Acetoxybutadiene	18.0	281	25	A1		152
Butadiene	$k_p = 1.2 \times 10^8 \times \exp(-39000/RT)$		10	D		23
	150 ± 40	–	5	C		223
		$k_t = 1.13 \times 10^4 \times \exp(-711/T)$	45–60	G1		202
	$\ln k_p = \ln(3.873 \times 10^{10}) - 53400/RT$		50	F1		221
	111.6	–	50	F1	Solvent: chlorobenzene	221
	$k_p = 8.05 \times 10^7 \times \exp(-35710/RT)$			F2	Solvent: chlorobenzene	187
Chloroprene	220	–	40	D	Quoted in Ref. 86	59
	$k_p = 2.9 \times 10^9 \times \exp(-41000/RT)$			D		84
	$k_p = 1.95 \times 10^7 \times \exp(-26630/RT)$			F1		198
2,3-Dimethyl-1,3-butadiene	$k_p = 8.9 \times 10^7 \times \exp(-38000/RT)$			D		71
Ethyl 4-ethoxy-2,4-pentadienoate	9.9	9.3	25	A1		152
Ethyl 4-methyl-2,4-pentadienoate	29.7	23	25	A1		152
Ethyl pentadienoate	30.9	19	25	A1		152
1,3-Hexadiene	20 ± 10	–	5	C		223
2,4-Hexadiene	16 ± 12	–	5	C		223
Isoprene	2.8	–	5	D	Calalyst system: diisopropylbenzene, monohydroperoxide-tetraethylenepentamine	24
	125 ± 30	–	5	C		223
2-Methyl-1,3-pentadiene	35 ± 10	–	5	C		223

TABLE 2. OLEFINS

Monomer	k_p (l/mol/s)	k_t ($\times 10^{-6}$) (l/mol/s)	Temp. (°C)	Method	Remarks	Refs.
Ethylene	470 ± 30	1050 ± 50	83	A1	Solvent: benzene	53
	18.6 ± 2	455 ± 50	−20.01	A1		66
	5400	200	130	A1	Pressure 1.8×10^8 Pa	139
	$k_p = 4.8 \times 10^7 \times \exp[(-4450 + 3.1 \times 10^{-6} p)/T]$				Pressure $(5–17.5) \times 10^7$ Pa, using results of Ref. 141	142
	1.2×10^4	$3.9\ (7.8) \times 10^2$	130	A1	Pressure 1.9×10^8 Pa	135
	1.09×10^4	1.99×10^2	190	C	Initial pressure 2.27×10^8 Pa	151
	3.08×10^4	–	230	F1	Pressure 2.55×10^8 Pa, at low or moderate conversion	167
	–	3.2×10^3	190	F1	Pressure 2.50×10^8 Pa, at conversion 0	167
Propylene	$k_p = 2 \times 10^6 \times \exp(-32000/RT)$		50–150		Radical telomerization	129

TABLE 3. ACRYLIC DERIVATIVES

Monomer	k_p (l/mol/s)	k_t ($\times 10^{-6}$) (l/mol/s)	Temp. (°C)	Method	Remarks	Refs.
Acrylamide	6000 ± 1000	3.3 ± 0.6		A1, B1	Solvent: water, pH 5.5	79
	18000 ± 1500	14.5 ± 2.0	25	A1	Solvent: water	41
	8200	5.5	19	A	Solvent: water	89
	220	1.0	26	A	Solvent: DMSO	89
	$(7.9 \pm 0.5) \times 10^4$	660 ± 40	30	A1	Solvent: water 0.38 M	126
	$(4.3 \pm 0.2) \times 10^4$	350 ± 20	30	A1	H_2O : DMSO (90 : 10)	119
	$(3.3 \pm 0.2) \times 10^4$	230 ± 20		A1	H_2O : dioxane (90 : 10)	119
	$(2.3 \pm 0.1) \times 10^4$	160 ± 10		A1	H_2O : THF (92 : 8)	119
	$k_p = 7 \times 10^6 \times \exp[(-21000 \pm 2000)/RT]$			F1		197
Acrylic acid						
	650	2.6	23	A1	Solvent: Water, pH 7.9, (with 1.2 M NaOH)	99
	3150	2.6		A1	Solvent: water, pH 7.9 (with 1.5 N NaCl)	99
	6600	2.7		A1	Solvent: water, pH 11	99
–, butyl ester	13	0.018	25	A1		10
	2100	330	25	B4		57
	1977	3.84		A1	Pressure 5.0×10^7 Pa	107
	679 ± 66	6.4 ± 0.6	30	A1	Solvent: benzene 1.76 M	137
	$\log_{10} k_p = 6.0123 - 748.4/T$		25–80	F1		201
		$\ln[(k_t[p]/(1.00 + 0.06p)] = \ln k_t\,[1] - 0.60p$	30	B5	$k_t\,[p]$; k_t for pressure p (bar), $k_t\,[1] = 3.5 \times 10^6$	122
	1360	1.28	30	A1	Solvent: anisole 2.00 M	138
	963	1.18			Solvent: benzene 2.00 M	138
	1320	1.07			Solvent: chlorobenzene 2.00 M	138
	360	0.36			Solvent: benzonitrile 2.00 M	138
–, cyclohexyl ester	2722 ± 248	3.2 ± 0.3	30	A1	Solvent: benzene 1.76 M	137
–, ethyl ester	800	1.76	50	A1	Solvent: toluene 1.84 M	108
	12.39×10^3	139.2	50	A1	Solvent: benzene x; molar fractions of monomer, $x = 0.401$, k_p and k_t also given by other [M]	171
–, 2-ethylhexyl ester	155	0.233	50	A1	Solvent: toluene 1.94 M	108
–, methyl ester	1300	75	15	A1	From unpublished results of Ross and Melville	22
	880	260	15	A1	From unpublished results of Matheson	22
	1580	55	25	A1		19
	580	6.5	25	B1		48
	$k_p = 1.0 \times 10^8 \times \exp(-30000/RT)$	$k_t = 2.8 \times 10^{11} \times \exp(-22000/RT)$		A1		21
	1000	3.5550		A1		50
	11680	194		A1	Solvent: benzene 2.69 M	144
	21300	–		A1		144
	$(1.5 \pm 0.2) \times 10^4$	–	60	G2	Primary propagating step (k_{p1}), Ph-MA•	190
	$(3.7 \pm 0.6) \times 10^4$	–	60	G2	$PhCO_2$-MA•	190
	6.3×10^4	–	60	G2	*tert*-BuO-MA•	190
	$(1.4 \pm 0.2) \times 10^4$	–	60	G2	Secondary propagating step (k_{p2}), Ph-MA-MA•, $PhCO_2$-MA-MA•, *tert*-BuO-MA-MA•	
–, 2-(acetoacetoxy-methyl)-, ethyl ester	300	1.0	60	C	Solvent: benseme	170
–, 2-cyano-, ethyl ester	1622	411	30	A1	AcOH[7] wt.%	143
	1610	404	30	A1	1,3-propanesulfone 0.5 wt.%	143
	1613	411	30	A1	Optimum value, solvent: AcOH	123
	1607	404	30	A1	Optimum value Solvent: propanesulfone	123
–, 2-chloro-, ethyl ester	1660	333	30	A1	AIBN 4.88×10^{-2} M	140
	1408	244	30	A1	Optimum value	123
–, 2-fluoro-, ethyl ester	1120	4.8×10^2	30	A1		146
	978	435	30	A1	Optimum value	123
–, 2-acetoxymethyl-, methyl ester	350	2.1	60	C	Solvent: benzene 1.00 M, MAIB 0.050 M	225

TABLE 3. *cont'd*

Monomer	k_p (l/mol/s)	k_t ($\times 10^{-6}$) (l/mol/s)	Temp. (°C)	Method	Remarks	Refs.
–, 2-acetyloxy-, methyl ester	430	–	60	C	Solvent: 1,1,2-trichloroethane 2.0 M 2,2′-azobis (4-methoxy-2,4-dimethylvaleronitrile) 0.030 M, k_p also given by other temp.	224
–, 2-benzoyloxy-, ethyl ester	990	2.9	60	C	Solvent: benzene 1.56 M	172
–, 2-(benzyloxymethyl)-, methyl ester	182	1.6	60	C	Solvent: benzene 2.0 M, AIBN 5.0×10^{-3} M	206
–, 2-[2,2-bis(carbomethoxy) ethyl], methyl ester	4.0	0.038	60	C	Bulk AVN 0.05 M, k_p and k_t also given by other temp.	228
–, 2-butoxy-, methyl ester	298	8	60	C	Solvent: benzene 2 M	176
	184	–	60	C	Solvent: 1,1,2-trichloroethane 2.0 M 2,2′-azobis (4-methoxy-2,4-dimethylvaleronitrile) 0.030 M, k_p also given by other temp.	224
–, 2-butyroxymethyl-, methyl ester	360	1.4	60	C	Solvent: benzene 1.00 M, MAIB 0.050 M	225
–, 2-(2-carbomethoxy)- ethyl-, methyl ester	19	0.51	60	C	Bulk MAIB 0.05 M, k_p and k_t also given by other temp.	229
–, 2-ethyl-, methyl ester	8.6	21	60	C	Bulk AIBN 0.10 M	230
–, 2-ethyl-, cyclohexyl ester	1.6	1.8	60	C	Bulk AIBN 0.10 M	230
–, 2-isobutyroxymethyl-, methyl ester	300	1.1	60	C	Solvent: benzene 1.00 M, MAIB 0.050 M	225
–, -2-(methoxycarbonylmethyl)-, phenetyl ester	11	0.08	50	C	Solvent: benzene 2.22 M, k_p and k_t also given by other temp. and [M]	157
–, 3-methyl, adamantyl ester	0.57	0.11	60	C	Bulk 4.8 M MAIB 0.05 M	232
	0.76	1.4	60	C	Solvent: benzene 2.4 M, MAIB 0.05 M, k_p also given by other [M]	232
–, 3-methyl, dimethyladamantyl ester	0.41	0.081	60	C	Bulk 4.0 M, MAIB 0.05 M	232
	0.71	1.1	60	C	Solvent: benzene 2.0 M, MAIB 0.05 M	232
–, 3-methyl, *tert*-butyl ester	0.90	2.3	60	C	Bulk 5.9 M, MAIB 0.05 M	232
	1.0	4.7	60	C	Solvent: benzene 2.0 M, MAIB 0.05 M	232
–, 2-naphthoyloxymethyl-, ethyl ester	320	0.37	60	C	Solvent: benzene 1.00 M, MAIB 0.01 M	226
–, 2-pivaroxymethyl-, methyl ester	230	0.59	60	C	Solvent: benzene 1.00 M, MAIB 0.005 M	225
–, *trans*-2-vinyl-, methyl ester	125	–	60	C	Solvent: benzene 1.0 M, AIBN 0.25 M	227
Acrylonitrile	3000–5000	–	0	D		42
	127	12.2	25	B4		49
	52	5	25	B4		63
	51	1.8	25	B4	Solvent: DMF	75
	20000		40	D		42
	24	23	50		Primary radical termination in a precipitating medium	35
	1960	782	60	A1	Solvent: DMF	43
	15400	2700	25	A1	Solvent: water	54
	28000	3700	25	A1	Solvent: water	55
	1910	290	25	A1	Solvent: DMSO	70
	382 ± 230	47.6 ± 22	25	A1	Solvent: DMF	68
	3300 ± 300	1200 ± 170	50	A1	Solvent: DMF 3.8 M	88
	3200 ± 400	300 ± 50	50	A1	Solvent: DMSO 3.8 M	88
	3000 ± 600	240 ± 70	50	A1	Solvent: Ethylene carbonate 3.8 M	88
	$(6.5 \pm 1.3) \times 10^3$	4700 ± 1300	50	A1	Solvent: $Mg(ClO_4)_2 \cdot 12H_2O$ 3.04 M	88
N-Acryloyl-2,2-dimethyl-5 (R)-phenyl-1,3-dioxazoline	28.2	0.20	60	C	Solvent: benzene 1.08 M, MAIB 0.05 M, k_p and k_t also given by other temp.	231
N-Acryloylpiperidine	273	17.9	30	A1		145
	273	11.9	30	A1	Optimum value	123
N-Acryloylpyrrolidine	8267	2200	30	A1	Optimum value	123

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TABLE 3. *cont'd*

Monomer	k_p (l/mol/s)	k_t ($\times 10^{-6}$) (l/mol/s)	Temp. (°C)	Method	Remarks	Refs.
N,N'-Dimethylacrylamide	11000	38	50	A1		74
	27200	3540	30	A1		121
	29198	4080	30	A1	Optimum value	123
	15×10^3	–	25	F1	Solvent: water, pH 1.4	197
3-Dimethyl-(acryloyloxyethyl)-ammonium propane sulfonate	2330 ± 230	0.540 ± 0.053	30	A4	Solvent: formamide : 1,4-dioxane (3 : 1 (v/v))	192
	2760 ± 342	0.452 ± 0.056	30		Solvent: formamide: 1,4-dioxane (3 : 1 (v/v)), NaCl 0.1 M	192
N-Methylacrylamide	9.9×10^3	–	25	F1	Solvent: water, pH 1.9	197

TABLE 4. METHACRYLIC DERIVATIVES

Monomer	k_p (l/mol/s)	k_t ($\times 10^{-6}$) (l/mol/s)	Temp. (°C)	Method	Remarks	Refs.
Methacrylamide	79.6 ± 5.6	16.5 ± 1.4	25	A1	Solvent: water	69
	1.1×10^3	–	25	F1	Solvent: water, pH 1	197
Methacrylonitrile	~21	~27	30			26
	26	21	25	A1		39
	$k_p = 10^{6.43 \pm 0.26} \times \exp[(-29700 \pm 1500)/RT]$					
Methacrylic acid						
	670	2.1	23	A1	Solvent: water, pH 8.0 (with 0.22 M NaOH)	99
	1950	2.25		A1	pH = 13.6	99
–, benzyl ester	1410	41.9	30	A1		101
	110	80	32.5	C		153
	895	40	32.5	C		153
	1250	41.9	30	A1		87
	510	2.87	20	A1	k_p and k_t also given as a function of viscosity	103
–, bornyl ester	580	3.3	60	C	Solvent: benzene 1.0 M, AIBN 0.05 M	193
–, *n*-butyl ester	369	10.2	30	A1		27
	573	18.0	30	A1	Pressure: 5.0×10^7 Pa	106
	360	10	30	A1		109
	$\ln k_p = 6.13 + 6.33 \times 10^{-9} p$		30	F2		216
	$\ln k_p = 15.8 - 2751/T$		12–93	F2	Pressure 1.0×10^8 Pa	216
	–	2.6	70	B5	$\eta = 1.92$ cp	212
		$\ln[(k_t[p]/(1.00 + 0.01p)] = \ln k_t[1] - 0.73p$	30	B5	$k_t[p]$; k_t for pressure p (bar), $k_t[1] = 13.4 \times 10^6$	122
	$\ln k_p = (14.41 \pm 0.09) - (2472 \pm 29)/T$		10–90	F1		219
	$k_p = 3.44 \times 10^6 \exp(-23300/RT)$			F1		169
	1576	9.74	30	A3		225
–, *tert*-butyl ester	350	14	25	A1		52
	$k_p = 10^{7.4 \pm 0.4} \times \exp[-(27.7 \pm 2.5) \times 10^3/RT]$		9–66	F1		203
–, *trans*-4-*tert*-butyl-cyclohexyl ester	550	1.9	60	C	Solvent: benzene 1.0 M, AIBN 0.05 M, *trans* 100%	194
	510	1.9	60	C	*trans* 28.9%	194
	570 ± 10	0.5–2.3	60	C	Solvent: benzene	210
–, cetyl ester	300 ± 90	0.16 ± 0.04	30	A1		109
–, *p*-[*p*-(cetyloxy)-benzoyloxy]-phenyl ester	300	0.25	50	A1	Solvent: dioxane 0.2 M	97
	170	0.30	50	A1	Solvent: toluene 0.2 M	97
–, 2-chloroethyl ester	254	6.71	30	A1		87
–, 2-cyclohexyl-ethyl ester	1190	32.8	30	A1		87
–, cyclohexyl ester	510	5.4	60	C	Solvent: benzene 1.0 M, AIBN 0.05 M	193
–, 2-decahydro-naphthyl ester	570	3.1	60	C	Solvent: benzene 1.0 M, AIBN 0.05 M	193

TABLE 4. *cont'd*

Monomer	k_p (l/mol/s)	k_t ($\times 10^{-6}$) (l/mol/s)	Temp. (°C)	Method	Remarks	Refs.
–, 2,6-dimethyl-phenyl ester	68	2.1	30	A1		120
	72	2.4	30	A1	Optimum value	123
–, dodecyl ester	–	0.6	70	B5	$\eta = 3.96$ cp	212
–, ethyl ester	126	7.35	30	A1		87
	–	10	70	B5	$\eta = 0.91$ cp	212
	$k_p = 1.50 \times 10^6 \times \exp(-20460/RT)$			F1		169
	$\ln k_p = (15.11 \pm 0.17) - (2753 \pm 55)/T$		10–90	F1		219
–, hexadecyl ester	–	0.16	70	B5	$\eta = 7.52$ cp	212
–, isobornyl ester	390	3.5	60	C	Solvent: benzene 1.0 M, AIBN 0.05 M	193
–, isobutyl ester	$\ln k_p = (14.72 \pm 0.13) - (2590 \pm 42)/T$		10–90	F1		219
–, isopropyl ester	121	4.52	30	A1		87
–, lauryl ester	460 ± 140	0.6 ± 0.2	30	A1		109
	$k_p = 2.93 \times 10^5 \times \exp(-16190/RT)$			F1		169
–, 2-methoxyethyl ester	249	9.30	30	A1		87
–, methyl ester	310 ± 20	66 ± 4	23.6	A1		9
	$k_p = 5.13 \times 10^6 \times \exp(-26400/RT)$	$k_t = 1.36 \times 10^3 \times \exp(-11900/RT)$		A1		7
	187	72.1	32.5	C		153
	404	17.6	40	B1	Solvent: ethyl acetate	51
	410	24	50	E	Using results of Ref. 7	62
	13.2	0.488	– 30	B1	Solvent: ethyl acetate	72
	390	–	20	A1	k_p also given as a function of temp. and of viscosity for other solvents	92
	517	37	10	B1	Solvent: methanol	94
	527	23	10	B1	Solvent: pyridine	94
	28	4.4	10	B1	Solvent: DMF	94
	260	21	25	A1	Solvent: benzene 4.69 M	85
	270	21	25	A1	Solvent: fluorobenzene 4.69 M	85
	280	19.5	25	A1	Solvent: chlorobenzene 4.69 M	85
	285	17.5	25	A1	Solvent: anisole 4.69 M	85
	310	17	25	A1	Solvent: bromobenzene 4.69 M	85
	330	17	25	A1	Solvent: benzonitrile 4.69 M	85
	340	17	25	B5	Solvent: methyl benzoate 4.69 M	90
	240	11.5	25	B5	Solvent: methylphenyl acetate 4.69 M	90
	335	9	25	B5	Solvent: dimethyl phthalate 4.69 M	90
	270	22	25	B5	Solvent: dimethyl carbonate 4.69 M	90
	330	16	25	B5	Solvent: diethyl oxalate 4.69 M	90
	250	29	25	B5	Solvent: methyl formate 4.69 M	90
	240	25	25	B5	Solvent: methyl propionate 4.69 M	90
	280	14	25	B5	Solvent: diethyl succinate 4.69 M	90
	320	28	25	B5	Solvent: acetonitrile 4.69 M	90
	390 ± 40	42 ± 4	25	A1	Solvent: methanol 50% by vol.	104
	410 ± 40	29 ± 3	25	A1	Solvent: *n*-octane 5% by vol.	104
	410 ± 40	26 ± 3	25	A1	Solvent: *n*-nonane 20% by vol.	104
	180 ± 50	20 ± 6	20	E	$\overline{DP} = (2-8) \times 10^3$ using results of Ref. 86	96
	500 ± 250	63 ± 32	20	B6	$\overline{DP} = (3-5) \times 10^4$	96
	41.6	2.69	0	B5	Assuming biradical initiation	11
	62	–	5	D		65
	200	–	20	B6	k_p found as a linear function of M_w	91
	128	8.44	22	B1		29
	364	41.8	22.5	B4	Rate of initiation; 1.20×10^{-8} (moles/l/s)	60
	512.6	46.6	25	A1		30
	410	42.7	25	A1	k_p and k_t also given as a function of viscosity for other solvents	93
	248	22.7	30	A1		14
	141	11.6	30	A		87
	106	5.7	32	B4		58
	140	–	40	D		65

TABLE 4. *cont'd*

Monomer	k_p (l/mol/s)	k_t ($\times 10^{-6}$) (l/mol/s)	Temp. (°C)	Method	Remarks	Refs.
	0.224	–	45	D		67
	573	2.0	60	E	Termination by combinat. using results of Refs. 7 and 31	33
	573	11.9	60	E	Termination by disprop. using results of Refs. 7 and 31	33
	995 ± 83	43.6 ± 4.9	80		Solvent: benzene 4.7 M	111
	506 ± 48	35.6 ± 3.9	30	A1	Solvent: anisole 2.0 M	133
	450 ± 33	42.0 ± 3.0		A1	Solvent: benzene 2.0 M	133
	456 ± 29	43.8 ± 2.0		A1	Solvent: C_6D_6 2.0 M	133
	448 ± 47	47.2 ± 6.6		A1	Solvent: fluorobenzene 2.0 M	133
	498 ± 39	42.9 ± 4.7		A1	Solvent: chlorobenzene 2.0 M	133
	614 ± 43	39.9 ± 3.3		A1	Solvent: benzonitrile 2.0 M	133
	427 ± 38	30.9 ± 3.7	30	A1	Solvent: benzene 1.0 M	133
	290	21	60	A1		118
	1020	292		A1	Addition of 1×10^{-3} mol pyridine	118
	530	55		A1	Addition of 1×10^{-3} mol acetone	118
	550	68		A1	Addition of 1×10^{-3} mol triethanolamine	118
	$k_p = 4.92 \times 10^5 \times \exp(-18210/RT)$	$k_t = 98 \times \exp(-2930/RT)$	15–30	A2	$\bar{P}_n = 10^4$	114
	315	33.9	25	A2	k_p and k_t also given as a function of $\bar{P}_n$	110
	336 ± 90	28 ± 12	25	A1	Pressure 5.0×10^6 Pa	127
	441	19.7	30	A1	Pressure 5.0×10^7 Pa	105
	$k_p = 2.5 \times 10^6 \times \exp[(-23000 \pm 2500)/RT]$	720	25–60	C		45
	$k_p = k_p^0$ $(0.33 \leq w_p \leq 0.84)$ $= k_p^0 \exp[-29.8\,(w_p - 0.84)]$ $(0.84 \leq w_p \leq 0.99)$ $(k_p^0 = 790 \pm 300)$		50	C	w_p (weight fraction of polymer)	150
	130	20.7 ± 1.0	0	A1	At high conversions (~65%)	148
	705.6	25	60		Special evaluation from steady-state and $\bar{M}_n$	134
	170	–	0.2	F3	Solvent: toluene	222
	306	–	25	F1		196
	292	–	25	F1	Solvent: ethanol (50%) 4.67 M, k_p also given by other [M] and solvents	
	670 ± 30	22	60	C		175
	$\ln k_p = 14.69 - 2670/T + 0.201/T \times (1.0 \times 10^{-5} p - 1)$		20–90	F1		207
		$\ln k_t[p] = \ln k_t[1] - 0.57p$	30	B5	$k_t[p]$; k_t for pressure p (bar), $k_t[1] = 15.4 \times 10^6$	122
	26.6	1.4	5	B10	Scavenger DPPH, solvent: DMF, blank polymn.	115
	5.8	0.017	5	B10	Scavenger DPPH, solvent: DMF, template polymn., template; it-MMA	115
		$k_t(m,n) = 1.22 \times 10^2 (n \times m)^{-0.075}$	25	A3	n: n-mer; m: m-mer, coupling with n-mer and m-mer	147
	–	21	70	B5	$\eta = 0.53$ cP	212
	–	0.034	50	D	No addition of chain-transfer agent, Time 7.5–20.5 min.	149
	–	0.16	50	D	Addition of 2% CBr_4, Time 7.5–20.5 min.	149
	$k_p = 10^{6.694} \exp(-23940/RT)$		−1 to −70	F1		217
	$\ln k_p$ (l/mol/min) $= \ln k_{p,0} - (3.86\,[\text{AIBME}]_0 + 0.8) \times (1 - \phi_m) - 1.6\,(1 - \phi_m)^{6.0}$		60	C	AIBME (dimethyl 2,2′-azodiisobutyrate) 0.0434 M, ϕ_m; monomer volume fraction $k_{p,0} = 700$ (l/mol/min)	158
	131	–	−8	F3	Benzoin 7×10^{-4} M	199
	680–820	–	30	F1	Solvent: toluene, pressure 1.0×10^8 Pa, k_p also given by other pressures	208
	690–810	–		F1	Solvent/2-butanone, pressure 1.0×10^8 Pa	208

TABLE 4. *cont'd*

Monomer	k_p (l/mol/s)	k_t ($\times 10^{-6}$) (l/mol/s)	Temp. (°C)	Method	Remarks	Refs.
	313 ± 8.1	39 ± 4	25	F1		161
	794.0	62.4	60	B5	Solvent: benzene 3 M	204
	815.0	51.6			Solvent: chlorobenzene 3 M	204
	957.0	38.2			Solvent: benzonitrile 3 M	204
	–	25(± 3)	60	C		166
	510 ± 100	21 ± 2	60	C		191
	299	45	25	A1		160
	431	50	40			160
	$k_p = 2.39 \times 10^6 \times \exp(-22000/RT)$			F1		198
	359	–	25	F1		220
	12	–	50	C	Emulsion polymn., particle size 260 nm, k_p also given by other particle sizes	184
	135	–	0	A1	k_p; average value	159
	292	–	25	F1		164
	200	25.6	28	B1	Values from Chem. Abstr.	83
	135 ± 50	–	0	A1		165
	170	–	50	C	Emulsion polymn., *n*-butyl acrylate: MMA: methacrylic acid (8 : 91 : 1), particle size (p.s.) 50 nm, k_p also given by other temp. and particle sizes	155
	35	–	50		p.s. 500 nm	155
	2960	29.1	30	A3		225
	$k_p = 1.9068 \times 10^6 \times \exp(-21181.07/RT)$			F1		227
	$k_p = 1.2169 \times 10^6 \times \exp(-25203.59/RT)$			F1	30% MMA in benzyl alcohol	227
	$k_p = 3.0598 \times 10^7 \times \exp(-28008.18/RT)$			F1	30% MMA in NMP	227
	35	–	50		p.s. 500 nm	155
–, octyl ester	1710	62.6		A1	Pressure 5.0×10^7 Pa	113
	240 ± 80	2.6 ± 0.9	30	A1		109
		$\ln[(k_t[p]/(1.00 - 0.19)] = \ln k_t[1] - 1.01p$	30	B5	$k_t[p]$; k_t for pressure p (bar), $k_t[1] = 40.0 \times 10^6$	122
–, phenyl ester	411	11.9	30	A1		87
	230 ± 15	2.02 ± 0.22	30	A1	Solvent: anisole 2.00 M	116
	176 ± 8	2.06 ± 0.21		A1	Solvent: benzene 2.00 M	116
	180 ± 9	2.16 ± 0.19		A1	Solvent: fluorobenzene 2.00 M	116
	223 ± 11	2.26 ± 0.22		A1	Solvent: chlorobenzene 2.00 M	116
	235 ± 8	1.72 ± 0.11		A1	Solvent: bromobenzene 2.00 M	116
	273 ± 8	1.96 ± 0.12		A1	Solvent: benzonitrile 2.00 M	116
–, 2-phenylethyl ester	228	1.88	30	A1		87
–, 3-phenylpropyl ester	149	0.813	30	A1		87
–, *n*-propyl ester	467	45.1	30	A1		28
–, 3-tetracyclo-[4.4.0^{2,5}.1^{7,10}]-dodecyl ester	590	2.6	60	C	Solvent: benzene 1.0 M, AIBN 0.05 M	193
–, triphenylmethyl ester	26	0.301	32.5	C		153
3-Dimethyl-(methacryloyloxy-ethyl) ammonium propane sulfonate	1470 ± 170	0.499 ± 0.058	30	A4	Solvent: formamide: 1,4-dioxane (3 : 1 (v/v))	192
	2760 ± 342	0.452 ± 0.056	30		Solvent: formamide: 1,4-dioxane (3 : 1 (v/v)), NaCl 0.1 M	192
Polyhydroxytetramethylene-α, ω-methacrylate of MW = 700	185	0.034	20	B8	Calcd. from nonstationary state kinetics	125
	230	0.053	20	B8	Calcd. from stationary state kinetics	125

TABLE 5. ITACONIC DERIVATIVES

Monomer	k_p (l/mol/s)	k_t ($\times 10^{-6}$) (l/mol/s)	Temp. (°C)	Method	Remarks	Refs.
Itaconic acid						
–, bis (4-*tert*-butyl-cyclohexyl) ester	1.7	2.5×10^{-3}	60	C	Solvent: benzene 0.5 M	213
–, bis (cyclohexyl-methyl) ester	3.9	3.4×10^{-3}	60	C	Solvent: benzene 1.5 M, MAIB 0.02 M	182

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TABLE 5. *cont'd*

Monomer	k_p (l/mol/s)	k_t ($\times 10^{-6}$) (l/mol/s)	Temp. (°C)	Method	Remarks	Refs.
–, bis (3,5-dimethyl-1-adamantyl) ester	0.92	0.32×10^{-3}	60	C	Solvent: benzene 1.5 M	213
–, bis (2-ethylhexyl) ester	6.8	–	50	C	Solvent: hexane 1.03 M	185
	3.4	–	50	C	Solvent: cyclohexane 1.03 M	185
	2.0	–	50	C	Solvent: toluene 1.03 M	185
	2.1	–	50	C	Solvent: benzene 1.03 M	185
	2.2	–	50	C	Solvent: chlorobenzene 1.03 M	185
	2.1	–	50	C	Solvent: ethyl acetate 1.03 M	185
	2.1	–	50	C	Solvent: THF 1.03 M	185
	1.4	–	50	C	Solvent: acetone 1.03 M	185
	3.0	0.001	50	C	Solvent: benzene 2.0 M, MAIB 0.05 M	177
–, diadamantyl ester	0.56	0.30×10^{-3}	60	C	Solvent: benzene 1.5 M, k_p and k_t also given by other [M]	213
–, di-*n*-butyl ester	3.5	1.59×10^{-2}	60	C	Solvent: benzene 1.5 M, MAIB 0.02 M	182
	13	0.11	50	C	Solvent: cyclohexane 1.33 M, MAIB 5.00×10^{-2} M, k_p and k_t also given by other temp.	162
	11	0.13	50		Solvent: *n*-hexane 1.33 M	162
	6.8	0.07	50		Solvent: chlorobenzene 1.33 M	162
	9.4	0.11	50		Solvent: methyl benzoate 1.33 M	162
	6.7	0.083	50		Solvent: benzene 1.33 M	162
	3.4	0.068	50		Solvent: acetone 1.33 M	162
	3.2	0.13	50		Solvent: acetonitrile 1.33 M	162
	–	1.0×10^{-3}	50	C	Solvent: benzene 0.794 M, AIBN 0.05 M k_t also given by other [M]	154
	5.3	8.5×10^{-2}	50	C	Solvent: benzene 0.794 M, MAIB 0.05 M	154
	5.9	0.053	50	C	Solvent: benzene 2.0 M, MAIB 0.05 M	177
–, di-*sec*-butyl ester	0.6	4.0×10^{-3}	60	C	Solvent: benzene 1.5 M, MAIB 0.02 M	182
–, di-*tert*-butyl ester	0.2	5.6×10^{-3}	60	C	Solvent: benzene 1.5 M, MAIB 0.02 M	182
–, dicyclohexyl ester	2.3	1.4×10^{-3}	60	C	Solvent: benzene 1.5 M, MAIB 0.02 M	182
–, diethyl ester	7.7	0.24	50	C	Solvent: benzene 2.0 M, MAIB 0.05 M	177
	3.7	6.41×10^{-2}	60	C	Solvent: benzene 1.5 M, MAIB 0.02 M	182
–, diisobutyl ester	2.7	1.56×10^{-2}	60	C	Solvent: benzene 1.5 M, MAIB 0.02 M	182
–, diisopropyl ester	1.1	5.0×10^{-3}	60	C	Solvent: benzene 1.5 M, MAIB 0.02 M	182
–, dimethyl ester	5.2	0.36	60	C	Solvent: benzene 1.5 M, MAIB 0.02 M	195
	10	0.59	50	C	Solvent: benzene 2.0 M, MAIB 0.05 M	177
–, α-ethyl-β-hexafluoropropyl ester	5.0	0.28	60	C	Solvent: benzene 2.0 M, MAIB 0.05 M, k_p and k_t also given by other [M] and temp.	233
–, α-methyl-β-isopropyl ester	3.4	0.06	60	C		195
–, α-methyl-β-*tert*-butyl ester	4.2	0.051	60	C		195
–, α-isopropyl-β-methyl ester	1.9	0.07	60	C		195
–, α-*tert*-butyl-β-methyl ester	0.91	0.056	60	C		195
N(2,6-dimethylphenyl) itaconimide	26	0.082	50	C	Solvent: THF 0.44 M, AIBN 0.05 M, k_p and k_t also given by other [M]	234
Methyl *N*-phenyl-itaconamate	15	0.29	60	C	Solvent: DMF 1.4 M, AIBN 0.05 M, k_p and k_t also given by other [M] and temp.	235

TABLE 6. FUMARIC DERIVATIVES

Monomer	k_p (l/mol/s)	k_t ($\times 10^{-6}$) (l/mol/s)	Temp. (°C)	Method	Remarks	Refs.
Fumaric acid						
–, bis (2-methoxy-ethyl) ester	0.19	330×10^{-6}	60	C	Solvent: benzene 1.0 M	211
–, bis (2-chloro-ethyl) ester	0.26	320×10^{-6}	60	C	Solvent: benzene 1.0 M	211
–, *tert*-butyl methyl ester	0.23	150×10^{-6}	60	C	Solvent: benzene 1.0 M	211
–, *tert*-butyl isopropyl ester	0.51	26×10^{-6}	60	C	Solvent: benzene 1.0 M	211
	0.35		60	C	AIBN	181
	0.39	1.75×10^{-5}			MAIB	181
–, di-*tert*-butyl ester	0.61	30×10^{-6}	60	C	Solvent: benzene 1.0 M	211
–, dicyclohexyl ester	0.60	40×10^{-6}	60	C	Solvent: benzene 1.0 M	211
–, diethyl ester	0.21	$(510-560) \times 10^{-6}$	60	C	Solvent: benzene 1.0 M	211
	0.015	1.64×10^{-4}	30	A1	AVN (2,2′-azobis-2,4-dimethylvaleronitrile), ACN (1.1′-azobiscyclo-hexane-1-carbonitrile)	173
	0.029 ± 0.003	8×10^{-6}	30	B10	ACN, scavenger TPV (1,3,5-triphenylverdazyl), sovent: benzene	179
–, diisopropyl ester	0.46	$(80-100) \times 10^{-6}$	60	C	Solvent: benzene 1.0 M	211
	0.31 ± 0.07	0.84×10^{-6}	30	B10	ACN, scavenger TPV, solvent: benzene	180
–, dimethyl ester	0.058	430×10^{-6}	60	C	Solvent: benzene 1.0 M	211
–, dineopentyl ester	0.028	44×10^{-6}	60	C	Solvent: benzene 1.0 M	211
Ethyl *o*-formylphenyl fumarate	4.0	1.4	60	C	Solvent: benzene 1.16 M, MAIB 0.100 M, k_p and k_t also given by other [M]	236

TABLE 7. VINYL HALIDES

Monomer	k_p (l/mol/s)	k_t ($\times 10^{-6}$) (l/mol/s)	Temp. (°C)	Method	Remarks	Refs.
Tetrafluoroethylene	7400	7.4×10^{-5}	40		Large active chain end concentration measured by addition of inhibitor in aqueous solution polymn.	81
Vinyl bromide	22.7	92	−30	A1		80
	570	385	20		Quoted in Ref. 80	44
Vinyl chloride	$k_p = 3.3 \times 10^6 \times \exp(-15000/RT)$	$k_t = 1.3 \times 10^6 \times \exp(-4200/RT)$		A1		32
	11000	2100	25	A1		56
	3130	2300	25	A1		77
Vinylidene chloride	8.6	0.175	25	A1		18
	$k_p = 10^9 \times \exp(-4540/T)$	$k_t = 10^6 \times \exp(-2670/T)$	22–75	A1	Solvent: *N*-methylpyrrolidone 2.0 M	117

TABLE 8. VINYL ESTERS

Monomer	k_p (l/mol/s)	k_t ($\times 10^{-6}$) (l/mol/s)	Temp. (°C)	Method	Remarks	Refs.
Vinyl acetate	4600	220	25	B5		13
	795	46	15	B1		47
	556–586	2860–3040	15.9	A1		1
	670–770	2500–3100	15.9	A1		3
	700	2600	15.9	A1	Solvent: *n*-hexane	4
	559	51.8	20	B4		37
	1100	80	25	A1		2
	1000	59	25	A1		15
	895	24	25	B4	At 4% conversion	36
	$k_p = 2.43 \times 10^8 \times \exp(-30600/RT)$	$k_t = 4.16 \times 10^5 \times \exp(-21900/RT)$		A1		8
	9500–19000	380–760	60	E	Using results of Refs. 8 and 15	64
	$(15-26) \times 10^2$	25	50	A1		128

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TABLE 8. *cont'd*

Monomer	k_p (l/mol/s)	k_t ($\times 10^{-6}$) (l/mol/s)	Temp. (°C)	Method	Remarks	Refs.
	117 ± 12	319 ± 61	30	A1	Solvent: benzene 2.00 M	130
	113 ± 10	351 ± 54		A1	Solvent: C_6D_6 2.00 M	130
	48 ± 5	239 ± 45		A1	Solvent: anisole 2.00 M	130
	97 ± 10	311 ± 59		A1	Solvent: fluorobenzene 2.00 M	130
	61 ± 9	266 ± 75		A1	Solvent: chlorobenzene 2.00 M	130
	37 ± 5	412 ± 104		A1	Solvent: ethyl benzoate 2.00 M	130
	8 ± 1	258 ± 76		A1	Solvent: benzonitrile 2.00 M	130
	637 ± 101	94.2 ± 23.7		A1	Solvent: ethyl acetate 2.00 M	130
	• 78	–			Solvent: ethyl acetate: ethyl benzoate (1 : 1 (v/v))	130
	120	310	32.5	A1	Solvent: benzene	153
	530	630	32.5	C	Solvent: benzene 5.41 M	153
	1900	280	32.5	C	Solvent: ethyl acetate 5.43 M	153
	1400	–	32.5	C		153
	4435	64.4	30	A1	Pressure 5.0×10^7 Pa	112
	$k_p = 2.0 \times 10^6 \times \exp[(-19000 \pm 2900)/RT]$	27.5	15–60	C		45
	$k_p = 2.7 \times 10^8 \times \exp(-27820/RT)$			F1		209
		$\ln[(k_t[p]/(1.00-0.07p)] = \ln k_t[1] - 0.50p$	30	B5	$k_t[p]$; k_t for pressure p (bar) $k_t[1] = 52.0 \times 10^6$	122
Vinyl benzoate	106 ± 14	253 ± 63	30	A1	Solvent: anisole 1.01 M	116
	185 ± 8	402 ± 32		A1	Solvent: benzene 1.01 M	116
	245 ± 13	522 ± 48		A1	Solvent: fluorobenzene 1.01 M	116
	168 ± 18	383 ± 76		A1	Solvent: chlorobenzene 1.01 M	116
	69 ± 13	257 ± 72		A1	Solvent: ethyl benzoate 1.01 M	116
	33 ± 3	299 ± 44		A1	Solvent: benzonitrile 1.01 M	116
	267 ± 33	451 ± 65		A1	Solvent: ethyl acetate 1.01 M	116

TABLE 9. VINYL ETHERS

Monomer	k_p (l/mol/s)	k_t ($\times 10^{-6}$) (l/mol/s)	Temp. (°C)	Method	Refs.
Monovinyl ether of ethylene glycol	5.0 ± 1.0	1.5 ± 0.3	50	A1	136
Monovinyl ether of diethylene glycol	3.0 ± 0.8	1.4 ± 0.3	50	A1	136

TABLE 10. STYRENE DERIVATIVES

Monomer	k_p (l/mol/s)	k_t ($\times 10^{-6}$) (l/mol/s)	Temp. (°C)	Method	Remarks	Refs.
Styrene	40 ± 20	80 ± 40	15	A1	Dimension of k_p and k_t: kg/mol/s	46
	24	14	20	A1	From copolymn. data with sulfur dioxide	25
	51.9	10.5	30	A1		16
	108	32.5	30	A1		38
	106	108	30	A1		78
	102	–	40	D	Quoted in Ref. 86	59
	390	–	50	D		5
	209	115	50	E	Using results of Ref. 20	61
	18.7	2.79	25	B5		6
	39.5	5.96	25	B1		17
	$k_p = 2.16 \times 10^7 \times \exp(-32500/RT)$	$2k_t = 2.59 \times 10^3 \times \exp(-9920/RT)$		A1		20
	22	–	5	D	Catalyst: cumene hydroperoxide–triethylenetetramine	24
	139	–	40	D	Catalyst: persulfate	24
	223	–	50	D		40
	206	–	50	D		67

TABLE 10. *cont'd*

Monomer	k_p (l/mol/s)	k_t ($\times 10^{-6}$) (l/mol/s)	Temp. (°C)	Method	Remarks	Refs.
	$k_p = 2.24 \times 10^{14} \times \exp(-73510/RT)$			B1		73
	50	–	25	D		65
	80	64	60	A1		118
	370	915			Addition of 1×10^{-3} mol pyridine	118
	25 ± 3	9 ± 1.5	25	A1	Solvent: dodecane 40% by vol	104
	35 ± 7	19 ± 4	25	A1		100
	35 ± 5	19 ± 3	25	A1	Solvent: bromobenzene 20% by vol	100
	29 ± 7	15 ± 4	25	A1	Solvent: diethyl malonate 20% by vol	100
	23 ± 8	11 ± 2	25	A1	Solvent: diethyl phthalate 20% by vol	100
	27 ± 4	31 ± 0.4	25	A1	Solvent: dinonyl phthalate 60% by vol	100
	$k_p = 1.09 \times 10^7 \times \exp(-31380/RT)$	$k_t = 1.703 \times 10^3 \times \exp(-9489/RT)$	15–30	A2	$\overline{DP} = 2500$	114
	66.6	22.4	30	A1	Pressure 5.0×10^7 Pa	102
	66.5	–	25	C		98
	$k_p = 2.4 \times 10^8 \times \exp(-38000 \pm 1700)/RT$		50–90			98
	187.1	29.4	60		Special evaluation from steady-state kinetics and $\bar{M}_n$	134
		$k_p = 10^{7.630} \times \exp(-32510/RT)$	– 12–93	F2		215
	84	–	25	F1	k_p also given by other [M] and solvents	196
	76	–	25	F1	Solvent/ethanol (25%) 6.52 M	196
	70	–	25	F1	Solvent: methanol (25%) 6.52 M	196
	380 ± 110	–	40	F1	Pressure 2.0×10^8 Pa	186
	480 ± 10	–	70	C	Over a range of degree of polymn. of the polymer radical from 40 to 410	188
	–	16.6–17.0	100	C	Conversion 0–20% TBP (*tert*-butyl peroxide)	174
	256	190	50	C	k_p and k_t also given by other temp.	189
	107	–	25	G1	Laser-flash-initiated polymn. by benzoin	156
		$k_t(m,n) = 1.97 \times 10^2 (n \times m)^{-0.12}$	30	A3	*n*: *n*-mer, *m*: *m*-mer, coupling with *n*-mer and *m*-mer	147
	180 ± 10	–	5	C		223
	$k_p = 1.99 \times 10^7 \exp(-30780/RT)$			F1		169
	$\ln k_p = 17.14 - 1.873 \times 10^{-9} p - 3748/T + 2.02 \times 10^{-6} p/T$		30–90	F2	Pressure 1×10^5–2.8×10^8 Pa	214
	77 ± 4.1	78 ± 12	25	F1		161
	79 ± 5.1	96 ± 9	25	F1	Solvent: toluene 50% (v/v)	161
	187.0	63.2	60	B5	Solvent: benzene 3 M	204
	201.0	51.1			Solvent: chlorobenzene 3 M	204
	167.0	37.9			Solvent: benzonitrile 3 M	204
	641 ± 48	–	91.2	G1	Solvent: toluene	178
	89	132	25	A1		160
	107	–	30	F1	k_p also given by other temp.	198
	92	–	25	F1		220
	78	–	25	F1		164
	23	0.6	28	B1		83
	$\ln k_p = 16.09 - 28950/RT$ (overall) $= 16.47 - 3003/RT$ (chain length ≥ 4)			F1	Solvent: benzene 4.33 M	200
	$k_p = 10^{7.1 \pm 0.5} \times \exp[-(29 \pm 3) \times 10^3/RT]$			B1		131
	$k_p = 1.8861 \times 10^7 \times \exp(-30737.52/RT)$			F1		227
	$k_p = 4.2060 \times 10^8 \times \exp(-37468.93/RT)$			F1	30% styrene in benzylalcohol	227
	$k_p = 4.2458 \times 10^8 \times \exp(-39014.90/RT)$			F1	30% styrene in NMP	227
–, *p*-bromo-	186	46	30	A1		78
–, *p*-chloro-	150	77	30	A1		78
–, *p*-cyano-	219	35	30	A1	Solvent: dimethylacetamide	78
–, *p*-fluoro-	112	127	30	A1		78
–, *p*-methoxy-	2.92	1.06	0	B5		12
	71	33	30	A1		78

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TABLE 10. *cont'd*

Monomer	k_p (l/mol/s)	k_t ($\times 10^{-6}$) (l/mol/s)	Temp. (°C)	Method	Remarks	Refs.
–, *o*-methyl-	$k_p = 1.67 \times 10^{11} \times \exp(-58240/RT)$			B1		73
–, *p*-methyl-	84	66	30	A1		78
	$k_p = 2.27 \times 10^7 \times \exp(-32060/RT)$			B1		73
	$k_p = 10^{5.77} \times \exp(-23.0/RT)$		24–55	F1	Solvent: toluene 2 M	226
Styrene-d_8	$k_p = 3.63 \times 10^7 \times \exp(-31500/RT)$	$k_t = 2.55 \times 10^4 \times \exp(-14200/RT)$		A1		168

TABLE 11. VINYL HETEROAROMATICS

Monomer	k_p (l/mol/s)	k_t ($\times 10^{-6}$) (l/mol/s)	Temp. (°C)	Method	Remarks	Refs.
N-Vinylcarbazole	6.0	0.306	10	A1		80
2-Vinylpyridine	186	33	25	A1		76
	96.6	8.9	25	B4		76
4-Vinylpyridine	12	3	25	B5		34
5-Vinylpyridine	47	3.5	25	B4		75
–, 2-methyl-	122	66	20	B1	Solvent: methanol 1.95 M, k_p also given as a function of [M]	94
	209	43	20	B1	Solvent: 50% (molar) aqueous methanol	94
	17.3	1.2	20	B1	Solvent: acetic acid	94
N-Vinylpyrrolidone	953	65	20	B4		82
	22000 ± 4000	600 ± 200	25	A1	Solvent: water	132

TABLE 12. ALDEHYDES

Monomer	k_p (l/mol/s)	k_t ($\times 10^{-6}$) (l/mol/s)	Temp. (°C)	Method	Remarks	Refs.
Formaldehyde	–	$(7-10) \times 10^{-3}$	– 190	B4	Solid monomer, gamma irradiation	95

TABLE 13. OTHERS

Monomer	k_p (l/mol/s)	k_t ($\times 10^{-6}$) (l/mol/s)	Temp. (°C)	Method	Remarks	Refs.
Maleimide						
–, *N-tert*-amyl-	69	0.048[a],0.017[b]	60	C	Solvent: benzene 1 M	205
–, *N-tert*-butyl-	100	0.021[a],0.023[b]	60	C	(a) Determined from steady-state equation $k_t = (2k_d f[I])/[P^\bullet]^2$, AIBN 0.005 M; (b) determined from second order plot of the decay curve of the radical concentration, ATMP (2,2′-azobis-(2,4,4-trimethyl-pentane)) 0.02 M, for *tert*-BMI, ATMP 0.01 M	205
–, *N-tert*-butyl-dimethylsilyl-	120	0.20[a]	60	C		205
–, *N-tert*-octyl-	23	0.027[a],0.015[b]	60	C		205
–, *N*-trimethylsilyl-	120	0.15[a],0.23[b]	60	C		205
–, *N*-cyclohexyl-	49	0.054	50	C	Solvent: benzene 0.559 M, AIBN 1.39×10^{-2} M	163
	55	0.069			Solvent: benzene 0.698 M, AIBN 1.00×10^{-2} M, k_p and k_t also given by other [M] and [I]	163

TABLE 13. *cont'd*

Monomer	k_p (l/mol/s)	k_t ($\times 10^{-6}$) (l/mol/s)	Temp. (°C)	Method	Remarks	Refs.
–, *N*-(2,6-diethylphenyl-	2.0	0.0078	60	C	Solvent: benzene 1 M, AIBN 5×10^{-3} M	183
–, *N*-(2,6-dimethylphenyl)-	14	0.034	60	C	Solvent: benzene 1 M, AIBN 5×10^{-3} M	183
–, *N*-(4-ethylphenyl)-	1200	3.9	60	C	Solvent: benzene 1 M, AIBN 5×10^{-3} M	183
–, *N*-(2-methylphenyl)-	190	0.59	60	C	Solvent: benzene 1 M, AIBN 5×10^{-3} M	183
–, *N*-(2-carboethoxyphenyl)-	96	0.10	60	C	Solvent: benzene MAIB 0.005 M	237
–, *N*-dodecyl-	54	0.12	50	C	Solvent: benzene MAIB 0.01 M	238
	104	0.45	50	C	Solvent: toluene MAIB 0.01 M	238
	175	1.0	50	C	Solvent: anisole MAIB 0.01 M	238
	80	0.40	50	C	Solvent: chlorobenzene MAIB 0.01 M	238
	128	0.064	50	C	Solvent: bromobenzene MAIB 0.01 M	238
	149	0.17	50	C	Solvent: methyl benzoate MAIB 0.01 M	238
	386	–	50	C	Solvent: THF, MAIB 0.01 M	238
	250	–	50	C	Solvent: dioxane, MAIB 0.01 M	238
	235	0.55	50	C	Solvent: ethyl acetate MAIB 0.01 M	238
	196	–	50	C	Solvent: methyl ethyl ketone MAIB 0.01 M	238
–, *N*-octadecyl-	33	0.10	50	C	Solvent: benzene AIBN 0.20 M, k_p and k_t also given by other [I]	239
Oligotetramethylene glycol dimethacrylic ester (MW 600)	400	0.07	50	B9		124

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Transfer Constants to Monomers, Polymers, Catalysts and Initiators, Solvents and Additives, and Sulfur Compounds in Free Radical Polymerization†

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A. INTRODUCTION

The transfer reaction in radical polymerization describes a process in which the polymer radical reacts with another molecule (monomer, polymer, catalyst, solvent, modifier, etc.) forming a dead polymer and new radical. This new radical can continue the kinetic chain:

$$P_n^{\bullet} + RX \xrightarrow{k_{tr,X}} P_nR + X^{\bullet}$$

$$X^{\bullet} + M \xrightarrow{k_{i,X}} P_1^{\bullet}$$

The dimensionless transfer constant is defined by the ratio

$$C_X = k_{tr,X}/k_p$$

where k_p is the rate constant of propagation.

Based on the tables in the third edition, by K. C. Berger and G. Brandrup.

If it is assumed that

(a) all new radicals $X^{\bullet}$ react only by formation of growing polymer radicals;
(b) all polymer radicals have equal reactivities independent of their size;
(c) all rate constants are independent of solvent;
(d) the consumption of monomer by initiation and transfer is negligible compared with propagation;
(e) a steady-state concentration of polymer radicals is quickly established ($d[P^{\bullet}]/dt = 0$).

The application of these assumptions to the common reaction scheme results in the following relationship of ideal kinetics (Ref. 145):

$$\frac{1}{P_n} = \frac{1}{P_{n0}} + \sum C_X \frac{[X]}{[M]}$$

P_n, P_{n0} = number-average degree of polymerization obtained in the presence or absence, respectively, of transfer agent X.
[M], [X] = concentration of monomer or transfer agent, respectively.

The left-hand side of this equation is obtained by measuring the number average molecular weight of polymer at different concentrations of the transfer agent X, all other variables being kept constant. In many cases the degree of polymerization was determined by measurement of viscosity (Remark R). It should be noted that the ratio of

viscosimetric to number average molecular weight shows a considerable dependence on the molecular weight distribution.

The first term P_{n0} of the right-hand side of this equation is the number average molecular weight measured in the absence of transfer agent X. This is limited to cases where the transfer agent is a modifier. In all other cases, P_{n0} is calculated by combination of several kinetic expressions and used with its numerical value:

Initiation $R_i = 2fk_d[I]$ or therm. $R_i = R_t$

Termination $R_t = k_t[P^\bullet]^2 = (k_{t,d} + k_{t,c})[P^\bullet]^2$

Propagation $R_p = k_p[M][P]^\bullet]$

Number-average molecular weight $P_{n0} = \frac{2(1+\delta)}{1+2\delta}\frac{R_p}{R_t}$

where k_t, $k_{t,d}$, and $k_{t,c}$ are the rate constants of termination, termination by disproportionation, and termination by combination, respectively.

$$\delta = k_{t,d}/k_{t,c}$$

The second term of the right-hand side of the above equation is given by the following expression:

$$C_X = C_M + C_I\frac{[I]}{[M]} + C_S\frac{[S]}{[M]} + C_p\frac{[P]}{[M]} + \cdots$$

where C_p is the constant of chain transfer with added polymer before starting polymerization.

The transfer constant of very reactive molecules can be determined from the rate of disappearance of both transfer agent and monomer:

$$C_X = \frac{d\ln([X])}{d\ln([M])}$$

This decrease of the transfer agent concentration with increasing monomer conversion is important in practice because very reactive transfer agents are used up preferentially, giving a broad molecular weight distribution if they cannot be replenished.

In analogy to quickly decomposing initiators with their criterion of "half-life", one can define, in addition to the transfer constant C_X, a "half-conversion" $U_{1/2}$ as that monomer conversion where the transfer agent is half consumed:

$$U_{1/2} = 100(1 - 0.5^{1/C_X})$$

The following table demonstrates (with some examples for a calibration curve) that the "half-conversion" $U_{1/2}$ decreases with increasing transfer constant C_X:

The "Half-Conversion" of Transfer Agents

C_X	$U_{1/2}$(%)	C_X	$U_{1/2}$(%)
0.1	99.9	5	13.0
0.2	96.8	10	6.7
0.5	75.0	20	3.4
1	50.0	50	1.4
2	29.3	100	0.7

The transfer agent must be replenished at this monomer conversion at the latest, if polymerization is to proceed, still yielding a narrow molecular weight distribution.

Numerous examples are known of polymerization systems that possibly do not satisfy basic assumptions: retardation (Remark J), induced decomposition and primary radical termination by peroxide or hydroperoxide initiation (Remarks C and B), diffusion control of termination (Remark X), electron donor/acceptor complexes (Remarks JJ), etc. Corresponding data in this table have to be used with caution.

B. TABLES OF TRANSFER CONSTANTS

TABLE 1. TRANSFER CONSTANTS TO MONOMERS

Monomer	T (°C)	C_M ($\times 10^4$)	Remarks	Refs.
Acetic acid, allyl ester	80	170		29
		700		27
Acrylamide	25	0.12	D	92
		0.16		74
		0.2		75
		0.2	E	103
	50	0.558	C2, F13, LL	560
	60	0.651	C2, F13, LL	560
	60	0.6	E	103
Acrylamide, *N,N*-dimethyl-	50	1.5		272
Acrylic acid, benzyl ester	55	0.883		291
	60	0.905		291
–, butyl ester	60	0.333	C1, H, KK	561
	60	1.05	C1, H, KK	561

TABLE 1. *cont'd*

Monomer	T (°C)	C_M ($\times 10^4$)	Remarks	Refs.
Acetic acid, butyl ester (*cont'd*)	60	1.25	C1, H, KK	561
	65	0.955		291
–, ethyl ester	50	0.193		306
		0.90	F7	510
		0.41	C, F17, R	512
	60	0.579	C, F17, R	512
	65	0.332		306
	70	0.351		306
		0.789	C, F17, R	512
–, -2 ethylhexyl ester	70	6.28	C, F17, R	512
	80	3.79	C, F17, R	512
–, methyl ester	50	0.80	F7	510
	55	0.275	C, AA	221
	60	0.036	B, AA	221
		0.325	C, AA	221
	65	0.10	C, AA	221
		0.11	C, F10	123
		0.11	C, AA	221
		0.37	C, AA	221
	70	0.01	C, F10	322
		0.072	B, AA	221
		0.16	C, AA	221
		0.18	C, AA	221
		0.405	C, AA	221
	75	0.224	C, AA	221
		0.25	C, F10	123
		0.25	C, AA	221
–, tetrahydrofurfuryl ester	40	4.0	C, F2	319
–, 2-chloro-, ethyl ester	60	3.0		342
–, thio-, methyl ester	60	560		140
Acrylonitrile	20	0.18	E	299
	25	0.105		284
	30	1.5	F8	196
	40	0.17		284
	50	0.050	F18	410
		0.27	F17	376
		8.2	F16	362
	60	0.26		95
		0.3		23
	60	0.333	C1, H, KK	561
	60	0.57	C1, H, KK	561
	60	1.02	C1, H, KK	561
Allyl bromide	60	30	C, R, HH	505
Ammonium chloride, *N,N*-diallyl-*N,N*-diethyl-	60	18	C1, F30	538
–, *N,N*-diallyl-*N,N*,-dimethyl-	60	7	C1, F30	538
Anisole, *p*-vinyl	0	0.198		13
	60	0.74		53
Anthranilic acid, vinyl ester	70	80		139
Benzoic acid, vinyl ester	60	6.0		321,393
	80	7.0		26
	95	2.0		321
		4.0		213
1,3-Butadiene, 2-chloro-	50	2.32	F2	153
–, 1,1,2-trichloro-	25	16	E	230
1-Butene	40	3.1		334
	50	5.1		334
	60	7.3		334
2-Butene, *cis*-	40	3.2		334
	50	4.9		334
	60	11.2		334
–, *trans*-	40	3.0		334
	50	5.2		334
	60	10.8		334
3-Butene-2-one, 3-methyl-	80	4.00	C	84

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TABLE 1. *cont'd*

Monomer	T (°C)	C_M ($\times 10^4$)	Remarks	Refs.
Butyric acid, vinyl ester	50	26.7		71
	80	22.3		200
Carbamic acid, vinyl-, ethyl ester	60	0.25		117
Carbazole, *N*-vinyl-7H-benzo(2)-	70	11	R, F2	522
Decanoic acid, vinyl ester	50	45.5		71
Ethylene	60	0.4	W5	102
		1.4	W4, W5	102
		4.2	W4	102
	83	5.0	D, W	204
		5.32	D, W	205
	110	1.1	W4, W5	102
		3.5	W4, W5	102
		9.0	W4	102
	130	0.0	C, F21, W5	259
		1.6	W4, W5	102
		4.7	W4, W5	102
		11.2	W4	102
	50–70	5	W3	218
–, chloro-	20	3.2		94
	25	3.2		315
		7.0		425
	30	6.25	Y	58
	40	19.4	F5	463
		50		246
	50	6.4	F3	379
		7.8	F4	379
		8.5		379
		11	C, F26	392
		13.5	Y	58
	60	10.8	F3	379
		12.3		379
		12.8	F4	379
	70	23.8	Y	58
Glutaramic acid, *N,N*-diisobutyl-, vinyl ester	60	42	C, F10	106
–, *N,N*-diisopentyl-, vinyl ester	60	51	C, F10	107
	70	51	C, F10	107
	80	51	C, F10	107
Hexanoic acid, vinyl ester	80	36		200
5-Hexen-3-yn-2-ol, 2-methyl-	60	5.0		226
Isobutyric acid, vinyl ester	80	46		200
Lauric acid, vinyl ester	50	45.5		71
Maleic anyhydride	75	750	C	175
Maleic anhydride/methyl methacrylate	60	100		367
Maleimide, *N*-(3-dimethylamino-6-methyl-phenyl)	50	720	F2	542
Methacrylamide	60	10×10^5	JJ1	515
Methacrylic acid, bornyl ester	60	2.85		162
–, butyl ester	50	0.54		233
	60	120×10^5	JJ1	515
		0.14		264
–, tert-butyl ester	70	0.35		9
–, *o-t*-butylphenyl ester	60	30.41	C	550
–, *p-t*-butylphenyl ester	60	2.01	C	550
–, *n*-dodecyl ester	60	80×10^5	JJ1	515
–, 2,3-epoxypropyl ester	60	0.59		198
–, ethyl ester	45	0.248	CC	193
	60	0.259	CC	193
	80	0.456	CC	193
	90	0.442	CC	193
–, *o*-ethylphenyl ester	60	3.63	C	550
–, *p*-ethylphenyl ester	60	1.36	C	550
–, glycidyl ester	60	45×10^5	JJ1	515
–, hexadecyl ester	70	0.14		138
–, isobornyl ester	60	1.85		162

TABLE 1. *cont'd*

Monomer	T (°C)	C_M ($\times 10^4$)	Remarks	Refs.
Methacrylic acid, isobutyl ester	35	0.189	DD	193
	50	0.179	DD	193
	60	0.14		264
		0.165	F2	264
		0.224	DD	193
	80	0.301	DD	193
	100	0.382	DD	193
–, *n*-nonyl ester	60	105×10^5	JJ1	515
–, phenyl ester	27	400	R	534
	60	0.61	C	550
–, *o*-tolyl ester	60	1.13	C	550
–, *p*-tolyl ester	60	1.06	C	550
Methacrylonitrile	25	2.08	Z	125
	60	5.81	Z	125
	70	8.00	Z	125
	80	10.05	Z	125
Methyl methacrylate	0	0.128		69
		0.148		18
	30	0.117		69
		0.260	D	224
		0.15		508
		30×10^5	JJ2	525
	40	242×10^5	JJ1	528
	50	0.10	F2	147,327
		0.15		145
		0.477	D	224
		241×10^5	JJ1	528
		0.85		69
	60	0.07		274
		0.10		34,290,317
		0.103	C	316
		0.18		145
		240×10^5	JJ0	556
	65	0.20		123
	70	0.17	C, F10	123
		0.20		267
		0.23		145
		0.265		440
		0.29	C, F17	123
		0.30		123
		0.45		104
		0.807	D	224
		1.37		459
		240×10^5	JJ1	528
	75	0.27	C, F10	123
		0.33	C	123
		0.60	C, F11	123
		0.70	C, F2	123
	80	0.25		145
		0.40		123
	90	0.10		147
	100	0.38		145
	120	0.58		145
Naphthalene, 1-vinyl-	50	290		216
	60	310		216
	70	300		216
1,4-Pentadiene, 1,1,2,3,3,4,5,5-octafluoro-	110	500	W10	68
Phernol, *o*-vinyl-	70	130		186
2-Picoline, 5-vinyl-	70	6.7		11
1-Propene, 2-chloro-	80	1600		27
–, 2-methyl-	40	2.5		334
	50	4.4		334
	60	6.9		334
Propionic acid, vinyl ester	–	3.6		158
	50	48.9		71

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TABLE 1. *cont'd*

Monomer	T (°C)	C_M ($\times 10^4$)	Remarks	Refs.
Pyridine, 2-vinyl-	15–35	0	D	38
–, 4-vinyl-	25	6.7		283
2-Pyrrolidinone, 1-vinyl-	20	4.0		59
Stearic acid, vinyl ester	50	69.8		71
Styrene	0	0	BB	360
		0.108		17,69
	25	0.279		69,245
		0.358		17
	27	0.31	A	145
	30	0.2	BB	318,360
		0.32		245
	45	0.3	BB	360
	50	0.35	H	354,355
		0.40	F2	318,327
		0.50	C, H	388
		0.6	C	145
		0.62	A, K	145
		0.65	B, C, H	388
		0.78	A	146
	60	0.07	C	467
		0.6		34,171,223
		0.6	C	145,240
		0.6	BB	318,360
		0.75		467
		0.79	A	145
		0.85	A, F	145
		0.92		447
		1.1		53
		1.37	C	234
		20×10^5	JJ1	515
	67.8	1.0		34
	70	0	C, F10	123
		0.6		104
		0.6	BB	360
		0.8	B, H	388
		0.96		67
		1.16	A	145
		1.35	A	145
		2.0	C, F2	123
	75	0	C, F10	123
		1.6	C	123
		5.0	C, F2	123
		5.00	C, F11	123
	80	0.7		98
		0.75	BB	360
		1.00		318
	80.3	4.0		34
	90	0.85	BB	360
		1.25	C, F	145
		1.47	A	145
		1.79	A	145
	99	1.5		98
	100	1.72	A	145
		1.8	A, F	145
		1.83	A	145
	110	2.80	A	145
	117	1.40		318
	132	2.45	A	145
		3.0	A, F	145
		3.4	A	145
		5.33	A	145
Styrene, *p*-boromo-	50	23		192
–, *o*-chloro-	30	0.25		62
	50	0.25	C	60
		0.28	C, H	60

TABLE 1. *cont'd*

Monomer	T (°C)	C_M ($\times 10^4$)	Remarks	Refs.
Styrene, *p*-iodo-	50	1.9	F1	56
Succinimide, *N*-vinyl-	55	0.55	C	93
Valeric acid, 4-methyl-, vinyl ester	80	24.8		200
Vinyl acetate	–	1.9		158
	−60	0.40	D	464
	−40	0.60	D	464
	−20	0.70	D	464
	−20	0.30	D	241
	0	0.50	D	241
		0.90	I4	86
		0.96	D	464
	20	0.94		328
	25	0.90	D	241
		1.3	I7	86
		1.45	I7	86
		2.4	D	202
		10.7		69
	40	1.29		12
		1.32		328
	45	2.0		51
	50	0.25		466
		0.41		265
		0.54	W14	265
		0.61	W15	265
		1.29		12
		2		552
		4.55	C	71
		20		225
	60	1.75		12
		1.8		466
		1.9		124
		1.91		328
		1.93		348
		2.0		231
		2.1	I12	145
		2.4		294
		2.5	C	86
		2.5		167
		2.6		167
		2.8	C	80
	65	2.1	C	466
	70	2.4		403
		2.9	I13	86
Vinylidene chloride	50	22	R	541
	60	38	R	541

TABLE 2. TRANSFER CONSTANTS TO POLYMERS

Polymer	T (°C)	C_P ($\times 10^4$)	Remarks	Refs.
Acrylamide, *N,N*-dimethyl-				
Poly(*N,N*-dimethylacrylamide)	50	0.61		272
Acrylic acid, ethyl ester				
Poly(methyl methacrylate)	60	12800	M6	120
–, methyl ester				
Poly(isoprene)				
–, chlorinated	75	12.6	C, F2	308
Poly(methyl acrylate)	60	0.5	L	212
		1.0	L	105
Poly(methyl methacrylate)	60	18000	M6	120
Acrylonitrile				
Cellulose	60	1.0	L, N	361
		11	L, M4	361
		20	L, M5	361

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TABLE 2. *cont'd*

Polymer	T (°C)	C_P ($\times 10^4$)	Remarks	Refs.
Acrylonitrile, (*cont'd*)				
Poly(acrylonitrile)	50	4.7	F14	376
	60	3.5	L	135
Poly(methyl methacrylate)	60	0.2	N	25
		240	M2	25
		900	M3	25
		1270	M	25
Poly(sarcosine)	60	400		23
1,3-Butadiene				
Poly(1,3-butadiene)	50	11		142
Ethylene	174.8	108.40	C, W20, F32	540
	201.6	150.70	C, W20, F32	540
	215.0	194.81	C, W20, F32	540
	231.2	214.46	C, W20, F32	540
	230.3	337.31	C, W22, F32	540
	229.2	256.85	C, W21, F32	540
	230.3	195.81	C, W20, F32	540
	230.4	199.89	C, W19, F32	540
	230.5	155.78	C, W18, F32	540
	256.0	348.46	C, W20, F32	540
–, chloro-				
Poly(vinyl chloride)	50	5	L	211
Hexanoic acid, vinyl ester				
Poly(oxyethylene), dodecyl ether	60	780		278
Methacrylic acid, butyl ester				
Poly(methyl methacrylate)	60	7700	M6	120
–, dodecyl ester				
Poly(methyl methacrylate)	60	12800	M6	120
–, ethyl ester				
Poly(isoprene), chlorinated	70	18.3	C, F2	308
Poly(vinyl chloride)	70	21.0	C, F28	308
Methyl methacrylate				
Poly(ethylene)	50	0.6		209
Poly(isoprene), chlorinated	80	23.4	C, F17	307
Poly(methyl methacrylate)	40	1.5	N	326
		360	M	326
	50	0.22	N	147
		1.5	N	326
		1.5	M	327
		360	M	326
		360	N	327
		1000	M	147
	60	0.1		105
		1.5	N	326
		2.1		262
		360	M	326
	80	2.48		262
	90	0.22	N	147
		1000	M	147
Poly(propylene)	50	0.04	C	292
		1.0		209
	130	0.42		292
Poly(styrene)	50	0.75		148
	60	2.20		262
	80	2.95		262
Poly(vinyl acetate)	60	2.0		263
	80	2.8		263
Poly(vinyl chloride)	–	11		250
	70	10.0	C, F28	308
Poly(vinyl urethane)	50	17	C, F8	157
Rubber, natural	50	10.9		258
		11.0	C	258
2-Pyrrolidinone, 1-vinyl-dextran				
Dextran	50	5		333
		5.87		203

TABLE 2. *cont'd*

Polymer	T (°C)	C_P ($\times 10^4$)	Remarks	Refs.
Styrene				
Poly(oxyadipoyloxy-2,2-dibromomethyl trimethylene)	60	4.05	L	325
Poly(oxyethylene)	70	19	M10	562
	70	14	M10	562
–, dodecyl ether	60	20		278
Poly(oxythexamethyleneoxy sebacoyl)	80	13	C, N	394
Poly(methyl methacrylate)	50	0.4	N	327
		<0.3	M	326
		1110	N	326
		1140	M	327
	60	16.4	M1	64
		17.5	M1	64
		5.7×10^4	M7	120
		32×10^4	M6	120
	80	3.74		262
	100	6.04		262
Poly(propylene)	60	0.025	C	292
	66	26		486
	130	0.3		292
		0.30		207
Poly(styrene)	50	1.9		144,148
		4.5		327
		14.0		327
		16.6		176
	55	15		177
	60	0.8	L	105
		1.9		73
		3.1		105
		15.4	M1	64
		15.8	M1	64
		16.6		176
	73.5	1.0	C	8
	85	1.4	C	8
	90	5.8		327
	100	2.0	N	276
	110	9.2		177
		10.8		176
	130	1.8		43
	154	1.5		43
Poly(vinyl acetate)	100	6.6		263
	130	9.2		263
Poly(vinyl chloride)	–	160		250
Poly(2-vinylpyridine)	50	8–10		279
Vinyl acetate				
Poly(oxyethylene)	60	17	N	277
		40	M	277
–, dodecyl ether	60	10	M8	277
		40	M9	277
		750		271
Poly(methyl methacrylate)	60	21		263
	75	26		263
Poly(styrene)	40	12		263
	60	15		263
	75	19		263
Poly(vinyl acetate)	–15	0.36		97
	0	0.5		97
		1.7		350
	11	2	O	145
	21	4	O	145
	31	16	O	145
	40	11.2		12
		30.9		43
		32.0		263
	50	0.06	W15	265

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TABLE 2. *cont'd*

Polymer	T (°C)	C_P ($\times 10^4$)	Remarks	Refs.
Vinyl acetate (*cont'd*)				
Poly(vinyl acetate) (*cont'd*)		0.11	W14	265
		0.15		265
		3		43
		10.2		12
	60	1.2		124
		1.4		168,169
		1.8		348
		1.9		328
		2.5		329
		3.0		165
		4.0		105
		6.8		12
		8.0		105
		47.0		263
	60–70	3.5	P	350
	70	2	O	403
		4		403
Poly(vinyl acetate-*co*-vinyl chloride)	60	0.21	VCL-Part	166
		3.0	VOAC-Part	166

TABLE 3. TRANSFER CONSTANTS TO CATALYSTS AND INITIATORS

Catalyst/Initiator	T (°C)	C_I	Remarks	Refs.
Acrylamide				
Bisulfite ion	75	0.17	F13	352
Hydrogen peroxide	25	0.0005	D	92
Potassium persulfate	50	0.0258	F13, LL	560
	60	0.028	F13, LL	560
Acrylic acid, benzyl ester				
Isobutyronitrile, 2,2′-azobis-	55	0		291
	60	0		291
	65	0		291
–, ethyl ester				
Isobutyronitrile, 2,2′-azobis-	65	0		306
–, methyl ester				
Benzoyl peroxide	55	0.0143		221
	60	0.0246		221
	65	0.0375		221
	70	0.01	C, F10	322
		0.05		221
2-Butanone, peroxide	65	0.05	F10	123
		0.05		221
	70	0.077		221
	75	0.113	F10	123
		0.113		221
tert-Butyl hydroperoxide	60	0.01		221
	70	0.0266		221
tert-Butyl peroxide	65	0.00047		221
	70	0.00082		221
	75	0.00111		221
Chloroform/$CuCl_2$	120	600	Q(5–19), F1	551
Acrylonitrile				
Isobutyronitrile, 2,2′-azobis-	50	0	F16	362
	60	0		95
Azodiphenylmethane, benzyl-	50	0.07	R	536
	60	0.07	R	536
	80	0.07	R	536
–, cyclohexyl-	50	0.02	R	536
	60	0.04	R	536
	80	0.05	R	536

TABLE 3. *cont'd*

Catalyst/Initiator	T (°C)	C_I	Remarks	Refs.
Azodiphenylmethane (*cont'd*)				
–, 1-phenylethyl-	50	0.1	R	536
	60	0.1	R	536
	80	0.1	R	536
–, 2-propyl-	50	0.02	R	536
	60	0.04	R	536
	80	0.05	R	536
Benzoic acid, vinyl ester				
Benzoyl peroxide	80	0.0527		26
Isobutyronitrile, 2,2′-azobis-	80	0		26
3-Buten-2-one, 3-methyl-				
Benzoyl peroxide	80	0.0509		84
Ethylene				
Azoethane, 1,1′-dimethyl-	83	0.5	D, W	204
		0.51	D, W	205
Ethylene, chloro-				
Valeronitrile, 2,2′-azobis[2,4,4-trimethyl-	25	0.85		425
Maleic anhydride				
Benzoyl peroxide	75	2.63		175
Methacrylonitrile				
Isobutyronitrile, 2,2′-azobis-	60	0		125
Methyl methacrylate				
Acetophenone, 2-diazo-2-phenyl-	70	0.0		459
p-Anisoyl peroxide	60	0.037		316
Benzoyl peroxide	50	0.01		145
	60	0		34
		0.02	12	145
2-Butanone peroxide	65	0.0025	F2	123
		0.00698		123
	70	0.0033	F17	123
		0.0033	F10	123
		0.0040	F11	123
		0.0092		123
	75	0.00553	F11	123
		0.00667	F2	123
		0.0071	F10	123
		0.0089		123
	80	0.0111	F17	123
		0.0128		123
tert-Butyl hydroperoxide	60	1.27 × [cat]		34
tert-Butyl peroxide	20	<0.0001	C, D	35
Butyronitrile, 2-ethyl-,2,2′-azobis-	60	0		317
–, 2-methyl-, 2,2′-azobis-	60	0		317
–, 2,3,3-trimethyl-, 2,2′-azobis-	60	0	317	
Cinnamoyl peroxide	60	0.009		316
Cobalt, [bis-[μ-[(2,3-butane-dionedioximato)(2-)-*O,O′*]] tetrafluorodiborato(2-)-*N,N′,N″,N″*]-		36000		563
		2500	F17	563
Cyclohexanecarbonitrile, 1,1′-azodi-	60	0	317	
Cyclopropanecarboxylic acid, 1-methyl-2-(9′-anthryl)-, methyl ester	70	0.002	440	
Hydrogen peroxide	60	0.046	F11	290
Hydroperoxide, α,α-dimethylbenzyl	60	0.33		34
Isobutyronitrile, 2,2′-azobis-	50	0	F2	327
	60	0	F10	34,290,317
Methane, diazodiphenyl-	70	0.0		267
Palmitoyl peroxide	60	0		316
		0.16	I11	145
Peroxide, bis(*m*-chlorobenzoyl)	60	0.003		316
–, bis(*o*-chlorobenzoyl)	60	0.019		316
		0.35	F10	290
		0.8	I10	145
–, bis(*p*-chlorobenzoyl)	60	0.009		316
–, bis(*m*-nitrobenzoyl)	60	0.012		316

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TABLE 3. *cont'd*

Catalyst/Initiator	T (°C)	C_I	Remarks	Refs.
Methyl methacrylate (*cont'd*)				
–, bis(*p*-nitrobenzoyl)	60	0.144		316
–, bis(*m*-phenylazobenzoyl)	50	0.00001	C	282
2-Tetrazene, 1,1,4,4-tetramethyl-	30	0.038	D	483
o-Toluoyl peroxide	60	0.046		316
		0.06	I11	145
Valeronitrile, 2-methyl, 2,2′-azobis-	60	0		317
Styrene				
Acetyl peroxide	70	0		87,217
p-Anisoyl peroxide	70	0.074		87
Benzoyl peroxide	22	0.1	D	65
	50	0.13		58
	60	0.048		171
		0.055		240
		0.101	C	234
	70	0		217
		0.075		87
		0.12		67
		0.18		58,65
	80	0.13		58,65
		0.813	F17	530
Cobalt, [Bis-[μ-[(2,3-butane-dionedioximato)(2-)-*O,O′*]] tetrafluorodiborato(2-)-*N,N′,N″,N″*]-		1500		563
Di-3-phenylazo benzoyl peroxide	50	6.7	R	527
	70	5.5	R	527
	90	4.8	R	527
2-Butanone, peroxide	50	0.46	H	388
	70	0.0667	F2	123
		0.1250	F10	123
		0.1670	F11	123
	75	0.1250	F2	123
		0.1670	F10	123
		0.2000	F11	123
		0.243		123
tert-Butyl hydroperoxide	60	0.035		171
	70	0.051	H	388
		0.060		399
		0.063	F6	400
		0.064		400
		0.066	F2, F5	400
	80	0.003		385
Butyl peroxide	60	0.00076	F9	302
		0.00092	F2	302
	80	0.0029	F9	302
sec-Butyl peroxide	60	0.0004	F2	301
	80	0.0021	F2	301
tert-Butyl peroxide	60	0.00023	F9	303
		0.0003		303
		0.0006	F2, F12	303
		0.00086		300
		0.0013		304
	70	0.039	F2	400
	80	0.0022	F2	303
		0.0033		385
Butyryl peroxide	70	0.018		87
Cinnamoyl peroxide	70	1.10		87
Crotonyl peroxide	70	0.146		87
Cyclohexanone peroxide	60	0.062		33
Ethyl peroxide	60	0.00066	F2	301
	80	0.0024	F2	301
Formamide, 2-cyano-2-propylazo-	100	0.17		47
Furoyl peroxide	70	0.23		87
Hexanoyl peroxide	70	0.166		87
Hydroperoxide, α,α-dimethylbenzyl	40	0.052	H	388

TABLE 3. *cont'd*

Catalyst/Initiator	T (°C)	C_I	Remarks	Refs.
Styrene (*cont'd*)				
Hydroperoxide, α,α-dimethylbenzyl (*cont'd*)	50	0.069	H	388
	60	0.063		171
	70	0.082	H	388
		0.10		399
–, α,α-dimethylbenzyl, *p*-isopropyl-	70	0.033	H	388
Isobutyronitrile,2,2′-azobis-	50	0	F2	327
		0	H	388
	60	0		171
		0		318
		0.012		468
		0.16		447
Isopropyl peroxide	60	0.0003	F2	301
	80	0.0015	F2	301
Lauroyl peroxide	70	0		217
		0.024		87
	84	0		217
p-Menth-8-yl hydroperoxide	50	0.048	H	388
Myristoyl peroxide	70	0		217
		0.116		87
2-Naphthoyl peroxide	70	0.178		87
Nickel peroxide	60	0.00265	C, F2	266
Octanoyl peroxide	70	0		217
		0.098		87
Oleoyl peroxide	70	0.154		87
Palmitoyl peroxide	70	0.142		87
Peroxide, bis(*p*-acetoxybenzoyl)	70	0.187		87
–, bis(*m*-bromobenzoyl)	70	0.465		87
–, bis(*o*-[bromobenzoyl)	50	1.0		58,65
	70	2.17		87
–, bis(*p*-bromobenzoyl)	70	0.193		87
–, bis(*p*-*tert*-butylbenzoyl)	70	0		87
–, bis(*m*-chlorobenzoyl)	70	0.346		87
Peroxide, bis(*o*-chlorobenzoyl)	22	2.0	D	65
	70	1.91		87
–, bis(*p*-chlorobenzoyl)	70	0.216		217
–, bis(*p*-cyanobenzoyl)	70	0.804		87
–, bis(2,4-dichlorobenzoyl)	60	2.9		217
	70	2.6		217
–, bis(α,α-dimethylbenzyl)	50	0.01	H	388
–, bis(*m*-fluorobenzoyl)	70	0.246		87
–, bis(*o*-fluorobenzoyl)	70	0.40		87
–, bis(*p*-fluorobenzoyl)	70	0.219		87
–, bis(hydroxyheptyl)	50	<0.005	H	388
–, bis(*m*-iodobenzoyl)	70	0.262		87
–, bis(*p*-methoxycarbonyloxy-benzoyl)	70	0.208		87
–, bis(*m*-nitrobenzoyl)	70	6.2		87
–, bis(*p*-nitrobenzoyl)	70	7.4		87
–, bis(*m*-phenylazobenzoyl)	70	5.5	C	281
	90	4.8	C	281
–, bis(5-phenyl-2,4-pentadienoyl)	70	5.24		87
–, bis(2-thiophenecarbonyl)	50	0.23		65
	70	0.38		65
–, *tert*-butoxymaleoyl	70	1.52		87
–, *tert*-butoxyphthaloyl	70	0.018		87
–, butylidenebis[*tert*-butyl	80	0.00077	C	411
	90	0.00140	C	411
–, *sec*-butylidenebis[*tert*-butyl	80	0.00072	C	411
	90	0.00115	C	411
–, isobutylidenebis[*tert*-butyl	80	0.00083	C	411
	90	0.00155	C	411
–, isopropylidenebis[*tert*-butyl	80	0.00040	C	411
	90	0.00105	C	411
Pinanyl hydroperoxide	70	0.026	H	388

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TABLE 3. *cont'd*

Catalyst/Initiator	T (°C)	C_I	Remarks	Refs.
Styrene (*cont'd*)				
Pivalonitrile	60	0.000038		468
Propylene, oxidized	60	1.01		396
	70	1.14		396
Propyl peroxide	60	0.00084		305
Sorboyl peroxide	70	1.19		87
Stearoyl peroxide	70	0.154		87
Succinonitrile, tetramethyl-	60	0.000037		468
2-Tetrazene, 1,1,4,4-tetramethyl-	30	0.038	D	483
o-Toluoyl peroxide	70	0.175		87
p-Toluoyl peroxide	50	0.17		65
	70	0.003		87
		0.19		65
9-Undecenoyl peroxide	70	0.065		87
Valeronitrile, 2,2′-azobis[2,44-trimethyl-	25	0.59		426
Vinyl acetate				
Benzoyl peroxide	60	0.032		465
		0.09		231
		0.15		80
	65	0.040		466
Isobutyronitrile, 2,2′-azobis-	50	0.025		466
	60	0.055		466
Lauroyl peroxide	60	0.10		80
Palmitoyl peroxide	60	0.10		80
		0.17	I3	145
Peroxide, bis(*m*-bromobenzoyl)	60	0.24		80
		0.6	I3	145
–, bis(*o*-bromobenzoyl)	60	0.25		80
		3.5	I3	145
–, bis(*p*-bromobenzoyl)	60	0.17		80
–, bis(*o*-chlorobenzoyl)	60	0.17	I3	145

TABLE 4. TRANSFER CONSTANTS TO SOLVENTS AND ADDITIVES

Solvent/Additive	T (°C)	C_S ($\times 10^4$)	Remarks	Refs.
Acetic acid, allyl ester				
Benzene	80	21.0		273
p-Benzoquinone	80	5.2×10^5	J	27
–, 2,3,5,6-tetrachloro-	80	16×10^5	J	27
–, 2,3,5,6-tetramethyl-	80	4.14×10^4	J	27
–, 2,3,5-trichloro-	80	5.5×10^5	J	27
Carbon tetrachloride	100	2.0×10^4	C	210
Phosphorus trichloride	40	1.0×10^4	C, D	214
Acrylamide				
Acetonitrile		5.5	F13	564
tris(2-Carbamoylethyl)amine		85	F13	564
Iron(III) chloride	25	4.26×10^4		75
Isopropyl alcohol	50	19	F13	353
	80	7.2	F13, S	353
Methanol	30	0.13	C, F13	130
Propionamide	25	220	E	103
	60	64	E	103
Water	25	0.204	C, F13	437
	40	5.8	F13	444
Acrylic acid, butyl ester				
Aniline, *N,N*-dimethyl-	50	380		161
Ethanol	80	4.28	A, R	548
Methanol	80	0.47	F31, A, R	548
Propanol	80	3.78	A, R	548
Iso-propanol	80	14.12	A, R	548

TABLE 4. *cont'd*

Solvent/Additive	T (°C)	C_S ($\times 10^4$)	Remarks	Refs.
Acrylic acid, ethyl ester				
Acetic acid	50	0.176		472
	80	0.537	A	471
	100	1.05	A	472
Acetone	40	0.207		472
	60	0.27	C	134
	80	1.10	A	471
	100	2.30	A	472
Acetonitrile	50	0.158		472
	60	0.245		472
	80	0.55	A	471
	100	1.43	A	472
Aniline, *N,N*-dimethyl-	50	2300	F16	228
Benzene	50	0.016		472
	60	0.22		472
		0.27	C	133
		0.45	C	134
	80	0.525	A	471
	100	2.2	A	472
–, bromo-	60	0.163		472
	80	0.685	A	471
	100	3.34	A	472
–, chloro-	40	0.054		472
	80	0.37	A	471
	100	1.68	A	472
–, ethyl-	40	0.668		472
	60	11.6		472
	80	16.80	A	471
	100	28.7	A	472
2-Butanone	50	1.44		472
	60	0.151	C	134
	80	1.92		472
		3.29	A	471
	90	4.45	A	472
Butyl alcohol	40	1.28		472
	60	2.91		472
	80	5.85	A	471
	100	12.6	A	472
sec-Butyl alcohol	45	10.6		472
	63	18.5		472
	80	22.20	A	471
	100	31.5	A	472
tert-Butyl alcohol	40	0.068		472
	60	0.17		472
	80	0.712	A	471
	100	1.64	A	472
Butyric acid	80	0.855	A	471
Carbon tetrachloride	40	0.332		472
	60	0.90		472
		3.2		416
	70	1.13	C	134
	80	1.55	A	471
	100	2.80	A	472
Chloroform	40	0.195		472
	60	0.89	C	134
	70	1.57	C	134
	80	1.49	A	471
	100	4.74	A	472
Cumene	50	11.7		472
	60	13.8		472
	80	22.2	A	471
	90	26.0	A	472
Cyclohexane	50	28.9		472
	60	0.48		472
		0.61	C	134

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TABLE 4. *cont'd*

Solvent/Additive	T (°C)	C_S ($\times 10^4$)	Remarks	Refs.
Acrylic acid, ethyl ester (*cont'd*)				
cyclohexane (*cont'd*)	80	1.22	A	471
	100	3.08	A	472
Dimethylformamide	50	0.1	F7	510
Ethanol	80	4.38	A, R	548
Ethyl acetate	50	0.298		472
	60	0.448		472
		0.69	C	134
	80	0.89	A	471
	100	1.82	A	472
Formic acid	80	0.046	A	471
Heaxane	50	0.524		472
	60	0.593		472
	80	0.97	A	471
	100	1.46	A	472
Isobutyl alcohol	45	2.1		472
	63	3.31		472
	80	4.65	A	471
	100	8.06	A	472
Isopropyl alcohol	–	21	C	445
	80	28.70	A, R	548
Methanol	60	0.32	C	134
		1.70	4	472
	80	0.36	A, R	548
Propanol	80	4.73	A,R	548
Toluene	40	0.88		472
	50	0.611	C, F17, R	512
	60	0.929	C, F17, R	512
	70	1.37	C, F17, R	512
		1.84	C	134
	80	2.60	A	471
	100	6.80	A	471
–, 2-ethylhexylester				
Toluene	70	28.70	C, F17, R	512
	80	2.13	C, F17, R	512
–, methyl ester				
Acetone	60	0.23	C	470
	80	0.622		332
		1.1	C	111
Acetophenone	50	<2.5		15
Aluminum, triethyl	60	480	F2, S	156
Aniline	50	<1.0		15
–, *N,N*-dimethyl-	50	60	F16	228
–, *m*-nitro-	50	42.1		15
–, *p*-nitro-	50	26.7		15
Anisole, *m*-nitro-	50	72.7		15
Anthracene	50	1000		15
Benzene	80	0.326		332
		0.45	C	111
–, chloro-	80	0.52	C	111
		0.986		332
–, *o*-dichloro-	80	0.71	C	111
–, *m*-dinitro-	50	309		15
–, ethyl-	80	6.056		332
–, nitro-	50	46.4		15
–, 1,3,5-trinitro-	50	2040		15
Benzoic acid, *p*-nitro-	50	107		15
Benzonitrile	50	<1.0		15
Copper(II) chloride	120	600	F34	565
Phosphine, tributyl-	60	1890	F2	156
Phosphorus trichloride	40	1000	C, D	214
Propanol	80	3.92	A, R	548
Silane, dimethyphenyl-	60	400	A, R	539
–, methyldichloro-	60	1200	A, R	539
–, tetraethyl-	60	33.1	F2	156
–, trichloro-	60	1600	A, R	539

TABLE 4. *cont'd*

Solvent/Additive	T (°C)	C_S ($\times 10^4$)	Remarks	Refs.
Acrylic acid, methyl ester(*cont'd*)				
–, triethyl-	60	300	A, R	539
–, triphenyl-	60	800	A, R	539
Stearic acid, methyl ester	60	0.751		441
Toluene	60	2.7		21,24
	80	1.775		332
		2.7	C	111
–, *m*-nitro-	50	41.2		15
–, *p*-nitro-	50	48.6		15
Triethylamine	60	400		24
Tripropylamine	60	470	F2	156
–, tetrahydrofurfuryl ester				
Carbon tetrachloride	40	1.0	C, F2	319
Acrylonitrile				
Acetaldehyde	–	14	F	436
	50	47	F7	377
Acetamide, *N,N*-dimethyl-	50	4.945		375
		5.05		197
Acetic acid	50	0.81	F14	377
Acetone	50	1.7	F14	377
	60	1.13	F	95
Acetonitrile	50	0.7	F14	377
	60	2.0	F15	86
Acrolein, bis(2-ethoxyethyl)acetal	60	120	F7	499
–, bis(2-butoxyethyl)acetal	60	90.5	F7	156
Aluminum, hydrodiisobutyl	60	3940	F7	156
–, triethyl	60	590	F7	156
	100	17.0×10^4	F7	247
–, triisobutyl	100	28.0×10^4	F7	247
Aniline	40	32.0	F2, G	229
	50	44.0	F2, J	229
		9600	F16, G, J	227,229
	60	1.22×10^4	F16, G, J	229
–, *N,N*-diethyl-	40	215	F2, J	229
		5.81×10^4	F16, G, J	229
	50	359	F2, J	229
		9.38×10^4	F16, G, J	227,229
	60	547	F2, J	229
		14.3×10^4	F16, G, J	229
Aniline, *N,N*-dimethyl-	40	605	F2, J	229
		1.19×10^4	F16, G, J	229
	50	708	F2, J	229
		1040		161
		1.5×10^4	F16, J	228
		1.54×10^4	F16, G, J	227,229
	60	870	J	24
		964	F2, J	229
		2.18×10^4	F16, G, J	229
Anthracene	50	1.8×10^4		15
Arabinose	60	13.0	F8	361
Benzene	60	2.46	G	95
–, bromo-	60	1.36	G, S	95
–, *tert*-butyl-	60	1.93	G	95
–, chloro-	60	0.79	G, S	95
–, ethyl-	60	35.73	G	95
–, iodo-	60	5.19	G, S	95
Benzoic acid, vinyl ester	65	1400		136
p-Benzoquinone	50	1.3×10^4		15
Borane, tributyl	60	6470	F7	156
2-Butanone	60	6.43	G	95
–, 3-methyl-	60	21.08	G	95
1-Buten-3-yne	50	3800	F7	377
Butyl alcohol	60	15.42	G	95
sec-Butyl alcohol	60	97.55	G	95
tert-Butyl alcohol	60	0.44	G	95

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TABLE 4. *cont'd*

Solvent/Additive	T (°C)	C_S ($\times 10^4$)	Remarks	Refs.
Acrylonitrile (*cont'd*)				
Butyric acid, 4-hydroxy-γ-lactone	50	0.658		375
		0.74		374
Cadmium, dibutyl	60	5.5×10^4	F7	156
Carbonic acid, cyclic ethylene ester	50	0.073		293
		0.33		197
		0.39		374
		0.474		375
		0.5		404
		0.511	E	458
		1.0		356
	60	0.128		293
Carbon tetrabromide	50	400		493
	60	500		20
		1900	F7, J	24
Carbon tetrachloride	60	0.85	G	96
	80	1.13	C	336
Chloroform	60	5.64	G	95
	80	5.90	C	336
Copper(II) chloride	35	1.8×10^5	U(0.01)	402
		1.9×10^5	U(0.1)	402
		3.2×10^5	U(1.0)	402
	60	10×10^5	F7	37
Copper(II) sulfate	35	1900	F13, J	402
		2800	J, V(0.0001)	402
		3000	J, U(0.01)	402
		1.07×10^4	J, V(0.001)	402
		1.35×10^4	J, U(0.1)	402
		3.93×10^4	J, V(0.01)	402
		13.6×10^4	J, U(1.0)	402
		21.0×10^4	J, V(0.1)	402
Crotonaldehyde	50	47	F7	377
Crotononitrile, *trans*-	50	19	F7	377
Cumene	60	41.41	G	95
Cyclohexane	60	2.06	G	95
–, methyl-	60	2.31	G	95
Dimethylamine	50	175	F7	377
m-Dioxane, 5,5-dimethyl-2-vinyl-	60	2.20	F7	498
m-Dioxane, 5,5-dimethyl-2-vinyl-				
–, 4-methyl-2-vinyl-	60	4.40	F7	498
–, 2-vinyl-	60	2.71	F7	498
1,3,-Dioxolane, 2-vinyl-	60	16.60	F7	498
1,3-Dioxolane-4-methanol, 2-vinyl-	60	2.40	F7	498
Diphenylamine-T	60	700	F7	61
Erythritol	60	12.8	F8	361
Ethane, 1,2-dichloro-	60	1.47	G	95
–, 1,1,2,2-tetrachloro-	60	3.11	G	95
–, 1,1,1-trichloro-	60	1.25	G	95
–, 1,1,2-trichloro-	60	1.68	G	95
Ethanol, 2,2′-iminodi-	30	10.1	F13	476
–, 2,2′,2″-nitrilotri-	30	76.0	F13	476
Ether, dodecyl vinyl	50	4.95	C	4
Ethyl acetate	60	2.54	G	95
Formamide, *N,N*-dimethyl-	20	1.4	C, J, F7	248
	25	4.97	D, J	91
	40	3.24	E	458
	50	1.0		347
		2.70		374
		2.78		197
		2.8	F7	377
		2.83		375
		10		356
	60	2.412		347
		4.494		22
		5.0	F15	86

TABLE 4. *cont'd*

Solvent/Additive	T (°C)	C_S ($\times 10^4$)	Remarks	Refs.
Acrylonitrile (*cont'd*)				
Formamide, *N,N*-dimethyl- (*cont'd*)				
–, *N*-methyl-	50	1.8	F14	377
Formic acid	50	0.5	F14	377
Glucose	60	6.9	F8	361
α,D-Glucoside, methyl-	60	20	F7	220
–, –, 6-deoxy-6-iodo-	60	50	F7	220
–, –, 6-deoxy-6-mercapto-	60	1300	F7	220
–, –, 6-deoxy-6-phthalimido-	60	60	F7	220
–, –, 2,3-di-*O*-benzyl-	60	90	F7	220
–, –, 2,3,4,6-tetra-*O*-acetyl-	60	30	F7	220
–, –, 6,-*O*-(*p*-toluenesulfonyl)-	60	10	F7	220
–, –, 6-*O*-triphenylmethyl-	60	80	F7	220
β,D-Glucoside, methyl-	60	20	F7	220
–, –, 6-deoxy-6-dipropylamino-	60	1100	F7	220
Glutaronitrile, 2,4-dimethyl-	50	0.6	F14	376
Glyceraldehyde	60	32.1	F8	361
Glycerol	60	23.5	F8	361
2,4,6-Heptanetricarbonitrile	50	1.0	F14	376
1-Heptanol, 2,2,3,3,4,4,5,5,6,6,7,7-dodecafluoro-	60	1.9	F2	442
1,5-Hexadien-3-yne	50	1.17×10^4	F7	377
Hydrocyanic acid	50	0.81	F14	377
	–	6.2	F	436
Indium, triethyl	60	2220	F7	156
Iron(III) chloride	60	3.33×10^4	F7	19
Isobutyl alcohol	60	24.06	G	95
Isobutylene	60	70		553
Isobutyronitrile	50	1.3	F14	376
	60	1.8	I6	376
		3.5		135
		4.0	F15	86
Lactonitrile	50	1	F14	377
Lead, tetraethyl	60	243	F7	156
Magnesium perchlorate	50	<0.05		376
Mercury, diethyl	60	72.2	F7	156
Methane, dichloro-	60	3.06	G	95
–, nitro-	60	6.0	F15	86
Methanol	50	0.5	F14	377
Methylamine	50	175	F7	377
2,6-Octadiene, 2,6-dimethyl-	60	450		6
Oxime, acrolein	60	6.26×10^5		555
–, crotonaldehyde-	60	2.05×10^4		555
–, ethylisopropenylketone-	60	1.03×10^4		555
–, methacrolein-	60	9.41×10^4		555
–, methylacrolein-	60	5.35×10^4		555
–, methylvinylketone-	60	1.2×10^4		555
–, methylisopropenylketone-	60	1.71×10^4		555
–, methylisobutenylketone-	60	2.65×10^4		555
1-Pentanol, 2,2,3,3,4,4,5,5-octa-fluoro-	60	1.9	F2	442
1-Pentanol, 4-methyl-	60	11.79	G	95
Piperidine, 1-ethyl-	60	3300	J	24
–, 1-methyl-	60	2300	J	24
1-Propanol, 2,2,3,3-tetrafluoro-	60	1.5	F2	442
Silane, tetraethyl	60	21.0	F7	156
Sorbitol	60	6.1	F8	361
Stibine, tributyl	60	11.1×10^4	F7	156
Succinonitrile	60	0.6		86
Sulfur dioxide	50	0		362
Tin, tetrabutyl	60	80.8	F7	156
Toluene	50	1.153	G	347
	60	2.632	G	347
		3.2		21
		5.83	G	24,95
o-Toluidine, *N,N*-dimethyl-	40	272	F2, J	229
	50	334	F2, J	229

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TABLE 4. *cont'd*

Solvent/Additive	T (°C)	C_S ($\times 10^4$)	Remarks	Refs.
Acrylonitrile (*cont'd*)				
o-Toluidine, *N,N*-dimethyl- (*cont'd*)		30200	F16, G, J	227,229
	60	463	F2, J	229
Tributylamine	60	6700	J	24
Triethylamine	60	1700	T	20
		1900		20
		3800		22
		5900	F7, J	24
		6600	J	24
Trimethylamine	50	175	F7	377
	60	790	J	24
Tripropylamine	60	4820	F7	156
		1.05×10^4	J	24
Zinc, diethyl	60	1.06×10^4	F7	156
Zinc chloride	50	0.006	F13	410
Acrylonitrile/styrene (38.5–61.5 mol%)				
Methanol	65	1.4		116
Anisole, *p*-vinyl-				
Anisole, *p*-isopropyl-	60	3.40		407
Benzonitrile, *p*-isopropyl-	60	40.9		407
Cumene	60	4.28		407
–, *p*-bromo-	60	11.8		407
–, *p*-tert-butyl-	60	3.64		407
–, *p*-chloro-	60	8.52		407
Benzoic acid, vinyl ester				
Benzene	60	1.5		393
	80	0.4		26
Benzoic acid, isopropyl ester	60	1.0		393
2-Butanone	80	29.0		26
Carbon tetrachloride	80	730		26
Chloroform	80	105		26
Cyclohexane	80	2.3		26
1,3-Butadiene, 2-chloro-				
1-Butene, 3-chloro-3-methyl-	50	5.47	F1	152
2-Butene, 1-chloro-3-methyl-	50	4.57	F2	152
2,6-Octadiene, 2,7-dichloro-	50	5.24	F2	152
3-Buten-2-one, 3-methyl-				
Benzene	80	2.489	C	84
–, ethyl-	80	6.934	C	84
Cyclohexane, methyl-	80	0.500	C	84
Toluene	80	3.282	C	84
Butyraldehyde, divinyl acetal				
Aniline, *N,N*-dimethyl-	50	1060		430
Benzene	50	27.7		430
Butyl alcohol	50	3500		430
tert-Butyl alcohol	50	37.2		430
1,3-Dioxolane, 2-propyl-	50	708		430
Butyric acid, vinyl ester				
Benzene	80	3.28		201
Carbamic acid, vinyl-, ethyl ester				
Acetone	60	8.5		117
Benzene	60	1.25		117
Chloroprene				
3-Chloro-(methyl-^{14}C)-				
1-butene(4-^{14}C)	50	5.37	F2	509
3-Chloro-2-pentene-(2,4-^{14}C)	50	3.94	F2	509
p-Dioxin, 2,3-dihydro-/maleic anhydride				
Benzene	60	11500	R	169
Carbon tetrabromide	60	100×10^5	R	169
Carbon tetrachloride	60	1.7×10^5	R	169
Chloroform	60	3.6×10^4	R	169
p-Dioxane	60	1.07×10^4	R	169
Toluene	60	6.0×10^4	R	169
m-Xylene	60	9.9×10^4	R	169

TABLE 4. *cont'd*

Solvent/Additive	T (°C)	C_S ($\times 10^4$)	Remarks	Refs.
Ethylene				
Acetamide, *N,N*-diethyl-	130	125	C, W5	454
–, *N,N*-diisopropyl-	130	57	C, W5	454
–, *N,N*-dimethyl-	130	182	C, W5	454
–, *N*-ethyl-	130	115	C, W5	454
–, *N*-methyl-	130	61	C, W5	454
Acetic acid, butyl ester	130	89	C, W5	454
–, *tert*-butyl ester	130	40	C, W5	454
–, methyl ester	130	40	C, W5	454
Acetic acid, chloro-				
–, –, methyl ester	90	610	C, Q1	434
		1210	C, Q2	434
		2170	C, Q3	434
		2150	C, Q4	434
		2580	C, Q5	434
	120	630	C, Q1	434
		1160	C, Q2	434
		1880	C, Q3	434
		1990	C, Q4	434
		2090	C, Q5	434
	130	1120	C, W5	454
Acetic acid, cyano-				
–, –, methyl ester	130	6700	C, W5	454
Acetic acid, dichloro-				
–, –, methyl ester	55	1800	C, Q1	435
		7900	C, Q2	435
		11100	C, Q3	435
		13000	C	435
	90	1900	C, Q1	435
		6900	C, Q2	435
		9400	C, Q3	435
		10500	C	435
	120	2000	C, Q1	435
		5900	C, Q2	435
		8100	C, Q3	435
		11100	C	435
Acetic acid, trichloro-				
–, –, methyl ester	55	700	C, Q1	484
		16100	C, Q2	484
		27500	C, Q3	484
		38000	C, Q4	484
		65700	C	484
	90	1000	C, Q1	484
		17000	C, Q2	484
		27700	C, Q3	484
		39000	C, Q4	484
		65200	C	484
	120	1200	C, Q1	484
		15400	C, Q2	484
		23600	C, Q3	484
		33000	C, Q4	484
		54100	C	484
Acetic anhydride	130	130	C, W5	454
Acetone	130	160	C, W17	456
		165	C, F21, W5	259
		168	C, W5	456
	200	282	C, W5	455
Acetonitrile	130	100	C, F21, W5	159
Benzaldehyde	130	1970	C, W5	457
Benzene	20	0.629	E, W	143
	83	20	D	204
		21	D, W	205
	130	9.4	C, W5	260
	50–70	18	W3	218

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TABLE 4. *cont'd*

Solvent/Additive	T (°C)	C_S ($\times 10^4$)	Remarks	Refs.
Ethylene (*cont'd*)				
–, ethyl-	130	430	C, W17	456
		480	C, W5	52
		520	C, W5	454
		560	C, W5	52
	200	500	C, W5	455
Benzene-D6	130	5.6	C, W5	260
Benzoic acid, butyl ester	130	140	C, W5	454
–, ethyl ester	130	55	C, W5	454
–, methyl ester	130	53	C, W5	454
Butane	130	40	C, F21, W5	259
		45	C, W17	456
–, 1-iodo-	100	9.45×10^4	Q1, W14	187
		11.3×10^4	Q2, W14	187
		12.6×10^4	Q3, W14	187
2-Butanone	130	550	C, W17	456
		600	C, F21, W5	259
	200	750	C, W5	455
–, 3-methyl-	130	840	C, F21, W5	259
1-Butene	130	330	C, W5	52
		470	C, W5	52
		560	C, F21, W5	259
	189	900	B, W5	443
	200	570	C, W5	455
–, 2-methyl-	130	210	C, F21, W5	259
		530	C, F21, W5	259
–, 3-methyl-	130	1200	C, F21, W5	259
2-Butene	130	250	C, F21, W5	259
		380	C, W5	454
–, 1,4-dichloro-	130	4100	C, W5	454
–, 2-methyl	130	470	C, F21, W5	259
tert-Butyl alcohol	30	0	E, W4	482
	130	2	C, F21, W5	259
Butylamine	130	220	C-W5	454
Butyraldehyde	130	3250	C, W5	457
Butyric acid, methyl ester	130	220	C, W5	454
Butyronitrile	130	520	C, F21, W5	259
Carbon tetrachloride	20	215	E, W	143
	50	772	C, Q1,	391
	70	974	C, Q1	391
		7000	C, W4	215
		32000	C	210
	90	740	Q1, W12	453
		1210	C, Q1	391
		20200	Q2, W12	453
		32500	Q3, W12	453
		34000	W12	453
	95	1250 ± 200	W23, Q(1)	518
		22000 ± 1000	W23, Q(2)	518
		43000 ± 4000	W23, Q(3)	518
		1130 ± 700	W20, Q(1)	518
		2000 ± 1000	W20, Q(2)	518
		37000 ± 3000	W20, Q(3)	518
	130	9800	C, F21, W5	259
	140	1600	C, Q1	170
		1700	C, Q1, F19	170
		1800	C, Q1, W13	170
		2200	C, Q1, F20	170
		22000	C, Q2	170
		23000	C, Q2, F19	170
		30000	C, Q1, W1	170
		36000	C, Q3	170
		38000	C, Q2, F20	170
		39000	C, Q3, F19	170
		60000	C, Q2, W13	170

TABLE 4. *cont'd*

Solvent/Additive	T (°C)	C_S ($\times 10^4$)	Remarks	Refs.
Ethylene (*cont'd*)				
Carbon tetrachloride (*cont'd*)		60000	C, Q3	170
		61000	C, Q3, F20	170
		70000	C, Q4, F20	170
		90000	C, Q4, F20	170
		100000	C, Q2, W1	170
		110000	C, Q3, W1	170
		130000	C, Q3, W13	170
		140000	C, Q4, W1	170
		180000	C	170
Chloroacetic acid, methyl ester	90	590, 550, 1200	C, Q(1), Q(2), Q(3)	557
		1680, 2240, 2340	C, Q(4), Q(5), Q(6)	557
Chloroform	28	2100	E, Q1, W	244
		13000	E, Q2, W	244
		15000	E, Q3, W	244
	70	8000	C, W4	215
		30000	C	210
	80	2470	C, Q1, W12	101
		15500	C, Q2, W12	101
		24900	C, Q3, W12	101
		31200	C, Q4, W12	101
		43900	C, W12	101
	95	2000 ± 120	W23, Q(1)	518
		10000 ± 500	W23, Q(2)	518
		16000 ± 3000	W23, Q(3)	518
		1150 ± 50	W20, Q(1)	518
		5000 ± 300	W20, Q(3)	518
		8000 ± 1000	W20, Q(3)	518
	101	1500	E, Q1, W	224
		4500	E, Q3, W	244
		5400	E, Q2, W	244
	103	2890	C, Q1, W12	101
		15400	C, Q2, W12	101
		23800	C, Q3, W12	101
		29800	C, Q4, W12	101
		41100	C, W12	101
	130	2900	C, F21, W5	259
	140	3210	C, Q1, W12	101
		15200	C, Q2, W12	101
		22200	C, Q3, W12	101
		28000	C, Q4, W12	101
		37600	C, W12	101
Cumene	130	500	C, F21, W5	259
Cyclohexane	130	80	C, F21, W5	259
		90	C, W17	456
		91	C, F21, W5	259
	200	190	C, W5	455
–, methyl-	130	110	C, F21, W5	259
Cyclopentane	130	109	C, W17	456
		127	C, F21, W5	259
	200	228	C, W5	455
Cyclopropane	130	0	C, F21, W5	259
Decane	130	120	C, F21, W5	259
	189	425	B, W5	443
1-Decene	189	1090	B, W5	443
Dibutylamine	130	1070	C, W5	454
Dichloroacetic acid, methyl ester	90	1900, 6900, 9400	C, Q(1), Q(2), Q(3)	558
Dimethylamine	130	1900	C, F21, W5	259
p-Dioxane	130	320	C, F21, W5	259
Ethane	130	6	C, F21, W5	259
–, 1,1-bis(dimethylamino)-	130	1070	C, W5	457
–, 1-bromo-2-chloro-	130	390	C, W5	454
–, chloro-	70	120	C, W4	215
–, 1,2-dibromo-	130	1250	C, W5	454
–, 1,1-dichloro-	70	1500	C, W4	215

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TABLE 4. *cont'd*

Solvent/Additive	T (°C)	C_S ($\times 10^4$)	Remarks	Refs.
Ethylene (*cont'd*)				
Ethane, 1,2-dichloro-	130	110	C, F21, W5	259
–, iodo-	65	1.51×10^5	Q1	189
		1.59×10^5	Q2	189
		1.65×10^5	Q3	189
	100	1.1×10^5	Q1	452
		1.36×10^5	Q1, W14	188
		1.43×10^5	Q2, W14	188
		1.48×10^5	Q3, W14	188
		1.49×10^5	Q3	452
–, 1,1,1-trichloro-	70	500	C, W4	215
Ethanol	20	5.71	E, W	143
	30	110, 210, 270	E, Q(1), Q(3), Q(5)	523
	60	76, 240, 280	E, Q(1), Q(3), Q(5)	523
	100	89, 270, 340	E, Q(1), Q(3), Q(5)	523
	125	100, 310, 320	E, Q(1), Q(3), Q(5)	523
	130	68	C, W17	456
		69	C, F21, W5	259
		75	C, W5	454
	125–135	190	C, W2	381
	150	92, 260	E, Q(1), Q(3)	523
	180	73, 350	E, Q(1), Q(3)	523
	200	135	C, W5	455
Ethyl acetate	130	45	C, W5	454
	200	121	C, W17	455
Ethylene oxide	130	7	C, F21, W5	259
Formaldehyde	130	560	C, W5	457
Fomamide, *N,N*-dimethyl-	130	260	C, F21, W5	259
Formic acid, methyl ester	130	42	C, W5	454
Furan, tetrahydro-	130	288	C, W5	454
		289	C, F21, W5	259
	200	401	C, W5	455
Heptaldehyde	130	2600	C, W17	457
		3900	C, W5	457
	200	4800	C, W5	457
Heptane	50–70	90	W3	218
	130	80	C, F21, W5	259
Hexane	130	68	C, F21, W5	259
	189	225	B, W5	443
1-Hexene	189	900	B, W5	443
–, 2-ethyl-	130	3300	C, F21, W5	259
Hydrogen	130	159	C, W5	454
		160	C, F21, W5	259
	200	400	C, W5	455
Isobutyronitrile	130	1070	C, F21, W5	259
Isocyanic acid, butyl ester	130	212	C, W5	454
Isopropanol	30	96, 410, 520	E, Q(1), Q(3), Q(5)	523
	60	65, 310, 380	E, Q(1), Q(3), Q(5)	523
	100	65, 300, 350	E, Q(1), Q(3), Q(5)	523
	125	75, 380, 380	E, Q(1), Q(3), Q(5)	523
	130	130	C, W17	456
		140	C, F21, W5	259
		144	C, W5	454
	125–135	570	C, W1	381
	150	98, 470, 460	E, Q(1), Q(3), Q(5)	523
	180	86, 440, 500	E, Q(1), Q(3), Q(5)	523
	200	234	C, W5	455
Isothiocyanic acid, butyl ester	130	0	C, W5	454
Methane	130	0	C, W5	259
–, bromochloro-	100	1600	C, Q1, W11	2
		4500	C, Q2, W11	2
		7500	C, Q3, W11	2
		8000	C, Q4, W11	2
	130	10000	C, W5	454
	140	16.0×10^5	Q1, W11, II	1

TABLE 4. *cont'd*

Solvent/additive	T (°C)	C_S ($\times 10^4$)	Remarks	Refs.
Ethylene (*cont'd*)				
Methane, bromochloro- (*cont'd*)		47.0×10^5	Q2, W11, II	1
–, chloro-	70	4	C, W4	215
–, dichloro-	70	700	C, W4	215
	130	360	C, F21, W5	259
–, dimethoxy-	130	73	C, W5	454
–, iodo-	65	41000	Q1	189
		45000	Q2	189
		45000	Q3	189
	100	41000	Q1	189
		45000	Q2	189
		45000	Q3	189
Methanol	30	36, 84, 100	E, Q(1), Q(2), Q(3)	523
	60	46, 100, 140	E, Q(1), Q(2), Q(3)	523
	100	34, 90, 120	E, Q(1), Q(2), Q(3)	523
	125	56, 100, 140	E, Q(1), Q(2), Q(3)	523
	130	21	C, F21, W5	259
	150	53, 120, 160	E, Q(1), Q(2), Q(3)	523
	180	37, 120, 160	E, Q(1), Q(2), Q(3)	523
Methylamine	130	53	C, W5	454
1-Octene	130	360	C, W5	52
		360	C, F21, W5	259
Pentane, 2,2,4-trimethyl-	130	64	C, F21, W5	259
Pentene	189	900	B, W5	443
–, 4,4-dimethyl-	130	175	C, W5	454
–, 4-methyl-	130	310	C, W5	454
Phosphine	130	207000	C, W5	457
–, dibutyl	130	36000	C, W5	454
–, tributyl	130	4500	C, W5	454
–, triphenyl	130	50	C, W5	454
Phosphorous acid, dimethyl ester	130	5100	C, F21, W5	259
Propane	130	27	C, F21, W5	259
		27.6	C, W17	456
		31	C, F21, W5	259
	200	65.2	C, W5	455
–, 2-chloro-	70	250	C, W4	215
Propane, 2-chloro-2-methyl-	70	40	C, W4	215
–, 2,2-dimethyl-	130	8	C, F21, W5	259
–, 2-iodo-	65	5.7×10^5	Q1	189
		5.9×10^5	Q2	189
		6.07×10^5	Q3	189
	100	4.55×10^5	Q1	189
		4.70×10^5	Q2	189
		4.83×10^5	Q3	189
–, 2-methyl-	130	50	C, F21, W5	259
		72	C, W5	454
	200	136	C, W5	455
–, 1,1,1,2,2,3,3,3-octafluoro-	130	4	C, F21, W5	259
1-Propene	130	110	C, W5	52
		122	C, W5	454
		150	C, W5	52
	200	200	C, W5	455
Propionaldehyde	130	2300	C, W17	457
		3300	C, W5	457
	200	2830	C, W5	457
Propionic acid, methyl ester	90	63000	C, Q1	485
		92000	C, Q3	485
		1.08×10^5	C, Q5	485
		630, 420, 780	C, Q(1), Q(2), Q(3)	516
		890, 1030, 1230	C, Q(4), Q(5), Q(6)	516
	120	78000	C, Q1	485
		1.12×10^5	C, Q3	485
		1.39×10^5	C, Q5	485
		780, 430, 1060	C, Q(1), Q(2), Q(3)	516
		1220, 1300, 1410	C, Q(4), Q(5), Q(6)	516

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TABLE 4. *cont'd*

Solvent/Additive	T (°C)	C_S ($\times 10^4$)	Remarks	Refs.
Ethylene (*cont'd*)				
–, 3-cyano-, methyl ester	130	790	C, W5	454
Silane, tetramethyl	130	0	C, F21, W5	259
Tetradecane	189	580	B, W5	443
1-Tetradecene	189	1760	B, W5	443
Toluene	130	130	C, W5	52
		154	C, W5	454
		180	C, W17	456
	200	220	C, W5	455
Tributylamine	130	820	C, W5	454
Trichloroacetic acid, methyl ester	90	1000, 1700, 2770	C, Q(1), Q(2), Q(3)	559
Tridecane	130	140	C, F21, W5	259
Trimethylamine	130	180	C, F21, W5	259
		330	C, W5	454
Water	20	1.71	E, W	143
p-Xylene	130	300	C, F21, W5	259
		317	C, W5	454
		400	C, W17	456
	200	434	C, W5	455
Ethylene, bromo-				
Carbon tetrachloride	60	50		417
Ethylene, chloro-				
Acetaldehyde	50	110		164
Aniline, *N,N*-dimethyl-	50	2700		161
Benzene	35	1500		219
Butyraldehyde	50	350	W8	500
		420	W7	500
		500	W15	500
		580		500
Carbon tetrabromide	50	4.7×10^4	F26	492
		50.0×10^4		66
	60	3300	Q1	418
		1.85×10^4	Q2	418
		7.45×10^4	Q3	418
		12.15×10^4	Q4	418
Cyclohexane, 1,2-epoxy-4-vinyl-	–	264		428
Ethane, 1,2-dichloro-	25	4.0		425
	50	4.5	C, F26	392
Ether, dodecyl vinyl	50	156		4
Furan, tetrahydro-	25	16		425
	40	30		246
	50	24		164
Heptane, 2,4,6-trichloro-	50	5		211
Oxalic acid, diethyl ester	25	1.4		315
Pentane, 2,4-dichloro-	25	9.0	G	315
	50	5		211
Ethylene, 1,1-dichloro-				
Phosphorus trichloride	60	14	D	214
Ethylene, tetrafluoro-				
Ethanol	100	800	C, Q5, W2	3
		820	C, Q6, W2	3
		860	C, Q4, W2	3
		880	C, Q3, W2	3
Isopropanol	100	1540	C, Q3, W2	3
		1660	C, Q4, W2	3
		1700	C, Q5, W2	3
Methanol	100	350	C, Q3, W2	3
		390	C, Q4, W2	3
Hexanoic acid, vinyl ester				
Benzene	80	4.9		201
1-Hexene				
Carbon tetrachloride	140	4.1×10^4	C, Q1, F19	170
Cyclohexanol	125–135	390	C	381
Ethyl alcohol	30–35	170	D	381

TABLE 4. *cont'd*

Solvent/Additive	T (°C)	C_S ($\times 10^4$)	Remarks	Refs.
Isobutene				
Carbon tetrachloride	100	$(7.1 \pm 0.2) \times 10^4$	E, Q(1)	537
		$(8.1 \pm 0.5) \times 10^5$	E, Q(2)	
Isobutyric acid, vinyl ester				
Benzene	80	4.49		201
Maleic acid, diethyl ester				
Stearamide, *N*-allyl-	90	22.4	J	173
Maleic anhydride/methyl methacrylate				
Acetone	60	1.6	HH	367
Maleic anhydride/styrene				
Aniline, *N,N*-dimethyl-	60	930		489
Carbon tetrachloride	70	1.04	HH	365
Methacrylic acid				
Bromotrichloromethane	70	300		566
–, butyl ester				
Benzene	60	0.158		264
–, 2-(diethylamino)ethyl ester/styrene				
Carbon tetrachloride	80	23.6		335
Toluene	80	13.3		335
–, ethyl ester				
Acetic acid	80	0.095	S	83
Acetone	80	0.102		83
Acetophenone	80	0.281		83
Benzene	80	0.081		83
–, chloro-	80	0.436		83
–, ethyl-	80	1.428		83
2-Butanone	80	0.252		83
Butyl alcohol	80	0.454		83
sec-Butyl alcohol	80	1.604		83
tert-Butyl alcohol	80	0.417		83
Carbon tetrachloride	80	0.901		83
		5.640	C	183
Chloroform	80	0.703		83
		2.360	C	183
Cumene	80	2.067		83
Cyclohexane	80	0.928		83
Ethane, 1,2-dichloro-	80	1.821	C	183
Ethane, 1,1,2,2-tetrachloro-	80	0.311		83
		1.820	C	183
–, 1,1,1-trichloro-	80	0.536		83
Ethyl acetate	80	0.919		83
Ethyl alcohol	80	0.429		83
Heptane	80	0.865		83
2-Heptanone	80	0.702		83
Isobutyl alcohol	80	0.445		83
2,4-Pentanedione	80	0.236		83
Toluene	80	0.436		83
–, hexadecyl ester				
Carbon tetrachloride	70	0.983	–	137
Cumene	70	2.05	–	137
–, isobutyl ester				
Benzene	60	0.165		264
Carbon tetrachloride	80	1.971	C	183
Chloroform	80	1.110	C	183
Ethane, 1,2-dichloro-	80	0.510	C	183
–, 1,1,2,2-tetrachloro-	80	0.510	C	183
Methacrylonitrile				
Carbon tetrabromide	100	900	A, F7	109
	120	1000	A, F7	109
Iron(III) chloride	60	30800	F7	19
Isobutyraldehyde	60	0.001		70
Toluene	60	0.996		21
Methyl methacrylate				
Acetaldehyde	60	6.5		86
Acetic acid	80	0.24	A	31

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TABLE 4. *cont'd*

Solvent/Additive	T (°)	C_S ($\times 10^4$)	Remarks	Refs.
Methyl methacrylate (*cont'd*)				
Acetic acid, monochloro-	60	0.64	R	529
–, dichloro-	60	0.80	R	529
–, 1,1-dimethyl-2,2,2-trinitro-ethyl ester	45	520		110
–, trichloro-	60	1.10	R	529
Acetone	60	0.195		81
	80	0.225	A	31
		0.275		81
Acetonitrile, (*m*-bromophenyl)-	60	3.89		462
–, (*p*-bromophenyl)-	60	2.78		461
–, (*m*-chlorophenyl)-	60	4.28		462
–, (*p*-chlorophenyl)-	60	3.21		461
–, (*p*-methoxyphenyl)-	60	19.0		461
–, phenyl-	60	5.18		461
–, *m*-tolyl-	60	5.75		462
–, *p*-tolyl-	60	7.83		461
Acetylene, *p*-bromophenyl-	60	41.3	K	151
–, *p*-chlorophenyl-	60	38.9	K	151
–, *p*-nitrophenyl-	60	127.5	K	151
Aluminum, hydrodiisobutyl	60	3600	S	156
–, triethyl	50	1550	R, F2	547
	60	1240		156
Aniline	60	4.2	F2	424
	80	6.3	F2	424
	100	9.0	F2	424
–, *N,N*-dimethyl-	30	2.45		508
	50	18	F16	228
		30.4	H	409
		430		161
	60	11.3	A, F2	424
	70	10.8		270
	80	17.0	A, F2	424
	100	20.0	A, F2	424
–, *N,N*-divinyl-	60	340		82
–, *N*-methyl-	60	7.0	F2	424
	80	10.0	F2	424
	100	13.3	F2	424
p-Anisaldehyde	60	1.11		495
Anisole	25	0	D	16
–, *p*-ethynyl-	60	40.3	K	151
–, *p*-isopropyl-	60	3.46		406
–, *p*-methyl-	60	0.57		496
Anthracene	50	0		15
Azobenzene	50	100	C	282
Benzaldehyde	60	2.5		86
		0.86		495
–, *p*-bromo-	60	1.43		495
–, *m*-chloro-	60	0.96		495
–, *p*-chloro-	60	1.03		495
–, *p*-cyano-	60	2.06		495
Benzene	25	0	D	16
	30	0.01		508
	50	0.036		147,327
	52	0.027		81
	60	0.040		81
		0.83	C	181
	75	0.33	C	123
	80	0.075	A	31
		0.080		81
		0.24	I1	145
	90	0.036		147
–, allyl-	60	400		502
–, bromo-	25	0	D	16
–, *tert*-butyl-	80	0.260	A	31

TABLE 4. *cont'd*

Solvent/Additive	T (°C)	C_S ($\times 10^4$)	Remarks	Refs.
Methyl methacrylate (*cont'd*)				
–, chloro-	25	0	D	16
	60	0.074		81
	80	0.200	A	31
		0.207		81
–, *p*-diisopropyl-	60	5.72		406
–, *m*-dinitro-	50	52		15
–, ethyl-	52	0.501		81
	60	0.766		81
	80	1.311		81
		1.350	A	31
		2.1	I1	145
–, ethynyl-	60	21.9	K	151
		22.3	J	150
–, fluoro-	25	0	D	16
Benzene sulfonylchloride	60	5.16	R	543
–, *p*-chloro-	60	8.56	R	543
–, *p*-dimethyl-	60	4.06	R	543
Benzonitrile	25	0	D	16
	60	0.162		150
–, *p*-hydroxy-	50	6.0		479
–, *p*-isopropyl-	60	4.99		406
p-Benzoquinone	44.1	5.5×10^4		194
	50	5.7×10^4		15
	60	4.5×10^4		42
–, 2,3,5,6-tetrachloro-	44.1	2600		194
Benzothiazolethion, 3-allyl-	60	153		502
Benzyl ether	25	10.4	D	368
	60	8.0		368
Bibenzyl	50	0.0	F2	354
Biphenyl, 2,2-methylene-	60	41.8		567
	60	53.5		567
Borane, tributyl-	60	7.45		156
Bromoform	77	23	D, C, R	506
Butane, 1-chloro-	80	1.20	A	31
–, 1,1,1-trinitro-	45	8300		110
1,4-Butanediol	60	0.61	F24	421
	80	1.07	F24	421
2-Butanone	60	0.45	C	290
	70	0.56	C	123
	75	0.83	C	123
	80	0.70	A	31
1-Butene	40	3.1		287
	50	5.1		287
–, 3,4-epoxy-2-methyl-	80	29.6		269
2-Butene, *cis*-	40	3.2		287
	50	4.9		287
–, *trans*-	40	3.0		287
	50	5.2		287
3-Buten-2-ol, 1-chloro-3-methyl-	80	18.8		269
Butyl alcohol	60	0.394		479
	80	0.25	A	31
sec-Butyl alcohol	60	0.259		479
	80	0.85	A	31
tert-Butyl alcohol	60	0.085		81
	80	0.100	A	31
		0.152		81
Butylamine, *N*-nitro-	45	0		110
Butyl ether	60	0.8		86
1-Butyne, 1-phenyl-	60	10.8		150
Butyraldehyde	50	1.47	W8	500
		2.25	W7	500
		3.40		500
Carbon tetrabromide	30	2800 ± 600	D, R, JJ3a	521
		1000 ± 100	D, R, JJ3b	521

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TABLE 4. *cont'd*

Solvent/Additive	T (°C)	C_S ($\times 10^4$)	Remarks	Refs.
Methyl methacrylate (*cont'd*)				
Carbon tetrabromide (*cont'd*)		1000 ± 500	D, R, JJ3c	521
		500 ± 200	D, R, JJ3d	521
	60	2700	F2	109
	60	1500		568
	60	1900		568
	80	3300	F2	109
	100	4600	F2	109
Carbon tetrachloride	20	0.2	C, D	35
	30	20	D, F2	451
		0.20		514
	50	0.82		514
	60	0.925		81
		2.40	C	181
		5		86
		20.11	R	529
		18.52	R, H	529
		0.42	R	568
		0.5	R, H	568
	70	1.74		514
	80	2.393	A	31
		2.421		81
		3.3	I1	145
	–	24.4	D	427
Chloroform	60	0.454		81
		1.77	C	181
	80	1.129		81
		1.400	A	31
		1.9	I1	145
	–	1.9	D	427
Copper(II) chloride	60	105×10^5	F7	36
Cumene	60	1.9		7
		2.56		406
	80	1.9	A	31
		2.4	I1	145
–, *p*-bromo-	60	3.71		406
–, *p-tert*-butyl-	60	2.74		406
–, *p*-chloro-	60	3.07		406
Cyclohexane	60	12		86
	80	0.10	A	31
–, methyl-	80	0.195	A	31
–, *trans*-1,4-, diacetate	60	8.46	C	569
–, *cis/trans*-1,4-, dicarboxylic acid dimethylester	60	1.16	C	569
Cyclotetrasiloxane, octamethyl-	50	2.5	C	450
	79.5	0.080		474
p-Dioxane	80	0.222	A	31
Diphenylamine	44.1	0		194
Diphenylamine-T	60	0.3	F2	46
Disiloxane, 1,1-dimethoxy-3,3,3-trimethyl-1-phenyl-	79.5	0.032		474
–, hexamethyl-	79.5	0.104		474
Epibromohydrin	60	16.53	R	529
Epichlorohydrin	60	9.3	R	529
Ethane, 1,2-dichloro-	60	0.35		81
	80	0.756		81
–, nitro-	45	2.0		110
–, 1,1,2,2-tetrachloro-	60	0.155		81
	80	0.200	A	31
		0.235		81
–, 1,1,1-trichloro-	80	0.600	A	31
–, 1,1,1-trinitro-	45	1400		110
Ethyl acetate	60	0.100	C	316
		0.13	A	290,316
		0.132	C	216
		0.134		290
		0.155		290

TABLE 4. *cont'd*

Solvent/Additive	T (°C)	C_S ($\times 10^4$)	Remarks	Refs.
Methyl methacrylate (*cont'd*)				
Ethyl acetate (*cont'd*)		0.156	C	290
		0.46	I10	146
	70	0.55	C	123
	75	0.83	C	123
	80	0.240	A	31
Ethyl alcohol	60	0.40	A, F2	423
	80	0.625	A, F2	423
	100	0.80	A	49
Ethylene glycol	60	0.28	F24	421
	80	0.60	F24	421
Germane, diethylchloro-	60	22000	A, R	539
–, ethyldichloro-	60	39300	A, R	539
–, triethyl-	60	5800	A, R	539
–, triphenyl-	60	18500	A, R	539
Glycerol	60	0.152		479
Heptane	50	1.8		206
1-Heptanol, 2,2,3,3,4,4,5,5,6,6,7,7-dodecafluoro-	60	2.8	F2	442
Hydrazyl, 2,2-diphenyl-1-picryl	44.1	200×10^5		194
Hydroquinone	45	7.0		30
	131	100	A	398
Indium, triethyl-	60	332		156
Isobutyl alcohol	60	0.10		81
		0.505		479
	80	0.229		81
		0.250	A	31
Isobutyric acid	80	0.900	A	31
–, methyl ester	60	0.26		275
Isopropyl alcohol	60	0.583		81
	80	1.907		81
	100	3.00	A	49
		8	C	337
	130	43	C	337
		45	C	480
Lead, tetraethyl	60	3.14	S	156
Malononitrile, furfurylidene-	44.1	1.2×10^4		194
Mercury, diethyl	60	0.898		156
Methane, bromotrichloro-	30	830	D, Q3	311
		1.2×10^4	D	311
		4.5×10^4	D, Q4	311
–, bromotrinitro-	45	1.0×10^4		110
Methane, dichloro-	60	0.100		81
	80	0.217		81
–, nitro-	60	2.0		86
–, trinitro-	45	5400		110
–, triphenyl-	60	4.0		44
Methanol	60	0.2	A, F2	423
	80	0.33	A, F2	423
	100	0.45	A	49
1-Naphthol	45	<5.0		30
2,6-Octadiene, 2,6-dimethyl-	60	6.7		324
Oleic acid, methyl ester	60	1.68		441
		8.0		7
Oxime, acrolein-	60	25500		555
–, crotonaldehyde-	60	500		555
–, ethylisopropenylketone-	60	3000		555
–, methacrolein-	60	17000		555
–, methylacrolein-	60	5200		555
–, methylisobutenylketone-	60	4700		555
–, methylisopropenylketone-	60	2900		555
–, methylvinylketone-	60	1300		555
Oxolane, *cis*-3,4-diacetoxy-	60	1.39	C	569
Pentane, 2,2,4-trimethyl-	50	1.2		206
1-Pentanol, 2,2,3,3,4,4,5,5-octa-fluoro-	60	2.36	F2	442
2-Pentanone, 4,4-dimethyl-5,5,5-trinitro-	45	400		110

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TABLE 4. *cont'd*

Solvent/Additive	T (°C)	C_S ($\times 10^4$)	Remarks	Refs.
Methyl methacrylate (*cont'd*)				
–, 4-methyl-	80	0.700	A	31
3-Pentanone	60	0.833		81
	80	1.729		81
		1.775	A	31
		2.7	I1	145
Pentasiloxane, dodecamethyl-	79.5	0.145		474
Phenol	50	2.5		479
–, *o*-bromo-	50	5.0		479
–, *p*-bromo-	50	5.0		479
–, *o*-chloro-	50	3.5		479
–, *o*-ethyl-	50	7.2		479
–, *p*-ethyl-	50	7.5		479
–, *o*-isopropyl-	50	13.3		479
–, *p*-isopropyl-	50	13.3		479
–, *p*-methoxy-	45	<5.0		30
–, 2,3,4,6-tetramethyl-	45	11.0		30
Phenyl ether	25	6.42	D	368
	60	9.13		368
Phosphine, octyl-	60	2.3×10^4		295
–, phenyl-	60	16.1×10^4	S	295
–, tributyl-	60	30.6		156
Phthalic acid, dimethylester	30	0.2		508
Piperidine, 1-nitroso-	45	8.2		110
Propane, 1,2-dichloro-	80	0.675	A	31
–, 1,1-dinitro-	45	68		110
–, 2,2-dinitro-	45	15		110
–, 1-nitro-	45	5		110
1,2-Propanediol	60	0.48	F24	421
	80	0.86	F24	421
1-Propanol, 2,2,3,3-tetrafluoro-	60	1.86	F2	442
Propene, 1,3-diphenyl-	60	15.6		567
1-Propene, 2-methyl-	40	2.5		287
	50	4.4		287
Propionic acid, 2,2,2-trinitroethyl ester	45	3000		110
Propionitrile, 3-phosphino-	60	1.4×10^4		295
–, 3,3′-phosphinylidenedi-	60	1.3×10^4		295
Propyl alcohol	60	0.69	A, F2	423
	80	0.84	A, F2	423
	100	1.25	A	49
Pyridine	70	0.176		514
Pyrocatechol	45	<5		30
–, *p-tert*-butyl-	45	9		30
Pyrogallol	45	26		30
Silane, (α-bromotolyl)trimethoxy-	79.5	29.8		474
–, bromomethylphenyltrimethoxy-	79.5	29.8	R	554
–, chlorotrimethyl-	30	144	D, F2	451
	50	2.2		249
–, dichlorodimethyl-	30	175	D, F2	451
	50	2.45		249
–, dichloromethyl-	79.5	15.2		474
–, diethylchloro-	60	1700	A, R	539
–, dimethoxymethylphenyl-	79.5	0.20		474
		0.2	R	554
–, dimethylphenyl-	60	300	A, R	539
–, hexamethoxy-(3,3′-thiodipropyl)bis-	79.5	25.8	R	554
–, methyldichloro-	79.5	15.2	R	554
	60	3100	A, R	539
–, (3-mercaptopropyl)trimethoxy-	79.5	6930	R	554
–, tetraethyl-	60	5.75		156
–, tetramethyl-	30	5.0	D, F2	451
	50	1.3		249
–, trichloro	60	5000	A, R	539
–, trichloromethyl-	30	185	D, F2	451
	50	2.7		249

TABLE 4. *cont'd*

Solvent/Additive	T (°C)	C_S ($\times 10^4$)	Remarks	Refs.
Methyl methacrylate (*cont'd*)				
–, triethyl	60	200	A, R	539
–, triisopropoxymethyl-	79.5	0.697		474
		0.697	R	554
–, trimethoxymethyl-	79.5	0.331		474
		0.331	R	554
–, trimethoxyphenyl-	79.5	0.053		474
		0.053	R	554
–, triphenyl-	60	1200	A, R	539
Silicon chloride	30	256	D, F2	451
	50	3.0		249
Siloxane, 1,1-dimethoxy-trimethyl-1-phenyl-di-3,3,3-	79.5	0.032	R	554
–, dodecamethyl penta-	79.5	0.145	R	554
–, 1,1,1,3,5,5,5-heptamethyl-3-phenyltri-	79.5	0.232	R	554
–, 1,1,1,3,5,5,5-heptamethyl-tri-	79.5	0.284	R	554
–, 1,1,1,3,5,5,5-heptamethyl-tri-	79.5	0.189	R	554
–, 1,1,1,3,5,5,5-heptamethyl-3-(3,3,3,3-tri-fluoropropyl)-tri-	79.5	0.205	R	554
–, hexamethyl-di-	79.5	0.104	R	554
–, hexamethyl-phenyl-tri-	79.5	1.84	R	554
–, 1,1,1,5,5,5-bexamethyl-3-(2-phenylpropyl)-tri-	79.5	2.08	R	554
–, 3-(3-mercaptopropyl)-	79.5	1284.5	R	554
1,1,1,3,5,5,5-heptamethyl-tri-				
–, octamethyl cyclotetra-	79.5	0.08	R	554
–, octamethyl tri-	79.5	0.0316	R	554
Sorbit-2,5-diacetate, 1,4:3,	60	29	C	569
6-, dianhydro-				
Stearamide, *N*-allyl-	90	3.01	C, J	173
Stearic acid, methyl ester	60	0.282		441
Stibine, tributyl	60	<1.0		156
Tin, tetrabutyl	60	1.32		156
Toluene	20	0.04	C, D	35
	52	0.084		81
	60	0.170		21,81
		0.190	C	316
		0.202	C	32,316,317
		0.250	C	316
		0.26		275
		0.400	C	316
		0.45		496
	70	0.567	C	123
	80	0.292	C	32
		0.303		81
		0.52	I1	145
		0.525	A	31
		0.91	C	123
–, *p*-bromo-	60	0.58		496
–, *m*-chloro-	60	0.48		496
–, *p*-chloro-	60	0.49		496
–, α-chloro	60	4.17	C	181
–, *p*-ethynyl-	60	64.4	K	151
–, *p*-nitro-	44.1	0		194
–, 2,4,6-trinitro-	44.1	500		194
m-Tolunitrile, α-cyano-	60	4.55		462
p-Tolunitrile	60	0.73		496
–, α-cyano-	60	1.74		461
Tributylamine	70	25.7		270
Triethylamine	20	1.5	C, D	35
	60	8.3	J	24
		1900		25
Tripropylamine	60	14.6		156
Trisiloxane, 1,1,1,3,5,5,5-heptamethyl-	79.5	0.284		474
–, –, 3-(β-methylphenethyl)-	79.5	2.08		474
–, –, 3-phenyl-	79.5	0.232		474
–, –, 3-propyl-	79.5	0.189		474
–, –, 3-(3,3,3-trifluoropropyl)-	79.5	0.205		474

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TABLE 4. *cont'd*

Solvent/Additive	T (°C)	C_S ($\times 10^4$)	Remarks	Refs.
Methyl methacrylate (*cont'd*)				
–, 1,1,1,5,5,5-hexamethyl-3-phenyl-	79.5	1.84		474
–, octamethyl-	79.5	0.032		474
Urea, thio-	42	1.21		503
Water	60	0		268
		0.002		479
		0.03	A, R	529
	80.5	0	F7, F24	48
m-Xylene	60	0.43		496
p-Xylene	60	0.50		496
2,4-Xylenol	50	6.5		479
Naphthalene, 1-vinyl-				
Naphthalene	60	30–50		216
Nonanoic acid, vinyl ester				
Toluene	50	11.1	R	357
	60	13.9	R	357
	70	15.2	R	357
1-Octene				
Butyl alcohol	117–118	270	C	381
sec-Butyl alcohol	117–118	520	C	381
Ethyl alcohol	115–118	230	C	381
Isopropyl alcohol	30–35	630	D	381
	120–125	520	C	381
Methanol	116–120	110	C	381
Phthalimide, *N*-vinyl-				
Chloroform	55	3.4		313
Ethane, 1,2-dichloro-	55	0.35		313
Methane, dichloro-	55	0.97		313
2-Picoline, 5-vinyl-				
Allyl ether	70	21.4		11
1-Propene				
Carbon tetrachloride	100	$(5-10)\times 10^4$	C	210
Chloroform	100	1.03×10^4	C	210
1-Propene, 3-chloro-				
Carbon tetrachloride	100	4800	C	210
Hydrochloric acid	80	1.8×10^4	Q1	238
		5.4×10^4	Q2	238
1-Propene, 2-methyl-				
Carbon tetrachloride	100	17.0×10^4	C	210
–, 3,3,3-trifluoro-				
Carbon tetrabromide		640000	C, Q(1–3)	570
Propionic acid, vinyl ester				
Toluene	–	1.4		158
Propylene				
Bromoethane	50	1200	Q(1–4)	517
	75	1400	Q(1)	517
		1500	Q(2)	517
		1800	Q(3–4)	517
	100	1700	Q(1)	517
		1900	Q(2)	517
		1800	Q(3–4)	517
	125	2200	Q(1–2)	517
		2100	Q(3–4)	517
	150	2700	Q(1–4)	517
Chloroform	95	17200 ± 1100	W23, Q(1)	518
		33000 ± 15000	W23, Q(2)	518
		17000 ± 800	W24, Q(1)	518
		299000 ± 8000	W24, Q(2)	518
		13800 ± 800	W20, Q(1)	518
		266000 ± 10000	W20, Q(2)	518
Stearic acid, vinyl ester				
Toluene	50	20.7	R	357
	70	21.6	R	357
Styrene				
Acetaldehyde	60	8.5		86

TABLE 4. *cont'd*

Solvent/Additive	T (°C)	C_S ($\times 10^4$)	Remarks	Refs.
Styrene (*cont'd*)				
Acetamide, *N,N*-dimethyl-	50	0.743		375
	60	4.6		113
Acetic acid	40	2.22	C	385
–, methyl ester	100	0.33		72
–, bromo-	60	430		112
	68	300		149
–, chloro-	68	200		149
–, –, methyl ester	60	0.3	A	128
	100	0.75	A	128
–, dibromo-, ethyl ester	90	2700	C	64
–, monochloro-	60	28.6	R	529
		0.76	R, H	529
–, dichloro-	60	35.0	R	529
		1.0	R, H	529
–, dichloro-, ethyl ester	60	1.3	A	128
–, iodo-	68	8000		149
–, phenyl-	60	6.0	A	128
–, –, ethyl ester	100	8.8		72
–, tribromo-	–	3.0×10^4		178
	90	2.4×10^4	C	64
–, –, ethyl ester	90	10.5×10^4	C	64
–, trichloro-	–	270		178
	60	66.0	A	128
		100	R	529
		3.75	R, H	529
–, –, ethyl ester	60	65.0	A	128
	90	90.0	C	64
	100	145.0	A	128
Acetic anhydride	60	0.7	A	128
Acetoacetic acid, ethyl ester	100	1.3		72
–, 2-acetyl, ethyl ester	100	3.0		72
Acetone	60	4.1	C	182
		<0.5	A	128
		0.32	A	501
–, oxime	60	2.2	A	128
Acetonitrile	60	0.44	A	128
–, *m*-bromophenyl-	60	66.7		462
Acetonitrile, *p*-bromophenyl-	60	68.5		461
–, *m*-chlorophenyl-	60	65.2		462
–, *p*-chlorophenyl-	60	66.0		461
–, *p*-methoxyphenyl-	60	51.0		461
–, phenyl-	60	45.1		461
–, *m*-tolyl-	60	48.5		462
–, *p*-tolyl-	60	49.2		461
Acetyl bromide	60	8600	S	112
Acetyl chloride, chloro-	60	3300		112
Acetylene, *p*-bromophenyl-	60	188.5	K	151
–, *p*-chlorophenyl-	60	161	K	151
–, *p*-nitrophenyl-	60	3130	K	151
Adipic acid, diallyl ester	60	6.0		446
–, di-(3,3,5,5-tetramethyl-4-nitrosocyclohexyl) ester	60	1.1×10^4	F9, J	314
Allyl alcohol	60	1.5	A	128
Aluminum, hydrodiisobutyl	100	26.9×10^4		156
		28.0×10^4	A	155
–, triethoxy-	100	<0.1	A	155,156
–, triethyl	100	8.05×10^4		156
		17.0×10^4	A	155
–, triisobutyoxy-	100	<1.0	A	155
–, triisobutyl	110	28.5×10^4	A	155
Aniline	50	20	F2	154
	60	2.0	A	128
–, *N,N*-dimethyl-	50	12	F2	154
		53		161
–, *N,N*-divinyl-	60	130		82

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TABLE 4. *cont'd*

Solvent/Additive	T (°)	C_S ($\times 10^4$)	Remarks	Refs.
Styrene (*cont'd*)				
Aniline, *N*-methyl-	50	13	F2	154
–, 2,4,6-trinitro-	50	11.8×10^4		370,372
p-Anisaldehyde	60	2.86		495
Anisole, *p*-ethynyl-	60	60.0	K	151
–, *m*-isopropyl-	60	5.23		405
–, *p*-isopropyl-	60	3.23		406
–, *p*-methyl-	60	0.78		496
–, 2,4,6-trinitro-	50	20.3×10^4		370,372
Anthracene	44.1	2.0×10^4	J	159
–, dihydro-	50	610	D	271
2H-Azepin-2-one, hexahydro-	130	0.61	C, I	108
Azobenzene	70	750	C	281
Benzaldehyde	60	4.54		495
		5.5		86
	100	2.6	A	298
–, *p*-bromo-	60	12.2		495
–, *m*-chloro-	60	13.7		495
–, *p*-chloro-	60	8.63		495
	100	5.6	A	298
–, *p*-cyano-	60	76.7		495
Benzene	35	3.9	F2	119
	40	5.8	F2	119
	50	0.01		327
	60	0.018	A	127
		0.023		79
		0.028	C	255
		0.04	A, I5	145
		1.92	H	415
	70	5.50	C	123
	75	6.67	C	123
	80	0.061	I5	185
		0.121	C	255
		0.156		273
	100	0.184	A	127
		0.23	A, I5	145
		0.31	A	235
		0.42	A	235
	132	0.81	A	235
		0.89	A	127
		1.5	A, I5	145
–, allyl-	100	36	A, R	524
–, bromo-	60	1.78	C	182
	155	3	A	237
–, *sec*-butyl-	60	6.22	H	415
–, *tert*-butyl-	60	0.04	A, I5	145
		0.06	A	127
	80	0.193	I5	185
	100	0.55	A	127
–, chloro-	60	0.133	C	255
		1.50	C	182
	80	0.235	C	255
		0.874	I5	185
	100	0.54	A	235
	140	0.6		58
–, –, 2,4,6-trinitro-	50	58.5×10^4		370,372
–, 1,2-dibromoethyl-	60	1950		112
–, *p*-dibutyl	60	7.02	H	415
–, *p*-di-*sec*-butyl-	60	10.70	H	415
–, *p*-di-*tert*-butyl-	60	0.87	H	415
–, *m*-dichloro-	140	0.2		58
		1.4		67
–, *o*-dichloro-	60	3.4	C	182
–, *p*-dichloro-	60	2.6	C	182

TABLE 4. *cont'd*

Solvent/Additive	T (°C)	C_S ($\times 10^4$)	Remarks	Refs.
Styrene (*cont'd*)				
Benzene, diethyl-, (mixture)	100	3.35	A	235
		6.33	A	235
	132	5.13	A	235
–, *p*-diisopropyl-	60	3.30		497
		6.60		406
–, ethyl-	60	0.67	A	127
		0.70		79
		0.710	C	255
		0.83	A, I5	145
		2.7	C	363
	80	1.07	I5	185
		1.113	C	255
	100	1.38	A	235
		1.62	A	127
		2.2	A, I5	145
		2.33	A	235
	132	2.31	A	235
		2.9	A	127
		4.9	A, I5	145
–, ethynyl-	60	96.3	K	151
		98.3	J	150
–, *sec*-hexyl-	60	12.76	H	415
–, *sec*-pentyl-	60	9.43	H	415
–, tri-*sec*-butyl-	60	13.30	H	415
–, 1,3,5-trinitro-	40	9.48×10^5		372
	50	6.43×10^5		370,372,373
	60	3.51×10^5		372
Benzo[B] chrysene	44.1	1.3×10^5	J	159
Benzoic acid				
–, *m*-(phenylazo)-, methyl ester	70	700	C	281
–, 2,4,6-trinitro-, ethyl ester	50	5.72×10^5		370,372
Benzoin	60	40	A	128
Benzonitrile	60	5.3		150
–, *p*-isopropyl	60	18.6		406
Benzo[A]pyrene	44.1	1.4×10^5	J	159
p-Benzoquinone	60	22.7×10^5		42
	80	56.6×10^5	J	27
p-Benzoquinone, 2-anilino-	45	53.2×10^5	J	199
–, 2,5-dimethyl-	80	4.3×10^5	J	27
–, 2-methyl-	80	21.0×10^5	J	27
–, 2,3,5,6-tetrachloro-	80	95.0×10^5	J	27
–, 2,3,5,6-tetramethyl-	80	6700	J	27
–, 2,3,5-trimethyl-	80	2.6×10^5	J	27
Benzyl ether	25	71.6	D	368
	60	62.4		368
Bibenzyl, α,α′-dibromo-	60	3020		112
Bicyclohexyl, 3,3,3′,3′,5,5,5′,5′-octamethyl-4,4′-dinitroso-	60	1.12×10^4	F9, J	314
	80	1.2×10^4	F9, J	314
Biphenyl, 2,2′-methylene-	60	142		567
	60	97.9		567
Borane, tributoxy-	100	<0.1		156
–, tributyl	100	34.8		156
Butane, 1-bromo-	60	0.06	A	128
	100	0.35	A	128
–, 1-chloro-	60	0.04	A	128
	100	0.37	A	128
–, 2-chloro-	60	1.2	A, S	128
	100	0.3	A	128
–, 2,2-dimethyl-	60	0.43		304
–, 1-iodo-	60	1.85	A	128
	100	5.5	A	128
1,4-Butanediol	60	3.2	F24	422
	80	5.6	F24	422
	100	9.3	F24	422

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TABLE 4. *cont'd*

Solvent/Additive	T (°C)	C_S ($\times 10^4$)	Remarks	Refs.
Styrene (*cont'd*)				
2-Butanone	60	4.98	C	182
	70	8.60	C	123
	75	12.00	C	123
1-Butene	100	2.6	A	358
–, 3,3-dimethyl-2-phenyl-	110	10	A	433
–, 2,4-diphenyl-	110	70	A	433
–, 3,4-epoxy-2-methyl-	80	17.4		269
–, 2-methyl-	100	3.1	A	358
–, 3-methyl-	100	6.9	A	358
		6.1	A, R	524
2-Butene	100	2.0	A	358
–, 1,4-dichloro-	80	51	C	112
–, 2,3-dimethyl-	100	5.4	A	358
		5.1	A, R	524
–, 2-methyl-	100	2.9	A	358
3-Buten-2-ol, 1-chloro-3-methyl-	80	8.2		269
Butyl alcohol	40	11.2	F24	119
	50	6.5		430
	60	0.06	A	128
		1.6	A, C	323,385
sec-Butyl alcohol	60	0.562		479
tert-Butyl alcohol	50	6.6		430
	60	0.22		422
		6.65	A	385
	80	0.345		422
	100	0.55	A	261
	130	1.0	A	261
Butylamine	60	0.5	A	128
tert-Butyl ether	60	2.6	C, F2	301
	80	1.0	C, F2	301
tert-Butyl isocyanide	100	33.0		4,75
1-Butyne, 1-phenyl-	60	34.3		150
Butyraldehyde	–	2.7	W8	412
	–	14.3		412
	50	2.7	F29, W8	414
		3.7	F29, W16	414
		4.0	F2, W7	413
		4.7	F29, W7	414
		8.0	F2, W15	413
		8.0	F29, W15	414
		11.7	F2	413
		14.3	F29	414
	60	5.7	A	128
	100	11.0	A	128
–, diallyl acetal	60	20.2		446
Butyric acid, 4-hydroxy-, γ-lactone	50	0.409		375
Cadmium, dibutyl	100	1170		156
Carobonic acid, cyclic ethylene ester	50	0.235	E	458
–, diallyl ester	60	6.2		446
–, di-(3,3,5,5-tetramethyl-4-nitrosocyclohexyl) ester	60	1.3×10^4	F27, J	314
	80	1.4×10^4	F9, J	314
Carbon tetrabromide	40	1.8×10^4	F2	109
	60	1.78×10^4	C	64
		2.2×10^4	F2	109
		2.5×10^4	F1	109
		13.6×10^4	A	128
		4.2×10^4		487
		$(5.09 \pm 0.18) \times 10^5$	II2	520
	60	88300		568
	60	40600		568
	70	1.8×10^4		61
	80	2.3×10^4	F2	109
	90	2.51×10^4	C	64
	100	2.35×10^4	A	128

TABLE 4. *cont'd*

Solvent/Additive	T (°C)	C_S ($\times 10^4$)	Remarks	Refs.
Styrene (*cont'd*)				
Carbon tetrachloride	–	80	W8	412
	–	100		412
	50	17		513
		248		513
	60	69	Q36	63
		84	C, W8	401
		87	C	113,183
		90	C, W7	401
		92	A	128,129,210
		98	C	401
		100		366
		109	Q142	63
		110		223
		120		416
		122	A, X	114
		144.1	R	529
		130.9	R, H	529
		148	X	115
	60	92		568
	60	110		568
	76	18	C	236
		117	A	236
	80	133	I5	185
	85	34.1		163
	95	148	Q38	63
		186	Q142	63
	100	185	A	128,129
	132	304	A	129
	140	300		58
Chloroform	60	0.41	A	501
		0.5	A	128,210
		0.566	C	255
		3.40	C	182
	68	4.0		149
	80	0.50	I5	185
		0.916	C	255
Chloroform/acetone	60	3.3		501
m-Cresol	50	11		247,248
o-Cresol	50	33		247,248
	60	43		121
p-Cresol	50	22.1		247,248
	60	39		121
–, α-phenyl-	60	<5		121
Cumene	60	0.8		7
		0.82	A	127
		1.04	A, I5	145
		3.88		406
	80	1.31	I5	185
	100	2.00	A	127
		2.90	A, I5	145
–, *m*-bromo-	60	8.29		405
–, *p*-bromo-	60	7.57		406
–, *p*-tert-butyl-	60	3.46		406
–, *p*-chloro-	60	6.90		406
Cyclohexane	60	0.024	A	127
		0.031		79
		0.04	A, I5	145
		0.063	C	255
		8.5	F23	119
	80	0.066	I5	185
		0.083	C	255
		0.156		273
	100	0.16	A	127
		0.23	A, I5	145

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TABLE 4. *cont'd*

Solvent/Additive	T (°C)	C_S ($\times 10^4$)	Remarks	Refs.
Styrene (*cont'd*)				
Cyclohexane (*cont'd*)		0.31	A	235
		12.3	A, R	524
	132	0.81	A	235
		0.87	A	127
		1.5	A, I5	145
Cyclohexanone	60	7.90	C	182
–, *trans*-1,4-, diacetate	60	16.9	C	569
–, *cis/trans*-1,4-, dicarboxylic acid dimethylester	60	4.2	C	569
Cyclopentanone	60	3.30	C	182
1-Cyclopentene-1-carboxylic acid, 3,3,5,5-tetramethyl-4-nitroso-, diester with pyrocatechol	60	1.3×10^4	F27, J	314
	80	1.0×10^4	F9, J	314
Cyclotetrasiloxane, octamethyl-	50	4.0	C	450
1,2,3,4-Dibenzpyrene	44.4	6.0×10^4	J	159
1,2,7,8-Dibenztetracene	44.4	13.0×10^4	J	159
1,2,9,10-Dibenztetracene	44.4	13.0×10^4	J	159
p-Dioxane	60	0	A, S	128
		2.28	C	4
		2.75	C	182
	100	0.8		220
Diphenylamine-T	60	0.9	F2	46
Disiloxane, hexamethyl-	79.5	0.387		474
Epibromohydrine	60	67.48	R	529
Epichlorohydrine	60	37.87	R	529
Ethane, 1,2-dibromo-	60	0.988	C	255
	80	1.914	C	255
–,1,2-dichloro-	60	0.333	C	255
		4.12	C	182
	70	1.1		67
	80	1.137	C	255
		9.8	C	112
	100	3.84	A	235
–, pentaphenyl-	60	20000	A	127
–, 1,1,2,2-tetrachloro-	100	10.8	A	235
–, 1,1,2,2-tetrachloro-1,2-difluoro-	90	1.13	A	14
–, 1,1,2-trichloro-1,2,2-trifluoro-	90	0.84	A	14
Ethanehexacarboxylic acid, hexaethyl ester	50	<50		89
1,1,2-Ethanetricarboxyic acid	100	0.94		72
Ether, benzyl methyl	68	6.0		149
–, *p*-bromobenzyl methyl	68	6.0		149
–, *p*-chlorobenzyl methyl	68	4.0		149
–, *p*-cyanobenzyl methyl	68	20.0		149
–, dodecyl vinyl	60	3.32	C	4
		4.11	C	4
Ethyl acetate	60	15.5	F10	119
	70	5.5	C	123
	75	6.67	C	123
	100	0.39		72
Ethyl alcohol	60	1.32	F2	423
		1.611		479
	80	2.60	F2	423
Ethylene, 1,1-diphenyl-	110	450	A	432
Ethylene glycol	60	1.36	F24	422
	80	2.70	F24	422
	100	4.70	F24	422
–, bis(*m*-phenylazobenzoate)	70	900	C	281
Ethyl ether	60	5.64	C	4
Fluorene	60	75.0	A	127
	100	124.0	A	127
Formamide, *N,N*-dimethyl-	40	1.09	E	458
	50	0.869		375
	60	4.0		113
	100	1.08		256

TABLE 4. *cont'd*

Solvent/Additive	T (°C)	C_S ($\times 10^4$)	Remarks	Refs.
Styrene (*cont'd*)				
Furan, tetrahydro-	50	0.50	C	449
α, D-Glucoside, methyl-				
–, –, 6-deoxy-6-mercapto-	100	55000		220
–, –, 2,3-di-*O*-benzyl-	100	62		220
–, –, 2,3,4,6-tetra-*O*-acetyl-	100	2.0		220
–, –,6-*O*-(*p*-toluenesulfonyl)-	100	2.0		220
–, –, 2,3,4-tri-*O*-acetyl-6-deoxy-6-iodo-	100	50		220
–, –, 6-*O*-triphenylmethyl-	100	21		220
β, D-Glucoside, methyl-				
–, –, 6-deoxy-6-dipropylamino-	100	22		220
Germane, ethyldichloro-	60	56900	A, R	539
–, diethylchloro-	60	31600	A, R	539
–, triethyl-	60	2400	A, R	539
–, dimethylchloro-	60	33500	A, R	539
–, triphenyl-	60	23000	A, R	539
Heptane	60	0.42	A	127
	100	0.95	A	127
1-Heptanol, 2,2,3,3,4,4,5,5,6,6,7,7-dodecafluoro-	60	13.33	F2	442
1-Heptene	100	2.7	A	358
2-Heptene	100	3.2	A	358
Hexane	100	0.9	A	358
1-Hexene	100	2.5	A	358
		2.5	A, R	524
2-Hexene	100	3.6	A	358
Hydrochloric acid	100	0		238
Hydroquinone	60	3.6	A	128
Hydroxylamine, *N,N*-dibenzyl-	60	5000	R	533
–, *N*-benzyl-*N*-phenyl-	60	3.8×10^4	R	533
–, *N,N*-diethylene-	60	2.5×10^4	R	533
–, *N*-ethyl-*N*-phenyl-	60	20.5×10^4	R	533
Indium triethyl	100	1.7600×10^4		156
Iron(III) chloride	60	536.0×10^4		19
Isobutyl alcohol	60	0.17	A	385
		0.497		479
Isobutyl alcohol-D	100	2.9	A	261
	130	7.8	A	261
Isobutyraldehyde		8.2	W8	412
		21.0		412
Isobutyric acid	60	2.5	C	385
		4.6	A	385
Isobutyronitrile	100	2.7	A	261
	130	3.5	A	261
Isophthalic acid, diallyl ester	60	3.5		446
Isopropyl alcohol	60	3.05	F2	423
	80	4.00	F2	423
	100	1.7	A	261
		6.0	F2	423
	130	2.7	A	261
Isopropyl alcohol-D	100	1.6	A	261
Isopropyl-1-D alcohol-D	100	0.78	A	261
Lead, tetraethyl	100	1.24		156
Malonic acid, diallyl ester	60	5.2		446
–, diethyl ester	60	0.47	A	128
	100	0.46		72
–, dimethyl ester	100	0.42		72
–, acetyl-, diethyl ester	100	1.2		72
–, bromo-, diethyl ester	60	700	A	128
	100	1200	A	128
–, butyl-, diethyl ester	100	0.82		72
–, dibromo-, diethyl ester	60	1.2×10^4	A	128
–, dichloro-, diethyl ester	60	30.0	A	128
	100	62.0	A	128
–, diethyl-, diethyl ester	100	0.88		72
–, ethyl-, diethyl ester	100	0.72		72

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TABLE 4. *cont'd*

Solvent/Addition	T (°C)	C_S ($\times 10^4$)	Remarks	Refs.
Styrene (*cont'd*)				
Malonic acid, phenyl-, diethyl ester	100	3.5		72
Mercury, diethyl	100	0.335		156
Methane, bis(2-chloroethoxy)-	80	6.0	C	112
–, bromotrichloro-	80	7.6×10^4	D, Q2	312
		7.7×10^4	D, Q2	195
		2.4×10^6	D, Q3	312
		2.78×10^6	D, Q3	195
	60–80	6.5×10^5		439
		$(6.5 \pm 0.4) \times 10^5$		504
	80	9450	I5	185
–, dibromo-	60	110		112
–, dichloro-	60	0.15	A	128
	80	9.5	C	112
	100	11.8	A	128
–, diiodo-	60	710		112
–, diphenyl-	60	2.3	A	127
	100	4.2	A	127
		35	A, R	524
–, nitro-	60	10		86
–, triphenyl-	60	3.5	A	127
	80	6.0		44
	100	8.0	A	127
Methanetricarboxylic acid	100	0.91		72
Methanol	60	0.296		479
		0.74	F2	423
	80	1.10	F2	423
	100	1.22	F2	423
–, (4-biphenylyl)phenyl(*p*-vinyl-phenyl)-	50	3.5		57
–, bis(4-biphenylyl)(*p*-vinyl-phenyl)-	50	3.5		57
Naphthalene	60	11		216
–, decahydro-	60	0.4	A	127
–, 2-isopropenyl-	80	56		98
		70		98
	99	69		98
		86		98
–, 2-methoxy-	60	<5.0		121
–, 1,2,3,9-tetahydro-1-phenyl-	60	10000	C	467
1-Naphthol	60	480	J	50,121
–, 2,4-dichloro-	60	490	J	121
1-Naphthol-D	60	75		50,121
2-Naphthol	60	77		122
Naphtho[2,3-a]pyrene	44.4	24.0×10^5	J	159
2,6-Octadiene, 2,6-dimethyl-	60	2.0	C	324
2-Octene	100	2.8	A	358
Oleic acid, methyl ester	60	3.15	C	441
		3.52		441
		455		239
	70	420	C	141
	90	6.64	A	441
Oxalic acid, diallyl ester	60	4.2		446
–, diethyl ester	60	13.5	F22	119
Oxetane, 3,3-bis(chloromethyl)-	50	8.0	C	449
Oxime, acrolein	60	10800		555
–, crotonaldehyde-	60	1500		555
–, ethylisopropenylketone-	60	4300		555
–, methacrolein-	60	13000		555
–, methylacrolein-	60	400		555
–, methylisobutylketone-	60	2300		555
–,methylisopropenylketone-	60	1100		555
–, methylvinylketone-	60	2700		555
Oxolane, *cis*-3,4-diacetoxy-	60	1.89	C	569
Pentane, 1-chloro-	60	0.49	A	128
–, 2,2,4-trimethyl-	100	<10	A	155
2,4-Pentanedione	100	2.0		72

TABLE 4. *cont'd*

Solvent/Additive	T (°C)	C_S ($\times 10^4$)	Remarks	Refs.
Styrene (*cont'd*)				
1-Pentanol, 2,2,3,3,4,4,5,5-octa-fluoro-	60	11.36	F2	442
3-Pentanone	60	2.6	A	385
Pentasiloxane, dodecamethyl-	79.5	0.285		474
1-Pentene	100	2.3	A	358
–, 4,4-dimethyl-2-phenyl-	110	10	A	433
–, 2,4-diphenyl-	110	170	A	433
–, 4-methyl-2,4-diphenyl-	110	2900	A	433
–, 4-methyl-2-phenyl-	110	10	A	433
–, 2,4,4-triphenyl-	110	2600	A	433
2-Pentene	100	4.2	A	358
–, 2-methyl-	100	6.3	A	358
–, 4-methyl-	100	6.9	A	358
Phenol	50	8.1		247,248
	60	14		122
–, *p*-benzyloxy	60	290	J	50,121
–, *p-tert*-butyl-	60	26		121
–, *o*-chloro-	60	6.0		122
–, *p*-chloro-	60	−11		121
–, 2,6-di-*tert*-butyl-	60	49		121
–, 2,6-diisopropyl-	60	310	J	121
–, *p*-fluoro-	60	54		121
–, *m*-methoxy-	60	<5		121
–, *o*-methoxy-	60	43		122
–, *p*-methoxy-	60	260	J	121
–, *o*-phenyl-	60	<5		121
–, 2,3,4,6-tetramethyl-	60	580	J	50,121
–, 2,4,6-trinitro-	50	2.11×10^5		371
Phenol-D, *p*-benzyloxy-	60	10		50
–, 2,3,4,6-tetramethyl-	60	20		50
Phenyl ether	25	7.94	D	368
	60	7.86		368
Phosphine, dibutyl	100	2.08×10^4		296
–, diethyl	100	1.35×10^4		296
–, octyl	60	3.6×10^4	A	295
Phosphine, phenyl	60	43.9×10^4	A, S	295
–, tributyl	100	24.4		156
Phosphoric acid, tributyl ester	100	<0.1		156
Phosphorus, white (P4)	25	400	E	99
Phosphorus trichloride	57	250	C, D	214
	75	800		494
o-Phthalic acid				
–, bis(2-methylallyl) ester	60	6.3		446
–, diallyl ester	60	6.3		446
–, di-(3,3,5,5-tetramethyl-4-nitrosocyclohexyl) ester	80	1.2×10^4	F9, J	314
		1.32×10^4	F27, J	314
Piperidine	60	1.0	A	128
Propane, 1-chloro-2,3-epoxy-	50	7.5	C	449
–, 1-chloro-2-methyl	60	1.4	A	128
	100	3.0	A	128
–, 1,1,1,3-tetrabromo-3-phenyl-	90	3.65×10^4	C	64
–, 1,1,1-tribromo-	90	2.41×10^4	C	64
1,2-Propanediol	60	2.08	F24	422
	80	3.90	F24	422
	100	6.80	F24	422
1,3-Propanediol, 2,2-bis(bromomethyl)-, diacetate	60	4.05		325
1,3-Propanedione, 1,3-diphenyl-	60	7.0	A	128
1-Propene, 3-chloro-2-methyl-	60	24.0	A	128
–, 2-methyl-	100	1.7	A	358
–, 1,3-diphenyl-	60	87.3		567
Propionaldehyde, diallyl acetal	60	12.3		446
Propionic acid	60	0.05	A	128
		4.3	C	385
		4.5		323
		4.65	A	385

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TABLE 4. *cont'd*

Solvent/Additive	T (°C)	C_S ($\times 10^4$)	Remarks	Refs.
Styrene (*cont'd*)				
Propionitrile, 3-phosphino-	60	50000	A	295
–, 3,3′-phophinylidenedi-	60	50000	A	295
Propyl alcohol	60	2.00	F2	423
	80	3.14	F2	423
	100	3.60	F2	423
Propylene oxide	50	1.6	C	449
2-Propyn-1-ol	60	7.0	A	128
Pyridine	60	0.6	A	128
Pyrocatechol	60	1340	J	50,121
–, *p-tert*-butyl-	60	3600	J	50,121
Pyrocatechol-D	60	260		50
–, *p-tert*-butyl-	60	370		50
Pyrogallol	60	10400	J	50,121
Pyrogallol-D	60	1600		50
Sebacic acid, diallyl ester	60	4.8		446
Silane, chlorotrimethyl-	50	12.5		249
–, dichlorodimethyl-	50	17.8		249
–, diethylchloro-	60	5700	A, R	539
–, dimethylphenyl-	60	2200	A, R	539
–, hexamethoxy-(3,3′-thiodipropyl) bis-	79.5	118	R	554
–, methyldichloro-	60	9800	A, R	539
–, 3-mercaptopropyl-trimethoxy-	79.5	5.9×10^4	R	554
–, trichloro-	60	1.4×10^4	A, R	539
–, tetraethyl-	100	8.12		156
–, tetramethyl-	50	3.1		249
–, trichloromethyl-	50	19.2		249
–, triethyl-	60	1200	A, R	539
	70	33.4		90
	80	36.8		90
–, trimethoxymethyl-	79.5	0.23		474
		0.230	R	554
–, triphenyl-	60	3700	A, R	539
	70	2.44		90
	80	1.3		90
Silicon chloride	50	20.0		249
Siloxane, hexamethyl-di-	79.5	0.387	R	554
–, dodecamethyl-penta-	79.5	0.285	R	554
–, octamethyltri-	79.5	0.069	R	554
Sorbit-2,5-diacetate, 1,4:3,6-, dianhydro-	60	77	C	569
Stannane, triphenyl-	60	3.3×10^4	A, R	539
Stearamide, *N*-allyl-	90	5.82	A, J	173
		8.30	C, J	173
Stearic acid, methyl ester	60	1.06		441
		526		239
	70	15.6	C	141
	90	0.676	A	441
Stibine, tributyl	100	58.0		156
Stibene, dibromo-	60	3020	A	112
Styrene, α-bromo-	70	10000		172
–, β-bromo-	70	2000		172
–, dibromo-	60	1950		112
–, α-ethyl-	110	10		439
–, α-methyl-	60	0.86		431
	74	95		343
	80	3.2		98
		4.9		98
	99	5.6		98
		8.5		98
	110	1.67		431
Succinic acid, diallyl ester	60	5.4		446
Succinonitrile, tetraphenyl-	50	28000		89
Sulfonyl chloride, benzene-	60	4330	R	543
–, *p*-chloro-benzene-	60	7650	R	543
–, *p*-methyl-benzene-	60	3180	R	543

TABLE 4. *cont'd*

Solvent/Additive	T (°)	C_S ($\times 10^4$)	Remarks	Refs.
Styrene (*cont'd*)				
Sulfonyl chloride, *p*-methoxy-benzene-	60	3110	R	543
–, methane-	60	1180	R	543
–, phenylmethane-	60	3190	R	543
–, α-phenyl-β-(methanesulfonyl)-ethane-	60	27600	R	543
Terephthalamide, *N,N'*-dimethyl-*N,N'*-dinitroso-	40	1400		160
	60	2000		160
Terephthalic acid, diallyl ester	60	4.5		446
Tin, tetrabutyl	100	3.71		156
Toluene	60	0.105	C	255
		0.121		21,24,79
		0.125	A	127
		0.134		78
		0.16	A, I5	145
		0.21		318
		0.82		496
		1.10	C	363
		2.05		363
	80	0.15	C	385
		0.298	I5	185
		0.3	C	385
		0.308	C	255
		0.310		76,77
		0.313		78,273
		0.813	C, F17	530
	100	0.53	A	235
		0.55	C	385
		0.645	A	127
		0.72	A	235
		0.8	A, I5	145
	132	1.12	A	235
–, *p*-bromo-	60	1.30		496
–, *m*-chloro-	60	1.25		496
	70	0.62		67
	140	1.8		67
–, *p*-chloro-	60	1.07		496
–, α-chloro-	60	1.56	A	128
–, α,α-dichloro-	60	50.0	A	128
–, *p*-ethynyl-	60	72.0	K	151
–, α-$^2H_1$, toluene	80	0.825	C, F17	530
–, ββ-$^2H_2$, toluene	80	0.820	C, F17	530
–, αββ-$^2H_3$, toluene	80	0.992	C, F17	530
–, ααα-trichloro-	60	57.5	A	128
–, 2,4,6-trinitro-	50	14.6×10^4		370,372
p-Toluidine	50	78	F2	154
–, *N,N*-dimethyl-	50	16	F2	154
–, *N*-methyl-	50	11	F2	154
m-Tolunitrile, α-cyano-	60	91.4		462
p-Tolunitrile	60	2.07		496
–, α-cyano-	60	112		461
s-Triazine, trimethyl-	60	0.468		88
Triethylamine	60	1.4	W9	364
		3.0	W6	364
		7.1		24
		7.5		363,364
Tripropylamine	100	24.2		156
Trisiloxane, octamethyl-	79.5	0.069		474
Urea, 1,3-bis(3,3,5,5-tetramethyl-4-nitrosocyclohexyl)-	60	14500	F9, J	314
	80	15000	F9, J	314
Water	60	0.006		479
		0.31	A, R	529
m-Xylene	60	0.78		496
p-Xylene	60	0.84		496
–, α,α'-dibromo-	60	150		112
2,6-Xylenol	60	110		121

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TABLE 4. *cont'd*

Solvent/Additive	T (°C)	C_S ($\times 10^4$)	Remarks	Refs.
Styrene (*cont'd*)				
Zinc, diethyl	100	3660		156
–, *p*-chloro-				
Anisole, *p*-isopropyl-	60	3.86		406
Benzaldehyde	100	1.9	A	298
–, *p*-chloro-	100	9.7	A	298
Benzene, *p*-diisopropyl-	60	3.62		497
		7.24		406
Benzonitrile, *p*-isopropyl-	60	8.84		406
Carbon tetrabromide	60	52000	F2	109
Carbon tetrachloride	60	45		366
Cumene	60	3.44		406
–, *p*-bromo-	60	5.71		406
–, *p-tert*-butyl-	60	3.52		406
–, *p*-chloro-	60	4.97		406
–, *p*-iodo-				
Benzene	50	0.2		56
–, *p*-methyl				
Anisole, *p*-isopropyl-	60	3.27		408
Benzene, *p*-diisopropyl-	60	3.67		408
		7.34		406
Benzonitrile, *p*-isopropyl-	60	26.0		408
Cumene	60	4.12		408
–, *p*-bromo-	60	9.23		408
–, *p-tert*-butyl-	60	3.59		408
–, *p*-chloro-	60	7.67		408
–, pentafluoro-				
Benzene, bromo-	60	0		469
–, chloro-	60	0		469
–, ethyl-	60	5.35		469
–, fluoro-	60	0.117		469
2-Butanone, 3-methyl-	60	1.09		469
Cumene	60	6.76		469
Furan, tetrahydro-	60	1.53	A	469
		1.61		469
2-Pentanone, 4-methyl-	60	0.033		469
Toluene	60	1.20		469
Styrene/Styrene, *p*-chloro-				
Carbon tetrachloride	60	15	EF	366
		115	EE	366
Succinimide, *N*-vinyl-				
Acetic acid	55	0.077	C, F25	93
Ethane, 1,2-dichloro-	55	0.127	C, F26	93
Valeric acid, 4-methyl-, vinyl ester				
Benzene	80	6.2		201
Vinyl acetate				
Acetaldehyde	30	400		346
	45	530	J	86
	50	390		460
	60	0.72		257
		200	I8	145
		220		232
		500		460
		570	F2	86
		660	J	86
	70	610		460
	75	700	J	86
Acetamide, *N*-butyl-	60	40		86
Acetic acid	50	0.180		466
	60	0.166	C	465
		0.200		466
		1.0	I9	145
		1.13		289
		10	F2	86
	65	0.170	C	466

TABLE 4. *cont'd*

Solvent/Additive	T (°C)	C_S ($\times 10^4$)	Remarks	Refs.
Vinyl acetate (*cont'd*)				
Acetic acid, allyl ester	60	85	F2	86
		94	J	86
–, benzyl ester	60	80	F2, J	86
–, butyl ester	50	13.2		208
–, *sec*-butyl ester	50	4.4		208
	60	8.0		86
–, *tert*-butyl ester	50	1.5		208
	60	6.2		232
–, isobutyl ester	50	9.1		208
–, isopropyl ester	50	3.5		208
	60	3.1		145,232
		8.0		86
	67.5	9.0	J	86
	75	10	J	86
–, methyl ester	60	1.56		145,231
		1.6		145,232
		2.5		86
–, propyl ester	50	6.2		208
	60	3.4		145,232
–, 1,3,3,3-tetrachloropropyl ester	70	423.2	C	389
–, bromo-	60	489	C, J	386
	70	4450	C	389
–, chloro-	70	2550	C	389
–, cyano-, methyl ester	60	5000	J	86
–, dichloro-, ethyl ester	60	210		86
–, phenyl-	60	400	J	86
–, trichloro-	70	1445	C	389
–, ethyl ester	60	4400		86
–, trifluoro-, ethyl ester	50	30	C	71
Acetic anhydride	60	8.0		86
Acetoacetic acid, ethyl ester	70	80.4	C	390
Acetone	60	1.5		86
		11.70		289
		12.0		145
	70	25.6	C	330
	75	42	C	184
Acetonitrile	60	10		86
–, phenyl-	60	2100	J	86
Acetophenone	50	91.5		15
	60	100	J	86
	70	62.0	C	390
–, 3′-hydroxy-	45	1405	J	51
–, 3′-hydroxy-D-	45	1290	J	51
Aniline	50	149		15
		210	F2	154
–, *N,N*-dimethyl-	50	260	F2	154
–, *N*-methyl-	50	360	F2	154
–, *p*-nitro-	50	48600		15
m-Anisaldehyde	60	2500	J	86
o-Anisaldehyde	60	420	J	86
p-Anisaldehyde	60	370	J	86
Anisole	60	10	F2, J	86
Anthracene	20	6.68×10^5	J	41
	30	6.03×10^5	J	41
	40	4.55×10^5	J	41
	50	2.057×10^5		15
		3.64×10^5	J	41
	60	2.78×10^5	J	41
–, 9-phenyl-	50	2.73×10^5	J	41
Benzaldehyde	60	230	J	145,355
		460	F2	86
		540	J	86
	70	421	C, J	390
	75	600	J	86

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TABLE 4. *cont'd*

Solvent/Additive	T (°C)	C_S ($\times 10^4$)	Remarks	Refs.
Vinyl acetate (*cont'd*)				
Benzaldehyde, *m*-chloro-	60	860	J	86
–, *o*-chloro-	60	390	J	86
–, *p*-chloro-	60	340	J	86
–, *m*-cyano-	60	1070	J	86
–, *p*-cyano-	60	610	J	86
–, *p*-isopropyl-	60	540	J	86
Benz[A]anthracene	50	1.17×10^5	J	41
Benzene	60	1.07		263
		1.2	J	86
		1.2		294
		2.4	C	80
		2.96		289
		20		294
	70	5.27	C	390
	75	1.4	J	86
		1.40		263
		3.6	C	184
–, bromo-	50	18.9		15
	60	8.0	W7	265
		9.2	W15	265
		10.0		265
	70	134.2	C	389
	75	25.2	C	184
–, *tert*-butyl-	60	3.61		289
–, chloro-	60	5.6	W7	265
		6.8	W15	265
		8.0		265
		8.35		289
		80	J	86
	70	2.61	C	389
	75	12.7	C	184
Benzene, *o*-dichloro-	75	42	C	184
–, *p*-dichloro-	70	11.8	C	389
–, *m*-dinitro-	45	1.05×10^6	C, J	28
	50	645700		15
–, *o*-dinitro-	45	9.6×10^5	C, J	28
–, *p*-dinitro-	45	26.7×10^5	C, J	28
	50	662800		15
–, ethyl-	60	55.15		289
		100	J	86
–, nitro-	50	110300		15
–, 1,3,5-trinitro-	45	8.9×10^6	C, J	28
	50	434280		15
Benzo[B]chrysene	50	2.83×10^5	J	41
Benzoic acid	60	50	J	86
–, ethyl ester	60	26	J	86
–, *p*-nitro-	50	245700		15
Benzoic anhydride	60	130	J	86
Benzoin	60	800	J	86
Benzonitrile	50	40.6		15
–, *m*-hydroxy-	45	820	J	51
–, *m*-hydroxy-D-	45	805	J	51
Benzo[GHI]perylene	50	1.82×10^4	J	370
Benzophenone	50	286		15
Benzo[A]pyrene	50	3.06×10^5	J	41
Benzo[E]pyrene	50	8400	J	370
p-Benzoquinone, 2,3,5,6-tetramethyl-	45	9.5×10^5	J	27
Benzoyl chloride	50	366		15
	70	300	C	389
Benzyl alcohol	70	556	C	390
Biphenyl	50	263		15
	60	6.4		132
Borane, tributyl	10	9000		191

TABLE 4. *cont'd*

Solvent/Additive	T (°C)	C_S ($\times 10^4$)	Remarks	Refs.
Vinyl acetate (*cont'd*)				
Butane, 1-bromo-	60	50		86
	70	1100	C	389
–, 1-chloro-	60	10		86
–, 1-iodo-	60	800		86
2,3-Butanedione	60	670	F2, J	86
2-Butanone	60	73.80		289
	75	165	C	184
–, 3-methyl-	60	118.16		289
1-Butene, 3-chloro-3-methyl-	50	28900	F2	152
2-Butene, 1-chloro-3-methyl-	50	4300	F2	152
1-Buten-3-yne	60	0	J	232
Butyl alcohol	60	20.0	I9	145
		20.39		289
	70	29.1	C	390
sec-Butyl alcohol	60	31.74		289
	70	6.21	C	390
	75	95.0	C	184
tert-Butyl alcohol	60	0.46		289
		0.5	I9	145
		1.3		86
	70	12.1	C, J	390
Butyl ether	60	76		86
3-Butyn-2-ol, 2-methyl-	60	400	J	86
Butyraldehyde	40	440	W8	500
		510	W7	500
		590	W15	500
		670		500
	60	650		232,355
		1000		86
	70	388	C	390
Butyric acid, ethyl ester	50	45	C	71
–, methyl ester	60	18		145,232
		19		86
Carbon tetrabromide	60	7.39×10^6	F2	109,145
	70	28740	C	389
Carbon tetrachloride	0	1500		346
	20	4700	E	309
	45	7600	J	86
	60	800	Q1	10
		1300	Q2	10
		4700	Q3	10
		6700	Q4	10
		7300	F2	86
		8000	Q5	10
		9000	Q6	10
		9600	J	86
		10000		210
		10500	Q7	10
		10700	Q8	10
	70	2023	C	389
	75	10500	J	86
Chloral	60	5000		86
	70	4927	C	389
Chloral hydrate	70	4312	C	389
Chloroform	–	100		345
	30	140		346
	60	125.18		289
		130	I9	145
		150	J	86
		160		210
		170	F2	86
	70	554	C	389
2-Chloro-3-(methyl-^{14}C)-1butene(4-^{14}C)	50	3980	F2	509
3-Chloro-2-pentene-(2,4-^{14}C)	50	628	F2	509

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TABLE 4. *cont'd*

Solvent/Additive	T (°C)	C_S ($\times 10^4$)	Remarks	Refs.
Vinyl acetate (*cont'd*)				
Chrysene	50	3360	J	370
m-Cresol	45	375	J	51
m-Cresol-D	45	85	J	61
p-Cresol	45	710	J	51
p-Cresol-D	45	130	J	51
Crotonaldehyde	60	1800	J	355
Cumene	60	89.9		289
		100		7,86
	70	139	C	390
	75	356	C	184
Cyclohexane	60	6.59		289
		7.0	I9	145
		100	F2	86
–, methyl-	60	11.75		289
		24		86
1,3-Cyclohexanedione, 5,5-dimethyl-	70	5580	C	390
Cyclohexanol	70	127	C	390
Cyclohexanone	60	180	F2	86
	75	670	C	184
Cyclohexene	60	620	J	86
		1600	F2	86
	75	770	J	86
Dibenz[a,h]anthracene	50	8.7×10^4	J	370
Dibenzo[def,mno]chrysene	40	156.5×10^4	J	41
	50	129.2×10^4	J	41
	60	105.4×10^4	J	41
1,2,3,4-Dibenzpyrene	50	73.6×10^4	J	41
Diethylene glycol	70	85.3	C	390
Diethylphosphonate	60	350	F1	571
	60	910	F2	571
	60	830	F2	571
	60	730	F2	571
p-Dioxane	60	20	F2	86
	70	49.1	C	390
Diphenylamine	50	138		15
	60	240		46
Diphenylamine-D	60	170		46
Diphenylamine-T	60	230		46
Ethane, 1,1-dibromo-	60	1100		86
–, 1,2-dibromo-	70	134	C	389
–, 1,1-dichloro-	60	65		86
–, 1,2-dichloro-	60	5		86
		7	I9	145
		7.18		289
–, 1,2-dichloro-	70	10.2	C	389
–, hexachloro-	70	1210	C	389
–, pentachloro-	70	1348	C	389
–, 1,1,2,2-tetrabromo-	60	6000		86
–, 1,1,2,2-tetrachloro-	60	107.03		289
		160		86
	70	67.72	C	389
–, 1,1,1-trichloro-	60	71.11		289
–, 1,1,2-trichloro-	60	35.98		289
1,1-Ethanediol, diacetate	60	40		86
Ether, benzyl methyl	60	280	F2, J	86
–, bis(2-chloroethyl)	70	245	C	389
–, dodecyl vinyl	60	57.2	C	4
		73.5	C	4
–, ethyl	60	45.3	C	4
Ethyl acetate	20	1.52		328
	40	2.11		328
	50	2.9		208
		12	C	71
	60	1.07		289

TABLE 4. *cont'd*

Solvent/Additive	T (°C)	C_S ($\times 10^4$)	Remarks	Refs.
Vinyl acetate (*cont'd*)				
Ethyl acetate (*cont'd*)		1.25	C	80
		2.6		145,232
		2.96		328
		3.3		86
		3.4		420
	70	7.8	C	390
Ethyl alcohol	60	25	F2	86
	70	26.3	C	390
Ethylene, tetrabromo-	70	2800	C	389
–, tetrachloro-	70	465	C	389
–, tribromo-	70	34720	C	389
–, trichloro-	70	3810	C	389
Ethylene glycol	70	83.0	C, J	390
Fluorene	60	4700	J	86
	70	3610	C, J	390
–, 9-phenyl-	70	16240	C	390
Formamide, *N,N,*-dimethyl-	60	50		86
Formic acid, ethyl ester	50	22	C	71
–, methyl ester	60	3		86
2-Furaldehyde	60	15000	J	86
Furfuryl alcohol	70	2520	C, J	390
Germane, diethylchloro-	60	7800	A, R	539
–, dimethylchloro-	60	86600	A, R	539
–, triethyl-	60	4500	A, R	539
–,triphenyl-	60	56000	A, R	539
Glycolic acid, methyl ester	60	300		86
Heptane	50	17.0		208
1-Heptanol, 2,2,3,3,4,4,5,5,6,6,7,7-dodecafluoro-	60	33.3	F2	442
1,5-Hexadien-3-yne	60	0		232
Hexanoic acid, 2-ethyl-, ethyl ester	50	65	C	71
Hydroquinone	50	7000	J	338
–, 2,5-di-*tert*-butyl-	50	38000	J	338
–, 2,6-dimethyl-	50	29000	J	338
–, tetramethyl-	50	74000	J	338
Isobutyl alcohol	60	21.75		289
	70	32.4	C	390
Isobutyric acid	60	5.02		289
Isobutyric acid, ethyl ester	50	160	C	71
–, methyl ester	60	58		145,232
		71		420
		86		86
Isobutyronitrile	60	100		86
Isopropyl alcohol	70	44.6	C	390
Lactic acid, ethyl ester	60	700		86
–, methyl ester	60	640		86
Lauric acid, ethyl ester	50	105	C	71
Malonic acid, dimethyl ester	60	17		86
p-Mentha-1,8-dene	60	1900	J	86
Mesitol	50	5000	J	338
Methane, bromotrichloro-	25	$\gg 10^4$	D, S	39
	60	6000	C	39
		$>4 \times 10^5$	C	39
	70	6303	C	389
–, dichloro-	60	4		86
–, iodo-	70	1230	C	389
–, nitro-	60	2300	F2, J	86
	75	2600	J	86
–, tribromo-	70	34760	C	389
–, triphenyl-	60	700		45
Methanol	–	9.0		5
		10.0		5
		10.5		5
	10	3.4		190
	60	2.26		145,231

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TABLE 4. *cont'd*

Solvent/Additive	T (°C)	C_S ($\times 10^4$)	Remarks	Refs.
Vinyl acetate (*cont'd*)				
Methanol (*cont'd*)		4.3		320
		6.0		86
	70	5.5		320
Naphthacene	50	8.62×10^6	J	370
Naphthalene	50	1150	J	370
		1457		15
	70	1715	C, J	390
–, decahydro-	60	48		86
Naphtho[1,2,3,4-def]chrysene	50	1.35×10^5	J	41
Nonanoic acid, ethyl ester	50	80	C	71
2,6-Octadiene, 2,7-dichloro-	50	3200	F2	152
–, 2,6-dimethyl-	60	430		324
		700		7
Octanoic acid, ethyl ester	50	70	C	71
Oleic acid, methyl ester	60	217		441
		1000	J	86
	90	358		441
Orthoformic acid, trimethyl ester	–	7.6		345
	30	8.0		346
Oxalic acid, diethyl ester	60	4.0		86
–, dimethyl ester	60	1.0		86
		2.0		145,232
Paraldehyde	70	136	C	390
Pentane, 2,2,4-trimethyl-	50	8.0		208
2,4-Pentanedione	60	10		86
1-Pentanol, *n* 2,2,3,3,4,4,5,5-octafluoro-	60	26.1	F2	442
2-Pentanone, 4-methyl-	60	34.52		289
3-Pentanone	60	10.0	I9	145
		114.39		289
Pentyl acetate	70	7.2	C	390
	75	87.0	C	184
Pentyl alcohol	75	56	C	184
Perylene	50	2.88×10^5	J	41
Phenanthrene	50	870	J	370
		5600		15
	70	3380	C, J	390
Phenol	45	215	J	51
	50	120		15
	60	600	J	86
–, *m*-chloro-	45	205	J	51
–, *p*-chloro-	45	400	J	51
–, *p*-nitro-	50	8.86×10^4		15
–, 2,3,4,6-tetramethyl-	45	1.13×10^4	J	51
Phenol-D	45	35	J	51
–, *m*-chloro-	45	70	J	51
–, *p*-chloro-	45	80	J	51
–, 2,3,4,6-tetramethyl-	45	800	J	51
Phosphorus trichloride	60	1.5×10^4	C, D	214
Propane, 2-bromo-2-methyl-	60	150		86
–, 2-chloro-2-methyl	60	26		86
1-Propanol, 2,2,3,3-tetrafluoro-	60	7.11	F2	442
1-Propene, 3-chloro-	60	3100		86
–, 3-chloro-2-methyl-	60	400	J	86
Propionaldehyde	60	950	J	86
		1000	F2	86
	70	457	C	390
Propionic acid, ethyl ester	50	40	C	71
–, methyl ester	60	23		232
		26		420
Pyrene	50	11500	J	370
Pyrocatechol, 4-(1,1,3,3,-tetramethylbutyl)-	50	11000	J	338
Pyrogallol	50	50000	J	338
Salicylic acid	70	296	C	390
Silane, dimethylphenyl-	60	2200	A, R	539

TABLE 4. *cont'd*

Solvent/Additive	T (°C)	C_S ($\times 10^4$)	Remarks	Refs.
Vinyl acetate (*cont'd*)				
Silane, methyldichloro-	60	5800	A, R	539
–, trichloro-	60	8800	A, R	539
–, triethyl-	60	1200	A, R	539
–, triphenyl-	60	2700	A, R	539
Stearamide, *N*-allyl-	90	620.1	C, J	173
Stearic acid, ehtyl ester	50	140	C	71
–, methyl ester	60	38.2		441
Succinic acid, diethyl ester	60	41		420
–, dihexyl ester	60	40		420
–, dimethyl ester	60	31		420
m-Tolualdehyde	60	570	J	86
p-Tolualdehyde	60	440	J	86
Toluene		3.3		158
	50	12.0		15
		14.9	R	357
		100	C	71
		123		71
	60	17.8	R	357
		20.75	C	80
		20.89		21,59,289
		21.6		357
		34	J	86
	60	35	F2	86
		49.0	W15	265
		69.0		265
	70	21.1	R	357
		21.8	C	390
		29.2		357
	75	66	C	184
	80	91.6		273
–, bromo-	50	20.6		15
–, *o*-chloro-	70	92.86	C	389
–, *p*-chloro-	70	195	C	389
–, α-chloro-	60	450	J	86
	70	584	C	389
	75	118	C	184
Toluene, *p*-nitro-	50	106300		15
p-Toluidine	50	750	F2	154
–, *N,N*-dimethyl-	50	380	F2	154
–, *N*-methyl-	50	830	F2	154
Toluonitrile	50	38.3		15
Triethylamine	50	360	F2	154
	60	370	J	24,145
Triphenylene	50	160	J	370
Veratraldeyhyde	60	550	J	86
Xylene	50	14.9		15
	70	278	C	390
	75	166	C	184
Vinyl chloride				
Carbon tetrachloride	60	280	Q(3)	511
Chloroform	60	290	Q(3)	511
Bromotrichloromethane	60	400000	Q(3)	511
Vinylidene chloride				
N-Methylpyrolidone	50	20	R	541
	60	20	R	541
2-Vinylpyridine				
Silane, diethylchloro-	60	5400	A, R	539
–, Methyldichloro-	60	8600	A, R	539
–, trichloro-	60	12000	A, R	539
–, triethyl-	60	2000	A, R	539
–, triphenyl-	60	4000	A, R	539
Vinyltrimethylsilane				
Bromoform		1200000	C, Q(1–2)	572

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TABLE 5. TRANSFER CONSTANTS TO SULFUR COMPOUNDS

Modifier	T (°C)	C_X	Remarks	Refs.
Acrylamide, *N*-octadecyl-/acrylonitrile (1:1 mol ratio)				
1-Dodecanethiol	60	0.539	C, F24	174
Acrylic acid				
1-Dodecanethiol	45	1.9	C, F31	549
–, methyl ester				
1-Butanethiol	30	1.53	A	397
	60	1.69	A	69,397
Ethanethiol	50	0.78	Q1	330
		0.94 ± 0.07	Q1	478,507
		1.65 ± 0.12	Q2	478,507
		1.57 ± 0.09	Q3	508
		1.57 ± 0.18	Q4	330,509
		1.79	Q2	330
		5.00	Q3	330
2-Propanethiol	60	0.544	Q1	477
		0.668	Q2	477
		0.700	Q3	477
		0.656	Q4	477
Acrylonitrile				
1-Dodecanethiol	50	0.73		378
Hydrogen sulfide	50	0.13		378
Methyl sulfoxide	20	0.1	C, F8	248
	30	0.47		196
	40	0.0000812	E	458
	50	0.11		404
		0.29		197
		0.795		375
Methyl tetrasulfide	80	0.69	J	85
p-Toluenethiol	50	0.97		378
Acrylonitrile/1,3-butadiene (10–90%)				
1-Hexanethiol,				
–, 1,1,3,3,5,5-hexamethyl-	5	1.5	C, H	380
1-Pentanethiol,				
–, 1,1,3,3-tetramethyl-		53.3	C, H	380
Acrylonitrile/1,3-butadiene (20–80%)				
1-Hexanethiol				
–, 1,1,3,3,5,5-hexamethyl-	5	1.2	C, H	380
1-Pentanethiol				
–, 1,1,3,3-tetramethyl-	5	2.1	C, H	380
Acrylonitrile/1,3-butadiene (30–70%)				
1-Hexanethiol				
–, 1,1,3,3,5,5-hexamethyl-	5	1.1	C, H	380
1-Pentanethiol				
–, 1,1,3,3-tetramethyl-	5	1.8	C, H	380
Acrylonitrile/styrene (38.5–61.5 mol%)				
1-Pentanethiol				
–, 1,1,3,3,4-pentamethyl-	50	1.02	C, H	380
Butadiene				
Xanthogendisulfide, dibutyl-	60	6.9	J	532
–, diethyl-	60	8.1	J	532
–, di-2-ethylhexyl-	60	7.5	J	532
–, di-isopropyl-	60	8.3	J	532
1,3-Butadiene				
1-Butanethiol, 1,1,3,3-tetramethyl-	5	5.3	H	242
	50	3.7	H	242
1-Octanethiol	5	21.8	H	242
	50	16.0	H	242
		19.0	H	243
–, 1,1,3,3,5,5,7,7-octamethyl-	50	3.0	H	242
1-Tetradecanethiol	50	19.5	H	242
1,3-Butadiene/styrene				
1-Dodecanethiol	5	0.66	B, H, J	384
Formic acid, thio-, dithiobis-				
–, –, –, *O,O′*-dibutyl ester	5	2.42	B, H, J	383

TABLE 5. *cont'd*

Modifier	T (°C)	C_X	Remarks	Refs.
1,3-Butadiene/styrene (*cont'd*)	−5	1.75	H	180
	50	5.34	C, H, J	382
−, −, −, *O,O'*-di-*sec*-butyl ester	5	1.65	B, H, J	
	−5	1.565	H	180
−, −, − *O,O'*-dicyclohexyl ester	5	1.78	B, H, J	383
	50	3.71	C, H, J	383
−, −, −, *O,O'*-diethyl ester	5	8.43	B, H, J	383
	−5	4.23	H	180
	50	16.04	C, H, J	382
−, −, −, *O,O'*-diheptyl ester	5	0.41	B, H, J	383
	50	1.12	C, H, J	382
−, −, −, *O,O'*-dihexyl ester	5	0.74	B, H, J	383
	50	1.78	C, H, J	382
−, −, −, *O,O'*-diisobutyl ester	5	1.87	B, H, J	383
	−5	1.573	H	180
	50	6.43	C, H, J	382
−, −, *O,O'*-diisopentyl ester	5	1.21	B, H, J	383
		7.0	B, H, J	341
	−5	1.85	H	180
	50	4.38	C, H, J	382
−, −, −, *O,O'*-diisopropyl ester	5	2.83	B, H, J	383
		3.4	B, H, J	341
		12.5	B, H	100
		0.40–1.31	B, H, J, GG4	100
		0.80–3.01	B, H, J, GG3	100
		1.40–3.70	B, H, J, GG2	100
		1.80–3.50	B, H, J, GG1	100
		1.80–6.0	B, H, J, GG5	100
	−	9.78		179
	−5	1.185	H	180
	50	9.78	C, H, J	382
−, −, −, *O,O'*-dimethyl ester	5	16.43	B, H, J	383
	−5	15.86	H	180
	50	27.04	C, H, J	382
−, −, −, *O,O'*-dineopentyl ester	5	1.01	B, H, J	383
	50	3.40	C, H, J	382
−, −, −, *O,O'*-dioctyl ester	5	0.23	B, H, J	383
	50	0.64	C, H, J	382
−, −, −, *O,O'*-dipentyl ester	5	1.45	B, H, J	383
	−5	1.70	H	180
	50	3.20	C, H, J	382
−, −, −, *O,O'*-dipropyl ester	5	4.42	B, H, J	383
	−5	1.815	H	180
	50	9.20	C, H, J	382
1-Heptanethiol				
−, 1,1,3,3,5,5,6-heptamethyl-	5	0.64	B, H, J	384
1-Hexanethiol				
−, 1,1,3,3,5,5-hexamethyl-	5	1.22	B, H, J	384
		4.1	H	54,55
		2.7–4.7	H	54
1-Octanethiol				
−, 1,1,3,5,5,7,7-octamethyl-	5	0.34	B, H, J	384
p-Dioxin, 2,3-dihydro/maleic anhydride				
1-Butanethil	60	6300	R	169
Ethylene				
1-Butanethiol	130	5.8	C, W5	457
Ethyl sulfide	130	0.027	C, W5	454
Methyl sulfoxide	130	12	C, F21, W5	259
2-Propanethiol, 2-methyl-	130	15.0	C, W5	457
Sulfur hexafluoride	130	0.0000	C, F21, W5	259
Methyl methacrylate				
Acetic acid, dithiodi-, diethyl ester	60	0.00065		86
−, mercapto-, methyl ester	60	0.63		274
Acetophenone, 3'-mercapto-	45	4.2		30
−, 4'-mercapto-	45	2.6		30

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TABLE 5. *cont'd*

Modifier	T (°C)	C_X	Remarks	Refs.
Methyl methacrylate (*cont'd*)				
Anisole, 4,4′-dithiodi-	50	0.0044		285
	60	0.0052		285
p-Anisoyl disulfide	60	14.6		369
Benzenesulfonic acid				
–, compound with pyridine	60	0.00365		490
–, thio-, *S*-phenyl ester	60	0.0196	A	491
Benzenethiol	45	4.7		30
	60	2.7		274
	70	15		566
–, *m*-bromo-	45	3.8		30
–, *p*-bromo-	45	5.6		30
–, *m*-chloro-	45	3.5		30
–, *p*-chloro-	45	4.6		30
Benzoyl disulfide	60	10.0		369
Benzyl disulfide	25	0.134		368
	50	0.016	F2	354
	60	0.00627		368
Benzyl sulfide	25	0.0183	D	368
	50	0.0098		252
		0.0098	F2	354
	60	0.00154		368
Benzyl sulfone	50	0.0040		252
Benzyl sulfoxide	50	0.0039		252
Benzyl tetrasulfide	50	0.084	F2, J	354
Benzyl trisulfide	50	0.021	F2, J	354
1-Butanethiol	60	0.66		274
		0.67	A	69,397
Carbanilide, thio-	50	0.008	F2	251
		0.22	C, F2	251
–, –, 4,4′-bis(dimethylamino)-	50	0.09	C, F2	251
–, –, 4,4′-dichloro-	50	0.35	C, F2	251
–, –, 3,3′-dimethoxy-	50	0.33	C, F2	251
–, –, 3,3′-dimethyl-	50	0.21	C, F2	251
–, –, 4,4′-dimethyl-	50	0.13	C, F2	251
–, –, 3,3′-dinitro-	50	0.55	C, F2	251
Carbon disulfide	60	0.00007	A	288
2,13-Dioxa-7,8-dithia-3,12-disila-tetradecane, 3,3,12,12-tetrameth oxy-	79.5	0.00258		474
Disulfide, bis(*p*-bromobenzoyl)-	60	16.7		369
–, bis (*p*-bromophenyl)-	50	0.0046		285
	60	0.0098		285
–, bis(*p*-chlorobenzoyl)-	60	10.0		369
–, bis(*p*-chlorophenyl)-	50	0.0072		285
	60	0.0117		285
–, bis(*p*-cyanobenzoyl)-	60	290		369
–, bis(dimethylthiocarbamoyl)-	70	0.0115		104
–, bis(*p*-nitrobenzoyl)-	60	694		369
–, bis(*o*-nitrophenyl)-	50	0.0176		285
	60	0.0508		285
–, bis(*p*-nitrophenyl)-	50	0.0127		285
	60	0.0193		285
1-Dodecanethiol	60	0.7		573
	70	0.55		573
	80	0.42		573
	90	0.33		573
Ethanethiol, 2-amino-, hydrochloride	50	0.17	F7	473
	70	0.15	F7	473
Ethanol, 2-mercapto-	50	0.43	F2	473
	60	0.62		274
	70	0.40	F2	473
Ethyl disulfide	60	0.00013		310
Formamidine, *N,N′*-diphenyl-				
–, –, 1,1′-dithiobis-	50	0.22	C, F2	251
Methyl sufoxide	60	0.0000071	A	438

TABLE 5. *cont'd*

Modifier	T (°C)	C_X	Remarks	Refs.
Methyl methacrylate (*cont'd*)				
2-Naphthalenethiol	45	1.3		30
	60	3.1		274
1-Penthanethiol	50	0.8	H	344
Phenyl disulfide	25	0.0174	D	368
	50	0.0038		285
	60	0.0007		310
		0.00176		368
		0.0085		285
		0.0110	A	491
Phenyl disufone	60	0.0003	A	491
Phenyl sulfide	25	0.00554	D	368
	50	0.0064		252
	60	0.00132		368
Phenyl sulfone	50	0.0006		252
Phenyl sulfoxide	50	0.0013		252
1-Propanethiol, 3-[1,3,3,3-tetramethyl-1-(trimethylsiloxy)disiloxanyl]-	79.5	0.128		474
–, 3-(trimethoxy)-	79.5	0.693		474
2-Propanethiol	60	0.38		274
–, 2-methyl-	60	0.18		274
Propionic acid, 3-mercapto-	50	0.39	F2	473
	70	0.38	F2	473
Sulfide, benzoyl dimethylthiocarbamoyl	20	5.5	D	280
	60	0.08	A	280
Sulfur	–	1.3	C	118
	44.1	0.075		194
	50	0.106	F2, J	354
Thiosulfuric acid, *S*-butyl ester				
–, –, sodium salt	60	0.00226		490
–, *S*-isopropyl ester				
–, –, sodium salt	60	0.00167		490
–, *S*-phenyl ester				
–, –, compound with pyridine	60	0.374		490
–, –, potassium salt	60	0.00537		490
–, *S*-propyl ester				
–, –, sodium salt	60	0.00190		490
m-Toluenethiol	45	4.7		30
p-Toluenethiol	45	7.4		30
α-Toluenethiol	50	0.027	F2, J	354
p-Toluoyl disulfide	60	11.0		369
p-Tolyl disulfide	50	0.0031		285
	60	0.0044		285
Styrene				
Acetic acid, dithiodi-	50	<0.005		297
	99	0.2		96
–, –, diethyl ester	60	0.015		86
–, –, dimethyl ester	99	0.1		96
–, –, mercapto-	99	>14.0	J, R	96
–, –, butyl ester	50	26.0	A	146
–, –, ethyl ester	60	58.0	A	126
–, –, methyl ester	60	0.63		323
	99	27.6		96
–, phenyl-				
–, –, *p,p'*-dithiodi-	50	0.24		89
–, thio	99	>14.7	J	96
Aniline, 2,2' dithiodi-	25	3.8		297
	50	3.0		297
		3.4		297
	75	3.0		297
–, 4,4'-dithiodi-	50	0.24		89
–, *N*-dodecyl-, 4,4'-dithiodi-	50	0.21		89
Anisole, 2,2'-dithiodi-	50	3.0		89
–, 4,4'-dithiodi-	50	0.18		89
–, *p*-methyl-, α,α'-dithiobis-	99	0.021		96

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TABLE 5. *cont'd*

Modifier	T (°C)	C_X	Remarks	Refs.
Styrene (*cont'd*)				
p-Anisoyl disulfide	60	96.0		369
Anthranilic acid, 4,4′-dithiobis-	50	3.0		89
Arylbenzene thiolsulfonate	60	0.95	R, F2	544
–, *p*-chloro-	60	2.22	R, F2	544
–, *p*-methoxy-	60	1.872	R, F2	544
–, *p*-methyl-	60	1.237	R, F2	544
Benzenesulfonic acid				
–, compound with pyridine	60	0.00617		490
–, thio-, *S*-phenyl ester	50	1.60	A	491
	60	1.67	A	491
Benzenethiol	99	0.08		96
–, *o*-ethoxy-	99	25.1		96
–, *p*-ethoxy-	99	0.13		96
Benzene thiosulfonate				
–, aryl-*p*-chloro-	60	2.597	R, F2	544
–, aryl-*p*-methoxy-	60	1.475	R, F2	544
–, aryl-*p*-methyl	60	1.099	R, F2	544
2-Benzimidazolethiol	99	0.21		96
Benzoic acid, 2,2′-dithiodi-	50	0.01		89
–, –, diethyl ester	50	<0.005		89
–, –,dimethyl ester	99	0.2		96
–, 4,4′-dithiodi-	50	0.11		297
		0.17		89
–, –, diethyl ester	50	0.11		89,297
–, *o*-mercapto-	99	>14.7		96
–, –, methyl ester	99	17.0		96
–, thio-	99	6.23	J	96
Benzothiazole, 2,2′-dithiobis-	25	2.3		297
	50	2.1		297
		2.3		297
	75	2.4		297
	99	2.73		96
–, 2,2′-thiobis-	50	<0.005		297
2-Benzothiazolethiol	50	0.03		297
	99	0.26		96
Benzo[B]thiophene, 4,5,6,7-tetrahydro-4(2-thienyl)-	60	0.011		419
Benzoyl disulfide	50	<0.005		89
	60	0.010		545
		0.0107		304
		36.0		369
	99	0.11		96
Benzyl alcohol, *o,o*′-dithiobis-	50	0.58		89
–, *p,p*′-dithiobis-	50	0.09		297
Benzyl diselenide	60	2.0	A	128
Benzyl disulfide	50	0.02		89
		0.03		297
	60	0.00878		368
		0.01	A	128
	99	0.011		96
Benzyl sulfide	25	0.548	D	368
	50	0.069		252
	60	0.00335		368
Benzyl sulfone	50	0.052		252
Benzyl sulfoxide	50	0.051		252
1-Butanethiol	25	5.4	D, Q1	340
		13.2	D	340
	60	21.0	A	395
		22.0	A	69,397
		25		131
	70	15.0	A	395
	80	17.0	A	395
	99	15.4		96

TABLE 5. *cont'd*

Modifier	T (°C)	C_X	Remarks	Refs.
Styrene (*cont'd*)				
1-Butanethiol, 1,1,3,3-tetramethyl-	5	5.5	H	242
		6.4	H	222
	50	4.3	H	242
1-Butanethiol-D	60	5.2	A	395
	70	4.0	A	395
	80	7.0	A	395
Butyl disulfide	25	0.00079		448
	55	0.00154		448
	60	0.0024		304
	99	0.0068		96
	150	0.022	A	359
sec-Butyl disulfide	50	<0.005		89
tert-Butyl disulfide	50	<0.005		89
	60	0.00014		304
Butyl sulfide	60	0.0022		304
tert-Butyl sulfide	60	0.025		304
Carbanilic acid, *p,p'*-dithiodi-diethyl ester	50	0.24		89
Carbon disulfide	60	0.00066	A	288
Carbonic acid, dithio-				
–, –, *S,S'*-bis(carboxymethyl)ester	50	0.36		297
–, trithio-				
–, –, *S,S'*-bis(carboxymethyl) ester	50	0.21		297
1-Decanethiol	80	4.3	C3, H	574
	80	4.2	C3, H	574
2,13-Dioxa-7,8-dithia-3,12-disilatetradecane, 3,3,12,12-tetramethoxy-	79.5	0.0118		474
Diphenyldisulfide	60	0.147		546
Disulfide, bis(*p*-bromobenzoyl)	60	745		369
–, bis(α-bromo-*o*-tolyl)	50	1.0		297
–, bis(*p*-chlorobenzoyl)	60	196		369
–, bis(chlorobenzyl)	50	<0.005		297
–, bis(2-chloroethyl)	50	0.01		297
–, bis(α-chloro-*o*-tolyl)	50	1.3		297
–, bis(*p*-cyanobenzoyl)	60	3190		369
–, bis(diethylthiocarbamoyl)	60	0.724		286
–, bis(dimethylthiocarbamoyl)	60	1.11		286
	70	0.0136		104
	80	0.568	J	40
		0.620		481
	95	0.780		481
		0.860	J	40
	115	0.939	J	40
		1.035		481
	130	0.984	J	40
		1.150		481
–, bis(2-ethylhexyl)	50	<0.005		297
–, bis(*N*-ethyl-*N*-phenylthio-carbamoyl)	60	1.75		286
–, bis(1-methylheptyl)	99	0.0104		96
–, bis(morpholinothiocarbonyl)	60	6.1		286
–, bis(1-naphthylmethyl)	99	0.033		96
–, bis(*p*-nitrobenzoyl	60	6650		369
–, bis(*o*-nitrophenyl)	50	–		89
–, bis(1-phenylethyl)	50	<0.005		89
–, bis(β-(2-pyridyl)ethyl)	50	0.03		297
–, bis(2,3,5,6-tetramethylphenyl)	50	0.73		297
–, bis(2,4,6-triisopropylphenyl)	50	0.12		89
1-Dodecanethiol	60	14.8	A	69,126
		19.0		59
	70	19		562
	70	0.69	C3, H	574
	90	1.3	C3, H	574
	100	13.0		156
	110	26.0		156

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TABLE 5. *cont'd*

Modifier	T (°C)	C_X	Remarks	Refs.
Styrene (*cont'd*)				
tert-Dodecanethiol	70	1.5	C3, H	574
	90	1.5	C3, H	574
	90	1.6	C3, H	574
Ethanethiol	50	17.1		331
Ethanol, 2,2′-dithiodi-	50	<0.005		297
–, –, di(chloroacetate)	50	<0.005		297
Ether, ethyl 3-mercaptopropyl	60	14.1	A	126
		21.0		69
	100	13.7		69
Ethyl disulfide	99	0.0045		96
Formamidine, *N,N′*-diphenyl-, 1,1′-dithiobis-	50	6.72	C, F2	251
Formic acid, thio-, dithiobis, *O,O′*–diisopropyl ester	50	5.3		297
	99	7.5		96
1-Heptanethiol	99	15.1		96
1-Hexanethiol	99	15.3		96
–, 1,1,3,3,5,5-hexamethyl-	25	3.2		297
	50	2.9		297
	75	2.4		297
Hexyl disulfide	99	0.0104		96
Hydrogen sulfide	70	5.0		145
Isobutyl disulfide	60	0.0020		304
Isopropyl disulfide	60	0.00066		304
Lauryl disulfide	60	0.00023	A	128
Lepidine, 2,2-dithiodi-	50	0.04		89
Mesityl disulfide	50	0.69		89
Methyl disulfide	60	0.0094		304
Methyl sulfoxide	40	0.0000693	E	458
	50	0.548		375
	60	0.0000242		429
		0.000048	A	438
Morpholine, 4,4′-dithiodi-	50	<0.005		297
1-Naphthalenemethanethiol	25	12.7		297
	50	18.3		297
	75	15.7		297
	99	24.6		96
1-Naphthalenethiol	99	0.15		96
2-Naphthalenethiol	99	0.18		96
1-Naphthoyl disulfide	50	0.34		89
1-Naphthyl disulfide	99	1.57		96
2-Naphthyl disulfide	25	0.17		297
	50	0.19		297
	75	0.29		297
	99	0.36		96
1-Octadecanethiol	99	14.7		96
Octadecyl disulfide	99	0.024		96
1-Octanethiol	5	19.3	H	339
		23.0	H	242
	50	19.0	H	242
–, 1,1,3,3,5,5,7,7-octamethyl-	50	4.7	H	242
2-Octanethiol	99	3.2		96
1,4,5-Oxadithiepane	150	0.057	A	359
1-Pentanethiol	50	20.0	H	344
Phenetole, 2,2′-dithiodi-	99	0.075		96
–, 4,4′-dithiodi-	99	0.33		96
Phenyl disulfide	50	0.06		297
		0.102	A	491
	60	0.0103		368
		0.111	A	491
		0.147		285
Phenyl disulfone	50	0.022	A	491
	60	0.025	A	491
Phenyl sulfide	25	0.0325	D	368
	50	0.056		252
	60	0.00548		368

TABLE 5. *cont'd*

Modifier	T (°C)	C_X	Remarks	Refs.
Styrene (*cont'd*)				
Phenyl sulfone	50	0.021		252
Phenyl sulfoxide	50	0.024		252
1-Propanethiol, 3-(trimethoxysilyl)-	79.5	5.90		474
2-Propanethiol, 2-methyl-	50	4.0	H	344
	60	3.1	A	261
		3.7	A	69,126
	60	4.6		59
	100	1.8	A	261
		2.3	A	69,126
Propionic acid, 3,3-dithiodi-				
–, –, dipropyl ester	50	<0.005		297
–, 2-mercapto-	–	7.7		178
–, 3-mercapto-	–	9.4		178
	50	6.0		297
Propyl disulfide	60	0.00234		304
Pyridine, 2,2′-dithiodi-	50	0.01		89
Quinoline, 2,2′-dithiodi-	50	0.05		89
Sulfide, ethyl 2,4-diphenylbutyl	50	30.0		331
–, ethyl phenethyl	50	7.15		331
1-Tetradecanethiol	50	19.0	H	242
Thiosulfuric acid, *S*-butyl ester				
–, –, sodium salt	60	0.173		490
–, *S*-isopropyl ester, sodium salt	60	0.407		490
–, *S*-phenyl ester				
–, – potassium salt	60	0.763		490
–, *S*-propyl ester, sodium salt	60	0.150		490
p-Toluenethiol	99	0.07		96
α-Toluenethiol	99	25.5		96
–, *p*-methoxy-	99	26.0		96
p-Toluoyl disulfide	60	46.3		369
o-Tolyl disulfide	25	0.22		297
	50	0.23		297
		0.28		297
	75	0.32		297
p-Tolyl disulfide	50	0.11		297
	99	0.15		96
2,6-Xylyl disulfide	50	0.69		297
Vinyl acetate				
Acetic acid, dithiodi-				
–, –, diethyl ester	60	1.41		86
		1.5		351
Acetic acid, ithio-				
–, –, *S*-(2-hydroxyethyl)ester, acetate	60	0.0132	J	140
Acetyl disulfide	60	0.29	J	86
1-Butanethiol	60	48.0		140,397
Butyl disulfide	60	1.0	J	86, 351
Butyl sulfide	60	0.026	J	351
1,4,5-Oxadithiepane	60	0.25–2.5		351
Sulfur	45	470.0	J	28
α-Toluenethiol	70	0.885	C	390
Thiol acetate	60	0.186	F20	575

C. REMARKS

A. Thermal initiation
B. Hydroperoxide initiation
C. Peroxide initiation
  C1. Ammonium persulfate
  C2. Potassium persulfate
  C3. Sodium persulfate
D. Photoinitiation
E. γ-Ray initiation
F. Solution polymerization in:
  F1. Acetonitrile
  F2. Benzene
  F3. Butyl acetate
  F4. Butyl chloride
  F5. Chlorobenzene

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TABLE 5. *cont'd*

Modifier	T (°C)	C_X	Remarks	Refs.
Styrene (*cont'd*)				
Phenyl sulfone	50	0.021		252
Phenyl sulfoxide	50	0.024		252
1-Propanethiol, 3-(trimethoxysilyl)-	79.5	5.90		474
2-Propanethiol, 2-methyl-	50	4.0	H	344
	60	3.1	A	261
		3.7	A	69,126
	60	4.6		59
	100	1.8	A	261
		2.3	A	69,126
Propionic acid, 3,3-dithiodi-				
–, –, dipropyl ester	50	<0.005		297
–, 2-mercapto-	–	7.7		178
–, 3-mercapto-	–	9.4		178
	50	6.0		297
Propyl disulfide	60	0.00234		304
Pyridine, 2,2′-dithiodi-	50	0.01		89
Quinoline, 2,2′-dithiodi-	50	0.05		89
Sulfide, ethyl 2,4-diphenylbutyl	50	30.0		331
–, ethyl phenethyl	50	7.15		331
1-Tetradecanethiol	50	19.0	H	242
Thiosulfuric acid, *S*-butyl ester				
–, –, sodium salt	60	0.173		490
–, *S*-isopropyl ester, sodium salt	60	0.407		490
–, *S*-phenyl ester				
–, – potassium salt	60	0.763		490
–, *S*-propyl ester, sodium salt	60	0.150		490
p-Toluenethiol	99	0.07		96
α-Toluenethiol	99	25.5		96
–, *p*-methoxy-	99	26.0		96
p-Toluoyl disulfide	60	46.3		369
o-Tolyl disulfide	25	0.22		297
	50	0.23		297
		0.28		297
	75	0.32		297
p-Tolyl disulfide	50	0.11		297
	99	0.15		96
2,6-Xylyl disulfide	50	0.69		297
Vinyl acetate				
Acetic acid, dithiodi-				
–, –, diethyl ester	60	1.41		86
		1.5		351
Acetic acid, ithio-				
–, –, *S*-(2-hydroxyethyl)ester, acetate	60	0.0132	J	140
Acetyl disulfide	60	0.29	J	86
1-Butanethiol	60	48.0		140,397
Butyl disulfide	60	1.0	J	86, 351
Butyl sulfide	60	0.026	J	351
1,4,5-Oxadithiepane	60	0.25–2.5		351
Sulfur	45	470.0	J	28
α-Toluenethiol	70	0.885	C	390
Thiol acetate	60	0.186	F20	575

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F6. *o*-Dichlorobenzene
F7. Dimethylformamide
F8. Dimethyl sulfoxide
F9. *p*-Dioxane
F10. Ethyl acetate
F11. Ethyl methyl ketone
F12. Heptane
F13. Water
F14. Magnesium perchlorate
F15. Succinonitrile
F16. Sulfur dioxide
F17. Toluene
F18. Zinc chloride
F19. Octane
F20. Methanol
F21. Propane
F22. Diethyl oxalate
F23. Cyclohexane
F24. Butyl alcohol
F25. Acetic acid
F26. 1,2-Dichloroethane
F27. Ethylbenzene
F28. Cylohexanone
F29. Parabutyr aldehyde
F30. Water–methanol mixture
F31. *tert*-Butyl alcohol
F32. Hexane
F33. 1-Propanol
F34. Carbon tetrachloride

G. Heterogeneous polymerization
H. Emulsion polymerization
I. Recalculated from data of:
I1. Basu, Sen, and Palit (1950)
I2. Baysal and Tobolsky (1952)
I3. Chadha and Misra (1958)
I4. Dixon-Lewis (1949)
I5. Gregg and Mayo (1953)
I6. Ham (1956)
I7. Kwart, Broadbent, and Bartlett (1950)
I8. Matsumoto, et. al. (1959)
I9. Palit and Das (1954)
I10. Palit, Nandi, and Saha (1954)
I11. Saha, Nandi, and Palit (1956)
I12. Stein and Schulz (1960)
I13. Wheeler, Lavin, and Crozier (1952)

J. Apparent transfer constant; retardation occurred
K. Average value
L. Estimated from model compounds
M. For end groups:
M1. Tribromomethyl
M2. Butylamino
M3. Diethylamino
M4. Hydroxymethyl
M5. Aldehyde
M6. Thioglycolate
M7. $-CH(OH)CH_2$-SH
M8. Dodecyl
M9. 2-Hydroxyethyl
M10. $-(CH_2)_{11}SH$

N. For middle groups
O. For side chain
P. For main chain
Q. Telomerization (number of monomer units in transferring chain)
R. Calculated from viscosity average molecular weight
S. Value uncertain
T. In presence of 0.4 mol/l lithium nitrate
U. In presence of ( ) mol/l sodium chloride
V. In presence of ( ) mol/l sodium bromide
W. Under pressure of:
W1. 200 psi (13.8 bar)
W2. 250 psi (17.2 bar)
W3. 1470 psi (101.4 bar)
W4. 5000 psi (344.8 bar)
W5. 20000 psi (1379.0 bar)
W6. 26600 psi (1834.1 bar)
W7. 28400 psi (1958.2 bar)
W8. 56000 psi (3861.2 bar)
W9. 64600 psi (4454.2 bar)
W10. 168000 psi (11583.6 bar)
W11. 600 psi (41.4 bar)
W12. 2500 psi (172.4 bar)
W13. 18 psi (1.2 bar)
W14. 735 psi (50.7 bar)
W15. 14200 psi (979.1 bar)
W16. 42600 psi (2937.3 bar)
W17. 34500 psi (2378.8 bar)
W18. 3000 bar
W19. 2700 bar
W20. 2400 bar
W21. 2000 bar
W22. 1800 bar
W23. 150 bar
W24. 600 bar

X. Corrected for loss of low molecular weight polymer
Y. $CM = 125 \times \exp(-7300/RT)$
Z. $CM = 3.0 \times \exp(-5673/RT)$
AA. $CM = 0.4 \times \exp(-6219/RT)$
BB. $CM = 0.2 \times \exp(-5400/RT)$
CC. $CM = 6.4 \times \exp(-4120/RT)$
DD. $CM = 4.77 \times \exp(-3540/RT)$
EE. Radical is styrene
FF. Radical is *p*-chlorostyrene
GG. 1/C varies with polym. rate and emulsifier of:
GG1. K caprate
GG2. K laurate
GG3. K myristate
GG4. K palmitate
GG5. K rosinate
HH. *C* is combined constant for copolymerization,
$= (C_{S1} \times R_1 \times M_1 + C_{S2} \times R_2 \times M_2)/(R_1 \times M_1 \times M_1 + 2 \times M_1 \times M_2 + R_2 \times M_2 \times M_2)$
II. In presence of $FeBr_2$

II1. In presence of $FE(CO)_5$
II2. In presence of methacrylic acid methyl ester
JJ0. Catalyzed by Co(II)-tetramethylhematoporphyrine
JJ1. Catalyzed by Co(II)-hematoporphyrine-tetramethyl ether
JJ2. Catalyzed by Co(II)-tetra-4-*tert*-butylbenzoporphyrine
JJ3. In presence of $ZnCl_2$; $[ZnCl_2]/[MMA] =$
(a) 0
(b) 0.1
(c) 0.23
(d) 0.40
KK. Copolymerization of acrylonitrile and butyl acrylate
LL. Controlled to pH 3–4 with acetic acid

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Photopolymerization Reactions

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A. INTRODUCTION

UV curing technologies use light beams to start photochemical and chemical reactions in organic materials (monomers, oligomers, prepolymers, polymers), mostly through a Photo-Induced Polymerization (PIP) reaction. This leads to the formation of a new polymeric material whose applications lie in various industrial sectors, such as coatings, graphic arts, imaging, microelectronics, etc. Specific advantages of these technologies over the usual thermal operations are rapid through-cure, solvent-free formulation, room temperature treatment and low energy requirements.

This PIP process is concerned with the creation of a polymer P through a chain radical or cationic reaction initiated by light in the presence of a photoinitiator (PI) and a coupled PI/photosensitizer (PS):

The reactivities of PI and PS govern, for a large part, the practical efficiency of the PIP reaction. The present chapter reports typical data obtained (through time-resolved laser spectroscopy experiments) on the excited state processes in PI and PS occurring after the absorption of the photon. Rate constants reported in the following tables correspond to the following processes:

1.

2. $R^{\bullet}$ (or $A^{\bullet}$ or $S^{\bullet}$ . . .) + M $\xrightarrow{k_{RM}}$ $RM^{\bullet}$
3. $^3PI^*$ + light stabilizer (LS) $\xrightarrow{k_a}$
4. $^3PS^*$ + PI $\xrightarrow{k_T}$ excitation transfer
5. τ_T°: Triplet state lifetime under the given conditions (equal to the reciprocal value of the sum of the first-order rate constants of the different processes)
   τ_T: Triplet state lifetime in the presence of a given additive
6. $^3PS^*$ + cationic photoinitiator C^+ $\xrightarrow{k_e}$ $PS^{\bullet +}$ $C^{\bullet}$
   (a) Energy transfer can sometimes occur:
   $^3PS^* + C^+ \longrightarrow PS + C^{+*}$
   (b) Energy and electron transfer can also occur in the first excited singlet state $^1PS^*$.

Detailed data are available, especially in several chapters of two edited books (1) and in a recent monograph (2). Few data are known on the photopolymerization itself and largely depend on the practical formulation used as well as the experimental conditions. Typically, one photon absorbed can lead to ~10000 polymerized double bonds (3). Rate constants of propagation k_p and termination k_t for a polyurethane acrylate resin containing an acrylate monomer (weight ratio, 1 : 1) as reactive diluent are $\sim 10^4$ l/mol/s and 3×10^4 l/mol/s respectively (when half of the double bonds have been polymerized) (3).

B. TABLES

TABLE 1. RATE CONSTANTS OF CLEAVAGE, ELECTRON TRANSFER AND MONOMER QUENCHING IN RADICAL PHOTOINITIATORS[a]

Compound	$10^{-8}k_c$ (s^{-1})	$10^{-9}k_e$ (l/mol/s)	$10^{-6}k_q$ (l/mol/s)	Monomers[b]/amines[c]/ solvents[d]	Refs.
I1a		1.3	66	M_1, AH_1, S_1	4
I1b		2.0	150		
I1c		1.2	2.5		
I1d		1.2	2		
I1e		0.2	1		
I1f		0.07	13		
I1g		1.5	180		
I1h		0.6	8		
I1i		0.27	0.05		
I1a			3200	M_2, S_2	21
			360	M_5, S_2	21
			5.4	M_3, S_2	21
			34	M_4, S_2	21
I1a		0.003[e]			22
		0.001[f]			
I1a		7		S_2, AH_3	26
		2		S_2, AH_4	
		1.9		S_2, AH_2	
		2		S_2, AH_5	
		0.56		S_2, AH_6	
I1j	10			S_3	23
I1k		0.5	1500	M_7, AH_2, S_4	25
I1l		0.9	1550		
I1m		0.0064[e]		S_2	26
I1n		0.0025[e]			
I1p		0.0056[e]			
I1q		0.0043[e]			
I1r			56	S_6, M_1	26
I1s			110		
I1r			5500	S_6, M_2	26
I1s			7400		
I1r			5100	S_6, M_5	26
I1s			6500		
I1r			49	S_6, M_3	26
I1s			140		
I1r			9.4	S_6, M_4	26
I1s			50		
I2a	7.14		250	M_1, AH_1, S_1	5
I2b	0.87	0.26	20		
I2c	0.003	<0.001	4.5		
I2d	0.00025	0.08	8		
I2e	0.83	0.20	22		
I2f	0.003	0.08	10		
I2g	0.67	0.17	29		
I2h	1.18	0.15	20		
I2i	0.80	0.05	21		

TABLE 1. *cont'd*

Compound	$10^{-8}k_c$ (s^{-1})	$10^{-9}k_e$ (l/mol/s)	$10^{-6}k_q$ (l/mol/s)	Monomers[b]/amines[c]/ solvents[d]	Refs.
I3a	10		≥200	M_1, AH_1, S_1	6
I3b	1		2		
I3c	25				
I3d	0.005	$<10^{-4}$			
I3e	10				
I3f	0.006	$\approx 10^{-4}$			
I3g	0.007	$<10^{-4}$			
I3h	0.13	$<10^{-4}$			
I4a	≥100			S_1	7
I4b	≥100				
I4c	≥100				
I4d	≥100				
I4e			8100	M_2, S_2	7
I4f			4800		
I4g			6500		
I4h			1500		
I4i			190		
I4e			480	M_1, S_2	7
I4f			800		
I4g			1000		
I4h			200		
I4i			13		
I4f			60	M_3, S_2	7
I4g			17		
I4h			<1		
I4i			5.7		
I4f			1300	M_4, S_2	7
I4g			700		
I4h			380		
I4i			180		
I5a	≥10				8
I6a	7×10^{-3}		0.7	M_1, S_1	9
I7a		0.7	0.05	M_1, AH_1, S_1	9
I7b		6×10^{-5}	440		
I8a		0.85	0.35	M_1, AH_1, S_1	9
I9a		2.5	11	M_1, AH_1, S_1	9
I10a	≥10				10
I11a	0.8			M_1, AH_1, S_1	10
I11b	≥1				
I11c	0.12	0.9	700		
I11d	0.01	0.4	1200		
I12a			480	M_1, S_2	11
I12b			800		
I12c			1000		
I12d			200		
I12e			13		
I12a			8100	M_2, S_2	11
I12b			4800		
I12c			6500		
I12d			1500		
I12e			190		
I12b			6	M_3, S_2	11
I12c			17		
I12d			<10		
I12e			5.7		
I12b			1300	M_4, S_2	11
I12c			700		
I12d			380		
I12e			180		
I13a	1.4	1.6		AH_2, S_2	12
I14a			11000	M_1, AH_1, S_1	13
I14b		6.5	2900		
I14c		6.0	15		
I14d		3.5	1200		
I15a	>5			S_2	14
I15b	4				
I15c	>5				

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TABLE 1. *cont'd*

Compound	$10^{-8}k_c$ (s^{-1})	$10^{-9}k_e$ (l/mol/s)	$10^{-6}k_q$ (l/mol/s)	Monomers[b]/amines[c]/ solvents[d]	Refs.
I15d	3.3				
I16a		1.5	180	AH_1, S_1	15
I16b	>3				
I17a	0.05		300	S_1	16
I18a	0.16			S_1	17
I19a	0.3	0.7	100	S_1	18
I20a	29			S_2	18
I21a	60			S_2	18
I22a	~10			S_3	19
I22b	~5		93		
I22c	0.02		2.3		
I22d	0.014		2.0		
I23a		6	15	M_1, AH_3, S_2	20
I23b		5	2		
I23c		4	3		
I23d		4	3		
I23e		0.01		AH_2, S_5	24
I23f		0.017			
I23a		2.5	3000	M_2, S_2, AH_2	20
I23b			6000		
I23c			6000		
I23d			6000		
I23a			0.2	M_3, S_2	20
I23b			0.02		
I23c			0.03		
I23d			0.04		
I23a			4	M_4, S_2	20
I23b			0.4		
I23c			1		
I23d			1		
I23a			40	M_5, S_2	20
I23b			30		
I23c			5		
I23d			6		
I23a			1	M_6, S_2	20
I23b			1		
I23c			0.3		
I23d			0.3		
I23a		8		S_2, AH_4	26
I23b		6			
I23c		6			
I23d		6			
I23a			26	S_1, M_8	13
I23a			23	S_1, M_9	13
I23b		8		S_2, AH_7	26
I23b		0.85		S_2, AH_8	26
I23g		$<10^{-5}$	65	M_7, S_4	25
I23h		$<10^{-5}$	37		
I24			0.016	S_2, M_1	37
I25			0.006	S_2, M_{10}	37
I26			0.007	S_2, M_{10}	37
I27		4.4[f]		S_2	39
I28		0.3			
I29		0.015		S_7, AH_9	41

[a]Compound chemistries given in Annex to Table 1.
[b]*Monomers:* M_1 – methyl methacrylate; M_2 – styrene; M_3 – vinyl acetate; M_4 – acrylonitrile; M_5 – vinyl pyrrolidone; M_6 – butylvinylether; M_7 – acrylamide; M_8 – PETA; M_9 – TMPTA; M_{10} – butylmethacrylate.
[c]*Amines:* AH_1 – methyl diethanolamine; AH_2 – triethylamine; AH_3 – ethyl-4-(dimethylamino)-benzoate; AH_4 – bis-(2-hydroxy ethyl)-methylamine; AH_5 – methyl-4-amino benzoate; AH_6 – 1,4-diazabicyclo [2.2.2] octane (DABCO); AH_7 – dimethylamine; AH_8 – 2-(dimethyl aminoethyl)-benzoate; AH_9 – diethylaniline.
[d]*Solvents:* S_1 – toluene; S_2 – benzene; S_3 – acetonitrile; S_4 – water; S_5 – 2-propanol; S_6 – acetone; S_7 – ethanol.
[e]Rate constant of H abstraction by THF.
[f]Rate constant of H abstraction by isopropanol.

ANNEX TO TABLE 1. PHOTOINITIATOR COMPOUND CHEMISTRIES

	Compound	R	R_1	R_2	R_3	R_4
	I1a		H	H	H	H
	I1b		H	H	H	OCH_3
	I1c		H	H	H	SCH_3
	I1d		H	H	H	S–ϕ
	I1e		H	H	H	$N(CH_3)_2$
	I1f		$N(CH_3)_2$	H	H	$N(CH_3)_2$
	I1g		O–ϕ	H	H	O–ϕ
	I1h		CH_3	CH_3	CH_3	H
	I1i		H	H	H	ϕ
	I1j	COOOR				
	I1k	$-CH_2N(CH_3)_3^+Cl^-$				
	I1l	$-CH_2SO_3^-Na^+$				
	I1m	Cl				
	I1n	OCH_3				
	I1p	F				
	I1q	COOH				
	I1r	$COOCH_3$				
	I1s					
	I2a		H	H		
	I2b		OCH_3	H		
	I2c		$N(CH_3)_2$	H		
	I2d		SCH_3	H		
	I2e		$O(CH_2)_2OH$	H		
	I2f		$S(CH_2)_2OH$	H		
	I2g		$O(CH_2)_2Si(C_2H_5O)_3$	H		
	I2h		$O(CH_2)_2OCOCH{=}CH_2$	H		
	I2i		$O(CH_2)_2OCOCH{=}CH_2$	$COCH{=}CH_2$		
	I3a	H				
	I3b	SCH_3				
	I3c	OCH_3				
	I3d	$N(CH_3)_2$				
	I3e		H	C_6H_5	$N(CH_3)_2$	
	I3f			C_6H_5	$N(CH_3)_2$	
	I3g			$CH{=}CH_2$	$N(CH_3)_2$	
	I3h			$CH{=}CH_2$		
	I4a					
	I4b	OCH_3				
	I4c	OC_4H_9				
	I4d	$OCH(CH_3)_2$				
	I4e	OH				
	I4f	$OCOCH_3$				
	I4g	H				
	I4h	CH_3				
	I4i					

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ANNEX TO TABLE 1. *cont'd*

	Compound	R	R_1	R_2	R_3	R_4
	I5a					
	I6a					
	I7a	H				
	I7b	$CH_2SO_3^-Na^+$				
Fluorenone	I8a					
	I9a					
	I9b					
	I10a			C_2H_5		
	I11a		H	H		
	I11b		H	CH_3		
	I11c		CH_3	H		
	I11d		CH_3O	H		
	I12a	OH				
	I12b	$OCOCH_3$				
	I12c	H				
	I12d	CH_3				
	I12e					
	I13a	CH_3				
	I14a	H				
	I14b	i-C_3H_7				
	I14c	OC_2H_5				
	I14d	t-C_4H_9				
	I15a					
	I15b	H				
	I15c	CH_3				
	I15d					
	I16a					

ANNEX TO TABLE 1. *cont'd*

	Compound	R	R_1	R_2	R_3	R_4
	I16b					
	I17a					
	I18a					
	I19a					
	I20a					
	I21a					
	I22a		H	C_8H_{17}		
	I22b		NO_2	H		
	I22c					
	I22d			$C_{12}H_{25}$		
	I23a	H	H	H		
	I23b	Cl	H	H		
	I23c	CH_3	H	H		
	I23d	$CH_3(CH_3)_2$	H	H		
	I23e	H	Br	OC_3H_7		
	I23f	H	Cl	OC_3H_7		
	I23g	$-OCH_2COOH$				
	I23h	$OCH_2CH_2CH_2\overset{+}{N}(CH_3)_3SO_3Me^-$				
	I24					
Acridine	I25					
Phenazine	I26					
	I27					
	I28					
	I29					

TABLE 2. BIMOLECULAR RATE CONSTANTS[a] FOR THE REACTION OF PHOSPHONYL RADICALS WITH VARIOUS MONOMERS IN CYCLOHEXANE AT ROOM TEMPERATURE[b]

Monomer	Radical				
Methacrylonitrile	5.0	4.6	4.5	9.2	11
Styrene	6.0	4.5	8.0	22	25
Methylmethacrylate	8.0	5.0	5.8	5.8	5.3
Acrylonitrile	2.0	2.0	0.18	0.58	0.26
Methyl acrylate	3.5	2.1	1.3	1.7	1.6
n-Butyl vinyl ether	0.4	0.3	0.23	2.1	1.4
Vinyl acetate	0.16	0.13	0.082	0.29	0.18

[a] k_{RM} in 10^7 l/mol/s.
[b] Ref. 26.

TABLE 3. BIMOLECULAR RATE CONSTANTS[a] FOR THE REACTION OF VARIOUS RADICALS WITH VARIOUS OLEFINIC MONOMERS AT ROOM TEMPERATURE[b]

Monomer	Radical							
	$Ph-\dot{C}(OH)-Ph$	$H_3C-\dot{C}(OH)-CH_3$		$Ph-\dot{C}(=O)$	$Ph_2\dot{P}=O$	$Ph^{\bullet}$	$PhS\dot{O}_2$	$PhS\dot{O}_3$
Styrene		3.5×10^{-2}	7×10^{-4}	1.2×10^{-2}	6			
Methylmethacrylate	9×10^{-4}	5.4×10^{-2}	4×10^{-5}	0.9×10^{-2}	6	18[c]	10^{-3}[†]	10^{-1}[†]
Acrylonitrile	4×10^{-4}	1.6×10^{-2}		2×10^{-3}	2			
Methyl acrylate					2			
n-Butyl vinyl ether			$< 10^{-6}$		0.5			
Vinyl acetate	6×10^{-4}			2×10^{-2}	0.2			
N-Vinylpyrrolidone			4×10^{-5}					

[a] k_{RM} in 10^7 l/mol/s.
[b] Ref. 26.
[c] From Ref. 40.
[†] From Ref. 16.

TABLE 4. BIMOLECULAR RATE CONSTANTS[a] FOR THE REACTION OF $Ph_2\dot{P}=O$ AND $Ph_2\dot{P}=S$ WITH VARIOUS MONOMERS[b,c]

Monomer	Radical	
	$Ph_2\dot{P}=O$	$Ph_2\dot{P}=S$
Methacrylonitrile	1.9	0.9
Styrene	4.6	0.4
Methylmethacrylate	4.1	0.19
Acrylonitrile	1.3	0.52
Methyl acrylate	1.7	0.62
n-Butyl vinyl ether	5.0	0.15
Vinyl acetate	1.4	0.042

[a] k_{RM} in 10^7 l/mol/s
[b] Ref. 27.
[c] Experiments were carried out in CH_2Cl_2 solution at room temperature.

TABLE 5. ELECTRON TRANSFER REACTION OF RADICALS WITH DIPHENYLIODONIUM SALTS

Radicals	$10^{-9}k_e$ (l/mol/s)	Refs.
$Ph_2P\dot{O}$	$\leq 10^{-3}$	42
$Ph_2\dot{C}OH$	0.03	43
$(CH_3)_2\dot{C}OH$	0.06	

TABLE 6. ELECTRON TRANSFER RATE CONSTANTS (k_e) BETWEEN PHOTOSENSITIZERS AND CATIONIC PHOTOINITIATORS AND QUENCHING RATE CONSTANTS (k_q) FOR CYCLOHEXENE OXIDE IN METHANOL (M) AND ACETONITRILE (AN)

Photosensitizer	Cationic photoinitiator	Anion	Solvent	$10^{-7}k_e$ (l/mol/s)	$10^{-7}k_q$ (l/mol/s)	Refs.
Chlorothioxanthone		AsF_6^-	M	24	0.3	28
		Cl^-		24		
		PF_6^-		26		
		BF_4^-		24		
		AsF_6^-	AN	290		
Chlorothioxanthone		AsF_6^-	M	400		
				36		
Benzophenone		AsF_6^-	M	15	0.33	
		Cl^-		1		
		BF_4^-		47		
Ketocoumarin		BF_4^-	M	6.4	0.04	
Chlorothioxanthone	$(C_6H_5)_3S^+ PF_6^-$		M	14		29
		PF_6^-		35		
		PF_6^-		28		
		SbF_6^-		4		
		AsF_6^-		8		
		BF_4^-		570		
		BF_4^-		110		
		PF_6^-		14		
		AsF_6^-		100		
		BF_4^-		38		
	$(C_6H_5)_3Se^+AsF_6^-$			15		

TABLE 6. *cont'd*

Photosensitizer	Cationic photoinitiator	Anion	Solvent	$10^{-7}k_e$ (l/mol/s)	$10^{-7}k_q$ (l/mol/s)	Refs.
Xanthone		Cl^-	M	140		30
Michler's ketone				0.7		
Thioxanthone				200		
10-Methylacridone				350		
Acridone				740		
Anthracene			M	1		31
Chlorothioxanthone	$(NO_2\varphi)_2I^+$	Cl^-		400		28
Pyrene				130		
Benzophenone				500		
Isopropylthioxanthone				250		

TABLE 7. EXCITATION TRANSFER RATE CONSTANTS (k_T) FOR THIOXANTHONES AND PHOTOINITIATORS[a]

Thioxanthone	Initiator	Solvent	$10^{-6}k_T$ (l/mol/s)
TXI	HMK	Toluene	100
		Methanol	290
	OMK	Toluene	75
		Methanol	380
	TPMK	Toluene	240
		Methanol	630
	NMK	Toluene	4700
		Methanol	7900
ETX	TPMK	Toluene	12
		Methanol	110
ITX	TPMK	Toluene	60
		Methanol	55

[a]Ref. 32.

ANNEX TO TABLE 7. COMPOUND CHEMISTRIES

TX's	R	R_1	R_2	R_3	R_4	Abbrev.	Triplet state energy level (kcal/mol)
		H	Cl	H	H	CTX	62
		H	$CH(CH_3)_2$	H	H	ITX	61
		CH_3	H	COOET	H	ETX	58,5
		H	H	H	COOET	TXI	63
Mok's							
	H					HMK	65
	SCH_3					TPMK	61
	OCH_3					OMK	65
	$N(CH_3)_2$					NMK	63

TABLE 8. TRIPLET STATE LIFETIMES (τ_T) OF THE SENSITIZER (TXI) IN DIFFERENT MEDIA[a], AND RATE CONSTANT (k_T) OF THE INTERACTION BETWEEN TXI AND TPMK[b]

Medium	τ_T (ns)	η (cp at 28°C)	$10^{-6}k_T$ (l/mol/s)
TMPTA[c] (100%)	650	40	80
Acrylate (66/33)	2200	185	31
Toluene–Ep. acrylate (50/50)	1500	9.5	35
Toluene–TMPTA (25/75)	270	5.8	135
Toluene–TMPTA (50/50)	200	1.7	<40
Toluene–TMPTA (75/25)	280	0.9	150
HDDA[d] (100%)	650	5.2	95
HDDA–Ep. acrylate (50/50)	2500	58	22
Toluene–HDDA (50/50)	1000	1.2	140
Toluene–HDDA–Ep. acrylate (25/50/25)	850	5.8	68
Toluene–PETA[e] (50/50)	220	3.1	40
Toluene–PETA–Ep. acrylate (43/43/14)	360	6.9	69
Toluene	50	0.53	240
Methanol	140	0.52	630

[a]Viscosity: η.
[b]Ref. 33; for formula, see Annex to Table 7.
[c]Trimethylolpropane triacrylate.
[d]Hexanedioldiacrylate.
[e]Pentaerythritol triacrylate.

TABLE 9. SOME VALUES OF THE TRIPLET STATE ENERGY LEVELS OF PHOTOINITIATORS AND MONOMERS

Compound	Triplet state energy (ΔE) (kcal/mol)	
I1a	69	Cited in Ref. 13
I4a	73	
I7a	53	
I8a	53	
I9b	59	
M_2	61	
I14a	75	Cited in Ref. 38
I24	57	

TABLE 10. VALUES OF τ_T^0, τ_T, AND $k_a^{b\dagger}$ IN SOLUTION

Photoinitiators	τ_T^0 (ns)	τ_T (ns)	$10^{-6}k_a^b$ (l/mol/s)
	4200	4000	0.85
	3300	2000	14
	470	470	≤5
	4000	1750	24

†Determined in bulk epoxyacrylate–HDDA (60:40 w/w); a in solution b in the presence of LS1 (2%).; Ref. 34.

TABLE 11. RATE CONSTANT OF INTERACTION OF KETONES AND LIGHT STABILIZERS IN SOLUTION

Photoinitiator	Light stabilizer	$10^{-6}k_a$ (l/mol/s)	Refs.
Benzophenone	LS1	6500	34
	LS2	8550	
	LS3	10300	
	LS4	15000	
	LS5	7050	
	SL6	5900	35
Acetone	LS1	500	36
	LS7	700	

ANNEX TO TABLE 11.

LS1:

LS2:

LS3:

LS4:

LS5:

LS6:

LS7:

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Free Radical Copolymerization Reactivity Ratios

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A. INTRODUCTION

When a vinyl monomer is copolymerized with a second monomer, the relationship between the composition of the initially formed copolymer and the initial monomer mixture is given by

$$\frac{dm_1}{dm_2} = \frac{M_1(r_1M_1 + M_2)}{M_2(r_2M_2 + M_1)}$$

where m_1 is the number of moles of monomer 1 entering the copolymer, m_2, the number of moles of monomer 2 entering the copolymer, M_1, the number of moles of monomer 1 in the monomeric mixture, M_2, the number of the moles of monomer 2 in the monomer mixture, and r_1 and r_2 are the monomer reactivity ratios.

The monomer reactivity ratios, r_1 and r_2, for any monomer pair are the ratios of the rate constants of the different propagation reactions:

$$\sim M_1^{\bullet} + M_1 \longrightarrow \sim M_1M_1^{\bullet} \quad k_{11}$$
$$\sim M_1^{\bullet} + M_2 \longrightarrow \sim M_1M_2^{\bullet} \quad k_{12}$$
$$\sim M_2^{\bullet} + M_2 \longrightarrow \sim M_2M_2^{\bullet} \quad k_{22}$$
$$\sim M_2^{\bullet} + M_1 \longrightarrow \sim M_2M_1^{\bullet} \quad k_{21}$$

with $r_1 = k_{11}/k_{12}$, $r_2 = k_{22}/k_{21}$. $\sim M^{\bullet}$ represents a polymer chain ending in a radical derived from monomer M.

The original compilations of reactivity ratios and their references were published by L. J. Young in the first two editions of this Handbook. In the third edition, the original listings and those through 1986 were re-evaluated. This fourth edition contains an additional 548 evaluated monomer pairs giving a total of 3,265 such pairs. Only free radical reactivity ratios are listed. When the original references were available, they were read. If the experimental data was published, the reactivity ratios were recalculated according to the methods of Kelen and Tűdös (803,804). The 95% confidence limits for the reactivity ratios were also calculated (805). If the authors used this method for r-value evaluation, including adjustment of the monomer feeds for total conversion, then the reported values were utilized. There are a number of reported reactivity ratios that are not reported here. This is due to the absence of these values in the abstracts of papers which were published in journals unavailable to the author.

All of the monomer pairs in Table 1 are cross-referenced. The full spelling of each monomer was included in its Monomer 1 citation. Sometimes truncated but distinguishable names have been used in the Monomer 2 lists.

If only the reactivity ratios and reference are given, then, either no experimental data was given or the journal was not available and the Chemical Abstracts summary was the source of the data. If a Y or N (yes or no) appears in the conversion (Conv.) column then the reactivity ratios were recalculated. If a recalculation was performed but the 95% confidence columns (95%) are still left blank, it indicates that only two feed/polymer data pairs were available. In general, if there is a citation (Y or N) in the Conv. column but no reactivity ratios are shown in the reactivity ratio columns, the copolymerization did not follow the copolymerization equation (ionic or penultimate effects were prevalent). In a few cases, the data were too scattered to allow a reactivity ratio calculation.

Recalculations yield negative reactivity ratios in several cases. We are aware that this is a physically unrealistic artifact. When the 95% confidence limits are applied to these negative numbers, a value of zero usually falls within these limits. It may be noted that a single reference sometimes contains a variety of reactivity ratios for one monomer pair. The reader may assume that these result from a change of polymerization conditions; e.g., different polymerization temperatures or polymerization media of varying polarity.

For those who are interested in using the Kelen–Tűdös calculations, a listing of a simplistic program written in QuickBasic (Microsoft) is also given (Table 2).

*Retired.

B. TABLES

TABLE 1. COPOLYMER REACTIVITY RATIOS

Monomer 1	Monomer 2	r_1	±95%	r_2	±95%	Conv.	Refs.
Acenaphthalene	Acrylate, (−)-menthyl					Y	645
Acenaphthalene	Acrylonitrile	2.56		0.02			575
Acenaphthalene	Carbazole, *N*-vinyl-	6.62	1.77	−0.03	0.12	N	331
Acenaphthalene	Fumarate, diisopropyl	2.57		0.06			1039
Acenaphthalene	Maleic anhydride	0.46		0.02			1039
Acenaphthalene	Maleic anhydride	0.46	0.13	−0.04	0.05	N	26
Acenaphthalene	Maleimide, *N*-cyclohexyl-	0.57		0.11			1039
Acenaphthalene	Methacrylate, (−)-menthyl	2.48	0.55	0.316	0.085	Y	645
Acenaphthalene	Methacrylate, methyl	1.05	0.14	0.36	0.04	N	326
Acenaphthalene	Methacrylate, methyl	0.99	0.15	0.38	0.04	N	326
Acenaphthalene	Methacrylate, methyl	2.25		0.44			575
Acenaphthalene	Methacrylonitrile	2.38		0.15			575
Acenaphthalene	Pyrrolidone, *N*-vinyl-					N	326
Acenaphthalene	Pyrrolidone, *N*-vinyl-					N	326
Acenaphthalene	Stilbene	5.65	0.23	−0.01	0.04	N	725
Acenaphthalene	Styrene	0.33		3.81			525
Acetamide, *N*-(4-methacryloyloxyphenyl)-2-(4-methoxy)	Methacrylate, 2-hydroxyethyl	1.49		0.61			1051
Acetamide, *N*-vinyl-	Acrylamide	0.3		1.4			984
Acetamide, *N*-vinyl-	Methacrylate, methyl	0.19		2.65			984
Acetamide, *N*-vinyl-	Methacrylate, methyl	0.71		1.18			984
Acetamide, *N*-vinyl-	Methacrylate, methyl	0.01		2.1			984
Acetamide, *N*-vinyl-	Vinyl acetate	5.5		0.6			984
Acetamide, *N*-vinyl-	Vinyl acetate	21		0			984
Acetanilide, 4-(2-methacryloyloxy)-ethyloxy)	Methacrylate, 2-hydroxyethyl	0.67		1.39			1096
Acetanilide, 4-(2-methacryloyloxy)-hexyloxy)	Methacrylate, 2-hydroxyethyl	0.87		1.19			1096
Acetanilide, 4-(methacryloyloxy)-	Methacrylate, 2-hydroxyethyl	1.94		0.78			1096
Acetate, 2-chloro-, vinyl	Vinyl acetate	1.18		0.8			892
Acetate, allyl	Vinyl acetate	0.43		1.8			1045
Acetate, chloro-, allyl	Vinyl acetate	0.69		0.77			1045
Acetate, dichloro-, allyl	Vinyl acetate	0.54		0.57			1045
Acetate, isopropenyl	Fumarate, diisopropyl	0.011		0.67			1038
Acetate, trichloro-, allyl	Vinyl acetate	0.28		0.41			1045
Acetylene, phenyl-	Acrylate, methyl	0.272	0.072	0.622	0.062	Y	60
Acetylene, phenyl-	Acrylate, methyl	0.093	0.01	0.664	0.045	Y	731
Acetylene, phenyl-	Acrylonitrile	0.325	0.083	0.266	0.044	Y	60
Acetylene, phenyl-	Isoprene	0.1		3.01			648
Acetylene, phenyl-	Maleic anhydride	0.08		0.06			797
Acetylene, phenyl-	Methacrylate, methyl	0.2		1.5			443
Acetylene, phenyl-	Methacrylate, butyl	0.21		1.7			565
Acetylene, phenyl-	Methacrylate, isobutyl	0.27		1.9			565
Acetylene, phenyl-	Methacrylate, methyl	1.69	26.56	−0.06	0.16	Y	357
Acetylene, phenyl-	Methacrylate, methyl	0.07	0.016	1.111	0.095	Y	732
Acetylene, phenyl-	Methacrylonitrile	0.04		0.78			648
Acetylene, phenyl-	Pyridine, 2-vinyl-					Y	192
Acetylene, phenyl-	Styrene	0.33	0.12	0.324	0.02	Y	357
Aconitate, trimethyl	Acrylonitrile	−0.48	0.11	4.24	0.92	Y	147
Aconitate, trimethyl	Butadiene	0	0.22	0.4	0.4	Y	147
Aconitate, trimethyl	Styrene	−0.013	0.009	1.026	0.091	Y	147
Aconitate, trimethyl	Vinyl chloride	0.19		0.04		Y	147
Aconitate, trimethyl	Vinylidene chloride	0.15	0.94	64.6	23.74	N	149
Acrolein	Acrylamide	1.95	0.58	0.8	0.23	N	207
Acrolein	Acrylamide	1.59	0.1	0.18	0.02	N	208
Acrolein	Acrylate, butyl	1.86	0.19	0.638	0.032	Y	291
Acrolein	Acrylate, butyl	2.29	0.58	1.12	0.41	N	292
Acrolein	Acrylate, ethyl	1.2		0.6			291
Acrolein	Acrylate, ethyl	1.98	0.44	1.09	0.25	N	292
Acrolein	Acrylate, methyl	−0.07	0.03	7.86	3.58	N	207
Acrolein	Acrylate, methyl	1.41	0.4	0.83	0.12	Y	291

TABLE 1. *cont'd*

Monomer 1	Monomer 2	r_1	±95%	r_2	±95%	Conv.	Refs.
Acrolein	Acrylate, methyl	2.54	0.93	1.08	0.38	N	292
Acrolein	Acrylic acid	2.48	1.24	0.08	0.28	Y	57
Acrolein	Acrylic acid	0.5		1.15			57
Acrolein	Acrylonitrile	1.16	0.13	0.88	0.06	N	207
Acrolein	Acrylonitrile	1.07	0.08	0.71	0.03	N	207
Acrolein	Acrylonitrile	1.52	0.07	0.48	0.01	N	208
Acrolein	Acrylonitrile	1.28		0.6			504
Acrolein	Methacrylate, methyl	0.76	0.12	1.136	0.05	Y	291
Acrolein	Methacrylate, methyl	0.59	0.3	1.33	0.4	N	292
Acrolein	Methacrylonitrile	0.68	0.12	1.17	0.05	N	208
Acrolein	Methacrylonitrile	0.72		1.2			446
Acrolein	Pyridine, 2-vinyl-	2.64	0.14	−0.12	0.03	N	208
Acrolein	Styrene	0.216	0.036	0.257	0.017	Y	291
Acrolein	Styrene	0.02	0.01	0.22	0.02	N	292
Acrolein	Styrene	0.32	0.002	0.205	0.006	Y	307
Acrolein	Styrenesulfonate, *p*-, sodium	0.395	0.092	0.327	0.033	Y	57
Acrolein	Styrenesulfonate, *p*-, sodium	0.26	0.16	0.047	0.071	Y	57
Acrolein	Styrenesulfonate, *p*-, sodium	0.113	0.018	0.01	0.009	Y	57
Acrolein	Vinyl acetate	3.04	0.43	−0.02	0.12	N	207
Acrolein	Vinyl chloride	5.22	0.13	0.03	0.11	N	271
Acrolein diethylacetal	Acrylonitrile	0.02		11.19			767
Acrolein diethylacetal	Maleic anhydride	0.18		0.07			767
Acrolein, methyl-	Acrylate, butyl	2.5		0.02			589
Acrolein, methyl-	Acrylonitrile	1.7		0.15			455
Acrolein, methyl-	Acrylonitrile	3.8		0.15			587
Acrolein, methyl-	Acrylonitrile	3.8		0.15			589
Acrolein, methyl-	Acrylonitrile	1.72	0.42	0.03	0.19	Y	91
Acrolein, methyl-	Methacrylate, methyl	0.4		0.1			589
Acrolein, methyl-	Methacrylonitrile	1.78	0.07	0.41	0.01	N	208
Acrolein, methyl-	Methacrylonitrile	1.25		0.45			587
Acrolein, methyl-	Methacrylonitrile	1.25		0.45			589
Acrolein, methyl-	Styrene	0.833	0.092	0.173	0.017	N	223
Acrolein, methyl-	Styrene	0.3		0.41			589
Acrolein, methyl-	Vinyl acetate	0.98		0.15			589
Acrolein, 2-chloro-	Styrene	0.15	0.07	0.02	0.05		806
Acryl-2′-ethyl-4,5,7-trinitro-9-flurenone-2-carboxylate	Acrylate, *N*-(2-hydroxyethyl)-carbazolyl	0.585	0.028	0.912	0.079	Y	715
Acryl-2′-ethyl-4,5,7-trinitro-9-flurenone-2-carboxylate	Methacrylate, *N*-(2-hydroxyethyl)-carbazolyl	0.102	0.022	0.773	0.096	Y	703
Acrylamide	Acetamide, *N*-vinyl-	1.4		0.3			984
Acrylamide	Acrolein	0.8	0.23	1.95	0.58	N	207
Acrylamide	Acrolein	0.18	0.02	1.59	0.1	N	208
Acrylamide	Acrylic acid	1.08	0.17	0.288	0.029	Y	221
Acrylamide	Acrylic acid	0.445	0.075	1.644	0.069	Y	278
Acrylamide	Acrylic acid	1.346	0.044	0.341	0.012	Y	278
Acrylamide	Acrylic acid	0.598	0.047	1.38	0.14	N	37
Acrylamide	Acrylic acid	0.58		3.8			869
Acrylamide	Acrylic acid	1.06		0.29			869
Acrylamide	Acrylic acid, *cis*-3-bromo-	7.64	1.67	−0.2	0.11	Y	298
Acrylamide	Acrylic acid, *cis*-3-ethyl-	6.32	0.68	−0.16	0.1	Y	298
Acrylamide	Acrylic acid, *trans*-3-bromo-	4.13	0.76	−0.33	0.16	Y	298
Acrylamide	Acrylic acid, *trans*-3-ethyl-	8.19	1.09	−0.21	0.11	Y	298
Acrylamide	Acrylonitrile	0.81	0.11	0.863	0.033	Y	228
Acrylamide	Acrylonitrile	1.08	0.51	0.97	0.1	Y	228
Acrylamide	Acrylonitrile	0.5	0.26	1.8	0.75	N	330
Acrylamide	Acrylonitrile	1.36		0.88			421
Acrylamide	Acrylonitrile	1.3		0.8			461
Acrylamide	Cinnamic acid, *cis*-	3.84	0.68		0.28	Y	298
Acrylamide	Cinnamic acid, *trans*-	3.4	0.24	−0.24	0.15	Y	298
Acrylamide	Crotonic acid	3.76	0.89	−0.18	0.14	Y	298
Acrylamide	Crotonic acid	4.23	1.37	−0.19	0.19	Y	298
Acrylamide	Crotonic acid	4.72		0.11			569
Acrylamide	Crotonic acid	5.32		0.12			569
Acrylamide	Crotonic acid, *cis*-					Y	341
Acrylamide	Crotonic acid, *trans*-	7.2	0.33	−0.085	0.024	Y	341

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TABLE 1. *cont'd*

Monomer 1	Monomer 2	r_1	±95%	r_2	±95%	Conv.	Refs.
Acrylamide	Dioxolane, 1,3,4-methylene-2-trichloro-	8.6		0.037			616
Acrylamide	Maleic anhydride	0.56		0			655
Acrylamide	Methacrylate, 2-hydroxyethyl	0.05		1.89			689
Acrylamide	Methacrylate, 2-hydroxyethyl	0.14		0.98			928
Acrylamide	Methacrylate, 3-methoxy-2-hydroxypropyl	0.04		3.98			689
Acrylamide	Methacrylate, dimethylaminoethyl sulfate	0.52	0.05	1.9	0.2		1052
Acrylamide	Methacrylate, methyl	2.29	0.44	2.34	0.17	N	314
Acrylamide	Methacrylate, methyl	0.53	0.09	3	0.09	N	314
Acrylamide	Methacrylate, methyl	0.82		2.53			314
Acrylamide	Methacrylate, methyl	0.9	1.07	3	0.45	N	691
Acrylamide	Methacrylic acid	0.57		1.63			1028
Acrylamide	Methacrylic acid	0.58		4.4			852
Acrylamide	Methacrylic acid	0.56		0.15			852
Acrylamide	Methylenebutyrolactone	0.3		2.85			746
Acrylamide	Styrene	0.58	0.12	1.17	0.06	N	295
Acrylamide	Styrene	1.32	0.13	1.21	0.04	N	314
Acrylamide	Styrene	0.33	0.14	1.49	0.16	N	314
Acrylamide	Styrene	0.59		1.13			314
Acrylamide	Styrene	8.97	0.43	0.65	0.03	N	343
Acrylamide	Styrene	0.2		1.05			555
Acrylamide	Succinimide, *N*-vinyl-	1.86		0.17			600
Acrylamide	Vinyl chloride					Y	156
Acrylamide	Vinyl methyl ketone	3.99	0.7	0.47	0.44	Y	609
Acrylamide	Vinyl methyl ketone	1.02	0.13	0.75	0.23	Y	609
Acrylamide	Vinylene carbonate	13.8		0.05			387
Acrylamide	Vinylmethylphenylsulfonium tetrafluoro	3.4		0.1			793
Acrylamide	Vinylsulfonic acid	3.5	0.15	0.3	0.1		1066
Acrylamide, 2-chloro-*N*,*N*-dimethyl-	Methacrylate, methyl	−0.159	0.502	2.71	0.398	Y	917
Acrylamide, 2-chloro-*N*,*N*-dimethyl-	Styrene	−0.036	0.152	1.29	0.065	Y	917
Acrylamide, *N*,*N*-dibutyl-	Styrene	0.294	0.058	1.6	0.058		806
Acrylamide, *N*,*N*-diethyl-	Acrylic acid	0.35	0.12	0.36	0.04	N	205
Acrylamide, *N*,*N*-diethyl-	Butanoate, 3-acrylamido-3-methyl-, sodium	0.987	0.153	0.22	0.138	Y	857
Acrylamide, *N*,*N*-diethyl-	Methacrylate, methyl	0.41	0.15	1.65	0.16	N	170
Acrylamide, *N*,*N*-diethyl-	Styrene	0.39		1.23			739
Acrylamide, *N*,*N*-diethyl-	Styrene	0.34		1.36			739
Acrylamide, *N*,*N*-diethyl-	Styrene	0.18		1.54			739
Acrylamide, *N*,*N*-dimethyl-	Methacrylate, methyl	0.57	0.08	2.15	0.08	N	315
Acrylamide, *N*,*N*-dimethyl-	Methacrylate, methyl	0.59	0.09	2.8	0.1	N	315
Acrylamide, *N*,*N*-dimethyl-	Methacrylate, methyl	0.21	0.21	2.64	0.15	N	691
Acrylamide, *N*,*N*-dimethyl-	Styrene	0.12	0.3	1.15	0.35	N	170
Acrylamide, *N*,*N*-dimethyl-	Styrene	0.49	0.15	1.37	0.1	N	315
Acrylamide, *N*,*N*-dimethyl-	Styrene	0.47	0.2	1.32	0.12	N	315
Acrylamide, *N*,*N*-dimethyl-	Sulfonate, 2-acrylamido-2-methylpropane	1.108	0.59	0.162	0.949	Y	857
Acrylamide, *N*,*N*-dimethyl-	Vinyl methyl ketone	0.82	0.36	0.1	0.43	Y	609
Acrylamide, *N*-(2-(4-hydroxyphenyl)ethyl)-	Methacrylamide, *N*-(2-hydroxypropyl)-	0.95	0.09	1.01	0.09		965
Acrylamide, *N*-(2-(propionamide)-	Styrene	0.86	0.3	1.84	0.21	N	295
Acrylamide, *N*-methyl-	Methacrylate, methyl	0.05	0.72	1.14	0.09	N	691
Acrylamide, *N*-methylol	Acrylate, butyl	0.61		0.87			441
Acrylamide, *N*-methylol	Acrylate, ethyl	1.4		1.4			442
Acrylamide, *N*-methylol	Acrylate, methyl	1.9		1.3			441
Acrylamide, *N*-methylol	Acrylonitrile	1.2		0.7			442
Acrylamide, *N*-methylol	Acrylonitrile	2.33		0.98			577
Acrylamide, *N*-methylol	Acrylonitrile	2.56		0.22			596
Acrylamide, *N*-methylol	Methacrylate, methyl	0.7		1.62			593
Acrylamide, *N*-methylol	Methacrylate, methyl	0.7		1.62			596
Acrylamide, *N*-methylol	Styrene	0.48		0.03			596
Acrylamide, *N*-methylol	Vinyl chloride					Y	157
Acrylamide, *N*-methylol-	Styrene	0.4	0.03	1.55	0.05		891
Acrylamide, *N*-octadecyl-	Acrylonitrile	1.4	0.17	1.034	0.02	Y	119
Acrylamide, *N*-octadecyl-	Methacrylate, methyl	0.42	0.11	4.119	0.07	Y	290

TABLE 1. *cont'd*

Monomer 1	Monomer 2	r_1	±95%	r_2	±95%	Conv.	Refs.
Acrylamide, *N*-octadecyl-	Styrene	0.54	0.14	2.08	0.12	Y	290
Acrylamide, *N*-octadecyl-	Vinyl acetate	8.25	1.46	0.004	0.011	Y	119
Acrylamide, *N*-octadecyl-	Vinylidene chloride	1.4	0.11	0.432	0.008	Y	119
Acrylamide, *N*-octyl-	Styrene	0.258	0.119	2.715	0.244		806
Acrylamide, *N*-propyl-	Acrylate, butyl	0.4		0.8			730
Acrylamide, *N*-propyl-	Acrylate, methyl	0.26		1.2			730
Acrylamide, *N-tert*-butyl-	Acrylonitrile	1.14		0.2			709
Acrylamide, *N-tert*-butyl-	Methacrylate, methyl	2.83		0.25			709
Acrylamide, α-fluoro-	Methacrylate, methyl	0.148	0.081	2.13	0.136	Y	823
Acrylamido, 1-,-1-deoxy-D-glucitol	Methacrylate, methyl	0.05	0.09	3.75	0.24	N	258
Acrylamido, 1-,-1-deoxy-D-glucitol	Styrene	0.03	0.02	2.42	0.08	N	258
Acrylamido, 1-,-1-deoxy-D-glucitol	Vinyl acetate	0.98	0.87	0.03	0.17	N	258
Acrylamido, 2-,2-methylpropanesulfonate, sodium	Vinyl acetate	11.6		0.05			700
Acrylamido, 2-,-2-methylpropanesulfonic acid	Methacrylate, 2-hydroxyethyl	0.9		0.86			618
Acrylamido, 2-,-2-methylpropanesulfonic acid	Methacrylate, 2-hydroxypropyl	1.03		0.89			618
Acrylamido-2-methylpropane sulfonate sodium salt	*N*-Vinylpyrrolidone	0.66		0.13			939
Acrylamidomethylamino, *p*-, azobenzene	Styrene	8.5		0.083			858
Acrylamidomethylamino, *p*-, azobenzene	Vinyl acetate	12.98		0.126			858
Acrylate, (−)-menthyl	Acenaphthalene					Y	645
Acrylate, (−)-menthyl	Pyridine, 4-vinyl-	0.291	0.017	2.32	0.45	Y	667
Acrylate, 1,1,5-trihydroperfluoroamyl	Methacrylonitrile	0.14		1.03			809
Acrylate, 2,3-dibromopropyl	Styrene	0.16		0.42			643
Acrylate, 2,4,5-trichlorophenyl	Pyrrolidone, *N*-vinyl-	0.163	0.02	0.012	0.008	Y	840
Acrylate, 2,4,5-trichlorophenyl	Styrene	0.23	0.021	0.277	0.048	Y	622
Acrylate, 2,4,6-tribromophenyl	Styrene	0.1		0.2			643
Acrylate, 2,4-dinitrophenyl	Acrylate, *N*-(2-hydroxyethyl)-carbazolyl	0.158	0.015	0.109	0.026	Y	716
Acrylate, 2,4-dinitrophenyl	Methacrylate, *N*-(2-hydroxyethyl)-carbazolyl	0.186	0.009	0.243	0.034		716
Acrylate, 2(*O*-ethyl methylphosphonoxy)-, methyl	Methacrylate, methyl	0.44	0.25	0.73	0.04		882
Acrylate, 2-chloroethyl	Acrylate, ethyl	1.03		0.9			726
Acrylate, 2-chloroethyl	Acrylate, methyl	1.07		0.9			726
Acrylate, 2-chloroethyl	Acrylonitrile	0.87		1.03			790
Acrylate, 2-chloroethyl	Itaconate, bis(tri-*n*-butyltin)	0.683		0.391			940
Acrylate, 2-chloroethyl	Itaconic anhydride	−0.016	0.022	2.46	0.38	Y	365
Acrylate, 2-chloroethyl	Itaconic anhydride	0.251	0.021	2.61	0.32	Y	365
Acrylate, 2-chloroethyl	Maleic anhydride	7.15	0.31	0.027	0.004	Y	117
Acrylate, 2-chloroethyl	Methacrylate, methyl	0.37		2.15			790
Acrylate, 2-chloroethyl	Pyrrolidone, *N*-vinyl-	0.52		0.03			790
Acrylate, 2-chloroethyl	Styrene	0.1	0.17	0.55	0.47	Y	140
Acrylate, 2-chloroethyl	Styrene	0.139	0.083	0.494	0.097	Y	178
Acrylate, 2-chloroethyl	Styrene	0.12		0.54			790
Acrylate, 2-chloroethyl	Vinyl butyl ether	2.01		0			790
Acrylate, 2-chloroethyl	Vinyl isobutyl ether	2.24		0			790
Acrylate, 2-chloroethylglucitol	Styrene	0.14	0.09	0.49	0.2		806
Acrylate, 2-cyano-, methyl	Styrene, α-methyl-	0.001		0.05			452
Acrylate, 2-cyano-, methyl	Vinyl acetate	0.5		0.005			452
Acrylate, 2-cyanoethyl	Styrene	0.128	0.074	0.399	0.032	Y	178
Acrylate, 2-ethylhexyl	Acrylate, glycidyl	1.12	0.07	1.18	0.06	N	126
Acrylate, 2-ethylhexyl	Methacrylate, glycidyl	0.09	0.13	2.41	0.46	Y	674
Acrylate, 2-ethylhexyl	Styrene	0.31	0.6	0.96	0.3	N	126
Acrylate, 2-ethylhexyl	Styrene	0.26		0.94			463
Acrylate, 2-ethylhexyl	Vinyl acetate	7.5		0.04			570
Acrylate, 2-ethylhexyl	Vinyl chloride	4.15		0.16			510
Acrylate, 2-hydroxyethyl	Acrylate, butyl	0.9	0.23	0.3	0.06	N	868
Acrylate, 2-hydroxyethyl	Acrylate, ethyl	0.97	0.24	0.5	0.03	N	868
Acrylate, 2-hydroxyethyl	Acrylate, methyl	0.9	0.13	0.94	0.04	N	868
Acrylate, 2-nitrobutyl	Acrylonitrile	1.76	0.69	0.67	0.25	N	234
Acrylate, 2-nitrobutyl	Methacrylate, methyl	0.27	0.04	1.19	0.12	N	234
Acrylate, 2-nitrobutyl	Styrene	0.12	0.01	0.35	0.03	N	234
Acrylate, 3,4-epoxyhexahydrobenzyl	Acrylonitrile	0.388	0.074	0.25	0.13	Y	680

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TABLE 1. *cont'd*

Monomer 1	Monomer 2	r_1	±95%	r_2	±95%	Conv.	Refs.
Acrylate, 3,4-epoxyhexahydrobenzyl	Styrene	1.97	0.35	0.27	0.3	N	680
Acrylate, 4-acetylphenyl	Methacrylate, glycidyl	0.292	0.141	0.644	0.13	Y	1012
Acrylate, β-acetoxymethyl-, methyl	Methacrylate, methyl	0.24		0.91			1091
Acrylate, β-acetoxymethyl-, methyl	Styrene	0.19		0.34			1091
Acrylate, β-chloro-2-hydroxypropyl	Acrylonitrile	0.7		0.24			654
Acrylate, β-ethoxy-, ethyl	Acrylonitrile	−0.26	0.56	2.42	1.8	N	194
Acrylate, β-ethoxy-, ethyl	Styrene	−0.21	0.44	46.98	27.03	Y	194
Acrylate, *N*-(2-hydroxyethyl)-3,6-dichlorocarbazolyl	Methacrylate, 2,4-dinitrophenyl	0.115	0.029	1.207	0.032	Y	736
Acrylate, *N*-(2-hydroxyethyl)carbazolyl	Acryl-2′-ethyl-4,5,7-trinitro-9-fluorene	0.912	0.079	0.585	0.028	Y	715
Acrylate, *N*-(2-hydroxyethyl)carbazolyl	Acrylate, 2,4-dinitrophenyl	0.109	0.026	0.158	0.015	Y	716
Acrylate, *N*-(2-hydroxyethyl)carbazolyl	Acryloyl-β-hydroxyethyl-3,5-dinitrobenzoate	0.62	0.044	0.361	0.016	Y	702
Acrylate, *N*-(2-hydroxyethyl)carbazolyl	Methacryloyl-β-hydroxyethyl-3,5-dinitrobenzoate	1.04	0.14	0.08	0.026	Y	702
Acrylate, *N*-(2-hydroxyethyl)carbazolyl	Methacryloyl-β-hydroxyethyl-3,5-dinitrobenzoate	0.334	0.022	1.364	0.018	Y	719
Acrylate, α-(4-chlorobenzyl)-, ethyl	Styrene	1.03	0.13	0.04	0.09		806
Acrylate, α-(4-cyanobenzyl)-, ethyl	Styrene	0.65	0.09	0.06	0.05		806
Acrylate, α-(4-methoxybenzyl)-, ethyl	Styrene	0.71	0.24	0.33	0.3		806
Acrylate, α-(*O*-ethyl methylphosphonoxy)-methyl	Methacrylate, methyl	0.44		0.73			851
Acrylate, α-(hydroxymethyl)-, methyl	Styrene	0.34		0.36			932
Acrylate, α-[2,2-bis(carbomethoxy)ethyl]-, methyl	Methacrylate, methyl	0.04		3.7			1092
Acrylate, α-[2,2-bis(carbomethoxy)ethyl]-, methyl	Styrene	0.09		0.58			1092
Acrylate, α-acetoxy-, ethyl	Acrylate, α-chloro-, ethyl	0.3		1.71			638
Acrylate, α-acetoxy-, ethyl	Acrylate, ethyl	0.968	0.033	0.943	0.075	Y	244
Acrylate, α-acetoxy-, ethyl	Methacrylate, methyl	0.608	0.02	1.65	0.12	Y	244
Acrylate, α-acetoxy-, ethyl	Styrene	0.173	0.01	0.557	0.031	Y	244
Acrylate, α-acetoxy-, ethyl	Vinyl acetate	5.621	0.094	0.08	0.021	Y	244
Acrylate, α-benzyl-, methyl	Styrene	0.175	0.053	0.57	0.028	Y	49
Acrylate, α-benzyl-, ethyl	Styrene	0.9	0.2	0.14	0.17		806
Acrylate, α-benzyl-, methyl	Methacrylate methyl	0.173	0.022	2.36	0.23	Y	610
Acrylate, α-benzyl-, methyl	Methacrylate methyl	0.09	0.01	3.9	0.19	N	610
Acrylate, α-bromo-, ethyl	Styrene	0.44	0.08	0.02	0.04		806
Acrylate, α-butyl-, methyl	Styrene	0.205	0.053	0.812	0.043	Y	49
Acrylate, α-chloro-, methyl	Methacrylate, methyl	1.13	0.19	0.31	0.24	Y	6
Acrylate, α-chloro-, ethyl	Acrylate, α-methoxy-, methyl	0.58		0.11			638
Acrylate, α-chloro-, ethyl	Acrylate, α-acetoxy-, ethyl	1.71		0.3			638
Acrylate, α-chloro-, ethyl	Acrylate, α-fluoro-, ethyl	2.9		0.21			638
Acrylate, α-chloro-, ethyl	Acrylate, methyl	3.22		0.09			638
Acrylate, α-chloro-, ethyl	Acrylonitrile, α-methoxy-	0.9		0.3			638
Acrylate, α-chloro-, ethyl	Methacrylonitrile	2		0.45			638
Acrylate, α-chloro-, ethyl	Styrene	0.32	0.11	0.08	0.07		806
Acrylate, α-chloro-, ethyl	Vinyl acetate	30		0.03			638
Acrylate, α-chloro-, methyl	Acrylonitrile	1.76	0.18	0.122	0.081	Y	6
Acrylate, α-chloro-, methyl	Methacrylate, methyl	1.92	0.08	0.11	0.09	N	31
Acrylate, α-chloro-, methyl	Styrene	0.3		0.25			74
Acrylate, α-chloro-, methyl	Vinylidene cyanide	0.313	0.021	0.066	0.07	Y	82
Acrylate, α-chloro-, sodium	Styrenesulfonate, *p*-, sodium	0.27	0.06	1.44	0.31	Y	834
Acrylate, α-cyano-, methyl	Acrylonitrile	0.68	0.09	0.01	0.02	N	141
Acrylate, α-cyano-, methyl	Acrylate, methyl	0.34	0.07	0.02	0.04	N	141
Acrylate, α-cyano-, methyl	Methacrylate, methyl	0.03	0.01	0.21	0.02	N	141
Acrylate, α-cyano-, methyl	Methacrylate, methyl	0.135	0.016	0.068	0.014	Y	182
Acrylate, α-cyano-, methyl	Methacrylonitrile	0.15	0.01	0.18	0.01	N	143
Acrylate, α-cyano-, methyl	Styrene	0.61	0.05	0.05	0.01	N	141
Acrylate, α-cyclohexyl-, methyl	Styrene	−0.001	0.034	1.615	0.048	Y	49
Acrylate, α-ethyl-, methyl	Styrene	0.197	0.014	0.758	0.014	Y	49
Acrylate, α-ethyloxymethyl-, methyl	Styrene	0.24		0.37			1047
Acrylate, α-fluoro-, ethyl	Acrylate, α-chloro-, ethyl	0.21		2.9			638
Acrylate, α-fluoro-, methyl	Styrene	0.16	0.11	0.66	0.17		806
Acrylate, α-hexafluoropropyloxymethyl-, methyl	Styrene	0.07		0.23			1047

TABLE 1. *cont'd*

Monomer 1	Monomer 2	r_1	±95%	r_2	±95%	Conv.	Refs.
Acrylate, α-hydroxymethyl-, ethyl	Azlactone, 2-vinyl-4,4-dimethyl-	0.668	0.12	0.389	0.229	Y	1011
Acrylate, α-hydroxymethyl-, ethyl	Methacrylate, methyl	1.34	0.062	1.26	0.17	N	1027
Acrylate, α-hydroxymethyl-, ethyl	Styrene	0.546	0.127	0.468	0.03	Y	982
Acrylate, α-isobutyl-, methyl	Styrene	0.202	0.042	0.974	0.022	Y	49
Acrylate, α-isopropyl-, methyl	Styrene	0.036	0.034	1.872	0.052	Y	49
Acrylate, α-isopropyloxymethyl-, methyl	Styrene	0.26		0.41			1047
Acrylate, α-methoxy, methyl	Acrylate, α-chloro-, ethyl	0.11		0.58			638
Acrylate, α-methoxy-, methyl	Styrene	0.513	0.058	1.131	0.078		806
Acrylate, α-*p*-chlorobenzyl-, methyl	Methacrylate, methyl	0.255	0.034	1.87	0.222	Y	905
Acrylate, α-*p*-methoxybenzyl-, methyl	Methacrylate, methyl	0.13	0.008	1.71	0.109	Y	905
Acrylate, α-phenoxymethyl-, methyl	Methacrylate, methyl	0.755	0.061	1.13	0.038	Y	1048
Acrylate, α- phenoxymethyl-, methyl	Styrene	0.256	0.102	0.176	0.05	Y	1048
Acrylate, α-phenyl-, methyl	Acrylate, methyl	1		0.06			141
Acrylate, α-phenyl-, methyl	Acrylonitrile	6.7		0.08			141
Acrylate, α-phenyl-, methyl	Methacrylate, methyl	0		0.21			141
Acrylate, α-phenyl-, methyl	Methacrylate, methyl	0		0.3			49
Acrylate, α-phenyl-, methyl	Methacrylonitrile	0.25		0.19			143
Acrylate, α-phenyl-, methyl	Styrene	1		0.06			141
Acrylate, α-phenyl-, methyl	Styrene	0.4		0.03			399
Acrylate, α-phenyl-, methyl	Styrene	0.45		0.06			488
Acrylate, α-phenyl-, methyl	Styrene	1.275	0.008	1.176	0.015	Y	49
Acrylate, α-phenyl-, butyl	Styrene	0.107	0.055	0.04	0.022	Y	488
Acrylate, α-phenyl-, chloroethyl	Styrene	0.201	0.09	0.025	0.015	Y	488
Acrylate, α-phenyl-, propyl	Styrene	0.126	0.063	0.03	0.015	Y	488
Acrylate, α-propyl-, methyl	Styrene	0.208	0.07	0.821	0.029	Y	49
Acrylate, α-propyloxymethyl-, methyl	Styrene	0.29		0.47			1047
Acrylate, α-*sec*-butyl-, methyl	Styrene	0.004	0.024	2.29	0.068	Y	49
Acrylate, α-tetrafluoropropyloxymethyl-, methyl	Methacrylate, methyl	0.61		1.43			1047
Acrylate, α-tetrafluoropropyloxymethyl-, methyl	Styrene	0.17		0.37			1047
Acrylate, α-trifluoroethyloxymethyl-, methyl	Styrene	0.2		0.26			1047
Acrylate, α-trifluoromethyl-, methyl	Methacrylate, methyl	−0.17	0.18	1.8	0.23	Y	681
Acrylate, α-trifluoromethyl-, methyl	Methacrylate, methyl	0	0.1	3.2	0.5	N	825
Acrylate, α-trifluoromethyl-, methyl	Methacrylate, methyl	0.1	0.1	2.3	0.2	N	825
Acrylate, α-trifluoromethyl-, methyl	Styrene, *p*-chloro-	0	0.03	0.24	0.02	N	825
Acrylate, α-trimethylsiloxy-, methyl	Styrene	1.42		0.46			1101
Acrylate, benzyl	Acrylonitrile	0.72	0.16	0.28	0.19	N	23
Acrylate, benzyl	Acrylonitrile	0.63		1.49			385
Acrylate, benzyl	Allyl chloride	9.9		0.06			438
Acrylate, benzyl	Methacrylate, methyl	0.19	0.2	2.23	0.14	Y	277
Acrylate, benzyl	Styrene	0.2	0.12	0.494	0.05	Y	178
Acrylate, benzyl	Styrene	0.248	0.041	0.534	0.028	Y	277
Acrylate, butyl	2-Oxazoline, 2-isopropenyl-	0.24	0.01	1.4	0.08		894
Acrylate, butyl	Acrolein	0.638	0.032	1.86	0.19	Y	291
Acrylate, butyl	Acrolein	1.12	0.41	2.29	0.58	N	292
Acrylate, butyl	Acrolein, methyl-	0.02		2.5			589
Acrylate, butyl	Acrylamide, *N*-propyl-	0.8		0.4			730
Acrylate, butyl	Acrylamide, *N*-methylol-	0.87		0.61			441
Acrylate, butyl	Acrylate, 2-hydroxyethyl	0.3	0.06	0.9	0.23	N	868
Acrylate, butyl	Acrylic acid	1.08	0.18	0.59	0.27	N	187
Acrylate, butyl	Acrylic acid	0.91	0.13	1.31	0.3	N	252
Acrylate, butyl	Acrylic acid, α-bromo-	0.19		0.09			733
Acrylate, butyl	Acrylonitrile	1.06	0.15	1.679	0.058	Y	118
Acrylate, butyl	Acrylonitrile	0.894	0.019	0.781	0.083	Y	162
Acrylate, butyl	Acrylonitrile	0.82	0.13	1.08	0.08	N	233
Acrylate, butyl	Acrylonitrile	0.9		1			513
Acrylate, butyl	Acrylonitrile	1.2		1			513
Acrylate, butyl	Allyl acetate	10.2	42.2	0.039	0.066	N	1053
Acrylate, butyl	Allyl chloride	5.83		0.1			438
Acrylate, butyl	Benzofuran, 2-vinyl-	0.041	0.043	7.8	1.36	N	1020
Acrylate, butyl	Butadiene	0.074	0.03	1.04	0.11	Y	257
Acrylate, butyl	Ethylene	13.94	0.38	0.01	0.003	N	42
Acrylate, butyl	Furan, 2-vinyl-5-methyl	0.118	0.019	0.392	0.051	Y	1105

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TABLE 1. *cont'd*

Monomer 1	Monomer 2	r_1	±95%	r_2	±95%	Conv.	Refs.
Acrylate, butyl	Itaconate, bis(tri-*n*-butyltin)	0.91		0.422			940
Acrylate, butyl	Itaconate, dimethyl	0.4		0.94			398
Acrylate, butyl	Maleimide, *N*-(2,4-dimethylphenyl)-	0.62		0.2			788
Acrylate, butyl	Methacrylate, 2-(*N*,*N*-dimethylcarbamoyloxy)ethyl	0.47		1.89			600
Acrylate, butyl	Methacrylate, 2-chloro-2,3,3,3-fluoropropyl	0.079	0.304	0.221	0.636	N	927
Acrylate, butyl	Methacrylate, 2-hydroxyethyl	0.09	0.11	4.75	4.2	Y	358
Acrylate, butyl	Methacrylate, 2-hydroxypropyl	0.171	0.041	5.35	0.32	Y	333
Acrylate, butyl	Methacrylate, 2-hydroxypropyl	0.24	0.16	3.3	6.82	Y	662
Acrylate, butyl	Methacrylate, butyl	0.3		2.2			187
Acrylate, butyl	Methacrylate, glycidyl	0.083	0.052	2.16	0.57	Y	674
Acrylate, butyl	Methacrylate, methyl	0.13	0.15	0.92	0.2	N	30
Acrylate, butyl	Methacrylate, methyl	0.11	0.018	2.86	0.32	Y	639
Acrylate, butyl	Methacrylate, methyl	0.43	0.07	1.88	0.4	N	87
Acrylate, butyl	Methacrylic acid	0.31	0.1	1.25	0.31	N	187
Acrylate, butyl	Oxazoline, 2,2-isopropenyl-	0.24		1.4			862
Acrylate, butyl	Pyridine, 2-vinyl-	0.1		2.51			236
Acrylate, butyl	Pyridine, 2-vinyl-	0.11	0.01	2.59	0.14	N	78
Acrylate, butyl	Pyridine, 4-vinyl-	0.23	0.04	4.3	0.34	N	78
Acrylate, butyl	Styrene	0.25	0.05	0.79	0.08		1032
Acrylate, butyl	Styrene	0.34	0.06	0.79	0.11		1032
Acrylate, butyl	Styrene	0.38	0.05	0.75	0.1		1032
Acrylate, butyl	Styrene	−0.106	0.099	1.23	0.21	N	19
Acrylate, butyl	Styrene	0.29	0.05	0.44	0.03	N	20
Acrylate, butyl	Styrene	0.18	0.03	0.84	0.2	N	38
Acrylate, butyl	Styrene	0.19		0.66			38
Acrylate, butyl	Styrene	0.21		0.82			463
Acrylate, butyl	Styrene	0.15		0.8			549
Acrylate, butyl	Styrene	0.164		0.698			612
Acrylate, butyl	Styrene	0.164		0.698			632
Acrylate, butyl	Styrene, *o*-chloro-	0.2		2.25			558
Acrylate, butyl	Styrene, *p*-1-(2-hydroxybutyl)-	0.17		0.4			548
Acrylate, butyl	Styrene, *p*-octylamine sulfonate	0.3		2.3			817
Acrylate, butyl	Succinimide, *N*-vinyl-	1.54		0.15			789
Acrylate, butyl	Thiophene, 3-vinyl	0.386		0.499			1000
Acrylate, butyl	Vinyl acetate	3.48	3.39	0.018	0.072	Y	301
Acrylate, butyl	Vinyl bromide	4.07	0.44	0.18	0.16	N	268
Acrylate, butyl	Vinyl bromide	3.7		0.19			268
Acrylate, butyl	Vinyl chloride	4.4		0.07			518
Acrylate, butyl	Vinyl fluoride	19		0.01			604
Acrylate, butyl	Vinyl fluoride	19		0.01			606
Acrylate, butyl	Vinyl methyl ketone	0.8	0.06	1.81	0.24	N	53
Acrylate, butyl	Vinyl, *p*-, benzylethylcarbinol	0.17		0.4			591
Acrylate, butyl	Vinylanthracene, 9-	3.717	0.046	0.126	0.054	Y	123
Acrylate, butyl	Vinylidene chloride	0.873	0.022	0.934	0.006	Y	118
Acrylate, butyl	Vinylidene chloride	0.46		0.84			464
Acrylate, butyl	Vinylidene chloride	0.58		0.87			464
Acrylate, *cis*-B-cyano-, methyl	Acrylonitrile					N	1034
Acrylate, *cis*-B-cyano-, methyl	Styrene					N	1034
Acrylate, cresyl	Acrylonitrile	0.773	0.067	0.72	0.15	Y	363
Acrylate, cyclododecyl	Styrene	0.34	0.15	0.47	0.14		806
Acrylate, cyclododecyl	Styrene	0.31	0.08	0.54	0.08		806
Acrylate, cyclododecyl	Styrene	0.301	0.072	0.461	0.07		806
Acrylate, cyclohexyl	*N*-Vinylpyrrolidone	1.297	0.088	0.122	0.014		1061
Acrylate, cyclohexyl	Styrene	0.272	0.048	0.913	0.107		1061
Acrylate, cyclohexyl	Styrene	0.254	0.141	0.885	0.102		806
Acrylate, cyclohexyl	Styrene	0.16	0.13	0.53	0.11		806
Acrylate, cyclohexyl	Styrene	0.17	0.09	0.7	0.12		806
Acrylate, cyclohexyl	Styrene	0.18	0.07	0.58	0.1		806
Acrylate, di-, copper	Methacrylate, di-, dicyclopentadienyl-titanium	1.09		0.89			876
Acrylate, di-, copper	Styrene	0.12	0.08	5.94	0.05	N	829
Acrylate, di-, copper	Styrene	0.56	0.09	1.74	0.03	N	829

TABLE 1. *cont'd*

Monomer 1	Monomer 2	r_1	±95%	r_2	±95%	Conv.	Refs.
Acrylate, di-, nickel	Methacrylate, di-, dicyclopentadienyltitanium	0.95		0.65			876
Acrylate, di-, nickel	Styrene	0.53	0.06	1.83	0.02	N	829
Acrylate, di-, zinc	Acrylonitrile	0.24		0.41			646
Acrylate, di-, zinc	Styrene	0.9	0.07	1.1	0.02	N	829
Acrylate, dibutylchlorotin	Acrylate, methyl	0.09		0.81			659
Acrylate, diethylaluminum	Styrene	0.046	0.035	−0.002	0.016	Y	652
Acrylate, diethylaluminum	Styrene					Y	652
Acrylate, dodecyl	Acrylonitrile	0.88	0.16	2.37	0.07	N	233
Acrylate, ethyl	2-Oxazoline, 2-isopropenyl-	0.19	0.02	1.39	0.06		894
Acrylate, ethyl	Acrolein	0.6		1.2			291
Acrylate, ethyl	Acrolein	1.09	0.25	1.98	0.44	N	292
Acrylate, ethyl	Acrylamide, *N*-methylol-	1.4		1.4			442
Acrylate, ethyl	Acrylate, 2-chloroethyl	0.9		1.03			726
Acrylate, ethyl	Acrylate, 2-hydroxyethyl	0.5	0.03	0.97	0.24	N	868
Acrylate, ethyl	Acrylate, α-acetoxy-, ethyl	0.943	0.075	0.968	0.033	Y	244
Acrylate, ethyl	Acrylate, hydroxyethyl	0.5	0.05	0.88	0.09		890
Acrylate, ethyl	Acrylic acid	1.02		0.91			711
Acrylate, ethyl	Acrylonitrile	1.2	0.07	0.92	0.08		1023
Acrylate, ethyl	Acrylonitrile	0.81	0.27	1.16	0.78	N	198
Acrylate, ethyl	Acrylonitrile	4		0.66			389
Acrylate, ethyl	Acrylonitrile	0.95		0.44			542
Acrylate, ethyl	Allyl chloride	7.73		0.08			438
Acrylate, ethyl	Benzofuran, 2-vinyl-	0.015	0.01	5.76	0.334	N	1020
Acrylate, ethyl	Carbazole, *N*-vinyl-	1.1		0.27			757
Acrylate, ethyl	Ethylene, 1,1-diphenyl-	0.8		0.5			65
Acrylate, ethyl	Imidazolid-2-one, 1,3-divinyl-	0.41	0.13	−0.08	0.03	N	800
Acrylate, ethyl	Imidazolid-2-one, 1-ethyl-3-vinyl-	0.47	0.06	0.01	0.01	N	800
Acrylate, ethyl	Isopropenylisocyanate	0.79		0.15			434
Acrylate, ethyl	Maleimide, 2,3-dimethyl-*N*-(2-methacryloyloxy)ethyl	0.28	1.15	1.55	3.06	Y	619
Acrylate, ethyl	Methacrylate, 2-(sulfonic acid)ethyl	0.3		3.2			564
Acrylate, ethyl	Methacrylate, 2-bromoethyl	0.37		2.7			657
Acrylate, ethyl	Methacrylate, 2-hydroxyethyl	0.189	0.008	11.21	0.43	Y	358
Acrylate, ethyl	Methacrylate, 2-hydroxypropyl	0.273	0.054	13.32	1.05	Y	333
Acrylate, ethyl	Methacrylate, 2-hydroxypropyl	0.207	0.045	9.08	3.95	Y	662
Acrylate, ethyl	Methacrylate, butyl	0.22	0.17	2.43	0.39	Y	690
Acrylate, ethyl	Methacrylate, methyl	0.47		1.83			30
Acrylate, ethyl	Methacrylate, methyl	0.28		2			469
Acrylate, ethyl	Methacrylate, methyl	0.22	0.05	2.04	0.28	N	87
Acrylate, ethyl	Methacrylic acid					N	1065
Acrylate, ethyl	Norbornadiene	2.39	0.44	−0.01	0.03	N	267
Acrylate, ethyl	Oxazoline, 2-, 2-isopropenyl-	0.19		1.39			862
Acrylate, ethyl	Propanesulfonate, 3-[diethyl-2-(2-methacroyloxyethoxy)]ethyl	3.97	1.03	0.19	0.02	Y	962
Acrylate, ethyl	Pyridine, 2-vinyl-	0.21	0.06	0.28	0.1	N	250
Acrylate, ethyl	Pyridine, 2-vinyl-	0.21		2.25			832
Acrylate, ethyl	Pyridine, 4-vinyl-	0.29		2.58			832
Acrylate, ethyl	Pyrimid-2-one, 1,3-divinylhexahydro-	0.59	0.13	−0.05	0.03	N	800
Acrylate, ethyl	Styrene	0.139	0.085	0.699	0.072	Y	178
Acrylate, ethyl	Styrene	0.16		1.01			463
Acrylate, ethyl	Styrene	0.19		0.79			530
Acrylate, ethyl	Styrene	0.2		0.8			530
Acrylate, ethyl	Styrene	0.48		0.8			542
Acrylate, ethyl	Styrene	0.152		0.787			673
Acrylate, ethyl	Styrene	0.152		0.787			677
Acrylate, ethyl	Styrene 3-tri-*n*-butylstannyl-	10.4		0.01			985
Acrylate, ethyl	Tropone, 2-methacryloyloxy-	0.387	0.027	3.13	0.528	Y	1104
Acrylate, ethyl	Vinyl 2-chloroethyl ether	5		0.15			439
Acrylate, ethyl	Vinyl 2-chloroethyl ether	4.65		0			726
Acrylate, ethyl	Vinyl isobutyl sulfide	0.36	0.02	0.05	0.04	N	285
Acrylate, ethyl	Vinyl isobutyl sulfide	0.32	0.02	0.05	0.05	N	336
Acrylate, ethyl	Vinylanthracene, 9-	3.498	0.041	0.295	0.056	Y	123
Acrylate, ethyl	Vinylidene chloride	0.72	0.39	0.58	0.15	Y	65
Acrylate, ferrocenylmethyl	Acrylate, methyl	0.14		4.46			293

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TABLE 1. *cont'd*

Monomer 1	Monomer 2	r_1	±95%	r_2	±95%	Conv.	Refs.
Acrylate, ferrocenylmethyl	Maleic anhydride	−0.3	2.96	0.09	0.14	Y	325
Acrylate, ferrocenylmethyl	Methacrylate, methyl	0.024	0.064	2.8	0.19	Y	293
Acrylate, ferrocenylmethyl	Methacrylate, methyl	0.08		2.9			293
Acrylate, ferrocenylmethyl	Styrene	−0.016	0.06	1.87	0.17	Y	293
Acrylate, ferrocenylmethyl	Styrene	0.02		2.3			293
Acrylate, ferrocenylmethyl	Styrene	0.02		2.5			576
Acrylate, furfuryl	Methacrylate, 2-hydroxyethyl	0.88	0.19	1.35	0.08		1063
Acrylate, glycidyl	Acrylate, 2-ethylhexyl	1.18	0.06	1.12	0.07	N	126
Acrylate, glycidyl	Acrylonitrile	1		1.01			114
Acrylate, glycidyl	Styrene	0.17		0.6			114
Acrylate, glycidyl	Styrene	0.24		0.73	0.34	N	126
Acrylate, glycidyl	Vinyl acetate	7.6		0.003			553
Acrylate, heptafluorobutyl	Butadiene	0.073	0.031	0.359	0.039	Y	206
Acrylate, heptafluorobutyl	Methacrylate, methyl	0.177		0.084		Y	206
Acrylate, heptafluorobutyl	Styrene	0.049	0.013	0.31	0.01	Y	206
Acrylate, heptyl	Maleimide, *N*-(2,4-dimethylphenyl)-	0.14		0.2			788
Acrylate, heptyl	Methacrylate, methyl	0.46	0.02	2.51	0.13		980
Acrylate, hydroxyethyl	Acrylate, ethyl	0.88	0.09	0.5	0.05		890
Acrylate, hydroxyethyl	Acrylate, methyl	1	0.1	1	0.1		890
Acrylate, hydroxyethyl	Acrylate, methyl	0.94	0.1	0.23	0.03		890
Acrylate, isobutyl	Methacrylate, methyl	0.135	0.02	4.1	0.5	Y	639
Acrylate, isobutyl	Methacrylate, glycidyl	0.282	0.026	1.24	0.12	Y	674
Acrylate, isobutyl	Methacrylate, methyl	0.29	0.04	1.04	0.08	N	30
Acrylate, isopropyl	Styrene	0.195	0.027	0.755	0.024	Y	178
Acrylate, *m*-chlorophenyl	Acrylonitrile	0.85	0.036	1.3	0.073	Y	363
Acrylate, *m*-nitrophenyl	Methacrylate methyl	1.04	0.135	0.928	0.248	Y	1074
Acrylate, methyl	2-Oxazoline, 2-isopropenyl-	0.16	0.04	1.9	0.08		894
Acrylate, methyl	2-Oxazolinium BF4, 3-methyl-2-isopropenyl-	0.096	0.057	0.251	0.483	Y	908
Acrylate, methyl	2-Oxazolinium, 2-isopropenyl-	0.191	0.031	2.08	0.327	Y	908
Acrylate, methyl	Acetylene, phenyl-	0.622	0.062	0.272	0.072	Y	60
Acrylate, methyl	Acetylene, phenyl-	0.664	0.045	0.093	0.01	Y	731
Acrylate, methyl	Acrolein	7.86	3.58	−0.07	0.03	N	207
Acrylate, methyl	Acrolein	0.83	0.12	1.41	0.4	Y	291
Acrylate, methyl	Acrolein	1.08	0.38	2.54	0.93	N	292
Acrylate, methyl	Acrylamide, *N*-methylol-	1.3		1.9			441
Acrylate, methyl	Acrylamide, *N*-propyl-	1.2		0.26			730
Acrylate, methyl	Acrylate, 2-chloroethyl	0.9		1.07			726
Acrylate, methyl	Acrylate, 2-hydroxyethyl	0.94	0.04	0.9	0.13	N	868
Acrylate, methyl	Acrylate, α-chloro-, ethyl	0.09		3.22			638
Acrylate, methyl	Acrylate, α-cyano-, methyl	0.02	0.04	0.34	0.07	N	141
Acrylate, methyl	Acrylate, α-phenyl-, methyl	0.06		1			141
Acrylate, methyl	Acrylate, dibutylchlorotin	0.81		0.09			659
Acrylate, methyl	Acrylate, ferrocenylmethyl	4.46		0.14			293
Acrylate, methyl	Acrylate, hydroxyethyl	1	0.1	1	0.1		890
Acrylate, methyl	Acrylate, hydroxyethyl	0.23	0.03	0.94	0.1		890
Acrylate, methyl	Acrylate, tributyltin	0.82		0.03			659
Acrylate, methyl	Acrylic acid, α-bromo-	0.24		0.1			733
Acrylate, methyl	Acrylonitrile	0.51	0.02	0.56	0.03		1024
Acrylate, methyl	Acrylonitrile	0.844	0.037	1.54	0.044	Y	151
Acrylate, methyl	Acrylonitrile	0.85	0.2	1.31	0.08	N	233
Acrylate, methyl	Acryloyl chloride	0.34		2.3			508
Acrylate, methyl	Allyl acetate	5		0			470
Acrylate, methyl	Allyl acrylate	0.52		0.33			578
Acrylate, methyl	Allyl chloride					Y	204
Acrylate, methyl	Allyl chloride	8.45		0.05			437
Acrylate, methyl	Allyl chloride	5.45		0.07			437
Acrylate, methyl	Allyl chloride	6.46		0.4			437
Acrylate, methyl	Allyl chloride	9.1		−0.02			437
Acrylate, methyl	Allylbenzene	11.35	0.66	−0.036	0.016	Y	351
Acrylate, methyl	Benzophenone, *p*-vinyl-	0.09	0.02	3.6	1.06	Y	866
Acrylate, methyl	Benzophenone, *p*-vinyl-	1.1	0.02	3.54	0.077	Y	911
Acrylate, methyl	Butadiene	0.07	0.87	1.09	4.53	Y	257
Acrylate, methyl	Butadiene, 2-chloro-	0.06		10.4		Y	61
Acrylate, methyl	Carbamate, *N,N*-diethyl-, vinyl	4.78	0.22	−0.027	0.049	Y	92

TABLE 1. *cont'd*

Monomer 1	Monomer 2	r_1	±95%	r_2	±95%	Conv.	Refs.
Acrylate, methyl	Carbazole, *N*-vinyl-	0.53	0.13	0.049	0.029	Y	13
Acrylate, methyl	Carbazole, *N*-vinyl-	0.43		0.11			551
Acrylate, methyl	Carbazole, *N*-vinyl-	0.51	0.073	0.028	0.045	Y	98
Acrylate, methyl	Cinnamate, dibutylchlorotin	1.65		−0.2			659
Acrylate, methyl	Diallyl phthalate	6.208	0.069	0.028	0.005	Y	297
Acrylate, methyl	Diallyl phthalate	6.18	0.16	0.038	0.008	Y	297
Acrylate, methyl	Diallylcyanamide	6.7		0.05			603
Acrylate, methyl	Diallylcyanamide	6.7		0.05			604
Acrylate, methyl	Ethylene					N	41
Acrylate, methyl	Ethylene	19.4		0.02			768
Acrylate, methyl	Ethylene 1,1-diphenyl-	0.09	0.01	−0.24	0.15	N	334
Acrylate, methyl	Ethylene, 1,1-diphenyl-	0.12	0.01	0.21	0.05	N	334
Acrylate, methyl	Ethylene tetrachloro-	830		0			402
Acrylate, methyl	Ethylene, trichloro-	33		0			470
Acrylate, methyl	Fumarate, diisopropyl	1.9		0.091			1038
Acrylate, methyl	Hexatriene, tetrachloro-	0.262	0.087	3.19	1.36	Y	5
Acrylate, methyl	Hexene-1	−0.13	0.6	−0.67	0.03	Y	60
Acrylate, methyl	Imidazole, 1-vinyl-2-methyl-	1.28		0.05			465
Acrylate, methyl	Indene	0.63		0.1			606
Acrylate, methyl	Indene	0.62		0.12			606
Acrylate, methyl	Isoprene	0.12		0.75			424
Acrylate, methyl	Isoprene, 3-acetoxy-	0.27		5.71			770
Acrylate, methyl	Isopropenyl, 3-1-cyclohexenyl, acetate	0.37		0.57			770
Acrylate, methyl	Isopropenylisocyanate	0.6		0.11			434
Acrylate, methyl	Isopropenylisocyanate	0.799	0.049	0.079	0.047	Y	99
Acrylate, methyl	Maleic anhydride	2.788	0.051	0.012	0.013	Y	260
Acrylate, methyl	Maleic anhydride	2.5		0			470
Acrylate, methyl	Maleimide, *N*-(4-bromophenyl)-	0.429	0.099	0.39	0.17	Y	628
Acrylate, methyl	Maleimide, *N*-(4-chlorophenyl)-	0.684	0.052	0.155	0.052	Y	628
Acrylate, methyl	Maleimide, *N*-(4-tolyl)-	0.64	0.16	0.14	0.16	Y	644
Acrylate, methyl	Maleimide, *N*-phenyl-	0.554	0.048	0.103	0.052	Y	644
Acrylate, methyl	Methacrylate, 2,3-epithiopropyl	0.34		2.81			787
Acrylate, methyl	Methacrylate, 2-(*N*,*N*-dimethyl carbamoyloxy)ethyl	0.22		1.32			600
Acrylate, methyl	Methacrylate, 2-chloroethyl	0.29		2.19			726
Acrylate, methyl	Methacrylate, 2-hydroxyethyl	−0.005	0.036	8.67	8.28	Y	358
Acrylate, methyl	Methacrylate, 2-hydroxypropyl	0.013	0.007	7.335	0.083	Y	333
Acrylate, methyl	Methacrylate, ferrocenylmethyl	1.4	0.35	0.042	0.085	Y	293
Acrylate, methyl	Methacrylate, methyl	0.4	0.12	2.15	0.04	N	324
Acrylate, methyl	Methacrylate, *t*-butyl dimethylsilyl	0.288	0.057	1.07	0.21	Y	1069
Acrylate, methyl	Methacrylic anhydride	0.16		4.75			275
Acrylate, methyl	Oxazoline, 2-,2-isopropenyl-	0.16		1.9			862
Acrylate, methyl	Oxazoline, 2-,2-isopropenyl-	0.328	0.032	2.07	0.191	Y	877
Acrylate, methyl	Oxazoline, 2-,2-isopropenyl-4,4-dimethyl	0.46		1.3			596
Acrylate, methyl	Oxazoline, 2-,4-acryloxy-methyl-2,4-dimethyl	0.29		0.11			596
Acrylate, methyl	Oxazoline, 2-,4-methacryl-oxy-2,4-dimethyl	0.4		0.56			596
Acrylate, methyl	Oxazolinium, 2-, tetrafluoro-borate, 3-methyl	0.552	0.043	0.344	0.105	Y	877
Acrylate, methyl	Phthalimide, *N*-(4-vinylphenyl)-	1.14		1.56			636
Acrylate, methyl	Phthalimide, *N*-(methacryloyloxy)-	0.193	0.028	1.23	0.168	Y	979
Acrylate, methyl	Propenyl, 2-chloro-, acetate	0.7		0			445
	Pyridine, 2-methyl-5-vinyl-	0.18	0.05	1	0.3	N	232
Acrylate, methyl	Pyridine, 2-vinyl-	0.37	0.4	2.13	0.54	Y	2
Acrylate, methyl	Pyridine, 2-vinyl-	0.17	0.03	1.72	0.26	N	231
Acrylate, methyl	Pyridine, 2-vinyl-	0.2	0.03	2.12	0.1	N	749
Acrylate, methyl	Pyridine, 2-vinyl-5-ethyl-	0.18	0.004	1.32	0.03	N	231
Acrylate, methyl	Pyridine, 4-vinyl-	0.2	0.03	1.78	0.32	N	231
Acrylate, methyl	Pyridine, 4-vinyl-	0.15		2.14			424
Acrylate, methyl	Pyrrolidone, 1-benzyl-3-methylene-5-methyl	0.125	0.025	1.58	0.24	Y	633
Acrylate, methyl	Styrene	0.24		0.82			139
Acrylate, methyl	Styrene	0.8	0.21	0.192	0.057	Y	14

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TABLE 1. *cont'd*

Monomer 1	Monomer 2	r_1	±95%	r_2	±95%	Conv.	Refs.
Acrylate, methyl	Styrene	0.168	0.067	0.722	0.056	Y	151
Acrylate, methyl	Styrene	0.18		0.75			393
Acrylate, methyl	Styrene	0.18		0.75			397
Acrylate, methyl	Styrene	0.14		0.68			463
Acrylate, methyl	Styrene	0.07		0.9			495
Acrylate, methyl	Styrene	0.3		0.65			496
Acrylate, methyl	Styrene	0.16		0.4			496
Acrylate, methyl	Styrene	0.148	0.026	0.871	0.022	Y	865
Acrylate, methyl	Styrene, 2,5-dichloro-	0.142	0.054	3.93	1.38	Y	136
Acrylate, methyl	Styrene, 2,5-dichloro-	0.288	0.069	4.47	0.15	Y	2
Acrylate, methyl	Styrene, α-methoxy-	0.17	0.02	0.003	0.01	N	142
Acrylate, methyl	Styrene, *m*-methyl-	0.14		1.65			558
Acrylate, methyl	Styrene, *p*-1-(2-hydroxybutyl)-	0.18		0.48			548
Acrylate, methyl	Styrene, *p*-*N*,*N*-dimethylamino-	0.06	0.01	0.38	0.16	Y	866
Acrylate, methyl	Styrene, *p*-dimethylamino-	0.192	0.01	0.372	0.055	Y	911
Acrylate, methyl	Styrene, *p*-methoxy-	0.07		2			558
Acrylate, methyl	Styrene, *p*-methyl-	0.17		1.54			558
Acrylate, methyl	Succinimide, *N*-vinyl-	0.357	0.063	0.9	0.17	Y	80
Acrylate, methyl	Vinyl 2-chloroethyl ether	3.27		0			726
Acrylate, methyl	Vinyl acetate	7.28	0.37	0.04	0.01		1067
Acrylate, methyl	Vinyl acetate	6.38		0.03		Y	158
Acrylate, methyl	Vinyl acetate	2.58	0.3	0.405	0.043	Y	25
Acrylate, methyl	Vinyl acetate	6.7		0.03			489
Acrylate, methyl	Vinyl acetate	6.3		0.03			568
Acrylate, methyl	Vinyl butyl ether	3.65	0.07	0.01	0.01	N	345
Acrylate, methyl	Vinyl butyl ether	3.6		0			574
Acrylate, methyl	Vinyl butylsulfonate	4.14	0.58	0	0.4	Y	185
Acrylate, methyl	Vinyl chloride	4.4	0.22	0.093	0.002	Y	151
Acrylate, methyl	Vinyl chloride	7.66	0.5	0.002	0.01	Y	46
Acrylate, methyl	Vinyl chloride	5		0			470
Acrylate, methyl	Vinyl chloride	4		0.06			518
Acrylate, methyl	Vinyl cymantrene	0.46	0.14	0.211	0.067	Y	354
Acrylate, methyl	Vinyl ethyl ether	3.3		0			470
Acrylate, methyl	Vinyl fluoride	43		0.01			604
Acrylate, methyl	Vinyl fluoride	43		0.01			606
Acrylate, methyl	Vinyl hendecanoate	3.615	0.012	0.033	0.008	Y	145
Acrylate, methyl	Vinyl isobutyl ether	3.63	0.04	0	0.002	N	347
Acrylate, methyl	Vinyl isobutyl sulfide	0.3	0.01	0.05	0.02	N	285
Acrylate, methyl	Vinyl isobutyl sulfide	0.29	0.01	0.06	0.02	N	336
Acrylate, methyl	Vinyl methyl sulfide	0.209	0.034	0.084	0.086	Y	195
Acrylate, methyl	Vinyl phenyl sulfide	0.57	0.1	−0.02	0.22	Y	193
Acrylate, methyl	Vinyl stearate	5.8		0.03			537
Acrylate, methyl	Vinyl thiolacetate	0.8		0.23			566
Acrylate, methyl	Vinyl, 2-bromo-, ethyl ether	16.83	2.34	−0.79	0.32	Y	194
Acrylate, methyl	Vinyl, *p*-, benzylethylcarbinol	0.18		0.48			591
Acrylate, methyl	Vinylanthracene, 9-	2.998	0.067	0.08	0.092	Y	123
Acrylate, methyl	Vinylhydroquinone dibenzoate	0.46		0.75			440
Acrylate, methyl	Vinylidene chloride	0.95	0.21	0.9	0.11	Y	107
Acrylate, methyl	Vinylidene chloride	0.8		0.7			107
Acrylate, methyl	Vinylidene chloride	1		1			377
Acrylate, methyl	Vinylisocyanate	1.38		0.14			435
Acrylate, mono-, ethylene glycol	Acrylonitrile	1.2		0.8			682
Acrylate, *o*-chlorophenyl	Acrylonitrile	1.171	0.023	1.123	0.037	Y	363
Acrylate, *o*-chlorophenyl	Methacrylate, methyl	0.4		1.25			621
Acrylate, octadecyl	Acrylonitrile	1.04	0.38	1.91	0.1	Y	118
Acrylate, octadecyl	Acrylonitrile	1.35	0.4	4.39	0.64	N	233
Acrylate, octadecyl	Acrylonitrile	0.32	0.35	1.76	0.2	Y	290
Acrylate, octadecyl	Methacrylate, methyl	0.464	0.07	2.477	0.024	Y	290
Acrylate, octadecyl	Styrene	0.37	0.12	0.777	0.018	Y	290
Acrylate, octadecyl	Styrene	0.18		0.44			290
Acrylate, octadecyl	Styrene	0.31		0.79			290
Acrylate, octadecyl	Styrene	0.18		0.44			290
Acrylate, octadecyl	Vinylidene chloride	1	0.14	0.9	0.037	Y	118
Acrylate, octyl	Acrylonitrile	0.84	0.74	1.98	0.3	Y	118
Acrylate, octyl	Styrene	0.01	0.53	0.39	0.11		806

TABLE 1. *cont'd*

Monomer 1	Monomer 2	r_1	±95%	r_2	±95%	Conv.	Refs.
Acrylate, octyl	Vinyl chloride	4.8		0.12			518
Acrylate, octyl	Vinylidene chloride	0.679	0.057	0.851	0.018	Y	118
Acrylate, *p*-(cinnamoylamino)phenyl	Styrene	0.35		1.08			685
Acrylate, *p*-bromophenyl	Acrylonitrile	1.026	0.062	0.8	0.13	Y	363
Acrylate, *p*-bromophenyl	Methacrylate, methyl	0.191	0.014	0.926	0.056	Y	1074
Acrylate, *p*-chlorophenyl	Acrylonitrile	0.951	0.063	0.32	0.056	Y	63
Acrylate, *p*-chlorophenyl	Methacrylate, methyl	0.235	0.023	1.01	0.132	Y	1074
Acrylate, *p*-chlorophenyl	Methacrylate, methyl	0.3		1.09			621
Acrylate, *p*-methylphenyl	Methacrylate, methyl	0.223	0.036	1.45	0.275	Y	1074
Acrylate, pentabromophenyl	Styrene	0.1		0.16			643
Acrylate, pentachlorophenyl	Acrylic acid	1.12		0.82			900
Acrylate, pentachlorophenyl	Styrene	0.9		2.11			900
Acrylate, phenyl	Acrylonitrile	0.327	0.045	0.43	0.13	Y	363
Acrylate, phenyl	Fumarate, diisopropyl	3.4		0.07			1038
Acrylate, phenyl	Methacrylate, methyl	0.45		1.56			621
Acrylate, phenyl	Methacrylate, methyl	0.416	0.041	1.54	0.14	Y	672
Acrylate, sodium	Vinyl acetate					Y	37
Acrylate, *tert*-butyl	Methacrylate, glycidyl	0.463	0.079	2.096	0.443	Y	814
Acrylate, tetrahydrofurfuryl	Styrene	0.489	0.196	0.475	0.186		806
Acrylate, thio- butyl	Styrene	0.421	0.17	0.439	0.14		806
Acrylate, thio-, ethyl	Styrene	0.291	0.075	0.18	0.038		806
Acrylate, thio-, *tert*-butyl	Styrene	0.368	0.055	0.157	0.034		806
Acrylate, tributyltin	Acrylate, methyl	0.03		0.82			659
Acrylate, trifluoro-, methyl	Styrene	0		1.4			595
Acrylate, trifluoro-, methyl	Styrene	0		1.4			598
Acrylate, trifluoro-, methyl	Vinyl acetate	0		0.24			595
Acrylate, trifluoro-, methyl	Vinyl acetate	0		0.24			598
Acrylate, trifluoro-, methyl	Vinyl chloride	0		1.5			595
Acrylate, trifluoro-, methyl	Vinyl chloride	0		1.5			598
Acrylic acid	Acrolein	0.08	0.28	2.48	1.24	Y	57
Acrylic acid	Acrolein	1.15		0.5			57
Acrylic acid	Acrylamide	0.288	0.029	1.08	0.17	Y	221
Acrylic acid	Acrylamide	1.644	0.069	0.445	0.075	Y	278
Acrylic acid	Acrylamide	0.341	0.012	1.346	0.044	Y	278
Acrylic acid	Acrylamide	1.38	0.14	0.598	0.047	Y	37
Acrylic acid	Acrylamide	3.8		0.58			869
Acrylic acid	Acrylamide	0.29		1.06			869
Acrylic acid	Acrylamide, *N,N*-dimethyl-	0.36	0.04	0.35	0.12	N	205
Acrylic acid	Acrylate, pentachlorophenyl	0.82		1.12			900
Acrylic acid	Acrylate, butyl	0.59	0.27	1.08	0.18	N	187
Acrylic acid	Acrylate, butyl	1.31	0.3	0.91	0.13	N	252
Acrylic acid	Acrylate, ethyl	0.91		1.02			711
Acrylic acid	Acrylic acid, 2-benzamido-	0.48		2.08			1019
Acrylic acid	Acrylic acid, *N*-acetyl-α-amino-	1.41		0.49			661
Acrylic acid	Carbamate, *N,N*-diethyl-, vinyl	5.58	0.32	−0.097	0.068	Y	92
Acrylic acid	Carbamate, *N*-vinyl-, ethyl	4.69		0.26		Y	81
Acrylic acid	Imidazole, 1-vinyl-	0.0025		0.32			955
Acrylic acid	Methacrylate, isopropyl	1.03		0.68			847
Acrylic acid	Methacrylate, methyl	1.73	0.096	0.418	0.02	N	964
Acrylic acid	Methacrylate, butyl	0.24	0.21	3.53	0.42	N	187
Acrylic acid	*N*-Vinylimidazole	1.932	0.077	0.187	0.025	Y	879
Acrylic acid	Phosphonic acid, α-phenylvinyl-	0.7	0.13	0.04	0.83	Y	132
Acrylic acid	Propenyl, 2-chloro-, acetate	1		0			445
Acrylic acid	Propylene					Y	183
Acrylic acid	Pyrrolidone, *N*-vinyl-	0.88	0.69	0.1	0.21	N	250
Acrylic acid	Styrene	0.05		0.25			312
Acrylic acid	Styrene	0.08		1.1			312
Acrylic acid	Styrene	0.25		0.15			397
Acrylic acid	Styrene	0.35		0.22			414
Acrylic acid	Styrene	0.136	0.029	0.253	0.069	Y	47
Acrylic acid	Styrene	0.15		0.25			490
Acrylic acid	Styrene	0.45		0.25			542
Acrylic acid	Styrene	0.25		0.15			561
Acrylic acid	Vinyl acetate	8.66	6.63	0.021	0.059	Y	37
Acrylic acid	Vinyl chloride	6.69	0.88	0.107	0.011	Y	135

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TABLE 1. *cont'd*

Monomer 1	Monomer 2	r_1	±95%	r_2	±95%	Conv.	Refs.
Acrylic acid	Vinyl chloride	9.28	0.51	0.03	0.09	N	229
Acrylic acid	Vinyl chloride	7.04	0.33	0.024	0.069	Y	288
Acrylic acid	Vinyl chloride	6.8		0.11			379
Acrylic acid	Vinylhydroquinone	0.29	0.11	0.026	0.092	Y	337
Acrylic acid	Vinylhydroquinone dibenzoate	0.44		0.95			444
Acrylic acid	Vinylidene chloride	1.246	0.042	0.437	0.065	Y	288
Acrylic acid	Vinylidene cyanide	0.212	0.016	0.291	0.042	Y	82
Acrylic acid, 2-benzamido-	Acrylic acid	2.08		0.48			1019
Acrylic acid, 2-benzamido-	Styrene	0.78		0.13			1019
Acrylic acid, 2-ethyl	Methacrylic acid	0.194	0.027	1.12	0.132	Y	1004
Acrylic acid, 2-ethyl	Methacrylic acid	0.069	0.04	2.29	0.417	Y	1004
Acrylic acid, 2-ethyl	Methacrylic acid	0.23		1.14		Y	961
Acrylic acid, *N*-acetyl-α-amino	Acrylic acid	0.49		1.41			661
Acrylic acid, *N*-acetyl-α-amino-	Styrene	0.44		0.91			661
Acrylic acid, α-bromo	Methacrylate, methyl	0.11		0.37			733
Acrylic acid, α-bromo	Acrylate, butyl	0.09		0.19			733
Acrylic acid, α-bromo	Acrylate, methyl	0.1		0.24			733
Acrylic acid, α-bromo	Methacrylate, butyl	0.13		0.85			733
Acrylic acid, α-bromo	Pyrrolidone, *N*-vinyl	0.07		0.25			694
Acrylic acid, *cis*-3-bromo-	Acrylamide	−0.2	0.11	7.64	1.67	Y	298
Acrylic acid, *cis*-3-ethyl	Acrylamide	−0.16	0.1	6.32	0.68	Y	298
Acrylic acid, *trans*-3-bromo-	Acrylamide	−0.33	0.16	4.13	0.76	Y	298
Acrylic acid, *trans*-3-ethyl-	Acrylamide	−0.21	0.11	8.19	1.09	Y	298
Acrylic anhydride	Allyl chloride	11.66	0.56	0.02	0.02	N	219
Acrylic anhydride	Methacrylonitrile	1	0.13	0.42	0.04	N	219
Acrylic anhydride	Styrene	0.1	0.004	0.16	0.01	N	219
Acrylonitrile	1,3-pentadiene, *cis*-	0.026	0.173	0.017	0.012	Y	912
Acrylonitrile	1,3-pentadiene, *cis*-	0.06	0.242	0.071	0.029	Y	912
Acrylonitrile	1,3-pentadiene, *trans*-	0.069	0.104	0.018	0.01	Y	912
Acrylonitrile	1,3-pentadiene, *trans*-	0.068	0.096	0.064	0.02	Y	912
Acrylonitrile	2-Oxazoline, 2-isopropenyl-	0.13	0.04	0.52	0.06		894
Acrylonitrile	Acenaphthalene	0.02		2.56			575
Acrylonitrile	Acetylene, phenyl-	0.266	0.044	0.325	0.083	Y	60
Acrylonitrile	Aconitate, trimethyl	4.24	0.92	−0.48	0.11	Y	147
Acrylonitrile	Acrolein	0.88	0.06	1.16	0.13	N	207
Acrylonitrile	Acrolein	0.71	0.03	1.07	0.08	N	207
Acrylonitrile	Acrolein	0.48	0.01	1.52	0.07	N	208
Acrylonitrile	Acrolein	0.6		1.28			504
Acrylonitrile	Acrolein diethylacetal	11.19		0.02			767
Acrylonitrile	Acrolein, methyl-	0.15		1.7			455
Acrylonitrile	Acrolein, methyl-	0.15		3.8			587
Acrylonitrile	Acrolein, methyl-	0.03	0.19	1.72	0.42	Y	91
Acrylonitrile	Acrylamide	0.863	0.033	0.81	0.11	Y	228
Acrylonitrile	Acrylamide	0.97	0.1	1.08	0.51	Y	228
Acrylonitrile	Acrylamide	1.8	0.75	0.5	0.26	N	330
Acrylonitrile	Acrylamide	0.88		1.36			421
Acrylonitrile	Acrylamide	0.8		1.3			461
Acrylonitrile	Acrylamide, *N*-methylol-	0.7		1.2			442
Acrylonitrile	Acrylamide, *N*-methylol-	0.98		2.33			577
Acrylonitrile	Acrylamide, *N*-methylol-	0.22		2.56			596
Acrylonitrile	Acrylamide, *N*-octadecyl-	1.034	0.02	1.4	0.17	Y	119
Acrylonitrile	Acrylamide, *N-tert*-butyl-	0.2		1.14			709
Acrylonitrile	Acrylate, 2-chloroethyl	1.03		0.87			790
Acrylonitrile	Acrylate, 2-nitrobutyl	0.67	0.25	1.76	0.69	N	234
Acrylonitrile	Acrylate, 3,4-epoxyhexahydrobenzyl	0.25	0.13	0.388	0.074	Y	680
Acrylonitrile	Acrylate, β-chloro-2-hydroxypropyl	0.24		0.7			654
Acrylonitrile	Acrylate, β-ethoxy-, ethyl	2.42	1.8	−0.26	0.56	N	194
Acrylonitrile	Acrylate, α-chloro-, methyl	0.122	0.081	1.76	0.18	Y	6
Acrylonitrile	Acrylate, α-cyano-, methyl	0.01	0.02	0.68	0.09	N	141
Acrylonitrile	Acrylate, α-phenyl-, methyl	0.08		6.7			141
Acrylonitrile	Acrylate, benzyl	0.28	0.19	0.72	0.16	N	23
Acrylonitrile	Acrylate, benzyl	1.49		0.63			385
Acrylonitrile	Acrylate, butyl	1.679	0.058	1.06	0.15	Y	118
Acrylonitrile	Acrylate, butyl	0.781	0.083	0.894	0.019	Y	162
Acrylonitrile	Acrylate, butyl	1.08	0.08	0.82	0.13	N	233

TABLE 1. *cont'd*

Monomer 1	Monomer 2	r_1	±95%	r_2	±95%	Conv.	Refs.
Acrylonitrile	Acrylate, butyl	1		0.9			513
Acrylonitrile	Acrylate, butyl	1		1.2			513
Acrylonitrile	Acrylate, *cis*-β-cyano-, methyl					N	1034
Acrylonitrile	Acrylate, cresyl	0.72	0.15	0.773	0.067	Y	363
Acrylonitrile	Acrylate, di-, zinc	0.41		0.24			646
Acrylonitrile	Acrylate, dodecyl	2.37	0.07	0.88	0.16	N	233
Acrylonitrile	Acrylate, ethyl	0.92	0.08	1.2	0.07		1023
Acrylonitrile	Acrylate, ethyl	1.16	0.78	0.81	0.27	N	198
Acrylonitrile	Acrylate, ethyl	0.66		4			389
Acrylonitrile	Acrylate, ethyl	0.44		0.95			542
Acrylonitrile	Acrylate, glycidyl	1.01		1			114
Acrylonitrile	Acrylate, *m*-chlorophenyl	1.3	0.073	0.85	0.036	Y	363
Acrylonitrile	Acrylate, methyl	0.56	0.03	0.51	0.02		1024
Acrylonitrile	Acrylate, methyl	1.54	0.044	0.844	0.037	Y	151
Acrylonitrile	Acrylate, methyl	1.31	0.08	0.85	0.2	N	233
Acrylonitrile	Acrylate, mono-, ethylene glycol	0.8		1.2			682
Acrylonitrile	Acrylate, *o*-chlorophenyl	1.123	0.037	1.171	0.023	Y	363
Acrylonitrile	Acrylate, octadecyl	1.91	0.1	1.04	0.38	Y	118
Acrylonitrile	Acrylate, octadecyl	4.39	0.64	1.35	0.4	N	233
Acrylonitrile	Acrylate, octadecyl	1.76	0.2	0.32	0.35	Y	290
Acrylonitrile	Acrylate, octyl	1.98	0.3	0.84	0.74	Y	118
Acrylonitrile	Acrylate, *p*-bromophenyl	0.8	0.13	1.026	0.062	Y	363
Acrylonitrile	Acrylate, *p*-chlorophenyl	0.32	0.056	0.951	0.063	Y	363
Acrylonitrile	Acrylate, phenyl	0.43	0.13	0.327	0.045	Y	363
Acrylonitrile	Acryloyl chloride	1.2		1			580
Acrylonitrile	Acryloylpyrrolidone	1.56		0.43			666
Acrylonitrile	Allyl acetate	6.57	2.11	−0.09	0.12	Y	108
Acrylonitrile	Allyl alcohol					N	108
Acrylonitrile	Allyl alcohol	2.6		0.05			108
Acrylonitrile	Allyl alcohol	3.9	1.06	0.1	0.16	N	176
Acrylonitrile	Allyl alcohol	1.79	0.11	0.12	0.37	Y	300
Acrylonitrile	Allyl chloride	2.145	0.049	−0.152	0.008	Y	108
Acrylonitrile	Allyl chloride	3.45	0.65	0.08	0.03	Y	47
Acrylonitrile	Allylbenzene	3.82	1.7	−0.05	0.15	Y	24
Acrylonitrile	Allylbenzene	5.35	0.3	−0.026	0.022	Y	351
Acrylonitrile	Allylcyclohexane	3.81	11.42	−0.18	1.01	Y	24
Acrylonitrile	Allylstearamide, *N*-	3.79	0.28	0.03	0.27	Y	119
Acrylonitrile	Benzothiazole, vinylmercapto-	0.191	0.014	0.178	0.081	Y	763
Acrylonitrile	Butadiene	0.046	0.006	0.358	0.046	Y	21
Acrylonitrile	Butadiene	0.1	0.059	0.452	0.023	Y	255
Acrylonitrile	Butadiene	0.05		0.35			418
Acrylonitrile	Butadiene	0.06		0.1			501
Acrylonitrile	Butadiene	0.03	0.02	0.2	0.01	N	66
Acrylonitrile	Butadiene, 1,4-dicarboxylate, diethyl	0.29	0.12	2.79	0.9	N	327
Acrylonitrile	Butadiene, 1-(diethylamino)-	0.481	0.049	0.426	0.208	Y	864
Acrylonitrile	Butadiene, 1-(diethylamino)-	0.208	0.049	0.425	0.48	Y	889
Acrylonitrile	Butadiene, 1-acetoxy-	−0.012	0.043	0.82	0.68	Y	91
Acrylonitrile	Butadiene, 1-ethoxy	0.02	0.008	0.065	0.009	Y	864
Acrylonitrile	Butadiene, 1-ethoxy	0.01	0.008	0.065	0.02	Y	889
Acrylonitrile	Butadiene, 2-chloro-	0.04		5.35			402
Acrylonitrile	Butadiene, 2-chloro-	0.05		4.8			504
Acrylonitrile	Butadiene, 2-chloro-	0.056	0.023	5.38	0.45	Y	61
Acrylonitrile	Butadiene, 2-fluoro-	0.077	0.021	0.6	0.18	Y	174
Acrylonitrile	Butadiene, 2-trimethylsilyloxy-	0.036		0.065			993
Acrylonitrile	Butadiene-1-carboxylate, ethyl	0.3		3.2			791
Acrylonitrile	Butadiene-1-carboxylic acid	0.2		4			791
Acrylonitrile	Butadiene-1-carboxylic acid	0.03		11			799
Acrylonitrile	Butene-1	13.46	3.61	0.24	0.81	Y	211
Acrylonitrile	Butene-1, 4-(*p*-chlorophenyl)-	4.68	0.63	0.066	0.044	Y	24
Acrylonitrile	Butene-1, 4-(*p*-methoxy-phenyl)-	2.56	1.11	−0.085	0.088	Y	24
Acrylonitrile	Butene-1, 4-cyclohexyl-	5.03	0.76	0.014	0.055	Y	24
Acrylonitrile	Butene-1, 4-phenyl-	4.51	0.86	0.024	0.069	Y	24
Acrylonitrile	Butene-2, *cis*	22.32		0.11		Y	211
Acrylonitrile	Butene-2, *trans*	62.99	10.67	0.84	0.6	Y	211
Acrylonitrile	Carbazole, *N*-vinyl-	0.39	0.04	0.09	0.04	N	269

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TABLE 1. *cont'd*

Monomer 1	Monomer 2	r_1	±95%	r_2	±95%	Conv.	Refs.
Acrylonitrile	Cinnamate, α-cyano-, ethyl	12.6	2.3	−0.18	0.15	Y	310
Acrylonitrile	Cinnamonitrile	8.46	0.37	0.36	0.1	Y	310
Acrylonitrile	Cinnamonitrile, α-cyano-					Y	310
Acrylonitrile	Citraconimide, *N*-methyl-	0.53		0.6			460
Acrylonitrile	Crotonaldehyde	8		0			429
Acrylonitrile	Crotonaldehyde	25		0.01			504
Acrylonitrile	Crotonate, α-chloro-, ethyl	9.53		0			785
Acrylonitrile	Crotonate, α-cyano-, ethyl	11.4		0.06			785
Acrylonitrile	Crotonate, α-methoxy-, methyl	1		0			785
Acrylonitrile	Crotonate, α-methyl-, methyl	2.97		0			785
Acrylonitrile	Crotonate, α-acetyl-, methyl	8.68		0			785
Acrylonitrile	Crotonate, α-carboethoxy-, ethyl	18.7		0			785
Acrylonitrile	Crotonate, ethyl	25.2		0			785
Acrylonitrile	Crotonic acid	21		0			402
Acrylonitrile	Cyclopentene, 4-, -1,3-dione	3.02	0.71	0.04	0.058	Y	95
Acrylonitrile	Cyclopropene, 3,3-dimethoxy-	1.424	0.038	0.245	0.037	Y	838
Acrylonitrile	Diallyl phthalate	4.23	0.15	0.04	0.012	Y	153
Acrylonitrile	Diallyl phthalate	2.78	0.52	0.037	0.031	Y	153
Acrylonitrile	Ethylene	7		0			415
Acrylonitrile	Ethylene,1,1-diphenyl-	0.05	0.01	−0.02	0.01	N	143
Acrylonitrile	Ethylene, tetrachloro-	456		0			571
Acrylonitrile	Ethylene, tetrachloro-	470		0			59
Acrylonitrile	Ethylene, trichloro-	67		0			470
Acrylonitrile	Ethylene, trichloro-	62.1		0			572
Acrylonitrile	Fumarate, diisopropyl	16		0.2			1038
Acrylonitrile	Fumarate, diethyl	8		0			470
Acrylonitrile	Fumarate, diethyl	10		0.1			640
Acrylonitrile	Hexatriene, tetrachloro-	0.234	0.05	4.01	1.25	Y	4
Acrylonitrile	Hexene-1	2.07		−1.08		Y	60
Acrylonitrile	Indene	0.281	0.05	0.09	0.25	Y	360
Acrylonitrile	Indene	0.29	0.12	0.07	0.24	Y	360
Acrylonitrile	Isobutylene	1.295	0.008	0	0.002	Y	21
Acrylonitrile	Isobutylene	0.98	0.25	0.02	0.38	Y	211
Acrylonitrile	Isobutylene	1.02		0			484
Acrylonitrile	Isoprene	0.03		0.45			417
Acrylonitrile	Isopropenyl methyl ketone	0.3		1.2			490
Acrylonitrile	Isopropenyl methyl ketone	0.36		0.7			542
Acrylonitrile	Isopropenylisocyanate	0.24		0.1			434
Acrylonitrile	Itaconic acid	0.59	0.34	0.86	0.74	Y	164
Acrylonitrile	Itaconic anhydride	0.034	0.014	4.83	0.33	Y	365
Acrylonitrile	Maleate, diethyl	12		0			470
Acrylonitrile	Maleate, diethyl	20		0			640
Acrylonitrile	Maleic anhydride	6		0			470
Acrylonitrile	Maleimide, *N*-(2-bromophenyl)-	2.029	0.214	0.338	0.045	Y	863
Acrylonitrile	Maleimide, *N*-(2-chlorophenyl)-	0.956	0.095	1.078	0.048	Y	863
Acrylonitrile	Maleimide, *N*-(4-chlorophenyl)-	0.972	0.112	0.743	0.048	Y	863
Acrylonitrile	Maleimide, *N*-2-bromophenyl-	2.02	0.205	0.348	0.044	Y	915
Acrylonitrile	Maleimide, *N*-2-chlorophenyl-	0.955	0.095	1.08	0.048	Y	915
Acrylonitrile	Maleimide, *N*-4-chlorophenyl-	0.972	0.112	0.743	0.048	Y	915
Acrylonitrile	Maleimide, *N*-octadecyl-	2.482	0.119	0.389	0.023	Y	863
Acrylonitrile	Maleimide, *N*-octadecyl-	2.46	0.115	0.39	0.023	Y	915
Acrylonitrile	Methacrylamide, *N*-(*p*-chlorophenyl)-	0.399	0.019	0.627	0.051	Y	352
Acrylonitrile	Methacrylamide, *N*-(*p*-methoxyphenyl)-	0.337	0.019	0.559	0.048	Y	352
Acrylonitrile	Methacrylamide, *N*-(*p*-methylphenyl)-	0.336	0.026	0.549	0.06	Y	352
Acrylonitrile	Methacrylamide, *N*-(*p*-nitrophenyl)-	0.37	0.14	2.34	1.07	Y	352
Acrylonitrile	Methacrylamide, *N*-phenyl-	0.381	0.085	0.71	0.19	Y	352
Acrylonitrile	Methacrylate, 2,2,6,6-tetramethyl-4-piperidinyl	0.02		14			664
Acrylonitrile	Methacrylate, 2-(*N*,*N*-dimethylcarbamoyloxy)ethyl	0.38		1.89			600
Acrylonitrile	Methacrylate, 2-bromoethyl	0.31		2.38			657
Acrylonitrile	Methacrylate, 2-chloroethyl	0.14		1.3			382
Acrylonitrile	Methacrylate, 2-hydroxyethyl	0.2		1			689
Acrylonitrile	Methacrylate, 2-naphthyl	0.15	0.2	1.17	0.2	Y	611
Acrylonitrile	Methacrylate, 2-naphthyl	0.094	0.099	1.02	0.19	Y	611

TABLE 1. *cont'd*

Monomer 1	Monomer 2	r_1	±95%	r_2	±95%	Conv.	Refs.
Acrylonitrile	Methacrylate, 2-naphthyl	0.06	0.1	0.76	0.18	Y	611
Acrylonitrile	Methacrylate, 2-naphthyl	−0.01	0.16	0.64	0.24	N	611
Acrylonitrile	Methacrylate, 3,5-dimethyladamantyl	0.19	0.01	1.3	0.23	N	335
Acrylonitrile	Methacrylate, benzyl	0.2	0.1	0.96	0.1	N	23
Acrylonitrile	Methacrylate, butyl	0.291	0.039	0.98	0.2	Y	165
Acrylonitrile	Methacrylate, ferrocenylmethyl	0.15	0.04	0.82	0.42	Y	325
Acrylonitrile	Methacrylate, glycidyl	0.95	0.06	0.85	0.05	N	114
Acrylonitrile	Methacrylate, glycidyl	0.14		1.32			433
Acrylonitrile	Methacrylate, isobutyl	0.217	0.037	1.05	0.22	Y	165
Acrylonitrile	Methacrylate, methyl	0.138	0.037	1.322	0.05	Y	216
Acrylonitrile	Methacrylate, methyl	−0.016	0.048	1.11	0.12	Y	681
Acrylonitrile	Methacrylate, mono-, ethylene glycol	0.19		1.5			682
Acrylonitrile	Methacrylate, phenyl	0.36		0.46			363
Acrylonitrile	Methacrylate, potassium	0.226	0.04	0.203	0.086	Y	808
Acrylonitrile	Methacrylate, potassium 18-crown-6-ether	0.07	0.006	0.175	0.018	Y	808
Acrylonitrile	Methacrylic acid	0.04	0.13	0.2	0.26	Y	16
Acrylonitrile	Methacrylic acid	0.092	0.06	2.38	0.29	Y	216
Acrylonitrile	Methacrylonitrile	0.43	0.04	1.67	0.12	N	198
Acrylonitrile	Methacryloyl chloride	0.35		2.8			580
Acrylonitrile	Methacryloyl acetone	0.01	0.004	3.74	0.22	Y	339
Acrylonitrile	Methylenebutyrolactone	0.09		1.1			745
Acrylonitrile	*N,N*-Divinylaniline	0.246	0.014	−0.006	0.07	Y	45
Acrylonitrile	*N*-Vinylimidazole	3.393	0.008	0.832	0.044	Y	879
Acrylonitrile	Naphthalene, 1-vinyl-	0.107	0.028	0.451	0.088		967
Acrylonitrile	Norbornadiene	0.48	0.27	0.05	0.23	N	267
Acrylonitrile	Norbornadiene	0.66	0.01	0.44	0.05	N	69
Acrylonitrile	Oct-1-ene, 6,6-dimethyl-4,8-dioxaspiro	0.985	0.675	1.484	1.078	Y	838
Acrylonitrile	Oxazoline, 2-,2-isopropenyl-	0.13		0.52			862
Acrylonitrile	Oxazoline, 2-,2-isopropenyl-, 4-dimethyl	0.24		1.83			596
Acrylonitrile	Oxazoline, 2-,4-methacryloxy-2,4-dimethyl	0.11		0.89			596
Acrylonitrile	Pentadiene, *trans*-1,3-	0.06	0.064	0.095	0.021	Y	867
Acrylonitrile	Pentadiene, *cis*-1,3-	0.026	0.018	0.172	0.012	Y	867
Acrylonitrile	Pentadiene, *cis*-1,3-	0.056		0.198			952
Acrylonitrile	Pentadiene, *cis*-1,3-	0.033	0.017	0.188	0.011	N	997
Acrylonitrile	Pentadiene, *trans*-1,3-	0.07	0.017	0.104	0.01	Y	867
Acrylonitrile	Pentadiene, *trans*-1,3-	0.085		0.132			952
Acrylonitrile	Pentadiene, *trans*-1,3-	0.079	0.018	0.114	0.009	N	997
Acrylonitrile	Pentadiene, *cis*-1,3-	0.06	0.071	0.241	0.029	Y	867
Acrylonitrile	Pentadienoate, *trans*-4-ethoxy-2,4-, ethyl	0.01		5.4			723
Acrylonitrile	Pentene-1, 5-cyclohexyl-	4.22	0.45	−0.043	0.044	N	24
Acrylonitrile	Pentene-1, 5-phenyl-	3.84	0.48	−0.026	0.046	Y	24
Acrylonitrile	Phosphate, diethyl isopropenyl	15.2		0.03			650
Acrylonitrile	Phosphine oxide, diphenylvinyl-	3.8		0.16			843
Acrylonitrile	Phosphonic acid, α-phenylvinyl-	0.34	0.12	−0.45	0.41	Y	132
Acrylonitrile	Phosphonic acid, α-phenylvinyl-	2.36		0			590
Acrylonitrile	Phthalide, 3-(4-vinylphenoxy)-	0.084	0.053	0.43	0.19	Y	721
Acrylonitrile	Phthalimide, *N*-vinyl-	0.43	0.01	0.24	0.02		1046
Acrylonitrile	Phthalimide, *N*-(methacryloyloxy)-	0.204	0.016	1.45	0.072	Y	979
Acrylonitrile	Pinene	0.07	0.01	13.5	0.1		936
Acrylonitrile	Propene, 2-chloro-	1.164	0.053	−0.023	0.062	Y	181
Acrylonitrile	Propene, 3,3,3-trichloro-	12.2		0.1			402
Acrylonitrile	Propene, 1-chloro-, *cis*-	23.37	2.99	−0.12	0.19	Y	181
Acrylonitrile	Propene, 1-chloro-, *trans*-	19.61	1.72	0.01	0.17	Y	181
Acrylonitrile	Pyridazinone, 3-(2-vinyl)-6-methyl-	0.32	0.02	0.19	0.04	N	340
Acrylonitrile	Pyridazinone, 3-(2-vinyl)-6-methyl-4,5-	0.74	0.02	0.02	0.02	N	340
Acrylonitrile	Pyridine, 2-methyl-5-vinyl-	0.16	0.01	0.31	0.02	N	232
Acrylonitrile	Pyridine, 2-vinyl-	0.05		21.9			456
Acrylonitrile	Pyridine, 2-vinyl-	0.1	0.03	0.44	0.08	N	50
Acrylonitrile	Pyridine, 2-vinyl-5-ethyl-	0.02		0.43			115
Acrylonitrile	Pyridine, 2-vinyl-5-ethyl-	0.06	0.07	0.43	0.18	N	50
Acrylonitrile	Pyridine, 4-vinyl-	0.11		0.41			115
Acrylonitrile	Pyridine, 4-vinyl-	0.09	0.04	0.34	0.13	N	50

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TABLE 1. *cont'd*

Monomer 1	Monomer 2	r_1	±95%	r_2	±95%	Conv.	Refs.
Acrylonitrile	Pyrrolidone, *N*-vinyl-					Y	213
Acrylonitrile	Silane, γ-methacryloxypropyltrimethoxy-	0.094	0.034	3.79	0.594	Y	977
Acrylonitrile	Styrene	0		0.33			140
Acrylonitrile	Styrene	0.02	0.06	0.29	0.04	N	198
Acrylonitrile	Styrene	0.05		0.4			269
Acrylonitrile	Styrene	0.03		0.36			396
Acrylonitrile	Styrene	0.06		0.39			403
Acrylonitrile	Styrene	0.05		0.37			417
Acrylonitrile	Styrene	0.07		0.37			543
Acrylonitrile	Styrene	0.04		0.4			60
Acrylonitrile	Styrene	0.17		0.3			727
Acrylonitrile	Styrene	0.17		0.33			727
Acrylonitrile	Styrene	0.15		0.33			727
Acrylonitrile	Styrene	0.17		0.36			727
Acrylonitrile	Styrene	0.07		0.46			727
Acrylonitrile	Styrene	0.06		0.41			727
Acrylonitrile	Styrene	0.03		0.43			727
Acrylonitrile	Styrene	0.06		0.55			727
Acrylonitrile	Styrene	0.01		0.35			812
Acrylonitrile	Styrene, 2,4,6-trimethyl-	0.874	0.051	0.065	0.048	Y	58
Acrylonitrile	Styrene, 2,5-dichloro-	0.22	0.01	0.08	0.03	N	84
Acrylonitrile	Styrene, 2,5-dichloro-	0.25		0.07			84
Acrylonitrile	Styrene, 2,5-dichloro-	0.26		0.09			84
Acrylonitrile	Styrene, 3-tri-*n*-butylstannyl-	4.88		0.001			985
Acrylonitrile	Styrene, 4-methyl-	0.079	0.005	0.227	0.021	Y	929
Acrylonitrile	Styrene, α-(trimethylsilyloxy)-	0.05		0			970
Acrylonitrile	Styrene, α-methoxy-	0.06	0.01	−0.002	0.01	N	142
Acrylonitrile	Styrene, α-methyl-	0.07	0.04	0.08	0.03	N	171
Acrylonitrile	Styrene, α-methyl-	0.04		0.17			265
Acrylonitrile	Styrene, α-methyl-	0.04		0.24			265
Acrylonitrile	Styrene, α-methyl-	0.04	0.005	0.14	0.03	N	65
Acrylonitrile	Styrene, α-methyl-	0.063	0.041	0.09	0.024	Y	75
Acrylonitrile	Styrene, α-methyl-	0.34	0.15	0.103	0.036	Y	75
Acrylonitrile	Styrene, α-methyl-	0.03		0.14			835
Acrylonitrile	Styrene, α-methyl-	−0.02	0.27	0.08	0.07	N	94
Acrylonitrile	Styrene, *m*-methyl-	0.07		0.43			378
Acrylonitrile	Styrene, *p*-1-(2-hydroxy-butyl)-	0.04		0.31			548
Acrylonitrile	Styrene, *p*-1-(2-hydroxy-propyl)-	0.1		0.53			380
Acrylonitrile	Styrene, *p*-2-(2-hydroxy-propyl)-	0.05		0.41			547
Acrylonitrile	Styrene, *p*-acetoxy-	0.07	0.01	0.4	0.03	N	47
Acrylonitrile	Styrene, *p*-chloro-	−0.09	0.06	0.92	0.06	N	825
Acrylonitrile	Styrene, *p*-chloromethyl-	0.067		0.56			1035
Acrylonitrile	Styrene *p*-methyl-	0.05		0.33			378
Acrylonitrile	Succinimide, *N*-vinyl-	0.116	0.024	0.516	0.081		80
Acrylonitrile	Tetrazole, 2-methyl-5-(4′-vinyl)phenyl-	0.42		1.1			583
Acrylonitrile	Tetrazole, 5-phenyl-2-(4′-vinyl)phenyl-	0.32		1.4			583
Acrylonitrile	Tetrazole, 1-vinyl-	0.54	0.032	0.314	0.066	Y	925
Acrylonitrile	Toluenesulfonamide, *N,N*-methyl-vinyl-	0.42	0.12	0.04	1.04	Y	80
Acrylonitrile	Triallyl citrate	1.76	0.082	−0.08	0.1	Y	367
Acrylonitrile	Tricyclo[4.2.2.0{2,5}]dec-7-ene-3,4,9,10-tetracarboxylic acid	2.75		0.25			963
Acrylonitrile	Vinyl 12-ketostearate	3.3	0.5	−0.18	0.36	Y	146
Acrylonitrile	Vinyl 2-chloroethyl ether	1.09		0			597
Acrylonitrile	Vinyl 2-ethylhexanoate	9.24	1.96	−0.047	0.05	Y	47
Acrylonitrile	Vinyl 3,3-bis(ethoxycarbonyl)propyl ether	1.02		0.06			1015
Acrylonitrile	Vinyl acetate	4.05	0.82	0.04	0.067	Y	158
Acrylonitrile	Vinyl acetate					N	235
Acrylonitrile	Vinyl acetate	5.51	0.91	0.06	0.22	Y	6
Acrylonitrile	Vinyl acetate	5.29	1.13	−0.06	0.08	Y	75
Acrylonitrile	Vinyl acetate	9.2	6.39	−0.03	0.09	Y	75
Acrylonitrile	Vinyl benzoate	5.03	1.08	0.019	0.051	Y	47
Acrylonitrile	Vinyl bromide	2.79	0.2	0.06	0.04	N	268
Acrylonitrile	Vinyl bromide	2.25		0.06			268
Acrylonitrile	Vinyl butyl ether					N	345

TABLE 1. *cont'd*

Monomer 1	Monomer 2	r_1	±95%	r_2	±95%	Conv.	Refs.
Acrylonitrile	Vinyl butyl ether	0.98	0.13	−0.03	0.01	N	347
Acrylonitrile	Vinyl butyl sulfide	0.086	0.01	0.041	0.028	Y	303
Acrylonitrile	Vinyl chloride	3.26	0.34	−0.01	0.037	Y	140
Acrylonitrile	Vinyl chloride	2.55	0.12	0.07	0.03	N	202
Acrylonitrile	Vinyl chloride	2.62	0.25	0.02	0.08	N	22
Acrylonitrile	Vinyl chloride	3.62	0.21	0.044	0.002	Y	238
Acrylonitrile	Vinyl chloride	3.65	0.22	0.052	0.01	Y	46
Acrylonitrile	Vinyl chloride	4		0.04			529
Acrylonitrile	Vinyl chloroacetate	4.18	0.33	−0.007	0.016	Y	362
Acrylonitrile	Vinyl chloroacetate	0.34		0.09			542
Acrylonitrile	Vinyl chloroethyl ether	1.04	0.05	−0.02	0.02	N	116
Acrylonitrile	Vinyl chloromethyl ketone	0.064	0.019	0.88	0.12	Y	356
Acrylonitrile	Vinyl cymantrene	0.446	0.048	−0.065	0.093	Y	354
Acrylonitrile	Vinyl dichloroacetate	7.45	0.32	0.044	0.015	N	362
Acrylonitrile	Vinyl dichloroacetate	0.25		0.18			542
Acrylonitrile	Vinyl dodecyl ether	0.82		0			373
Acrylonitrile	Vinyl ether	0.94		0.02			386
Acrylonitrile	Vinyl ethyl ether	0.69	0.12	0.06	0.12	N	194
Acrylonitrile	Vinyl ethyl oxalate	1.34	0.45	0.06	0.03	N	285
Acrylonitrile	Vinyl ethyl sulfide	0.09	0.01	0.06	0.03	N	285
Acrylonitrile	Vinyl ethyl sulfide	0.06	0.01	0.05	0.03	N	336
Acrylonitrile	Vinyl ethyl sulfoxide	1.63	0.16	−0.08	0.14	Y	286
Acrylonitrile	Vinyl fluoride	44		0.005			528
Acrylonitrile	Vinyl fluoride	24		1			590
Acrylonitrile	Vinyl formate	2.54	1.79	−0.004	0.12	Y	47
Acrylonitrile	Vinyl hendecanoate	1.88	0.44	0.09	0.91	Y	145
Acrylonitrile	Vinyl isobutyl ether	−0.24	0.26	0.7	0.09	N	322
Acrylonitrile	Vinyl isobutyl ether	−0.05	0.07	0.99	0.06	N	322
Acrylonitrile	Vinyl isobutyl ether	0.98	0.15	−0.04	0.01	N	347
Acrylonitrile	Vinyl isobutyl ether	1.26	0.19	−0.04	0.02	N	347
Acrylonitrile	Vinyl isobutyl sulfide	0.08	0.005	0.03	0.01	N	285
Acrylonitrile	Vinyl isobutyl sulfide	0.062	0.004	0.022	0.038	Y	303
Acrylonitrile	Vinyl isobutyl sulfide	0.08	0.004	0.03	0.01	N	336
Acrylonitrile	Vinyl isothiocyanate	0.36		1.4			542
Acrylonitrile	Vinyl laurate	4		0.04			381
Acrylonitrile	Vinyl methyl ketone	0.59	0.13	1.75	0.11	Y	140
Acrylonitrile	Vinyl methyl ketone	0.63		1.39			504
Acrylonitrile	Vinyl octadecyl ether	0.85		0			373
Acrylonitrile	Vinyl octyl ether	0.81		0			373
Acrylonitrile	Vinyl phenyl ether	2.5		0.23			556
Acrylonitrile	Vinyl phenyl sulfide	0.11	0.01	0.03	0.02	N	285
Acrylonitrile	Vinyl phenyl sulfide	0.11	0.01	0.03	0.01	N	336
Acrylonitrile	Vinyl stearate	4.639	0.015	0.078	0.007	Y	145
Acrylonitrile	Vinyl *tert*-butyl sulfide	0.09	0.024	0	0.013	Y	303
Acrylonitrile	Vinyl trichloroacetate	7.34	0.9	0.047	0.039	Y	362
Acrylonitrile	Vinyl, α-chloro-, triethoxysilane					Y	
Acrylonitrile	Vinyl, *p*-, benzylethylcarbinol	0.04		0.31			591
Acrylonitrile	Vinyl, *p*-, benzylmethylcarbinol	0.11	0.17	0.54	0.2	N	48
Acrylonitrile	Vinyl-tris(trimethoxysiloxy)-silane	3.9		0.07			209
Acrylonitrile	Vinyl-tris(trimethoxysiloxy)-silane	3.85		0.08			573
Acrylonitrile	Vinylbenzoate, *p*-, sodium	0.174	0.04	0.23	0.34	Y	175
Acrylonitrile	Vinylbenzoic acid, *p*-	0.06	0.009	1.63	0.42	Y	175
Acrylonitrile	Vinylene carbonate	14.9		0.08			579
Acrylonitrile	Vinylethynyl-4-piperidinol, 1,2,5-trimethyl	0.08		0.38			783
Acrylonitrile	Vinylferrocene	0.186	0.025	0.165	0.092	Y	294
Acrylonitrile	Vinylferrocene	0.16		0.15			294
Acrylonitrile	Vinylhydroquinone	0.56	0.36	0.04	0.03	N	338
Acrylonitrile	Vinylidene chloride	0.92	0.11	0.32	0.14	Y	138
Acrylonitrile	Vinylidene chloride	1.04	0.2	0.28	0.034	Y	238
Acrylonitrile	Vinylidene chloride	0.44		0.4			404
Acrylonitrile	Vinylidene chloride	0.58		0.42			404
Acrylonitrile	Vinylidene chloride	0.65		0.49			404
Acrylonitrile	Vinylidene chloride	0.57		0.69			404
Acrylonitrile	Vinylidene chloride	0.5		0.76			404

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TABLE 1. *cont'd*

Monomer 1	Monomer 2	r_1	±95%	r_2	±95%	Conv.	Refs.
Acrylonitrile	Vinylidene chloride	0.48		0.95			404
Acrylonitrile	Vinylidene chloride	0.65		0.95			404
Acrylonitrile	Vinylidene chloride	0.65		1.3			404
Acrylonitrile	Vinylidene chloride	0.66		1.74			404
Acrylonitrile	Vinylidene chloride	0.63		1.43			404
Acrylonitrile	Vinylidene chloride	0.63		1.8			404
Acrylonitrile	Vinylidene chloride	0.58		0.39			468
Acrylonitrile	Vinylisocyanate	0.19		0.16			435
Acrylonitrile	Vinylmethyldiacetoxysilane	2.246	0.054	−0.11	0.23	Y	754
Acrylonitrile	Vinylmethylphenylsulfonium tetrafluoroborate	2.2		0.1			793
Acrylonitrile	Vinyltriethoxysilane	6.59	0.6	0.41	0.38	Y	209
Acrylonitrile	Vinyltriethoxysilane	26.83	29.59	2.69	2.5	Y	237
Acrylonitrile	Vinyltrimethoxysilane	9.09		0.45		Y	237
Acrylonitrile	Vinyltrimethylsilane	4.08	0.76	0.1	0.27	Y	209
Acrylonitrile, 2-chloro-	Styrene	0.087	0.04	0.014	0.004	Y	884
Acrylonitrile, 2-fluoro-	Styrene					Y	884
Acrylonitrile, α-chloro-	Styrene	0.03	0.02	0.13	0.04		806
Acrylonitrile, α-fluoro-	Styrene	0.03		0.44			850
Acrylonitrile, α-hydroxymethyl-	Styrene	0.528	0.086	0.205	0.029	Y	981
Acrylonitrile, α-methoxy	Acrylate, α-chloro-, ethyl	0.3		0.9			638
Acrylonitrile, α-methoxy	Styrene	0.312	0.054	0.534	0.069		806
Acrylonitrile, α-perfluoropropyl-	Methacrylate, methyl	0	0.05	1.9	0.3		926
Acryloxymethylpentamethyldisiloxane	Methacrylate, 2-hydroxyethyl	0.52		0.86			822
Acryloyl chloride	Acrylate, methyl	2.3		0.34			508
Acryloyl chloride	Acrylonitrile	1		1.2			580
Acryloyl chloride	Methacrylate, 2-hydroxypropyl	0.29		1.79			649
Acryloyl chloride	Methacrylate, methyl	1.51		0.48			508
Acryloyl chloride	Methacrylate, methyl	0.05		0.42			776
Acryloyl chloride	Pyrrolidone, *N*-vinyl	0.15		0.04			599
Acryloyl chloride	Styrene	0.02	0.02	0.1	0.05	N	220
Acryloyl chloride	Vinyl chloride	3.03	0.22	0.02	0.029	Y	288
Acryloyl chloride	Vinylidene chloride	1.12		0.5			288
Acryloyl-β-hydroxyethyl-3,5-dinitrobenzoate	Acrylate, *N*-(2-hydroxyethyl)-carbazolyl	0.361	0.016	0.62	0.044	Y	702
Acryloyl-β-hydroxyethyl-3,5-dinitrobenzoate	Methacrylate, *N*-ethyl-3-hydroxymethylcarbazolyl	0.103	0.015	1.425	0.09	Y	701
Acryloyloxy, 2-, benzoic acid	Methacrylate, *N*-methyl-*N*-phenyl-2-amino	1.82	0.2	0.22	0.03	N	651
Acryloyloxy, 2-, benzoic acid	Styrene	0.64	0.02	0.06	0.02	N	651
Acryloylpyrrolidone	Acrylonitrile	0.43		1.56			666
Adipate, divinyl	Styrene	0.011	0.011	20.36	0.26	Y	815
Allyl acetate	Acrylate, butyl	0.039	0.066	10.2	42.2	N	1053
Allyl acetate	Acrylate, methyl	0		5			470
Allyl acetate	Acrylonitrile	−0.09	0.12	6.57	2.11	Y	108
Allyl acetate	Isobutylene, 3-chloro-	0.15		4.5			412
Allyl acetate	Maleic anhydride	−0.001	0.007	0.028	0.019	Y	27
Allyl acetate	Methacrylate, ethyl	−0.57	0.82	81.27	1.93	N	210
Allyl acetate	Methacrylate, methyl	−2.42	37.66	99.24	24.6	N	210
Allyl acetate	Methacrylate, methyl	0		23			470
Allyl acetate	Styrene	0.01	0.05	62.8	82.7	N	1053
Allyl acetate	Styrene	0		90			470
Allyl acetate	Vinyl acetate	0.45		0.6			140
Allyl acetate	Vinyl acetate	0.7		1			502
Allyl acetate	Vinyl acetate	0.7		1			998
Allyl acetate	Vinyl chloride	1.2					470
Allyl acetate	Vinyl chloride	0		1.16			475
Allyl acetate	Vinylidene chloride	0		6.6			470
Allyl acrylate	Acrylate, methyl	0.33		0.52			578
Allyl acrylate	Allyl chloride	10.4		0.08			578
Allyl acrylate	Vinyl acetate	17.35		0.11			578
Allyl alcohol	Acrylonitrile					N	108
Allyl alcohol	Acrylonitrile	0.05		2.6			108
Allyl alcohol	Acrylonitrile	0.1	0.16	3.9	1.06	N	176
Allyl alcohol	Acrylonitrile	0.12	0.37	1.79	0.11	Y	300

TABLE 1. *cont'd*

Monomer 1	Monomer 2	r_1	±95%	r_2	±95%	Conv.	Refs.
Allyl alcohol	Methacrylate, ethyl	−0.02	1.92	107.4	5.3	N	210
Allyl alcohol	Methacrylate, methyl	−1.62	2.9	78.79	6.5	N	210
Allyl butyrate	Vinyl acetate	0.64		0.97			998
Allyl chloride	Acrylate, benzyl	0.06		9.9			438
Allyl chloride	Acrylate, butyl	0.1		5.83			438
Allyl chloride	Acrylate, ethyl	0.08		7.73			438
Allyl chloride	Acrylate, methyl					Y	204
Allyl chloride	Acrylate, methyl	0.05		8.45			437
Allyl chloride	Acrylate, methyl	0.07		5.45			437
Allyl chloride	Acrylate, methyl	0.4		6.46			437
Allyl chloride	Acrylate, methyl	−0.02		9.1			437
Allyl chloride	Acrylic anhydride	0.02	0.02	11.66	0.56	N	219
Allyl chloride	Acrylonitrile	−0.152	0.008	2.145	0.049	Y	108
Allyl chloride	Acrylonitrile	0.08	0.03	3.45	0.65	Y	47
Allyl chloride	Allyl acrylate	0.08		10.4			578
Allyl chloride	Methacrylate, benzyl	0.02		58.7			438
Allyl chloride	Methacrylate, methyl					Y	204
Allyl chloride	Styrene	0.05	0.16	35.55	15.82	Y	10
Allyl chloride	Styrene						204
Allyl chloride	Styrene	0.03		36.8			438
Allyl chloride	Vinyl acetate	−2.4	3.21	1.355	0.089	Y	204
Allyl chloride	Vinyl acetate	0.61	0.15	0.66	0.15	Y	3
Allyl chloride	Vinyl acetate	0.75		0.34			438
Allyl chloride	Vinyl benzoate	0.88		0.46			438
Allyl chloride	Vinyl butyrate	1.15		0.31			438
Allyl chloride	Vinyl formate	0.78		0.57			438
Allyl chloride	Vinyl propionate	0.68		0.62			438
Allyl chloride	Vinylidene chloride	0.24	0.24	3.49	1.4	Y	3
Allyl chloroacetate	Methacrylic anhydride	−0.01	0.13	29.76	13	Y	106
Allyl chloroacetate	Styrene	0.06		34.3			782
Allyl glycidyl hexahydrophthalate	Styrene	0.06		34.3			782
Allyl glycidyl phthalate	Styrene	0.14		34.8			782
Allyl isobutyrate	Vinyl acetate	0.51		1.04			998
Allyl propionate	Vinyl acetate	0.42		1.29			998
Allyl trichloroacetate	Styrene	0.81	0.02	2.32	0.15		913
Allyl trimethylacetate	Vinyl acetate	0.34		1.15			998
Allyl valerate	Vinyl acetate	0.58		1.07			998
Allylbenzene	Acrylate, methyl	−0.036	0.016	11.35	0.66	Y	351
Allylbenzene	Acrylonitrile	−0.05	0.15	3.82	1.7	Y	24
Allylbenzene	Acrylonitrile	−0.026	0.022	5.35	0.3	Y	351
Allylbenzene	Maleic anhydride					Y	351
Allylbenzene	Methacrylonitrile	−0.061	0.03	16.24	1.36	Y	351
Allylbenzene	Triallyl citrate	0.339	0.039	2.01	0.5	Y	367
Allylcyclohexane	Acrylonitrile	−0.18	1.01	3.81	11.42	Y	24
Allylstearamide, *N*-	Acrylonitrile	0.03	0.27	3.79	0.28	Y	119
Allylstearamide, *N*-	Vinyl acetate	0.68	0.26	0.923	0.092	Y	119
Allylstearamide, *N*-	Vinylidene chloride	−0.24	0.19	5.22	0.15	Y	119
Allyltriethoxysilane	Vinyl chloride	−0.94	0.48	1.68	0.38	Y	237
Allylurea	Methacrylic anhydride	−0.06	0.17	29.01	18.48	Y	106
Azlactone, 2-vinyl-4,4-dimethyl-	Acrylate, α-hydroxymethyl-, ethyl	0.389	0.229	0.668	0.12	Y	1011
Azlactone, 2-vinyl-4,4-dimethyl-	Styrene	0.237	0.129	0.175	0.054	Y	1011
Azobenzene, 4-(acrylamidomethylamino)-	Styrene	8.5		0.083			880
Azobenzene, 4-(acrylamidomethylamino)-	Vinyl acetate	12.98		0.126			880
Benzenesulfamide, *p*-methacrylamide-	Vinyl butyl ether	3.4	0.1	0			1005
Benzimidazole, vinylmercapto-	Styrene	0.56	0.41	6.51	0.51	Y	764
Benzoate, *p*-(acryloylethoxy)-, *p*-butoxy phenyl	Benzoate, *p*-(acryloyloxy)-, *p*-butoxy phenyl	0.36		0.91			881
Benzoate, *p*-(acryloylethoxy)-, phenyl	Benzoate, *p*-(acryloyloxy)-, *p*-butoxy phenyl	0.61		0.32			881
Benzoate, *p*-(acryloyloxy)-, *p*-butoxy phenyl	Benzoate, *p*-(acryloyloxy)-, *p*-butoxy phenyl	0.91		0.36			881
Benzoate, *p*-(acryloyloxy)-, *p*-butoxy phenyl	Benzoate, *p*-(acryloyloxy)-, phenyl	0.32		0.61			881
Benzoate, *p*-(acryloyloxy)-, *p*-methoxy phenyl	Benzoate, *p*-(acryloyloxy)-, phenyl *p*-butoxyphenyl	0.49		1.5			881

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TABLE 1. *cont'd*

Monomer 1	Monomer 2	r_1	±95%	r_2	±95%	Conv.	Refs.
Benzoate, *p*-(acryloyloxy)-, phenyl *p*-butoxy phenyl	Benzoate, *p*-(acryloyloxy)-, *p*-methoxyphenyl	1.5		0.49			881
Benzoate, *p*-(acryloyloxy)-, phenyl *p*-butoxy phenyl	Benzoate, *p*-(methacryloyloxy)-, (*p*-octyloxy)phenyl	0.23		1.26			881
Benzoate, *p*-(acryloyloxy)-, *p*-butoxy phenyl	Benzoate, *p*-(acryloyloxy-ethoxy)-, *p*-butoxy phenyl	0.91		0.36			856
Benzoate, *p*-(acryloyloxy)-, *p*-butoxy phenyl	Benzoate, *p*-(acryloyloxy-ethoxy)-, phenyl	0.32		0.61			856
Benzoate, *p*-(acryloyloxy)-, phenyl	Benzoate, *p*-(acryloyloxy-ethoxy)-, *p*-methoxy phenyl	1.5		0.49			856
Benzoate, *p*-(acryloyloxy)-, phenyl	Benzoate, *p*-(methacryloyloxy-ethoxy)-, *p*-methoxy phenyl	0.23		1.26			856
Benzoate, *p*-(acryloyloxy-ethoxy)-, *p*-butoxy phenyl	Benzoate, *p*-(acryloyloxy)-, *p*-butoxy phenyl	0.36		0.91			856
Benzoate, *p*-(acryloyloxy-ethoxy)-, *p*-methoxy phenyl	Benzoate, *p*-(acryloyloxy)-, phenyl	0.49		1.5			856
Benzoate, *p*-(acryloyloxy-ethoxy)-,phenyl	Benzoate, *p*-(acryloyloxy)-, *p*-butoxy phenyl	0.61		0.32			856
Benzoate, *p*-(methacryloyloxy)-, *p*-octyloxy phenyl	Benzoate, *p*-(acryloyloxy)-, phenyl butoxy phenyl	1.26		0.23			881
Benzoate, *p*-(methacryloyloxyethoxy)-, *p*-octyloxy phenyl	Benzoate, *p*-(acryloyloxy)-, phenyl	1.26		0.23			856
Benzocyclobutane, α-methylene-	Maleic anhydride	0.002		0.025			1083
Benzocyclobutane, α-methylene-	Methacrylate, methyl	0.46		0.32			1083
Benzocyclobutene, 4-vinyl-	Methacrylate, methyl	1.47		0.6			1085
Benzofuran, 2-vinyl-	Acrylate, butyl	7.8	1.36	0.041	0.043	N	1020
Benzofuran, 2-vinyl-	Acrylate, ethyl	5.76	0.334	0.015	0.01	N	1020
Benzofuran, 2-vinyl-	Methacrylate, methyl	3.89	0.617	0.006	0.02	N	1020
Benzophenone, 2-hydroxy-4-(methacryloxy)-	Methacrylate, methyl	1.65	0.114	0.315	0.036	Y	934
Benzophenone, *p*-vinyl-	Acrylate, methyl	3.6	1.06	0.09	0.02	Y	866
Benzophenone, *p*-vinyl-	Acrylate, methyl	3.54	0.077	1.1	0.02	Y	911
Benzophenone, *p*-vinyl-	Styrene, *p*-*N*,*N*-dimethyl-aminomethyl-	2.54	0.136	0.26	0.017	Y	86
Benzophenone, *p*-vinyl-	Styrene, *p*-*N*,*N*-dimethylamino-	0.84	0.18	0.07	0.05	Y	866
Benzophenone, *p*-vinyl-	Styrene, *p*-dimethylamino-	0.842	0.072	0.176	0.046	Y	911
Benzophenone, *p*-vinyl-	Styrene, *p*-dimethylaminomethyl-	2.54	0.259	0.135	0.017	Y	911
Benzothiazole, vinylmercapto-	Acrylonitrile	0.178	0.081	0.191	0.014	Y	763
Benzothiazole, vinylmercapto-	Fumaronitrile					Y	763
Benzothiazole, vinylmercapto-	Maleic anhydride					Y	763
Benzothiazole, vinylmercapto-	Methacrylate, methyl	0.43	0.14	1.25	0.083	Y	763
Benzothiazole, vinylmercapto-	Styrene	0.349	0.087	2.171	0.07	Y	764
Benzothiazole, vinylmercapto-	Styrene	0.5	0.095	3.02	0.14	Y	764
Benzothiazole, vinylmercapto-	Vinyl acetate	2.53	0.47	0.013	0.037	Y	763
Benzothiazole, vinylmercapto-	Vinyl phenyl sulfide	0.95	0.61	0.24	0.12	Y	763
Benzothiazolone, *N*-[(methacroyloxy)-methyl]	Styrene	3.1	0.01	0.35	0.02		960
Benzoxazole, vinylmercapto-	Styrene	0.24	0.12	2.87	0.19	Y	764
Bicyclo[2,2,1]hept-2-ene-5,6-dicarboximide, *N*-benzyl	Methacrylate, methyl	0		30.5			994
Bicyclo[2,2,1]hept-2-ene-5,6-dicarboximide, *N*-benzyl	Methacrylate, methyl	0		108			994
Bicyclo[2,2,1]hept-2-ene-5,6-dicarboximide, *N*-benzyl	Styrene	0		18.2			994
Bicyclo[2,2,1]hept-2-ene-5,6-dicarboximide, *N*-benzyl	Styrene	0		89.2			994
Bicyclo[2,2,1]hept-2-ene-5,6-dicarboximide, *N*-benzyl	Vinyl acetate	0.35		1.26			994
Bicyclo[2,2,1]hept-2-ene-5,6-dicarboximide, *N*-benzyl	Vinyl acetate	0.15		1.46			994
Bicyclo[2,2,1]hept-2-ene-5,6-dicarboximide, *N*-benzyl	Vinyl acetate	0.014		1.99			994
Borazine, β-vinyl	Styrene	0.001	0.016	4.53	0.62		1018
Butadiene	Aconitate, trimethyl	0.4	0.4	0	0.22	Y	147
Butadiene	Acrylate, butyl	1.04	0.11	0.074	0.03	Y	257
Butadiene	Acrylate, heptafluorobutyl	0.359	0.039	0.073	0.031	Y	206

TABLE 1. *cont'd*

Monomer 1	Monomer 2	r_1	±95%	r_2	±95%	Conv.	Refs.
Butadiene	Acrylate, methyl	1.09	4.53	0.07	0.87	Y	257
Butadiene	Acrylonitrile	0.358	0.046	0.046	0.006	Y	21
Butadiene	Acrylonitrile	0.452	0.23	0.1	0.059	Y	255
Butadiene	Acrylonitrile	0.35		0.05			418
Butadiene	Acrylonitrile	0.1		0.06			501
Butadiene	Acrylonitrile	0.2	0.01	0.03	0.02	N	66
Butadiene	Butadiene, 2,3-dimethyl-	1.26		0.78			173
Butadiene	Butadiene, 2,3-dimethyl-	0.3	0.92	0.86	0.24	Y	83
Butadiene	Butadiene, 2-chloro-	0.06		3.41			418
Butadiene	Butadiene, 2-phthalidomethyl	1.014	0.049	1.35	0.45	Y	735
Butadiene	Cyclobutane, 1,2-dimethylene-	0.1		5.76			854
Butadiene	Cyclobutane, 1,2-dimethylene-	0.1	0.05	5.76	0.36		885
Butadiene	Ethylene, trichloro-	9.64	0.21	−0.03	0.07	N	89
Butadiene	Ferrocene, ethyl-α-cylopentadienylide	0.02		1.51			699
Butadiene	Fumarate, diethyl	2.13		0.25			466
Butadiene	Isoprene	0.94		1.06			173
Butadiene	Isoprene	0.14	0.37	0.608	0.062	Y	83
Butadiene	Maleamic acid, *N*-3-dimethylamino-6-methyl phenyl	0.37	0.04	−0.08	0.03	N	679
Butadiene	Maleate, diethyl	8.08		0.11			466
Butadiene	Methacrylate, 2-(*N,N*-dimethylcarbamoyloxy)ethyl	1.06		0.35			600
Butadiene	Methacrylate, methyl	0.75		0.25			140
Butadiene	Methacrylate, methyl	0.504	0.024	0.027	0.004	Y	257
Butadiene	Methacrylate, methyl	0.7		0.32			467
Butadiene	Methacrylonitrile	0.39	0.15	0.053	0.016	Y	257
Butadiene	Methyleneglutaronitrile, 2-					N	196
Butadiene	Pentadiene, *cis*-1,3-	0.63		0.26			743
Butadiene	Pentadiene, *trans*-1,3-	1.22		0.09			743
Butadiene	Pyridine, 2-methyl-5-vinyl-	0.61		0.47			462
Butadiene	Pyridine, 2-methyl-5-vinyl-	1.32		0.72			520
Butadiene	Pyridine, 2-methyl-5-vinyl-	1.29	0.02	0.41	0.02	N	56
Butadiene	Styrene	1.44	0.56	0.84	0.4	Y	140
Butadiene	Styrene	1.55	0.14	0.37	0.25	N	159
Butadiene	Styrene	1.37		0.38			173
Butadiene	Styrene					Y	21
Butadiene	Styrene	1.35		0.58			418
Butadiene	Styrene	1.59		0.44			428
Butadiene	Styrene	1.8		0.6			473
Butadiene	Styrene	1.4		0.44			486
Butadiene	Styrene	1.4		0.38			486
Butadiene	Styrene	0.5		0.68			491
Butadiene	Styrene	1.38	0.11	0.82	0.13	N	56
Butadiene	Styrene	1.83	0.41	0.83	0.21	Y	83
Butadiene	Styrene	1.38		0.64			83
Butadiene	Styrene, 2,5-dichloro-	0.449	0.043	0.45	0.17	Y	255
Butadiene	Styrene, 2,5-dichloro-	0.662	0.017	0.187	0.049	Y	8
Butadiene	Styrene, *p*-chloromethyl	0.87		0.42			1075
Butadiene	Styrene, α-methyl-	1.5	0.13	0.139	0.087	Y	70
Butadiene	Styrene, *p*-chloro-	1.22	2.16	1.6	5.7	Y	255
Butadiene	Vinyl chloride	8.8		0.04			517
Butadiene	Vinyl chloride	5.27	3.35	−0.11	0.31	Y	717
Butadiene	Vinylhendecanoate	22.56	24.54	−0.22	1.26	Y	145
Butadiene	Vinyl pelargonate	26.3		0.02			145
Butadiene	Vinyl stearate	42.5	4.73	0.02	0.27	Y	145
Butadiene	Vinylferrocene	4.34	0.18	0.16	0.15	Y	802
Butadiene	Vinylidene chloride	1.97	0.25	−0.044	0.038	Y	257
Butadiene monoxide	Maleic anhydride	0.05	0.18	0.64	0.06		1064
Butadiene, 1,4-dicarboxylate-,diethyl	Acrylonitrile	2.79	0.9	0.29	0.12	N	327
Butadiene, 1,4-dicarboxylate-, diethyl	Pyridine, 2-vinyl-	0.69	0.23	0.41	0.07	N	327
Butadiene, 1,4-dicarboxylate-,diethyl	Styrene	0.55	0.1	0.09	0.014	Y	327
Butadiene, 1-(2-hydroxyethylthio)-	Styrene, *p*-chloro-	3.27		0.24			810
Butadiene, 1-(diethylamino)-	Acrylonitrile	0.426	0.208	0.481	0.049	Y	864
Butadiene, 1-(diethylamino)-	Acrylonitrile	0.425	0.48	0.208	0.049	Y	889
Butadiene, 1-acetoxy-	Acrylonitrile	0.82	0.68	−0.012	0.043	Y	91

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TABLE 1. *cont'd*

Monomer 1	Monomer 2	r_1	±95%	r_2	±95%	Conv.	Refs.
Butadiene, 1-chloro-	Styrene	1.44	3.1	0.27	0.27	Y	695
Butadiene, 1-ethoxy-	Acrylonitrile	0.065	0.009	0.02	0.008	Y	864
Butadiene, 1-ethoxy-	Acrylonitrile	0.065	0.02	0.01	0.008	Y	889
Butadiene, 1-phthalimido-	Styrene	1.56	0.63	0.299	0.049	Y	163
Butadiene, 1-succinimido-	Styrene	1.68	0.16	0.286	0.018	Y	163
Butadiene, 2,3-bis(diethylphosphono)-	Maleimide	0.14		0.43			759
Butadiene, 2,3-bis(diethylphosphono)-	Maleimide, *N*-(2-hydroxyethyl)-	0.12		0.49			759
Butadiene, 2,3-bis(diethylphosphono)-	Maleimide, *N*-(4-chlorophenyl)-	0.03		0.41			759
Butadiene, 2,3-bis(diethylphosphono)-	Maleimide, *N*-(4-methoxy-phenyl)-	0.04		0.47			759
Butadiene, 2,3-bis(diethylphosphono)-	Maleimide, *N*-chloromethyl-	0.05		0.3			759
Butadiene, 2,3-bis(diethylphosphono)-	Maleimide, *N*-phenyl-	0.05		0.42			759
Butadiene, 2,3-dichloro-	Butadiene, 2-chloro-	1.98	0.25	0.31	0.12	Y	122
Butadiene, 2,3-dichloro-	Ethylene, 1,1-diphenyl-	3.58		−0.08		Y	61
Butadiene, 2,3-dichloro-	Methacrylate, methyl	11.04		0.08		Y	61
Butadiene, 2,3-dichloro-	Phosphonic acid, α-phenylvinyl-	7.75		0.07			588
Butadiene, 2,3-dichloro-	Phosphonic acid, α-phenylvinyl-	7.75		0.07			597
Butadiene, 2,3-dichloro-	Styrene	8.65		0.25			587
Butadiene, 2,3-dichloro-	Styrene	10.6		0.05		Y	61
Butadiene, 2,3-dimethyl-	Butadiene	0.78		1.26			173
Butadiene, 2,3-dimethyl-	Butadiene	0.86	0.24	0.3	0.92	Y	83
Butadiene, 2,3-dimethyl-	Isoprene	0.84		1.18			173
Butadiene, 2,3-dimethyl-	Styrene	1.048	0.066	0.534	0.035	Y	173
Butadiene, 2,3-chloro-		5.19		0.06			457
Butadiene, 2,3-chloro-	Acrylate, methyl	10.4		0.06		Y	61
Butadiene, 2,3-chloro-	Acrylonitrile	5.35		0.04			402
Butadiene, 2,3-chloro-	Acrylonitrile	4.8		0.05			504
Butadiene, 2,3-chloro-	Acrylonitrile	5.38	0.45	0.056	0.023	Y	61
Butadiene, 2,3-chloro-	Butadiene	3.41		0.06			418
Butadiene, 2,3-chloro-	Butadiene, 1-(2-hydroxyethyl-thio)-	1		0.2			810
Butadiene, 2,3-chloro-	Butadiene, 2,3-dichloro-	0.31	0.12	1.98	0.25	Y	122
Butadiene, 2,3-chloro-	Butadiene, 2-fluoro-	3.7		0.22			493
Butadiene, 2,3-chloro-	Butadiene, hexafluoro-	5.47		0.1			127
Butadiene, 2,3-chloro-	Butadiene, hexafluoro-	5.52		0.1			453
Butadiene, 2,3-chloro-	Ethylene, 1,1-diphenyl-	3.4		0.03		Y	61
Butadiene, 2,3-chloro-	Fumarate, diethyl	6.51		0.02		Y	61
Butadiene, 2,3-chloro-	Hexatriene, tetrachloro-	3.6		0.2			459
Butadiene, 2,3-chloro-	Isoprene	2.82		0.06			418
Butadiene, 2,3-chloro-	Isopropenyl methyl ketone	4.035	0.087	0.14	0.01	Y	259
Butadiene, 2,3-dichloro-	Methacrylate, methyl	11.04	0.08			Y	61
Butadiene, 2-chloro-	Maleic anhydride	0.026	0.03	0.329	0.107	N	1068
Butadiene, 2-chloro-	Methacrylate, isobutyl	1.8	0.06	0.9	0.088	N	1057
Butadiene, 2-chloro-	Methacrylate, methyl	6.33		0.08		Y	61
Butadiene, 2-chloro-	Methacrylic acid	2.52	0.2	−0.035	0.058	Y	259
Butadiene, 2-chloro-	Phosphonate, vinyl-,dimethyl	7.5		0.1			594
Butadiene, 2-chloro-	Phosphonic acid, α-phenylvinyl-	7.5		0.1			546
Butadiene, 2-chloro-	Phosphonic acid, α-phenylvinyl-	7.5		0.1			597
Butadiene, 2-chloro-	Quinoline, 2-vinyl-	2.1		0.38			456
Butadiene, 2-chloro-	Styrene	7.84		0.05		Y	61
Butadiene, 2-chloro-	Styrene	5.98	0.5	0.025	0.047	Y	8
Butadiene, 2-chloro-	Vinyl acetate	33.52	8.98	−0.02	0.09	N	247
Butadiene, 2-chloro-	Vinyl butyrate					N	247
Butadiene, 2-chloro-	Vinyl formate	15		−0.04			127
Butadiene, 2-chloro-	Vinyl formate	11.91	3.89	−0.05	0.01	N	247
Butadiene, 2-chloro-	Vinyl propionate					N	247
Butadiene, 2-chloro-	Vinylidene cyanide					Y	82
Butadiene, 2-fluoro-	Acrylonitrile	0.6	0.18	0.077	0.021	Y	174
Butadiene, 2-fluoro-	Butadiene, 2-chloro-	0.22		3.7			493
Butadiene, 2-fluoro-	Butadiene, hexafluoro-	2.93		0.24			453
Butadiene, 2-fluoro-	Isoprene	2.63	0.96	0.25	0.12	Y	174
Butadiene, 2-fluoro-	Methacrylate, methyl	1.23	1.77	0.76	0.77	Y	174
Butadiene, 2-fluoro-	Styrene	2.1	0.12	0.214	0.03	Y	174
Butadiene, 2-fluoro-	Styrene	1.24	0.61	0.22	0.15	Y	174
Butadiene, 2-fluoro-	Styrene, α-methyl-	2.22	0.7	0.72	0.24	Y	174
Butadiene, 2-phthalidomethyl-	Butadiene	1.35	0.45	1.014	0.049	Y	735
Butadiene, 2-trimethylsilyloxy-	Acrylonitrile	0.065		0.036			993
Butadiene, 2-trimethylsilyloxy-	Styrene	1.2		0.64			993

TABLE 1. *cont'd*

Monomer 1	Monomer 2	r_1	±95%	r_2	±95%	Conv.	Refs.
Butadiene, hexafluoro-	Butadiene, 2-chloro-	0.1		5.47			127
Butadiene, hexafluoro-	Butadiene, 2-chloro-	0.1		5.52			453
Butadiene, hexafluoro-	Butadiene, 2-fluoro-	0.24		2.93			453
Butadiene, hexafluoro-	Isoprene	0.78		1.19			453
Butadiene,1-(2-hydroxyethylthio)-	Butadiene, 2-chloro-	0.2		1			810
Butadiene-1carboxylate, ethyl	Styrene	0.56		0.12			791
Butadiene-1carboxylate, *S*-(-)α-phenethyl-ammonium	Styrene	6.81	1.68	0.45	0.13	Y	748
Butadiene-1-carboxylate, ethyl	Acrylonitrile	3.2		0.3			791
Butadiene-1-carboxylate, ethyl	Pyridine, 2-vinyl-	0.8		0.4			791
Butadiene-1-carboxylic acid	Acrylonitrile	4		0.2			791
Butadiene-1-carboxylic acid	Acrylonitrile	11		0.03			799
Butadiene-1-carboxylic acid	Styrene	0.52		0.15			791
Butadiene-1-carboxylic acid	Styrene	5.55		0.08			799
Butanoate, 3-acrylamido-3-methyl-, sodium	Acrylamide, *N,N*-dimethyl-	0.22	0.138	0.987	0.153	Y	857
Butene, *cis*-2-	Maleimide, *N*-cyclohexyl-	3		0			995
Butene-1	Acrylonitrile	0.24	0.81	13.46	3.61	Y	211
Butene-1	Ethylene	3.25					388
Butene-1	Ethylene	0.16		3.6			407
Butene-1	Vinyl acetate	0.11	0.42	1.55	0.24	Y	211
Butene-1	Vinyl chloride	0.12	0.12	3.34	0.58	Y	30
Butene-1, 2-ethyl-	Vinyl chloride	−1.05	0.89	1.56	0.26	N	329
Butene-1, 2-methyl-	Vinyl chloride	−1.18	1.2	1.01	0.31	N	329
Butene-1, 3,3-dimethyl-	Vinyl chloride	−0.44	0.28	5.64	0.2	N	329
Butene-1, 3,3-dimethyl-	Vinyl chloride	−0.07	2.5	6.18	13.57	Y	6
Butene-1, 4-(*p*-chlorophenyl)-	Acrylonitrile	−0.066	0.044	4.68	0.63	Y	24
Butene-1, 4-(*p*-methoxyphenyl)-	Acrylonitrile	−0.085	0.088	2.56	1.11	Y	24
Butene-1, 4-cyclohexyl-	Acrylonitrile	0.014	0.055	5.03	0.76	Y	24
Butene-1,4-phenyl-	Acrylonitrile	0.024	0.069	4.51	0.86	Y	24
Butene-2	Ethylene			7.5			477
Butene-2	Vinyl chloride	−1.79	5.22	3.3	2.18	N	329
Butene-2, 2-methyl-	Vinyl chloride	0.3	5.31	8.52	10.54	N	329
Butene-2, *cis*-	Acrylonitrile	0.11		22.32		Y	211
Butene-2, *cis*-	Vinyl acetate	0.03	0.25	8.27	1.05	Y	211
Butene-2, *cis*-	Vinyl chloride	0		8.8			230
Butene-2, *trans*-	Acrylonitrile	0.84	0.6	62.99	10.67	Y	211
Butene-2, *trans*-	Vinyl acetate	−0.03	0.44	7.2	1.69	Y	211
Butenoate, 3-phenyl-3-, methyl	Styrene	−0.532	0.512	1.97	0.364	Y	1008
Butyrolactone, α-methylene-	Styrene	0.85	0.06	0.14	0.01	N	663
Caprolactam, *N*-vinyl-	Crotonaldehyde	0.31		0			875
Caprolactam, *N*-vinyl-	Crotonaldehyde	0.31	0.005	0			907
Caprolactam, *N*-vinyl-	*N*-Vinyl pyrrolidone	1.7	0.2	2.8	0.2		883
Caprolactam, *N*-vinyl-	Pyridine, 2-methyl-5-vinyl-	0.04		11.58			589
Caprolactam, *N*-vinyl-	Pyridine, 2-methyl-5-vinyl-	0.04		11.58			592
Caprolactam, *N*-vinyl-	Pyridine, 2-vinyl-	0.12		4.35			589
Caprolactam, *N*-vinyl-	Pyridine, 2-vinyl-	0.12		4.35			592
Caprolactam, *N*-vinyl-	Pyridine, 4-vinyl-	0.1		4.43			589
Caprolactam, *N*-vinyl-	Pyridine, 4-vinyl-	0.1		4.43			592
Caprolactam, *N*-vinyl-	Pyrrolidone, *N*-vinyl-	1.7		2.8			859
Caprolactam, *N*-vinyl-	Styrene	1.02	0.01	0.2	0.01		916
Caprolactam, *N*-vinyl-	Vinyl acetate	0.31		0.63			557
Caprolactam, *N*-vinyl-	Vinyl acetate	2.5		0.35			859
Caprolactam, *N*-vinyl-	Vinyl acetate	2.5		0.35			883
Caprolactam, *N*-vinyl-	Vinyl butyl ether	3.1	5.3	0.03	0.73	Y	215
Caprolactam, *N*-vinyl-	Vinyl isopropyl ether	0.22	1.95	0.01	0.96	Y	215
Caprolactam, *N*-vinyl-	Vinyl phenyl ether	1.3	2.43	0.26	0.37	Y	214
Carbamate, *N,N*-diethyl-, vinyl	Acrylate, methyl	−0.027	0.049	4.78	0.22	Y	92
Carbamate, *N,N*-diethyl-, vinyl	Acrylic acid	−0.097	0.068	5.58	0.32	Y	92
Carbamate, *N,N*-diethyl-, vinyl	Maleic anhydride	0.024	0.066	0.025	0.034	Y	92
Carbamate, *N,N*-diethyl-, vinyl	Styrene	−0.08	0.18	29.56	3.59	Y	197
Carbamate, *N,N*-diethyl-, vinyl	Vinyl acetate	0.13	0.19	1.7	0.04	Y	197
Carbamate, *N*-phenyl-, vinyl	Methacrylate, butyl	0.329		0.418			833
Carbamate, *N*-phenyl-, vinyl	Methacrylate, di-, triethylene-glycol	0.034		0.504			833
Carbamate, *N*-vinyl-, ethyl	Acrylic acid	0.26		4.69		Y	81

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TABLE 1. *cont'd*

Monomer 1	Monomer 2	r_1	±95%	r_2	±95%	Conv.	Refs.
Carbamate, *N*-vinyl-, ethyl	Pyrrolidone, *N*-vinyl-	0.371	0.05	1.77	0.12	Y	81
Carbamate, *N*-vinyl-, ethyl	Vinyl acetate	2.09		0.39			629
Carbamate, *N*-vinyl-, ethyl	Vinyl acetate	0.4	0.26	0.418	0.063	Y	81
Carbamate, *N*-vinyl-, *tert*-butyl	Vinyl acetate	0.46	0.03	1.12	0.07	N	827
Carbamate, *N*-vinyl-, *tert*-butyl	Methacrylate, methyl	0.17	0.1	1.87	0.2		991
Carbamate, *N*-vinyl-, *tert*-butyl	*N*-Vinylpyrrolidone	2.4	0.5	0.4	0.06		991
Carbazole, 2-butenyl-	Carbazole, 9-vinyl-	0.02	0.003	2.6	0.5		904
Carbazole, 9-propenyl-	Carbazole, 9-vinyl-	0.02	0.003	2.8	0.5		904
Carbazole, 9-vinyl-	Carbazole, 2-butenyl-	2.6	0.5	0.02	0.003		904
Carbazole, 9-vinyl-	Carbazole, 9-propenyl-	2.8	0.5	0.02	0.003		904
Carbazole, *N*-butenyl-	Carbazole, *N*-vinyl-	0.02		2.6			871
Carbazole, *N*-methyl-3-vinyl	Styrene	1.404	0.146	0.735	0.067		806
Carbazole, *N*-propenyl-	Carbazole, *N*-vinyl-	0.02		2.8			871
Carbazole, *N*-vinyl-	Acenaphthalene	−0.03	0.12	6.62	1.77	N	331
Carbazole, *N*-vinyl-	Acrylate, ethyl	0.27		1.1			757
Carbazole, *N*-vinyl-	Acrylate, methyl	0.049	0.029	0.53	0.13	Y	13
Carbazole, *N*-vinyl-	Acrylate, methyl	0.11		0.43			551
Carbazole, *N*-vinyl-	Acrylate, methyl	0.028	0.045	0.51	0.073	Y	98
Carbazole, *N*-vinyl-	Acrylonitrile	0.09	0.04	0.39	0.04	N	269
Carbazole, *N*-vinyl-	Carbazole, *N*-butenyl-	2.6		0.02			871
Carbazole, *N*-vinyl-	Carbazole, *N*-propenyl-	2.8		0.02			871
Carbazole, *N*-vinyl-	Fumarate, diisopropyl	0		0			1038
Carbazole, *N*-vinyl-	Maleate, diethyl	0.21	0.05	0	0.01	N	361
Carbazole, *N*-vinyl-	Maleate, dimethyl	0.51	0.11	0	0.01	N	361
Carbazole, *N*-vinyl-	Methacrylate, methyl	0.14	0.03	1.55	0.16	N	11
Carbazole, *N*-vinyl-	Methacrylate, methyl	0.033	0.015	2.12	0.14	Y	13
Carbazole, *N*-vinyl-	Methacrylate, methyl	0.06		1.8			738
Carbazole, *N*-vinyl-	Methacrylate, methyl	0.75		0.57			738
Carbazole, *N*-vinyl-	Methacrylate, methyl	0.08	0.05	1.84	0.26	N	758
Carbazole, *N*-vinyl-	Methacrylate, methyl	0.33	0.18	0.44	0.22	N	758
Carbazole, *N*-vinyl-	Methacrylate, methyl	0.031	0.022	2.123	0.048	Y	98
Carbazole, *N*-vinyl-	Propene, 2,3-dichloro-	1		0			376
Carbazole, *N*-vinyl-	Styrene	−0.02	0.06	6	1.34	N	11
Carbazole, *N*-vinyl-	Styrene	0.026	0.034	5.93	1.05	Y	13
Carbazole, *N*-vinyl-	Styrene	0.032	0.057	5.72	0.4	Y	98
Carbazole, *N*-vinyl-	Styrene, *p*-chloro-	0.02		7			551
Carbazole, *N*-vinyl-	Succinimide, *N*-vinyl-	0.04	0.09	0.11	0.83	Y	284
Carbazole, *N*-vinyl-	Vinyl acetate	2.67	0.13	0.126	0.023	Y	246
Carbazole, *N*-vinyl-	Vinyl acetate	3.02		0.15			246
Carbazole, *N*-vinyl-	Vinyl acetate	3.9		0.13			551
Carbazole, *N*-vinyl-	Vinyl butyrate	1.33	0.34	0.07	0.12	Y	246
Carbazole, *N*-vinyl-	Vinyl chloride	4.77		0.17			427
Carbazole, *N*-vinyl-	Vinyl formate	4.142	0.011	0.192	0.001	Y	246
Carbazole, *N*-vinyl-	Vinyl propionate	1.69	0.21	0.081	0.073	Y	246
Carbazole, *N*-vinyl-	Vinyl thiolacetate	0.44	0.28	0.45	0.15	N	97
Carbazole, *N*-vinyl-	Vinylidene chloride	3.6	0.12	−0.023	0.068	Y	13
Carbazole, *N*-vinyl-	Vinylidene chloride	3.65	0.3	−0.008	0.018	Y	98
Carbon monoxide	Ethylene	0.32	0.65	0.068	0.012	Y	51
Carbon monoxide	Ethylene	0.004	0.012	0.025	0.006	Y	51
Carbon monoxide	Ethylene	−0.15	0.07	0.04	0.01	N	52
Carbon monoxide	Ethylene	0		0.5			52
Carbon monoxide	Vinyl acetate	0.33		0.24			474
Carbon monoxide	Vinyl chloride	0.121	0.011	13.52	0.25	Y	184
Cinnamat, methyl	Styrene	0.04	0.13	1.799	0.073	Y	488
Cinnamate, 2-chloroethyl	Styrene	0.01	0.11	1.394	0.068	Y	488
Cinnamate, α-cyano-, 2-ethylhexyl	Styrene	0.06	0.01	0.58	0.004	N	282
Cinnamate, α-cyano-, benzyl	Styrene	−0.16	0.17	0.4	0.03	N	282
Cinnamate, α-cyano-, butyl	Styrene	−0.09	0.08	0.47	0.03	N	282
Cinnamate, α-cyano-, cyclohexyl	Styrene	−0.24	0.22	0.37	0.04	N	282
Cinnamate, α-cyano-, ethyl	Acrylonitrile	−0.18	0.15	12.6	2.3	Y	310
Cinnamate, α-cyano-, ethyl	Styrene					Y	134
Cinnamate, α-cyano-, hexyl	Styrene	−0.17	0.26	0.39	0.04	N	282
Cinnamate, α-cyano-, methyl	Pyrrolidone, *N*-vinyl-	−0.001	0.001	0.044	0.008	Y	816
Cinnamate, α-cyano-, methyl	Styrene	−0.21	0.35	0.4	0.06	N	282
Cinnamate, benzyl	Styrene	0.14	0.13	1.33	0.12	Y	488

TABLE 1. *cont'd*

Monomer 1	Monomer 2	r_1	±95%	r_2	±95%	Conv.	Refs.
Cinnamate, butyl	Styrene	0.04	0.15	1.757	0.082	Y	488
Cinnamate, dibutylchlorotin	Acrylate, methyl	−0.2		1.65			659
Cinnamate, ethyl	Styrene	−0.076	0.054	1.52	0.31	Y	200
Cinnamate, ethyl	Styrene	0.082	0.045	1.566	0.035	Y	488
Cinnamate, methyl	Styrene	0.02		1.27			653
Cinnamate, *p*-chloro-, methyl	Styrene	0.04		2.24			653
Cinnamate, *p*-methyl-, methyl	Styrene	0		2.84			653
Cinnamate, phenyl	Styrene	0.029	0.055	1.66	0.12	Y	488
Cinnamate, *tert*-butyl	Styrene	0.1	0.12	1.692	0.087	Y	488
Cinnamic acid, *cis*-	Acrylamide	−0.48	0.28	3.84	0.68	Y	298
Cinnamic acid, *trans*-	Acrylamide	−0.24	0.15	3.4	0.24	Y	298
Cinnamide, *N,N*-diethyl-	Styrene	0.01		4.17			737
Cinnamide, *p*-chloro-, *N,N*-diethyl-	Styrene	0.01		2.99			737
Cinnamide, *p*-methyl-, *N,N*-diethyl-	Styrene	0.01		4.95			737
Cinnamonitrile	Acrylonitrile	0.36	0.1	8.46	0.37	Y	310
Cinnamonitrile	Styrene	−0.008	0.021	2.549	0.092	Y	134
Cinnamonitrile, α-cyano-	Acrylonitrile					Y	310
Cinnamonitrile, α-cyano-	Styrene					Y	134
Citraconate, di-*sec*-butyl	Styrene	0.13		2			841
Citraconate, dibenzyl	Styrene	0.047		1.55			841
Citraconate, dibutyl	Styrene	0.054		2.74			841
Citraconate, dicyclohexyl	Styrene	0.03		1.88			841
Citraconate, diethyl	Styrene	0.029		2.48			841
Citraconate, diisobuty	Styrene	0.03		1.8			841
Citraconate, diisopropyl	Styrene	0.076		1.62			841
Citraconate, dimethyl	Styrene	0.049		1.58			841
Citraconate, dipropyl	Styrene	0.027		2.19			841
Citraconic acid	Styrene	0		1.36			1021
Citraconic anhydride	Styrene	0.021	0.058	0.16	0.15	Y	47
Citraconimide, β-iso-, *N*-(4-acetylphenyl)-	Styrene	0		0.42			608
Citraconimide, β-iso-, *N*-(4-acetylphenyl)-	Styrene	0		0.28			608
Citraconimide, β-iso-, *N*-(4-ethoxycarbonylphenyl)-	Styrene	0		0.3			608
Citraconimide, β-iso-, *N*-(4-methoxyphenyl)-	Styrene	0		0.27			608
Citraconimide, β-iso-, *N*-(*p*-tolyl)-	Styrene	0		0.4			608
Citraconimide, β-iso-, *N*-phenyl-	Styrene	0		0.39			608
Citraconimde, *N*-(1-menthylcarboxylatomethyl)-	Methacrylate, methyl	0.109	0.115	3.47	0.335	Y	950
Citraconimide, *N*-(4-acetoxyphenyl)-	Methacrylate, methyl	0.18	0.13	1.88	0.16	Y	728
Citraconimide, *N*-(4-acetoxyphenyl)-	Styrene	0.015	0.086	0.151	0.054	Y	728
Citraconimide, *N*-(4-chlorophenyl)-	Methacrylate, methyl	−0.01	0.18	2.93	0.4	Y	728
Citraconimide, *N*-(4-chlorophenyl)-	Styrene	0.075	0.093	0.181	0.057	Y	728
Citraconimide, *N*-(4-ethoxycarbonylphenyl)-	Methacrylate, methyl	−0.027	0.084	2.72	0.18	Y	728
Citraconimide, *N*-(4-ethoxycarbonylphenyl)-	Styrene	0.004	0.033	0.148	0.018	Y	728
Citraconimide, *N*-(4-methoxyphenyl)-	Methacrylate, methyl	−0.1	0.19	3.16	0.73	Y	728
Citraconimide, *N*-(4-methoxyphenyl)-	Styrene	0.04	0.11	0.63	0.19	Y	728
Citraconimide, *N*-allyl	Styrene	0.004		0.142			959
Citraconimide, *N*-benzyl-	Methacrylate, methyl	0.02	0.14	2.77	0.28	Y	714
Citraconimide, *N*-benzyl	Styrene	−0.066	0.082	0.19	0.087	Y	714
Citraconimide, *N*-butyl-	Methacrylate, methyl	−0.12	0.36	2.17	0.56	Y	714
Citraconimide, *N*-butyl-	Styrene	0.03	0.045	0.169	0.028	Y	714
Citraconimide, *N*-ethyl-	Methacrylate, methyl	−0.04	0.33	3.25	0.79	Y	714
Citraconimide, *N*-ethyl-	Styrene	−0.002	0.05	0.231	0.044	Y	714
Citraconimide, *N*-hexyl-	Methacrylate, methyl	−0.08	0.28	2.38	0.45	Y	714
Citraconimide, *N*-hexyl-	Styrene	−0.03	0.11	0.316	0.086	Y	714
Citraconimide, *N*-isobutyl-	Methacrylate, methyl	−0.18	0.42	1.78	0.85	Y	714
Citraconimide, *N*-isobutyl-	Styrene	0.07	0.14	0.326	0.094	Y	714
Citraconimide, *N*-isopropyl-	Methacrylate, methyl	0.09	0.27	2.7	0.51	Y	714
Citraconimide, *N*-isopropyl-	Styrene	−0.014	0.063	0.244	0.055	Y	714
Citraconimide, *N*-methyl-	Acrylonitrile	0.6		0.53			460
Citraconimide, *N*-methyl-	Methacrylate, methyl	0.15		3.24			460
Citraconimide, *N*-methyl-	Styrene	0.24		0.15			460

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TABLE 1. *cont'd*

Monomer 1	Monomer 2	r_1	±95%	r_2	±95%	Conv.	Refs.
Citraconimide, *N*-methyl-	Styrene	0.24		0.14			506
Citraconimide, *N*-phenyl-	Methacrylate, methyl	0.001	0.033	3.081	0.074	Y	728
Citraconimide, *N*-phenyl-	Styrene	−0.001	0.023	0.175	0.016	Y	728
Citraconimide, *N*-propyl-	Methacrylate, methyl	−0.03	0.43	3.23	0.98	Y	714
Citraconimide, *N*-propyl-	Styrene	−0.014	0.087	0.196	0.062	Y	714
Citraconimide, *N*-*tert*-butyl-	Methacrylate, methyl	0.038	0.072	2.88	0.19	Y	714
Citraconimide, *N*-*tert*-butyl-	Styrene	0.045	0.05	0.465	0.039	Y	714
Citraconimide, *N*-tolyl-	Methacrylate, methyl	0.003	0.088	2.75	0.19	Y	728
Citraconimide, *N*-tolyl-	Styrene	−0.02	0.18	0.31	0.13	Y	728
Citraconimide, α-iso-, *N*-(4-acetylphenyl)-	Styrene	0		0.81			608
Citraconimide, α-iso-, *N*-(4-chlorophenyl)-	Styrene	0		1.03			608
Citraconimide, α-iso-, *N*-(4-ethoxy-carbonylphenyl)-	Styrene	0		0.96			608
Citraconimide, α-iso-, *N*-(4-methoxy-phenyl)-	Styrene	0		0.39			608
Citraconimide, α-iso-, *N*-(p-tolyl)-	Styrene	0		1.69			608
Citraconimide, α-iso-, *N*-phenyl-	Styrene	0		1.76			608
Copper diacrylate	Titanium, dicylopentadienyl-, dimethacrylate	1.09		0.89			895
Crotonaldehyde	Acrylonitrile	0		8			429
Crotonaldehyde	Acrylonitrile	0.01		25			504
Crotonaldehyde	Caprolactam, *N*-vinyl-	0		0.31			875
Crotonaldehyde	Caprolactam, *N*-vinyl-	0		0.31	0.005		907
Crotonaldehyde	Pyrrolidone, *N*-vinyl-	−0.15	0.01	0.42	0.02	N	248
Crotonaldehyde	Styrene	0.03		14.7			428
Crotonaldehyde	Styrene	0.07		14.7			428
Crotonaldehyde	Styrene	0.12		14.7			428
Crotonaldehyde	Vinyl chloride	−0.56	0.25	1.55	0.26	N	271
Crotonaldehyde	Vinylidene chloride	0					405
Crotonate, hydrocortisone 21-	*N*-Vinyl pyrrolidone	0.05	0.05	0.75	0.02		1022
Crotonate, α-acetyl-, methyl	Acrylonitrile	0		8.68			785
Crotonate, α-acetyl-, methyl	Styrene	0		2.7			785
Crotonate, α-bromo-, ethyl	Styrene	0		4.42			785
Crotonate, α-carboethoxy-, ethyl	Acrylonitrile	0		18.7			785
Crotonate, α-carboethoxy-, ethyl	Styrene	0		8.24			785
Crotonate, α-chloro-, ethyl	Acrylonitrile	0		9.53			785
Crotonate, α-chloro-, ethyl	Styrene	0		5.13			785
Crotonate, α-cyano-, ethyl	Acrylonitrile	0.06		11.4			785
Crotonate, α-cyano-, ethyl	Styrene	0.02		0.26			785
Crotonate, α-methoxy-, methyl	Acrylonitrile	0		1			785
Crotonate, α-methoxy-, methyl	Styrene	0.04		18.4			785
Crotonate, α-methyl-, methyl	Acrylonitrile	0		2.97			785
Crotonate, α-methyl-, methyl	Styrene	0.02		30.7			785
Crotonate, ethyl	Acrylonitrile	0		25.2			785
Crotonate, ethyl	Styrene	0		27			785
Crotonate, methyl	Styrene	−0.27	0.22	9.68	1.86	Y	112
Crotonic acid	Acrylamide	−0.18	0.14	3.76	0.89	Y	298
Crotonic acid	Acrylamide	−0.19	0.19	4.23	1.37	Y	298
Crotonic acid	Acrylamide	0.11		4.72			569
Crotonic acid	Acrylamide	0.12		5.32			569
Crotonic acid	Acrylonitrile	0		21			402
Crotonic acid	Pyrrolidone, *N*-vinyl-	0	0.03	0.84	0.07	N	245
Crotonic acid	Styrene	0		20			402
Crotonic acid	Vinyl acetate	0.04	0.14	0.317	0.081	Y	47
Crotonic acid	Vinyl acetate	0.01		0.3			526
Crotonic acid	Vinyl acetate	0.001	0.1	0.31	0.07	N	94
Crotonic acid	Vinylidene chloride	−0.2	1.03	18.1	43.7	Y	47
Crotonic acid, *cis*-	Acrylamide					Y	341
Crotonic acid, *trans*-	Acrylamide	−0.085	0.024	7.2	0.33	Y	341
Crotononitrile	Styrene	−0.012	0.06	23.29	1.7	Y	112
Crotononitrile	Styrene	0		23.8			785
Crotononitrile, α-phenyl-	Styrene	0		0.43			785
Cyclobutane, 1,2-dimethylene-	Butadiene	5.76		0.1			854
Cyclobutane, 1,2-dimethylene-	Butadiene	5.76	0.36	0.1	0.05		885
Cyclobutane, 1,2-dimethylene-	Styrene	3.6		0.26			854

TABLE 1. *cont'd*

Monomer 1	Monomer 2	r_1	±95%	r_2	±95%	Conv.	Refs.
Cyclobutane, 1,2-dimethylene-	Styrene	3.6	0.16	0.28	0.05		885
Cyclopentene, 4-,-1,3-dione	Acrylonitrile	0.04	0.058	3.02	0.71	Y	95
Cyclopentene, 4-,-1,3-dione	Methacrylate, methyl	0.094	0.017	8.11	0.38	Y	95
Cyclopentene, 4-,-1,3-dione	Styrene					Y	263
Cyclopentene, 4-,-1,3-dione	Styrene, *p*-chloro-	0.014	0.006	0.294	0.081	Y	264
Cyclopentene, 4-,-1,3-dione	Vinylidene chloride	0.113	0.027	1.88	0.35	Y	264
Cyclopropane, 1,1-bis(ethoxycarbonyl)-2-vinyl-	Methacrylate, methyl	0.223	0.194	4.21	0.905	Y	1076
Cyclopropane, 1,1-bis(ethoxycarbonyl)-2-vinyl-	Methacrylate, methyl	0.111	0.194	18.3	2.5	Y	1076
Cyclopropene, 3,3-dimethoxy-	Acrylonitrile	0.245	0.037	1.424	0.038	Y	838
Diallyl β-cyanoethylisocyanurate	Vinyl acetate	4.6		0.06			778
Diallyl melamine	Methacrylate, methyl					Y	201
Diallyl melamine	Styrene	−0.32	0.2	36.96	4.02	Y	201
Diallyl melamine	Vinyl acetate	0.318	0.073	0.68	0.026	Y	201
Diallyl phthalate	Acrylate, methyl	0.028	0.005	6.208	0.069	Y	297
Diallyl phthalate	Acrylate methyl	0.038	0.008	6.18	0.16	Y	297
Diallyl phthalate	Acrylonitrile	0.04	0.012	4.23	0.15	Y	153
Diallyl phthalate	Acrylonitrile	0.037	0.031	2.78	0.52	Y	153
Diallyl phthalate	Fumarate, dibutyl	0.02		1.01			665
Diallyl phthalate	Fumarate, diethyl	0.01		1.25			665
Diallyl phthalate	Fumarate, dioctyl	0.02		0.96			665
Diallyl phthalate	Methacrylate, methyl	−0.001	0.011	26.56	1.98	Y	153
Diallyl phthalate	Methacrylate, methyl	0.029	0.026	22.73	1.48	Y	153
Diallyl phthalate	Methacrylate, methyl	0.076	0.006	21.52	0.39	Y	153
Diallyl phthalate	Styrene	0.041	0.038	36.41	1.23	Y	152
Diallyl phthalate	Styrene	0.026	0.071	25.59	2.19	Y	152
Diallyl phthalate	Styrene	0.038	0.04	23.67	1.2	Y	152
Diallyl phthalate	Styrene	0.08		18.8			152
Diallyl phthalate	Styrene	0.09		27.5			152
Diallyl phthalate	Styrene	0.1		16.9			152
Diallyl phthalate	Styrene	0.1		23.8			152
Diallyl phthalate	Styrene	0.13		15.1			152
Diallyl phthalate	Vinyl acetate	2.19	0.34	0.336	0.049	Y	297
Diallyl phthalate	Vinyl acetate	1.66	0.16	0.414	0.029	Y	297
Diallyl phthalate	Vinyl acetate	2		0.72			509
Diallyl phthalate	Vinyl chloride	0.7	0.046	0.833	0.012	Y	296
Diallyl phthalate	Vinylidene chloride	0.2		5			376
Diallyl, 1,3-,5-(2-hydroxy-3-phenoxypropyl)isocyanate	Vinyl acetate	5.5		0.15			671
Diallyl, 1,3-,5-(2-hydroxy-3-phenoxypropyl)isocyanate	Vinyl acetate	3.65		0.16			676
Diallylcyanamide	Acrylate, methyl	0.05		6.7			603
Diallylcyanamide	Acrylate, methyl	0.05		6.7			604
Diallylcyanamide	Methacrylate, methyl	0.04		25			603
Diallylcyanamide	Methacrylate, methyl	0.04		25			604
Diallylcyanamide	Vinyl acetate	1.62		0.01			581
Diallylcyanamide	Vinyl chloride	0.68		0.44			602
Diallylcyanamide	Vinyl chloride	0.68		0.44			603
Diallyldimethylammonium chloride	Vinyl acetate	1.95		0.35			1029
Dicyclopentadiene	Maleic anhydride	0.037	0.112	0.071	0.045	Y	914
Dihydroxydiphenylsulfone diallyl ether	Styrene	0.92	0.16	0.975	0.015		1016
Dimethyleneheptanedioate, 2,6-,dimethyl	Methacrylate, methyl	0.53	0.02	2.36	0.25	N	795
Dioxolane,1,3-,4,4-dimethyl-5-methylene-2-trichloro-	Pyrrolidone, *N*-vinyl-	0.01		3.87			647
Dioxolane,1,3-,4-methylene-2-trichloromethyl-	Acrylamide	0.037		8.6			616
Dioxolane,1,3-,4-methylene-2-trichloromethyl-	Pyrrolidone, *N*-vinyl-	0.04		2.98			647
Diphenyl sulfone,3,3′-bisitaconimido-*m,m′*-	Methacrylic acid	0.015	0.058	0.564	0.032	Y	1042
Dithiane, 2-methylene-1,3-	Methacrylate, methyl	4.12		0.08			1031
Dithiane, 2-methylene-1,3-	Styrene	3.35		0.03			1031
Divinylbenzene, *m*-	Styrene	0.58	0.04	0.58	0.15	N	262
Divinylbenzene, *p*-	Maleic anhydride	0.01	0.01	0.09	0.01		943

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TABLE 1. *cont'd*

Monomer 1	Monomer 2	r_1	±95%	r_2	±95%	Conv.	Refs.
Divinylbenzene, *p*-	Styrene	1.18	0.17	0.26	0.25	N	262
Ethene, 2-phenyl-1,1-dicyano-	*N*-Vinylpyrrolidone					Y	947
Ethylene	Acrylate, butyl	0.01	0.003	13.94	0.38	N	42
Ethylene	Acrylate, methyl					N	41
Ethylene	Acrylate, methyl	0.02		19.4			768
Ethylene	Acrylonitrile	0		7			415
Ethylene	Butene-1	3.25					388
Ethylene	Butene-1	3.6		0.16			407
Ethylene	Butene-2	7.5					477
Ethylene	Carbon monoxide	0.068	0.012	0.32	0.65	Y	51
Ethylene	Carbon monoxide	0.025	0.006	0.004	0.012	Y	51
Ethylene	Carbon monoxide	0.04	0.01	−0.15	0.07	N	52
Ethylene	Carbon monoxide	0.5		0			52
Ethylene	Ethylene, tetrafluoro-	0.52	0.18	0.067	0.12		1093
Ethylene	Ethylene, tetrafluoro-	0.575	0.09	0.065	0.027		1094
Ethylene	Ethylene, tetrafluoro-	0.61		0.02			563
Ethylene	Ethylene, tetrafluoro-	0.38		0.1			563
Ethylene	Fumarate, diethyl	0.11	1.14	1.91	3.4	N	41
Ethylene	Maleate, diethyl	0.25		10			41
Ethylene	Maleic anhydride	0.04		0			620
Ethylene	Methacrylate, di-, zinc	0.19		40			935
Ethylene	Methacrylate, methyl					N	41
Ethylene	Phosphonate, vinyl-, diphenyl	0.088	0.01	1.66	2.22	Y	801
Ethylene	Phosphonate, vinyl-, bis(2-chloroethyl)	0.077	0.003	7.73	2.19	Y	801
Ethylene	Phosphonate, vinyl- diisobutyl					Y	801
Ethylene	Propylene	3.43					388
Ethylene	Propylene	3.2		0.62			477
Ethylene	Styrene	0.05		14.88			615
Ethylene	Vinyl acetate	0.16	0.03	0.72	1.2	N	309
Ethylene	Vinyl acetate					N	41
Ethylene	Vinyl acetate	0.28		1.14			413
Ethylene	Vinyl acetate	0.88	0.52	1.03	0.77	N	42
Ethylene	Vinyl acetate	0.74		1.52			559
Ethylene	Vinyl acetate	0.67	0.03	3.74	0.64	N	68
Ethylene	Vinyl acetate	0.13	0.01	1.23	0.21	N	68
Ethylene	Vinyl acetate	0.79		1.4			766
Ethylene	Vinyl butyrate	0.7		1.5			605
Ethylene	Vinyl chloride	0.19	0.17	1.99	0.42	N	180
Ethylene	Vinyl chloride	0.24	0.13	1.74	0.58	N	270
Ethylene	Vinyl chloride	0.34	0.13	4.38	0.44	N	42
Ethylene	Vinyl chloride	0.2		2			472
Ethylene	Vinyl chloride	0.21		3.21			536
Ethylene	Vinyl chloride	0.21	0.01	1.85	0.1	N	63
Ethylene	Vinyl chloride	0.14	0.12	0.96	0.22	N	63
Ethylene	Vinyl chloride	0.23	0.01	1.63	0.22	N	64
Ethylene	Vinyl chloride	0.16	0.01	1.55	0.18	N	68
Ethylene	Vinyl diethylphosphinate	0.15	0.16	−11.99	80.64	Y	311
Ethylene	Vinyl diphenylphosphinate	0.05	0.01	−62.84	34.66	Y	311
Ethylene	Vinyl ethyl ether	2.7		0			584
Ethylene	Vinyl fluoride	2.52	0.32	0.01	0.15	N	42
Ethylene	Vinyl fluoride	1.7		0.3			590
Ethylene	Vinyl propionate	0.67		1.5			605
Ethylene	Vinylidene chloride	0.018	0.005	15.71	1.96	Y	299
Ethylene, 1,1-dichloro-2,2-difluoro	Vinyl acetate	−0.13	0.36	0.33	0.58	Y	6
Ethylene, 1,1-diphenyl-	Acrylate, ethyl	0.5		0.8			65
Ethylene, 1,1-diphenyl-	Acrylate, methyl	−0.24	0.15	0.09	0.01	N	334
Ethylene, 1,1-diphenyl-	Acrylate, methyl	0.21	0.05	0.12	0.01	N	334
Ethylene, 1,1-diphenyl-	Acrylonitrile	−0.02	0.01	0.05	0.01	N	143
Ethylene, 1,1-diphenyl-	Butadiene, 2,3-dichloro-	−0.08		3.58		Y	61
Ethylene, 1,1-diphenyl-	Butadiene, 2-chloro-	0.03		3.4		Y	61
Ethylene, 1,1-diphenyl-	Methacrylate, methyl	0.09		2.1			65
Ethylene, 1,1-diphenyl-	Methacrylate, methyl	0		8.7			901
Ethylene, 1,1-diphenyl-	Methacrylonitrile	−0.45	0.11	0.48	0.1	N	143
Ethylene, 1,1-diphenyl-	Styrene	0.01	0.02	0.33	0.02	N	189
Ethylene, 1,1-diphenyl-	Styrene	−0.02	0.01	0.34	0.01	N	281

TABLE 1. *cont'd*

Monomer 1	Monomer 2	r_1	±95%	r_2	±95%	Conv.	Refs.
Ethylene, 1,1-diphenyl-	Styrene	1.15		0.87			901
Ethylene, chlorotrifluoro-	Ethylene, tetrafluoro-	1		1			392
Ethylene, chlorotrifluoro-	Isobutylene	0.01	0.02	0.06	0.03	N	318
Ethylene, chlorotrifluoro-	Methacrylate, methyl	−0.074	0.062	51.36	3.31	Y	236
Ethylene, chlorotrifluoro-	Propionate, vinyl	0.08	0.01	0.63	0.04		1097
Ethylene, chlorotrifluoro-	Propylene	0.02	0.08	0.08	0.07	N	318
Ethylene, chlorotrifluoro-	Pyrrolidone, *N*-vinyl-	0.3		0.38			830
Ethylene, chlorotrifluoro-	Styrene	−0.1	0.21	4.38	0.99	Y	236
Ethylene, chlorotrifluoro-	Styrene	0.01		5.2			567
Ethylene, chlorotrifluoro-	Vinyl acetate	0.04	0.02	0.68	0.11		1097
Ethylene, chlorotrifluoro-	Vinyl acetate	−0.02		0.47		Y	236
Ethylene, chlorotrifluoro-	Vinyl chloride	0.01		2.53			454
Ethylene, chlorotrifluoro-	Vinyl fluoride	1.2		0.8			406
Ethylene, chlorotrifluoro-	Vinylidene chloride	0.02		17.14			454
Ethylene, dichloro-, *cis*	Styrene	−3.1		3.1		Y	137
Ethylene, dichloro-, *cis*	Styrene	−2.2		63.1		Y	137
Ethylene, dichloro-, *cis*	Styrene	−0.28	0.12	21.4	4.9	Y	40
Ethylene, dichloro-, *cis*	Styrene	−0.02	0.062	161.3	30.3	Y	9
Ethylene, dichloro-, *cis*	Styrene	0.067	0.053	24.75	2.64	Y	9
Ethylene, dichloro-, *cis*	Vinyl acetate	0.055	0.024	1.02	0.27	Y	137
Ethylene, dichloro-, *cis*	Vinyl acetate	0.01		6.4		Y	137
Ethylene, dichloro-, *cis*	Vinyl acetate	0.058	0.03	0.898	0.06	Y	9
Ethylene, dichloro-, *cis*	Vinyl acetate	0.1	0.14	4.13	1.94	Y	9
Ethylene, dichloro-, *cis*	Vinylidene cyanide					Y	82
Ethylene, dichloro-, *cis*	Vinylidene cyanide					Y	82
Ethylene, *p*-vinyl-1,1-diphenyl-	Styrene	1.31		0.46			742
Ethylene, tetrachloro-	Acrylate, methyl	0		830			402
Ethylene, tetrachloro-	Acrylonitrile	0		456			571
Ethylene, tetrachloro-	Acrylonitrile	0		470			59
Ethylene, tetrachloro-	Methacrylate, methyl					Y	204
Ethylene, tetrachloro-	Styrene					Y	204
Ethylene, tetrachloro-	Styrene	200					204
Ethylene, tetrachloro-	Styrene					Y	40
Ethylene, tetrachloro-	Styrene	0		187			40
Ethylene, tetrachloro-	Styrene	0		185			59
Ethylene, tetrachloro-	Vinyl acetate	−0.07	0.15	4.45	1.87	Y	3
Ethylene, tetrachloro-	Vinyl acetate					Y	59
Ethylene, tetrachloro-	Ethylene	0.067	0.12	0.52	0.18		1093
Ethylene, tetrafluoro-	Ethylene	0.065	0.027	0.575	0.09		1094
Ethylene, tetrafluoro-	Ethylene	0.02		0.61			563
Ethylene, tetrafluoro-	Ethylene	0.1		0.38			563
Ethylene, tetrafluoro-	Ethylene, chlorotrifluoro-	1		1			392
Ethylene, trichloro-	Acrylate, methyl	0		33			470
Ethylene, trichloro-	Acrylonitrile	0		67			470
Ethylene, trichloro-	Acrylonitrile	0		62.1			572
Ethylene, trichloro-	Butadiene	−0.03	0.07	9.64	0.21	N	89
Ethylene, trichloro-	Methacrylate, methyl	0		100			470
Ethylene, trichloro-	Styrene	0		17.1			40
Ethylene, trichloro-	Styrene	0		16.5			40
Ethylene, trichloro-	Styrene	0		12.1			40
Ethylene, trichloro-	Styrene	0		12.7			40
Ethylene, trichloro-	Styrene	−0.006	0.37	16	11	Y	59
Ethylene, trichloro-	Vinyl acetate	−0.06	0.34	0.607	0.076	Y	158
Ethylene, trichloro-	Vinyl acetate	−0.006	0.019	0.7	0.1	Y	9
Ethylene, trichloro-	Vinyl isobutyl ether	0.014	0.003	0.05	0.009	Y	332
Ferrocene, ethyl-α-cyclopentadienylidene	Butadiene	1.51		0.02			699
Ferrocene, ethyl-α-cyclopentadienylidene	Isoprene	1.91		0.01			699
Formaldehyde-*S*-vinyl-*O*-ethylthioacetal	Styrene	0.32	0.24	7.75	0.68	Y	273
Fumarate, allyl methyl	Styrene	0.03	0.02	0.25	0.01	N	713
Fumarate, bis(2-butyl)	Styrene	0	0.01	0.51	0.04	N	249
Fumarate, bis(3-[tris(trimethylsiloxy)-silyl)propyl]	Fumarate, di-*tert*-butyl	0.21		0.67			1040
Fumarate, bis(3-[tris(trimethylsiloxy)-silyl)propyl]	Fumarate, diisopropyl	0.07		0.87			1040
Fumarate, bis(3-chloro-2-butyl)	Styrene	−0.06	0.03	0.26	0.04	N	249

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TABLE 1. *cont'd*

Monomer 1	Monomer 2	r_1	±95%	r_2	±95%	Conv.	Refs.
Fumarate, di-(2-chloroethyl)	Styrene	0		0.18			1038
Fumarate, di-(2-cyanoethyl)	Styrene	0.09		0.07			1038
Fumarate, di-(2-(methoxyethyl)	Styrene	0.03		0.35			1038
Fumarate, di-(2-phenylethyl)	Styrene	0		0.27			1038
Fumarate, di-*sec*-butyl	Styrene	0.04		0.55			1038
Fumarate, di-*tert*-amyl	Styrene	0.08		0.69			1038
Fumarate, di-*tert*-butyl	Fumarate, bis(3-[tris(trimethylsiloxy) silyl)propyl	0.67		0.21			1040
Fumarate, di-*tert*-butyl	Fumarate, dimethyl	1.57	0.365	0.156	0.227	Y	1049
Fumarate, di-*tert*-butyl	Maleate, dimethyl	18.2	6.7	0.011	0.037	Y	1049
Fumarate, di-*tert*-butyl	Styrene	0.04		0.57			1038
Fumarate, dibenzyl	Styrene	0		0.32			1038
Fumarate, dibutyl	Diallyl phthalate	1.01		0.02			665
Fumarate, dibutyl	Imidazole, 1-vinyl-	0.182	0.054	0.03	0.01	Y	614
Fumarate, dibutyl	Styrene	0.04		0.35			1038
Fumarate, dibutyl	Styrene, *tert*-butoxy	0.01		0.18			1077
Fumarate, dicyclohexyl	Styrene	0.06		0.49			1038
Fumarate, dicyclopentyl	Styrene	0.06		0.3			1038
Fumarate, diethyl	Acrylonitrile	0		8			470
Fumarate, diethyl	Acrylonitrile	0.1		10			640
Fumarate, diethyl	Butadiene	0.25		2.13			466
Fumarate, diethyl	Butadiene, 2-chloro-	0.02		6.51		Y	61
Fumarate, diethyl	Diallyl phthalate	1.25		0.01			665
Fumarate, diethyl	Ethylene	1.91	3.4	0.11	1.14	N	41
Fumarate, diethyl	Methacrylate, methyl	0.04	0.004	40.3	0.6	N	28
Fumarate, diethyl	Methacrylate, methyl	0.05		2.1			394
Fumarate, diethyl	*N*-Vinylimidazole	0.191	0.022	0.113	0.019	Y	879
Fumarate, diethyl	Styrene	0.02		0.29			1038
Fumarate, diethyl	Styrene	0.081	0.005	6.3	0.26	Y	139
Fumarate, diethyl	Styrene	0.11	0.022	0.394	0.06	Y	139
Fumarate, diethyl	Styrene	0.07		0.3			139
Fumarate, diethyl	Styrene	0	0.01	0.31	0.02	N	249
Fumarate, diethyl	Styrene	0.1		0.36			562
Fumarate, diethyl	Styrene	0.02		0.29			640
Fumarate, diethyl	Vinyl acetate	0.443	0.007	0.011	0.004	Y	137
Fumarate, diethyl	Vinyl acetate	0.33		0.09			718
Fumarate, diethyl	Vinyl chloride	0.48	0.1	0.13	0.1	Y	137
Fumarate, diethyl	Vinyl ethyl ether	1.63	0.16	−0.124	0.059	Y	194
Fumarate, diethyl	Vinyl isobutyl ether	0.52		0			640
Fumarate, diethyl	Vinylidene chloride	0.012	0.038	12.19	1.58	Y	59
Fumarate, diisobutyl	Styrene	0.05		0.37			1038
Fumarate, diisopropyl	Acenaphthalene	0.06		2.57			1039
Fumarate, diisopropyl	Acetate, isopropenyl	0.67		0.011			1038
Fumarate, diisopropyl	Acrylate, methyl	0.091		1.9			1038
Fumarate, diisopropyl	Acrylate, phenyl	0.07		3.4			1038
Fumarate, diisopropyl	Acrylonitrile	0.2		16			1038
Fumarate, diisopropyl	Carbazole, *N*-vinyl-	0		0			1038
Fumarate, diisopropyl	Fumarate, bis(3-[tris(trimethylsiloxy) silyl)propyl	0.87		0.07			1040
Fumarate, diisopropyl	Isobutylene	0.42		0			1038
Fumarate, diisopropyl	Methacrylate, methyl	0.17		23			1038
Fumarate, diisopropyl	Methacrylonitrile	0		85			1038
Fumarate, diisopropyl	Styrene	0.055		0.4			1038
Fumarate, diisopropyl	Vinyl acetate	0.9		0.012			1038
Fumarate, diisopropyl	Vinyl chloride	0.49		0.29			1038
Fumarate, diisopropyl	Vinylidene chloride	0.095		48			1038
Fumarate, dimethyl	Fumarate, di-*tert*-butyl	0.156	0.227	1.57	0.365	Y	1049
Fumarate, dimethyl	*N*-Vinylimidazole	0.252	0.015	0.133	0.021	Y	879
Fumarate, dimethyl	Styrene	0.03		0.39			1038
Fumarate, dioctyl	Diallyl phthalate	0.96		0.02			665
Fumarate, dioctyl	Pyrrolidone, *N*-vinyl-	0.04	0.04	0.02	0.01	N	121
Fumarate, dipropyl	Imidazole, 1-vinyl-	0.163	0.69	0.009	0.012	Y	614
Fumarate, dipropyl	Styrene	0.02		0.32			1038
Fumarate, isopropyl butyl	Styrene	0.01		0.42			1056
Fumarate, isopropyl butyl	Styrene	0.01		0.3			1056

TABLE 1. *cont'd*

Monomer 1	Monomer 2	r_1	±95%	r_2	±95%	Conv.	Refs.
Fumarate, isopropyl isobutyl	Styrene	0.01		0.46			1056
Fumarate, isopropyl methyl	Styrene	0.16		0.3			1056
Fumarate, isopropyl *sec*-butyl	Styrene	0.02		0.54			1056
Fumarate, methyl butyl	Styrene	0.02		0.36			1056
Fumarate, methyl ethyl	Styrene	0.02		0.32			1056
Fumarate, methyl isobutyl	Styrene	0.03		0.32			1056
Fumarate, methyl isopropyl	Styrene	0.16		0.3			1056
Fumarate, methyl propyl	Styrene	0.05		0.28			1056
Fumarate, methyl *sec*-butyl	Styrene	0.02		0.45			1056
Fumarate, methyl *tert*-amyl	Styrene	0.06		0.53			1056
Fumarate, methyl *tert*-butyl	Styrene	0.03		0.45			1056
Fumarate, mono-2-butyl	Styrene	−0.04	0.03	0.33	0.03	N	249
Fumarate, *tert*-butyl 2-ethylhexyl	Styrene	0.01		0.54			1056
Fumarate, *tert*-butyl 4-methyl-2-pentyl	Styrene	0.01		0.57			1056
Fumarate, *tert*-butyl ethyl	Styrene	0.04		0.25			1056
Fumarate, *tert*-Butyl isoamyl	Styrene	0.06		0.45			1056
Fumarate, *tert*-butyl methyl	Styrene	0.03		0.45			1056
Fumarate, *tert*-butyl *sec*-butyl	Styrene	0.07		0.55			1056
Fumaric acid	*N*-vinylimidazole	0.313	0.012	0.121	0.01	Y	879
Fumaronitrile	Benzothiazole, vinylmercapto-					Y	763
Fumaronitrile	Methacrylate, methyl	−0.064	0.096	6.74	0.79	Y	191
Fumaronitrile	Styrene	−0.016	0.021	0.202	0.058	Y	137
Fumaronitrile	Styrene	0.006	0.031	0.294	0.044	Y	199
Fumaronitrile	Styrene	0		0.3			478
Fumaronitrile	Styrene					Y	77
Fumaronitrile	Styrene, α-methyl-	−0.01	0.078	0.094	0.02	Y	77
Fumaryl chloride	Styrene					Y	91
Fumaryl chloride	Vinyl acetate					Y	91
Furan, 2,3-dihydro-	Styrene	0		20			806
Furan, 2-vinyl-5-methyl	Acrylate, butyl	0.392	0.051	0.118	0.019	Y	1105
Furan, 2-vinyl-5-methyl	Methacrylate, isobutyl	0.716	0.169	0.105	0.044	Y	1105
Furan, 2-vinyl-5-methyl	Methacrylate, methyl	0.867	0.292	0.183	0.146	Y	1105
Hex-3-yne-5-ene, 2-methyl-*tert*-butyl peroxide	Maleic anhydride	0.36		0.01			637
Hexatriene, tetrachloro-	Acrylate, methyl	3.19	1.36	0.262	0.087	Y	5
Hexatriene, tetrachloro-	Acrylonitrile	4.01	1.25	0.234	0.05	Y	4
Hexatriene, tetrachloro-	Butadiene, 2-chloro-	0.2		3.6			459
Hexatriene, tetrachloro-	Isoprene	1.58		0.58			459
Hexatriene, tetrachloro-	Methacrylate, methyl	1.76	0.28	0.504	0.057	Y	5
Hexatriene, tetrachloro-	Styrene	0.85	0.22	0.123	0.042	Y	4
Hexatriene, tetrachloro-	Vinyl acetate					Y	4
Hexene, 1-, 3,4-dioic anhydride	Styrene	−0.052	1	8.57	8.4	Y	933
Hexene, 2-, 3,4-dioic anhydride	Styrene	−0.08	1.17	3.63	5.6	Y	933
Hexene, 3-, 3,4-dioic anhydride	Styrene	−0.54	5.83	17.17	436	Y	933
Hexene, 5-, 2,4-dione	Styrene	1.22		0.031			931
Hexene, 5-, 2,4-dione	Styrene	1.38		0.049			931
Hexene, 5-, 2,4-dione	Styrene	1.52		0.066			931
Hexene, 5-, 2,4-dione	Styrene	1.73		0.07			931
Hexene, 5-, 2,4-dione	Styrene	1.91		0.171			931
Hexene, 5-, 2,4-dione	Styrene	1.91		0.179			931
Hexene, 5-, 2,4-dione	Styrene	2.07		0.173			931
Hexene, 5-, 2,4-dione	Styrene	2.46		0.121			931
Hexene, 5-, 2,4-dione	Styrene	2.69		0.24			931
Hexene, 5-, 2,4-dione	Styrene	2.93		0.014			931
Hexene, 5-, 2,4-dione	Styrene	3.19		0.044			931
Hexene, 5-, 2,4-dione	Styrene	4.11		0.028			931
Hexene-1	Acrylate, methyl	−0.67	0.03	−0.13	0.6	Y	60
Hexene-1	Acrylonitrile	−1.08		2.07		Y	60
Hexene-1	Vinyl chloride	−1.72	9.23	1.54	0.98	N	329
Hexene-1, 2,5-dicarboxylate, dimethyl	Styrene	0.196	0.043	0.678	0.031	Y	828
Imidazole, 1-vinyl	Triazole, 1-*N*-vinyl-1,2,4-					N	972
Imidazole, 1-vinyl-	Acrylic acid	0.32		0.002			955
Imidazole, 1-vinyl-	Fumarate, dibutyl	0.03	0.01	0.182	0.054	Y	614
Imidazole, 1-vinyl-	Fumarate, dipropyl	0.009	0.012	0.163	0.069	Y	614

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TABLE 1. *cont'd*

Monomer 1	Monomer 2	r_1	±95%	r_2	±95%	Conv.	Refs.
Imidazole, 1-vinyl-	Maleate, dibutyl	0.486	0.057	0.093	0.08	Y	614
Imidazole, 1-vinyl-	Maleate, dipropyl	0.314	0.028	0.053	0.035	Y	614
Imidazole, 1-vinyl-	Maleate, monomethyl	0.4		0.6			724
Imidazole, 1-vinyl-	Maleic acid	0.3		0.6			635
Imidazole, 1-vinyl-	Methacrylate, methyl	0.014	0.03	4.36	1.86	Y	364
Imidazole, 1-vinyl-	Pyrrolidone, *N*-vinyl-	0.96	0.19	0.16	0.074	Y	364
Imidazole, 1-vinyl-	Styrene	0.071	0.029	9.94	0.24	Y	364
Imidazole, 1-vinyl-	Vinyl acetate	1.9	6.99	−0.11	1.17	Y	364
Imidazole, 1-vinyl-2-methyl-	Acrylate, methyl	0.05		1.28			465
Imidazole, 1-vinyl-2-methyl-	Methacrylate, methyl	0.047	0.088	4	0.54	Y	364
Imidazole, 1-vinyl-2-methyl-	Methacrylate, methyl	0.003		3.48			479
Imidazole, 1-vinyl-2-methyl-	Styrene	0.09	0.064	8.87	0.62	Y	364
Imidazole, 1-vinyl-2-methyl-	Styrene	0.07		8.97			479
Imidazole, 1-vinyl-2-methyl-	Vinyl chloride	2.15	0.26	0.188	0.077	Y	154
Imidazole, *N*-vinyl-	Silane, methacryloxypropyldimethoxy methyl-	0.079		1.39			1095
Imidazole, *N*-vinyl-	Silane, methacryloxypropyltrimethoxy-	0.158	0.04	2.27	1.12	Y	1088
Imidazole, *N*-vinyl-	Styrene, *p*-trimethyoxysilyl-	0.002		6.9			1095
Imidazolid-2-one, 1,3-divinyl-	Acrylate, ethyl	−0.08	0.03	0.41	0.13	N	800
Imidazolid-2-one, 1-ethyl-3-vinyl-	Acrylate, ethyl	0.01	0.01	0.47	0.06	N	800
Indene	Acrylate, methyl	0.1		0.63			606
Indene	Acrylate, methyl	0.12		0.62			606
Indene	Acrylonitrile	0.09	0.25	0.281	0.05	Y	360
Indene	Acrylonitrile	0.07	0.24	0.29	0.12	Y	360
Indene	Styrene, *p*-chloro-	−0.069	0.066	2.86	0.83	Y	6
Indene	Vinyl acetate	8.64	2.8	0.39	0.2	Y	360
Indene	Vinyl 1-menthyl ether	12.64	12.59	0.67	2.82	Y	750
Indene	Vinyl methyl ketone	0.2		2.63			606
Indene	Vinyl methyl ketone	0.25		2.9			606
Indene	Vinylidene chloride	0.293	0.095	0.49	0.15	Y	6
Indene	Vinylidene chloride	0.34	0.85	−0.02	1.15	Y	6
Isobutene	Maleimide, *N*-cyclohexyl-	0.41		0			995
Isobutylene	Acrylonitrile	0	0.002	1.295	0.008	Y	21
Isobutylene	Acrylonitrile	0.02	0.38	0.98	0.25	Y	211
Isobutylene	Acrylonitrile	0		1.02			484
Isobutylene	Ethylene, chlorotrifluoro-	0.06	0.03	0.01	0.02	N	318
Isobutylene	Fumarate, diisopropyl	0		0.42			1038
Isobutylene	Maleic anhydride	0.012		0.065			988
Isobutylene	Vinyl acetate	0.17	0.19	1.66	0.18	Y	211
Isobutylene	Vinyl chloride	0.06	0.8	2.04	1.82	Y	140
Isobutylene	Vinyl chloride	0.268	0.043	2.12	0.2	Y	155
Isobutylene	Vinyl chloride	−0.54	5.8	1.2	2.05	N	329
Isobutylene	Vinyl chloride	0.08		1.54			560
Isobutylene, 3-chloro-	Allyl acetate	4.5		0.15			412
Isobutylene, 3-chloro-	Vinyl acetate	0		0.13			475
Isobutylene, 3-chloro-	Vinyl chloride	0		0.31			475
Isobutylene, 3-chloro-	Vinylidene chloride	0		1.1			470
Isooctene	Maleimide, *N*-cyclohexyl-	0.72		0			995
Isoprene	Acetylene, phenyl-	3.01		0.1			648
Isoprene	Acrylate, methyl	0.75		0.12			424
Isoprene	Acrylonitrile	0.45		0.03			417
Isoprene	Butadiene	1.06		0.94			173
Isoprene	Butadiene	0.608	0.062	0.14	0.37	Y	83
Isoprene	Butadiene, 2,3-dimethyl-	1.18		0.84			173
Isoprene	Butadiene, 2-chloro-	0.06		2.82			418
Isoprene	Butadiene, 2-fluoro-	0.25	0.12	2.63	0.96	Y	174
Isoprene	Butadiene, hexafluoro-	1.19		0.78			453
Isoprene	Ferrocene, ethyl-α-cyclo-pentadienylide	0.01		1.91			699
Isoprene	Hexatriene, tetrachloro-	0.58		1.58			459
Isoprene	Methacrylate, methyl	0.65	0.23	0.26	0.21	Y	302
Isoprene	Methacrylate, methyl	0.64		0.25			698
Isoprene	Methacrylate, methyl	0.64		0.25			704
Isoprene	Pyridine, 2-vinyl-	0.59		0.47			456
Isoprene	Pyridine, 2-vinyl-	0.58		0.46			458
Isoprene	Pyridine, 4-vinyl-	0.32		2.49			424

TABLE 1. *cont'd*

Monomer 1	Monomer 2	r_1	±95%	r_2	±95%	Conv.	Refs.
Isoprene	Quinoline, 2-vinyl-	1.88		0.53			456
Isoprene	Styrene	1.922	0.016	0.513	0.02	Y	366
Isoprene	Styrene	1.957	0.011	0.476	0.018	Y	366
Isoprene	Styrene	1.98		0.44			544
Isoprene	Styrene	2.02		0.42			544
Isoprene	Styrene	1.3		0.48			83
Isoprene, 3-acetoxy-	Acrylate, methyl	5.71		0.27			770
Isoprene, 3-acetoxy-	Methacrylate, methyl	2.81		0.16			770
Isoprene, 3-acetoxy-	Styrene	4.47		0.34			770
Isopropenyl acetate	Maleic anhydride	0.034	0.022	0.002	0.011	Y	260
Isopropenyl acetate	Methacrylate, methyl	−0.09	0.12	17.36	1.95	Y	100
Isopropenyl acetate	Vinyl acetate	1.082	0.074	1.171	0.038	Y	100
Isopropenyl acetate	Vinyl chloride	0.23	0.16	2.26	0.13	Y	100
Isopropenyl methyl ketone	Acrylonitrile	1.2		0.3			490
Isopropenyl methyl ketone	Acrylonitirle	0.7		0.36			542
Isopropenyl methyl ketone	Butadiene, 2-chloro-	0.14	0.01	4.035	0.087	Y	259
Isopropenyl methyl ketone	Styrene	0.29		0.44			542
Isopropenyl methyl ketone	Styrene	0.66		0.32			542
Isopropenyl methyl ketone	Vinylidene chloride	4.06	0.66	0.134	0.099	Y	47
Isopropenyl, 3-(1-cyclohexenyl), acetate	Acrylate, methyl	0.57		0.37			770
Isopropenyl, 3-(1-cyclohexenyl), acetate	Methacrylate, methyl	0.4		0.81			770
Isopropenyl, 3-(1-cyclohexenyl), acetate	Styrene	0.56		1.59			770
Isopropenyl-, *p*-, phenol glycidyl ether	Maleic anhydride	0.003		0.002			937
Isopropenylacetophenone, *p*-	Styrene	0.84	0.59	0.3	0.18	Y	266
Isopropenylisocyanate	Acrylate, ethyl	0.15		0.79			434
Isopropenylisocyanate	Acrylate, methyl	0.11		0.6			434
Isopropenylisocyanate	Acrylate, methyl	0.079	0.047	0.799	0.049	Y	99
Isopropenylisocyanate	Acrylonitrile	0.1		0.24			434
Isopropenylisocyanate	Methacrylate, methyl	0.14		3.1			434
Isopropenylisocyanate	Styrene	0.07		8.12			434
Isopropenylisocyanate	Styrene	0.122	0.047	6.84	0.18	Y	99
Isopropenylisocyanate	Vinyl chloride	3		0.39			777
Isopropenylisocyanate	Vinylidene chloride	0.31		0.85			434
Isopropenyltoluene	Methacrylate, methyl	0.04		0.68			688
Isopropenyltoluene	Methacrylate, methyl	0.04		0.68			722
Isopropylidene, 2,3:4,5-di-*O*-, -1-vinylbenzyl-β-D-fructose	Styrene	3.26	1.12	0.14	0.055	Y	772
Itaconamate, *N*-(4-carboethoxyphenyl)-, butyl	Styrene	0.61		0.2			678
Itaconamate, *N*-(4-carboethoxyphenyl)-, ethyl	Methacrylate, methyl	0.48		1.21			678
Itaconamate, *N*-(4-carboethoxyphenyl)-, ethyl	Styrene	0.2		0.23			678
Itaconamate, *N*-(4-carboethoxyphenyl)-, methyl	Styrene	0.58		0.15			678
Itaconamate, *N*-(4-carboethoxyphenyl)-, propyl	Methacrylate, methyl	0.53		1			678
Itaconamate, *N*-(4-carboethoxyphenyl)-, propyl	Styrene	0.4		0.26			678
Itaconamate, *N*-(4-chlorophenyl)-, ethyl	Methacrylate, methyl	0.36		1.24			678
Itaconamate, *N*-(4-chlorophenyl)-, ethyl	Styrene	0.16		0.35			678
Itaconamate, *N*-(4-chlorophenyl)-, methyl	Styrene	0.18		0.38			678
Itaconamate, *N*-(4-chlorophenyl)-, propyl	Methacrylate, methyl	0.31		1.26			678
Itaconamate, *N*-(4-chlorophenyl)-, propyl	Styrene	0.31		0.39			678
Itaconamate, *N*-(4-methoxyphenyl)-, butyl	Styrene	0.69		0.12			678
Itaconamate, *N*-(4-methoxyphenyl)-, ethyl	Methacrylate, methyl	0.43		1.31			678
Itaconamate, *N*-(4-methoxyphenyl)-, ethyl	Styrene	0.34		0.33			678
Itaconamate, *N*-(4-methoxyphenyl)-, methyl	Styrene	0.41		0.26			678
Itaconamate, *N*-(4-methoxyphenyl)-, propyl	Methacrylate, methyl	0.4		1.03			678
Itaconamate, *N*-(4-methoxyphenyl)-, propyl	Styrene	0.4		0.38			678
Itaconamate, *N*-(4-methylphenyl)-, propyl	Methacrylate, methyl	0.28		1.11			678
Itaconamate, *N*-(4-methylphenyl)-, propyl	Styrene	0.19		0.54			678

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TABLE 1. *cont'd*

Monomer 1	Monomer 2	r_1	±95%	r_2	±95%	Conv.	Refs.
Itaconamate, *N*-(4-methylphenyl)-, butyl	Styrene	0.31		0.19			678
Itaconamate, *N*-(4-methylphenyl)-, ethyl	Methacrylate, methyl	0.63		1.43			678
Itaconamate, *N*-(4-methylphenyl)-, ethyl	Styrene	0.26		0.38			678
Itaconamate, *N*-(4-methylphenyl)-, methyl	Styrene	0.16		0.3			678
Itaconamate, *N*-phenyl-, butyl	Styrene	0.49		0.12			678
Itaconamate, *N*-phenyl-, ethyl	Methacrylate, methyl	0.47		1.32			678
Itaconamate, *N*-phenyl-, ethyl	Styrene	0.21		0.45			678
Itaconamate, *N*-phenyl-, methyl	Styrene	0.52		0.31			1059
Itaconamate, *N*-phenyl-, methyl	Styrene	0.18		0.39			678
Itaconamate, *N*-phenyl-, propyl	Methacrylate, methyl	0.15		1.13			678
Itaconamate, *N*-phenyl-, propyl	Styrene	0.18		0.5			678
Itaconate, bis(2-ethylhexyl)	Maleimide, *N*-cyclohexyl-	0.38		0.34			1060
Itaconate, bis(tri-*n*-butyltin)	Acrylate, 2-chloroethyl	0.391		0.683			940
Itaconate, bis(tri-*n*-butyltin)	Acrylate, butyl	0.422		0.91			940
Itaconate, bis(tri-*n*-butyltin)	Methacrylate,allyl	0.038		1.08			940
Itaconate, bis(tri-*n*-butyltin)	*N*-Vinylpyrrolidone	0.065	0.04	0.21	0.013	Y	941
Itaconate, di-2[-2(2-methoxyethoxy)-ethoxy]ethyl	Styrene	0.2	0.015	0.53	0.022		1098
Itaconate, di-*p*-butyl	Maleimide, *N*-cyclohexyl	0.34	0.04	0.21	0.04		1014
Itaconate, diamyl	Styrene	0.5	0.09	0.36	0.05	N	39
Itaconate, dibutyl	Itaconate, dimethyl	1.1		1.1			398
Itaconate, dibutyl	Methacrylate, methyl	0.717	0.11	1.33	0.09		1073
Itaconate, dibutyl	Methacrylate, methyl	0.4		0.8			398
Itaconate, dibutyl	Styrene	0.34	0.05	0.42	0.06	N	39
Itaconate, diethyl	Pyridine, 2-methyl-5-vinyl-	0.17		0.51			545
Itaconate, diethyl	Styrene	0.34	0.12	0.23	0.11	N	39
Itaconate, diethyl	Vinyl chloride	5.65		0.06			480
Itaconate, dimenthyl	Maleimide, *N*-cyclohexyl-	0.318	0.213	0.601	0.193	Y	975
Itaconate, dimenthyl	Methacrylate, methyl	−0.156	0.02	3.34	0.557	Y	975
Itaconate, dimenthyl	Styrene	0.483	0.364	0.502	0.188	Y	975
Itaconate, dimenthyl	Vinyl acetate					Y	975
Itaconate, dimethyl	Acrylate, butyl	0.94		0.4			398
Itaconate, dimethyl	Itaconate, dibutyl	1.1		1.1			398
Itaconate, dimethyl	Methacrylate, methyl	0.3		1.2			398
Itaconate, dimethyl	Methacrylonitrile	0.28		1.26			398
Itaconate, dimethyl	Pyridine, 2-methyl-5-vinyl-	0.22		0.88			545
Itaconate, dimethyl	Styrene					N	39
Itaconate, dimethyl	Styrene	0.14		0.48			398
Itaconate, dimethyl	Styrene	0.06		0.5			586
Itaconate, dimethyl	Styrene, *p*-chloro-	0.15		0.69			398
Itaconate, dimethyl	Vinyl chloride	5		0.05			479
Itaconate, dioctyl	Styrene	0.14	0.12	0.33	0.16	N	39
Itaconate, dipropy	Styrene	0.28	0.06	0.16	0.07	N	39
Itaconate, ethyl hexafluoroisopropyl	Styrene	0.039	0.035	0.435	0.025	N	1103
Itaconate, glycidyl methyl	Styrene	0.041	0.079	0.376	0.036		806
Itaconate, mono-methyl	Methacrylate, 2-naphthyl	0.31	0.42	0.52	0.16	Y	613
Itaconate, mono-methyl	Methacrylate, 2-naphthyl	0.36	0.21	0.59	0.14	Y	613
Itaconate, mono-methyl	Methacrylate, 2-naphthyl	0.135	0.028	0.223	0.02	Y	613
Itaconate, mono-methyl	Methacrylate, 2-naphthyl	0.04	0.11	0.189	0.055	Y	613
Itaconate, mono-methyl	Styrene	0.111	0.052	0.029	0.039	Y	656
Itaconate, mono-methyl	Styrene	0.33	0.15	0.34	0.077	Y	656
Itaconate, mono-methyl	Styrene	0.33	0.11	0.52	0.085	Y	656
Itaconate, mono-methyl	Styrene	0.218	0.086	0.404	0.06	Y	656
Itaconate, monomethyl	Methacrylate, methyl	0.139	0.103	1.1	0.071	Y	1010
Itaconic acid	Acrylonitrile	0.86	0.74	0.59	0.34	Y	164
Itaconic acid	Methacrylate, methyl	0		1.23			260
Itaconic acid	Methacrylate, methyl	0		1.14			408
Itaconic acid	Styrene	0		0.34			420
Itaconic acid	Styrene	0.12	0.67	0.26	0.08	Y	76
Itaconic acid mono(*p*-sulfamidoanilide)	Methacrylate, propargyl	0.58	0.05	1.65	0.02		957
Itaconic anhydride	Acrylate, 2-chloroethyl	2.46	0.38	−0.016	0.022	Y	365
Itaconic anhydride	Acrylate, 2-chloroethyl	2.61	0.32	0.251	0.021	Y	365
Itaconic anhydride	Acrylonitrile	4.83	0.33	0.034	0.014	Y	365
Itaconic anhydride	Methacrylate, methyl	1.17	0.33	0.155	0.024	Y	1010
Itaconic anhydride	Styrene	0.405	0.09	0.004	0.01	Y	365

TABLE 1. *cont'd*

Monomer 1	Monomer 2	r_1	±95%	r_2	±95%	Conv.	Refs.
Itaconic anhydride	Styrene	0.456	0.09	0.086	0.015	Y	62
Itaconic anhydride	Styrene	0.785	0.05	0.003	0.005	Y	62
Itaconic anhydride	Vinyl acetate	1.57	0.3	−0.019	0.045	Y	365
Itaconic anhydride	Vinyl acetate	2.87	0.32	−0.04	0.024	Y	365
Itaconimide, *N*-(2-chloroethyl)-	Methacrylate, methyl	0.54	0.39	0	0.11	Y	642
Itaconimide, *N*-(2-chloroethyl)-	Styrene	0.162	0.092	0.069	0.045	Y	642
Itaconimide, *N*-(4-acetoxyphenyl)-	Styrene	0.21	0.21	0.35	0.12	Y	729
Itaconimide, *N*-(4-chlorophenyl)-	Styrene	0.2	0.18	0.159	0.084	Y	729
Itaconimide, *N*-(4-ethoxycarbonylphenyl)-	Styrene	0.112	0.054	0.232	0.032	Y	729
Itaconimide, *N*-(*p*-chlorophenyl)-	Styrene	0.14		0.15			740
Itaconimide, *N*-(*p*-tolyl)-	Styrene	0.24		0.16			740
Itaconimide, *N*-benzyl-	Methacrylate, methyl	1.06	0.75	0.46	0.18	Y	642
Itaconimide, *N*-benzyl-	Styrene	0.2	0.11	0.056	0.048	Y	642
Itaconimide, *N*-butyl-	Styrene	−0.019	0.04	0.22	0.03	Y	642
Itaconimide, *N*-ethyl-	Methacrylate, methyl	0.42	0.13	0.486	0.066	Y	642
Itaconimide, *N*-ethyl-	Styrene	0.172	0.06	0.232	0.029	Y	642
Itaconimide, *N*-isobutyl-	Styrene	−0.03	0.11	0.44	0.11	Y	642
Itaconimide, *N*-isopropyl-	Styrene	0.045	0.064	0.308	0.043	Y	642
Itaconimide, *N*-methyl-	Methacrylate, methyl	1.12	0.73	0.38	0.22	Y	642
Itaconimide, *N*-methyl-	Styrene	0.12	0.12	0.153	0.069	Y	642
Itaconimide, *N*-naphthyl-	Styrene	0.35		0.08			740
Itaconimide, *N*-phenyl-	Styrene	0.109	0.082	0.116	0.043	Y	729
Itaconimide, *N*-phenyl-	Styrene	0.08		0.05			740
Itaconimide, *N*-phenyl-	Styrene	0.998	0.123	0.05	0.248	N	978
Itaconimide, *N*-propyl-	Styrene	0.04	0.18	0.28	0.12	Y	642
Itaconimide, *N*-tolyl-	Styrene	0.219	0.079	0.134	0.031	Y	729
Malemic acid, *N*-3-dimethylamino-6-methylphenyl-	Butadiene	−0.08	0.03	0.37	0.04	N	679
Malemic acid, *N*-3-dimethylamino-6-methylphenyl-	Styrene	−0.19	0.03	0.55	0.03	N	679
Maleate, chloro-, diethyl	Styrene	−0.043	0.021	2.07	0.14	Y	14
Maleate, dibutyl	Imidazole, 1-vinyl-	0.093	0.08	0.486	0.057	Y	614
Maleate, allyl methyl	Styrene	0.02	0.01	8.29	0.14	N	713
Maleate, butyl stannylallyl	Styrene	0.06	0.03	0.1	0.02	N	811
Maleate, di-*tert*-butyl	Vinyl acetate	0.199	0.02	0.005	0.024	Y	1049
Maleate, dibutyl tin	Methacrylate, methyl	−0.095	0.199	72.7	5.93	Y	987
Maleate, dibutyl tin	Styrene	0.194	0.121	2.08	0.118	Y	987
Maleate, diethyl	Acrylonitrile	0		12			470
Maleate, diethyl	Acrylonitrile	0		20			640
Maleate, diethyl	Butadiene	0.11		8.08			466
Maleate, diethyl	Carbazole, *N*-vinyl-	0	0.01	0.21	0.05	N	361
Maleate, diethyl	Ethylene	10		0.25			41
Maleate, diethyl	Methacrylate, methyl	−0.1	0.05	341	46	N	28
Maleate, diethyl	Methacrylate, methyl	0		20			470
Maleate, diethyl	Methacrylate, methyl	−0.02	0.015	285.8	35.9	Y	873
Maleate, diethyl	*N*-Vinylimidazole	0.106	0.147	0.057	0.028	Y	879
Maleate, diethyl	Styrene					Y	14
Maleate, diethyl	Styrene	−0.013	0.022	6.59	0.46	Y	139
Maleate, diethyl	Styrene	0.07		8			640
Maleate, diethyl	Styrene	0.01	0.01	6.07	0.07	N	874
Maleate, diethyl	Styrene	0.001		6.592			888
Maleate, diethyl	Vinyl acetate	0.04	0.012	0.171	0.025	Y	137
Maleate, diethyl	Vinyl chloride	−0.003	0.044	0.768	0.078	Y	137
Maleate, diethyl	Vinyl chloride	0		0.8			449
Maleate, diethyl	Vinyl chloride	0.046	0.07	0.9	0.11	Y	6
Maleate, diethyl	Vinyl isobutyl ether	0.17		0			640
Maleate, diethyl	Vinylidene chloride	12.5					3
Maleate, dimethyl	Carbzole, *N*-vinyl-	0	0.01	0.51	0.11	N	361
Maleate, dimethyl	Fumarate, di-*tert*-butyl	0.011	0.037	18.2	6.7	Y	1049
Maleate, dimethyl	*N*-Vinylimidazole	0.046	0.438	0.046	0.046	Y	879
Maleate, dimethyl	Styrene	0.15	0.12	10.65	2.81	Y	137
Maleate, dimethyl	Styrene	0.105	0.058	0.083	0.015	Y	317
Maleate, dimethyl	Succinimide, *N*-vinyl-	−0.012	0.021	1.25	0.16	Y	284
Maleate, dimethyl	Vinyl acetate	0.257	0.086	−0.006	0.084	Y	1049
Maleate, dioctyl	Vinyl chloride	0.608	0.099	0.05	0.14	Y	3

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TABLE 1. *cont'd*

Monomer 1	Monomer 2	r_1	±95%	r_2	±95%	Conv.	Refs.
Maleate, dipropyl	Imidazole, 1-vinyl-	0.053	0.035	0.314	0.028	Y	614
Maleate, monoallyl	Maleic anhydride	0.027	0.014	0.051	0.054	N	906
Maleate, monoallyl	Styrene	0.07	0.02	0.14	0.01	N	811
Maleate, monomethyl	Imidazole, 1-vinyl-	0.6		0.4			724
Maleate, tributylstannyl allyl	Maleic anhydride	0.095	0.104	0.032	0.017	N	906
Maleic Anhydride	Isopropenyl-, *p*–, phenol glycidyl ether	0.002		0.003			937
Maleic acid	Imidazole, 1-vinyl-	0.6		0.3			635
Maleic acid	*N*-Vinylimidazole	0.094	0.027	0.018	0.007	Y	879
Maleic anhydride	Acenaphthalene	0.02		0.46			1039
Maleic anhydride	Acenaphthalene	−0.04	0.05	0.46	0.13	N	326
Maleic anhydride	Acetylene, phenyl-	0.06		0.08			797
Maleic anhydride	Acrolein diethylacetal	0.07		0.18			767
Maleic anhydride	Acrylamide	0		0.56		Y	655
Maleic anhydride	Acrylate, 2-chloroethyl	0.027	0.004	7.15	0.31	Y	117
Maleic anhydride	Acrylate, ferrocenylmethyl				2.96	Y	325
Maleic anhydride	Acrylate, methyl	0.012	0.013	2.788	0.051	Y	260
Maleic anhydride	Acrylate, methyl	0		2.5			470
Maleic anhydride	Acrylonitrile	0		6			470
Maleic anhydride	Allyl acetate	0.028	0.019	−0.001	0.007	Y	27
Maleic anhydride	Allylbenzene					Y	351
Maleic anhydride	Benzocyclobutane, α-methylene-	0.025		0.002			1083
Maleic anhydride	Benzothiazole, vinylmercapto-					Y	763
Maleic anhydride	Butadiene monoxide	0.64	0.06	0.05	0.18		1064
Maleic anhydride	Butadiene, 2-chloro-	0.329	0.107	0.026	0.03	N	1068
Maleic anhydride	Carbamate, *N,N*-diethyl-, vinyl	0.025	0.034	0.024	0.066	Y	92
Maleic anhydride	Dicyclopentadiene	0.071	0.045	0.037	0.112	Y	914
Maleic anhydride	Divinylbenzene, *p*-	0.09	0.01	0.01	0.01		943
Maleic anhydride	Ethylene	0		0.04			620
Maleic anhydride	Hex-3-yne-5-ene, 2-methyl-*tert*-butyl-peroxide	0.01		0.36			637
Maleic anhydride	Isobutylene	0.065		0.012			988
Maleic anhydride	Isopropenyl acetate	0.002	0.011	0.034	0.022	Y	260
Maleic anhydride	Maleate, monoallyl	0.051	0.054	0.027	0.014	N	906
Maleic anhydride	Maleate, tributylstannyl allyl	0.032	0.017	0.095	0.104	N	906
Maleic anhydride	Maleimide, *N*-phenyl-	−0.095	0.106	1.08	0.13	Y	990
Maleic anhydride	Maleimide, *N*-phenyl-	0.02	0.65	1.92	11.83	Y	341
Maleic anhydride	Methacrylate, ferrocenylmethyl	0.24	0.28	0.33	0.65	Y	325
Maleic anhydride	Methacrylate, methyl	−0.163	0.027	4.18	0.31	Y	169
Maleic anhydride	Methacrylate, methyl	−0.019	0.026	6.36	0.64	Y	260
Maleic anhydride	Methacrylate, methyl	0.08	1.77	0.46	0.69	N	320
Maleic anhydride	Methacrylate, methyl	0.02	0.004	5.2	0.47	N	33
Maleic anhydride	Methacrylate, methyl	0.01		3.1			524
Maleic anhydride	Methacrylate, methyl	0.01		3.85			524
Maleic anhydride	Methacrylate, methyl	0.01		3.4			524
Maleic anhydride	Methacrylate, methyl	0.02		3.85			524
Maleic anhydride	Methacrylate, di-, di-*n*-butylstannyl	0.024	0.008	0.012	0.016	Y	954
Maleic anhydride	Methacrylate, benzyl					Y	720
Maleic anhydride	Methacrylate, benzyl	0.372	0.093	−0.075	0.088	Y	720
Maleic anhydride	Phthalimide, *N*-vinyl-	0.008	0.012	0.344	0.061	Y	284
Maleic anhydride	Propene, 1-chloro-, *cis*-	0.347	0.082	−0.022	0.08	Y	181
Maleic anhydride	Propene, 1-chloro-, *trans*-	0.28	0.012	0.05	0.015	Y	181
Maleic anhydride	Styrene	0.001	0.008	0.097	0.002	N	105
Maleic anhydride	Styrene	0	0.13	0.04	0.12	Y	12
Maleic anhydride	Styrene	0.003	0.03	0.02	0.003	N	17
Maleic anhydride	Styrene	0.02	0.01	0	0.01	N	241
Maleic anhydride	Styrene	0		0.02			384
Maleic anhydride	Styrene	0		0.02			397
Maleic anhydride	Styrene	0.02		0.04			483
Maleic anhydride	Styrene	0.01		0.04			506
Maleic anhydride	Styrene	0.001		0.04			522
Maleic anhydride	Styrene	0.005		0.05			522
Maleic anhydride	Styrene	0.01		0.02			522
Maleic anhydride	Styrene	0.02		0.04			522
Maleic anhydride	Styrene	0.05		0.04			522
Maleic anhydride	Styrene					N	923
Maleic anhydride	Styrene, α-methyl-	0.08		0.04			492

TABLE 1. *cont'd*

Monomer 1	Monomer 2	r_1	±95%	r_2	±95%	Conv.	Refs.
Maleic anhydride	Succinimide, *N*-vinyl-	0.021	0.027	0.148	0.073	Y	284
Maleic anhydride	Vinyl 2-chlorocyclohexyl ketone	0.83		1.7			836
Maleic anhydride	Vinyl 4-chlorocyclohexyl ketone	0.08		0.12			836
Maleic anhydride	Vinyl acetate	−0.058	0.074	0.019	0.008	Y	260
Maleic anhydride	Vinyl chloride	−0.22	0.38	0.098	0.042	Y	260
Maleic anhydride	Vinyl chloride	0.4		0.04			521
Maleic anhydride	Vinyl chloride	0.67		0.1			521
Maleic anhydride	Vinylidene cyanide					Y	82
Maleic anhydride, α-chloro-	Styrene	0		0.07			845
Maleimide	Butadiene, 2,3-bis(diethyl-phosphono)-	0.43		0.14			759
Maleimide	Methacrylate, methyl	0.166	0.047	2.576	0.061	Y	251
Maleimide	Methacrylate, methyl	0.17		2.5			992
Maleimide	Piperidinol, 4-, *N*-methyl-4-(vinylethynyl)-	0.49	0.01	2.05	0.03		948
Maleimide	Styrene	0.088	0.036	0.057	0.012	Y	251
Maleimide	Vinylidene chloride	0.464	0.083	0.666	0.056	Y	251
Maleimide, *N*-hydroxymethyl	Methacrylate, methyl	0.263	0.026	1.745	0.03	Y	323
Maleimide, 2,3-dimethyl-*N*-(2-methacryloxyethyl)-	Acrylate, ethyl	1.55	3.06	0.28	1.15	Y	619
Maleimide, 2,3-dimethyl-*N*-(2-methacryloxyethyl)-	Methacrylate, methyl	1.1	3.58	0.51	1.66	Y	619
Maleimide, 2,3-dimethyl-*N*-(2-methacryloxyethyl)-	Methacrylic acid	1.33	0.1	0.746	0.059	Y	619
Maleimide, *N*-(2,4-dimethylphenyl)-	Acrylate, butyl	0.2		0.62			788
Maleimide, *N*-(2,4-dimethylphenyl)-	Acrylate, heptyl	0.2		0.14			788
Maleimide, *N*-(2,6-diethylphenyl)-	Methacrylate, methyl	0.05		4.78			992
Maleimide, *N*-(2,6-diethylphenyl)-	Styrene	0.02		0.19			992
Maleimide, *N*-(2,6-diisopropylphenyl)-	Methacrylate, methyl	0.02		10.9			992
Maleimide, *N*(2,6-dimethylphenyl)-	Methacrylate, methyl	0.07		3.62			992
Maleimide, *N*-(2,6-dimethylphenyl)-	Styrene	0.08		0.14			992
Maleimide, *N*-(2-bromophenyl)-	Acrylonitrile	0.338	0.045	2.029	0.214	Y	863
Maleimide, *N*-(2-chlorophenyl)-	Acrylonitrile	1.078	0.048	0.956	0.095	Y	863
Maleimide, *N*-(2-chlorophenyl)-	Methacrylate, methyl	0.1		2.1			992
Maleimide, *N*-(2-chlorophenyl)-	Styrene	0.013	0.002	0.011	0.004	Y	853
Maleimide, *N*-(2-chlorophenyl)-	Styrene	0.028	0.003	0.038	0.006	Y	853
Maleimide, *N*-(2-chlorophenyl)-	Styrene	0.01	0.005	0.013	0.012	Y	910
Maleimide, *N*-(2-chlorophenyl)-	Styrene	0.006	0.003	0.038	0.28	Y	910
Maleimide, *N*-(2-hydroxyethyl)-	Butadiene, 2,3-bis(diethyl-phosphono)-	0.49		0.12			759
Maleimide, *N*-(2-hydroxyethyl)-	Methacrylate, methyl	0.201	0.083	1.396	0.089	Y	323
Maleimide, *N*-(2-hydroxyethyl)-	Pyrrolidone, *N*-vinyl-	0.038	0.01	0.002	0.002	Y	323
Maleimide, *N*-(2-hydroxyethyl)-	Styrene	0.011	0.027	0.046	0.017	Y	323
Maleimide, *N*-(2-hydroxyethyl)-	Vinyl acetate	0.61	0.12	−0.014	0.037	Y	323
Maleimide, *N*-(2-hydroxyethyl)-	Vinyl acetate	0.88	0.17	0.01	0.041	Y	323
Maleimide, *N*-(2-methylphenyl)-	Methacrylate, methyl	0.09		2.22			992
Maleimide, *N*-(3,5-dimethylphenyl)-	Methacrylate, methyl	0.28		1.63			992
Maleimide, *N*-(3-dimethylaminophenyl)-	Styrene	0.19		0.03			747
Maleimide, *N*-(3-methylphenyl)-	Methacrylate, methyl	0.22		1.18			992
Maleimide, *N*-(3-trifluoromethylphenyl)-	Methacrylate, methyl	0.1		1.57			992
Maleimide, *N*-(4-bromophenyl)-	Acrylate, methyl	0.39	0.17	0.429	0.099		628
Maleimide, *N*-(4-bromophenyl)-	Styrene	0.018	0.007	0.02	0.006	Y	1030
Maleimide, *N*-(4-carboxyethylphenyl)-	Vinyl chloride	3.29	0.18	0.04	0.03	N	306
Maleimide, *N*-(4-carboxyethylphenyl)-α-chloro-	Methacrylate, methyl	−0.004	0.168	0.472	0.114	Y	973
Maleimide, *N*-(4-carboxyethylphenyl)-α-chloro-	Styrene	0.022	0.041	0.059	0.021	Y	973
Maleimide, *N*-(4-chlorophenyl)-	Acrylate, methyl	0.155	0.052	0.684	0.052	Y	628
Maleimide, *N*-(4-chlorophenyl)-	Acrylonitrile	0.743	0.048	0.972	0.112	Y	863
Maleimide, *N*-(4-chlorophenyl)-	Butadiene, 2,3-bis(diethyl-phosphono)-	0.41		0.03			759
Maleimide, *N*-(4-chlorophenyl)-	Vinyl chloride	3.65	0.39	0.026	0.044	Y	306
Maleimide, *N*-(4-chlorophenyl)-α-chloro-	Methacrylate, methyl	0.02	0.03	0.562	0.025	Y	973
Maleimide, *N*-(4-chlorophenyl)-α-chloro-	Styrene	0.019	0.038	0.149	0.048	Y	973
Maleimide, *N*-(4-hydroxyphenyl)-	Methacrylate, methyl	0.345	0.001	1.392	0.001	Y	323
Maleimide, *N*-(4-hydroxyphenyl)-	Styrene	0.13	0.1	−0.059	0.041	Y	323
Maleimide, *N*-(4-hydroxyphenyl)-	Vinyl acetate	1.75	0.17	−0.011	0.027	Y	323
Maleimide, *N*-(4-hydroxyphenyl)-	Butadiene, 2,3-bis(diethyl-phosphono)-	0.47		0.04			75

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TABLE 1. *cont'd*

Monomer 1	Monomer 2	r_1	±95%	r_2	±95%	Conv.	Refs.
Maleimide, *N*-(4-methoxyphenyl)-α-chloro-	Methacrylate, methyl	0.064	0.189	0.556	0.145	Y	973
Maleimide, *N*-(4-methoxyphenyl)-α-chloro-	Styrene	0.049	0.061	0.112	0.031	Y	973
Maleimide, *N*-(4-methylphenyl)-	Methacrylate, methyl	0.34		0.83			992
Maleimide, *N*-(4-methylphenyl)-	Vinyl chloride	4.49	0.34	0.022	0.048	Y	306
Maleimide, *N*-(4-methylphenyl)-α-chloro-	Methacrylate, methyl	0.029	0.158	0.564	0.117	Y	973
Maleimide, *N*-(4-methylphneyl)-α-chloro-	Styrene	0.019	0.078	0.107	0.048	Y	973
Maleimide, *N*-(4-tolyl)-	Acrylate, methyl	0.14	0.16	0.64	0.16	Y	644
Maleimide, *N*-(β-chloroethyl)-α-chloro-	Methacrylate, methyl	0.05	0.04	0.94	0.06		974
Maleimide, *N*-(β-chloroethyl)-α-chloro-	Methacrylate, methyl	0.11	0.05	0.59	0.06		974
Maleimide, *N*-(β-chloroethyl)-α-chloro-	Styrene	0	0.06	0.29	0.05		974
Maleimide, *N*-(L-menthoxycarbonylmethyl)-	Maleimide, *N*-benzyl	0.848	0.221	0.474	0.087	Y	1089
Maleimide, *N*-(L-menthoxycarbonyl-methyl)-	Maleimide, *N*-phenyl-	0.79	0.261	0.798	0.141	Y	1089
Maleimide, *N*-2-bromophenyl-	Acrylonitrile	0.348	0.044	2.02	0.205	Y	915
Maleimide, *N*-2-chlorophenyl-	Acrylonitrile	1.08	0.048	0.955	0.095	Y	915
Maleimide, *N*-4-chlorophenyl-	Acrylonitrile	0.743	0.048	0.972	0.112	Y	915
Maleimide, *N*-[*N'*-α-methylbenzyl) aminocarbonylpentyl]-	Methacrylate, methyl	0.582	0.359	1.37	0.291	Y	1099
Maleimide, *N*-[*N'*-α-methylbenzyl) aminocarbonylpentyl]-	Styrene	0.258	0.25	0.198	0.143	Y	1099
Maleimide, *N*-[*N'*-α-methylbenzyl) aminocarbonylpentyl]-	Styrene					Y	1099
Maleimide, *N*-α-methylbenzyl-	Maleimide, *N*-cyclohexyl-	1.07	0.177	0.392	0.214	Y	1055
Maleimide, *N*-α-methylbenzyl-	Maleimide, *N*-phenyl-	0.683	0.177	0.788	0.5	Y	1055
Maleimide, *N*-allyl-	Styrene	0.035		0.056			1003
Maleimide, *N*-benzyl-	Maleimide, *N*-(L-menthoxycarbonyl-methyl)-	0.474	0.087	0.848	0.221	Y	1089
Maleimide, *N*-benzyl-	Methacrylate, methyl	0.03	0.23	1.28	0.23	Y	348
Maleimide, *N*-benzyl-	Styrene	0.013	0.031	0.058	0.021	Y	348
Maleimide, *N*-benzyl-α-chloro-	Styrene	0	0.06	0.42	0.06		974
Maleimide, *N*-butyl-	Methacrylate, methyl	−0.1	0.16	1.41	0.19	Y	115
Maleimide, *N*-butyl-	Styrene					Y	115
Maleimide, *N*-butyl-	Styrene	60		0.02			50
Maleimide, *N*-butyl-	Vinyl chloride	−12.7	106.2	0.24	1.13	Y	305
Maleimide, *N*-chloromethyl-	Butadiene, 2,3-bis(diethyl-phosphono)-	0.3		0.05			759
Maleimide, *N*-cyclohexyl-	Methacrylate, methyl	0.24		1.35			992
Maleimide, *N*-cyclohexyl-	Acenaphthalene	0.11		0.57			1039
Maleimide, *N*-cyclohexyl-	Butene, *cis*-2-	0		3			995
Maleimide, *N*-cyclohexyl-	Isobutene	0		0.41			995
Maleimide, *N*-cyclohexyl-	Itaconate, bis(2-ethylhexyl)	0.34		0.38			1060
Maleimide, *N*-cyclohexyl-	Itaconate, di-*n*-butyl	0.21	0.04	0.34	0.04		1014
Maleimide, *N*-cyclohexyl-	Itaconate, dimenthyl	0.601	0.193	0.318	0.213	Y	975
Maleimide, *N*-cyclohexyl-	Maleimide, *N*-α-methylbenzyl-	0.392	0.214	1.07	0.177	Y	1055
Maleimide, *N*-cyclohexyl-	Methacrylate, methyl	0.19		1.31			1100
Maleimide, *N*-cyclohexyl-	Methacrylate, methyl	0.106	0.048	2.26	0.066	Y	348
Maleimide, *N*-cyclohexyl-	Styrene	0.1		0.102			1100
Maleimide, *N*-cyclohexyl-	Styrene	0.162	0.054	−0.01	0.017	Y	348
Maleimide, *N*-cyclohexyl-	Isooctene	0		0.72			995
Maleimide, *N*-ethyl-α-chloro-	Methacrylate, methyl	0.13	0.03	0.53	0.04		974
Maleimide, *N*-ethyl-α-chloro-	Styrene	0	0.04	0.9	0.05		974
Maleimide, *N*-hexyl-	Methacrylate, methyl	0.1	0.15	1.9	0.2	Y	348
Maleimide, *N*-hexyl-	Styrene	0.09	0.16	−0.041	0.069	Y	348
Maleimide, *N*-hydroxymethyl-	Styrene	0.06	0.11	−0.035	0.053	Y	323
Maleimide, *N*-hydroxymethyl-	Vinyl acetate	1.45	0.21	0.017	0.037	Y	323
Maleimide, *N*-methyl-α-chloro-	Methacrylate, methyl	0.11	0.03	0.63	0.34		974
Maleimide, *N*-methyl-α-chloro-	Styrene	0	0.03	0.63	0.04		974
Maleimide, *N*-octadecyl-	Acrylonitrile	0.389	0.023	2.482	0.119	Y	863
Maleimide, *N*-octadecyl-	Acrylonitrile	0.39	0.023	2.46	0.115	Y	915
Maleimide, *N*-phenyl-	Acrylate, methyl	0.103	0.052	0.554	0.048	Y	644
Maleimide, *N*-phenyl-	Butadiene, 2,3-bis(diethyl-phosphono)-	0.42		0.05			759
Maleimide, *N*-phenyl-	Maleic anhydride	1.92	11.83	0.02	0.65	Y	341
Maleimide, *N*-phenyl-	Maleic anhydride	1.08	0.13	−0.095	0.106	Y	990
Maleimide, *N*-phenyl-	Maleimide, *N*-(L-menthoxycarbonyl-methyl)-	0.798	0.141	0.79	0.261	Y	1089
Maleimide, *N*-phenyl-	Maleimide, *N*-α-methylbenzyl-	0.788	0.5	0.683	0.177	Y	1055

TABLE 1. *cont'd*

Monomer 1	Monomer 2	r_1	±95%	r_2	±95%	Conv.	Refs.
Maleimide, *N*-phenyl-	Methacrylate, methyl	0.3		0.98			323
Maleimide, *N*-phenyl-	Methacrylate, methyl	0.164	0.065	1.014	0.06	Y	328
Maleimide, *N*-phenyl-	Methacrylate, methyl	0.3		0.91			992
Maleimide, *N*-phenyl-	Styrene					N	1026
Maleimide, *N*-phenyl-	Styrene	0.044	0.017	0.016	0.004	Y	328
Maleimide, *N*-phenyl-	Styrene	0.01		0.07			992
Maleimide, *N*-phenyl-	Vinyl acetate	1.284	0.046	−0.003	0.006	Y	328
Maleimide, *N*-phenyl-	Vinyl chloride	4.01	0.18	0.023	0.026	Y	306
Maleimide, *N*-phenyl-α-chloro-	Methacrylate, methyl	0.077	0.098	0.657	0.083	Y	973
Maleimide, *N*-phenyl-α-chloro-	Styrene	−0.002	0.073	0.087	0.04	Y	973
Maleimide, *N*-propyl-	Vinyl chloride	2.38	0.16	0.06	0.05	N	305
Maleimido-*N*,*N*-dimethylaniline, 4-(2-chlorophenyl)azo	Styrene	0.04		0.05			747
Mesaconate, dibenzyl	Styrene	0.08		0.73			658
Mesaconate, di-*sec*-butyldithiol	Styrene	0.02		0.45			624
Mesaconate, diamyl	Styrene	0.02		1.27			658
Mesaconate, dibenzyldithiol	Styrene	0.06		0.28			624
Mesaconate, dibutyl	Styrene	0.05		1.28			658
Mesaconate, dibutyldithiol	Styrene	0.05		0.41			624
Mesaconate, dicyclohexyl	Styrene	0.1		1.25			658
Mesaconate, diethyl	Styrene	0.06		1.24			658
Mesaconate, diethyldithiol	Styrene	0.03		0.4			624
Mesaconate, dihexyl	Styrene	0.1		1.51			658
Mesaconate, diisoamyl	Styrene	0.07		1.34			658
Mesaconate, diisobutyl	Styrene	0.1		1.29			658
Mesaconate, diisobutyldithiol	Styrene	0.03		0.41			624
Mesaconate, diisopropyl	Styrene	0.04		1.31			658
Mesaconate, diisopropyldithiol	Styrene	0.05		0.44			624
Mesaconate, dimethyl	Styrene	0.04		0.98			658
Mesaconate, dimethyldithiol	Styrene	0.07		0.35			624
Mesaconate, dioctyl	Styrene	0.01		1.23			658
Mesaconate, diphenyl	Styrene	0.07		0.45			658
Mesaconate, diphenyldithiol	Styrene	0.15		0.16			624
Mesaconate, dipropyl	Styrene	0.05		1.22			658
Mesaconate, dipropyldithiol	Styrene	0.06		0.39			624
Mesaconic acid	Styrene	0		1.6			1021
Methacryl-2′-ethyl-4,5,7-trinitro-9-fluorenone-2-carboxylate	Methacrylate, *N*-(2-hydroxyethyl)carbazolyl	0.382	0.014	0.63	0.041	Y	703
Methacrylamide	Methacrylate, methyl	1.27	0.24	1.57	0.11	N	316
Methacrylamide	Methacrylate, methyl	0.425	0.085	1.39	0.074	Y	54
Methacrylamide	Methacrylate, methyl	0.49		1.65			55
Methacrylamide	Methacrylic acid	0.33	0.25	2.73	0.28	Y	190
Methacrylamide	Methacrylic acid	1.28		1.55			527
Methacrylamide	Methacrylic acid	0.2	0.014	2.006	0.09	Y	55
Methacrylamide	Styrene	0.48	0.2	1.4	0.13	N	316
Methacrylamide	Styrene	1.24	0.38	1.42	0.17	N	316
Methacrylamide	Vinyl methyl ketone	3	0.18	0.25	0.12	Y	609
Methacrylamide	Vinyl methyl ketone	1.72	0.26	0.28	0.24	Y	609
Methacrylamide, 1-deoxy-D-glucitol	Vinyl acetate	0.56		0.16			258
Methacrylamide, *N*-(2-hydroxypropyl)-	Acrylamide, *N*-(2-(4-hydroxyphenyl)-ethyl)-	1.01	0.09	0.95	0.09		965
Methacrylamide, *N*-(4′-nitro-4-stilbenyl)-	Methacrylate, 2-hydroxyethyl	0.593	0.047	1.474	0.05	Y	342
Methacrylamide, *N*-(4-stilbenyl)-	Methacrylate, 2-hydroxyethyl	0.7	0.23	1.842	0.062	Y	342
Methacrylamide, *N*-(*p*-chlorophenyl)-	Acrylonitrile	0.627	0.051	0.399	0.019	Y	352
Methacrylamide, *N*-(*p*-methoxyphenyl)-	Acrylonitrile	0.559	0.048	0.337	0.019	Y	352
Methacrylamide, *N*-(*p*-methylphenyl)-	Acrylonitrile	0.549	0.06	0.336	0.026	Y	352
Methacrylamide, *N*-(*p*-nitrophenyl)-	Acrylonitrile	2.34	1.07	0.37	0.14	Y	352
Methacrylamide, *N*-[4-(4-methoxyphenylacetyloxy)phenyl]-	Methacrylate, 2-hydroxyethyl	0.29		1.47			1051
Methacrylamide, *N*-methoxymethyl-	Methacrylate, methyl	0.265	0.009	1.678	0.048	Y	227
Methacrylamide, *N*-*p*-bromophenyl-	Methacrylate, methyl	0.38	0.2	3.48	0.2		968
Methacrylamide, *N*-*p*-tolyl-	Methacrylate, methyl	0.78	0.2	1.43	0.2		968
Methacrylamide, *N*-phenyl	Methacrylate, methyl	0.28	0.2	1.95	0.2		968
Methacrylamide, *N*-phenyl-	Acrylonitrile	0.71	0.19	0.381	0.085	Y	352
Methacrylamide, *N*-phenyl-	Methacrylate, methyl	0.56	0.12	1.42	0.096	Y	352

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TABLE 1. *cont'd*

Monomer 1	Monomer 2	r_1	±95%	r_2	±95%	Conv.	Refs.
Methacrylamide, *N*-phenyl-	Styrene	0.88	0.17	1.24	0.06	N	352
Methacrylamide, 1-deoxy-D-glucitol	Methacrylate, methyl	0.04		4.2			258
Methacrylamide, 1-deoxy-D-glucitol	Styrene	0.005		2.09			258
Methacrylamide, *N*-*p*-nitrophenyl-	Methacrylate, methyl	0.29	0.2	5.05	0.2		968
Methacrylate, 2-ethylhexyl	Methacrylate, 2-hydroxypropyl	0.083	0.006	4.56	0.18	Y	708
Methacrylate, ferrocenylmethyl	Maleic anhydride	0.33	0.65	0.24	0.28	Y	325
Methacrylate, ferrocenylmethyl	Pyrrolidone, *N*-vinyl-	2.57	2.77	0.073	0.096	Y	325
Methacrylate, octyl	Methacrylonitrile	0.61	0.05	0.75	0.04	N	44
Methacrylate, potassium 18-crown-6-ether	Acrylonitrile	0.175	0.018	0.07	0.006	Y	808
Methacrylate, tert-butyl	Methacrylate, 2-chloroethyl	0.98	0.22	1.18	0.11	Y	179
Methacrylate, (−)-menthyl	Acenaphthalene	0.316	0.085	2.48	0.55	Y	645
Methacrylate, (2,2-dimethyl-1,3-dioxolane-4-yl)methyl	Methacrylate, methyl	1.1		0.9			807
Methacrylate, 1,1-diphenylethyl	Methacrylate, methyl	0.77		0.72			761
Methacrylate, 1-naphthyl	Methacrylate, methyl	1.8	0.73	0.77	0.14	Y	752
Methacrylate, 1-naphthyl	Methacrylate, methyl	1.68	0.38	0.809	0.078	Y	752
Methacrylate, 1-naphthyl	Methacrylate, methyl	2.62	0.47	0.851	0.084	Y	752
Methacrylate, 1-naphthyl	Methacrylate, methyl	1.52		0.61			761
Methacrylate, 2,2,6,6-tetramethyl-4-piperidinyl	Acrylonitrile	14		0.02			664
Methacrylate, 2,2,6,6-tetramethyl-4-piperidinyl	Styrene	0.3		0.63			664
Methacrylate, 2,2,6,6-tetramethyl-4-piperidinyl	Vinyl acetate	13.7		0.2			664
Methacrylate, 2,2,6,6-tetramethyl-4-piperidinyl	Vinyl methyl ketone	0.53		0.41			664
Methacrylate, 2,2-dimethylaminoethyl	Methacrylate, methyl	1.01	0.54	0.42	0.02	N	691
Methacrylate, 2,3-epithiopropyl	Acrylate, methyl	2.81		0.34			787
Methacrylate, 2,3-epithiopropyl	Methacrylate glycidyl	0.78		0.81			787
Methacrylate, 2,3-epithiopropyl	Methacrylate, methyl	0.97		0.83			787
Methacrylate, 2,3-epithiopropyl	Styrene	0.28		0.41			787
Methacrylate, 2,4,6-trinitrophenyl	Methacrylate, 2-naphthyl					Y	744
Methacrylate, 2,4-dinitrophenyl ethyl	Acrylate, *N*-(2-hydroxyethyl)-oxy) 3,6-dichloro	1.207	0.032	0.115	0.029	Y	736
Methacrylate, 2,4-dinitrophenyl	Methyacrylate, *N*-(2-hydroxyethyl)-3,6-dichloro	1.112	0.026	0.126	0.026	Y	
Methacrylate, 2,6-(diphenyl)phenyl	Methacrylate, methyl	0.071	0.004	1.42	0.06		1079
Methacrylate, 2-(2-carboxybenzoyl-oxy)ethyl	Methacrylate, butyl	0.85		0.75			1009
Methacrylate, 2-(2-carboxybenzoyl-oxy)ethyl	Methacrylate, butyl	0.85		0.75			1041
Methacrylate, 2-(*N*,*N*-dimethyl-carbamoyloxy)ethyl	Acrylate, butyl	1.89		0.47			600
Methacrylate, 2-(*N*,*N*-dimethyl-carbamoyloxy)ethyl	Acrylate, methyl	1.32		0.22			600
Methacrylate, 2-(*N*,*N*-dimethyl-carbamoyloxy)ethyl	Acrylonitrile	1.89		0.38			600
Methacrylate, 2-(*N*,*N*-dimethyl carbamoyloxy)ethyl	Butadiene	0.35		1.06			600
Methacrylate, 2-(*N*,*N*-dimethyl-carbamoyloxy)ethyl	Methacrylate, methyl	0.42		0.59			600
Methacrylate, 2-acetoxyethyl	Methacrylate, 2-hydroxyethyl	0.99	0.02	1.02	0.01	N	346
Methacrylate, 2-acetoxyethyl	Methacrylate, methyl	1.12	0.06	0.94	0.02	N	346
Methacrylate, 2-acetoxyethyl	Styrene	0.58	0.04	0.44	0.02	N	346
Methacrylate, 2-acetylsalicylicoyloxy-3-hydroxypropyl	*N*-Vinylpyrrolidone	0.85		0.34			1080
Methacrylate, 2-bromoethyl	Acrylate, ethyl	2.7		0.37			657
Methacrylate, 2-bromoethyl	Acrylonitrile	2.38		0.31			657
Methacrylate, 2-bromoethyl	Methacrylate, methyl	1.18		0.79			657
Methacrylate, 2-bromoethyl	Pyrrolidone, *N*-vinyl-	2.44		0.02			657
Methacrylate, 2-bromoethyl	Styrene	0.41		0.32			657
Methacrylate, 2-bromoethyl	Vinyl butyl ether	13.7		0			657
Methacrylate, 2-chloro-2,3,3,3-fluoro-propyl	Acrylate, butyl	0.221	0.636	0.079	0.304	N	927

TABLE 1. *cont'd*

Monomer 1	Monomer 2	r_1	±95%	r_2	±95%	Conv.	Refs.
Methacrylate, 2-chloro-2,3,3,3-fluoro-propyl	Methacrylate, methyl	0.583	1.17	0.984	0.395	N	927
Methacrylate, 2-chloro-2,3,3,3-fluoro-propyl	Styrene	0.243	0.15	0.121	0.068	N	927
Methacrylate, 2-chloroethyl	Acrylate, methyl	2.19		0.29			726
Methacrylate, 2-chloroethyl	Acrylonitrile	1.3		0.14			382
Methacrylate, 2-chloroethyl	Methacrylate, benzyl	0.989	0.098	1.068	0.042	Y	179
Methacrylate, 2-chloroethyl	Methacrylate, butyl	0.82	0.041	1.086	0.02	Y	179
Methacrylate, 2-chloroethyl	Methacrylate, isobutyl	0.85	0.14	1.014	0.064	Y	179
Methacrylate, 2-chloroethyl	Methacrylate, methyl	0.97	0.18	1.156	0.082	Y	179
Methacrylate, 2-chloroethyl	Methacrylate, methyl	0.48		0.55			382
Methacrylate, 2-chloroethyl	Methacrylate, phenyl	1.02	0.21	0.785	0.083	Y	179
Methacrylate, 2-chloroethyl	Methacrylate, *tert*-butyl	1.18	0.11	0.98	0.22	Y	179
Methacrylate, 2-chloroethyl	Styrene	0.341	0.075	0.35	0.046	Y	179
Methacrylate, 2-chloroethyl	Styrene	0.34	0.08	0.345	0.048	Y	179
Methacrylate, 2-chloroethyl	Styrene	0.23		0.42			382
Methacrylate, 2-chloroethyl	Methacrylate, tributyltin	0.53	0.16	0.2	0.444	N	945
Methacrylate, 2-ethylhexyl	Methacrylate, 2-hydroxypropyl	0.083	0.006	4.56	0.18	Y	692
Methacrylate, 2-hydroxyethyl	Acetamide, *N*-(4-methacryloyloxy-phenyl)-2-(4-methoxy)	0.61		1.49			1051
Methacrylate, 2-hydroxyethyl	Acetanilide, 4-(2-(methacryloyloxy) ethyloxy)	1.39		0.67			1096
Methacrylate, 2-hydroxyethyl	Acetanilide, 4-(2-(methacryloyloxy) hexyloxy)	1.19		0.87			1096
Methacrylate, 2-hydroxyethyl	Acetanilide, 4-(methacryloyloxy)-	0.78		1.94			1096
Methacrylate, 2-hydroxyethyl	Acrylamide	1.89		0.05			689
Methacrylate, 2-hydroxyethyl	Acrylamide	0.98		0.14			928
Methacrylate, 2-hydroxyethyl	Acrylamido, 2-,2-methylpropanesulfonic	0.86		0.9			618
Methacrylate, 2-hydroxyethyl	Acrylate, butyl	4.75	4.2	0.09	0.11	Y	358
Methacrylate, 2-hydroxyethyl	Acrylate, ethyl	11.21	0.43	0.189	0.008	Y	358
Methacrylate, 2-hydroxyethyl	Acrylate, furfuryl	1.35	0.08	0.88	0.19		1063
Methacrylate, 2-hydroxyethyl	Acrylate, methyl	8.67	8.28	−0.005	0.036	Y	358
Methacrylate, 2-hydroxyethyl	Acrylonitrile	1		0.2			689
Methacrylate, 2-hydroxyethyl	Acryloxymethylpentamethyl disiloxane	0.86		0.52			822
Methacrylate, 2-hydroxyethyl	Methacrylate, 2-hydroxypropyl	0.55		1.82			686
Methacrylate, 2-hydroxyethyl	Methacrylamide, *N*-(4′-nitro-4-stilbenyl)-	1.474	0.05	0.593	0.047	Y	342
Methacrylate, 2-hydroxyethyl	Methacrylamide, *N*-(4-stilbenyl)-	1.842	0.062	0.7	0.23	Y	342
Methacrylate, 2-hydroxyethyl	Methacrylamide, *N*-[4-(4-methoxy-phenylacetyloxy)phenyl]-	1.47		0.29			1051
Methacrylate, 2-hydroxyethyl	Methacrylate, 2-acetoxyethyl	1.02	0.01	0.99	0.02	N	346
Methacrylate, 2-hydroxyethyl	Methacrylate, dodecyl	11.2		0.7			837
Methacrylate, 2-hydroxyethyl	Methacrylate, dodecyl	1.6		0.5			837
Methacrylate, 2-hydroxyethyl	Methacrylate, dodecyl	0.8		0.8			837
Methacrylate, 2-hydroxyethyl	Methacrylate, methyl	0.63	0.076	0.824	0.01	Y	350
Methacrylate, 2-hydroxyethyl	Methacrylate, methyl	0.81	1.02	0.192	0.09	Y	358
Methacrylate, 2-hydroxyethyl	Methacrylate, methyl	1.5		0.75			710
Methacrylate, 2-hydroxyethyl	Methacryloxymethylpentamethyl disiloxane	0.97		0.33			822
Methacrylate, 2-hydroxyethyl	Pyridine, 2-vinyl-	0.56	0.04	0.64	0.16	N	342
Methacrylate, 2-hydroxyethyl	Pyridine, 3-vinyl-	0.69	0.01	0.73	0.04	N	342
Methacrylate, 2-hydroxyethyl	Pyridine, 4-vinyl-	0.62	0.04	0.9	0.09	N	342
Methacrylate, 2-hydroxyethyl	Pyrrolidone, *N*-vinyl-	4.841	0.133	−0.019	0.046	Y	840
Methacrylate, 2-hydroxyethyl	Styrene	0.54	0.03	0.44	0.02	N	346
Methacrylate, 2-hydroxyethyl	Styrene	0.856	0.018	0.332	0.006	Y	350
Methacrylate, 2-hydroxyethyl	Styrene	0.65		0.57			463
Methacrylate, 2-hydroxyethyl	Styrene	1.65		0.5			878
Methacrylate, 2-hydroxyethyl	Styrene	0.53		0.59			878
Methacrylate, 2-hydroxyethyl	Styrene	0.59		0.53			903
Methacrylate, 2-hydroxyethyl	Styrene	1.65		0.5			903
Methacrylate, 2-hydroxypropyl	Acrylamido, 2-, 2-methylpropane-sulfonic	0.89		1.03			618
Methacrylate, 2-hydroxypropyl	Acrylate, butyl	5.35	0.32	0.171	0.041	Y	333
Methacrylate, 2-hydroxypropyl	Acrylate, butyl	3.3	6.82	0.24	0.16	Y	662
Methacrylate, 2-hydroxypropyl	Acrylate, ethyl	13.32	1.05	0.273	0.054	Y	333
Methacrylate, 2-hydroxypropyl	Acrylate, ethyl	9.08	3.95	0.207	0.045	Y	662

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TABLE 1. *cont'd*

Monomer 1	Monomer 2	r_1	±95%	r_2	±95%	Conv.	Refs.
Methacrylate, 2-hydroxypropyl	Acrylate, methyl	7.335	0.083	0.013	0.007	Y	333
Methacrylate, 2-hydroxypropyl	Acryloyl chloride	1.79		0.29			649
Methacrylate, 2-hydroxypropyl	Methacrylate, 2-ethylhexyl	4.56	0.18	0.083	0.006	Y	692
Methacrylate, 2-hydroxypropyl	Methacrylate, 2-ethylhexyl	4.56	0.18	0.083	0.006	Y	708
Methacrylate, 2-hydroxypropyl	Methacrylate, 2-hydroxyethyl	1.82		0.55			686
Methacrylate, 2-hydroxypropyl	Methacrylate, butyl	2.35	0.13	0.158	0.007	Y	692
Methacrylate, 2-hydroxypropyl	Methacrylate, butyl	2.35	0.13	0.158	0.007	Y	708
Methacrylate, 2-hydroxypropyl	Methacrylate, ethyl	1.878	0.056	0.245	0.007	Y	692
Methacrylate, 2-hydroxypropyl	Methacrylate, ethyl	1.844	0.039	0.267	0.005	Y	708
Methacrylate, 2-hydroxypropyl	Methacrylate, methyl	1.055	0.04	0.402	0.017	Y	333
Methacrylate, 2-hydroxypropyl	Methacrylate, tributyltin	1.81	0.275	0.728	0.517	N	945
Methacrylate, 2-hydroxypropyl	Methacrylic acid	0.31		0.99			886
Methacrylate, 2-naphthyl	Acrylonitrile	1.17	0.2	0.15	0.2	Y	611
Methacrylate, 2-naphthyl	Acrylonitrile	1.02	0.19	0.094	0.099	Y	611
Methacrylate, 2-naphthyl	Acrylonitrile	0.76	0.18	0.06	0.1	Y	611
Methacrylate, 2-naphthyl	Acrylonitrile	0.64	0.24	−0.01	0.16	N	611
Methacrylate, 2-naphthyl	Itaconate, mono-methyl	0.52	0.16	0.31	0.42	Y	613
Methacrylate, 2-naphthyl	Itaconate, mono-methyl	0.59	0.14	0.36	0.21	Y	613
Methacrylate, 2-naphthyl	Itaconate, mono-methyl	0.223	0.02	0.135	0.028	Y	613
Methacrylate, 2-naphthyl	Itaconate, mono-methyl	0.189	0.055	0.04	0.11	Y	613
Methacrylate, 2-naphthyl	Methacrylate, 2,4,6-trinitrophenyl					Y	744
Methacrylate, 2-naphthyl	Methacrylate, methyl	0.85	0.34	0.75	0.16	Y	540
Methacrylate, 2-naphthyl	Methacrylate, methyl	2.57	0.48	0.602	0.059	Y	760
Methacrylate, 2-naphthyl	Methacrylate, methyl	2.53	0.27	0.581	0.023	Y	760
Methacrylate, 2-naphthyl	Methacrylate, methyl	1.91	0.6	0.532	0.055	Y	760
Methacrylate, 2-naphthyl	Methacrylate, methyl	4.41	0.76	0.614	0.051	Y	760
Methacrylate, 2-naphthyl	Methacrylate, methyl	3.83	0.57	0.623	0.048	Y	760
Methacrylate, 2-naphthyl	Styrene	0.534	0.099	0.56	0.025	Y	540
Methacrylate, 2-naphthyl-, methyl	Styrene	0.113	0.126	0.786	0.16	Y	924
Methacrylate, 2-naphthyl-, methyl	Styrene	0.321	0.098	0.486	0.117	Y	924
Methacrylate, 2-naphthyl-, methyl	Styrene	0.576	0.477	0.61	0.195	Y	924
Methacrylate, 2-naphthyl-, methyl	Styrene	0.216	0.422	0.384	0.225	Y	924
Methacrylate, 2-sulfonic acid)ethyl	Acrylate, ethyl	3.2		0.3			564
Methacrylate, 2-sulfonic acid)ethyl	Methacrylate, ethyl	2		1			564
Methacrylate, 2-sulfonic acid)ethyl	Styrene	0.6		0.37			564
Methacrylate, 2-sulfonic acid)ethyl	Vinylidene chloride	3.6		0.22			564
Methacrylate, 2-methoxyethyl	Styrene	0.48		0.46			918
Methacrylate, 3,5-dimethyladamantyl	Acrylonitrile	1.3	0.23	0.19	0.01	N	335
Methacrylate, 3,5-dimethyladamantyl	Methacrylate, methyl	0.45	0.16	0.68	0.04	N	335
Methacrylate, 3,5-dimethyladamantyl	Styrene	0.63	0.21	0.89	0.14	N	335
Methacrylate, 3,5-dimethyladamantyl	Vinyl chloride	1.85	8.87	0.21	0.04	N	335
Methacrylate, 3-methoxy-2-hydroxypropyl	Acrylamide	3.98		0.04			689
Methacrylate, 5-oxo-pyrrolidinylmethyl	Methacrylate, methyl	0.694	0.087	0.421	0.033	Y	633
Methacrylate, 5-oxo-pyrrolidinylmethyl	Styrene	0.411	0.033	0.342	0.013	Y	633
Methacrylate, β-(2-benzothiazolylthio) ethyl	Vinyl chloride	0.26		0.64			741
Methacrylate, *N*-(2-hydroxyethyl)-3,6-dichlorocarbazolyl	Methacrylate, 2,4-dinitrophenyl	0.126	0.026	1.112	0.026	Y	736
Methacrylate, *N*-(2-hydroxyethyl)-carbazolyl	Acryl-2′-ethyl-4,5,7-trinitroflourenone	0.773	0.096	0.102	0.022	Y	703
Methacrylate, *N*-(2-hydroxyethyl)-carbazolyl	Acrylate, 2,4-dinitrophenyl	0.243	0.034	0.186	0.009	Y	716
Methacrylate, *N*-(2-hydroxyethyl)-carbazolyl	Methacryl-2′-ethyl-4,5,7-trinitro-9-fluorenone	0.63	0.041	0.382	0.014	Y	703
Methacrylate, *N*-α-benzothiazolonylmethyl	Methacrylate, methyl	0.6	0.02	0.5	0.01		887
Methacrylate, *N*-ethyl-3-hydroxymethylcarbazolyl	Acryloyl-β-hydroxyethyl-3,5-dinitrobenzoate	1.425	0.09	0.103	0.015	Y	701
Methacrylate, *N*-ethyl-3-hydroxymethylcarbazolyl	Methacryloyl-β-hydroxyethyl-3,5-dinitrobenzoate	0.729	0.051	0.554	0.019	Y	701
Methacrylate, *N*-methyl-*N*-phenyl-2-aminoethyl	Acryloyloxy, 2-, benzoic acid	0.22	0.03	1.82	0.2	N	651
Methacrylate, *N*-methyl-*N*-phenyl-2-aminoethyl	Methacrylic acid	0.2	0.01	2.16	0.18	N	651
Methacrylate, *N*-methyl-*N*-phenyl-2-aminoethyl	Methacryloyloxy, 2-,benzoate, methyl	0.55	0.04	1.11	0.18	N	651

TABLE 1. *cont'd*

Monomer 1	Monomer 2	r_1	±95%	r_2	±95%	Conv.	Refs.
Methacrylate, *N*-methyl-*N*-phenyl-2-aminoethyl	Methacryloyloxy, 2-,benzoic acid	0.2	0.01	2.6	0.08	N	651
Methacrylate, *N*-methyl-*N*-phenyl-2-aminoethyl	Styrene	0.58	0.02	0.44	0.04	N	651
Methacrylate, α,α-dimethylbenzyl	Methacrylate, methyl	0.92		0.81			761
Methacrylate, α-naphthoyloxy-, ethyl	Styrene	0.242	0.018	0.216	0.043		1102
Methacrylate, acetonyl	Styrene	0.505	0.115	0.285	0.041	Y	958
Methacrylate, allyl	Itaconate, bis(tri-*n*-butyltin)	1.08		0.038			940
Methacrylate, amyl	Styrene	0.46	0.2	0.52	0.11	Y	179
Methacrylate, benzyl	Acrylonitrile	0.96	0.1	0.2	0.1	N	23
Methacrylate, benzyl	Allyl chloride	58.7		0.02			438
Methacrylate, benzyl	Maleic anhydride					Y	720
Methacrylate, benzyl	Maleic anhydride	−0.075	0.088	0.372	0.093	Y	720
Methacrylate, benzyl	Methacrylate, 2-chloroethyl	1.068	0.042	0.989	0.098	Y	179
Methacrylate, benzyl	Methacrylate, methyl	1.112	0.093	0.808	0.03	Y	111
Methacrylate, benzyl	Methacrylate, methyl	1.05		0.93			32
Methacrylate, benzyl	Methacrylate, methyl	1.38		0.78			540
Methacrylate, benzyl	Methacrylate, phenyl	0.67	0.06	1.42	0.09	N	32
Methacrylate, benzyl	Styrene	0.658	0.084	0.463	0.041	Y	111
Methacrylate, benzyl	Styrene	0.467	0.048	0.435	0.026	Y	179
Methacrylate, benzyl	Styrene	0.51		0.45			487
Methacrylate, benzyl	Styrene	0.42		0.48			540
Methacrylate, benzyl	Styrene	0.3		0.8			602
Methacrylate, benzyl	Styrene	0.5	0.38	0.45	0.32		806
Methacrylate, benzyl	Vinylidene chloride	3.3		0.34			432
Methacrylate, benzylmethylaminoethyl	Methacrylate, methyl	0.296	0.123	0.523	0.134	Y	1081
Methacrylate, butyl	Acetylene, phenyl-	1.7		0.21			565
Methacrylate, butyl	Acrylate, butyl	2.2		0.3			187
Methacrylate, butyl	Acrylate, ethyl	2.43	0.39	0.22	0.17	Y	690
Methacrylate, butyl	Acrylic acid	3.53	0.42	0.24	0.21	N	187
Methacrylate, butyl	Acrylic acid, α-bromo-	0.85		0.13			733
Methacrylate, butyl	Acrylonitrile	0.98	0.2	0.291	0.039	Y	165
Methacrylate, butyl	Carbamate, *N*-phenyl-, allyl	0.418		0.329			833
Methacrylate, butyl	Methacrylate, 2-(2-carboxybenzoyloxy)ethyl	0.75		0.85			1009
Methacrylate, butyl	Methacrylate, 2-(2-carboxybenzoyloxy)ethyl	0.75		0.85			1041
Methacrylate, butyl	Methacrylate, 2-chloroethyl	1.086	0.02	0.82	0.041	Y	179
Methacrylate, butyl	Methacrylate, 2-hydroxypropyl	0.158	0.007	2.35	0.13	Y	692
Methacrylate, butyl	Methacrylate, 2-hydroxypropyl	0.158	0.007	2.35	0.13	Y	708
Methacrylate, butyl	Methacrylate, ethyleneglycol-*N*-phenylcarbamate	0.395		0.299			833
Methacrylate, butyl	Methacrylate, glycidyl	0.85	0.03	0.94	0.06	N	224
Methacrylate, butyl	Methacrylate, methyl	2.11	0.08	0.52	0.07	N	30
Methacrylate, butyl	Methacrylate, methyl	1.2		1.27			844
Methacrylate, butyl	Methacrylic acid	1.26	0.12	0.8	0.16	N	187
Methacrylate, butyl	Methacrylic acid	1.15	0.12	0.73	0.2	N	224
Methacrylate, butyl	Methacrylonitrile	0.75	0.07	0.56	0.15	N	44
Methacrylate, butyl	Styrene	0.31	0.2	0.56	0.12	Y	179
Methacrylate, butyl	Styrene	2.52	1.1	−0.05	1.09	N	43
Methacrylate, butyl	Styrene	0.47		0.52			463
Methacrylate, butyl	Styrene	0.64		0.63			530
Methacrylate, butyl	Styrene	0.64		0.54			530
Methacrylate, butyl	Styrene	0.59		0.74			835
Methacrylate, butyl	Styrene, *o*-chloro-	0.32		1.24			558
Methacrylate, butyl	Styrene, *p*-chloro-		0.1		0.1	N	872
Methacrylate, butyl	Styrene *p*-chloro-	0.564	0.131	1.025	0.124		966
Methacrylate, butyl	Styrene chloromethyl-	0.38		1.46			1035
Methacrylate, butyl	Styrene *p*-octylamine sulfonate	0.7		1.5			817
Methacrylate, butyl	Thioindigoid	11.5		0.5			1007
Methacrylate, butyl	Vinyl acetate	30.18	14.47	−0.003	0.15	Y	165
Methacrylate, butyl	Vinyl chloride	13.5		0.05			519
Methacrylate, butyl	Vinylidene chloride	2.07	0.18	0.35	0.03	Y	3
Methacrylate, chloromethyl	Methacrylate, methyl	1.02	0.16	0.477	0.029	Y	712
Methacrylate, chloromethyl	Styrene	0.298	0.03	0.208	0.006	Y	712

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TABLE 1. *cont'd*

Monomer 1	Monomer 2	r_1	±95%	r_2	±95%	Conv.	Refs.
Methacrylate, cyanomethyl	Methacrylate, methyl	0.73	0.11	0.399	0.019	Y	625
Methacrylate, cyanomethyl	Styrene	0.28	0.041	0.144	0.011	Y	625
Methacrylate, cyclohexyl	Methacrylate, tributyltin	0.891	0.136	0.395	0.428	N	945
Methacrylate, cyclohexyl	Styrene	0.57	0.28	0.586	0.088	Y	179
Methacrylate, decyl	Oxazolidone, *N*-vinyl-	12.19	1.35	−0.052	0.049	Y	36
Methacrylate, di-, di-*n*-butylstannyl	Maleic anhydride	0.012	0.016	0.024	0.008	Y	954
Methacrylate, di-, di-*n*-butylstannyl	Vinyl acetate	0.013	0.036	0.013	0.018	Y	949
Methacrylate, di-, zinc	Ethylene	40		0.19			935
Methacrylate, di-, dicyclopentadienyl-titanate	Acrylate, di-, copper	0.89		1.09			876
Methacrylate, di-, dicyclopentadienyl-titanate	Acrylate, di-, nickel	0.65		0.95			876
Methacrylate, di-, ethylene glycol	Styrene	0.67	0.08	0.39	0.15	N	262
Methacrylate, di-, triethyleneglycol	Carbamate, *N*-phenyl-, allyl	0.504		0.034			833
Methacrylate, di-, triethyleneglycol	Methacrylate, ethylene-glycol *N*-phenylcarbamate	0.59		0.24			833
Methacrylate, diethylaminoethyl	Methacrylate, methyl	1.44	0.085	0.843	0.128	Y	1081
Methacrylate, diethylaminoethyl	Methacrylic acid	2.34	1.59	0.63	1.47	Y	16
Methacrylate, dimethylaminoethyl	Methacrylate, methyl	1.2	0.154	0.699	0.051	Y	1081
Methacrylate, dimethylaminoethyl sulfate	Acrylamide	1.9	0.2	0.52	0.05		1052
Methacrylate, diphenylmethyl	Methacrylate, 2-hydroxyethyl	0.5		1.6			837
Methacrylate, diphenylmethyl	Methacrylate, 2-hydroxyethyl	0.8		0.8			837
Methacrylate, diphenylmethyl	Methacrylate, dodecyl	0.7		11.2			837
Methacrylate, diphenylmethyl	Methacrylate, methyl	1.07		0.81			761
Methacrylate, diphenylmethyl	Styrene	0.3	0.1	0.528	0.05	Y	179
Methacrylate, ethyl	Allyl acetate	81.27	1.93	−0.57	0.82	N	210
Methacrylate, ethyl	Allyl alcohol	107.4	5.3	−0.02	1.92	N	210
Methacrylate, ethyl	Methacrylate, 2-(sulfonic acid)ethyl	1		2			564
Methacrylate, ethyl	Methacrylate, 2-hydroxypropyl	0.245	0.007	1.878	0.056	Y	692
Methacrylate, ethyl	Methacrylate, 2-hydroxypropyl	0.267	0.005	1.844	0.039	Y	708
Methacrylate, ethyl	Methacrylate, methyl					N	32
Methacrylate, ethyl	Methacrylate, methyl	1.08		1.08			844
Methacrylate, ethyl	Methacrylate, methyl	1	0.09	1.16	0.19	N	87
Methacrylate, ethyl	Methacrylate, tributyltin	0.601	0.123	0.299	0.607	N	945
Methacrylate, ethyl	Methacrylic acid	0.71		0.57			820
Methacrylate, ethyl	Methacrylonitrile	0.83	0.05	0.46	0.04	N	44
Methacrylate, ethyl	Styrene	0.36	0.12	0.55	0.062	Y	179
Methacrylate, ethyl	Styrene	0.26		0.67			530
Methacrylate, ethyl	Styrene	0.29		0.65			530
Methacrylate, ethyl	Styrene	0.33		0.55			570
Methacrylate, ethyl	Styrene, *o*-chloro-	0.45		1.34			558
Methacrylate, ethyl	Styrene, *p*-chloromethyl-	0.36		1.29			1035
Methacrylate, ethyl	Vinyl acetate	131.8	29.8	−0.77	5.29	N	210
Methacrylate, ethyl	Vinylidene chloride	2.18	0.1	0.353	0.02	Y	3
Methacrylate, ethyleneglycol-*N*-phenylcarbamate	Methacrylate, butyl	0.299		0.395			833
Methacrylate, ethyleneglycol-*N*-phenylcarbamate	Methacrylate, di-, triethyleneglycol	0.24		0.59			833
Methacrylate, ferrocenylmethyl	Acrylate, methyl	0.042	0.085	1.4	0.35	Y	293
Methacrylate, ferrocenylmethyl	Acrylonitrile	0.82	0.42	0.15	0.04	Y	325
Methacrylate, ferrocenylmethyl	Styrene	−0.01	0.14		3.63	Y	293
Methacrylate, ferrocenylmethyl	Styrene	0.01		3.6			576
Methacrylate, ferrocenylmethyl	Vinyl acetate	1.52		0.2			293
Methacrylate, furfuryl	*N*-Vinylpyrrolidone	5.16	1.13	0.0036	0.02	Y	1050
Methacrylate, glycidyl	Acrylate, 2-ethylhexyl	2.41	0.46	0.09	0.13	Y	674
Methacrylate, glycidyl	Acrylate, 4-acetylphenyl	0.644	0.13	0.292	0.141	Y	1012
Methacrylate, glycidyl	Acrylate, butyl	2.16	0.57	0.083	0.052	Y	674
Methacrylate, glycidyl	Acrylate, isobutyl	1.24	0.12	0.282	0.026	Y	674
Methacrylate, glycidyl	Acrylate, *tert*-butyl	2.096	0.443	0.463	0.079	Y	814
Methacrylate, glycidyl	Acrylonitrile	0.85	0.05	0.95	0.06	N	114
Methacrylate, glycidyl	Acrylonitrile	1.32		0.14			433
Methacrylate, glycidyl	Methacrylate, 2,3-epithiopropyl	0.81		0.78			787
Methacrylate, glycidyl	Methacrylate, butyl	0.94	0.06	0.85	0.03	N	224
Methacrylate, glycidyl	Methacrylate, methyl	0.52	0.06	0.71	0.08	Y	113
Methacrylate, glycidyl	Methacrylate, methyl	0.934	0.085	0.726	0.042	Y	226

TABLE 1. *cont'd*

Monomer 1	Monomer 2	r_1	±95%	r_2	±95%	Conv.	Refs.
Methacrylate, glycidyl	Methacrylate, methyl	1.05		0.8			463
Methacrylate, glycidyl	Methacrylate, methyl	0.501	0.027	0.688	0.076	Y	639
Methacrylate, glycidyl	Methacrylic acid	1.2	0.1	0.98	0.16	N	224
Methacrylate, glycidyl	*N*-Vinylpyrrolidone	4.29	0.498	0.003	0.018		1017
Methacrylate, glycidyl	Styrene	0.16	0.03	0.54	0.07	N	114
Methacrylate, glycidyl	Styrene	0.539	0.04	0.278	0.086	Y	217
Methacrylate, glycidyl	Styrene	0.46	0.08	0.47	0.02	N	225
Methacrylate, glycidyl	Styrene	0.54		0.44			225
Methacrylate, glycidyl	Styrene	0.55		0.45			463
Methacrylate, glycidyl	Styrene	0.74	0.1	0.31	0.04	N	849
Methacrylate, glycidyl	Styrene	0.73	0.284	0.11	0.045	N	893
Methacrylate, glycidyl	Styrene	0.514	0.098	0.435	0.033	Y	999
Methacrylate, glycidyl	Vinyl phenyl ketone	0.719		0.697			946
Methacrylate, glycidyl	Vinyl, mono-, ethylene glycol ether	4.41		0			780
Methacrylate, hexyl	Styrene	0.44	0.13	0.58	0.07	Y	179
Methacrylate, hydroxyethyl	Methacrylate, tetra(2-hydroxypropyl) ethylenediamine	0.606	0.416	1.44	1	Y	996
Methacrylate, hydroxyethyl	Methacrylate, tributyltin	2.33	0.185	0.282	0.424	N	945
Methacrylate, iso-butyl	Butadiene, 2-chloro-	0.9	0.088	1.8	0.06	N	1057
Methacrylte, isobornyl	Styrene	0.24	0.3	0.61	0.45		806
Methacrylate, isobutyl	Acetylene, phenyl-	1.9		0.27			565
Methacrylate, isobutyl	Acrylic acid	0.68		1.03			847
Methacrylate, isobutyl	Acrylonitrile	1.05	0.22	0.217	0.037	Y	165
Methacrylate, isobutyl	Furan, 2-vinyl-5-methyl	0.105	0.044	0.716	0.169	Y	1105
Methacrylate, isobutyl	Methacrylate, 2-chloroethyl	1.014	0.064	0.85	0.14	Y	179
Methacrylate, isobutyl	Methacrylate, methyl	1.88	0.07	0.62	0.08	N	30
Methacrylate, isobutyl	Methacrylate, methyl	1.2		0.89			541
Methacrylate, isobutyl	Methacrylate, methyl	0.488	0.029	0.92	0.15	Y	639
Methacrylate, isobutyl	Methacrylic acid	0.47		2.01			847
Methacrylate, isobutyl	Methacrylonitrile	0.68	0.05	0.74	0.07	N	44
Methacrylate, isobutyl	Methacrylonitrile	0.94	0.12	0.43	0.08	N	44
Methacrylate, isobutyl	Styrene	0.271	0.036	0.509	0.014	Y	179
Methacrylate, isobutyl	Styrene	0.58		0.56			463
Methacrylate, isobutyl	Styrene	0.42		0.5			463
Methacrylate, isobutyl	Styrene	0.4		0.55			487
Methacrylate, isobutyl	Styrene	0.74		0.47			541
Methacrylate, isobutyl	Vinyl acetate	29.7	24.16	−0.06	0.22	Y	165
Methacrylate, *m*-chlorophenyl	Styrene	0.209	0.013	0.375	0.05	Y	177
Methacrylate, *m*-nitrophenyl	Styrene	0.185	0.054	0.44	0.16	Y	177
Methacrylate, methoxymethyl	Styrene	0.586	0.069	0.395	0.014	Y	821
Methacrylate, methyl	2-Oxazoline, 2-isopropenyl-	0.69	0.02	0.99	0.07		894
Methacrylate, methyl	3-Pyridazone, 2-vinyl	0.63		1.56			897
Methacrylate, methyl	3-Pyridazone, 2-vinyl-6-methyl-	0.16		0.3			897
Methacrylate, methyl	3-Pyridazone, 2-vinyl-6-methyl-4,5-benz-3-	1.65		0.27			897
Methacrylate, methyl	3-Pyridazone, 2-vinyl-6-phenyl-	0.58		0.49			897
Methacrylate, methyl	4H-1,3-Oxazinium F_3CSO_3, 3-methyl-2-vinyl-5,6-dihydro-	0.37		0.31			909
Methacrylate, methyl	Acenaphthalene	0.36	0.04	1.05	0.14	N	326
Methacrylate, methyl	Acenaphthalene	0.38	0.04	0.99	0.15	N	326
Methacrylate, methyl	Acenaphthalene	0.44		2.25			575
Methacrylate, methyl	Acetamide, *N*-vinyl-	2.65		0.19			984
Methacrylate, methyl	Acetamide, *N*-vinyl-	1.18		0.71			984
Methacrylate, methyl	Acetamide, *N*-vinyl-	2.1		0.01			984
Methacrylate, methyl	Acetylene, phenyl-	−0.06	0.16	1.69	26.56	Y	357
Methacrylate, methyl	Acetylene, phenyl-	1.5		0.2			443
Methacrylate, methyl	Acetylene, phenyl-	1.111	0.095	0.07	0.016	Y	732
Methacrylate, methyl	Acrolein	1.136	0.05	0.76	0.12	Y	291
Methacrylate, methyl	Acrolein	1.33	0.4	0.59	0.3	N	292
Methacrylate, methyl	Acrolein, methyl-	0.1		0.4			589
Methacrylate, methyl	Acrylamide	2.34	0.17	2.29	0.44	N	314
Methacrylate, methyl	Acrylamide	3	0.09	0.53	0.09	N	314
Methacrylate, methyl	Acrylamide	2.53		0.82			314
Methacrylate, methyl	Acrylamide	3	0.45	0.9	1.07	N	691
Methacrylate, methyl	Acrylamide, 2-chloro-*N*,*N*-dimethyl-	2.71	0.398	−0.159	0.502	Y	917

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TABLE 1. *cont'd*

Monomer 1	Monomer 2	r_1	±95%	r_2	±95%	Conv.	Refs.
Methacrylate, methyl	Acrylamide, *N,N*-dimethyl-	1.65	0.16	0.41	0.15	N	170
Methacrylate, methyl	Acrylamide, *N,N*-dimethyl-	2.15	0.08	0.57	0.08	N	315
Methacrylate, methyl	Acrylamide, *N,N*-dimethyl-	2.8	0.1	0.59	0.09	N	315
Methacrylate, methyl	Acrylamide, *N,N*-dimethyl-	2.64	0.15	0.21	0.21	N	691
Methacrylate, methyl	Acrylamide, *N*-methyl-	1.14	0.09	0.05	0.72	N	691
Methacrylate, methyl	Acrylamide, *N*-methylol-	1.62		0.7			593
Methacrylate, methyl	Acrylamide, *N*-methylol	1.62		0.7			596
Methacrylate, methyl	Acrylamide, *N*-octadecyl-	4.119	0.07	0.42	0.11	Y	290
Methacrylate, methyl	Acrylamide, *N-tert*-butyl-	0.25		2.83			709
Methacrylate, methyl	Acrylamide, α-fluoro-	2.13	0.136	0.148	0.081	Y	823
Methacrylate, methyl	Acrylamido, 1-,-1-deoxy-D-glucitol	3.75	0.24	0.05	0.09	N	258
Methacrylate, methyl	Acrylate, α-benzyl-, methyl	3.9	0.19	0.09	0.01	N	610
Methacrylate, methyl	Acrylate, α-chloro-methyl	0.11	0.09	1.92	0.08	N	31
Methacrylate, methyl	Acrylate, ferrocenylmethyl	2.9		0.08			293
Methacrylate, methyl	Acrylate, 2-(*O*-ethyl methyl-phosphonoxy)-, methyl	0.73	0.04	0.44	0.25		882
Methacrylate, methyl	Acrylate, 2-chloroethyl	2.15		0.37			790
Methacrylate, methyl	Acrylate, 2-nitrobutyl	1.19	0.12	0.27	0.04	N	234
Methacrylate, methyl	Acrylate, β-acetoxymethyl-, methyl	0.91		0.24			1091
Methacrylate, methyl	Acrylate, α-(*O*-ethyl methylphos-phenoxy)	0.73		0.44			851
Methacrylate, methyl	Acrylate, α-[2,2-bis(carbomethoxy)-ethyl]-, methyl	3.7		0.04			1092
Methacrylate, methyl	Acrylate, α-acetoxy-, ethyl	1.65	0.12	0.608	0.02	Y	244
Methacrylate, methyl	Acrylate, α-benzyl-, methyl	2.36	0.23	0.173	0.022	Y	610
Methacrylate, methyl	Acrylate, α-chloro-, methyl	0.31	0.24	1.13	0.19	Y	6
Methacrylate, methyl	Acrylate, α-cyano-, methyl	0.21	0.02	0.03	0.01	N	141
Methacrylate, methyl	Acrylate, α-cyano-, methyl	0.068	0.014	0.135	0.016	Y	182
Methacrylate, methyl	Acrylate, α-hydroxymethyl-, ethyl	1.26	0.17	1.34	0.062	N	1027
Methacrylate, methyl	Acrylate, α-phenoxymethyl-, methyl	1.13	0.038	0.755	0.061	Y	1048
Methacrylate, methyl	Acrylate, α-phenyl-, methyl	0.21		0			141
Methacrylate, methyl	Acrylate, α-phenyl-, methyl	0.3		0			49
Methacrylate, methyl	Acrylate, α-tetrafluoropropyloxymethyl-, methyl	1.43		0.61			1047
Methacrylate, methyl	Acrylate, α-trifluoromethyl-, methyl	1.8	0.23	−0.17	0.18	Y	681
Methacrylate, methyl	Acrylate, α-trifluoromethyl-, methyl	3.2	0.5	0	0.1	N	825
Methacrylate, methyl	Acrylate, α-trifluoromethyl-, methyl	2.3	0.2	0.1	0.1	N	825
Methacrylate, methyl	Acrylate, benzyl	2.23	0.14	0.19	0.2	Y	277
Methacrylate, methyl	Acrylate, butyl	0.92	0.2	0.13	0.15	N	30
Methacrylate, methyl	Acrylate, butyl	2.86	0.32	0.11	0.018	Y	639
Methacrylate, methyl	Acrylate, butyl	1.88	0.4	0.43	0.07	N	87
Methacrylate, methyl	Acrylate, ethyl	1.83		0.47			30
Methacrylate, methyl	Acrylate, ethyl	2		0.28			469
Methacrylate, methyl	Acrylate, ethyl	2.04	0.28	0.22	0.05	N	87
Methacrylate, methyl	Acrylate, ferrocenylmethyl	2.8	0.19	0.024	0.064	Y	293
Methacrylate, methyl	Acrylate, heptafluorobutyl	1.387	0.072	0.177	0.084	Y	206
Methacrylate, methyl	Acrylate, heptyl	2.51	0.13	0.46	0.02		980
Methacrylate, methyl	Acrylate, isobutyl	1.04	0.08	0.29	0.04	N	30
Methacrylate, methyl	Acrylate, isobutyl	4.1	0.5	0.135	0.02	Y	639
Methacrylate, methyl	Acrylate, *m*-nitrophenyl	0.928	0.248	1.04	0.135	Y	1074
Methacrylate, methyl	Acrylate, methyl	2.15	0.04	0.4	0.12	N	324
Methacrylate, methyl	Acrylate, *o*-chlorophenyl	1.25		0.4			621
Methacrylate, methyl	Acrylate, octadecyl	2.477	0.024	0.464	0.07	Y	290
Methacrylate, methyl	Acrylate, *p*-bromophenyl	0.926	0.056	0.191	0.014	Y	1074
Methacrylate, methyl	Acrylate, *p*-chlorophenyl	1.01	0.132	0.235	0.023	Y	1074
Methacrylate, methyl	Acrylate, *p*-chlorophenyl	1.09		0.3			621
Methacrylate, methyl	Acrylate, methylphenyl	1.45	0.275	0.223	0.036	Y	1074
Methacrylate, methyl	Acrylate, phenyl	1.56		0.45			621
Methacrylate, methyl	Acrylate, phenyl	1.54	0.14	0.416	0.041	Y	672
Methacrylate, methyl	Acrylate, α-*p*-chlorobenzyl-, methyl	1.87	0.222	0.255	0.034	Y	905
Methacrylate, methyl	Acrylate, α-*p*-methoxybenzyl-, methyl	1.71	0.109	0.13	0.008	Y	905
Methacrylate, methyl	Acrylic acid	0.418	0.02	1.73	0.096	N	964
Methacrylate, methyl	Acrylic acid, α-bromo-	0.37		0.11			733
Methacrylate, methyl	Acrylonitrile	1.322	0.05	0.138	0.037	Y	216
Methacrylate, methyl	Acrylonitrile, α-trifluoromethyl-	1.11	0.12	−0.016	0.048	Y	681

TABLE 1. *cont'd*

Monomer 1	Monomer 2	r_1	±95%	r_2	±95%	Conv.	Refs.
Methacrylate, methyl	Acrylonitrile, α-perfluoropropyl-	1.9	0.3	0	0.05		926
Methacrylate, methyl	Acryloyl chloride	0.48		1.51			508
Methacrylate, methyl	Acryloyl chloride	0.42		0.05			776
Methacrylate, methyl	Allyl acetate	99.24	24.6	−2.42	37.66	N	210
Methacrylate, methyl	Allyl acetate	23		0			470
Methacrylate, methyl	Allyl alcohol	78.79	6.5	−1.62	2.9	N	210
Methacrylate, methyl	Allyl chloride					Y	204
Methacrylate, methyl	Benzocyclobutane, α-methylene-	0.32		0.46			1083
Methacrylate, methyl	Benzocyclobutene, 4-vinyl-	0.6		1.47			1085
Methacrylate, methyl	Benzofuran, 2-vinyl-	0.006	0.02	3.89	0.617	N	1020
Methacrylate, methyl	Benzophenone, 2-hydroxy-4-(methacryloxy)-	0.315	0.036	1.65	0.114	Y	934
Methacrylate, methyl	Benzothiazole, vinylmercapto-	1.25	0.083	0.43	0.14	Y	763
Methacrylate, methyl	Bicyclo[2,2,1]hept-2-ene-5,6-dicarboximide, *N*-benzyl	30.5		0			994
Methacrylate, methyl	Bicyclo[2,2,1]hept-2-ene-5,6-dicarboximide, *N*-benzyl	108		0			994
Methacrylate, methyl	Butadiene	0.25		0.75			140
Methacrylate, methyl	Butadiene	0.027	0.004	0.504	0.024	Y	257
Methacrylate, methyl	Butadiene	0.32		0.7			467
Methacrylate, methyl	Butadiene, 2,3-dichloro-	0.08		11.04		Y	61
Methacrylate, methyl	Butadiene, 2-chloro-	0.08		6.33		Y	61
Methacrylate, methyl	Butadiene, 2-fluoro-	0.76	0.77	1.23	1.77	Y	174
Methacrylate, methyl	Carbamate, *N*-vinyl-*t*-butyl-	1.87	0.2	0.17	0.1		991
Methacrylate, methyl	Carbazole, *N*-vinyl-	1.55	0.16	0.14	0.03	N	11
Methacrylate, methyl	Carbazole, *N*-vinyl-	2.12	0.14	0.033	0.015	Y	13
Methacrylate, methyl	Carbazole, *N*-vinyl-	1.8		0.06			738
Methacrylate, methyl	Carbazole, *N*-vinyl-	0.57		0.75			738
Methacrylate, methyl	Carbazole, *N*-vinyl-	1.84	0.26	0.08	0.05	N	758
Methacrylate, methyl	Carbazole, *N*-vinyl-	0.44	0.22	0.33	0.18	N	758
Methacrylate, methyl	Carbazole, *N*-vinyl-	2.123	0.048	0.031	0.022	Y	98
Methacrylate, methyl	Citraconimide, *N*-(4-acetoxyphenyl)-	1.88	0.16	0.18	0.13	Y	728
Methacrylate, methyl	Citraconimide, *N*-(4-chlorophenyl)-	2.93	0.4	−0.01	0.18	Y	728
Methacrylate, methyl	Citraconimide, *N*-(4-ethoxycarbonyl-phenyl)-	2.72	0.18	−0.027	0.084	Y	728
Methacrylate, methyl	Citraconimide, *N*-(4-methoxyphenyl)-	3.16	0.73	−0.1	0.19	Y	728
Methacrylate, methyl	Citraconimide, *N*-(1-menthylcarboxylatomethyl)-	3.47	0.335	0.109	0.115	Y	950
Methacrylate, methyl	Citraconimide, *N*-benzyl-	2.77	0.28	0.02	0.14	Y	714
Methacrylate, methyl	Citraconimide, *N*-butyl-	2.17	0.56	−0.12	0.36	Y	714
Methacrylate, methyl	Citraconimide, *N*-ethyl-	3.25	0.79	−0.04	0.33	Y	714
Methacrylate, methyl	Citraconimide, *N*-hexyl-	2.38	0.45	−0.18	0.28	Y	714
Methacrylate, methyl	Citraconimide, *N*-isobutyl-	1.78	0.85	−0.18	0.42	Y	714
Methacrylate, methyl	Citraconimide, *N*-isopropyl-	2.7	0.51	0.09	0.27	Y	714
Methacrylate, methyl	Citraconimide, *N*-methyl	3.24		0.15			460
Methacrylate, methyl	Citraconimide, *N*-phenyl	3.081	0.074	0.001	0.033	Y	728
Methacrylate, methyl	Citraconimide, *N*-propyl	3.23	0.98	−0.03	0.43	Y	714
Methacrylate, methyl	Citraconimide, *N*-*tert*-butyl-	2.88	0.19	0.038	0.072	Y	714
Methacrylate, methyl	Citraconimide, *N*-tolyl-	2.75	0.19	0.003	0.088	Y	728
Methacrylate, methyl	Cyclopentene, 4-,-1,3-dione	8.11	0.38	0.094	0.017	Y	95
Methacrylate, methyl	Cyclopropane, 1,1-bis(ethoxy-carbonyl)-2-vinyl-	4.21	0.905	0.223	0.194	Y	1076
Methacrylate, methyl	Cyclopropane, 1,1-bis(ethoxy-carbonyl)-2-vinyl-	18.3	2.5	0.111	0.194	Y	1076
Methacrylate, methyl	Diallyl melamine					Y	201
Methacrylate, methyl	Diallyl phthalate	26.56	1.98	−0.001	0.011	Y	153
Methacrylate, methyl	Diallyl phthalate	22.73	1.48	0.029	0.026	Y	153
Methacrylate, methyl	Diallyl phthalate	21.52	0.39	0.076	0.006	Y	153
Methacrylate, methyl	Diallylcyanamide	25		0.04			603
Methacrylate, methyl	Diallylcyanamide	25		0.04			604
Methacrylate, methyl	Dimethyleneheptanedioate, 2,6-dimethyl	2.36	0.25	0.53	0.02	N	795
Methacrylate, methyl	Ditiane, 2-methylene-1,3-	0.08		4.12			1031
Methacrylate, methyl	Ethylene					N	41

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TABLE 1. *cont'd*

Monomer 1	Monomer 2	r_1	±95%	r_2	±95%	Conv.	Refs.
Methacrylate, methyl	Ethylene, 1,1-diphenyl-	2.1		0.09			65
Methacrylate, methyl	Ethylene, 1,1-diphenyl-	8.7		0			901
Methacrylate, methyl	Ethylene, chlorotrifluoro-	51.36	3.31	−0.074	0.062	Y	236
Methacrylate, methyl	Ethylene, tetrachloro-					Y	204
Methacrylate, methyl	Ethylene, trichloro-	100		0			470
Methacrylate, methyl	Fumarate, diethyl	40.3	0.6	0.04	0.004	N	28
Methacrylate, methyl	Fumarate, diethyl	2.1		0.05			394
Methacrylate, methyl	Fumarate, diisopropyl	23		0.17			1038
Methacrylate, methyl	Fumaronitrile	6.74	0.79	−0.064	0.096	Y	191
Methacrylate, methyl	Furan, 2-vinyl-5-methyl	0.183	0.146	0.867	0.292	Y	1105
Methacrylate, methyl	Hexatriene, tetrachloro-	0.504	0.057	1.76	0.28	Y	5
Methacrylate, methyl	Imidazole, 1-vinyl-	4.36	1.86	0.014	0.03	Y	364
Methacrylate, methyl	Imidazole, 1-vinyl-2-methyl-	4	0.54	0.047	0.088	Y	364
Methacrylate, methyl	Imidazole, 1-vinyl-2-methyl-	3.48		0.003			479
Methacrylate, methyl	Isoprene	0.26	0.21	0.65	0.23	Y	302
Methacrylate, methyl	Isoprene	0.25		0.64			698
Methacrylate, methyl	Isoprene	0.25		0.64			704
Methacrylate, methyl	Isoprene, 3-acetoxy-	0.16		2.81			770
Methacrylate, methyl	Isopropenyl acetate	17.36	1.95	−0.09	0.12	Y	100
Methacrylate, methyl	Isopropenyl, 3-(1-cyclohexenyl), acetate	0.81		0.4			770
Methacrylate, methyl	Isopropenylisocyanate	3.1		0.14			434
Methacrylate, methyl	Isopropenyltoluene	0.68		0.04			688
Methacrylate, methyl	Isopropenyltoluene	0.68		0.04			722
Methacrylate, methyl	Itaconamate, *N*-(4-chlorophenyl)-, ethyl	1.24		0.36			678
Methacrylate, methyl	Itaconamate, *N*-(4-chlorophenyl)-, propyl	1.26		0.31			678
Methacrylate, methyl	Itaconamate, *N*-(4-methoxyphenyl)-, ethyl	1.31		0.43			678
Methacrylate, methyl	Itaconamate, *N*-(4-carboethoxyphenyl)-ethyl	1.21		0.48			678
Methacrylate, methyl	Itaconamate, *N*-(4-methylphenyl)-, ethyl	1.43		0.63			678
Methacrylate, methyl	Itaconamate, *N*-(4-methoxyphenyl)-, propyl	1.03		0.4			678
Methacrylate, methyl	Itaconamate, *N*-(4-methylphenyl)-, propyl	1.11		0.28			678
Methacrylate, methyl	Itaconamate, *N*-phenyl-, ethyl	1.32		0.47			678
Methacrylate, methyl	Itaconamate, *N*-phenyl-, propyl	1.13		0.15			678
Methacrylate, methyl	Itaconamate, *N*-(4-carboethoxyphenyl)-propyl	1		0.53			678
Methacrylate, methyl	Itaconate, dibutyl	1.33	0.09	0.717	0.11		1073
Methacrylate, methyl	Itaconate, dibutyl	0.8		0.4			398
Methacrylate, methyl	Itaconate, dimethyl	3.34	0.557	−0.156	0.02	Y	975
Methacrylate, methyl	Itaconate, dimethyl	1.2		0.3			398
Methacrylate, methyl	Itaconate, monomethyl	1.1	0.071	0.139	0.103	Y	1010
Methacrylate, methyl	Itaconic acid	1.23		0			260
Methacrylate, methyl	Itaconic acid	1.14		0			408
Methacrylate, methyl	Itaconic anhydride	0.155	0.024	1.17	0.33	Y	1010
Methacrylate, methyl	Itaconimide, *N*-(2-chloroethyl)-	0	0.11	0.54	0.39	Y	642
Methacrylate, methyl	Itaconimide, *N*-benzyl-	0.46	0.18	1.06	0.75	Y	642
Methacrylate, methyl	Itaconimide, *N*-ethyl-	0.486	0.066	0.42	0.13	Y	642
Methacrylate, methyl	Itaconimide, *N*-methyl-	0.38	0.22	1.12	0.73	Y	642
Methacrylate, methyl	Maleate, dibutyl tin	72.7	5.93	−0.095	0.199	Y	987
Methacrylate, methyl	Maleate, diethyl	341	46	−0.1	0.05	N	28
Methacrylate, methyl	Maleate, diethyl	20		0			470
Methacrylate, methyl	Maleate, diethyl	285.8	35.9	−0.02	0.015	Y	873
Methacrylate, methyl	Maleic anhydride	4.18	0.31	−0.163	0.027	Y	169
Methacrylate, methyl	Maleic anhydride	6.36	0.64	−0.019	0.026	Y	260
Methacrylate, methyl	Maleic anhydride	0.46	0.69	0.08	1.77	N	320
Methacrylate, methyl	Maleic anhydride	5.2	0.47	0.02	0.004	N	33
Methacrylate, methyl	Maleic anhydride	3.1		0.01			524
Methacrylate, methyl	Maleic anhydride	3.85		0.01			524
Methacrylate, methyl	Maleic anhydride	3.4		0.01			524
Methacrylate, methyl	Maleic anhydride	3.85		0.02			524
Methacrylate, methyl	Maleimide	2.576	0.061	0.166	0.047	Y	251
Methacrylate, methyl	Maleimide	2.5		0.17			992

TABLE 1. *cont'd*

Monomer 1	Monomer 2	r_1	±95%	r_2	±95%	Conv.	Refs.
Methacrylate, methyl	Maleimide, 2,3-dimethyl-*N*-(2-methacryloyloxyethyl)	0.51	1.66	1.1	3.58	Y	619
Methacrylate, methyl	Maleimide, *N*-(4-hydroxyphenyl)-	1.392	0.001	0.345	0.001	Y	323
Methacrylate, methyl	Maleimide, *N*-(2-hydroxyethyl)-	1.396	0.089	0.201	0.083	Y	323
Methacrylate, methyl	Maleimide, *N*-(2,6-diethylphenyl)-	4.78		0.05			992
Methacrylate, methyl	Maleimide, *N*-(2,6-diisopropylphenyl)-	10.9		0.02			992
Methacrylate, methyl	Maleimide, *N*-(2,6-dimethylphenyl)-	3.62		0.07			992
Methacrylate, methyl	Maleimide, *N*-(2-chlorophenyl)-	2.1		0.1			992
Methacrylate, methyl	Maleimide, *N*-(2-methylphenyl)-	2.22		0.09			992
Methacrylate, methyl	Maleimide, *N*-(3,5-dimethylphenyl)-	1.63		0.28			992
Methacrylate, methyl	Maleimide, *N*-(3-methylphenyl)-	1.18		0.22			992
Methacrylate, methyl	Maleimide, *N*-(3-trifluoromethylphenyl)-	1.57		0.1			992
Methacrylate, methyl	Maleimide, *N*-(4-carboxyethylphenyl)-α-chloro-	0.472	0.114	−0.004	0.168	Y	973
Methacrylate, methyl	Maleimide, *N*-(4-chlorophenyl)-α-chloro-	0.562	0.025	0.02	0.03	Y	973
Methacrylate, methyl	Maleimide, *N*-4-methoxyphenyl)-α-chloro-	0.556	0.145	0.064	0.189	Y	973
Methacrylate, methyl	Maleimide, *N*-(4-methylphenyl)-	0.83		0.34			992
Methacrylate, methyl	Maleimide, *N*-(4-methylphenyl)-α-chloro-	0.564	0.117	0.029	0.158	Y	973
Methacrylate, methyl	Maleimide, *N*-(β-chloroethyl)-α-chloro-	0.94	0.06	0.05	0.04		974
Methacrylate, methyl	Maleimide, *N*-(β-chloroethyl)-α-chloro-	0.59	0.06	0.11	0.05		974
Methacrylate, methyl	Maleimide, *N*-[*N'*-(α-methylbenzyl) aminocarbonylpentyl]-	1.37	0.291	0.582	0.359	Y	1009
Methacrylate, methyl	Maleimide, *N*-benzyl	1.28	0.23	0.03	0.23	Y	348
Methacrylate, methyl	Maleimide, *N*-butyl	1.41	0.19	−0.1	0.16	Y	115
Methacrylate, methyl	Maleimide, *N*-cyclohexyl	1.35		0.24			992
Methacrylate, methyl	Maleimide, *N*-cyclohexyl	1.31		0.19			1100
Methacrylate, methyl	Maleimide, *N*-cyclohexyl	2.26	0.066	0.106	0.048	Y	348
Methacrylate, methyl	Maleimide, *N*-ethyl-α-chloro-	0.53	0.04	0.13	0.03		974
Methacrylate, methyl	Maleimide, *N*-hexyl-	1.9	0.2	0.1	0.15	Y	348
Methacrylate, methyl	Maleimide, *N*-hydroxymethyl-	1.745	0.03	0.263	0.026	Y	323
Methacrylate, methyl	Maleimide, *N*-methyl-α-chloro-	0.63	0.34	0.11	0.03		974
Methacrylate, methyl	Maleimide, *N*-phenyl-	0.98		0.3			323
Methacrylate, methyl	Maleimide, *N*-phenyl-	0.91		0.3			992
Methacrylate, methyl	Maleimide, *N*-phenyl-α-chloro-	0.657	0.083	0.077	0.098	Y	973
Methacrylate, methyl	Maleimide, *N*-phenyl-	1.014	0.06	0.164	0.065	Y	328
Methacrylate, methyl	Methacrylate, 2-acetoxyethyl	0.94	0.02	1.12	0.06	N	346
Methacrylate, methyl	Methacrylate, cyanomethyl	0.399	0.019	0.73	0.11	Y	625
Methacrylate, methyl	Methacrylate, diphenylmethyl	0.81		1.07			761
Methacrylate, methyl	Methacrylamide	1.57	0.11	1.27	0.24	N	316
Methacrylate, methyl	Methacrylamide	1.7	0.04	0.44	0.06	N	316
Methacrylate, methyl	Methacrylamide	1.39	0.074	0.425	0.085	Y	54
Methacrylate, methyl	Methacrylamide	1.65		0.49			55
Methacrylate, methyl	Methacrylamide, *N*-methoxymethyl-	1.678	0.048	0.265	0.009	Y	227
Methacrylate, methyl	Methacrylamide, *N*-*p*-bromophenyl-	3.48	0.2	0.38	0.2		968
Methacrylate, methyl	Methacrylamide, *N*-*p*-tolyl-	1.43	0.2	0.78	0.2		968
Methacrylate, methyl	Methacrylamide, *N*-phenyl	1.95	0.2	0.28	0.2		968
Methacrylate, methyl	Methacrylamide, *N*-phenyl-	1.42	0.096	0.56	0.12	Y	352
Methacrylate, methyl	Methacrylamide, 1-deoxy-D-glucitol	4.2		0.04			258
Methacrylate, methyl	Methacrylamide, *N*-*p*-nitrophenyl-	5.05	0.2	0.29	0.2		968
Methacrylate, methyl	Methacrylate, *tert*-butyl	0.96		1.35			761
Methacrylate, methyl	Methacrylate, α,α-dimethylbenzyl	0.81		0.92			761
Methacrylate, methyl	Methacrylate, (2,2-dimethyl-1,3-dioxolane)	0.9		1.1			807
Methacrylate, methyl	Methacrylate, 1,1-diphenylethyl	0.72		0.77			761
Methacrylate, methyl	Methacrylate, 1-naphthyl	0.77	0.14	1.8	0.73	Y	752
Methacrylate, methyl	Methacrylate, 1-naphthyl	0.809	0.078	1.68	0.38	Y	752
Methacrylate, methyl	Methacrylate, 1-naphthyl	0.851	0.084	2.62	0.47	Y	752
Methacrylate, methyl	Methacrylate, 1-naphthyl	0.61		1.52			761
Methacrylate, methyl	Methacrylate, 2,2-dimethylaminoethyl	0.42	0.02	1.01	0.54	N	691
Methacrylate, methyl	Methacrylate, 2,3-epithiopropyl	0.83		0.97			787
Methacrylate, methyl	Methacrylate, 2,6-(diphenyl)phenyl	1.42	0.06	0.071	0.004		1079
Methacrylate, methyl	Methacrylate, 2-(*N*,*N*-dimethylcarbamoyloxy)ethyl	0.59		0.42			600

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TABLE 1. *cont'd*

Monomer 1	Monomer 2	r_1	±95%	r_2	±95%	Conv.	Refs.
Methacrylate, methyl	Methacrylate, 2-bromoethyl	0.79		1.18			657
Methacrylate, methyl	Methacrylate, 2-chloro-2,3,3,3-fluoropropyl	0.984	0.395	0.583	1.17	N	927
Methacrylate, methyl	Methacrylate, 2-chloroethyl	1.156	0.082	0.97	0.18	Y	179
Methacrylate, methyl	Methacrylate, 2-chloroethyl	0.55		0.48			382
Methacrylate, methyl	Methacrylate, 2-hydroxyethyl	0.824	0.01	0.63	0.076	Y	350
Methacrylate, methyl	Methacrylate, 2-hydroxyethyl	0.192	0.09	0.81	1.02	Y	358
Methacrylate, methyl	Methacrylate, 2-hydroxyethyl	0.75		1.5			710
Methacrylate, methyl	Methacrylate, 2-hydroxypropyl	0.402	0.017	1.055	0.04	Y	333
Methacrylate, methyl	Methacrylate, 2-naphthyl	0.602	0.059	2.57	0.48	Y	760
Methacrylate, methyl	Methacrylate, 2-naphthyl	0.581	0.023	2.53	0.27	Y	760
Methacrylate, methyl	Methacrylate, 2-naphthyl	0.532	0.055	1.91	0.6	Y	760
Methacrylate, methyl	Methacrylate, 2-naphthyl	0.614	0.051	4.41	0.76	Y	760
Methacrylate, methyl	Methacrylate, 2-naphthyl	0.623	0.048	3.83	0.57	Y	760
Methacrylate, methyl	Methacrylate, 2-phenylethyl	0.75	0.16	0.85	0.34	Y	540
Methacrylate, methyl	Methacrylate, 3,5-dimethyladamantyl	0.68	0.04	0.45	0.16	N	335
Methacrylate, methyl	Methacrylate, 5-oxo-pyrrolidinylmethyl	0.421	0.033	0.694	0.087	Y	633
Methacrylate, methyl	Methacrylate, *N*-α-benzothiazolonyl-methyl	0.5	0.01	0.6	0.02		887
Methacrylate, methyl	Methacrylate, benzyl	0.808	0.03	1.112	0.093	Y	111
Methacrylate, methyl	Methacrylate, benzyl	0.93		1.05			32
Methacrylate, methyl	Methacrylate, benzyl	0.78		1.38			540
Methacrylate, methyl	Methacrylate, benzylmethylaminoethyl	0.523	0.134	0.296	0.123	Y	1081
Methacrylate, methyl	Methacrylate, butyl	0.52	0.07	2.11	0.08	N	30
Methacrylate, methyl	Methacrylate, butyl	1.27		1.2			844
Methacrylate, methyl	Methacrylate, chloromethyl	0.477	0.029	1.02	0.16	Y	712
Methacrylate, methyl	Methacrylate, diethylaminoethyl	0.843	0.128	1.44	0.085	Y	1081
Methacrylate, methyl	Methacrylate, dimethylaminoethyl	0.699	0.051	1.2	0.154	Y	1081
Methacrylate, methyl	Methacrylate, ethyl	0.81	0.22	0.86	0.12	N	32
Methacrylate, methyl	Methacrylate, ethyl	1.08		1.08			844
Methacrylate, methyl	Methacrylate, ethyl	1.16	0.19	1	0.09	N	87
Methacrylate, methyl	Methacrylate, glycidyl	0.71	0.08	0.52	0.06	Y	113
Methacrylate, methyl	Methacrylate, glycidyl	0.726	0.042	0.934	0.085	Y	226
Methacrylate, methyl	Methacrylate, glycidyl	0.8		1.05			463
Methacrylate, methyl	Methacrylate, glycidyl	0.688	0.076	0.501	0.027	Y	639
Methacrylate, methyl	Methacrylate, isobutyl	0.62	0.08	1.88	0.07	N	30
Methacrylate, methyl	Methacrylate, isobutyl	0.92	0.15	0.488	0.029	Y	639
Methacrylate, methyl	Methacrylate, isopropyl	0.89		1.2			541
Methacrylate, methyl	Methacrylate, methyl diphenylsilyl	0.438	0.075	0.38	0.178	Y	1069
Methacrylate, methyl	Methacrylate, methylthiomethyl	0.639	0.057	1.1	0.356	Y	920
Methacrylate, methyl	Methacrylate, *p*-acetylphenyl	0.47		0.67			769
Methacrylate, methyl	Methacrylate, *p*-chlorophenyl	0.54		1.08			769
Methacrylate, methyl	Methacrylate, *p*-methoxyphenyl	0.72		1.19			769
Methacrylate, methyl	Methacrylate, *p*-tolyl	0.59		1.28			769
Methacrylate, methyl	Methacrylate, phenyl	0.53		1.67			32
Methacrylate, methyl	Methacrylate, phenyl	0.58		1.69			32
Methacrylate, methyl	Methacrylate, phenyl	0.56		1.72			32
Methacrylate, methyl	Methacrylate, phenyl	0.66		1.55			761
Methacrylate, methyl	Methacrylate, phenyl	0.55		0.99			769
Methacrylate, methyl	Methacrylate, propyl	1.21		1.24			844
Methacrylate, methyl	Methacrylate, sulfolanyl	1.07	2.48	7.16	23.7	N	359
Methacrylate, methyl	Methacrylate, *t*-butyl dimethylsilyl	0.897	0.05	0.725	0.455	Y	1069
Methacrylate, methyl	Methacrylate, *t*-butyl diphenylsilyl	0.636	0.014	0.396	0.257	Y	1069
Methacrylate, methyl	Methacrylate, tributyltin	0.58		0.62			1082
Methacrylate, methyl	Methacrylate, tributyltin	0.62		0.87			1082
Methacrylate, methyl	Methacrylate, trimethyltin	0.63		1.07			1082
Methacrylate, methyl	Methacrylate, trimethyltin	0.6		0.68			1082
Methacrylate, methyl	Methacrylic acid	0.63	0.03	0.25	0.05		1071
Methacrylate, methyl	Methacrylic acid	0.1	0.01	1.06	0.02		1072
Methacrylate, methyl	Methacrylic acid	0.78	0.03	0.33	0.02		1072
Methacrylate, methyl	Methacrylic acid	0.31	0.02	0.63	0.02		1072
Methacrylate, methyl	Methacrylic acid	0.27	0.03	0.46	0.03		1072
Methacrylate, methyl	Methacrylic acid	0.1	0.01	1.06	0.02		1087
Methacrylate, methyl	Methacrylic acid	0.78	0.03	0.33	0.02		1087
Methacrylate, methyl	Methacrylic acid	0.32	0.02	0.63	0.02		1087

TABLE 1. *cont'd*

Monomer 1	Monomer 2	r_1	±95%	r_2	±95%	Conv.	Refs.
Methacrylate, methyl	Methacrylic acid	0.87	0.05	2.16	0.28	N	203
Methacrylate, methyl	Methacrylic acid	1.81	0.16	1.63	6.25	N	210
Methacrylate, methyl	Methacrylic acid	0.56	0.23	0.99	0.55	Y	216
Methacrylate, methyl	Methacrylic acid	0.29	0.04	1.18	0.19	N	276
Methacrylate, methyl	Methacrylic acid	1.28	0.1	0.48	0.1	N	276
Methacrylate, methyl	Methacrylic acid	0.77	0.05	1.84	0.24	N	312
Methacrylate, methyl	Methacrylic acid	0.36	0.08	1.38	0.27	N	313
Methacrylate, methyl	Methacrylic acid	1.18		0.63			313
Methacrylate, methyl	Methacrylic acid	0.55		1.55			424
Methacrylate, methyl	Methacrylic acid	0.209	0.05	1.26	0.2	Y	54
Methacrylate, methyl	Methacrylic acid	1.25		0.78			630
Methacrylate, methyl	Methacrylic acid	0.48		0.68			819
Methacrylate, methyl	Methacrylic anhydride	0.22	0.02	1.58	0.06	N	275
Methacrylate, methyl	Methacrylophenone, α-	1.79	0.07	0.11	0.02	N	798
Methacrylate, methyl	Methacrylophenone, α-	1.74	0.22	0.119	0.009	Y	798
Methacrylate, methyl	Methacryloyl chloride	0.45		0.2			591
Methacrylate, methyl	Methacryloyl chloride	0.45		0.2			593
Methacrylate, methyl	Methacryloyl fluoride	0.405	0.037	0.43	0.12	Y	617
Methacrylate, methyl	Methacryloyl fluoride	0.53	0.06	0.9	0.16	N	660
Methacrylate, methyl	Methacryloyl isocyanate	0.75		0.35			944
Methacrylate, methyl	Methacryloyloxy-, *o*-, benzoic acid	0.908	0.252	1.37	0.64	Y	938
Methacrylate, methyl	Methylenebutyrolactone	0.6		1.67			746
Methacrylate, methyl	Methyleneglutaronitrile, 2-	1.36	0.28	0.12	0.74	N	196
Methacrylate, methyl	Methyleneglutaronitrile, 2-	1.27		0.12			196
Methacrylate, methyl	Myrcene	0.256	0.013	0.448	0.06	Y	1062
Methacrylate, methyl	*N,N*-divinylaniline	1.06	0.18	0.005	0.018	Y	45
Methacrylate, methyl	*N*-Vinylimidazole	4.306	0.185	0.663	0.104	Y	879
Methacrylate, methyl	*N*-Vinylpyrrolidone	4.78	0.236	0.006	2.29		1084
Methacrylate, methyl	*N*-Vinylpyrrolidone	5.93	0.198	0.014	0.899		1084
Methacrylate, methyl	*N*-Vinylpyrrolidone	2.07	0.247	0.027	0.062		1084
Methacrylate, methyl	*N*-Vinylpyrrolidone	4.04	0.956	0.066	3.96		1084
Methacrylate, methyl	Naphthalene, 1-vinyl-	0.321	0.096	0.574	0.073		967
Methacrylate, methyl	Norbornadiene	14.68	16.78	−0.5	0.52	N	267
Methacrylate, methyl	Oxazolidone, *N*-vinyl-	6.75	0.37	0.04	0.13	Y	102
Methacrylate, methyl	Oxazolidone, *N*-vinyl-	9.46	0.39	0.027	0.008	Y	36
Methacrylate, methyl	Oxazoline, 2-,2-isopropenyl 4,4-dimethyl	0.53		0.82			596
Methacrylate, methyl	Oxazoline, 2-,2-isopropenyl	0.69		0.99			862
Methacrylate, methyl	Oxazoline, 2-,4-acryloxymethyl 2,4-dimethyl	0.41		0.11			596
Methacrylate, methyl	Oxazoline, 2-,4-methacryloxy- 2,4-dimethyl	1.17		0.19			596
Methacrylate, methyl	Pentadiene, *trans*-1,3-	0.404	0.038	0.379	0.013	Y	1058
Methacrylate, methyl	Pentenoate, 3-oxo-4-, ethyl	0.555	0.032	3.39	0.263	N	1033
Methacrylate, methyl	Pentenoate, 3-oxo-4-, ethyl	0.424	0.022	2.02	0.141	N	1033
Methacrylate, methyl	Pentenoate, 3-oxo-4-, ethyl	0.591	0.046	3.06	0.349	N	1033
Methacrylate, methyl	Pentenoate, 3-oxo-4-, ethyl	0.443	0.032	1.67	0.183	N	1033
Methacrylate, methyl	Pentenoate, 3-oxo-4-, ethyl	0.34	0.031	1.24	0.168	N	1033
Methacrylate, methyl	Pentenoate, 3-oxo-4-, ethyl	0.57	0.023	1.72	0.123	N	1033
Methacrylate, methyl	Pentenoate, 3-oxo-4-, ethyl	0.606	0.045	1.69	0.236	N	1033
Methacrylate, methyl	Pentenoate, 3-oxo-4-, ethyl	0.269	0.027	0.72	0.12	N	1033
Methacrylate, methyl	Pentenoate, 3-oxo-4-, ethyl	0.715	0.048	1.55	0.224	N	1033
Methacrylate, methyl	Pentenoate, 3-oxo-4-, ethyl	0.528	0.02	1.09	0.09	N	1033
Methacrylate, methyl	Pentenoate, 4-methyl-3-oxo-4-, ethyl	0.597	0.03	2.56	0.218	N	1033
Methacrylate, methyl	Pentenoate, 4-methyl-3-oxo-4-, ethyl	0.38	0.034	0.748	0.155	N	1033
Methacrylate, methyl	Pentenoate, 4-methyl-3-oxo-4-, ethyl	0.513	0.022	1.14	0.109	N	1033
Methacrylate, methyl	Pentenoate, 4-methyl-3-oxo-4-, ethyl	0.43	0.034	0.952	0.164	N	1033
Methacrylate, methyl	Pentenoate, 4-methyl-3-oxo-4-, ethyl	0.474	0.023	1.67	0.143	N	1033
Methacrylate, methyl	Pentenoate, 4-methyl-3-oxo-4-, ethyl	0.581	0.025	1.04	0.111	N	1033
Methacrylate, methyl	Pentenoate, 4-methyl-3-oxo-4-, ethyl	0.616	0.024	1.05	0.108	N	1033
Methacrylate, methyl	Pentenoate, 4-methyl-3-oxo-4-, ethyl	0.663	0.023	0.725	0.08	N	1033
Methacrylate, methyl	Pentenoate, 4-methyl-3-oxo-4-, ethyl	0.528	0.02	1.09	0.09	N	1033
Methacrylate, methyl	Phosphate, 2-(acryloyloxy)ethyl diethyl	2.37	0.046	0.486	0.088	N	971
Methacrylate, methyl	Phosphate, 2-(acryloyloxy)ethyl diethyl	2.23	0.047	0.521	0.138	N	971
Methacrylate, methyl	Phosphate, 2-(acryloyloxy)ethyl diethyl	1.87	0.086	0.946	0.436	N	971

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TABLE 1. *cont'd*

Monomer 1	Monomer 2	r_1	±95%	r_2	±95%	Conv.	Refs.
Methacrylate, methyl	Phosphate, 2-(acryloyloxy)ethyl diethyl	1.97	0.029	1.16	0.248	N	971
Methacrylate, methyl	Phosphate, 2-(acryloyloxy)ethyl diethyl	2.1	0.045	0.42	0.097	N	971
Methacrylate, methyl	Phosphate, 2-(acryloyloxy)ethyl diethyl	2.56	0.094	0.258	0.226	N	971
Methacrylate, methyl	Phosphate, 2-(acryloyloxy)ethyl diethyl	2.04	0.012	0.0701	0.052	N	971
Methacrylate, methyl	Phosphonate, α-bromovinyl-,diethyl	1.25	0.04				684
Methacrylate, methyl	Phosphonate, α-carboethoxyvinyl-, diethyl	1		0.05			684
Methacrylate, methyl	Phosphonate, α-carbomethoxyvinyl-, diethyl	4.7		0.01			684
Methacrylate, methyl	Phosphonate, isopropenyl-, dimethyl	30		0.2			684
Methacrylate, methyl	Phosphonate, vinyl-, bis(2-chloroethyl)	29.9		0.26			410
Methacrylate, methyl	Phosphonate, vinyl-, diethyl	11.1	0.04				684
Methacrylate, methyl	Phosphonic acid, α-phenylvinyl-	1.362	0.084	−0.063	0.077	Y	131
Methacrylate, methyl	Phthalimide,-*N*-)methacryloyloxy)-	0.69	0.048	1.45	0.151	Y	979
Methacrylate, methyl	Pinene, α-	10		0.08			48
Methacrylate, methyl	Propene, 2,3-dichloro-	6.02	1.66	0.18	0.1	N	11
Methacrylate, methyl	Propene, 2-chloro-3-hydroxy-	4.4		0			445
Methacrylate, methyl	Propenyl, 2-chloro-, acetate	1		0			445
Methacrylate, methyl	Propenyl, 2-methyl, acetate	10		0			470
Methacrylate, methyl	Pyridazinone, 3-(2-vinyl)-6-methyl-4,5-	1.19	0.04	0.08	0.03	N	340
Methacrylate, methyl	Pyridazinone 3-(2-vinyl)-6-methyl-	0.86	0.02	0.56	0.04	N	340
Methacrylate, methyl	Pyridine, 2-methyl-5-vinyl-	0.42	0.09	0.54	0.19	N	232
Methacrylate, methyl	Pyridine, 2-vinyl-	0.42	0.02	0.73	0.06	N	231
Methacrylate, methyl	Pyridine, 2-vinyl-	0.4		0.86			532
Methacrylate, methyl	Pyridine, 2-vinyl-	0.35	0.19	0.76	0.12	Y	6
Methacrylate, methyl	Pyridine, 2-vinyl-	0.31		0.64			623
Methacrylate, methyl	Pyridine, 2-vinyl-	0.27	0.04	1.1	0.08	N	749
Methacrylate, methyl	Pyridine, 2-vinyl-5-ethyl-	0.39	0.02	0.68	0.06	N	231
Methacrylate, methyl	Pyridine, 4-vinyl-	0.57	0.02	0.77	0.07	N	231
Methacrylate, methyl	Pyridine, 4-vinyl-	0.54	0.01	0.99	0.18	N	691
Methacrylate, methyl	Pyrrolidone, 1-benzyl-3-methylene-5-methyl	0.387	0.07	2.28	0.47	Y	33
Methacrylate, methyl	Pyrrolidone, *N*-vinyl-					Y	213
Methacrylate, methyl	Pyrrolidone, *N*-vinyl-	5.62	0.3	−0.05	0.08	N	320
Methacrylate, methyl	Pyrrolidone, *N*-vinyl-	4.63	0.34	−0.032	0.068	Y	321
Methacrylate, methyl	Pyrrolidone, *N*-vinyl-	4.36	0.61	−0.052	0.028	Y	36
Methacrylate, methyl	Pyrrolidone, *N*-vinyl-	4.04	0.61	0.01	0.15	N	691
Methacrylate, methyl	Pyrrolidone, α-methylene-*N*-methyl-	0.577	0.058	0.24	0.14	Y	641
Methacrylate, methyl	Silane, γ-methacryloxypropyltrimethoxy-	0.788	0.082	2.06	0.309	Y	977
Methacrylate, methyl	Styrene	0.5		0.5			138
Methacrylate, methyl	Styrene	0.46		0.52			139
Methacrylate, methyl	Styrene	0.46		0.52			179
Methacrylate, methyl	Styrene	0.42		0.48			20
Methacrylate, methyl	Styrene	0.45		0.52			21
Methacrylate, methyl	Styrene	0.46		0.49			21
Methacrylate, methyl	Styrene	0.47		0.45			21
Methacrylate, methyl	Styrene	0.48		0.58			21
Methacrylate, methyl	Styrene	0.5		0.44			21
Methacrylate, methyl	Styrene	0.22	0.13	0.396	0.048	Y	241
Methacrylate, methyl	Styrene	0.32		0.42			241
Methacrylate, methyl	Styrene	0.418	0.085	0.49	0.14	Y	254
Methacrylate, methyl	Styrene	0.54	0.029	0.564	0.047	Y	254
Methacrylate, methyl	Styrene	0.478	0.011	0.585	0.007	Y	287
Methacrylate, methyl	Styrene	0.45	0.01	0.44	0.08	N	324
Methacrylate, methyl	Styrene	0.45		0.47			324
Methacrylate, methyl	Styrene	0.49		0.54			403
Methacrylate, methyl	Styrene	0.47		0.52			416
Methacrylate, methyl	Styrene	0.48		0.38			451
Methacrylate, methyl	Styrene	0.46		0.52			463
Methacrylate, methyl	Styrene	0.42		0.54			492
Methacrylate, methyl	Styrene	0.5		0.44			492
Methacrylate, methyl	Styrene	0.46		0.52			505
Methacrylate, methyl	Styrene	0.44		0.5			531
Methacrylate, methyl	Styrene	0.49		0.56			531
Methacrylate, methyl	Styrene	0.49		0.53			534

TABLE 1. *cont'd*

Monomer 1	Monomer 2	r_1	±95%	r_2	±95%	Conv.	Refs.
Methacrylate, methyl	Styrene	0.409	0.02	0.485	0.052	Y	751
Methacrylate, methyl	Styrene	0.504	0.026	0.48	0.059	Y	751
Methacrylate, methyl	Styrene	0.611	0.028	0.371	0.055	Y	751
Methacrylate, methyl	Styrene	0.59		0.62			753
Methacrylate, methyl	Styrene	0.6		0.52			753
Methacrylate, methyl	Styrene	0.63		0.5			753
Methacrylate, methyl	Styrene	0.58		0.55			753
Methacrylate, methyl	Styrene	0.64		0.55			753
Methacrylate, methyl	Styrene	0.41		0.41			753
Methacrylate, methyl	Styrene	0.454		0.472			824
Methacrylate, methyl	Styrene	0.464		0.497			824
Methacrylate, methyl	Styrene	0.422		0.432			824
Methacrylate, methyl	Styrene	0.41		0.57			835
Methacrylate, methyl	Styrene	0.314		0.275			860
Methacrylate, methyl	Styrene, 2,4,6-trimethyl-	1.511	0.072	0.083	0.045	Y	58
Methacrylate, methyl	Styrene, 2,4,6-trimethyl-	1.45	0.16	−0.01	0.11	Y	58
Methacrylate, methyl	Styrene, 2,5-dichloro-	0.44	0.13	2.66	0.38	Y	3
Methacrylate, methyl	Styrene, 2,6-dichloro-	1.98	0.16	−0.15	0.27	N	324
Methacrylate, methyl	Styrene, 3-methyl	0.48	0.04	0.53	0.04		1087
Methacrylate, methyl	Styrene, 3-methyl	0.38	0.03	0.36	0.06		1087
Methacrylate, methyl	Styrene, 3-methyl	0.41	0.04	0.51	0.05		1087
Methacrylate, methyl	Styrene, 3-tri-*n*-butylstannyl-	0.69		0.03			985
Methacrylate, methyl	Styrene, 4-methyl-	0.345	0.008	0.46	0.022	Y	929
Methacrylate, methyl	Styrene, α-methoxy-	2.5	0.39	−0.02	0.04	N	142
Methacrylate, methyl	Styrene, α-methyl-	0.48	0.02	0.27	0.07	N	265
Methacrylate, methyl	Styrene, α-methyl-	0.55		0.51			265
Methacrylate, methyl	Styrene, α-methyl-	0.55		0.6			265
Methacrylate, methyl	Styrene, α-methyl-	0.5		0.14			532
Methacrylate, methyl	Styrene, α-methyl-	0.42		0.22			835
Methacrylate, methyl	Styrene, α-methyl-	0.47		0.48			899
Methacrylate, methyl	Styrene, *m*-bromo-	0.48		1.17			256
Methacrylate, methyl	Styrene, *m*-chloro-					Y	150
Methacrylate, methyl	Styrene, *m*-methyl-	0.512	0.036	0.486	0.02	Y	256
Methacrylate, methyl	Styrene, *m*-nitro-	0.35	0.11	0.8	0.32	Y	222
Methacrylate, methyl	Styrene, *p*-chloro-	0.5		1.37			532
Methacrylate, methyl	Styrene, *o*-chloro-	0.46		1.34			558
Methacrylate, methyl	Styrene, *p*-1-(2-hydroxypropyl)-	0.26		1			380
Methacrylate, methyl	Styrene, *p*-*N*,*N*-dimethylamino-	0.204	0.022	0.101	0.016	Y	256
Methacrylate, methyl	Styrene, *p*-bromo-	0.4		1.1			256
Methacrylate, methyl	Styrene, *p*-chloro-	0.334	0.016	0.77	0.12	Y	150
Methacrylate, methyl	Styrene, *p*-chloro-	0.42		0.89			256
Methacrylate, methyl	Styrene, *p*-chloro-	0.43		0.47			476
Methacrylate, methyl	Styrene, *p*-chloromethyl-	0.408	0.038	0.91	0.15	Y	756
Methacrylate, methyl	Styrene, *p*-cyano-	0.22		1.41			256
Methacrylate, methyl	Styrene, *p*-methoxy-	0.29		0.32			35
Methacrylate, methyl	Styrene, *p*-methyl-	0.4		0.44			256
Methacrylate, methyl	Styrene, *p*-octylamine sulfonate	0.6		2.6			817
Methacrylate, methyl	Styrene, *p*-*tert*-butyl-	0.44		0.5			634
Methacrylate, methyl	Styrene, pentachloro-	3.65	0.85	0.3	0.05	N	7
Methacrylate, methyl	Succinamete, potassium *N*-vinyl-	1.1	0.17	−0.02	0.12	Y	771
Methacrylate, methyl	Succinimide, *N*-vinyl-	9.94	0.27	0.048	0.026	Y	104
Methacrylate, methyl	Succinimide, *N*-vinyl-	0.01	0.031	−0.059	0.096	Y	693
Methacrylate, methyl	Tetrazole, 1-Vinyl-	7.13	0.093	0.262	0.026	Y	925
Methacrylate, methyl	Tetrazole, 2-methyl-5-vinyl-	1.026	0.029	0.486	0.075	Y	670
Methacrylate, methyl	Tetrazole, 2-phenyl-5(4′-vinyl) phenyl-	0.7		0.4			583
Methacrylate, methyl	Thiophene, 3-vinyl	0.563		0.25			1000
Methacrylate, methyl	Thioxanthone, 2-(acryloyloxy)-	1.36		0.5			986
Methacrylate, methyl	Toluenesulfonamide, *N*,*N*-methyl-vinyl-	1.87	0.19	−1.83	0.26	Y	80
Methacrylate, methyl	Triallyl cyanurate	16.12	0.56	−0.005	0.05	Y	201
Methacrylate, methyl	Triallyl isocyanurate	16.88	6.64	−0.49	0.94	Y	201
Methacrylate, methyl	Triazole, 1,2,3-, 1-*p*-bromophenyl-4-vinyl	0.832	0.022	0.266	0.058	Y	670
Methacrylate, methyl	Triazole, 1,2,3-, 4(5)-vinyl-	0.839	0.055	0.27	0.13	Y	670
Methacrylate, methyl	Urea, *N*-vinyl-*N*′-ethyl-	1.85	0.23	−0.008	0.029	Y	101

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TABLE 1. *cont'd*

Monomer 1	Monomer 2	r_1	±95%	r_2	±95%	Conv.	Refs.
Methacrylate, methyl	Vinyl 2-chloroethyl ether	18.8		0			597
Methacrylate, methyl	Vinyl 4-chlorocyclohexyl ketone	0.77		0.51			668
Methacrylate, methyl	Vinyl acetate	2.71	0.25	−0.2	0.01		158
Methacrylate, methyl	Vinyl acetate	137.5	5.9	−0.81	1.17	N	210
Methacrylate, methyl	Vinyl acetate	26		0.03			272
Methacrylate, methyl	Vinyl acetate	28.6		0.04			383
Methacrylate, methyl	Vinyl acetate	22.21		0.07			471
Methacrylate, methyl	Vinyl benzoate	20.3		0.07			272
Methacrylate, methyl	Vinyl bromide	14.11	0.67	0.12	0.06	N	268
Methacrylate, methyl	Vinyl bromide	17.1		0.33			268
Methacrylate, methyl	Vinyl bromide	25.1	0.88	0.052	0.026	Y	34
Methacrylate, methyl	Vinyl bromide	19.84	2.58	0.05	0.074	Y	34
Methacrylate, methyl	Vinyl butyl ether					N	127
Methacrylate, methyl	Vinyl butyrate	25		0.03			272
Methacrylate, methyl	Vinyl chloride	8.99	2.97	0.07	0.047	Y	3
Methacrylate, methyl	Vinyl chloromethyl ketone	0.121	0.021	0.593	0.092	Y	356
Methacrylate, methyl	Vinyl ether	4.9	0.99	−0.15	0.16	Y	45
Methacrylate, methyl	Vinyl ethyl ether	37		0.01			106
Methacrylate, methyl	Vinyl ethyl ketone	0.42	0.17	0.65	0.42	Y	794
Methacrylate, methyl	Vinyl ethyl oxalate	4.74	2.95	−0.05	0.44	Y	124
Methacrylate, methyl	Vinyl ethyl sulfide	1.03	0.11	0.036	0.017	Y	303
Methacrylate, methyl	Vinyl ethyl sulfide	2.7		0.3			507
Methacrylate, methyl	Vinyl ethyl sulfoxide	11.17	0.48	0.37	0.06	Y	286
Methacrylate, methyl	Vinyl isobutyl sulfide	0.89	0.01	0.05	0.03	N	285
Methacrylate, methyl	Vinyl isobutyl sulfide	0.985	0.077	0.021	0.034	Y	303
Methacrylate, methyl	Vinyl isobutyl sulfide	0.88	0.02	0.03	0.02	N	336
Methacrylate, methyl	Vinyl isopropyl ketone	0.81		1.44			601
Methacrylate, methyl	Vinyl isopropyl ketone	0.54	0.22	0.6	0.47	Y	794
Methacrylate, methyl	Vinyl isopropyl sulfide	0.822	0.064	0.046	0.025	Y	303
Methacrylate, methyl	Vinyl isothiocyanate	0.85		0.6			422
Methacrylate, methyl	Vinyl *m*-cresyl ether	3.3		0.2			605
Methacrylate, methyl	Vinyl methyl sulfide	1		0.03			106
Methacrylate, methyl	Vinyl *o*-cresyl ether	1.8		0.1			605
Methacrylate, methyl	Vinyl *p*-cresyl ether	2.6		0			605
Methacrylate, methyl	Vinyl phenyl ether	11.34	5.76	0.01	0.32	Y	172
Methacrylate, methyl	Vinyl phenyl ether	2.8		0			605
Methacrylate, methyl	Vinyl phenyl ketone	0.71	0.6	0.59	1.9	Y	794
Methacrylate, methyl	Vinyl phenyl sulfide	0.79	0.06	0.06	0.09	N	239
Methacrylate, methyl	Vinyl phenyl sulfide	0.85		0.08			239
Methacrylate, methyl	Vinyl propionate	24		0.03			272
Methacrylate, methyl	Vinyl sulfone	4.5	0.49	0.1	0.16	Y	45
Methacrylate, methyl	Vinyl *tert*-butyl ketone	1.21	0.11	0.65	0.15	Y	794
Methacrylate, methyl	Vinyl, 4-, dithiobenzoate, methyl	0.151	0.092	0.3	0.29	Y	697
Methacrylate, methyl	Vinyl, *p*-,benzylmethylcarbinol	0.24	0.26	0.98	0.28	Y	48
Methacrylate, methyl	Vinyl-tris(trimethoxysiloxy)silane	34		0.02			482
Methacrylate, methyl	Vinylacetophenone, *p*-	0.33	0.36	1.65	3.81	Y	266
Methacrylate, methyl	Vinylanthracene, 9-	4.068	0.04	0.117	0.043	Y	123
Methacrylate, methyl	Vinylbenzoic acid, *p*-	0.398	0.097	1.16	0.3	Y	266
Methacrylate, methyl	Vinylbenzyl chloride	0.46		1.02			792
Methacrylate, methyl	Vinylene carbonate	126	298	−0.04	0.85	Y	103
Methacrylate, methyl	Vinylferrocene	1.22		0.52			294
Methacrylate, methyl	Vinylhydroquinone	0.49	0.21	0.02	0.13	Y	337
Methacrylate, methyl	Vinylhydroquinone dibenzoate	0.34		0.41			440
Methacrylate, methyl	Vinylidene chloride	2.6		0.3		Y	138
Methacrylate, methyl	Vinylidene chloride	2.38	0.02	0.36	0.03	N	324
Methacrylate, methyl	Vinylidene chloride	2.16	0.06	0.18	0.18	N	324
Methacrylate, methyl	Vinylidene chloride	2.5		0.5			426
Methacrylate, methyl	Vinylidene chloride	2.5		0.34			432
Methacrylate, methyl	Vinylidene chloride	2.1		0.09			538
Methacrylate, methyl	Vinylidene chloride	1.8	0.95	0.094	0.032	Y	65
Methacrylate, methyl	Vinylidene chloride	2.83		0.19			762
Methacrylate, methyl	Vinylidene chloride	1.23		0.02			762
Methacrylate, methyl	Vinylidene chloride	2.77	0.06	0.27	0.01	N	786
Methacrylate, methyl	Vinylidene cyanide		0.012		0.013	Y	82
Methacrylate, methyl	Vinylisocyanate	3.3		0.01			422

TABLE 1. *cont'd*

Monomer 1	Monomer 2	r_1	±95%	r_2	±95%	Conv.	Refs.
Methacrylate, methyl	Vinylphenyldimethylsilane	29.79	1.89	−0.009	0.034	Y	482
Methacrylate, methyl	Vinyltrimethylsilane	35.66	0.85	0.028	0.016	Y	482
Methacrylate, methyl	Xanthate, *S*-methacryloyl *O*-ethyl	0.76	0.04	0.6	0.08		1086
Methacrylate, methyl diphenylsilyl	Methacrylate, methyl	0.38	0.178	0.438	0.075	Y	1069
Methacrylate, methylthiomethyl	Methacrylate, methyl	1.1	0.356	0.639	0.057	Y	920
Methacrylate, methylthiomethyl	Styrene	0.512	0.05	0.338	0.01	Y	920
Methacrylate, mono-,ethylene glycol	Acrylonitrile	1.5		0.19			682
Methacrylate, octyl	Styrene	0.56	0.16	0.65	0.1	Y	179
Methacrylate, octyl	Styrene	0.68		0.56			463
Methacrylate, octyl	Vinyl chloride	14		0.04			511
Methacrylate, *p*-(cinnamoylamino)phenyl	Styrene	0.31		0.62			685
Methacrylate, *p*-acetylphenyl	Methacrylate, methyl	0.67		0.47			769
Methacrylate, *p*-carbomethoxyphenyl	Styrene	0.178	0.027	0.482	0.084	Y	177
Methacrylate, *p*-chlorophenyl	Methacrylate, methyl	1.08		0.54			769
Methacrylate, *p*-chlorophenyl	Styrene	0.243	0.022	0.34	0.11	Y	177
Methacrylate, *p*-methoxyphenyl	Methacrylate, methyl	1.19		0.72			769
Methacrylate, *p*-methoxyphenyl	Styrene	0.244	0.026	0.499	0.089	Y	177
Methacrylate, *p*-methylphenyl	Styrene	0.225	0.04	0.49	0.25	Y	177
Methacrylate, *p*-methylphenyl	Styrene	0.185	0.039	0.223	0.09	Y	177
Methacrylate, *p*-tolyl	Methacrylate, methyl	1.28		0.59			769
Methacrylate, phenyl	Acrylonitrile	0.46		0.36			363
Methacrylate, phenyl	Methacrylate, 2-chloroethyl	0.785	0.083	1.02	0.21	Y	179
Methacrylate, phenyl	Methacrylate, benzyl	1.42	0.09	0.67	0.06	N	32
Methacrylate, phenyl	Methacrylate, methyl	1.67		0.53			32
Methacrylate, phenyl	Methacrylate, methyl	1.69		0.58			32
Methacrylate, phenyl	Methacrylate, methyl	1.72		0.56			32
Methacrylate, phenyl	Methacrylate, methyl	1.55		0.66			761
Methacrylate, phenyl	Methacrylate, methyl	0.99		0.55			769
Methacrylate, phenyl	Methacrylic, acid	1.89	0.17	0.211	0.018	Y	88
Methacrylate, phenyl	Methacrylic, acid	0.589	0.081	0.398	0.019	Y	88
Methacrylate, phenyl	*N*-Vinylpyrrolidone	4.17	0.756	−0.026	0.032	Y	1013
Methacrylate, phenyl	Styrene	0.48	0.23	0.246	0.049	Y	177
Methacrylate, phenyl	Styrene	0.55	0.33	0.247	0.064	Y	179
Methacrylate, phenyl	Styrene	0.51		0.26			463
Methacrylate, potassium	Acrylonitrile	0.203	0.086	0.226	0.04	Y	808
Methacrylate, propargyl	Itaconic acid mono(*p*-sulfamidoanilide)	1.65	0.02	0.58	0.05		957
Methacrylate, propyl	Methacrylate, methyl	1.24		1.21			844
Methacrylate, propyl	Styrene	0.38	0.11	0.565	0.081	Y	179
Methacrylate, sodium (2-sulphoxyethyl)-	Methacrylic, acid	1.2	0.19	0.78	0.08	N	745
Methacrylate, sulfolanyl	Methacrylate methyl	7.16	23.7	1.07	2.48	N	359
Methacrylate, sulfolanyl	Methacrylic, acid	0.81	0.24	0.81	0.03	N	359
Methacrylate, sufolanyl	Styrene	−0.2	2.46	0.2	0.1	N	359
Methacrylate, *t*-butyl dimethylsilyl	Acrylate, methyl	1.07	0.21	0.288	0.057	Y	1069
Methacrylate, *t*-butyl dimethylsilyl	Methacrylate, methyl	0.725	0.455	0.897	0.05	Y	1069
Methacrylate, *t*-butyl diphenylsilyl	Methacrylate, methyl	0.396	0.257	0.636	0.014	Y	1069
Methacrylate, *tert*-butyl	Methacrylate, methyl	1.35		0.96			761
Methacrylate, *tert*-butyl	Styrene	0.61	0.51	0.545	0.054	Y	179
Methacrylate, tetra(2-hydroxypropyl)-ethylenediamine	Methacrylate, hydroxyethyl	1.44	1	0.606	0.416	Y	996
Methacrylate, tetra(2-hydroxypropyl)-ethylenediamine	Methacrylic acid	0.328	0.181	1.56	0.237	Y	996
Methacrylate, tributyltin	Methacrylate, 2-ethoxyethyl	0.2	0.444	0.53	0.16	N	945
Methacrylate, tributyltin	Methacrylate, 2-hydroxypropyl	0.728	0.517	1.81	0.275	N	945
Methacrylate, tributyltin	Methacrylate, cyclohexyl	0.395	0.428	0.891	0.136	N	945
Methacrylate, tributyltin	Methacrylate, ethyl	0.299	0.607	0.601	0.123	N	945
Methacrylate, tributyltin	Methacrylate, hydroxyethyl	0.282	0.424	2.33	0.185	N	945
Methacrylate, tributyltin	Methacrylate, methyl	0.62		0.58			1082
Methacrylate, triethyltin	Methacrylate, methyl	0.87		0.62			1082
Methacrylate, trimethyltin	Methacrylate, methyl	1.07		0.63			1082
Methacrylate, triphenyltin	Methacrylate, methyl	0.68		0.6			1082
Methacrylic acid	Acrylamide	1.63		0.57			1028
Methacrylic acid	Acrylamide	4.4		0.58			852
Methacrylic acid	Acrylamide	0.15		0.56			852
Methacrylic acid	Acrylate, butyl	1.25	0.31	0.31	0.1	N	187

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TABLE 1. *cont'd*

Monomer 1	Monomer 2	r_1	±95%	r_2	±95%	Conv.	Refs.
Methacrylic acid	Acrylate, ethyl					N	1065
Methacrylic acid	Acrylic acid, 2-ethyl	1.12	0.132	0.194	0.027	Y	1004
Methacrylic acid	Acrylic acid, 2-ethyl	2.29	0.417	0.069	0.04	Y	1004
Methacrylic acid	Acrylic acid, 2-ethyl	1.14		0.23		Y	961
Methacrylic acid	Acrylonitrile	0.2	0.26	0.04	0.13	Y	16
Methacrylic acid	Acrylonitrile	2.38	0.29	0.092	0.06	Y	216
Methacrylic acid	Butadiene, 2-chloro-	−0.035	0.058	2.52	0.2	Y	259
Methacrylic acid	Diphenyl sulfone, 3,3′-bisitaconimido-*m,m′*-	0.564	0.032	0.015	0.058	Y	1042
Methacrylic acid	Maleimide, 2,3-dimethyl-*N*-(2-methacryl)	0.746	0.059	1.33	0.1	Y	619
Methacrylic acid	Methacrylamide	2.73	0.28	0.33	0.25	Y	190
Methacrylic acid	Methacrylamide	1.55		1.28			527
Methacrylic acid	Methacrylamide	2.006	0.09	0.2	0.014	Y	55
Methacrylic acid	Methacrylate, 2-hydroxypropyl	0.99		0.31			886
Methacrylic acid	Methacrylate, *N*-methyl-*N*-phenyl-2-amino	2.16	0.18	0.2	0.01	N	651
Methacrylic acid	Methacrylate, butyl	0.8	0.16	1.26	0.12	N	187
Methacrylic acid	Methacrylate, butyl	0.73	0.2	1.15	0.12	N	224
Methacrylic acid	Methacrylate, diethylaminoethyl	0.63	1.47	2.34	1.59	Y	16
Methacrylic acid	Methacrylate, ethyl	0.57		0.71			820
Methacrylic acid	Methacrylate, glycidyl	0.98	0.16	1.2	0.1	N	224
Methacrylic acid	Methacrylate, isopropyl	2.01		0.47			847
Methacrylic acid	Methacrylate, methyl	0.25	0.05	0.63	0.03		1071
Methacrylic acid	Methacrylate, methyl	1.06	0.02	0.1	0.01		1072
Methacrylic acid	Methacrylate, methyl	0.33	0.02	0.78	0.03		1072
Methacrylic acid	Methacrylate, methyl	0.63	0.02	0.31	0.02		1072
Methacrylic acid	Methacrylate, methyl	0.46	0.03	0.27	0.03		1072
Methacrylic acid	Methacrylate, methyl	1.06	0.02	0.1	0.01		1087
Methacrylic acid	Methacrylate, methyl	0.33	0.02	0.78	0.03		1087
Methacrylic acid	Methacrylate, methyl	0.63	0.02	0.32	0.02		1087
Methacrylic acid	Methacrylate, methyl	2.16	0.28	0.87	0.05	N	203
Methacrylic acid	Methacrylate, methyl	1.63	6.25	1.81	0.16	N	210
Methacrylic acid	Methacrylate, methyl	0.99	0.55	0.56	0.23	Y	216
Methacrylic acid	Methacrylate, methyl	1.18	0.19	0.29	0.04	N	276
Methacrylic acid	Methacrylate, methyl	0.48	0.1	1.28	0.1	N	276
Methacrylic acid	Methacrylate, methyl	1.84	0.24	0.77	0.05	N	312
Methacrylic acid	Methacrylate, methyl	1.38	0.27	0.36	0.08	N	313
Methacrylic acid	Methacrylate, methyl	0.63		1.18			313
Methacrylic acid	Methacrylate, methyl	1.55		0.55			424
Methacrylic acid	Methacrylate, methyl	1.26	0.2	0.209	0.05	Y	54
Methacrylic acid	Methacrylate, methyl	0.78		1.25			630
Methacrylic acid	Methacrylate, methyl	0.68		0.48			819
Methacrylic acid	Methacrylate, phenyl	0.211	0.018	1.89	0.17	Y	88
Methacrylic acid	Methacrylate, phenyl	0.398	0.019	0.589	0.081	Y	88
Methacrylic acid	Methacrylate, sodium (2-sulphoxyethyl)-	0.78	0.08	1.2	0.19	N	745
Methacrylic acid	Methacrylate, sulfolanyl	0.81	0.03	0.81	0.24	N	359
Methacrylic acid	Methacrylate, tetra(2-hydroxypropyl)ethylenediamine	1.56	0.237	0.328	0.181	Y	996
Methacrylic acid	Methacrylonitrile	1.74	0.1	0.64	0.07	N	44
Methacrylic acid	Methacrylonitrile	0.54	3.71	0.52	0.32	N	85
Methacrylic acid	*N*-Vinylimidazole	1.384	0.034	0.145	0.022	Y	879
Methacrylic acid	Phosphonate, vinyl-, diethyl	1.9		0.15			431
Methacrylic acid	Phosphonic acid, α-phenylvinyl-	1.49	0.16	0.17	0.3	Y	130
Methacrylic acid	Piperylene, *cis*-	0.4		0.38			773
Methacrylic acid	Piperylene, *trans*-	0.38		0.33			773
Methacrylic acid	Propene, 2,3-dichloro-	4		0			445
Methacrylic acid	Propene, 2-chloro-3-hydroxy-	4.5		0			445
Methacrylic acid	Pyridine, 2-methyl-5-vinyl-	0.43		0.85			552
Methacrylic acid	Pyridine, 2-vinyl-	0.58	0.21	1.69	0.71	Y	15
Methacrylic acid	Pyridine, 2-vinyl-	0.44		1.38			498
Methacrylic acid	Styrene	0.55	0.66	0.21	0.02	N	166
Methacrylic acid	Styrene	0.64		0.22			166
Methacrylic acid	Styrene	0.66		0.2			203
Methacrylic acid	Styrene	0.49	0.08	0.15	0.04	N	312

TABLE 1. *cont'd*

Monomer 1	Monomer 2	r_1	±95%	r_2	±95%	Conv.	Refs.
Methacrylic acid	Styrene	0.56	0.19	0.2	0.04	N	313
Methacrylic acid	Styrene	0.28		0.38			313
Methacrylic acid	Styrene	0.602	0.088	0.124	0.092	Y	47
Methacrylic acid	Styrene	0.85		0.17			812
Methacrylic acid	Styrene	0.631	0.146	0.041	0.03	Y	842
Methacrylic acid	Styrene	0.6	0.249	0.067	0.046	Y	842
Methacrylic acid	Styrene	0.44	0.089	0.627	0.031	Y	842
Methacrylic acid	Styrene	0.39	0.199	0.55	0.06	Y	842
Methacrylic acid	Styrene	0.12	0.118	0.221	0.048	Y	842
Methacrylic acid	Styrene, 3-methyl	0.35	0.08	0.06	0.03		1087
Methacrylic acid	Styrene, 3-methyl	0.18	0.02	0.33	0.02		1087
Methacrylic acid	Styrene, 3-methyl	0.51	0.01	0.42	0.01		1087
Methacrylic acid	Styrene, *o*-chloro-	0.622	0.058	0.101	0.034	Y	6
Methacrylic acid	Sulfonic acid, *o*-methacryloylamino-benzene-	0.203	0.067	0.217	0.122	Y	1006
Methacrylic acid	Sulfonic acid, *o*-methacryloylamino-benzene-	0.188	0.076	0.523	0.195	Y	1006
Methacrylic acid	Sulfonic acid, *p*-methacryloylamino-benzene-	0.156	0.081	1.08	0.338	Y	1006
Methacrylic acid	Sulfonic acid, *p*-methacryloylamino-benzene-	0.155	0.052	1.65	0.27	Y	1006
Methacrylic acid	Vinyl acetate	0.2		0.01			377
Methacrylic acid	Vinyl chloride	23.52	0.98	0.064	0.008	Y	135
Methacrylic acid	Vinyl chloride	23.26	0.96	−0.022	0.02	Y	229
Methacrylic acid	Vinyl chloride	9.05		0.07			46
Methacrylic acid	Vinyl, mono-, diethyleneglycol ether	0		2.2			831
Methacrylic acid	Vinylethynyl-4-piperidinol, 1,2,5-trimethyl	0.4		0.05			734
Methacrylic acid	Vinylidene chloride	3.368	0.098	0.154	0.047	Y	6
Methacrylic anhydride	Acrylate, methyl	4.75		0.16			275
Methacrylic anhydride	Allyl chloroacetate	29.76	13	−0.01	0.13	Y	106
Methacrylic anhydride	Allylurea	29.01	18.48	−0.06	0.17	Y	106
Methacrylic anhydride	Methacrylate, methyl	1.58	0.06	0.22	0.02	N	275
Methacrylic anhydride	Methacrylonitrile	1.45	0.18	0.26	0.06	N	219
Methacrylic anhydride	Styrene	0.27	0.02	0.13	0.01	N	219
Methacrylic anhydride	Styrene	0.33		0.1			275
Methacrylic anhydride	Vinyl benzyl sulfide	0.97	0.27	−0.048	0.033	Y	106
Methacrylic anhydride	Vinyl chloroethyl ether					Y	106
Methacrylonitrile	Acenaphthalene	0.15		2.38			575
Methacrylonitrile	Acetylene, phenyl-	0.78		0.04			648
Methacrylonitrile	Acrolein	1.17	0.05	0.68	0.12	N	208
Methacrylonitrile	Acrolein	1.2		0.72			446
Methacrylonitrile	Acrolein, methyl-	0.41	0.01	1.78	0.07	N	208
Methacrylonitrile	Acrolein, methyl-	0.45		1.25			587
Methacrylonitrile	Acrolein, methyl-	0.45		1.25			589
Methacrylonitrile	Acrylate, 1,1,5-trihydroperfluoroamyl	1.03		0.14			809
Methacrylonitrile	Acrylate, α-chloro-, ethyl	0.45		2			638
Methacrylonitrile	Acrylate, α-cyano-, methyl	0.18	0.01	0.15	0.01	N	143
Methacrylonitrile	Acrylate, α-phenyl-, methyl	0.19		0.25			143
Methacrylonitrile	Acrylic anhydride	0.42	0.04	1	0.13	N	219
Methacrylonitrile	Acrylonitrile	1.67	0.12	0.43	0.04	N	198
Methacrylonitrile	Allylbenzene	16.24	1.36	−0.061	0.03	Y	351
Methacrylonitrile	Butadiene	0.053	0.016	0.39	0.15	Y	257
Methacrylonitrile	Ethylene 1,1-diphenyl-	0.48	0.1	−0.45	0.11	N	143
Methacrylonitrile	Fumarate, diisopropyl	85		0			1038
Methacrylonitrile	Itaconate, dimethyl	1.26		0.28			398
Methacrylonitrile	Methacrylate, butyl	0.56	0.15	0.75	0.07	N	44
Methacrylonitrile	Methacrylate, ethyl	0.46	0.04	0.83	0.05	N	44
Methacrylonitrile	Methacrylate, isobutyl	0.74	0.07	0.68	0.05	N	44
Methacrylonitrile	Methacrylate, isopropyl	0.43	0.08	0.94	0.12	N	44
Methacrylonitrile	Methacrylate, octyl	0.75	0.04	0.61	0.05	N	44
Methacrylonitrile	Methacrylic acid	0.64	0.07	1.74	0.1	N	44
Methacrylonitrile	Methacrylic acid	0.52	0.32	0.54	3.71	N	85
Methacrylonitrile	Methacrylic anhydride	0.26	0.06	1.45	0.18	N	219
Methacrylonitrile	Phosphonic acid, α-phenylvinyl-	2.24		0			590

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TABLE 1. *cont'd*

Monomer 1	Monomer 2	r_1	±95%	r_2	±95%	Conv.	Refs.
Methacrylonitrile	Styrene	0.41		0.37			311
Methacrylonitrile	Styrene	0.42		0.38			311
Methacrylonitrile	Styrene	0.28		0.43			542
Methacrylonitrile	Styrene	0.21		0.34			707
Methacrylonitrile	Styrene	0.25		0.25			75
Methacrylonitrile	Styrene	0.21		0.34			835
Methacrylonitrile	Styrene, α-methoxy-	0.83	0.04	−0.02	0.005	N	143
Methacrylonitrile	Styrene, α-methyl-	0.21		0.15			542
Methacrylonitrile	Styrene, *o*-chloro-	0.86		0.78			44
Methacrylonitrile	Vinyl acetate	12		0.01			75
Methacrylonitrile	Vinyl cinnamate	4.6		0.15			200
Methacrylonitrile	Vinylidene chloride	2.43	0.1	0.3	0.1	N	781
Methacrylonitrile	Vinylidene chloride	2.38	0.05	0.36	0.05	N	781
Methacrylophenone, α-	Methacrylate, methyl	0.11	0.02	1.79	0.07	N	798
Methacrylophenone, α-	Methacrylate, methyl	0.119	0.009	1.74	0.22	Y	798
Methacryloxymethylpentamethyldisiloxane	Methacrylate, 2-hydroxyethyl	0.33		0.97			822
Methacryloxypropyltrimethoxysilane	Styrene	0.58		0.36			951
Methacryloyl chloride	Acrylonitrile	2.8		0.35			580
Methacryloyl chloride	Methacrylate, methyl	0.2		0.45			591
Methacryloyl chloride	Methacrylate, methyl	0.2		0.45			593
Methacryloyl chloride	Pyrrolidone, *N*-vinyl-	0.58		0.05			599
Methacryloyl chloride	Vinyl chloride	2		0.3			432
Methacryloyl fluoride	Methacrylate, methyl	0.43	0.12	0.405	0.037	Y	617
Methacryloyl fluoride	Methacrylate, methyl	0.9	0.16	0.53	0.06	N	660
Methacryloyl fluoride	Styrene	0.164	0.045	0.069	0.014	Y	660
Methacryloyl fluoride, perfluoro-	Vinylidene fluoride	0.02		7.6			669
Methacryloyl isocyanate	Methacrylate, methyl	0.35		0.75			944
Methacryloyl-β-hydroxyethyl-3,5-dinitrobenzoate	Acrylate, *N*-(2-hydroxyethyl)carbazolyl	0.08	0.026	1.04	0.14	Y	702
Methacryloyl-β-hydroxyethyl-3,5-dinitrobenzoate	Acrylate, *N*-(2-hydroxyethyl)carbazolyl	1.364	0.018	0.334	0.022	Y	719
Methacryloyl-β-hydroxyethyl-3,5-dinitrobenzoate	Methacrylate, *N*-ethyl-3-hydroxymethyl-carbazolyl	0.554	0.019	0.729	0.051	Y	701
Methacryloylacetone	Acrylonitrile	3.74	0.22	0.01	0.004	Y	339
Methacryloylacetone	Pyrrolidone, *N*-vinyl-	5.66	0.4	0.008	0.004	Y	339
Methacryloylacetone	Styrene	1.66	0.16	0.067	0.007	Y	339
Methacryloyloxy, 2-benzoate methyl	Methacrylate, *N*-methyl-*N*-phenyl-2-amino ethyl	1.11	0.18	0.55	0.04	N	651
Methacryloyloxy, 2-benzoate methyl	Styrene	0.48	0.02	0.27	0.04	N	651
Methacryloyloxy, 2-benzoic acid methyl	Methacrylate, *N*-methyl-*N*-phenyl-2-amino ethyl	2.6	0.08	0.2	0.01	N	651
Methacryloyloxy, 2-benzoic acid	Styrene	1.17	0.03	0.15	0.04	N	651
Methacryloyloxy, 4-,2,2,6,6-tetramethylpiperidine	Styrene	0.32		0.6			687
Methacryloyloxy-, *o*-, benzoic acid	Methacrylate, methyl	1.37	0.64	0.908	0.252	Y	938
Methacryloyloxy-, *o*-, benzoic acid	Vinylchloride	11.26	3.5	0.004	0.052	Y	938
Methylenebutyrolactone	Acrylamide	2.85		0.3			746
Methylenebutyrolactone	Acrylonitrile	1.1		0.09			745
Methylenebutyrolactone	Methacrylate, methyl	1.67		0.6			746
Methylenebutyrolactone	Styrene	0.7		0.09			746
Methyleneglutaronitrile, 2-	Butadiene					N	196
Methyleneglutaronitrile, 2-	Methacrylate, methyl	0.12	0.74	1.36	0.28	N	196
Methyleneglutaronitrile, 2-	Methacrylate, methyl	0.12		1.27			196
Methyleneglutaronitrile, 2-	Styrene	−0.02	1.3	0.42	0.52	N	196
Methyleneglutaronitrile, 2-	Styrene	0.02		0.5			196
Methyleneglutaronitrile, 2-	Styrene	0.25		0.85			512
Methyleneglutaronitrile, 2-	Vinyl methyl ketone	1.24		5.05			512
Myrcene	Methacrylate, methyl	0.448	0.06	0.256	0.013	Y	1062
Myrcene	Styrene	1.38	0.081	0.891	0.015	Y	1062
Myrcene	Styrene *p*-fluoro-	0.87	0.143	0.362	0.022	Y	1062
N-*N*-Divinylaniline	Acrylonitrile	−0.006	0.07	0.246	0.014	Y	45
N-*N*-Divinylaniline	Methacrylate, methyl	0.005	0.018	1.06	0.18	Y	45
N-*N*-Divinylaniline	Styrene	0.033	0.067	5.38	0.36	Y	45
N-*N*-Divinylaniline	Styrene, *p*-methyl-	0.06	0.03	6.15	0.16	Y	45
N-*N*-Divinylaniline	Vinyl acetate	3.99	0.12	0.058	0.009	Y	45

TABLE 1. *cont'd*

Monomer 1	Monomer 2	r_1	±95%	r_2	±95%	Conv.	Refs.
N-Vinylimidazole	Acrylic acid	0.187	0.025	1.932	0.077	Y	879
N-Vinylimidazole	Acrylonitrile	0.832	0.044	3.393	0.008	Y	879
N-Vinylimidazole	Fumarate, diethyl	0.113	0.019	0.191	0.022	Y	879
N-Vinylimidazole	Fumarate, dimethyl	0.133	0.021	0.252	0.015	Y	879
N-Vinylimidazole	Fumaric acid	0.121	0.01	0.313	0.012	Y	879
N-Vinylimidazole	Maleate, diethyl	0.057	0.028	0.106	0.147	Y	879
N-Vinylimidazole	Maleate, dimethyl	0.046	0.046	0.046	0.438	Y	879
N-Vinylimidazole	Maleic acid	0.018	0.007	0.094	0.027	Y	879
N-Vinylimidazole	Methacrylate, methyl	0.663	0.104	4.306	0.185	Y	879
N-Vinylimidazole	Methacrylic acid	0.145	0.022	1.384	0.034	Y	879
N-Vinylimidazole	Styrene	0.68	0.02	8.377	0.149	Y	879
N-Vinylpyrolidone	Caprolactam, *N*-vinyl-	2.8	0.2	1.7	0.2		883
N-Vinylpyrolidone	Crotonate, hydrocortisone 21-	0.75	0.02	0.05	0.05		1022
N-Vinylpyrrolidone	2-Oxazoline, 2-isopropenyl-	0.01	0.02	3.5	1.2		894
N-Vinylpyrrolidone	Acrylamido-2-methylpropane sulfonate sodium salt	0.13		0.66			939
N-Vinylpyrrolidone	Acrylate, cyclohexyl	0.122	0.014	1.297	0.088		1061
N-Vinylpyrrolidone	Carbamate, *N*-vinyl-*t*-butyl-	0.4	0.06	2.4	0.5		991
N-Vinylpyrrolidone	Ethene, 2-phenyl-1,1-dicyano-					Y	947
N-Vinylpyrrolidone	Itaconate, bis(tri-*n*-butyltin)	0.21	0.013	0.065	0.04	Y	941
N-Vinylpyrrolidone	Methacrylate, 2-acetylsalicylicoyloxy-3-hydroxypropyl	0.34		0.85			1080
N-Vinylpyrrolidone	Methacrylate, furfuryl	0.0036	0.02	5.16	1.13	Y	1050
N-Vinylpyrrolidone	Methacrylate, glycidyl	0.003	0.018	4.29	0.498		1017
N-Vinylpyrrolidone	Methacrylate, methyl	0.006	2.29	4.78	0.236		1084
N-Vinylpyrrolidone	Methacrylate, methyl	0.014	0.899	5.93	0.198		1084
N-Vinylpyrrolidone	Methacrylate, methyl	0.027	0.062	2.07	0.247		1084
N-Vinylpyrrolidone	Methacrylate, methyl	0.066	3.96	4.04	0.956		1084
N-Vinylpyrrolidone	Methacrylate, phenyl	−0.026	0.032	4.17	0.756	Y	1013
N-Vinylpyrrolidone	Pyridine, 2-methyl-5-vinyl-	0.039	0.006	13	2		1070
N-Vinylpyrrolidone	Pyridine, 2-vinyl-	0.014	0.002	12.4	2.3		1070
N-Vinylpyrrolidone	Pyridine, 4-vinyl-	0.01	0.002	9.8	1.5		1070
N-Vinylpyrrolidone	Quinine	2.2		0.37			922
N-Vinylpyrrolidone	Styrene sulfonate, sodium salt	0.084		7.19			939
N-Vinylpyrrolidone	Vinyl trimethylammonioethyl ether iodide	11.6	0.03	0	0.02		1037
Naphthalene, 1-vinyl-	Acrylonitrile	0.451	0.088	0.107	0.028		967
Naphthalene, 1-vinyl-	Methacrylate, methyl	0.574	0.073	0.321	0.096		967
Naphthalene, 1-vinyl-	Styrene	2.02	0.401	0.699	0.233		967
Naphthalene, 1-vinyl-4-chloro-	Styrene	0.75	0.45	0.76	0.68		806
Naphthalene, 2-vinyl-	Styrene	1.345	0.093	0.395	0.049		806
Naphthalene, 2-vinyl-6-chloro-	Styrene	2.44	1.38	0.39	0.6		806
Naphthalene, 6-vinyl-2-*tert*-butyl	Styrene	1.014	0.244	0.616	0.069		806
Nickel diacrylate	Titanium, dicylopentadienyl-, dimethacrylate	0.95		0.65			895
Norbornadiene	Acrylate, ethyl	−0.01	0.03	2.39	0.44	N	267
Norbornadiene	Acrylonitrile	0.05	0.23	0.48	0.27	N	267
Norbornadiene	Acrylonitrile	0.44	0.05	0.66	0.01	N	69
Norbornadiene	Methacrylate, methyl	−0.5	0.52	14.68	16.78	N	267
Norbornadiene	Styrene, *p*-chloro-	0	0.12	69.93	24.19	Y	188
Norbornadiene	Vinyl acetate	1.354	0.07	0.818	0.019	Y	188
Norbornadiene	Vinyl chloride	0.41	0.01	0.67	0.02	N	267
Norbornadiene	Vinylidene chloride	0.09	0.17	1.36	0.63	N	267
Oct-1-ene, 4,8-dioxaspiro(2.5)-	Styrene	0.246	0.024	1.831	0.027	Y	838
Oct-1-ene, 6,6-dimethyl-4,8-dioxaspiro(2.5)-	Acrylonitrile	1.484	1.078	0.985	0.675	Y	838
Oct-1-ene, 6,6-dimethyl-4,8-dioxaspiro(2.5)-	Pyridine, 2-vinyl-	0.073	0.04	2.216	0.062	Y	838
Oct-1-ene, 6,6-dimethyl-4,8-dioxaspiro(2.5)-	Pyrrolidone, *N*-vinyl-	0.552	0.075	−0.009	0.018	Y	838
Oct-1-ene, 6,6-dimethyl-4,8-dioxaspiro(2.5)-	Styrene	0.271	0.109	1.93	0.098	Y	838
Octene-1	Vinyl chloride	−0.57	0.85	3.26	0.45	N	329
Oxazinium F3CSO3, 3-methyl-2-vinyl-5,6-dihydro-4H-1,3-	Methacrylate, methyl	0.31		0.37			909

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TABLE 1. *cont'd*

Monomer 1	Monomer 2	r_1	±95%	r_2	±95%	Conv.	Refs.
Oxazolidone, *N*-vinyl-	Methacrylate, decyl	−0.052	0.049	12.19	1.35	Y	36
Oxazolidone, *N*-vinyl-	Methacrylate, methyl	0.04	0.13	6.75	0.37	Y	102
Oxazolidone, *N*-vinyl-	Methacrylate, methyl	0.027	0.008	9.46	0.39	Y	36
Oxazolidone, *N*-vinyl-	Styrene	−0.029	0.014	29.42	2.19	Y	36
Oxazolidone, *N*-vinyl-	Vinyl acetate	1.55	0.28	0.602	0.038	Y	102
Oxazolidone, *N*-vinyl-	Vinyl acetate	2.04	0.13	0.55	0.18	Y	36
Oxazolidone, *N*-vinyl-	Vinyl chloride	0.822	0.048	0.313	0.095	Y	36
Oxazolidone, *N*-vinyl-	Vinylidene chloride	0.091	0.077	1.42	0.11	Y	102
Oxazoline, 2-, 2-isopropenyl-	Acrylate, butyl	1.4		0.24			862
Oxazoline, 2-, 2-isopropenyl-	Acrylate, ethyl	1.39		0.19			862
Oxazoline, 2-, 2-isopropenyl-	Acrylate, methyl	1.9		0.16			862
Oxazoline, 2-, 2-isopropenyl-	Acrylate, methyl	2.07	0.191	0.328	0.032	Y	877
Oxazoline, 2-, 2-isopropenyl-	Acrylonitrile	0.52		0.13			862
Oxazoline, 2-, 2-isopropenyl-	Methacrylate, methyl	0.99		0.69			862
Oxazoline, 2-, 2-isopropenyl-	Pyrrolidone, *N*-vinyl-	3.5		0.01			862
Oxazoline, 2-, 2-isopropenyl-	Styrene	0.64		0.67			862
Oxazoline, 2-, 2-isopropenyl-	Vinyl acetate	7.1		0.25			862
Oxazoline, 2-, 2-isopropenyl-4,4-dimethyl-	Acrylate, methyl	1.3		0.46			596
Oxazoline, 2-, 2-isopropenyl-4,4-dimethyl-	Acrylonitrile	1.83		0.24			596
Oxazoline, 2-, 2-isopropenyl-4,4-dimethyl-	Methacrylate, methyl	0.82		0.53			596
Oxazoline, 2-, 2-isopropenyl-4,4-dimethyl-	Styrene	0.68		0.55			596
Oxazoline, 2-, 4-acryloxymethyl-2,4-dimethyl-	Acrylate, methyl	0.11		0.29			596
Oxazoline, 2-, 4-acryloxymethyl-2,4-dimethyl-	Methacrylate, methyl	0.11		0.41			596
Oxazoline, 2-, 4-acryloxymethyl-2,4-dimethyl-	Styrene	0.14		0.56			596
Oxazoline, 2-, 4-acryloxymethyl-2,4-dimethyl-	Vinyl acetate	1.41		0.03			596
Oxazoline, 2-, 4-methacryloxy-2,4-dimethyl-	Acrylate, methyl	0.56		0.4			596
Oxazoline, 2-, 4-methacryloxy-2,4-dimethyl-	Acrylonitrile	0.89		0.11			596
Oxazoline, 2-, 4-methacryloxy-2,4-dimethyl-	Methacrylate, methyl	0.19		1.17			596
Oxazoline, 2-, 4-methacryloxy-2,4-dimethyl-	Vinyl acetate	6.2		0.05			596
Oxazoline, 2-isopropenyl-2-	Acrylate, butyl	1.4	0.08	0.24	0.01		894
Oxazoline, 2-isopropenyl-2-	Acrylate, ethyl	1.39	0.06	0.19	0.02		894
Oxazoline, 2-isopropenyl-2-	Acrylate, methyl	1.9	0.08	0.16	0.04		894
Oxazoline, 2-isopropenyl-2-	Acrylonitrile	0.52	0.06	0.13	0.04		894
Oxazoline, 2-isopropenyl-2-	Methacrylate, methyl	0.99	0.07	0.69	0.02		894
Oxazoline, 2-isopropenyl-2-	*N*-Vinylpyrrolidone	3.5	1.2	0.01	0.02		894
Oxazoline, 2-isopropenyl-2-	Styrene	0.64	0.03	0.67	0.02		894
Oxazoline, 2-isopropenyl-2-	Vinyl acetate	7.1	2	0.25	0.04		894
Oxazolinium BF_4, 3-methyl-2-isopropenyl-2-	Acrylate, methyl	0.251	0.483	0.096	0.057	Y	908
Oxazolinium BF_4, 3-methyl-2-isopropenyl-2-	Vinyl acetate	0.413	0.005	0.114	0.021	Y	908
Oxazolinium, 2-, tetrafluoroborate 3-methyl-2-isopropenyl-	Acrylate, methyl	0.344	0.105	0.552	0.043	Y	877
Oxazolinium, 2-, tetrafluoroborate 3-methyl-2-isopropenyl-	Vinyl acetate	0.366	0.151	0.43	0.057	Y	877
Oxazolinium, 2-isopropenyl-2-	Acrylate methyl	2.08	0.327	0.191	0.031	Y	908
Oxirane, 4-vinylphenyl-	Styrene	1.06		0.78			1001
Pentadiene, *cis*-1,3-	Acrylonitrile	0.172	0.012	0.026	0.018	Y	867
Pentadiene, *cis*-1,3-	Acrylonitrile	0.241	0.029	0.06	0.071	Y	867
Pentadiene, *cis*-1,3-	Acrylonitrile	0.017	0.012	0.026	0.173	Y	912
Pentadiene, *cis*-1,3-	Acrylonitrile	0.071	0.029	0.06	0.242	Y	912
Pentadiene, *cis*-1,3-	Acrylonitrile	0.198		0.056			952
Pentadiene, *cis*-1,3-	Acrylonitrile	0.188	0.011	0.033	0.017	N	997

TABLE 1. *cont'd*

Monomer 1	Monomer 2	r_1	±95%	r_2	±95%	Conv.	Refs.
Pentadiene, *cis*-1,3-	Butadiene	0.26		0.63			743
Pentadiene, *cis*-1,3-	Pentadiene, *trans*-1,3-	0.86		0.37			743
Pentadiene, *trans*-1,3-	Acrylonitrile	0.104	0.01	0.07	0.017	Y	867
Pentadiene, *trans*-1,3-	Acrylonitrile	0.095	0.021	0.06	0.064	Y	867
Pentadiene, *trans*-1,3-	Acrylonitrile	0.018	0.01	0.069	0.104	Y	912
Pentadiene, *trans*-1,3-	Acrylonitrile	0.064	0.02	0.068	0.096	Y	912
Pentadiene, *trans*-1,3-	Acrylonitrile	0.132		0.085			952
Pentadiene, *trans*-1,3-	Acrylonitrile	0.114	0.009	0.079	0.018	N	997
Pentadiene, *trans*-1,3-	Butadiene	0.09		1.22			743
Pentadiene, *trans*-1,3-	Methacrylate, methyl	0.379	0.013	0.404	0.038	Y	1058
Pentadiene, *trans*-1,3-	Pentadiene, *cis*-1,3-	0.37		0.86			743
Pentadienoate, *trans*-4-ethoxy-2,4-,ethyl	Styrene	12.2		0.04			723
Pentadienoate, *trans*-4-ethoxy-2,4-,ethyl	Acrylonitrile	5.4		0.01			723
Pentadienoate, *trans*-4-ethoxy-2,4-	Styrene	11.8		0.08			723
Penten-2,4-one	Styrene	−0.033	0.055	13.84	0.57	Y	112
Pentene-1	Vinyl chloride	0.001		4			3
Pentene-1	Vinyl chloride	0.81	5.2	2.08	1.78	N	329
Pentene-1, 2-methyl-	Vinyl chloride	−1.16	2.31	1.59	0.68	N	329
Pentene-1, 5-cyclohexyl-	Acrylonitrile	−0.043	0.044	4.22	0.45	N	24
Pentene-1, 5-phenyl-	Acrylonitrile	−0.026	0.046	3.84	0.48	Y	24
Pentenoate, 3-oxo-4-, ethyl	Styrene	3.29	0.712	0.233	0.069	N	930
Pentenoate, 3-oxo-4-, ethyl	Styrene	1.57	0.193	0.161	0.028	N	930
Pentenoate, 3-oxo-4-, ethyl	Styrene	1.29	0.309	0.215	0.051	N	930
Pentenoate, 3-oxo-4-, ethyl	Styrene	1.4	0.322	0.189	0.05	N	930
Pentenoate, 3-oxo-4-, ethyl	Styrene	0.923	0.075	0.179	0.014	N	930
Pentenoate, 3-oxo-4-, ethyl	Styrene	0.747	0.073	0.164	0.015	N	930
Pentenoate, 3-oxo-4-, ethyl	Styrene	0.635	0.068	0.162	0.015	N	930
Pentenoate, 3-oxo-4-, ethyl	Styrene	1.12	0.112	0.178	0.02	N	930
Pentenoate, 3-oxo-4-, ethyl	Styrene	0.568	0.035	0.217	0.009	N	930
Pentenoate, 3-oxo-4-, ethyl	Methacrylate, methyl	3.39	0.263	0.555	0.032	N	1033
Pentenoate, 3-oxo-4-, ethyl	Methacrylate, methyl	2.02	0.141	0.424	0.022	N	1033
Pentenoate, 3-oxo-4-, ethyl	Methacrylate, methyl	3.06	0.349	0.591	0.046	N	1033
Pentenoate, 3-oxo-4-, ethyl	Methacrylate, methyl	1.67	0.183	0.443	0.032	N	1033
Pentenoate, 3-oxo-4-, ethyl	Methacrylate, methyl	1.24	0.168	0.34	0.031	N	1033
Pentenoate, 3-oxo-4-, ethyl	Methacrylate, methyl	1.72	0.123	0.57	0.023	N	1033
Pentenoate, 3-oxo-4-, ethyl	Methacrylate, methyl	1.69	0.236	0.606	0.045	N	1033
Pentenoate, 3-oxo-4-, ethyl	Methacrylate, methyl	0.72	0.12	0.269	0.027	N	1033
Pentenoate, 3-oxo-4-, ethyl	Methacrylate, methyl	1.55	0.224	0.715	0.048	N	1033
Pentenoate, 3-oxo-4-, ethyl	Methacrylate, methyl	1.09	0.09	0.528	0.02	N	1033
Pentenoate, 4-methyl-3-oxo-4-, ethyl	Methacrylate, methyl	2.56	0.218	0.597	0.03	N	1033
Pentenoate, 4-methyl-3-oxo-4-, ethyl	Methacrylate, methyl	0.748	0.155	0.38	0.034	N	1033
Pentenoate, 4-methyl-3-oxo-4-, ethyl	Methacrylate, methyl	1.14	0.109	0.513	0.022	N	1033
Pentenoate, 4-methyl-3-oxo-4-, ethyl	Methacrylate, methyl	0.952	0.164	0.43	0.034	N	1033
Pentenoate, 4-methyl-3-oxo-4-, ethyl	Methacrylate, methyl	1.67	0.143	0.474	0.023	N	1033
Pentenoate, 4-methyl-3-oxo-4-, ethyl	Methacrylate, methyl	1.04	0.111	0.581	0.025	N	1033
Pentenoate, 4-methyl-3-oxo-4-, ethyl	Methacrylate, methyl	1.05	0.108	0.616	0.024	N	1033
Pentenoate, 4-methyl-3-oxo-4-, ethyl	Methacrylate, methyl	0.725	0.08	0.663	0.023	N	1033
Pentenoate, 4-methyl-3-oxo-4-, ethyl	Methacrylate, methyl	1.09	0.09	0.528	0.02	N	1033
Phenol, 3-(methacryloylamino)-	Styrene	0.99	0.04	0.5	0.06		896
Phenol, 4-(methacryloylamino)-	Styrene	0.86	0.03	0.71	0.04		896
Phosphate diethyl isopropenyl	Acrylonitrile	0.03		15.2			650
Phosphate diethyl isopropenyl	Vinyl acetate	0.44		1.56			650
Phosphate, 2-(acryloyloxy)ethyl diethyl	Methacrylate, methyl	0.486	0.088	2.37	0.046	N	971
Phosphate, 2-(acryloyloxy)ethyl diethyl	Methacrylate, methyl	0.521	0.138	2.23	0.047	N	971
Phosphate, 2-(acryloyloxy)ethyl diethyl	Methacrylate, methyl	0.946	0.436	1.87	0.086	N	971
Phosphate, 2-(acryloyloxy)ethyl diethyl	Methacrylate, methyl	1.16	0.248	1.97	0.029	N	971
Phosphate, 2-(acryloyloxy)ethyl diethyl	Methacrylate, methyl	0.42	0.097	2.1	0.045	N	971
Phosphate, 2-(acryloyloxy)ethyl diethyl	Methacrylate, methyl	0.258	0.226	2.56	0.094	N	971
Phosphate, 2-(acryloyloxy)ethyl diethyl	Methacrylate, methyl	0.0701	0.052	2.04	0.012	N	971
Phosphate, 2-(acryloyloxy)ethyl diethyl	Styrene	0.171	0.01	0.629	0.003	N	971
Phosphate, 2-(acryloyloxy)ethyl diethyl	Styrene	0.15	0.05	0.612	0.004	N	971
Phosphate, 2-(acryloyloxy)ethyl diethyl	Styrene	0.146	0.073	0.595	0.005	N	971
Phosphate, 2-(acryloyloxy)ethyl diethyl	Styrene	0.168	0.355	0.597	0.044	N	971
Phosphate, 2-(acryloyloxy)ethyl diethyl	Styrene	0.094	0.02	0.633	0.002	N	971
Phosphate, 2-(acryloyloxy)ethyl diethyl	Styrene	0.23	0.187	0.61	0.018	N	971

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TABLE 1. *cont'd*

Monomer 1	Monomer 2	r_1	±95%	r_2	±95%	Conv.	Refs.
Phosphate, 2-(acryloyloxy)ethyl diethyl	Styrene	0.108	0.034	0.599	0.002	N	971
Phosphate, vinyl bis(chloroethyl)	Styrene	0.03	0.23	2.47	0.78	Y	133
Phosphate, vinyl diethyl	Vinyl chloride	0.15	0.047	3.4	0.21	Y	779
Phosphate, vinyl diethyl	Vinyl chloroacetate	0.374	0.046	2.01	0.2	Y	779
Phosphate, vinyl diphenyl	Vinyl chloride	0.327	0.023	3.009	0.077	Y	779
Phosphate, vinyl diphenyl	Vinyl chloroacetate	0.53	0.12	1.42	0.15	Y	779
Phosphazene, isopropenylpentafluoro-	Styrene	−0.121	0.088	1.6	0.27	Y	765
Phosphazene, isopropenylpentafluoro-	Styrene, *p*-chloromethyl-	−0.048	0.067	1.64	0.58	Y	765
Phosphine oxide, diphenylvinyl-	Acrylonitrile	0.16		3.8			843
Phosphine oxide, diphenylvinyl-	Vinyl acetate	1.7		0.38			843
Phosphonate, 2-(4-vinylphenyl)ethyl, diethyl	Styrene	1.36		0.55			796
Phosphonate, 4-vinylphenyl, diethyl	Styrene	1.4		0.7			796
Phosphonate, α-bromovinyl-, diethyl	Methacrylate, methyl	0.04		1.25			684
Phosphonate, α-carboethoxyvinyl-, diethyl	Methacrylate, methyl	0.05		1			684
Phosphonate, α-carboethoxyvinyl-, diethyl	Phosphonate, vinyl-, diethyl	0.55		0.62			684
Phosphonate, α-carboethoxyvinyl-, diethyl	Methacrylate, methyl	0.01		4.7			684
Phosphonate, isopropenyl-, dimethyl	Methacrylate, methyl	0.2		30			684
Phosphonate, isopropenyl-, dimethyl	Styrene	0.23		8.6			684
Phosphonate, isopropenyl-, dimethyl	Vinyl acetate	0.99		0.14			684
Phosphonate, vinyl-, bis(2-chloroethyl)	Ethylene	7.73	2.19	0.077	0.003	Y	801
Phosphonate, vinyl-, bis(2-chloroethyl)	Methacrylate, methyl	0.26		29.9			410
Phosphonate, vinyl-, bis(2-chloroethyl)	Styrene	0.02	0.39	2.46	0.43	Y	133
Phosphonate, vinyl-, bis(2-chloroethyl)	Styrene	0.16		2.3			410
Phosphonate, vinyl-, bis(2-chloroethyl)	Styrene	0.2		2.2			485
Phosphonate, vinyl-, bis(2-chloroethyl)	Styrene	0.18		6.32			592
Phosphonate, vinyl-, bis(2-chloroethyl)	Styrene	0.18		6.32			594
Phosphonate, vinyl-, bis(2-chloroethyl)	Vinyl acetate	0.85		0.09			592
Phosphonate, vinyl-, bis(2-chloroethyl)	Vinyl acetate	0.85		0.09			594
Phosphonate, vinyl-, bis(2-chloroethyl)	Vinyl acetate	0.47		0.33			595
Phosphonate, vinyl-, dibutyl	Styrene	−0.12	2.33	4.97	3.44	Y	129
Phosphonate, vinyl-, diethyl	Methacrylate, methyl	0.04		11.1			684
Phosphonate, vinyl-, diethyl	Methacrylic acid	0.15		1.9			431
Phosphonate, vinyl-, diethyl	Phosphonate, α-carbomethoxyvinyl-, diethyl	0.62		0.55			684
Phosphonate, vinyl-, diethyl	Styrene	−0.15	2.18	4.36	4.27	Y	129
Phosphonate, vinyl-, diethyl	Styrene	−0.52	0.22	1.59	0.24	Y	18
Phosphonate, vinyl-, diethyl	Styrene	0.02		2.45			592
Phosphonate, vinyl-, diethyl	Styrene	0		3.88			684
Phosphonate, vinyl-, diethyl	Vinyl acetate	0.74		0.04			592
Phosphonate, vinyl-, diethyl	Vinyl acetate	0.6		0.09			684
Phosphonate, vinyl-, diisobutyl	Ethylene					Y	801
Phosphonate, vinyl-, diisobutyl	Styrene	−0.32	1.46	3.87	1.59	Y	129
Phosphonate, vinyl-, diisopropyl	Styrene	−0.52	2.52	2.57	2.13	Y	129
Phosphonate, vinyl-, dimethyl	Butadiene, 2-chloro-	0.1		7.5			594
Phosphonate, vinyl-, dimethyl	Styrene					Y	129
Phosphonate, vinyl-, dimethyl	Styrene	0.4		4.61			129
Phosphonate, vinyl-, dimethyl	Styrene	0.15		2.45			592
Phosphonate, vinyl-, dimethyl	Styrene	0.02		2.45			594
Phosphonate, vinyl-, dimethyl	Vinyl acetate	0.74		0.04			592
Phosphonate, vinyl-, dimethyl	Vinyl acetate	0.74		0.04			594
Phosphonate, vinyl-, diphenyl	Ethylene	1.66	2.22	0.088	0.01	Y	801
Phosphonate, vinyl-, diphenyl	Styrene	−0.38	0.29	1.74	0.16	Y	129
Phosphonate, vinyl-, dipropyl	Styrene	−0.41	0.72	3.81	0.68	Y	129
Phosphonic acid, α-phenylvinyl	Vinylidene cyanide	0.1		4.58			921
Phosphonic acid, α-phenylvinyl-	Acrylic acid	0.04	0.83	0.7	0.13	Y	132
Phosphonic acid, α-phenylvinyl-	Acrylonitrile	−0.45	0.41	0.34	0.12	Y	132
Phosphonic acid, α-phenylvinyl-	Acrylonitrile	0		2.36			590
Phosphonic acid, α-phenylvinyl-	Butadiene, 2,3-dichloro-	0.07		7.75			588
Phosphonic acid, α-phenylvinyl-	Butadiene, 2,3-dichloro-	0.07		7.75			597
Phosphonic acid, α-phenylvinyl-	Butadiene, 2-chloro-	0.1		7.5			546
Phosphonic acid, α-phenylvinyl-	Butadiene, 2-chloro-	0.1		7.5			597
Phosphonic acid, α-phenylvinyl-	Methacrylate, methyl	−0.063	0.077	1.362	0.084	Y	131
Phosphonic acid, α-phenylvinyl-	Methacrylic acid	0.17	0.3	1.49	0.16	Y	130
Phosphonic acid, α-phenylvinyl-	Methacrylonitrile	0		2.24			590

TABLE 1. *cont'd*

Monomer 1	Monomer 2	r_1	±95%	r_2	±95%	Conv.	Refs.
Phthalide, 3-(4-vinylphenyl)-	Acrylonitrile	0.43	0.19	0.084	0.053	Y	721
Phthalimide, *N*-(4-vinylphenyl)-	Acrylate, methyl	1.56		1.14			636
Phthalimide, *N*-(methacryloyloxy)-	Acrylate, methyl	1.23	0.168	0.193	0.028	Y	979
Phthalimide, *N*-(methacryloyloxy)-	Acrylonitrile	1.45	0.072	0.204	0.016	Y	979
Phthalimide, *N*-(methacryloyloxy)-	Methacrylate, methyl	1.45	0.151	0.69	0.048	Y	979
Phthalimide, *N*-vinyl-	Acrylonitrile	0.24	0.02	0.43	0.01		1046
Phthalimide, *N*-vinyl-	Maleic anhydride	0.344	0.061	0.008	0.012	Y	284
Phthalimide, *N*-vinyl-	Styrene	0.07	0.11	6.27	0.66	Y	163
Pinene	Acrylonitrile	13.5	0.1	0.07	0.01		936
Pinene, α-	Methacrylate, methyl	0.08		10			848
Piperidinol, 4-, *N*–methyl-4-(vinylethynyl)-	Maleimide	2.05	0.03	0.49	0.01		948
Piperylene, *cis*-	Methacrylic acid	0.38		0.4			773
Piperylene, *trans*-	Methacrylic acid	0.33		0.38			773
Propanesulfonate, 3-[diethyl-[2-(2-methacroyloxyethoxy)ethyl	Acrylate, ethyl	0.19	0.02	3.97	1.03	Y	962
Propene, 3,3,3-trichloro-	Acrylonitrile	0.1		12.2			402
Propene, 3,3,3-trichloro-	Styrene	0		6.9			402
Propene, 3,3,3-trichloro-	Vinyl acetate	0.19		0.19			402
Propene, 1-chloro-*cis*-	Acrylonitrile	−0.12	0.19	23.37	2.99	Y	181
Propene, 1-chloro-*cis*-	Maleic anhydride	−0.022	0.08	0.347	0.082	Y	181
Propene, 1-chloro-*cis*-	Vinyl acetate	−0.012	0.061	7.08	0.35	Y	181
Propene, 1-chloro-*cis*-	Vinyl chloride	0.1	0.63	11.52	2.14	Y	181
Propene, 1-chloro-*trans*-	Acrylonitrile	0.01	0.17	19.61	1.72	Y	181
Propene, 1-chloro-*trans*-	Maleic anhydride	0.05	0.015	0.28	0.012	Y	181
Propene, 1-chloro-*trans*-	Vinyl acetate	0.011	0.074	3.13	0.15	Y	181
Propene, 1-chloro-*trans*-	Vinyl chloride	0.33	0.4	4.45	0.81	Y	181
Propene, 2,3-dichloro-	Carbazole, *N*-vinyl-	0		1			376
Propene, 2,3-dichloro-	Methacrylate, methyl	0.18	0.1	6.02	1.66	N	11
Propene, 2,3-dichloro-	Methacrylic acid	0		4			445
Propene, 2,3-dichloro-	Styrene	0.05	0.01	3.51	0.18	N	11
Propene, 2,3-dichloro-	Styrene	0.036		3			983
Propene, 2-chloro-	Acrylonitrile	−0.023	0.062	1.164	0.053	Y	181
Propene, 2-chloro-	Vinyl acetate	1.65	0.36	0.186	0.091	Y	181
Propene, 2-chloro-	Vinyl chloride	4.75	5.12	0.095	0.085	Y	181
Propene, 2-chloro-	Vinyl chloride	0.58		0.75			517
Propene, 2-chloro-	Vinylidene cyanide	0.001	0.003	0.204	0.079	Y	82
Propene, 2-chloro-3-hydroxy-	Methacrylate, methyl	0		4.4			445
Propene, 2-chloro-3-hydroxy-	Methacrylic acid	0		4.5			445
Propene, 2-chloro-3-hydroxy-	Styrene	0		12.5			445
Propene, 3-chloro-2-chloromethyl-	Styrene	0.01	0.1	3.37	0.73		806
Propenyl methyl ketone	Styrene	0.08	0.3	18.12	6.09		806
Propenyl, 2-, acetate	Vinyl chloride	0.25		2.2			189
Propenyl, 2-chloro-, acetate	Acrylate, methyl	0		0.7			445
Propenyl, 2-chloro-, acetate	Acrylic acid	0		1			445
Propenyl, 2-chloro-, acetate	Methacrylate, methyl	0		1			445
Propenyl, 2-chloro-, acetate	Styrene	0		4.1			445
Propenyl, 2-chloro-, acetate	Vinyl chloride	0		0.7			445
Propenyl, 2-methyl-, acetate	Methacrylate, methyl	0		10			470
Propenyl, 2-chloro-, acetate	Styrene	0		71			470
Propenyl, 2-methyl-, acetate	Vinylidene chloride	0		2.4			470
Propenyltriethoxysilane	Vinyl chloride					Y	237
Propiolactam, *N*-phenyl-α-methylene-	Styrene	0.406	0.106	0.626	0.025	Y	1002
Propionate, vinyl	Ethylene, chlorotrifluoro-	0.63	0.04	0.08	0.01		1097
Propylene	Acrylic acid					Y	183
Propylene	Ethylene			3.43			388
Propylene	Ethylene	0.62		3.2			477
Propylene	Ethylene, chlorotrifluoro-	0.08	0.07	0.02	0.08	N	318
Propylene	Vinyl chloride	0.196	0.023	2.35	0.14	Y	155
Propylene	Vinyl chloride	3.1	0.21	−0.05	0.1	N	329
Propylene	Vinyl chloride	−0.02	0.04	5.16	0.06	N	355
Propylene	Vinyl chloride	0.09		2.45			560
Propylene	Vinyl chloride			2.9			588
Pyrazole, 3-methyl-1-vinyl-	Pyrazole, 5-methyl-1-vinyl-	0.42		1.35			898
Pyrazole, 5-methyl-1-vinyl-	Pyrazole, 3-methyl-1-vinyl-	1.35		0.42			898
Pyrazole, *N*-vinyl-3,5-dimethyl-	Styrene	0.049	0.011	8.663	0.196		806

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TABLE 1. *cont'd*

Monomer 1	Monomer 2	r_1	±95%	r_2	±95%	Conv.	Refs.
Pyridazinone, 3-(2-vinyl)-6-methyl-	Acrylonitrile	0.19	0.04	0.32	0.02	N	340
Pyridazinone, 3-(2-vinyl)-6-methyl-	Methacrylate, methyl	0.56	0.04	0.86	0.02	N	340
Pyridazinone, 3-(2-vinyl)-6-methyl-	Styrene	0.85	0.05	0.9	0.03	N	340
Pyridazinone, 3-(2-vinyl)-6-methyl-4,5-dihydro-	Acrylonitrile	0.02	0.02	0.74	0.02	N	340
Pyridazinone, 3-(2-vinyl)-6-methyl-4,5-dihydro-	Methacrylate, methyl	0.08	0.03	1.19	0.04	N	340
Pyridazinone, 3-(2-vinyl)-6-methyl-4,5-dihydro-	Styrene	0.13	0.03	5.92	0.1	N	340
Pyridazone, 2-vinyl-3-	Methacrylate, methyl	1.56		0.63			897
Pyridazone, 2-vinyl-3-	Styrene	0.43		0.53			897
Pyridazone, 2-vinyl-6-methyl-3-	Methacrylate, methyl	0.3		0.16			897
Pyridazone, 2-vinyl-6-methyl-3-	Styrene	1.2		0.9			897
Pyridazone, 2-vinyl-6-methyl-4,5-benz-3-	Methacrylate, methyl	0.27		1.65			897
Pyridazone, 2-vinyl-6-methyl-4,5-benz-3-	Styrene	0.24		0.7			897
Pyridazone, 2-vinyl-6-phenyl-3-	Methacrylate, methyl	0.49		0.58			897
Pyridazone, 2-vinyl-6-phenyl-3-	Styrene	1.45		0.51			897
Pyridine, 2-methyl-5-vinyl-	Acrylate, methyl	1	0.3	0.18	0.05	N	232
Pyridine, 2-methyl-5-vinyl-	Acrylonitrile	0.31	0.02	0.16	0.01	N	232
Pyridine, 2-methyl-5-vinyl-	Butadiene	0.47		0.61			462
Pyridine, 2-methyl-5-vinyl-	Butadiene	0.72		1.32			520
Pyridine, 2-methyl-5-vinyl-	Butadiene	0.41	0.02	1.29	0.02	N	56
Pyridine, 2-methyl-5-vinyl-	Caprolactam, *N*-vinyl-	11.58		0.04			589
Pyridine, 2-methyl-5-vinyl-	Caprolactam, *N*-vinyl-	11.58		0.04			592
Pyridine, 2-methyl-5-vinyl-	Itaconate, diethyl	0.51		0.17			545
Pyridine, 2-methyl-5-vinyl-	Itaconate, dimethyl	0.88		0.22			545
Pyridine, 2-methyl-5-vinyl-	Methacrylate, methyl	0.54	0.19	0.42	0.09	N	232
Pyridine, 2-methyl-5-vinyl-	Methacrylic acid	0.85		0.43			552
Pyridine, 2-methyl-5-vinyl-	*N*-Vinylpyrrolidone	13	2	0.039	0.006		1070
Pyridine, 2-methyl-5-vinyl-	Styrene	0.75	0.08	0.74	0.03	N	232
Pyridine, 2-methyl-5-vinyl-	Styrene	0.68		0.6			500
Pyridine, 2-methyl-5-vinyl-	Styrene	1.2		0.72			514
Pyridine, 2-methyl-5-vinyl-	Styrene	0.78	0.03	0.73	0.03	N	56
Pyridine, 2-methyl-5-vinyl-	Sulfonic acid, *o*-methacryloyl-aminobenzene-	−0.002	0.031	1.83	0.218	Y	1006
Pyridine, 2-methyl-5-vinyl-	Sulfonic acid, *p*-methacryloyl-aminobenzene-	−0.054	0.048	2.72	0.525	Y	1006
Pyridine, 2-methyl-5-vinyl-	Vinyl acetate	9		0.11			812
Pyridine, 2-vinyl-	Acetylene, phenyl-					Y	192
Pyridine, 2-vinyl-	Acrolein	−0.12	0.03	2.64	0.14	N	208
Pyridine, 2-vinyl-	Acrylate, butyl	2.51		0.1			236
Pyridine, 2-vinyl-	Acrylate, butyl	2.59	0.14	0.11	0.01	N	78
Pyridine, 2-vinyl-	Acrylate, ethyl	0.28	0.1	0.21	0.06	N	250
Pyridine, 2-vinyl-	Acrylate, ethyl	2.25		0.21			832
Pyridine, 2-vinyl-	Acrylate, methyl	2.13	0.54	0.37	0.4	Y	2
Pyridine, 2-vinyl-	Acrylate, methyl	1.72	0.26	0.17	0.03	N	231
Pyridine, 2-vinyl-	Acrylate, methyl	2.12	0.1	0.2	0.03	N	749
Pyridine, 2-vinyl-	Acrylonitrile	21.9		0.05			456
Pyridine, 2-vinyl-	Acrylonitrile	0.44	0.08	0.1	0.03		50
Pyridine, 2-vinyl-	Butadiene, 1,4-dicarboxylate-, diethyl	0.41	0.07	0.69	0.23	N	327
Pyridine, 2-vinyl-	Butadiene, 1-carboxylate, ethyl	0.4		0.8			791
Pyridine, 2-vinyl-	Butadiene, 2-chloro-	0.06		5.19			457
Pyridine, 2-vinyl-	Caprolactam, *N*-vinyl-	4.35		0.12			589
Pyridine, 2-vinyl-	Caprolactam, *N*-vinyl-	4.35		0.12			592
Pyridine, 2-vinyl-	Isoprene	0.47		0.59			456
Pyridine, 2-vinyl-	Isoprene	0.46		0.58			458
Pyridine, 2-vinyl-	Methacrylate, 2-hydroxyethyl	0.64	0.16	0.56	0.04	N	342
Pyridine, 2-vinyl-	Methacrylate, methyl	0.73	0.06	0.42	0.02	N	231
Pyridine, 2-vinyl-	Methacrylate, methyl	0.86		0.4			532
Pyridine, 2-vinyl-	Methacrylate, methyl	0.76	0.12	0.35	0.19	Y	6
Pyridine, 2-vinyl-	Methacrylate, methyl	0.64		0.31			623
Pyridine, 2-vinyl-	Methacrylate, methyl	1.1	0.08	0.27	0.04	N	749
Pyridine, 2-vinyl-	Methacrylic acid	1.69	0.71	0.58	0.21	Y	15
Pyridine, 2-vinyl-	Methacrylic acid	1.38		0.44			498
Pyridine, 2-vinyl-	*N*-Vinylpyrrolidone	12.4	2.3	0.014	0.002		1070

TABLE 1. *cont'd*

Monomer 1	Monomer 2	r_1	±95%	r_2	±95%	Conv.	Refs.
Pyridine, 2-vinyl-	Oct-1-ene, 6,6-dimethyl-4,8-dioxaspiro	2.216	0.062	0.073	0.04	Y	838
Pyridine, 2-vinyl-	Styrene	0.75	0.32	0.46	0.15	N	231
Pyridine, 2-vinyl-	Styrene	1.27		0.5			41
Pyridine, 2-vinyl-	Styrene	1.81		0.55			456
Pyridine, 2-vinyl-	Styrene	1.33		0.57			499
Pyridine, 2-vinyl-	Styrene	1.14		0.55			532
Pyridine, 2-vinyl-	Styrene, 2,5-dichloro-	0.62	0.12	0.14	0.18	N	2
Pyridine, 2-vinyl-	Vinyl acetate	13.65	3.64	−0.11	0.17	Y	6
Pyridine, 2-vinyl-	Vinyl acetate	30		0			6
Pyridine, 2-vinyl-5-ethyl-	Acrylate, methyl	1.32	0.03	0.18	0.004	N	231
Pyridine, 2-vinyl-5-ethyl-	Acrylonitrile	0.43		0.02			115
Pyridine, 2-vinyl-5-ethyl-	Acrylonitrile	0.43	0.18	0.06	0.07	N	50
Pyridine, 2-vinyl-5-ethyl-	Methacrylate, methyl	0.68	0.06	0.39	0.02	N	231
Pyridine, 2-vinyl-5-ethyl-	Styrene	1.09	0.12	0.74	0.05	N	231
Pyridine, 3-ethynyl-6-methyl-	Styrene	0.15		2.3			784
Pyridine, 3-vinyl-	Methacrylate, 2-hydroxyethyl	0.73	0.04	0.69	0.01	N	342
Pyridine, 4-vinyl-	Acrylate, (−)-menthyl	2.32	0.45	0.291	0.017	Y	667
Pyridine, 4-vinyl-	Acrylate, butyl	4.3	0.34	0.23	0.04	N	78
Pyridine, 4-vinyl-	Acrylate, ethyl	2.58		0.29			832
Pyridine, 4-vinyl-	Acrylate, methyl	1.78	0.32	0.2	0.03	N	231
Pyridine, 4-vinyl-	Acrylate, methyl	2.14		0.15			424
Pyridine, 4-vinyl-	Acrylonitrile	0.41		0.11			115
Pyridine, 4-vinyl-	Acrylonitrile	0.34	0.13	0.09	0.04	N	50
Pyridine, 4-vinyl-	Caprolactam, *N*-vinyl-	4.43		0.1			589
Pyridine, 4-vinyl-	Caprolactam, *N*-vinyl-	4.43		0.1			592
Pyridine, 4-vinyl-	Isoprene	2.49		0.32			424
Pyridine, 4-vinyl-	Methacrylate, 2-hydroxyethyl	0.9	0.09	0.62	0.04	N	342
Pyridine, 4-vinyl-	Methacrylate, methyl	0.77	0.07	0.57	0.02	N	231
Pyridine, 4-vinyl-	Methacrylate, methyl	0.99	0.18	0.54	0.01	N	691
Pyridine, 4-vinyl-	*N*-Vinylpyrrolidone	9.8	1.5	0.01	0.002		1070
Pyridine, 4-vinyl-	Styrene	0.69	0.16	0.52	0.07	N	231
Pyridine, 4-vinyl-	Styrene	1.04	0.22	−0.73	1.09	Y	79
Pyridine, 4-vinyl-	Vinyl chloride					Y	154
Pyridine, 4-vinyl-	Vinyl ether	32		0.03			395
Pyridine, 4-vinyl-	Vinylhydroquinone	0.53	0.4	−0.23	0.36	Y	337
Pyridine, *N*-oxide-, 2-vinyl-5-ethyl-	Styrene	2.27	0.88	0.06	0.11		806
Pyrimidine-2-one, 1,3-divinylhexahydro-	Acrylate, ethyl	−0.05	0.03	0.59	0.13	N	800
Pyrimidine, 2-*N*-*N*-dimethylamino-4-vinyl-	Styrene	1.404	0.071	0.338	0.017	Y	243
Pyrimidine, 4-vinyl-	Styrene	2.38	1.06	0.219	0.095	Y	243
Pyrrolidone, 1-benzyl-3-methylene-5-methyl-	Acrylate, methyl	1.58	0.24	0.125	0.025	Y	633
Pyrrolidone, 1-benzyl-3-methylene-5-methyl-	Methacrylate, methyl	2.28	0.47	0.387	0.07	Y	633
Pyrrolidone, 1-benzyl-3-methylene-5-methyl-	Styrene	0.71	0.17	0.555	0.053	Y	633
Pyrrolidone, *N*-vinyl-	Acenaphthalene					N	326
Pyrrolidone, *N*-vinyl-	Acrylate, 2,4,5-trichlorophenyl	0.012	0.008	0.163	0.02	Y	840
Pyrrolidone, *N*-vinyl-	Acrylate, 2-chloroethyl	0.03		0.52			790
Pyrrolidone, *N*-vinyl-	Acrylic acid	0.1	0.21	0.88	0.69	N	250
Pyrrolidone, *N*-vinyl-	Acrylic acid, α-bromo-	0.25		0.07			694
Pyrrolidone, *N*-vinyl-	Acrylonitrile					Y	213
Pyrrolidone, *N*-vinyl-	Acryloyl chloride	0.04		0.15			599
Pyrrolidone, *N*-vinyl-	Caprolactam, *N*-vinyl-	2.8		1.7			859
Pyrrolidone, *N*-vinyl-	Carbamate, *N*-vinyl-, ethyl	1.77	0.12	0.371	0.05	Y	81
Pyrrolidone, *N*-vinyl-	Cinnamate, α-cyano-, methyl	0.044	0.008	−0.001	0.001	Y	816
Pyrrolidone, *N*-vinyl-	Crotonaldehyde	0.42	0.02	−0.15	0.01	N	248
Pyrrolidone, *N*-vinyl-	Crotonic acid	0.84	0.07	0	0.03	N	245
Pyrrolidone, *N*-vinyl-	Dioxolane, 1,3,4-methylene-2-trichlor	2.98		0.04			647
Pyrrolidone, *N*-vinyl-	Dioxolane, 1,3-, 4,4-dimethyl-5-methyl	3.87		0.01			647
Pyrrolidone, *N*-vinyl-	Ethylene, chlorotrifluoro-	0.38		0.3			830
Pyrrolidone, *N*-vinyl-	Fumarate, dioctyl	0.02	0.01	0.04	0.04	N	121
Pyrrolidone, *N*-vinyl-	Imidazole, 1-vinyl-	0.16	0.074	0.96	0.19	Y	364
Pyrrolidone, *N*-vinyl-	Maleimide, *N*-(2-hydroxyethyl)-	0.002	0.002	0.038	0.01	Y	323
Pyrrolidone, *N*-vinyl-	Methacrylate, 2-bromoethyl	0.02		2.44			657
Pyrrolidone, *N*-vinyl-	Methacrylate, 2-hydroxyethyl	−0.019	0.046	4.841	0.133	Y	840

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TABLE 1. *cont'd*

Monomer 1	Monomer 2	r_1	±95%	r_2	±95%	Conv.	Refs.
Pyrrolidone, *N*-vinyl-	Methacrylate, ferrocenylmethyl	0.073	0.096	2.57	2.77	Y	325
Pyrrolidone, *N*-vinyl-	Methacrylate, methyl					Y	213
Pyrrolidone, *N*-vinyl-	Methacrylate, methyl	−0.05	0.08	5.62	0.3	N	320
Pyrrolidone, *N*-vinyl-	Methacrylate, methyl	−0.032	0.068	4.63	0.34	Y	321
Pyrrolidone, *N*-vinyl-	Methacrylate, methyl	−0.052	0.028	4.36	0.61	Y	36
Pyrrolidone, *N*-vinyl-	Methacrylate, methyl	0.01	0.15	4.04	0.61	N	691
Pyrrolidone, *N*-vinyl-	Methacryloyl chloride	0.05		0.58			599
Pyrrolidone, *N*-vinyl-	Methacryloylacetone	0.008	0.004	5.66	0.4	Y	339
Pyrrolidone, *N*-vinyl-	Oct-1-ene, 6,6-dimethyl-4,8-dioxaspiro	−0.009	0.018	0.552	0.075	Y	838
Pyrrolidone, *N*-vinyl-	Oxazoline, 2-, 2-isopropenyl-	0.01		3.5			862
Pyrrolidone, *N*-vinyl-	Styrene	0.057	0.028	17.2	1.55	Y	36
Pyrrolidone, *N*-vinyl-	Succinimide, *N*-vinyl-	0.97	0.42	3.67	0.89	N	96
Pyrrolidone, *N*-vinyl-	Triazine, 2-allyloxy-4,6-dichloro-	0.98		0.5			826
Pyrrolidone, *N*-vinyl-	Vinyl acetate	1.06	0.25	0.26	0.25	Y	103
Pyrrolidone, *N*-vinyl-	Vinyl acetate	1.75	2.79	0.19	1.77	N	121
Pyrrolidone, *N*-vinyl-	Vinyl acetate	3.4	0.21	0.195	0.057	Y	36
Pyrrolidone, *N*-vinyl-	Vinyl benzoate	2.507	0.039	0.408	0.03	Y	253
Pyrrolidone, *N*-vinyl-	Vinyl butyl ether	1.49	0.95	−0.027	0.063	Y	215
Pyrrolidone, *N*-vinyl-	Vinyl chloride	0.38		0.53			40
Pyrrolidone, *N*-vinyl-	Vinyl chloride	0.34		0.55			582
Pyrrolidone, *N*-vinyl-	Vinyl chloride	0.73		0.74			582
Pyrrolidone, *N*-vinyl-	Vinyl cinnamate	0.01		1.2			200
Pyrrolidone, *N*-vinyl-	Vinyl cyclohexyl ether	1.91	9.39	−0.11	0.59	Y	214
Pyrrolidone, *N*-vinyl-	Vinyl cymantrene	0.037	0.03	0.093	0.053	Y	308
Pyrrolidone, *N*-vinyl-	Vinyl ethylene glycol glycidyl ether	1.4		0.06			369
Pyrrolidone, *N*-vinyl-	Vinyl ethyleneglycol glycidyl ether	1.4		0.06			818
Pyrrolidone, *N*-vinyl-	Vinyl isopropyl ether	0.87	9.3	0.03	2.09	Y	215
Pyrrolidone, *N*-vinyl-	Vinyl phenyl ether	4.48	0.1	0.253	0.007	Y	214
Pyrrolidone, *N*-vinyl-	Vinylene carbonate	1.08	0.11	0.056	0.059	Y	103
Pyrrolidone, *N*-vinyl-	Vinylferrocene	0.364	0.068	0.71	0.16	Y	308
Pyrrolidone, α-methylene-*N*-methyl-	Methacrylate, methyl	0.24	0.14	0.577	0.058	Y	641
Quinine	*N*-Vinylpyrrolidone	0.37		2.2			922
Quinoline, 2-vinyl-	Butadiene, 2-chloro-	0.38		2.1			456
Quinoline, 2-vinyl-	Isoprene	0.53		1.88			456
Quinoline, 2-vinyl-	Styrene	2.09		0.49			456
Quinoline, 2-vinyl-	Styrene	2.69		0.49			458
S-Ethyl *N*-vinyl-*N*-methylthiolcarbamate	Styrene	−0.11	0.26	10	1.72	Y	197
S-Ethyl *N*-vinyl-*N*-methylthiolcarbamate	Vinyl acetate	1.22	1.17	0.67	0.1	Y	197
S-Vinyl *N*, *N*-diethylthiolcarbamate	Styrene	0.1	0.34	4.45	0.48	Y	197
S-Vinyl *N*, *N*-diethylthiolcarbamate	Vinyl acetate	1.89	0.77	0.133	0.025	Y	197
Silane, γ-methacryloxypropyltrimethoxy-	Acrylonitrile	3.79	0.594	0.094	0.034	Y	977
Silane, γ-methacryloxypropyltrimethoxy-	Methacrylate, methyl	2.06	0.309	0.788	0.082	Y	977
Silane, γ-methacryloxypropyltrimethoxy-	Styrene	0.868	0.096	0.425	0.048	Y	977
Silane, methacryloxypropyldimethoxy-methyl-	Imidazole, *N*-Vinyl-	1.39		0.079			1095
Silane, methacryloxypropyltrimethoxy-	Imidazole, *N*-Vinyl-	2.27	1.12	0.158	0.04	Y	1088
Stilbene	Acenaphthalene	−0.01	0.04	5.65	0.23	N	725
Stilbene	Styrene	0	0.09	3.92	0.17	N	725
Styrene	2-Oxazoline, 2-isopropenyl-	0.67	0.02	0.64	0.03		894
Styrene	3-Pyridazone, 2-vinyl-	0.53		0.43			897
Styrene	3-Pyridazone, 2-vinyl-6-methyl-	0.9		1.2			897
Styrene	3-Pyridazone, 2-vinyl-6-methyl-4,5-benz-3-	0.7		0.24			897
Styrene	3-Pyridazone, 2-vinyl-6-phenyl-	0.51		1.45			897
Styrene	4-Pentenoate, 3-oxo-, ethyl	0.233	0.069	3.29	0.712	N	930
Styrene	4-Pentenoate, 3-oxo-, ethyl	0.161	0.028	1.57	0.193	N	930
Styrene	4-Pentenoate, 3-oxo-, ethyl	0.215	0.051	1.29	0.309	N	930
Styrene	4-Pentenoate, 3-oxo-, ethyl	0.189	0.05	1.4	0.322	N	930
Styrene	4-Pentenoate, 3-oxo-, ethyl	0.179	0.014	0.923	0.075	N	930
Styrene	4-Pentenoate, 3-oxo-, ethyl	0.164	0.015	0.747	0.073	N	930
Styrene	4-Pentenoate, 3-oxo-, ethyl	0.162	0.015	0.635	0.068	N	930
Styrene	4-Pentenoate, 3-oxo-, ethyl	0.178	0.02	1.12	0.112	N	930
Styrene	4-Pentenoate, 3-oxo-, ethyl	0.217	0.009	0.568	0.035	N	930
Styrene	Acenaphthalene	3.81		0.33			525
Styrene	Acetylene, phenyl-	0.324	0.02	0.33	0.12	Y	357

TABLE 1. *cont'd*

Monomer 1	Monomer 2	r_1	±95%	r_2	±95%	Conv.	Refs.
Styrene	Aconitate, trimethyl	1.026	0.091	−0.013	0.009	Y	147
Styrene	Acrolein	0.257	0.017	0.216	0.036	Y	291
Styrene	Acrolein	0.22	0.02	0.02	0.01	N	292
Styrene	Acrolein	0.205	0.006	0.32	0.002	Y	307
Styrene	Acrolein, 2-chloro-	0.02	0.05	0.15	0.07		806
Styrene	Acrolein, methyl-	0.173	0.017	0.833	0.092	Y	223
Styrene	Acrolein, methyl-	0.41		0.3			589
Styrene	Acrylamide	1.17	0.06	0.58	0.12	N	295
Styrene	Acrylamide	1.21	0.04	1.32	0.13	N	314
Styrene	Acrylamide	1.49	0.16	0.33	0.14	N	314
Styrene	Acrylamide	1.13		0.59			314
Styrene	Acrylamide	0.65	0.03	8.97	0.43	N	343
Styrene	Acrylamide	1.05		0.2			555
Styrene	Acrylamide, 2-chloro-*N,N*-dimethyl-	1.29	0.065	−0.036	0.152	Y	917
Styrene	Acrylamide, *N,N*-dibutyl-	1.6	0.058	0.294	0.058		806
Styrene	Acrylamide, *N,N*-diethyl-	1.23		0.39			739
Styrene	Acrylamide, *N,N*-diethyl-	1.36		0.34			739
Styrene	Acrylamide, *N,N*-diethyl	1.54		0.18			739
Styrene	Acrylamide, *N,N*-dimethyl-	1.15	0.35	0.12	0.3	N	170
Styrene	Acrylamide, *N,N*-dimethyl-	1.37	0.1	0.49	0.15	N	315
Styrene	Acrylamide, *N,N*-dimethyl-	1.32	0.12	0.47	0.2	N	315
Styrene	Acrylamide, *N*-(2-propionamido)-	1.84	0.21	0.86	0.3	N	295
Styrene	Acrylamide, *N*-methylol-	0.03		0.48			596
Styrene	Acrylamide, *N*-methylol-	1.55	0.05	0.4	0.03		891
Styrene	Acrylamide, *N*-octadecyl-	2.08	0.12	0.54	0.14	Y	290
Styrene	Acrylamide, *N*-octyl-	2.715	0.244	0.258	0.119		806
Styrene	Acrylamido, 1- , -1-deoxy-D-glucitol	2.42	0.08	0.03	0.02	N	258
Styrene	Acrylamidomethylamino, *p*-, azobenzene	0.083		8.5			858
Styrene	Acrylate, 2,3-dibromopropyl	0.42		0.16			643
Styrene	Acrylate, 2,4,5-trichlorophenyl	0.277	0.048	0.23	0.021	Y	622
Styrene	Acrylate, 2,4,6-tribromophenyl	0.2		0.1			643
Styrene	Acrylate, 2-chloroethyl	0.55	0.47	0.1	0.17	Y	140
Styrene	Acrylate, 2-chloroethyl	0.494	0.097	0.139	0.083	Y	178
Styrene	Acrylate, 2-chloroethyl	0.54		0.12			790
Styrene	Acrylate, 2-chloroethylglucitol	0.49	0.2	0.14	0.09		806
Styrene	Acrylate, 2-cyanoethyl	0.399	0.032	0.128	0.074	Y	178
Styrene	Acrylate, 2-ethylhexyl	0.96	0.3	0.31	0.6	N	126
Styrene	Acrylate, 2-ethylhexyl	0.94		0.26			463
Styrene	Acrylate, 2-nitrobutyl	0.35	0.03	0.12	0.01	N	234
Styrene	Acrylate, 3,4-epoxyhexahydrobenzyl	0.27	0.3	1.97	0.35	N	680
Styrene	Acrylate, β-acetoxymethyl-, methyl	0.34		0.19			1091
Styrene	Acrylate, β-ethoxy-, ethyl	46.98	27.03	−0.21	0.44	Y	194
Styrene	Acrylate, α-(4-chlorobenzyl)-, ethyl	0.04	0.09	1.03	0.13		806
Styrene	Acrylate, α-(4-cyanobenzyl)-, ethyl	0.06	0.05	0.65	0.09		806
Styrene	Acrylate, α-(4-methoxybenzyl)-, ethyl	0.33	0.3	0.71	0.24		806
Styrene	Acrylate, α-(hydroxymethyl)-, methyl	0.36		0.34			932
Styrene	Acrylate, α-[2,2-bis(carbomethoxy)-ethyl]-, methyl	0.58		0.09			1092
Styrene	Acrylate, α-acetoxy-, ethyl	0.557	0.031	0.173	0.01	Y	244
Styrene	Acrylate, α-benzyl-, ethyl	0.14	0.17	0.9	0.2		806
Styrene	Acrylate, α-benzyl-, methyl	0.57	0.028	0.175	0.053	Y	49
Styrene	Acrylate, α-bromo-, ethyl	0.02	0.04	0.44	0.08		806
Styrene	Acrylate, α-butyl-, methyl	0.812	0.043	0.205	0.053	Y	49
Styrene	Acrylate, α-chloro-, ethyl	0.08	0.07	0.32	0.11		806
Styrene	Acrylate, α-chloro-, methyl	0.25		0.3			74
Styrene	Acrylate, α-cyano-, methyl	0.05	0.01	0.61	0.05	N	141
Styrene	Acrylate, α-cyclohexyl-, methyl	1.615	0.048	−0.001	0.034	Y	49
Styrene	Acrylate, α-ethyl-, methyl	0.758	0.014	0.197	0.014	Y	49
Styrene	Acrylate, α-ethyloxymethyl-, methyl	0.37		0.24			1047
Styrene	Acrylate, α-fluoro-, methyl	0.66	0.17	0.16	0.11		806
Styrene	Acrylate, α-hexafluoropropyloxymethyl-, methyl	0.23		0.07			1047
Styrene	Acrylate, α-hydroxymethyl-, ethyl	0.468	0.03	0.546	0.127	Y	982
Styrene	Acrylate, α-isobutyl-, methyl	0.974	0.022	0.202	0.042	Y	49

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TABLE 1. *cont'd*

Monomer 1	Monomer 2	r_1	±95%	r_2	±95%	Conv.	Refs.
Styrene	Acrylate, α-isopropyl-, methyl	1.872	0.052	0.036	0.034	Y	49
Styrene	Acrylate, α-isopropyloxymethyl-, methyl	0.41		0.26			1047
Styrene	Acrylate, α-methoxy-, methyl	1.131	0.078	0.513	0.058		806
Styrene	Acrylate, α-phenoxymethyl-, methyl	0.176	0.05	0.256	0.102	Y	1048
Styrene	Acrylate, α-phenyl-, chloroethyl	0.025	0.015	0.201	0.09	Y	488
Styrene	Acrylate, α-phenyl-, methyl	0.06		1			141
Styrene	Acrylate, α-phenyl-, methyl	0.03		0.4			399
Styrene	Acrylate, α-phenyl-, methyl	0.06		0.45			488
Styrene	Acrylate, α-phenyl-, methyl	1.176	0.015	1.275	0.008	Y	49
Styrene	Acrylate, α-phenyl-, propyl	0.03	0.015	0.126	0.063	Y	488
Styrene	Acrylate, α-phenyl-, butyl	0.04	0.022	0.107	0.055	Y	488
Styrene	Acrylate, α-propyl-, methyl	0.821	0.029	0.208	0.07	Y	49
Styrene	Acrylate, α-propyloxymethyl-, methyl	0.47		0.29			1047
Styrene	Acrylate, α-*sec*-butyl-, methyl	2.29	0.068	0.004	0.024	Y	49
Styrene	Acrylate, α-tetrafluoropropyloxymethyl-, methyl	0.37		0.17			1047
Styrene	Acrylate, α-trifluoroethyloxymethyl-, methyl	0.26		0.2			1047
Styrene	Acrylate, α-trimethylsiloxy-, methyl	0.46		1.42			1101
Styrene	Acrylate, benzyl	0.494	0.05	0.2	0.12	Y	178
Styrene	Acrylate, benzyl	0.534	0.028	0.248	0.041	Y	277
Styrene	Acrylate, butyl	0.79	0.08	0.25	0.05		1032
Styrene	Acrylate, butyl	0.79	0.11	0.34	0.06		1032
Styrene	Acrylate, butyl	0.75	0.1	0.38	0.05		1032
Styrene	Acrylate, butyl	1.23	0.21	−0.106	0.099	N	19
Styrene	Acrylate, butyl	0.44	0.03	0.29	0.05	N	20
Styrene	Acrylate, butyl	0.84	0.2	0.18	0.03	N	38
Styrene	Acrylate, butyl	0.66		0.19			38
Styrene	Acrylate, butyl	0.82		0.21			463
Styrene	Acrylate, butyl	0.8		0.15			549
Styrene	Acrylate, butyl	0.698		0.164			612
Styrene	Acrylate, butyl	0.698		0.164			632
Styrene	Acrylate, *cis*-β-cyano-, methyl					N	1034
Styrene	Acrylate, cyclododecyl	0.47	0.14	0.34	0.15		806
Styrene	Acrylate, cyclododecyl	0.54	0.08	0.31	0.08		806
Styrene	Acrylate, cyclododecyl	0.461	0.07	0.301	0.072		806
Styrene	Acrylate, cyclohexyl	0.913	0.107	0.272	0.048		1061
Styrene	Acrylate, cyclohexyl	0.885	0.102	0.254	0.141		806
Styrene	Actylate, cyclohexyl	0.53	0.11	0.16	0.13		806
Styrene	Acrylate, cyclohexyl	0.7	0.12	0.17	0.09		806
Styrene	Acrylate, cyclohexyl	0.58	0.1	0.18	0.07		806
Styrene	Acrylate, di-, copper	1.74	0.03	0.56	0.09	N	829
Styrene	Acrylate, di-, copper	5.94	0.05	0.12	0.08	N	829
Styrene	Acrylate, di-, nickel	1.83	0.02	0.53	0.06	N	829
Styrene	Acrylate, di-, zinc	1.1	0.02	0.9	0.07	N	829
Styrene	Acrylate, diethylaluminum	−0.002	0.016	0.046	0.035	Y	652
Styrene	Acrylate, diethylaluminum					Y	652
Styrene	Acrylate, ethyl	0.699	0.072	0.139	0.085	Y	178
Styrene	Acrylate, ethyl	1.01		0.16			463
Styrene	Acrylate, ethyl	0.79		0.19			530
Styrene	Acrylate, ethyl	0.8		0.2			530
Styrene	Acrylate, ethyl	0.8		0.48			542
Styrene	Acrylate, ethyl	0.787		0.152			673
Styrene	Acrylate, ethyl	0.787		0.152			677
Styrene	Acrylate, ferrocenylmethyl	1.87	0.17	−0.016	0.06	Y	293
Styrene	Acrylate, ferrocenylmethyl	2.3		0.02			293
Styrene	Acrylate, ferrocenylmethyl	2.5		0.02			576
Styrene	Acrylate, glycidyl	0.6		0.17			114
Styrene	Acrylate, glycidyl	0.73	0.34	0.24	0.58	N	126
Styrene	Acrylate, heptafluorobutyl	0.31	0.01	0.049	0.013	Y	206
Styrene	Acrylate, isopropyl	0.755	0.024	0.195	0.027	Y	178
Styrene	Acrylate, methyl	0.82		0.24			139
Styrene	Acrylate, methyl	0.192	0.057	0.8	0.21	Y	14
Styrene	Acrylate, methyl	0.722	0.056	0.168	0.067	Y	151

TABLE 1. *cont'd*

Monomer 1	Monomer 2	r_1	±95%	r_2	±95%	Conv.	Refs.
Styrene	Acrylate, methyl	0.75		0.18			393
Styrene	Acrylate, methyl	0.75		0.18			397
Styrene	Acrylate, methyl	0.68		0.14			463
Styrene	Acrylate, methyl	0.9		0.07			495
Styrene	Acrylate, methyl	0.65		0.3			496
Styrene	Acrylate, methyl	0.4		0.16			496
Styrene	Acrylate, methyl	0.871	0.022	0.148	0.026	Y	865
Styrene	Acrylate, octadecyl	0.777	0.018	0.37	0.12	Y	290
Styrene	Acrylate, octadecyl	0.44		0.18			290
Styrene	Acrylate, octadecyl	0.79		0.31			290
Styrene	Acrylate, octadecyl	0.44		0.18			290
Styrene	Acrylate, octyl	0.39	0.11	0.01	0.53		806
Styrene	Acrylate, *p*-(cinnamoylamino)phenyl	1.08		0.35			685
Styrene	Acrylate, pentabromophenyl	0.16		0.1			643
Styrene	Acrylate, pentachlorophenyl	2.11		0.9			900
Styrene	Acrylate, tetrahydrofurfuryl	0.475	0.186	0.489	0.196		806
Styrene	Acrylate, thio-, butyl	0.439	0.14	0.421	0.17		806
Styrene	Acrylate, thio-, ethyl	0.18	0.038	0.291	0.075		806
Styrene	Acrylate, thio-, *tert*-butyl	0.157	0.034	0.368	0.055		806
Styrene	Acrylate, trifluoro-, methyl	1.4		0			595
Styrene	Acrylate, trifluoro-, methyl	1.4		0			598
Styrene	Acrylic acid	0.25		0.05			312
Styrene	Acrylic acid	1.1		0.08			312
Styrene	Acrylic acid	0.15		0.25			397
Styrene	Acrylic acid	0.22		0.35			414
Styrene	Acrylic acid	0.253	0.069	0.136	0.029	Y	47
Styrene	Acrylic acid	0.25		0.15			490
Styrene	Acrylic acid	0.25		0.45			542
Styrene	Acrylic acid	0.15		0.25			561
Styrene	Acrylic acid, 2-benzamido-	0.13		0.78			1019
Styrene	Acrylic acid, *N*-acetyl-α-amino-	0.91		0.44			661
Styrene	Acrylic anhydride	0.16	0.01	0.1	0.004	N	219
Styrene	Acrylonitrile	0.33		0			140
Styrene	Acrylonitrile	0.29	0.04	0.02	0.06	N	198
Styrene	Acrylonitrile	0.4		0.05			269
Styrene	Acrylonitrile	0.36		0.03			396
Styrene	Acrylonitrile	0.39		0.06			403
Styrene	Acrylonitrile	0.37		0.05			417
Styrene	Acrylonitrile	0.37		0.07			543
Styrene	Acrylonitrile	0.4		0.04			60
Styrene	Acrylonitrile	0.3		0.17			727
Styrene	Acrylonitrile	0.33		0.17			727
Styrene	Acrylonitrile	0.33		0.15			727
Styrene	Acrylonitrile	0.36		0.17			727
Styrene	Acrylonitrile	0.46		0.07			727
Styrene	Acrylonitrile	0.41		0.06			727
Styrene	Acrylonitrile	0.43		0.03			727
Styrene	Acrylonitrile	0.55		0.06			727
Styrene	Acrylonitrile	0.35		0.01			812
Styrene	Acrylonitrile- 2-chloro-	0.014	0.004	0.087	0.04	Y	884
Styrene	Acrylonitrile, 2-fluoro-					Y	884
Styrene	Acrylonitrile, α-chloro-	0.13	0.04	0.03	0.02		806
Styrene	Acrylonitrile, α-fluoro-	0.44		0.03			850
Styrene	Acrylonitrile, α-hydroxymethyl-	0.205	0.029	0.528	0.086	Y	981
Styrene	Acrylonitrile, α-methoxy-	0.534	0.069	0.312	0.054		806
Styrene	Acryloyl chloride	0.1	0.05	0.02	0.02	N	220
Styrene	Acryloyloxy, 2-, benzoic acid	0.06	0.02	0.64	0.02	N	651
Styrene	Adipate, divinyl	20.36	0.26	0.011	0.011	Y	815
Styrene	Allyl acetate	62.8	82.7	0.01	0.05	N	1053
Styrene	Allyl acetate	90		0			470
Styrene	Allyl chloride	35.55	15.82	0.05	0.16	Y	10
Styrene	Allyl chloride					Y	204
Styrene	Allyl chloride	36.8		0.03			438
Styrene	Allyl glycidyl hexahydrophthalate	34.3		0.06			782
Styrene	Allyl glycidyl phthalate	34.8		0.14			782

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TABLE 1. *cont'd*

Monomer 1	Monomer 2	r_1	±95%	r_2	±95%	Conv.	Refs.
Styrene	Allyl trichloroacetate	2.32	0.15	0.81	0.02		913
Styrene	Azlactone, 2-vinyl-4,4-dimethyl-	0.175	0.054	0.237	0.129	Y	1011
Styrene	Azobenzene, 4-(acrylamidomethylamino)-	0.083	8.5				880
Styrene	Benzimidazole, vinylmercapto-	6.51	0.51	0.56	0.41	Y	764
Styrene	Benzothiazole, vinylmercapto-	2.171	0.07	0.349	0.087	Y	764
Styrene	Benzothiazole, vinylmercapto-	3.02	0.14	0.5	0.095	Y	764
Styrene	Benzothiazolone, *N*-[(methacroyloxy)methyl]	0.35	0.02	3.1	0.01		960
Styrene	Benzoxazole, vinylmercapto-	2.87	0.19	0.24	0.12	Y	764
Styrene	Bicyclo[2,2,1]hept-2-ene-5,6-dicarboximide, *N*-benzyl	18.2		0			994
Styrene	Bicyclo[2,2,1]hept-2-ene-5,6-dicarboximide, *N*-benzyl	89.2		0			994
Styrene	Borazine, β-vinyl	4.53	0.62	0.001	0.016		1018
Styrene	Butadiene	0.84	0.4	1.44	0.56	Y	140
Styrene	Butadiene	0.37	0.25	1.55	0.14	N	159
Styrene	Butadiene	0.38		1.37			173
Styrene	Butadiene					Y	21
Styrene	Butadiene	0.58		1.35			418
Styrene	Butadiene	0.44		1.59			428
Styrene	Butadiene	0.6		1.8			473
Styrene	Butadiene	0.44		1.4			486
Styrene	Butadiene	0.38		1.4			486
Styrene	Butadiene	0.68		0.5			491
Styrene	Butadiene	0.82	0.13	1.38	0.11	N	56
Styrene	Butadiene	0.83	0.21	1.83	0.41	Y	83
Styrene	Butadiene	0.64		1.38			83
Styrene	Butadiene, 1,4-dicarboxylate-, diethyl	0.09	0.014	0.55	0.1	Y	327
Styrene	Butadiene, 1-chloro-	0.27	0.27	1.44	3.1	Y	695
Styrene	Butadiene, 1-phthalimido-	0.299	0.049	1.56	0.63	Y	163
Styrene	Butadiene, 1-succinimido-	0.286	0.018	1.68	0.16	Y	163
Styrene	Butadiene, 2,3-dichloro-	0.25		8.65			587
Styrene	Butadiene, 2,3-dichloro-	0.05		10.6		Y	61
Styrene	Butadiene, 2,3-dimethyl-	0.534	0.035	1.048	0.066	Y	173
Styrene	Butadiene, 2-chloro-	0.05		7.84		Y	61
Styrene	Butadiene, 2-chloro-	0.025	0.047	5.98	0.5	Y	8
Styrene	Butadiene, 2-fluoro-	0.214	0.03	2.1	0.12	Y	174
Styrene	Butadiene, 2-fluoro-	0.22	0.15	1.24	0.61	Y	174
Styrene	Butadiene, 2-trimethylsilyloxy-	0.64		1.2			993
Styrene	Butadiene-1-carboxylate, *S*(-)-α-phenethyl	0.45	0.13	6.81	1.68	Y	748
Styrene	Butadiene-1-carboxylate, ethyl	0.12		0.56			791
Styrene	Butadiene-1-carboxylic acid	0.15		0.52			791
Styrene	Butadiene-1-carboxylic acid	0.08		5.55			799
Styrene	Butenoate, 3-phenyl-3-, methyl	1.97	0.364	−0.532	0.512	Y	1008
Styrene	Bntyrolactone, α-methylene-	0.14	0.01	0.85	0.06	N	663
Styrene	Caprolactam, *N*-vinyl-	0.2	0.01	1.02	0.01		916
Styrene	Carbamate, *N*, *N*-diethyl-, vinyl	29.56	3.59	−0.08	0.18	Y	197
Styrene	Carbazole, *N*-methyl-3-vinyl-	0.735	0.067	1.404	0.146		806
Styrene	Carbazole, *N*-vinyl-	6	1.34	−0.02	0.06	N	11
Styrene	Carbazole, *N*-vinyl-	5.93	1.05	0.026	0.034	Y	13
Styrene	Carbazole, *N*-vinyl-	5.72	0.4	0.032	0.057	Y	98
Styrene	Cinnamate, 2-chloroethyl	1.394	0.068	0.01	0.11	Y	488
Styrene	Cinnamate, α-cyano-, 2-ethylhexyl	0.58	0.004	−0.06	0.01	N	282
Styrene	Cinnamate, α-cyano-, benzyl	0.4	0.03	−0.16	0.17	N	282
Styrene	Cinnamate, α-cyano-, butyl	0.47	0.03	−0.09	0.08	N	282
Styrene	Cinnamate, α-cyano-, cyclohexyl	0.37	0.04	−0.24	0.22	N	282
Styrene	Cinnamate, α-cyano-, ethyl					Y	134
Styrene	Cinnamate, α-cyano-, hexyl	0.39	0.04	−0.17	0.26	N	282
Styrene	Cinnamate, α-cyano-, methyl	0.4	0.06	−0.21	0.35	N	282
Styrene	Cinnamate, benzyl	1.33	0.12	0.14	0.13	Y	488
Styrene	Cinnamate, butyl	1.757	0.082	0.04	0.15	Y	488
Styrene	Cinnamate, ethyl	1.52	0.31	−0.076	0.054	Y	200
Styrene	Cinnamate, ethyl	1.566	0.035	0.082	0.045	Y	488

TABLE 1. *cont'd*

Monomer 1	Monomer 2	r_1	±95%	r_2	±95%	Conv.	Refs.
Styrene	Cinnamate, methyl	1.799	0.073	0.04	0.13	Y	488
Styrene	Cinnamate, methyl	1.27		0.02			653
Styrene	Cinnamate, *p*-chloro-, methyl	2.24		0.04			653
Styrene	Cinnamate, *p*-methyl-, methyl	2.84		0			653
Styrene	Cinnamate, phenyl	1.66	0.12	0.029	0.055	Y	488
Styrene	Cinnamate, *tert*-butyl	1.692	0.087	0.1	0.12	Y	488
Styrene	Cinnamide, *N,N*-diethyl-	4.17		0.01			737
Styrene	Cinnamide, *p*-chloro-, *N,N*-diethyl-	2.99		0.01			737
Styrene	Cinnamide, *p*-methyl-, *N,N*-diethyl-	4.95		0.01			737
Styrene	Cinnamonitrile	2.549	0.092	−0.008	0.021	Y	134
Styrene	Cinnamonitrile, α-cyano-					Y	134
Styrene	Citraconate, di-*sec*-butyl	2		0.13			841
Styrene	Citraconate, dibenzyl	1.55		0.047			841
Styrene	Citraconate, dibutyl	2.74		0.054			841
Styrene	Citraconate, dicyclohexyl	1.88		0.03			841
Styrene	Citraconate, diethyl	2.48		0.029			841
Styrene	Citraconate, diisobutyl	1.8		0.03			841
Styrene	Citraconate, diisopropyl	1.62		0.076			841
Styrene	Citraconate, dimethyl	1.58		0.049			841
Styrene	Citraconate, dipropyl	2.19		0.027			841
Styrene	Citraconic acid	1.36		0			1021
Styrene	Citraconic anhydride	0.16	0.15	0.021	0.058	Y	47
Styrene	Citraconimide, β-iso-, *N*-(4-acetylphenyl)-	0.42		0			608
Styrene	Citraconimide, β-iso-, *N*-(4-chlorophenyl)-	0.28		0			608
Styrene	Citraconimide, β-iso-, *N*-(4-ethoxycarbonylphenyl)-	0.3		0			608
Styrene	Citraconimide, β-iso-, *N*(4-methoxyphenyl)-	0.27		0			608
Styrene	Citraconimide, β-iso-, *N*-(*p*-tolyl)-	0.4		0			608
Styrene	Citraconimide, β-iso-, *N*-phenyl-	0.39		0			608
Styrene	Citraconimide, *N*-(4-acetoxyphenyl)-	0.151	0.054	0.015	0.086	Y	728
Styrene	Citraconimide, *N*-(4-chlorophenyl)-	0.181	0.057	0.075	0.093	Y	728
Styrene	Citraconimide, *N*-(4-ethoxycarbonylphenyl)-	0.148	0.018	0.004	0.033	Y	728
Styrene	Citraconimide, *N*-(4-methoxyphenyl)-	0.63	0.19	0.04	0.11	Y	728
Styrene	Citraconimide, *N*-allyl	0.142		0.004			959
Styrene	Citraconimide, *N*-benzyl-	0.19	0.087	−0.066	0.082	Y	714
Styrene	Citraconimide, *N*-butyl-	0.169	0.028	0.03	0.045	Y	714
Styrene	Citraconimide, *N*-ethyl-	0.231	0.044	−0.002	0.05	Y	714
Styrene	Citraconimide, *N*-hexyl-	0.316	0.086	−0.03	0.11	Y	714
Styrene	Citraconimide, *N*-isobutyl-	0.326	0.094	0.07	0.14	Y	714
Styrene	Citraconimide, *N*-isopropyl-	0.244	0.055	−0.014	0.063	Y	714
Styrene	Citraconimide, *N*-methyl-	0.15		0.24			460
Styrene	Citraconimide, *N*-methyl-	0.14		0.24			506
Styrene	Citraconimide, *N*-phenyl-	0.175	0.016	−0.001	0.023	Y	728
Styrene	Citraconimide, *N*-propyl-	0.196	0.062	−0.014	0.087	Y	714
Styrene	Citraconimide, *N*-*tert*-butyl-	0.465	0.039	0.045	0.05	Y	714
Styrene	Citraconimide, *N*-tolyl-	0.31	0.13	−0.02	0.18	Y	728
Styrene	Citraconimide, α-iso-, *N*-(4-acetylphenyl)-	0.81		0			608
Styrene	Citraconimide, α-iso-, *N*-(4-chlorophenyl)-	1.03		0			608
Styrene	Citraconimide, α-iso-, *N*-(4-ethoxycarbonylphenyl)-	0.96		0			608
Styrene	Citraconimide, α-iso-, *N*-(4-methoxyphenyl)-	0.39		0			608
Styrene	Citraconimide, α-iso-, *N*-(*p*-tolyl)-	1.69		0			608
Styrene	Citraconimide, α-iso-, *N*-phenyl-	1.76		0			608
Styrene	Crotonaldehyde	14.7		0.03			428
Styrene	Crotonaldehyde	14.7		0.07			428
Styrene	Crotonaldehyde	14.7		0.12			428
Styrene	Crotonate, α-acetyl-, methyl	2.7		0			785
Styrene	Crotonate, α-bromo-, ethyl	4.42		0			785

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TABLE 1. *cont'd*

Monomer 1	Monomer 2	r_1	±95%	r_2	±95%	Conv.	Refs.
Styrene	Crotonate, α-carboethoxy-, ethyl	8.24		0			785
Styrene	Crotonate, α-chloro-, ethyl	5.13		0			785
Styrene	Crotonate, α-cyano-, ethyl	0.26		0.02			785
Styrene	Crotonate, α-methoxy-, methyl	18.4		0.04			785
Styrene	Crotonate, α-methyl-, methyl	30.7		0.02			785
Styrene	Crotonate, ethyl	27		0			785
Styrene	Crotonate, methyl	9.68	1.86	−0.27	0.22	Y	112
Styrene	Crotonic acid	20		0			402
Styrene	Crotononitrile	23.29	1.7	−0.012	0.06	Y	112
Styrene	Crotononitrile	23.8		0			785
Styrene	Crotononitrile, α-phenyl-	0.43		0			785
Styrene	Cyclobutane, 1,2-dimethylene-	0.26		3.6			854
Styrene	Cyclobutane, 1,2-dimethylene-	0.28	0.05	3.6	0.16		885
Styrene	Cyclopentene, 4-, -1,3-dione					Y	263
Styrene	Diallyl melamine	36.96	4.02	−0.32	0.2	Y	201
Styrene	Diallyl phthalate	36.41	1.23	0.041	0.038	Y	152
Styrene	Diallyl phthalate	25.59	2.19	0.026	0.071	Y	152
Styrene	Diallyl phthalate	23.67	1.2	0.038	0.04	Y	152
Styrene	Diallyl phthalate	18.8		0.08			152
Styrene	Diallyl phthalate	27.5		0.09			152
Styrene	Diallyl phthalate	16.9		0.1			152
Styrene	Diallyl phthalate	23.8		0.1			152
Styrene	Diallyl phthalate	15.1		0.13			152
Styrene	Dihydroxydiphenylsulfone diallyl ether	0.975	0.015	0.92	0.16		1016
Styrene	Dithiane, 2-methylene-1,3-	0.03		3.35			1031
Styrene	Divinylbenzene, *m*-	0.58	0.15	0.58	0.04	N	262
Styrene	Divinylbenzene, *p*-	0.26	0.25	1.18	0.17	N	262
Styrene	Ethylene	14.88		0.05			615
Styrene	Ethylene, 1,1-diphenyl-	0.34	0.01	−0.02	0.01	N	281
Styrene	Ethylene, 1,1-diphenyl-	0.87		1.15			901
Styrene	Ethylene, 1-diphenyl-	0.33	0.02	0.01	0.02	N	189
Styrene	Ethylene, chlorotrifluoro-	4.38	0.99	−0.1	0.21	Y	236
Styrene	Ethylene, dichloro-, *cis*-	3.1		−3.1		Y	137
Styrene	Ethylene, dichloro-, *cis*-	63.1		−2.2		Y	137
Styrene	Ethylene, dichloro-, *cis*-	21.4	4.9	−0.28	0.12	Y	40
Styrene	Ethylene, dichloro-, *cis*-	161.3	30.3	−0.02	0.062	Y	9
Styrene	Ethylene, dichloro-, *cis*-	24.75	2.64	0.067	0.053	Y	9
Styrene	Ethylene, *p*-vinyl-1,1-diphenyl-	0.46		1.31			742
Styrene	Ethylene, tetrachloro-					Y	204
Styrene	Ethylene, tetrachloro-	200					204
Styrene	Ethylene, tetrachloro-					Y	40
Styrene	Ethylene, tetrachloro-	187		0			40
Styrene	Ethylene, tetrachloro-	185		0			59
Styrene	Ethylene, tetrafluoro-	5.2		0.01			567
Styrene	Ethylene, trichloro-	17.1		0			40
Styrene	Ethylene, trichloro-	16.5		0			40
Styrene	Ethylene, trichloro-	12.1		0			40
Styrene	Ethylene, trichloro-	12.7		0			40
Styrene	Ethylene, trichloro-	16	11	−0.006	0.37	Y	59
Styrene	Formaldehyde,-*S*-vinyl-*O*-ethylthioacetal	7.75	0.68	0.32	0.24	Y	273
Styrene	Fumarate, allyl methyl	0.25	0.01	0.03	0.02	N	713
Styrene	Fumarate, bis(2-butyl)	0.51	0.04	0	0.01	N	249
Styrene	Fumarate, bis(3-chloro-2-butyl)	0.26	0.04	−0.06	0.03	N	249
Styrene	Fumarate, di-(2-chloroethyl)	0.18		0			1038
Styrene	Fumarate, di-(2-cyanoethyl)	0.07		0.09			1038
Styrene	Fumarate, di-(2-methoxyethyl)	0.35		0.03			1038
Styrene	Fumarate, di-(2-phenylethyl)	0.27		0			1038
Styrene	Fumarate, di-*sec*-butyl	0.55		0.04			1038
Styrene	Fumarate, di-*tert*-amyl	0.69		0.08			1038
Styrene	Fumarate, di-*tert*-butyl	0.57		0.04			1038
Styrene	Fumarate, dibenzyl	0.32		0			1038
Styrene	Fumarate, dibutyl	0.35		0.04			1038
Styrene	Fumarate, dicyclohexyl	0.49		0.06			1038
Styrene	Fumarate, dicyclopentyl	0.3		0.06			1038

TABLE 1. *cont'd*

Monomer 1	Monomer 2	r_1	±95%	r_2	±95%	Conv.	Refs.
Styrene	Fumarate, diethyl	0.29		0.02			1038
Styrene	Fumarate, diethyl	6.3	0.26	0.081	0.005	Y	139
Styrene	Fumarate, diethyl	0.394	0.06	0.11	0.022	Y	139
Styrene	Fumarate, diethyl	0.3		0.07			139
Styrene	Fumarate, diethyl	0.31	0.02	0	0.01	N	249
Styrene	Fumarate, diethyl	0.36		0.1			562
Styrene	Fumarate, diethyl	0.29		0.02			640
Styrene	Fumarate, diisobutyl	0.37		0.05			1038
Styrene	Fumarate, diisopropyl	0.4		0.055			1038
Styrene	Fumarate, dimethyl	0.39		0.03			1038
Styrene	Fumarate, dipropyl	0.32		0.02			1038
Styrene	Fumarate, isopropyl butyl	0.42		0.01			1056
Styrene	Fumarate, isopropyl ethyl	0.3		0.01			1056
Styrene	Fumarate, isopropyl isobutyl	0.46		0.01			1056
Styrene	Fumarate, isopropyl methyl	0.3		0.16			1056
Styrene	Fumarate, isopropyl *sec*-butyl	0.54		0.02			1056
Styrene	Fumarate, methyl butyl	0.36		0.02			1056
Styrene	Fumarate, methyl ethyl	0.32		0.02			1056
Styrene	Fumarate, methyl isobutyl	0.32		0.03			1056
Styrene	Fumarate, methyl isopropyl	0.3		0.16			1056
Styrene	Fumarate, methyl propyl	0.28		0.05			1056
Styrene	Fumarate, methyl *sec*-butyl	0.45		0.02			1056
Styrene	Fumarate, methyl *tert*-amyl	0.53		0.06			1056
Styrene	Fumarate, methyl tert-butyl	0.45		0.03			1056
Styrene	Fumarate, mono-2-butyl	0.33	0.03	−0.04	0.03	N	249
Styrene	Fumarate, *tert*-butyl 2-ethylhexyl	0.54		0.01			1056
Styrene	Fumarate, *tert*-butyl 4-methyl-2-pentyl	0.57		0.01			1056
Styrene	Fumarate, *tert*-butyl ethyl	0.25		0.04			1056
Styrene	Fumarate, *tert*-butyl isoamyl	0.45		0.06			1056
Styrene	Fumarate, *tert*-butyl methyl	0.45		0.03			1056
Styrene	Fumarate, *tert*-butyl *sec*-butyl	0.55		0.07			1056
Styrene	Fumaronitrile	0.202	0.058	−0.016	0.021	Y	137
Styrene	Fumaronitrile					Y	191
Styrene	Fumaronitrile	0.294	0.044	0.006	0.031	Y	199
Styrene	Fumaronitrile	0.3		0			478
Styrene	Fumaronitrile					Y	77
Styrene	Fumaryl chloride					Y	91
Styrene	Furan, 2,3-dihydro-	20		0			806
Styrene	Hexatriene, tetrachloro-	0.123	0.0428	0.85	0.22	Y	4
Styrene	Hexene, 1-, 3,4-dioic anhydride	8.57	8.4	−0.052	1	Y	933
Styrene	Hexene, 2-, 3,4-dioic anhydride	3.63	5.6	−0.08	1.17	Y	933
Styrene	Hexene, 3-, 3,4-dioic anhydride	17.17	436	−0.54	5.83	Y	933
Styrene	Hexene, 5-, 2,4-dione	0.031		1.22			931
Styrene	Hexene, 5-, 2,4-dione	0.049		1.38			931
Styrene	Hexene, 5-, 2,4-dione	0.066		1.52			931
Styrene	Hexene, 5-, 2,4-dione	0.07		1.73			931
Styrene	Hexene, 5-, 2,4-dione	0.171		1.91			931
Styrene	Hexene, 5-, 2,4-dione	0.179		1.91			931
Styrene	Hexene, 5-, 2,4-dione	0.173		2.07			931
Styrene	Hexene, 5-, 2,4-dione	0.121		2.46			931
Styrene	Hexene, 5-, 2,4-dione	0.24		2.69			931
Styrene	Hexene, 5-, 2,4-dione	0.014		2.93			931
Styrene	Hexene, 5-, 2,4-dione	0.044		3.19			931
Styrene	Hexene, 5-, 2,4-dione	0.028		4.11			931
Styrene	Hexene-1,5-dicarboxylate, dimethyl	0.678	0.031	0.196	0.043	Y	828
Styrene	Imidazole, 1-vinyl-	9.94	0.24	0.071	0.029	Y	364
Styrene	Imidazole, 1-vinyl-2-methyl-	8.87	0.62	0.09	0.064	Y	364
Styrene	Imidazole, 1-vinyl-2-methyl-	8.97		0.07			479
Styrene	Isoprene	0.513	0.02	1.922	0.016	Y	366
Styrene	Isoprene	0.476	0.018	1.957	0.011	Y	366
Styrene	Isoprene	0.44		1.98			544
Styrene	Isoprene	0.42		2.02			544
Styrene	Isoprene	0.48		1.3			83
Styrene	Isoprene, 3-acetoxy-	0.34		4.47			770
Styrene	Isopropenyl methyl ketone	0.44		0.29			542

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TABLE 1. *cont'd*

Monomer 1	Monomer 2	r_1	±95%	r_2	±95%	Conv.	Refs.
Styrene	Isopropenyl methyl ketone	0.32		0.66			542
Styrene	Isopropenyl, 3-(1-cyclohexenyl), acetate	1.59		0.56			770
Styrene	Isopropenylacetophenone, *p*-	0.3	0.18	0.84	0.59	Y	266
Styrene	Isopropenylisocyanate	8.12		0.07			434
Styrene	Isopropenylisocyanate	6.84	0.18	0.122	0.047	Y	99
Styrene	Isopropylidene, 2,3:4,5-di-*O*-, -1-vinylbenzyl-	0.14	0.055	3.26	1.12	Y	772
Styrene	Itaconamate, *N*-(4-carboethoxyphenyl)-, butyl	0.2		0.61			678
Styrene	Itaconamate, *N*-(4-carboethoxyphenyl)-, ethyl	0.23		0.2			678
Styrene	Itaconamate, *N*-(4-carboethoxyphenyl)-, methyl	0.15		0.58			678
Styrene	Itaconamate, *N*-(4-carboethoxyphenyl)-, propyl	0.26		0.4			678
Styrene	Itaconamate, *N*-(4-chlorophenyl)-, ethyl	0.35		0.16			678
Styrene	Itaconamate, *N*-(4-chlorophenyl)-, methyl	0.38		0.18			678
Styrene	Itaconamate, *N*-(-chlorophenyl)-, propyl	0.39		0.31			678
Styrene	Itaconamate, *N*-(4-methoxyphenyl-, butyl	0.12		0.69			678
Styrene	Itaconamate, *N*-(4-methoxyphenyl)-, ethyl	0.33		0.34			678
Styrene	Itaconamate, *N*-(4-methoxyphenyl)-, methyl	0.26		0.41			678
Styrene	Itaconamate, *N*-(4-methoxyphenyl)-, propyl	0.38		0.4			678
Styrene	Itaconamate, *N*-(4-methylphenyl)-, butyl	0.19		0.31			678
Styrene	Itaconamate, *N*-(4-methlyphenyl)-, ethyl	0.38		0.26			678
Styrene	Itaconamate, *N*-(4-methylphenyl)-, methyl	0.3		0.16			678
Styrene	Itaconamate, *N*-(4-methylphenyl)-, propyl	0.54		0.19			678
Styrene	Itaconamate, *N*-phenyl, methyl	0.39		0.18			678
Styrene	Itaconamate, *N*-phenyl-, butyl	0.12		0.49			678
Styrene	Itaconamate, *N*-phenyl, ethyl	0.45		0.21			678
Styrene	Itaconamate, *N*-phenyl-, methyl	0.31		0.52			1059
Styrene	Itaconamate, *N*-phenyl-, propyl	0.5		0.18			678
Styrene	Itaconate, di-2[-2(2-methoxyethoxy)-ethoxy]ethyl	0.53	0.022	0.2	0.015		1098
Styrene	Itaconate, diamyl	0.36	0.05	0.5	0.09	N	39
Styrene	Itaconate, dibutyl	0.42	0.06	0.34	0.05	N	39
Styrene	Itaconate, diethyl	0.23	0.11	0.34	0.12	N	39
Styrene	Itaconate, dimenthyl	0.502	0.188	0.483	0.364	Y	975
Styrene	Itaconate, dimethyl					N	39
Styrene	Itaconate, dimethyl	0.48		0.14			398
Styrene	Itaconate, dimethyl	0.5		0.06			586
Styrene	Itaconate, dioctyl	0.33	0.16	0.14	0.12	N	39
Styrene	Itaconate, dipropyl	0.16	0.07	0.28	0.06	N	39
Styrene	Itaconate, ethyl hexafluoroisopropyl	0.435	0.025	0.039	0.035	N	1103
Styrene	Itaconate, glycidyl methyl	0.376	0.036	0.041	0.079		806
Styrene	Itaconate, mono-methyl	0.029	0.039	0.111	0.052	Y	656
Styrene	Itaconate, mono-methyl	0.34	0.077	0.33	0.15	Y	656
Styrene	Itaconate, mono-methyl	0.52	0.085	0.33	0.11	Y	656
Styrene	Itaconate, mono-methyl	0.404	0.06	0.218	0.086	Y	656
Styrene	Itaconic acid	0.34		0			420
Styrene	Itaconic acid	0.26	0.08	0.12	0.67	Y	76
Styrene	Itaconic anhydride	0.004	0.01	0.405	0.09	Y	365
Styrene	Itaconic anhydride	0.086	0.015	0.456	0.09	Y	62
Styrene	Itaconic anhydride	0.003	0.005	0.785	0.05	Y	62
Styrene	Itaconimide, *N*-(2-chloroethyl)-	0.069	0.045	0.162	0.092	Y	642
Styrene	Itaconimide, *N*-(4-acetoxyphenyl)-	0.35	0.12	0.21	0.21	Y	729
Styrene	Itaconimide, *N*-(4-chlorophenyl)-	0.159	0.084	0.2	0.18	Y	729

TABLE 1. *cont'd*

Monomer 1	Monomer 2	r_1	±95%	r_2	±95%	Conv.	Refs.
Styrene	Itaconimide, *N*-(4-ethoxycarbonylphenyl)	0.232	0.032	0.112	0.054	Y	729
Styrene	Itaconimide, *N*-(*p*-chlorophenyl)-	0.15		0.14			740
Styrene	Itaconimide, *N*-(*p*-tolyl)-	0.16		0.24			740
Styrene	Itaconimide, *N*-benzyl-	0.056	0.048	0.2	0.11	Y	642
Styrene	Itaconimide, *N*-butyl-	0.22	0.03	−0.019	0.04	Y	642
Styrene	Itaconimide, *N*-ethyl	0.232	0.029	0.172	0.06	Y	642
Styrene	Itaconimide, *N*-isobutyl-	0.44	0.11	−0.03	0.11	Y	642
Styrene	Itaconimide, *N*-Isopropyl-	0.308	0.043	0.045	0.064	Y	642
Styrene	Itaconimide, *N*-methyl-	0.153	0.069	0.12	0.12	Y	642
Styrene	Itaconimide, *N*-naphthyl-	0.08		0.35			740
Styrene	Itaconimide, *N*-phenyl-	0.116	0.043	0.109	0.082	Y	729
Styrene	Itaconimide, *N*-phenyl-	0.05		0.08			740
Styrene	Itaconimide, *N*-phenyl-	0.05	0.248	0.998	0.123	N	978
Styrene	Itaconimide, *N*-propyl-	0.28	0.12	0.04	0.18	Y	642
Styrene	Itaconimide, *N*-tolyl-	0.134	0.031	0.219	0.079	Y	729
Styrene	Maleamic acid, *N*-3-dimethylamino-6-methyl	0.55	0.03	−0.19	0.03	N	679
Styrene	Maleate, allyl methyl	8.29	0.14	0.02	0.01	N	713
Styrene	Maleate, butyl stannyl, allyl	0.1	0.02	0.06	0.03	N	811
Styrene	Maleate, chloro-, diethyl	2.07	0.14	−0.043	0.021	Y	14
Styrene	Maleate, dibutyl tin	2.08	0.118	0.194	0.121	Y	987
Styrene	Maleate, diethyl	6.59	0.46	−0.013	0.022	Y	139
Styrene	Maleate, diethyl					Y	14
Styrene	Maleate, diethyl	8		0.07			640
Styrene	Maleate, diethyl	6.07	0.07	0.01	0.01	N	874
Styrene	Maleate, diethyl	6.592		0.001			888
Styrene	Maleate, dimethyl	10.65	2.81	0.15	0.12	Y	137
Styrene	Maleate, dimethyl	0.083	0.015	0.105	0.058	Y	317
Styrene	Maleate, monoallyl	0.14	0.01	0.07	0.02	N	811
Styrene	Maleic anhydride	0.097	0.002	0.001	0.008	N	105
Styrene	Maleic anhydride	0.04	0.12	0	0.13	Y	12
Styrene	Maleic anhydride	0.02	0.003	0.003	0.03	N	17
Styrene	Maleic anhydride	0	0.01	0.02	0.01	N	241
Styrene	Maleic anhydride	0.02		0			384
Styrene	Maleic anhydride	0.02		0			397
Styrene	Maleic anhydride	0.04		0.02			483
Styrene	Maleic anhydride	0.04		0.01			506
Styrene	Maleic anhydride	0.04		0.001			522
Styrene	Maleic anhydride	0.05		0.005			522
Styrene	Maleic anhydride	0.02		0.01			522
Styrene	Maleic anhydride	0.04		0.02			522
Styrene	Maleic anhydride	0.04		0.05			522
Styrene	Maleic anhydride					N	923
Styrene	Maleic anhydride, α-chloro-	0.07		0			845
Styrene	Maleimide	0.057	0.012	0.088	0.036	Y	251
Styrene	Maleimide, *N*-(2,6-diethylphenyl)-	0.19		0.02			992
Styrene	Maleimide, *N*-(2,6-dimethylphenyl)-	0.14		0.08			992
Styrene	Maleimide, *N*-(2-chlorophenyl)-	0.011	0.004	0.013	0.002	Y	853
Styrene	Maleimide, *N*-(2-chlorophenyl)-	0.038	0.006	0.028	0.003	Y	853
Styrene	Maleimide, *N*-(2-chlorophenyl)-	0.013	0.012	0.01	0.005	Y	910
Styrene	Maleimide, *N*-(2-chlorophenyl)-	0.038	0.028	0.006	0.003	Y	910
Styrene	Maleimide, *N*-(2-hydroxyethyl)-	0.046	0.017	0.011	0.027	Y	323
Styrene	Maleimide, *N*-(3-dimethylaminophenyl)-	0.03		0.19			747
Styrene	Maleimide, *N*-(4-bromophenyl)-	0.02	0.006	0.018	0.007	Y	1030
Styrene	Maleimide, *N*-(4-carboxyethylphenyl)-α-chloro-	0.059	0.021	0.022	0.041	Y	973
Styrene	Maleimide, *N*-(4-chlorophenyl)-α-chloro-	0.149	0.048	0.019	0.038	Y	973
Styrene	Maleimide, *N*-(4-hydroxyphenyl)-	−0.059	0.041	0.13	0.1	Y	323
Styrene	Maleimide, *N*-(4-methoxyphenyl)-α-chloro-	0.112	0.031	0.049	0.061	Y	973
Styrene	Maleimide, *N*-(4-methylphenyl)-α-chloro-	0.107	0.048	0.019	0.078	Y	973
Styrene	Maleimide, *N*-(β-chloroethyl)-α-chloro-	0.29	0.05	0	0.06		974

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TABLE 1. *cont'd*

Monomer 1	Monomer 2	r_1	±95%	r_2	±95%	Conv.	Refs.
Styrene	Maleimide, *N*-[*N'*-(α-methylbenzyl)-aminocarbonylpentyl]-	0.198	0.143	0.258	0.25	Y	1099
Styrene	Maleimide, *N*-[*N'*-(α-methylbenzyl)-aminocarbonylundecyl]-					Y	1099
Styrene	Maleimide, *N*-allyl	0.056		0.035			1003
Styrene	Maleimide, *N*-benzyl-	0.058	0.021	0.013	0.031	Y	348
Styrene	Maleimide, *N*-benzyl-α-chloro-	0.42	0.06	0	0.06		974
Styrene	Maleimide, *N*-butyl-					Y	115
Styrene	Maleimide, *N*-butyl-	0.02		0.06			50
Styrene	Maleimide, *N*-cyclohexyl-	0.102		0.1			1100
Styrene	Maleimide, *N*-cyclohexyl-	−0.01	0.017	0.162	0.054	Y	348
Styrene	Maleimide, *N*-ethyl-α-chloro-	0.9	0.05	0	0.04		974
Styrene	Maleimide, *N*-hexyl-	−0.041	0.069	0.09	0.16	Y	348
Styrene	Maleimide, *N*-hydroxymethyl-	−0.035	0.053	0.06	0.11	Y	323
Styrene	Maleimide, *N*-methyl-α-chloro-	0.63	0.04	0	0.03		974
Styrene	Maleimide, *N*-phenyl-					N	1026
Styrene	Maleimide, *N*-phenyl-	0.016	0.004	0.044	0.017	Y	328
Styrene	Maleimide, *N*-phenyl-	0.07		0.01			992
Styrene	Maleimide, *N*-phenyl-α-chloro-	0.087	0.04	−0.002	0.073	Y	973
Styrene	Maleimide-*N,N*-dimethylaniline, 4-(2-chlorophenyl)-	0.05		0.04			747
Styrene	Mesaconate, di-*sec*-butyldithiol	0.45		0.02			624
Styrene	Mesaconate, diamyl	1.27		0.02			658
Styrene	Mesaconate, dibenzyl	0.73		0.08			658
Styrene	Mesaconate, dibenzyldithiol	0.28		0.06			624
Styrene	Mesaconate, dibutyl	1.28		0.05			658
Styrene	Mesaconate, dibutyldithiol	0.41		0.05			624
Styrene	Mesaconate, dicyclohexyl	1.25		0.1			658
Styrene	Mesaconate, diethyl	1.24		0.06			658
Styrene	Mesaconate, diethyldithiol	0.4		0.03			624
Styrene	Mesaconate, dihexyl	1.51		0.1			658
Styrene	Mesaconate, diisoamyl	1.34		0.07			658
Styrene	Mesaconate, diisobutyl	1.29		0.1			658
Styrene	Mesaconate, diisobutyldithiol	0.41		0.03			624
Styrene	Mesaconate, diisopropyl	1.31		0.04			658
Styrene	Mesaconate, diisopropyldithiol	0.44		0.05			624
Styrene	Mesaconate, dimethyl	0.98		0.04			658
Styrene	Mesaconate, dimethyldithiol	0.35		0.07			624
Styrene	Mesaconate, dioctyl	1.23		0.01			658
Styrene	Mesaconate, diphenyl	0.45		0.07			658
Styrene	Mesaconate, diphenyldithiol	0.16		0.15			624
Styrene	Mesaconate, dipropyl	1.22		0.05			658
Styrene	Mesaconate, dipropyldithiol	0.39		0.06			624
Styrene	Mesaconic acid	1.6		0			1021
Styrene	Methacrylamide	1.4	0.13	0.48	0.2	N	316
Styrene	Methacrylamide	1.42	0.17	1.24	0.38	N	316
Styrene	Methacrylamide, 1-deoxy-D-glucitol	2.09		0.005			258
Styrene	Methacrylamide, *N*-phenyl-	1.24	0.06	0.88	0.17	N	352
Styrene	Methacrylate, 2,2,6,6,-tetramethyl-4-piperidinyl	0.63		0.3			664
Styrene	Methacrylate, 2,3-epithiopropyl	0.41		0.28			787
Styrene	Methacrylate, 2-(sulfonic acid)ethyl	0.37		0.6			564
Styrene	Methacrylate, 2-acetoxyethyl	0.44	0.02	0.58	0.04	N	346
Styrene	Methacrylate, 2-bromoethyl	0.32		0.41			657
Styrene	Methacrylate, 2-chloro-2,3,3,3-fluoropropyl	0.121	0.068	0.243	0.15	N	927
Styrene	Methacrylate, 2-chloroethyl	0.35	0.046	0.341	0.075	Y	179
Styrene	Methacrylate, 2-chloroethyl	0.345	0.048	0.34	0.08	Y	179
Styrene	Methacrylate, 2-chloroethyl	0.42		0.23			382
Styrene	Methacrylate, 2-hydroxyethyl	0.44	0.02	0.54	0.03	N	346
Styrene	Methacrylate, 2-hydroxyethyl	0.332	0.006	0.856	0.018	Y	350
Styrene	Methacrylate, 2-hydroxyethyl	0.57		0.65			463
Styrene	Methacrylate, 2-hydroxyethyl	0.5		1.65			878
Styrene	Methacrylate, 2-hydroxyethyl	0.59		0.53			878
Styrene	Methacrylate, 2-hydroxyethyl	0.53		0.59			903

TABLE 1. *cont'd*

Monomer 1	Monomer 2	r_1	±95%	r_2	±95%	Conv.	Refs.
Styrene	Methacrylate, 2-hydroxyethyl	0.5		1.65			903
Styrene	Methacrylate, 2-methoxyethyl	0.46		0.48			918
Styrene	Methacrylate, 2-naphthyl-, methyl	0.786	0.16	0.113	0.126	Y	924
Styrene	Methacrylate, 2-naphthyl-, methyl	0.486	0.117	0.321	0.098	Y	924
Styrene	Methacrylate, 2-naphthyl-, methyl	0.61	0.195	0.576	0.477	Y	924
Styrene	Methacrylate, 2-naphthyl-, methyl	0.384	0.225	0.216	0.422	Y	924
Styrene	Methacrylate, 2-phenethyl	0.56	0.025	0.534	0.099	Y	540
Styrene	Methacrylate, 3,5-dimethyladamantyl	0.89	0.14	0.63	0.21	N	335
Styrene	Methacrylate, 5-oxo-pyrrolidinylmethyl	0.342	0.013	0.411	0.033	Y	633
Styrene	Methacrylate, *N*-methyl-*N*-phenyl-2-aminoethyl	0.44	0.04	0.58	0.02	N	651
Styrene	Methacrylate, α-naphthoyloxy-, ethyl	0.216	0.043	0.242	0.018		1102
Styrene	Methacrylate, acetonyl	0.285	0.041	0.505	0.115	Y	958
Styrene	Methacrylate, amyl	0.52	0.11	0.46	0.2	Y	179
Styrene	Methacrylate, benzyl	0.463	0.041	0.658	0.084	Y	111
Styrene	Methacrylate, benzyl	0.435	0.026	0.467	0.048	Y	179
Styrene	Methacrylate, benzyl	0.45		0.51			487
Styrene	Methacrylate, benzyl	0.48		0.42			540
Styrene	Methacrylate, benzyl	0.8		0.3			602
Styrene	Methacrylate, bornyl	0.45	0.32	0.5	0.38		806
Styrene	Methacrylate, butyl	0.56	0.12	0.31	0.2	Y	179
Styrene	Methacrylate, butyl	−0.05	1.09	2.52	1.1	N	43
Styrene	Methacrylate, butyl	0.52		0.47			463
Styrene	Methacrylate, butyl	0.63		0.64			530
Styrene	Methacrylate, butyl	0.54		0.64			530
Styrene	Methacrylate, butyl	0.74		0.59			835
Styrene	Methacrylate, chloromethyl	0.208	0.006	0.298	0.03	Y	712
Styrene	Methacrylate, cyanomethyl	0.144	0.011	0.28	0.041	Y	625
Styrene	Methacrylate, cyclohexyl	0.586	0.088	0.57	0.28	Y	179
Styrene	Methacrylate, di-ethylene glycol	0.39	0.15	0.67	0.08	N	262
Styrene	Methacrylate, dodecyl	0.528	0.05	0.3	0.1	Y	179
Styrene	Methacrylate, ethyl	0.55	0.062	0.36	0.12	Y	179
Styrene	Methacrylate, ethyl	0.67		0.26			530
Styrene	Methacrylate, ethyl	0.65		0.29			530
Styrene	Methacrylate, ethyl	0.55		0.33			570
Styrene	Methacrylate, ferrocenylmethyl	3.63	0.14	−0.019	0.022	Y	293
Styrene	Methacrylate, ferrocenylmethyl	3.6		0.01			576
Styrene	Methacrylate, glycidyl	0.54	0.07	0.16	0.03	N	114
Styrene	Methacrylate, glycidyl	0.278	0.086	0.539	0.04	Y	217
Styrene	Methacrylate, glycidyl	0.47	0.02	0.46	0.08	N	225
Styrene	Methacrylate, glycidyl	0.44		0.54			225
Styrene	Methacrylate, glycidyl	0.45		0.55			463
Styrene	Methacrylate, glycidyl	0.31	0.04	0.74	0.1	N	849
Styrene	Methacrylate, glycidyl	0.11	0.045	0.73	0.284	N	893
Styrene	Methacrylate, glycidyl	0.435	0.033	0.514	0.098	Y	999
Styrene	Methacrylate, hexyl	0.58	0.07	0.44	0.13	Y	179
Styrene	Methacrylate, isobornyl	0.61	0.45	0.24	0.3		806
Styrene	Methacrylate, isobutyl	0.509	0.014	0.271	0.036	Y	179
Styrene	Methacrylate, isobutyl	0.56		0.58			463
Styrene	Methacrylate, isobutyl	0.55		0.4			487
Styrene	Methacrylate, isopropyl	0.5		0.42			463
Styrene	Methacrylate, isopropyl	0.47		0.74			541
Styrene	Methacrylate, *m*-chlorophenyl	0.375	0.05	0.209	0.013	Y	177
Styrene	Methacrylate, *m*-nitrophenyl	0.44	0.16	0.185	0.054	Y	177
Styrene	Methacrylate, methoxymethyl	0.395	0.014	0.586	0.069	Y	821
Styrene	Methacrylate, methyl	0.5		0.5			138
Styrene	Methacrylate, methyl	0.52		0.46			139
Styrene	Methacrylate, methyl	0.52		0.46			179
Styrene	Methacrylate, methyl	0.48		0.42			20
Styrene	Methacrylate, methyl	0.52		0.45			21
Styrene	Methacrylate, methyl	0.49		0.46			21
Styrene	Methacrylate, methyl	0.45		0.47			21
Styrene	Methacrylate, methyl	0.58		0.48			21
Styrene	Methacrylate, methyl	0.44		0.5			21
Styrene	Methacrylate, methyl	0.396	0.048	0.22	0.13	Y	241

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TABLE 1. *cont'd*

Monomer 1	Monomer 2	r_1	±95%	r_2	±95%	Conv.	Refs.
Styrene	Methacrylate, methyl	0.42		0.32			241
Styrene	Methacrylate, methyl	0.49	0.14	0.418	0.085	Y	254
Styrene	Methacrylate, methyl	0.564	0.047	0.54	0.029	Y	254
Styrene	Methacrylate, methyl	0.585	0.007	0.478	0.011	Y	287
Styrene	Methacrylate, methyl	0.44	0.08	0.45	0.01	N	324
Styrene	Methacrylate, methyl	0.47		0.45			324
Styrene	Methacrylate, methyl	0.54		0.49			403
Styrene	Methacrylate, methyl	0.52		0.47			416
Styrene	Methacrylate, methyl	0.38		0.48			451
Styrene	Methacrylate, methyl	0.52		0.46			463
Styrene	Methacrylate, methyl	0.54		0.42			492
Styrene	Methacrylate, methyl	0.44		0.5			492
Styrene	Methacrylate, methyl	0.52		0.46			505
Styrene	Methacrylate, methyl	0.5		0.44			531
Styrene	Methacrylate, methyl	0.56		0.49			531
Styrene	Methacrylate, methyl	0.53		0.49			534
Styrene	Methacrylate, methyl	0.485	0.052	0.409	0.02	Y	751
Styrene	Methacrylate, methyl	0.48	0.059	0.504	0.026	Y	751
Styrene	Methacrylate, methyl	0.371	0.055	0.611	0.028	Y	751
Styrene	Methacrylate, methyl	0.62		0.59			753
Styrene	Methacrylate, methyl	0.52		0.6			753
Styrene	Methacrylate, methyl	0.5		0.63			753
Styrene	Methacrylate, methyl	0.55		0.58			753
Styrene	Methacrylate, methyl	0.55		0.64			753
Styrene	Methacrylate, methyl	0.41		0.41			753
Styrene	Methacrylate, methyl	0.472		0.454			824
Styrene	Methacrylate, methyl	0.497		0.464			824
Styrene	Methacrylate, methyl	0.432		0.422			824
Styrene	Methacrylate, methyl	0.57		0.41			835
Styrene	Methacrylate, methyl	0.275		0.314			860
Styrene	Methacrylate, methylthiomethyl	0.338		0.512	0.05	Y	920
Styrene	Methacrylate, octyl	0.65	0.1	0.56	0.16	Y	179
Styrene	Methacrylate, octyl	0.56		0.68			463
Styrene	Methacrylate, *p*-(cinnamoylamino)-phenyl	0.62		0.31			685
Styrene	Methacrylate, *p*-carbomethoxyphenyl	0.482	0.084	0.178	0.027	Y	177
Styrene	Methacrylate, *p*-chlorophenyl	0.34	0.11	0.243	0.022	Y	177
Styrene	Methacrylate, *p*-methoxyphenyl	0.499	0.089	0.244	0.026	Y	177
Styrene	Methacrylate, *p*-methylphenyl	0.49	0.25	0.225	0.04	Y	177
Styrene	Methacrylate, *p*-nitrophenyl	0.223	0.09	0.185	0.039	Y	177
Styrene	Methacrylate, phenyl	0.246	0.049	0.48	0.23	Y	177
Styrene	Methacrylate, phenyl	0.247	0.064	0.55	0.33	Y	179
Styrene	Methacrylate, phenyl	0.26		0.51			463
Styrene	Methacrylate, propyl	0.565	0.081	0.38	0.11	Y	179
Styrene	Methacrylate, sulfolanyl	0.2	0.1	−0.2	2.46	N	359
Styrene	Methacrylate, *tert*-butyl	0.545	0.054	0.61	0.51	Y	179
Styrene	Methacrylic acid	0.21	0.02	0.55	0.66	N	166
Styrene	Methacrylic acid	0.22		0.64			166
Styrene	Methacrylic acid	0.2		0.66			203
Styrene	Methacrylic acid	0.15	0.04	0.49	0.08	N	312
Styrene	Methacrylic acid	0.2	0.04	0.56	0.19	N	313
Styrene	Methacrylic acid	0.38		0.28			313
Styrene	Methacrylic acid	0.124	0.092	0.602	0.088	Y	47
Styrene	Methacrylic acid	0.17		0.85			812
Styrene	Methacrylic acid	0.041	0.03	0.631	0.146	Y	842
Styrene	Methacrylic acid	0.067	0.046	0.6	0.249	Y	842
Styrene	Methacrylic acid	0.627	0.031	0.44	0.089	Y	842
Styrene	Methacrylic acid	0.55	0.06	0.39	0.199	Y	842
Styrene	Methacrylic acid	0.221	0.048	0.12	0.118	Y	842
Styrene	Methacrylic anhydride	0.13	0.01	0.27	0.02	N	219
Styrene	Methacrylic anhydride	0.1		0.33			275
Styrene	Methacrylonitrile	0.37		0.41			311
Styrene	Methacrylonitrile	0.38		0.42			311
Styrene	Methacrylonitrile	0.43		0.28			542
Styrene	Methacrylonitrile	0.34		0.21			707

TABLE 1. *cont'd*

Monomer 1	Monomer 2	r_1	±95%	r_2	±95%	Conv.	Refs.
Styrene	Methacrylonitrile	0.25		0.25			75
Styrene	Methacrylonitrile	0.34		0.21			835
Styrene	Methacryloxypropyltrimethoxysilane	0.36		0.58			951
Styrene	Methacryloyl fluoride	0.069	0.014	0.164	0.045	Y	660
Styrene	Methacryloylacetone	0.067	0.007	1.66	0.16	Y	339
Styrene	Methacryloyloxy, 2-, benzoate, methyl	0.27	0.04	0.48	0.02	N	651
Styrene	Methacryloyloxy, 2-, benzoic acid	0.15	0.04	1.17	0.03	N	651
Styrene	Methacryloyloxy, 4-, 2,2,6,6-tetramethyl	0.6		0.32			687
Styrene	Methylenebutyrolactone	0.09		0.7			746
Styrene	Methyleneglutaronitrile, 2-	0.42	0.52	−0.02	1.3	N	196
Styrene	Methyleneglutaronitrile, 2-	0.5		0.02			196
Styrene	Methyleneglutaronitrile, 2-	0.85		0.25			512
Styrene	Myrcene	0.891	0.015	1.38	0.081	Y	1062
Styrene	*N,N*-Divinylaniline	5.38	0.36	0.033	0.067	Y	45
Styrene	*N*-Vinylimidazole	8.377	0.149	0.68	0.02	Y	879
Styrene	Naphthalene, 1-vinyl-	0.699	0.233	2.02	0.401		967
Styrene	Naphthalene, 1-vinyl-4-chloro-	0.76	0.68	0.75	0.45		806
Styrene	Naphthalene, 2-vinyl-	0.395	0.049	1.345	0.093		806
Styrene	Naphthalene, 2-vinyl-6-chloro-	0.39	0.6	2.44	1.38		806
Styrene	Naphthalene, 6-vinyl-2-*tert*-butyl	0.616	0.069	1.014	0.244		806
Styrene	Oct-1-ene, 4,8-dioxaspiro(2,5)-	1.831	0.027	0.246	0.024	Y	838
Styrene	Oct-1-ene, 6,6-dimethyl-4,8-dioxaspiro	1.93	0.098	0.271	0.109	Y	838
Styrene	Oxazolidone, *N*-vinyl-	29.42	2.19	−0.029	0.014	Y	36
Styrene	Oxazoline, 2-, 2-isopropenyl-4,4-dimethyl	0.55		0.68			596
Styrene	Oxazoline, 2-, 4-acryloxymethyl-2,4-dimethyl	0.56		0.14			596
Styrene	Oxazoline, 2-isopropenyl-	0.67		0.64			862
Styrene	Oxirane, 4-vinylphenyl-	0.78		1.06			1001
Styrene	Pentadienoate, *trans*-4-ethoxy-2,4-, ethyl	0.04		12.2			723
Styrene	Pentadienonitrile, *trans*-4-ethoxy-2,4-	0.08		11.8			723
Styrene	Penten, 2-, -4-one	13.84	0.57	−0.033	0.055	Y	112
Styrene	Phenol, 3-(methacryloylamino)-	0.5	0.06	0.99	0.04		896
Styrene	Phenol, 4-(methacryloylamino)-	0.71	0.04	0.86	0.03		896
Styrene	Phosphate, 2-(acryloyloxy)ethyl diethyl	0.629	0.003	0.171	0.01	N	971
Styrene	Phosphate, 2-(acryloyloxy)ethyl diethyl	0.612	0.004	0.15	0.05	N	971
Styrene	Phosphate, 2-(acryloyloxy)ethyl diethyl	0.595	0.005	0.146	0.073	N	971
Styrene	Phosphate, 2-(acryloyloxy)ethyl diethyl	0.597	0.044	0.168	0.355	N	971
Styrene	Phosphate, 2-(acryloyloxy)ethyl diethyl	0.633	0.002	0.094	0.02	N	971
Styrene	Phosphate, 2-(acryloyloxy)ethyl diethyl	0.61	0.018	0.23	0.187	N	971
Styrene	Phosphate, 2-(acryloyloxy)ethyl diethyl	0.599	0.002	0.108	0.034	N	971
Styrene	Phosphate, vinyl bis(chloroethyl)	2.47	0.78	0.03	0.23	Y	133
Styrene	Phosphazene, isopropenylpentafluoro-	1.6	0.27	−0.121	0.088	Y	765
Styrene	Phosphonate, 2-(4-vinylphenyl)ethyl, diethyl	0.55		1.36			796
Styrene	Phosphonate, 4-vinylphenyl, diethyl	0.7		1.4			796
Styrene	Phosphonate, α-carbomethoxyvinyl-, diethyl	3.88		0			684
Styrene	Phosphonate, isopropenyl-, dimethyl	8.6		0.23			684
Styrene	Phosphonate, vinyl-, bis(2-chloroethyl)	2.46	0.43	0.02	0.39	Y	133
Styrene	Phosphonate, vinyl-, bis(2-chloroethyl)	2.3		0.16			410
Styrene	Phosphonate, vinyl-, bis(2-chloroethyl)	2.2		0.2			485
Styrene	Phosphonate, vinyl-, bis(2-chloroethyl)	6.32		0.18			592
Styrene	Phosphonate, vinyl-, bis(2-chloroethyl)	6.32		0.18			594
Styrene	Phosphonate, vinyl-, dibutyl	4.97	3.44	−0.12	2.33	Y	129
Styrene	Phosphonate, vinyl-, diethyl	4.36	4.27	−0.15	2.18	Y	129
Styrene	Phosphonate, vinyl-, diethyl	1.59	0.24	−0.52	0.22	Y	18
Styrene	Phosphonate, vinyl-, diethyl	2.45		0.02			592
Styrene	Phosphonate, vinyl-, diisobutyl	3.87	1.59	−0.32	1.46	Y	129
Styrene	Phosphonate, vinyl-, diispropyl	2.57	2.13	−0.52	2.52	Y	129
Styrene	Phosphonate, vinyl-, dimethyl					Y	129
Styrene	Phosphonate, vinyl-, dimethyl	4.61		0.4			129
Styrene	Phosphonate, vinyl-, dimethyl	2.45		0.15			592
Styrene	Phosphonate, vinyl-, dimethyl	2.45		0.02			594

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TABLE 1. *cont'd*

Monomer 1	Monomer 2	r_1	±95%	r_2	±95%	Conv.	Refs.
Styrene	Phosphonate, vinyl-, diphenyl	1.74	0.16	−0.38	0.29	Y	129
Styrene	Phosphonate, vinyl-, dipropyl	3.81	0.68	−0.41	0.72	Y	129
Styrene	Phthalimide, *N*-vinyl-	6.27	0.66	0.07	0.11	Y	163
Styrene	Propene, 2,3-dichloro-	3.51	0.18	0.05	0.01	N	11
Styrene	Propene, 2,3-dichloro-	3		0.036			983
Styrene	Propene, 2-chloro-3-hydroxy-	12.5		0			445
Styrene	Propene 3,3,3-trichloro-	6.9		0			402
Styrene	Propene, 3-chloro-2-chloromethyl-	3.37	0.73	0.01	0.1		806
Styrene	Propneyl methyl ketone	18.12	6.09	0.08	0.3		806
Styrene	Propenyl, 2-chloro-, acetate	4.1		0			445
Styrene	Propenyl, 2-methyl, acetate	71		0			470
Styrene	Propiolactam, *N*-phenyl-α-methylene-	0.626	0.025	0.406	0.106	Y	1002
Styrene	Pyrazole, *N*-vinyl-3,5-dimethyl-	8.663	0.196	0.049	0.011		806
Styrene	Pyridazinone, 3-(2-vinyl)-6-methyl-	0.9	0.03	0.85	0.05	N	340
Styrene	Pyridazinone, 3-(2-vinyl)-6-methyl-4,5-dihydro	5.92	0.1	0.13	0.03	N	340
Styrene	Pyridine, 2-methyl-5-vinyl-	0.74	0.03	0.75	0.08	N	232
Styrene	Pyridine, 2-methyl-5-vinyl-	0.6		0.68			500
Styrene	Pyridine, 2-methyl-5-vinyl-	0.72		1.2			514
Styrene	Pyridine, 2-methyl-5-vinyl-	0.73	0.03	0.78	0.23	N	56
Styrene	Pyridine, 2-vinyl-	0.46	0.15	0.75	0.32	N	231
Styrene	Pyridine, 2-vinyl-	0.5		1.27			41
Styrene	Pyridine, 2-vinyl-	0.55		1.81			456
Styrene	Pyridine, 2-vinyl-	0.57		1.33			499
Styrene	Pyridine, 2-vinyl-	0.55		1.14			532
Styrene	Pyridine, 2-vinyl-5-ethyl-	0.74	0.05	1.09	0.12	N	231
Styrene	Pyridine, 3-ethynyl-6-methyl-	2.3		0.15			784
Styrene	Pyridine, 4-vinyl-	0.52	0.07	0.69	0.16	N	231
Styrene	Pyridine, 4-vinyl-	−0.73	1.09	1.04	0.22	Y	79
Styrene	Pyridine, *N*-oxide-, 2-vinyl-5-ethyl-	0.06	0.11	2.27	0.88		806
Styrene	Pyrimidine, 2-*N,N*-dimethylamino-4-vinyl	0.338	0.017	1.404	0.071	Y	243
Styrene	Pyrimidine, 4-vinyl-	0.219	0.095	2.38	1.06	Y	243
Styrene	Pyrrolidone, 1-benzyl-3-methylene-5-methyl	0.555	0.053	0.71	0.17	Y	633
Styrene	Pyrrolidone, *N*-vinyl-	17.2	1.55	0.057	0.028	Y	36
Styrene	Quinoline, 2-vinyl-	0.49		2.09			456
Styrene	Quinoline, 2-vinyl-	0.49		2.69			458
Styrene	*S*-Ethyl *N*-vinyl-*N*-methylthiolcarbamate	10	1.72	−0.11	0.26	Y	197
Styrene	*S*-Vinyl *N,N*-diethylthiolcarbamate	4.45	0.48	0.1	0.34	Y	197
Styrene	Silane, γ-methacryloxypropyltrimethoxy-	0.425	0.048	0.868	0.096	Y	977
Styrene	Stilbene	3.92	0.17	0	0.09	N	725
Styrene	Styrene, 2,4-dibromo-	0.14	1.61	0.91	2.88		806
Styrene	Styrene, 2,5-dichloro-	0.268	0.08	0.81	0.14	Y	14
Styrene	Styrene, 2,5-dichloro-	0.18		0.25			411
Styrene	Styrene, 2,5-dichloro-	0.23		2.2			419
Styrene	Styrene, 2,5-dichloro-	0.26	0.17	0.14	0.04	N	84
Styrene	Styrene, 2,4,5-tribromo-	0.23		2.78			1054
Styrene	Styrene, 3-*tri-n*-butylstannyl-	18.5		0.03			985
Styrene	Styrene, 4-(*t*-butyldimethylsilyloxy)-	0.877	0.351	0.863	0.193	Y	976
Styrene	Styrene, 4-(trimethylsilyl)-	0.48		0.28			1036
Styrene	Styrene, 4-phenoxy-	1.38		0.94			602
Styrene	Styrene, α-(trimethylsilyloxy)-	1.48		0			970
Styrene	Styrene, α-methoxy-	2.51	0.34	0.07	0.05	N	142
Styrene	Styrene, α-methyl-	1.21	0.41	0.14	0.06	N	171
Styrene	Styrene, α-methyl-	0.96	0.03	0.05	0.13	N	281
Styrene	Styrene, α-methyl-	1.09		0.3			281
Styrene	Styrene, α-methyl-	1.13		0.4			281
Styrene	Styrene, α-methyl-	1.08	0.11	0.521	0.084	Y	289
Styrene	Styrene, α-methyl-	1.12		0.63			289
Styrene	Styrene, *m*-amino-	1.04		1.16			775
Styrene	Styrene, *m*-amino-	0.786	0.01	1.18	0.007	Y	989
Styrene	Styrene, *m*-bromo-	0.5		1.6			168
Styrene	Styrene, *m*-bromo-	0.55		1.05			256

TABLE 1. *cont'd*

Monomer 1	Monomer 2	r_1	±95%	r_2	±95%	Conv.	Refs.
Styrene	Styrene, *m*-chloro-	0.57		2.3			168
Styrene	Styrene, *m*-chloro-	0.64		1.09			256
Styrene	Styrene, *m*-cyano-	0.851	0.534	0.363	0.08		806
Styrene	Styrene, *m*-diethylaminoethyl-	1.2	0.28	1.21	0.26		806
Styrene	Styrene, *m*-dimethylamino-	1.027	0.248	0.617	0.264		806
Styrene	Styrene, *m*-hydroxy-	0.78	0.07	1.33	0.06	N	35
Styrene	Styrene, *m*-methoxy-	1.742	0.456	0.661	0.232		806
Styrene	Styrene, *m*-nitro-	0.279	0.055	0.5	0.14	Y	222
Styrene	Styrene, *m*-sulfonic acid fluoride	0.788	0.183	1.268	0.236		806
Styrene	Styrene, *p*-2-methoxyphenyl ketone	0.23	0.07	1.52	0.58		806
Styrene	Styrene, *p*-4-methoxyphenyl ketone	0.423	0.071	1.85	0.93		806
Styrene	Styrene, *p*-phenyl ketone	0.11	0.15	2.58	0.83		806
Styrene	Styrene, *p*-phenyl ketone	0.13	0.02	0.55	9.44		806
Styrene	Styrene, *p*-1-(2-hydroxypropyl)-	0.97		0.91			380
Styrene	Styrene, *p*-2-(2-hydroxypropyl)-	0.5		0.56			390
Styrene	Styrene, *p*-2-(2-hydroxypropyl)-	0.79		1.25			547
Styrene	Styrene, *p*-acetoxy-	0.835	0.029	1.305	0.05		806
Styrene	Styrene, *p*-acetoxy-	0.887	0.034	1.218	0.069		806
Styrene	Styrene, *p*-amino-	0.41		0.22			775
Styrene	Styrene, *p*-amino-	0.876	0.007	1.07	0.004	Y	989
Styrene	Styrene, *p*-bromo-	0.7	0.03	1.05	0.07	N	125
Styrene	Styrene, *p*-bromo-	0.67	0.09	1.1	0.05	N	128
Styrene	Styrene, *p*-bromo-	0.71	0.14	0.99	0.11	Y	256
Styrene	Styrene, *p*-bromo-	0.71		1.05			447
Styrene	Styrene, *p*-bormo-	0.69		1			554
Styrene	Styrene, *p*-chloro-	0.62	0.1	1.08	0.07	N	128
Styrene	Styrene, *p*-chloro-	0.744	0.08	1.029	0.056	Y	139
Styrene	Styrene, *p*-chloro-	0.816	0.029	1.062	0.014	Y	139
Styrene	Styrene, *p*-chloro-	0.74		1.03			140
Styrene	Styrene, *p*-chloro-	0.39	0.043	0.76	0.12	Y	150
Styrene	Styrene, *p*-chloro-	0.76		1.76			523
Styrene	Styrene, *p*-chloro-	0.74		1.02			554
Styrene	Styrene, *p*-chloromethyl-	0.622	0.047	1.12	0.17	Y	756
Styrene	Styrene, *p*-chloromethyl-	0.62	0.15	1.12	0.2		806
Styrene	Styrene, *p*-chloromethyl-	0.6	0.3	1.66	0.46		806
Styrene	Styrene, *p*-cyano-	0.24	0.07	1.22	0.11	N	128
Styrene	Styrene, *p*-cyano-	0.28		1.16			256
Styrene	Styrene, *p*-decyl-	0.88	0.22	0.26	1.32		806
Styrene	Styrene, *p*-diethylaminoethyl-	1.12	0.19	0.59	0.19		806
Styrene	Styrene, *p*-ethoxy	0.98	0.19	0.71	0.14		806
Styrene	Styrene, *p*-fluoromethyl-	0.474	0.151	1.399	0.236		806
Styrene	Styrene, *p*-formyl-	0.2		3			1025
Styrene	Styrene, *p*-formyl-	0.16		1.43			956
Styrene	Styrene, *p*-iodo-	0.485	0.093	1.044	0.159		806
Styrene	Styrene, *p*-iodo-	0.629	0.039	0.965	0.124	Y	839
Styrene	Styrene, *p*-mercapto-	0.607	0.188	0.907	0.223		806
Styrene	Styrene, *p*-methoxy-	0.85	0.19	0.69	0.1	N	128
Styrene	Styrene, *p*-methoxy-	1.14	0.6	1.01	1.27	N	160
Styrene	Styrene, *p*-methoxy-	1.16		0.82			256
Styrene	Styrene, *p*-methoxy-	1.05		0.79			535
Styrene	Styrene, *p*-methyl-	0.891	0.086	0.993	0.028	Y	261
Styrene	Styrene, *p*-nitro-	0.193	0.092	1.13	0.13	Y	256
Styrene	Styrene, *p*-octylamine sulfonate	0.7		2.7			817
Styrene	Styrene, *p*-sulfonic acid fluoride	0.171	0.045	1.372	0.188		806
Styrene	Styrene, *p*-trimethoxysilyl-	0.774	0.126	1.581	0.342		806
Styrene	Styrene, *p*-trimethylsilyl-	1.26	0.47	1.15	0.72		806
Styrene	Styrene, pentachloro-	1.33	0.19	0.07	0.1	N	7
Styrene	Succinimide, *N*-vinyl-	10.74	0.49	0.045	0.036	Y	104
Styrene	Succinimide, *N*-vinyl-	10.09	0.46	0.045	0.072	Y	163
Styrene	Succinimide, *N*-vinyl-	2.31	0.98	0.01	0.23	Y	693
Styrene	Succinimide, *N*-vinyl-	0.052	0.032	7	1.6	Y	80
Styrene	Terpyridinyl, 4′-vinyl-2,2′:6′,2″-	0.53	0.384	1.26	0.33	N	953
Styrene	Tetrazole, 1-vinyl-	3.85	0.045	0.184	0.031	Y	925
Styrene	Tetrazole, 2-methyl-5-(4′-vinyl)phenyl-	0.65		1.3			583
Styrene	Tetrazole, 2-methyl-5-vinyl-	1.124	0.081	0.62	0.21	Y	670

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TABLE 1. *cont'd*

Monomer 1	Monomer 2	r_1	±95%	r_2	±95%	Conv.	Refs.
Styrene	Tetrazole, 2-phenyl-5-(4′-vinyl)phenyl-	0.95		1			583
Styrene	Tetrazole, 5-phenyl-2-(4′vinyl)phenyl-	0.48		2.2			583
Styrene	Tetrazole, 5-vinyl-	0.78		0.31			870
Styrene	Tetrazole, 5-vinyl-	0.78	0.3	0.31	0.02		902
Styrene	Toluenesulfonamide, *N,N*-methyl-vinyl-	5.6	1.13	−0.58	0.44	Y	80
Styrene	Triallyl citrate	20.02	0.81	0.076	0.041	Y	367
Styrene	Triallyl cyanurate	32.45	1.27	0.22	0.12	Y	201
Styrene	Triallyl isocyanurate	28.6	1.39	−0.05	0.11	Y	201
Styrene	Triazine, 1,3,5-, 2-amino-4-(*N*-methyl-*p*-aminoanilino)-	0.306	0.054	0.44	0.12	Y	364
Styrene	Triazine, 1,3,5-, 2-amino-4-(*N*-methyl-*p*-nitroanilino)-	0.169	0.013	1.676	0.065	Y	364
Styrene	Triazine, 1,3,5-, 2-amino-4-(*p*-nitroanil)-	0.257	0.062	0.91	0.18	Y	364
Styrene	Triazine, 4,6-diamino-2-vinyl-	1.104	0.157	0.538	0.141		806
Styrene	Triazole, 1,2,3-, 1-*p*-bromophenyl-4-vi	1.32	0.15	0.73	0.4	Y	670
Styrene	Triazole, 1,2,3-, 4(5)-vinyl-	1.48	0.12	0.52	0.26	Y	670
Styrene	Urea, 1,3-divinyl-1,3-diphenyl-	3.62	0.98	−1.76	1.36	Y	800
Styrene	Urea, *N*-acryloyl-*N′*-benzoyl-	0.404		0.053			1090
Styrene	Urea, *N*-vinyl-*N′*-ethyl-	10.78	2.07	−0.33	0.33	Y	101
Styrene	Valerolactone, α-methylen-	0.097		1.42			919
Styrene	Valerolactone, α-methylene-	0.096		1.44			855
Styrene	Vinyl 2-, 1,1-dichlorocyclopropane	17.98	0.59	0	0.034		806
Styrene	Vinyl 2-, 2-methyl-4,4,6-6-tetraphenyl cyclotrisiloxane	0.11		0.8			626
Styrene	Vinyl 2-chloroethyl ether	160		0.07			597
Styrene	Vinyl 4, dithiobenzoate methyl	0.111	0.009	2.08	0.81	Y	697
Styrene	Vinyl 4-chlorocyclohexyl ketone	0.53		0.58			668
Styrene	Vinyl acetate	42.48	26.85	−0.04	0.072	Y	158
Styrene	Vinyl acetate	18.8	2.87	0.02	0.12	Y	241
Styrene	Vinyl acetate	56		0.01			481
Styrene	Vinyl acetate	48		0.05			481
Styrene	Vinyl acetate	60		0.16			481
Styrene	Vinyl acetate	57.8		0.08			812
Styrene	Vinyl acetoxymethyl ketone	0.103	0.011	0.368	0.018		806
Styrene	Vinyl benzoate	34.8	29.3	−0.02	1.62	Y	26
Styrene	Vinyl benzoate	31.56	4.33	0.06	0.15	N	696
Styrene	Vinyl benzyl sulfide	2.32	0.25	0.04	0.17	Y	303
Styrene	Vinyl bromide	16.88	0.94	0.012	0.049	Y	34
Styrene	Vinyl bromide	18		0.06			34
Styrene	Vinyl bromide	15	8.26	0.09	0.2	N	368
Styrene	Vinyl butyl ether	21.25	16.53	−0.08	0.78	Y	241
Styrene	Vinyl butyl sulfide	2.69	0.25	−0.06	0.18	Y	303
Styrene	Vinyl butylsulfonate	1.74	0.27	0	0.16	Y	185
Styrene	Vinyl chloride	27.54	7.35	−0.06	0.08	Y	109
Styrene	Vinyl chloride	17.24	1.12	0.058	0.003	Y	238
Styrene	Vinyl chloride	23.92	3.6	0.16	0.08	N	242
Styrene	Vinyl chloride	25	5	0.005	0.031	Y	46
Styrene	Vinyl chloride	12.4		0.04			516
Styrene	Vinyl chloride	14.7	29.2	0.01	0.87	Y	59
Styrene	Vinyl chloroacetate	14.57	62.41	−0.04	0.24	Y	212
Styrene	Vinyl chloroacetate	45		0.03			542
Styrene	Vinyl chloromethyl ketone	0.127	0.047	0.507	0.039	Y	353
Styrene	Vinyl cymantrene	2.324	0.06	0.096	0.014	Y	354
Styrene	Vinyl dichloroacetate	20		0.28			542
Styrene	Vinyl dodecyl ether	27		0			374
Styrene	Vinyl dodecyl ether	56		0			374
Styrene	Vinyl ether	152	185	1.2	5.3	Y	45
Styrene	Vinyl ethyl ether	90		0			140
Styrene	Vinyl ethyl ether	111	15.5	−0.122	0.066	Y	194
Styrene	Vinyl ethyl ketone	13.83	1.44	−0.033	0.023	Y	112
Styrene	Vinyl ethyl ketone	0.2	0.08	0.43	0.06	N	344
Styrene	Vinyl ethyl ketone	0.29	0.16	0.332	0.043	Y	353
Styrene	Vinyl ethyl ketone	0.665	0.021	0.122	0.017	Y	550
Styrene	Vinyl ethyl oxalate	5.62	1.06	−0.12	0.19	Y	124
Styrene	Vinyl ethyl sulfide	4.76	0.2	0.113	0.032	Y	303

TABLE 1. *cont'd*

Monomer 1	Monomer 2	r_1	±95%	r_2	±95%	Conv.	Refs.
Styrene	Vinyl ethyl sulfide	6		0.25			507
Styrene	Vinyl ethyl sulfioxde	9.64	0.54	0.101	0.044	Y	286
Styrene	Vinyl ethyl sulfoxide	6		0.1			286
Styrene	Vinyl hendecanoate	24.89	1.22	−0.17	0.18	Y	145
Styrene	Vinyl iodide	7.401	0.315	0.126	0.035		806
Styrene	Vinyl isobutyl ether	11.58	1.91	0.65	0.39	N	349
Styrene	Vinyl isobutyl ether	11.96	2.32	0.29	0.33	N	349
Styrene	Vinyl isobutyl ether	50		0.01			490
Styrene	Vinyl isobutyl sulfide	2.38	0.41	−0.11	0.2	Y	303
Styrene	Vinyl isopropyl ketone	0.46	0.05	0.26	0.07	N	344
Styrene	Vinyl isopropyl ketone	0.36	0.1	0.272	0.046	Y	353
Styrene	Vinyl isopropyl ketone	0.4		0.3			599
Styrene	Vinyl isopropyl sulfide	4.61	0.18	0.16	0.068	Y	303
Styrene	Vinyl isothiocyanate	0.65		0.37			422
Styrene	Vinyl isothiocyanate	0.8		0.5			542
Styrene	Vinyl methyl ketone	0.288	0.092	0.349	0.068	Y	140
Styrene	Vinyl methyl ketone	0.237	0.023	0.348	0.009	Y	353
Styrene	Vinyl methyl ketone	0.35		0.27			550
Styrene	Vinyl methyl sulfide	4.5		0.15			193
Styrene	Vinyl methyl sulfide	4.46	0.11	0.066	0.056	Y	195
Styrene	Vinyl methyl sulfide	5	0.24	0.046	0.084	Y	303
Styrene	Vinyl methyl sulfone	1.146	0.087	−0.22	0.17	Y	195
Styrene	Vinyl methyl sulfoxide	3.57		0.01			737
Styrene	Vinyl octyl ether	65		0			374
Styrene	Vinyl pelargonate	49.5		0.01			145
Styrene	Vinyl phenyl ether	1.7		0.01			423
Styrene	Vinyl phenyl ketone	0.24	0.04	0.3	0.02	N	344
Styrene	Vinyl phenyl ketone	0.21	0.042	0.465	0.03	Y	353
Styrene	Vinyl phenyl sulfide	3.63	0.12	0.019	0.054	Y	193
Styrene	Vinyl phenyl sulfide	3.96	0.27	0.26	0.18	N	239
Styrene	Vinyl phenyl sulfone	1.562	0.091	−0.31	0.16	Y	193
Styrene	Vinyl stearate	15.96	13.32	−0.39	0.71	Y	145
Styrene	Vinyl sulfone	0.731	0.058	−0.027	0.047	Y	45
Styrene	Vinyl *tert*-butyl ketone	0.3	0.31	3.2	0.46	N	344
Styrene	Vinyl *tert*-butyl ketone	0.36	0.11	0.248	0.05	Y	353
Styrene	Vinyl *tert*-butyl sulfide	4.36	0.76	0.158	0.073	Y	303
Styrene	Vinyl thiolacetate	4		0.25			566
Styrene	Vinyl, 1-cyano, acetate	0.181	0.409	0.147	0.033		806
Styrene	Vinyl, 2-bromo-, ethyl ether					Y	194
Styrene	Vinyl, *p*-benzylmethylcarbinol	0.98	0.32	0.94	0.15	Y	48
Styrene	Vinyl-*tris*(trimethoxysiloxy)silane	26		0			209
Styrene	Vinyl-*tris*(trimethoxysiloxy)silane	24		0.01			482
Styrene	Vinylacetophenone, *p*-	0.246	0.072	1.12	0.42	Y	266
Styrene	Vinylanthracene, 9-	2.12		0.25			123
Styrene	Vinylanthracene, 9-	2.12		0.3			48
Styrene	Vinylbenzoic acid, *p*-	0.282	0.011	1.029	0.06	Y	266
Styrene	Vinylene carbonate	411		3.16		Y	103
Styrene	Vinylene carbonate	21.03	23.45	−0.73	0.98	Y	120
Styrene	Vinylferrocene	4.37	1.44	0.2	0.1	Y	274
Styrene	Vinylferrocene	2.76	0.22	0.14	0.14	Y	294
Styrene	Vinylhydroquinone dibenzoate	0.22		0.43			440
Styrene	Vinylidene chloride	1.81	0.35	0.134	0.48	Y	138
Styrene	Vinylidene chloride	1.79	0.14	0.098	0.01	Y	238
Styrene	Vinylidene chloride	1.8		1.5			393
Styrene	Vinylidene chloride	1.839	0.024	0.87	0.007	Y	59
Styrene	Vinylidene chloride	1.81		0.15			812
Styrene	Vinylidene chloride	1.7	0.12	0.11	0.005	N	93
Styrene	Vinylidene cyanide	0.015	0.007	0.72	0.16	Y	134
Styrene	Vinylidene cyanide	0.003	0.001	0.001	0.001	Y	82
Styrene	Vinylisocyanate	8.13		0.08			435
Styrene	Vinylisocyanate	6.9		0.1			533
Styrene	Vinylmethyldiacetoxysilane	4.08	0.14	0	0.15	Y	754
Styrene	Vinylmethyldiethoxysilane	5.68	0.1	0.08	0.14	Y	754
Styrene	Vinylmethyldiethoxysilane	11.29	0.43	−0.08	0.2	Y	754
Styrene	Vinylphenyldimethylsilane	32.53	0.49	0.024	0.016	Y	482

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TABLE 1. *cont'd*

Monomer 1	Monomer 2	r_1	±95%	r_2	±95%	Conv.	Refs.
Styrene	Vinylphenylpropanol, 2-*p*-	0.48	0.3	0.41	0.4	Y	72
Styrene	Vinyltriethoxysilane	20.86	1.99	−0.09	0.14	Y	209
Styrene	Vinyltrimethylsilane	14.66	5.15	−0.19	0.36	Y	209
Styrene	Vinyltrimethylsilane					Y	482
Styrene	Vinyltrimethylsilane	5.98	0.18	0.049	0.025	Y	73
Styrene	Xanathate, *S*-methacryloyl *O*-ethyl	0.44	0.06	0.36	0.08		1086
Styrene sulfonate, sodium salt	*N*-Vinylpyrrolidone	7.19		0.084			939
Styrene, 2,4,6-trimethyl-	Acrylonitrile	0.065	0.048	0.874	0.051	Y	58
Styrene, 2,4,6-trimethyl-	Methacrylate, methyl	0.083	0.045	1.511	0.072	Y	58
Styrene, 2,4,6-trimethyl-	Methacrylate, methyl	−0.01	0.11	1.45	0.16	Y	58
Styrene, 2,4,6-trimethyl-	Styrene, *p*-chloro-	0.34	1.05	17.83	5.24	Y	58
Styrene, 2,4-dibromo-	Styrene	0.91	2.88	0.14	1.61		806
Styrene, 2,5-dichloro-	Acrylate, methyl	3.93	1.38	0.142	0.054	Y	136
Styrene, 2,5-dichloro-	Acrylate, methyl	4.47	0.15	0.288	0.069	Y	2
Styrene, 2,5-dichloro-	Acrylonitrile	0.08	0.03	0.22	0.01	N	84
Styrene, 2,5-dichloro-	Acrylonitrile	0.07		0.25			84
Styrene, 2,5-dichloro-	Acrylonitrile	0.09		0.26			84
Styrene, 2,5-dichloro-	Butadiene	0.45	0.17	0.449	0.043	Y	255
Styrene, 2,5-dichloro-	Butadiene	0.187	0.049	0.662	0.017	Y	8
Styrene, 2,5-dichloro-	Methacrylate, methyl	2.66	0.38	0.44	0.13	Y	3
Styrene, 2,5-dichloro-	Pyridine, 2-vinyl-	0.14	0.18	0.62	0.12	N	2
Styrene, 2,5-dichloro-	Styrene	0.81	0.14	0.268	0.08	Y	14
Styrene, 2,5-dichloro-	Styrene	0.25		0.18			411
Styrene, 2,5-dichloro-	Styrene	2.2		0.23			419
Styrene, 2,5-dichloro-	Styrene	0.14	0.04	0.26	0.17	N	84
Styrene, 2,5-dichloro-	Styrene, 2,5-dimethyl-	1.543	0.068	0.263	0.022	Y	91
Styrene, 2,5-dichloro-	Styrene, α-methyl-	3		0.14			377
Styrene, 2,5-dichloro-	Vinyl methyl ketone	2		0.5			375
Styrene, 2,5-dichloro-	Vinylidene cyanide	0.026	0.006	0.005	0.009	Y	82
Styrene, 2,5-dimethyl-	Styrene, 2,5-dichloro-	0.263	0.022	1.543	0.068	Y	91
Styrene, 2,6-dichloro-	Methacrylate, methyl	−0.15	0.27	1.98	0.16	N	324
Styrene, 2,4,5-tribromo-	Styrene	2.78		0.23			1054
Styrene, 3-tri-*n*-butylstannyl-	Acrylate, ethyl	0.01		10.4			985
Styrene, 3-tri-*n*-butylstannyl-	Acrylonitrile	0.001		4.88			985
Styrene, 3-tri-*n*-butylstannyl-	Methacrylate, methyl	0.03		0.69			985
Styrene, 3-tri-*n*-butylstannyl-	Styrene	0.03		18.5			985
Styrene, 3-tri-*n*-butylstannyl-	Vinyl acetate	0.38		5.33			985
Styrene, 4-(*tert*-butyldimethylsilyloxy)-	Styrene	0.863	0.193	0.877	0.351	Y	976
Styrene, 4-(trimethylsilyl)-	Styrene	0.28		0.48			1036
Styrene, 4-methyl-	Acrylonitrile	0.227	0.021	0.079	0.005	Y	929
Styrene, 4-methyl-	Methacrylate, methyl	0.46	0.022	0.345	0.008	Y	929
Styrene, 4-phenoxy-	Styrene	0.94		1.38			602
Styrene, α-(trimethylsilyloxy)-	Acrylonitrile	0		0.05			970
Styrene, α-(trimethylsilyloxy)-	Styrene	0		1.48			970
Styrene, α-methoxy-	Acrylate, methyl	0.003	0.01	0.17	0.02	N	142
Styrene, α-methoxy-	Acrylonitrile	−0.002	0.01	0.06	0.01	N	142
Styrene, α-methoxy-	Methacrylate, methyl	−0.02	0.04	2.5	0.39	N	142
Styrene, α-methoxy-	Methacrylonitrile	−0.02	0.005	0.83	0.04	N	143
Styrene, α-methoxy-	Styrene	0.07	0.05	2.51	0.34	N	142
Styrene, α-methyl-	Acrylate, 2-cyano-, methyl	0.05		0.001			452
Styrene, α-methyl-	Acrylonitrile	0.08	0.03	0.07	0.04	N	171
Styrene, α-methyl-	Acrylonitrile	0.14	0.03	0.04	0.005	N	265
Styrene, α-methyl-	Acrylonitrile	0.17		0.04			265
Styrene, α-methyl-	Acrylonitrile	0.24		0.04			265
Styrene, α-methyl-	Acrylonitrile	0.09	0.024	0.063	0.041	Y	75
Styrene, α-methyl-	Acrylonitrile	0.103	0.036	0.34	0.15	Y	75
Styrene, α-methyl-	Acrylonitrile	0.14		0.03			835
Styrene, α-methyl-	Acrylonitrile	0.08	0.07	−0.02	0.27	N	94
Styrene, α-methyl-	Butadiene	0.139	0.087	1.5	0.13	Y	70
Styrene, α-methyl-	Butadiene, 2-fluoro-	0.72	0.24	2.22	0.7	Y	174
Styrene, α-methyl-	Fumaronitrile	0.094	0.02	−0.01	0.078	Y	77
Styrene, α-methyl-	Maleic anhydride	0.04		0.08			492
Styrene, α-methyl-	Methacrylate, methyl	0.27	0.07	0.48	0.02	N	265
Styrene, α-methyl-	Methacrylate, methyl	0.51		0.55			265
Styrene, α-methyl-	Methacrylate, methyl	0.6		0.55			265

TABLE 1. *cont'd*

Monomer 1	Monomer 2	r_1	±95%	r_2	±95%	Conv.	Refs.
Styrene, α-methyl-	Methacrylate, methyl	0.14		0.5			532
Styrene, α-methyl-	Methacrylate, methyl	0.22		0.42			835
Styrene, α-methyl-	Methacrylate, methyl	0.48		0.47			899
Styrene, α-methyl-	Methacrylonitrile	0.15		0.21			542
Styrene, α-methyl-	Styrene	0.14	0.06	1.21	0.41	N	171
Styrene, α-methyl-	Styrene	0.05	0.13	0.96	0.03	N	281
Styrene, α-methyl-	Styrene	0.3		1.09			281
Styrene, α-methyl-	Styrene	0.4		1.13			281
Styrene, α-methyl-	Styrene	0.521	0.084	1.08	0.11	Y	289
Styrene, α-methyl-	Styrene	0.63		1.12			289
Styrene, α-methyl-	Styrene, 2,5-dichloro-	0.14		3			377
Styrene, α-methyl-	Styrene, *p*-chloro-	0.21	0.2	1.56	0.42	Y	218
Styrene, α-methyl-	Vinyl chloromethyl ketone	0.009	0.01	0.386	0.034	Y	356
Styrene, α-methyl-	Vinylhydroquinone dibenzoate	0.11		0.3			440
Styrene, *m*-amino-	Styrene	1.16		1.04			775
Styrene, *m*-amino-	Styrene	1.18	0.007	0.786	0.01	Y	989
Styrene, *m*-amino-	Styrene, *p*-amino-	0.63		0.49			774
Styrene, *m*-bromo-	Methacrylate, methyl	1.17		0.48			256
Styrene, *m*-bromo-	Styrene	1.6		0.5			168
Styrene, *m*-bromo-	Styrene	1.05		0.55			256
Styrene, *m*-bromo-	Styrene, *p*-methoxy-	1.4		0.25			168
Styrene, *m*-bromo-	Methacrylate, methyl					Y	150
Styrene, *m*-chloro-	Styrene	2.3		0.57			168
Styrene, *m*-chloro-	Styrene	1.09		0.64			256
Styrene, *m*-chloro-	Styrene, *p*-methoxy-	1.9		0.2			168
Styrene, *m*-cyano-	Styrene	0.363	0.08	0.851	0.534		806
Styrene, *m*-diethylaminoethyl-	Styrene	1.21	0.26	1.2	0.28		806
Styrene, *m*-dimethylamino-	Styrene	0.617	0.264	1.027	0.248		806
Styrene, *m*-hydroxy-	Styrene	1.33	0.06	0.78	0.07	N	35
Styrene, *m*-methoxy-	Styrene	0.661	0.232	1.742	0.456		806
Styrene, *m*-methyl	Methacrylate, methyl	0.53	0.04	0.48	0.04		1087
Styrene, *m*-methyl	Methacrylate, methyl	0.36	0.06	0.38	0.03		1087
Styrene, *m*-methyl	Methacrylate, methyl	0.51	0.05	0.41	0.04		1087
Styrene, *m*-methyl	Methacrylic acid	0.06	0.03	0.35	0.08		1087
Styrene, *m*-methyl	Methacrylic acid	0.33	0.02	0.18	0.02		1087
Styrene, *m*-methyl	Methacrylic acid	0.42	0.01	0.51	0.01		1087
Styrene, *m*-methyl	Acrylate, methyl	1.65		0.14			558
Styrene, *m*-methyl-	Acrylonitrile	0.43		0.07			378
Styrene, *m*-methyl-	Methacrylate, methyl	0.486	0.02	0.512	0.036	Y	256
Styrene, *m*-nitro-	Methacrylate, methyl	0.8	0.32	0.35	0.11	Y	222
Styrene, *m*-nitro-	Styrene	0.5	0.14	0.279	0.055	Y	222
Styrene, *m*-nitro-	Styrene, *p*-chloro-	1.73	0.47	0.3	0.14	Y	222
Styrene, *m*-sulfonic acid fluoride	Styrene	1.268	0.236	0.788	0.183		806
Styrene, *o*-chloro-	Acrylate, butyl	2.25		0.2			558
Styrene, *o*-chloro-	Indene	2.86	0.83	−0.069	0.066	Y	6
Styrene, *o*-chloro-	Methacrylate, butyl	1.24		0.32			558
Styrene, *o*-chloro-	Methacrylate, ethyl	1.34		0.45			558
Styrene, *o*-chloro-	Methacrylate, methyl	1.37		0.5			532
Styrene, *o*-chloro-	Methacrylate, methyl	1.34		0.46			558
Styrene, *o*-chloro-	Methacrylic acid	0.101	0.034	0.622	0.058	Y	6
Styrene, *o*-chloro-	Methacrylonitrile	0.78		0.86			44
Styrene, *p*-2-methoxyphenyl ketone	Styrene	1.52	0.58	0.23	0.07		806
Styrene, *p*-phenyl ketone	Styrene	2.58	0.83	0.11	0.15		806
Styrene, *p*-phenyl ketone	Styrene	0.55	9.44	0.13	0.02		806
Styrene, *p*-1-(2-hydroxybutyl)-	Acrylate, butyl	0.4		0.17			548
Styrene, *p*-1-(2-hydroxybutyl)-	Acrylate, methyl	0.48		0.18			548
Styrene, *p*-1-(2-hydroxybutyl)-	Acrylonitrile	0.31		0.04			548
Styrene, *p*-1-(2-hydroxypropyl)-	Acrylonitrile	0.53		0.1			380
Styrene, *p*-1-(2-hydroxypropyl)-	Methacrylate, methyl	1		0.26			380
Styrene, *p*-1-(2-hydroxypropyl)-	Styrene	0.91		0.97			380
Styrene, *p*-1-(2-hydroxypropyl)-	Styrene, *p*-chloro-	0.63		0.91			380
Styrene, *p*-2-(2-hydroxypropyl)-	Acrylonitrile	0.41		0.05			547
Styrene, *p*-2-(2-hydroxypropyl)-	Styrene	0.56		0.5			390
Styrene, *p*-2-(2-hydroxypropyl)-	Styrene	1.25		0.79			547
Styrene, *p*-2-(2-hydroxypropyl)-	Styrene, *p*-chloro-	0.53		1.24			547

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TABLE 1. *cont'd*

Monomer 1	Monomer 2	r_1	±95%	r_2	±95%	Conv.	Refs.
Styrene, *p*-4-methoxyphenyl ketone	Styrene	1.85	0.93	0.423	0.071		806
Styrene, *p*–*N*,*N*-dimethylamino-	Acrylate, methyl	0.38	0.16	0.06	0.01	Y	866
Styrene, *p*-*N*,*N*-dimethylamino-	Benzophenone, *p*-vinyl-	0.07	0.05	0.84	0.18	Y	866
Styrene, *p*-*N*,*N*-dimethylamino-	Methacrylate, methyl	0.101	0.016	0.204	0.022	Y	256
Styrene, *p*-*N*,*N*-dimethylaminomethyl-	Benzophenone, *p*-vinyl	0.26	0.017	2.54	0.136	Y	86
Styrene, *p*-acetoxy-	Acrylonitrile	0.4	0.03	0.07	0.01	N	47
Styrene, *p*-acetoxy-	Styrene	1.305	0.05	0.835	0.029		806
Styrene, *p*-acetoxy-	Styrene	1.218	0.069	0.887	0.034		806
Styrene, *p*-amino-	Styrene	0.22		0.41			775
Styrene, *p*-amino-	Styrene	1.07	0.004	0.876	0.007	Y	989
Styrene, *p*-amino-	Styrene, *m*-amino-	0.49		0.63			774
Styrene, *p*-bromo-	Methacrylate, methyl	1.1		0.4			256
Styrene, *p*-bromo-	Styrene	1.05	0.07	0.7	0.03	N	125
Styrene, *p*-bromo-	Styrene	1.1	0.05	0.67	0.09	N	128
Styrene, *p*-bromo-	Styrene	0.99	0.11	0.71	0.14	Y	256
Styrene, *p*-bromo-	Styrene	1.05		0.71			447
Styrene, *p*-bromo-	Styrene	1		0.69			554
Styrene, *p*-bromo-	Styrene, *p*-methoxy-	1.15	0.08	0.44	0.02	N	128
Styrene, *p*-chloro-	Acrylate, α-trifluoromethyl-, methyl	0.24	0.02	0	0.03	N	825
Styrene, *p*-chloro-	Acrylonitrile, α-trifluoromethyl-	0.92	0.06	−0.09	0.06	N	825
Styrene, *p*-chloro-	Butadiene	1.6	5.7	1.22	2.16	Y	255
Styrene, *p*-chloro-	Butadiene, 1-(2-hydroxyethylthio)-	0.24		3.27			810
Styrene, *p*-chloro-	Carbazole, *N*-vinyl-	7		0.02			551
Styrene, *p*-chloro-	Cyclopentene, 4-, -1,3-dione	0.294	0.081	0.014	0.006	Y	264
Styrene, *p*-chloro-	Itaconate, dimethyl	0.69		0.15			398
Styrene, *p*-chloro-	Methacrylate, butyl	1.036	0.1	0.517	0.1	N	872
Styrene, *p*-chloro-	Methacrylate, butyl	1.025	0.124	0.564	0.131		966
Styrene, *p*-chloro-	Methacrylate, methyl	0.77	0.12	0.334	0.016	Y	150
Styrene, *p*-chloro-	Methacrylate, methyl	0.89		0.42			256
Styrene, *p*-chloro-	Methacrylate, methyl	0.47		0.43			476
Styrene, *p*-chloro-	Norbornadiene	69.93	24.19	0	0.12	Y	188
Styrene, *p*-chloro-	Styrene	1.08	0.07	0.62	0.1	N	128
Styrene, *p*-chloro-	Styrene	1.029	0.056	0.744	0.08	Y	139
Styrene, *p*-chloro-	Styrene	1.062	0.014	0.816	0.029	Y	139
Styrene, *p*-chloro-	Styrene	1.03		0.74			140
Styrene, *p*-chloro-	Styrene	0.76	0.12	0.39	0.043	Y	150
Styrene, *p*-chloro-	Styrene	1.76		0.76			523
Styrene, *p*-chloro-	Styrene	1.02		0.74			554
Styrene, *p*-chloro-	Styrene, 2,4,6-trimethyl-	17.83	5.24	0.34	1.05	Y	58
Styrene, *p*-chloro-	Styrene, α-methyl-	1.56	0.42	0.21	0.2	Y	218
Styrene, *p*-chloro-	Styrene, *m*-nitro-	0.3	0.14	1.73	0.47	Y	222
Styrene, *p*-chloro-	Styrene, *p*-1-(2-hydroxypropyl)-	0.91		0.63			380
Styrene, *p*-chloro-	Styrene, *p*-2-(2-hydroxypropyl)-	1.24		0.53			547
Styrene, *p*-chloro-	Styrene, *p*-cyano-	0.26	0.08	1.28	0.13	N	128
Styrene, *p*-chloro-	Styrene, *p*-methoxy-	0.47	0.16	0.41	0.08	N	128
Styrene, *p*-chloro-	Styrene, *p*-methoxy-	0.86		0.56			256
Styrene, *p*-chloro-	Styrene, *p*-methyl-	1.15		0.61			256
Styrene, *p*-chloro-	Vinyl methyl sulfoxide	6.46		0.01			737
Styrene, *p*-chloro-	Vinyl, *p*-, benzylmethylcarbinol	1		1		Y	48
Styrene, *p*-chloromethyl-	Acrylonitrile	0.56		0.067			1035
Styrene, *p*-chloromethyl-	Butadiene	0.42		0.87			1075
Styrene, *p*-chloromethyl-	Methacrylate, butyl	1.46		0.38			1035
Styrene, *p*-chloromethyl-	Methacrylate, ethyl	1.29		0.36			1035
Styrene, *p*-chloromethyl-	Methacrylate, methyl	0.91	0.15	0.408	0.038	Y	756
Styrene, *p*-chloromethyl-	Phosphazene, isopropenylpentafluoro-	1.64	0.58	−0.048	0.067	Y	765
Styrene, *p*-chloromethyl-	Styrene	1.12	0.17	0.622	0.047	Y	756
Styrene, *p*-chloromethyl-	Styrene	1.12	0.2	0.62	0.15		806
Styrene, *p*-chloromethyl-	Styrene	1.66	0.46	0.6	0.3		806
Styrene, *p*-cyano-	Methacrylate, methyl	1.41		0.22			256
Styrene, *p*-cyano-	Styrene	1.22	0.11	0.24	0.07	N	128
Styrene, *p*-cyano-	Styrene	1.16		0.28			256
Styrene, *p*-cyano-	Styrene, *p*-chloro	1.28	0.13	0.26	0.08	N	128
Styrene, *p*-cyano-	Styrene, *p*-methoxy-	0.89	0.03	0.14	0.05	N	128
Styrene, *p*-decyl-	Styrene	0.26	1.32	0.88	0.22		806
Styrene, *p*-diethylaminoethyl-	Styrene	0.59	0.19	1.12	0.19		806

TABLE 1. *cont'd*

Monomer 1	Monomer 2	r_1	±95%	r_2	±95%	Conv.	Refs.
Styrene, *p*-dimethylamino-	Acrylate, methyl	0.372	0.055	0.192	0.01	Y	911
Styrene, *p*-dimethylamino-	Benzophenone, *p*-vinyl-	0.176	0.046	0.842	0.072	Y	911
Styrene, *p*-dimethylaminomethyl-	Benzophenone, *p*-vinyl-	0.135	0.017	2.54	0.259	Y	911
Styrene, *p*-ethoxy-	Styrene	0.71	0.14	0.98	0.19		806
Styrene, *p*-fluoro-	Myrcene	0.362	0.022	0.87	0.143	Y	1062
Styrene, *p*-fluoromethyl-	Styrene	1.399	0.236	0.474	0.151		806
Styrene, *p*-formyl-	Styrene	3		0.2			1025
Styrene, *p*-formyl-	Styrene	1.43		0.16			956
Styrene, *p*-iodo-	Styrene	1.044	0.159	0.485	0.093		806
Styrene, *p*-iodo-	Styrene	0.965	0.124	0.629	0.039	Y	839
Styrene, *p*-mercapto-	Styrene	0.907	0.223	0.607	0.188		806
Styrene, *p*-methoxy-	Acrylate, methyl	2		0.07			558
Styrene, *p*-methoxy	Methacrylate, methyl	0.32		0.29			35
Styrene, *p*-methoxy	Styrene	0.69	0.1	0.85	0.19	N	128
Styrene, *p*-methoxy	Styrene	1.01	1.27	1.14	0.6	N	160
Styrene, *p*-methoxy	Styrene	0.82		1.16			256
Styrene, *p*-methoxy	Styrene	0.79		1.05			535
Styrene, *p*-methoxy	Styrene, *m*-bromo-	0.25		1.4			168
Styrene, *p*-methoxy	Styrene, *m*-chloro-	0.2		1.9			168
Styrene, *p*-methoxy	Styrene, *p*-bromo-	0.44	0.02	1.15	0.08	N	128
Styrene, *p*-methoxy	Styrene, *p*-chloro-	0.41	0.08	0.47	0.16	N	128
Styrene, *p*-methoxy	Styrene, *p*-chloro-	0.56		0.86			256
Styrene, *p*-methoxy	Styrene, *p*-cyano-	0.14	0.05	0.89	0.03	N	128
Styrene, *p*-methyl	Acrylate, methyl	1.54		0.17			558
Styrene, *p*-methyl	Acrylonitrile	0.33		0.05			378
Styrene, *p*-methyl	Methacrylate, methyl	0.44		0.4			256
Styrene, *p*-methyl	*N,N*-Divinylaniline	6.15	0.16	0.06	0.03	Y	45
Styrene, *p*-methyl	Styrene	0.993	0.028	0.891	0.086	Y	261
Styrene, *p*-methyl	Styrene, *p*-chloro-	0.61		1.15			256
Styrene, *p*-methyl	Vinyl methyl sulfoxide	2.73		0.01			737
Styrene, *p*-nitro	Styrene	1.13	0.13	0.193	0.092	Y	256
Styrene, *p*-octylamine sulfonate	Acrylate, butyl	2.3		0.3			817
Styrene, *p*-octylamine sulfonate	Methacrylate, butyl	1.5		0.7			817
Styrene, *p*-octylamine sulfonate	Methacrylate, methyl	2.6		0.6			817
Styrene, *p*-octylamine sulfonate	Styrene	2.7		0.7			817
Styrene, *p*-sulfonic acid fluoride	Styrene	1.372	0.188	0.171	0.045		806
Styrene, *p*-*tert*-butyl-	Methacrylate, methyl	0.5		0.44			634
Styrene, *p*-*tert*-butyl-	Styrene	1.581	0.342	0.774	0.126		806
Styrene, *p*-trimethoxysilyl-	Imidazole, *N*-vinyl-	6.9		0.002			1095
Styrene, *p*-trimethylsilyl-	Styrene	1.15	0.72	1.26	0.47		806
Styrene, pentachloro-	Methacrylate, methyl	0.3	0.05	3.65	0.85	N	7
Styrene, pentachloro-	Styrene	0.07	0.1	1.33	0.19	N	7
Styrene, pentachloro-	Vinyl chloride	5.3		0.43			516
Styrene, *tert*-butoxy-	Fumarate, dibutyl	0.18		0.01			1077
Styrenesulfonate, *p*-, sodium	Acrolein	0.047	0.071	0.26	0.16	Y	57
Styrenesulfonate, *p*-, sodium	Acrolein	0.327	0.033	0.395	0.092	Y	57
Styrenesulfonate, *p*-, sodium	Acrolein	0.01	0.009	0.113	0.018	Y	57
Styrenesulfonate, *p*-, sodium	Acrylate, α-chloro-, sodium	1.44	0.31	0.27	0.06	Y	834
Succinamate, potassium *N*-vinyl-	Methacrylate, methyl	−0.02	0.12	1.1	0.17	Y	771
Succinimide, *N*-vinyl-	Acrylamide	0.17		1.86			600
Succinimide, *N*-vinyl-	Acrylate, butyl	0.15		1.54			789
Succinimide, *N*-vinyl-	Acrylate, methyl	0.9	0.17	0.357	0.063	Y	80
Succinimide, *N*-vinyl-	Acrylonitrile	0.516	0.081	0.116	0.024	Y	80
Succinimide, *N*-vinyl-	Carbazole, *N*-vinyl-	0.11	0.83	0.04	0.09	Y	284
Succinimide, *N*-vinyl-	Maleate, dimethyl	1.25	0.16	−0.012	0.021	Y	284
Succinimide, *N*-vinyl-	Maleic anhydride	0.148	0.073	0.021	0.027	Y	284
Succinimide, *N*-vinyl-	Methacrylate, methyl	0.048	0.026	9.94	0.27	Y	104
Succinimide, *N*-vinyl-	Methacrylate, methyl	−0.059	0.096	0.01	0.031	Y	693
Succinimide, *N*-vinyl-	Pyrrolidone, *N*-vinyl-	3.67	0.89	0.97	0.42	N	96
Succinimide, *N*-vinyl-	Styrene	0.045	0.036	10.74	0.49	Y	104
Succinimide, *N*-vinyl-	Styrene	0.045	0.072	10.09	0.46	Y	163
Succinimide, *N*-vinyl-	Styrene	0.01	0.23	2.31	0.98	Y	693
Succinimide, *N*-vinyl-	Styrene	7	1.6	0.052	0.32	Y	80
Succinimide, *N*-vinyl-	Vinyl acetate	5.68	0.12	0.072	0.009	Y	104
Succinimide, *N*-vinyl-	Vinyl acetate	4.49	9.49	0.18	0.54	Y	167

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TABLE 1. *cont'd*

Monomer 1	Monomer 2	r_1	±95%	r_2	±95%	Conv.	Refs.
Succinimide, *N*-vinyl-	Vinyl acetate	1.99	0.43	0.229	0.06	Y	80
Succinimide, *N*-vinyl-	Vinyl thiolacetate	0.17	0.15	2.47	0.37	N	97
Succinimide, *N*-vinyl-	Vinylidene chloride	0.311	0.058	1.441	0.061	Y	104
Sulfonate, 2-acrylamido-2-methylpropane-, sodium	Acrylamide, *N,N*-dimethyl-	0.162	0.949	1.108	0.59	Y	857
Sulfonic acid, *o*-methacryloylamino-benzene-	Methacrylic acid	0.217	0.122	0.203	0.067	Y	1006
Sulfonic acid, *o*-methacryloylamino-benzene-	Methacrylic acid	0.523	0.195	0.188	0.076	Y	1006
Sulfonic acid, *o*-methacryloylamino-benzene-	Pyridine, 2-methyl-5-vinyl-	1.83	0.218	−0.002	0.031	Y	1006
Sulfonic acid, *p*-methacryloylamino-benzene-	Methacrylic acid	1.08	0.338	0.156	0.081	Y	1006
Sulfonic acid, *p*-methacryloylamino benzene-	Methacrylic acid	1.65	0.27	0.155	0.052	Y	1006
Sulfonic acid, *p*-methacryloylamino benzene-	Pyridine, 2-methyl-5-vinyl-	2.72	0.525	−0.054	0.048	Y	1006
Terpyridinyl 4′-vinyl-2,2′:6′,2″-	Styrene	1.26	0.33	0.53	0.384	N	953
Tetrazole, 1-vinyl-	Acrylonitrile	0.314	0.066	0.54	0.032	Y	925
Tetrazole, 1-vinyl-	Methacrylate, methyl	0.262	0.026	7.13	0.093	Y	925
Tetrazole, 1-vinyl-	Styrene	0.184	0.031	3.85	0.045	Y	925
Tetrazole, 2-methyl-5-(4′-vinyl)phenyl-	Acrylonitrile	1.1		0.42			583
Tetrazole, 2-methyl-5-(4′-vinyl)phenyl-	Styrene	1.3		0.65			583
Tetrazole, 2-methyl-5-(4′-vinyl)phenyl-	Vinylidene chloride	1.9		0.13			583
Tetrazole, 2-methyl-5-vinyl-	Methacrylate, methyl	0.486	0.075	1.026	0.029	Y	670
Tetrazole, 2-methyl-5-vinyl-	Styrene	0.62	0.21	1.124	0.081	Y	670
Tetrazole, 2-methyl-5-vinyl-	Vinyl acetate	28.51	31.34	0.04	0.16	Y	670
Tetrazole, 2-phenyl-5-(4′-vinyl)phenyl-	Methacrylate, methyl	0.4		0.7			583
Tetrazole, 2-phenyl-5-(4′-vinyl)phenyl-	Styrene	1		0.95			583
Tetrazole, 2-phenyl-5-(4′-vinyl)phenyl-	Vinylidene chloride	1.8		0.25			583
Tetrazole, 2-phenyl-5-(4′-vinyl)phenyl-	Acrylonitrile	1.4		0.32			583
Tetrazole, 2-phenyl-5-(4′-vinyl)phenyl-	Styrene	2.2		0.48			583
Tetrazole, 2-phenyl-5-(4′-vinyl)phenyl-	Vinylidene chloride	1.9		0.11			583
Tetrazole, 5-vinyl-	Styrene	0.31		0.78			870
Tetrazole, 5-vinyl-	Styrene	0.31	0.02	0.78	0.3		902
Thioindigoid	Methacrylate, butyl	0.5		11.5			1007
Thiophene, 3-vinyl	Acrylate, butyl	0.499		0.386			1000
Thiophene, 3-vinyl	Methacrylate, methyl	0.25		0.563			1000
Thioxanthone, 2-(acryloyloxy)-	Methacrylate, methyl	0.5		1.36			986
Titanium, dicylopentadienyl-, dimethacrylate	Copper diacrylate	0.89		1.09			895
Titanium, dicylopentadienyl-, dimethacrylate	Nickel diacrylate	0.65		0.95			895
Toluenesulfonamide, *N,N*-methyl-vinyl-	Acrylonitrile	0.04	1.04	0.42	0.12	Y	80
Toluenesulfonamide, *N,N*-methyl-vinyl-	Methacrylate methyl	−1.83	0.26	1.87	0.19	Y	80
Toluenesulfonamide, *N,N*-methyl-vinyl-	Styrene	−0.58	0.44	5.6	1.13	Y	80
Toluenesulfonamide, *N,N*-methyl-vinyl-	Vinyl butyl ether	−0.31	0.29	3.37	1.65	Y	80
Triallyl citrate	Acrylonitrile	−0.08	0.1	1.76	0.082	Y	367
Triallyl citrate	Allylbenzene	2.01	0.5	0.339	0.039	Y	367
Triallyl citrate	Styrene	0.076	0.041	20.02	0.81	Y	367
Triallyl citrate	Vinyl acetate	2.97	0.38	0.222	0.025	Y	367
Triallyl citrate	Vinyl chloride	1.03	0.17	0.605	0.033	Y	367
Triallyl cyanurate	Methacrylate, methyl	−0.005	0.05	16.12	0.56	Y	201
Triallyl cyanurate	Styrene	0.22	0.12	32.45	1.27	Y	201
Triallyl cyanurate	Vinyl acetate	1.29	0.42	0.197	0.053	Y	201
Triallyl isocyanurate	Methacrylate, methyl	−0.49	0.94	16.88	6.64	Y	201
Triallyl isocyanurate	Styrene	−0.05	0.11	28.6	1.39	Y	201
Triallyl isocyanurate	Vinyl acetate	1.95	0.42	0.278	0.043	Y	201
Triazine, 4,6-diamino-2-vinyl-	Styrene	0.538	0.141	1.104	0.157		806
Triazine, 1,3,5-2-amino-4-(*N*-methyl-*p*-aminoanilino)-6-isopropenyl-	Styrene	0.44	0.12	0.306	0.054	Y	364
Triazine, 1,3,5-2-amino-4-(*N*-methyl-*p*-aminoanilino)-6-isopropenyl-	Styrene	1.676	0.065	0.169	0.013	Y	364
Triazine, 1,3,5-2-amino-4-(*p*-nitroanilino)-6-isopropenyl-	Styrene	0.91	0.18	0.257	0.062	Y	364

TABLE 1. *cont'd*

Monomer 1	Monomer 2	r_1	±95%	r_2	±95%	Conv.	Refs.
Triazine, 2-allyloxy-4,6-dichloro-	Pyrrolidone, *N*-vinyl-	0.5		0.98			826
Triazine, 4,6-diamino-2-vinyl-	Vinyl methyl ketone	1.35	0.68	0.17	0.11	Y	243
Triazole, 1,2,3-, 1-*p*-bromophenyl-4-vinyl-	Methacrylate, methyl	0.266	0.058	0.832	0.022	Y	670
Triazole, 1,2,3-, 1-*p*-bromophenyl-4-vinyl-	Styrene	0.73	0.4	1.32	0.15	Y	670
Triazole, 1,2,3-, 1-*p*-bromophenyl-4-vinyl-	Vinyl acetate	42.47	9.84	−0.011	0.008	Y	670
Triazole, 1,2,3-, 4(5)-vinyl-	Methacrylate, methyl	0.27	0.13	0.839	0.055	Y	670
Triazole, 1,2,3-, 4(5)-vinyl-	Styrene	0.52	0.26	1.48	0.12	Y	670
Triazole, 1-*N*-vinyl-1,2,4-	Imidazole, 1-*N*-vinyl					N	972
Tricyclo[4,2,2,0{2,5}]dec-7-ene-3,4,9,10-tetracarboxylicacid	Acrylonitrile	0.25		2.75			963
Tropone, 2-methacryloyloxy-	Acrylate, ethyl	3.13	0.528	0.387	0.027	Y	1104
Urea, 1,3-divinyl-1,3-diphenyl-	Styrene	−1.76	1.36	3.62	0.98	Y	800
Urea, *N*-acryloyl-*N'*-benzoyl-	Styrene	0.053		0.404			1090
Urea, *N*-vinyl-*N'*-ethyl-	Methacrylate, methyl	−0.008	0.029	1.85	0.23	Y	101
Urea, *N*-vinyl-*N'*-ethyl-	Styrene	−0.33	0.33	10.78	2.07	Y	101
Urea, *N*-vinyl-*N'*-ethyl-	Vinyl acetate	0.621	0.081	0.463	0.029	Y	101
Urea, *N*-vinyl-*N'*-ethyl-	Vinyl acetate	3.61		0.16			683
Urea, *N*-vinyl-*N'*-ethyl-	Vinyl acetate	1.45		0.38			683
Valerolactone, α-methylene-	Styrene	1.42		0.097			919
Valerolactone, α-methylene-	Styrene	1.44		0.096			855
Vinyl 1-cyano- acetate	Styrene	0.147	0.033	0.181	0.409		806
Vinyl 12-ketostearate	Acrylonitrile	−0.18	0.36	3.3	0.5	Y	146
Vinyl 12-ketostearate	Vinyl acetate	−0.28		0.18		Y	146
Vinyl 12-ketostearate	Vinyl chloride	−0.01		0.03		Y	146
Vinyl 12-ketostearate	Vinylidene chloride	0.26	2.61	4.4	4.8	Y	146
Vinyl 2-, 1,1-dichlorocyclopropane	Styrene	0	0.034	17.98	0.59		806
Vinyl 2-bromo-ethyl ether	Acrylate, methyl	−0.79	0.32	16.83	2.34	Y	194
Vinyl 2-bromo-ethyl ether	Styrene					Y	194
Vinyl 2-chlorocyclohexyl ketone	Maleic anhydride	1.7		0.83			836
Vinyl 2-chloroethyl ether	Acrylate, ethyl	0.15		5			439
Vinyl 2-chloroethyl ether	Acrylate, ethyl	0		4.65			726
Vinyl 2-chloroethyl ether	Acrylate, methyl	0		3.27			726
Vinyl 2-chloroethyl ether	Acrylonitrile	0		1.09			597
Vinyl 2-chloroethyl ether	Methacrylate, methyl	0		18.8			597
Vinyl 2-chloroethyl ether	Styrene	0.07		160			597
Vinyl 2-chloroethyl ether	Vinyl acetate	0.16		2.36			597
Vinyl 2-chloroethyl ether	Vinyl chloride	−0.07	0.11	2.46	0.52	Y	304
Vinyl 2-ethylhexanoate	Acrylonitrile	−0.047	0.05	9.24	1.96	Y	47
Vinyl 3,3-bis(ethoxycarbonyl)propyl ether	Acrylonitrile	0.06		1.02			1015
Vinyl 4-dithiobenzoate methyl	Methacrylate, methyl	0.3	0.29	0.151	0.092	Y	697
Vinyl 4-dithiobenzoate methyl	Styrene	2.08	0.81	0.111	0.009	Y	697
Vinyl 4-chlorocyclohexyl ketone	Maleic anhydride	0.12		0.08			836
Vinyl 4-chlorocyclohexyl ketone	Methacrylate, methyl	0.51		0.77			668
Vinyl 4-chlorocyclohexyl ketone	Styrene	0.58		0.53			668
Vinyl 4-chlorocyclohexyl ketone	Vinyl acetate	0.15		0.1			668
Vinyl 4-chlorocyclohexyl ketone	Vinyl cyclohexyl ketone	0.5		1.6			668
Vinyl *N,N*-methylacetamide	Vinyl acetate	0.93		0.49			631
Vinyl α-chloro-, triethoxysilane	Acrylonitrile					Y	237
Vinyl acetate	2-Oxazoline, 2-isopropenyl-	0.25	0.04	7.1	2		894
Vinyl acetate	2-Oxazolinium BF4, 3-methyl-2-isopropenyl-	0.114	0.021	0.413	0.005	Y	908
Vinyl acetate	Acetamide, *N*-vinyl-	0.6		5.5			984
Vinyl acetate	Acetamide, *N*-vinyl-	0		21			984
Vinyl acetate	Acetate, 2-chloro-, vinyl	0.8		1.18			892
Vinyl acetate	Acetate, allyl	1.8		0.43			1045
Vinyl acetate	Acetate, chloro-, allyl	0.77		0.69			1045
Vinyl acetate	Acetate, dichloro-, allyl	0.57		0.54			1045
Vinyl acetate	Acetate, trichloro-, allyl	0.41		0.28			1045
Vinyl acetate	Acrolein	−0.02	0.12	3.04	0.43	N	207
Vinyl acetate	Acrolein, methyl	0.15		0.98			589
Vinyl acetate	Acrylamide, *N*-octadecyl-	0.004	0.011	8.25	1.46	Y	119
Vinyl acetate	Acrylamido, 1-, -1-deoxy-D-glucitol	0.03	0.17	0.98	0.87	N	258
Vinyl acetate	Acrylamido, 2-, -2-methylpropane-sulfonate	0.05		11.6			700

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TABLE 1. *cont'd*

Monomer 1	Monomer 2	r_1	±95%	r_2	±95%	Conv.	Refs.
Vinyl acetate	Acrylamidomethylamino, *p*-, azobenzene	0.126		12.98			858
Vinyl acetate	Acrylate, 2-cyano-, methyl	0.005		0.05			452
Vinyl acetate	Acrylate, 2-ethylhexyl	0.04		7.5			570
Vinyl acetate	Acrylate, α-acetoxy-, ethyl	0.08	0.021	5.621	0.094	Y	244
Vinyl acetate	Acrylate, α-chloro-, ethyl	0.03		30			638
Vinyl acetate	Acrylate, butyl	0.018	0.072	3.48	3.39	Y	301
Vinyl acetate	Acrylate, glycidyl	0.003		7.6			553
Vinyl acetate	Acrylate, methyl	0.04	0.01	7.28	0.37		1067
Vinyl acetate	Acrylate, methyl	0.03		6.38		Y	158
Vinyl acetate	Acrylate, methyl	0.405	0.043	2.58	0.3	Y	25
Vinyl acetate	Acrylate, methyl	0.03		6.7			489
Vinyl acetate	Acrylate, methyl	0.03		6.3			568
Vinyl acetate	Acrylate, sodium					Y	37
Vinyl acetate	Acrylate, trifluoro-, methyl	0.24		0			595
Vinyl acetate	Actylate, trifluoro-, methyl	0.24		0			598
Vinyl acetate	Acrylic acid	0.021	0.059	8.66	6.63	Y	37
Vinyl acetate	Acrylonitrile	0.04	0.067	4.05	0.82	Y	158
Vinyl acetate	Acrylonitrile					N	235
Vinyl acetate	Acrylonitrile	0.06	0.22	5.51	0.91	Y	6
Vinyl acetate	Acrylonitrile	−0.06	0.08	5.29	1.13	Y	75
Vinyl acetate	Acrylonitrile	−0.03	0.09	9.2	6.39	Y	75
Vinyl acetate	Allyl acetate	0.6		0.45			140
Vinyl acetate	Allyl acetate	1		0.7			502
Vinyl acetate	Allyl acetate	1		0.7			998
Vinyl acetate	Allyl acrylate	0.11		17.35			578
Vinyl acetate	Allyl butyrate	0.97		0.64			998
Vinyl acetate	Allyl chloride	1.355	0.089	−2.4	3.21	Y	204
Vinyl acetate	Allyl chloride	0.66	0.15	0.61		Y	3
Vinyl acetate	Allyl chloride	0.34		0.75	0.15		438
Vinyl acetate	Allyl isobutyrate	1.04		0.51			998
Vinyl acetate	Allyl propionate	1.29		0.42			998
Vinyl acetate	Allyl trimethylacetate	1.15		0.34			998
Vinyl acetate	Allyl valerate	1.07		0.58			998
Vinyl acetate	Allystearamide, *N*-	0.923	0.092	0.68	0.26	Y	119
Vinyl acetate	Azobenzene, 4-(acrylamidomethyl-amino)-	0.126		12.98			880
Vinyl acetate	Benzothiazole, vinylmercapto-	0.013	0.037	2.53	0.47	Y	763
Vinyl acetate	Bicyclo[2,2,1]hept-2-ene-5,6-dicarboximide, *N*-benzyl	1.26		0.35			994
Vinyl acetate	Bicyclo[2,2,1]hept-2-ene-5,6-dicarboximide, *N*-benzyl	1.46			0.15		994
Vinyl acetate	Bicyclo[2,2,1]hept-2-ene-5,6-dicarboximide, *N*-benzyl	1.99		0.014			994
Vinyl acetate	Butadiene, 2-chloro-	−0.02	0.09	33.52	8.98	N	247
Vinyl acetate	Butene-1	1.55	0.24	0.11	0.42	Y	211
Vinyl acetate	Butene-2, *cis*-	8.27	1.05	0.03	0.25	Y	211
Vinyl acetate	Butene-2, *trans*-	7.2	1.69	−0.03	0.44	Y	211
Vinyl acetate	Caprolactam, *N*-vinyl-	0.63		0.31			557
Vinyl acetate	Caprolactam, *N*-vinyl-	0.35		2.5			859
Vinyl acetate	Caprolactam, *N*-vinyl-	0.35		2.5			883
Vinyl acetate	Carbamate, *N,N*-diethyl-, vinyl	1.7	0.04	0.13	0.19	Y	197
Vinyl acetate	Carbamate, *N*-vinyl-, ethyl	0.39		2.09			629
Vinyl acetate	Carbamate, *N*-vinyl-, ethyl	0.418	0.063	0.4	0.26	Y	81
Vinyl acetate	Carbamate, *N*-vinyl-, *tert*-butyl	0.07	1.12	0.46	0.03	N	827
Vinyl acetate	Carbazole, *N*-vinyl-	0.126	0.023	2.67	0.13	Y	246
Vinyl acetate	Carbazole, *N*-vinyl-	0.15		3.02			246
Vinyl acetate	Carbazole, *N*-vinyl-	0.13		3.9			551
Vinyl acetate	Carbon monoxide	0.24		0.33			474
Vinyl acetate	Crotonic acid	0.317	0.081	0.04	0.14	Y	47
Vinyl acetate	Crotonic acid	0.3		0.01			526
Vinyl acetate	Crotonic acid	0.31	0.07	0.001	0.1	N	94
Vinyl acetate	Diallyl β-cyanoethylisocyanurate	0.06		4.6			778
Vinyl acetate	Diallyl melamine	0.68	0.026	0.318	0.073	Y	201
Vinyl acetate	Diallyl phthalate	0.336	0.049	2.19	0.34	Y	297

TABLE 1. *cont'd*

Monomer 1	Monomer 2	r_1	±95%	r_2	±95%	Conv.	Refs.
Vinyl acetate	Diallyl phthalate	0.414	0.029	1.66	0.16	Y	297
Vinyl acetate	Diallyl phthalate	0.72		2			509
Vinyl acetate	Diallyl, 1,3-, 5-(2-hydroxy-3-phenoxypropyl)	0.15		5.5			671
Vinyl acetate	Diallyl, 1,3-, 5-(2-hydroxy-3-phenoxypropyl)	0.16		3.65			676
Vinyl acetate	Diallylcyanamide	0.01		1.62			581
Vinyl acetate	Diallyldimethylammonium chloride	0.35		1.95			1029
Vinyl acetate	Ethylene	0.72	1.2	0.16	0.03	N	309
Vinyl acetate	Ethylene					N	41
Vinyl acetate	Ethylene	1.14		0.28			413
Vinyl acetate	Ethylene	1.03	0.77	0.88	0.52	N	42
Vinyl acetate	Ethylene	1.52		0.74			559
Vinyl acetate	Ethylene	3.74	0.64	0.67	0.03	N	68
Vinyl acetate	Ethylene	1.23	0.21	0.13	0.01	N	68
Vinyl acetate	Ethylene	1.4		0.79			766
Vinyl acetate	Ethylene	0.33	0.58	−0.13	0.36	Y	6
Vinyl acetate	Ethylene, chlorotrifluoro-	0.68	0.11	0.04	0.02		1097
Vinyl acetate	Ethylene, chlorotrifluoro-	0.47		−.0.02		Y	236
Vinyl acetate	Ethylene, dichloro-, *cis*-	1.02	0.27	0.055	0.024	Y	137
Vinyl acetate	Ethylene, dichloro-, *cis*-	6.4		0.01		Y	137
Vinyl acetate	Ethylene, dichloro-, *cis*-	0.898	0.06	0.058	0.03	Y	9
Vinyl acetate	Ethylene, dichloro-, *cis*-	4.13	1.94	0.1	0.14	Y	9
Vinyl acetate	Ethylene, tetrachloro-	4.45	1.87	−0.07	0.015	Y	3
Vinyl acetate	Ethylene, tetrachloro-					Y	59
Vinyl acetate	Ethylene, trichloro-	0.607	0.076	−0.06	0.34	Y	158
Vinyl acetate	Ethylene, trichloro-	0.7	0.1	−0.006	0.019	Y	9
Vinyl acetate	Fumarate, diethyl	0.011	0.004	0.443	0.007	Y	137
Vinyl acetate	Fumarate, diethyl	0.09		0.33			718
Vinyl acetate	Fumarate, diisopropyl	0.012		0.9			1038
Vinyl acetate	Fumaryl chloride					Y	91
Vinyl acetate	Hexatriene, tetrachloro-					Y	4
Vinyl acetate	Imidazole, 1-vinyl-	−0.11	1.17	1.9	6.99	Y	364
Vinyl acetate	Indene	0.39	0.2	8.64	2.8	Y	360
Vinyl acetate	Isobutylene	1.66	0.18	0.17	0.19	Y	211
Vinyl acetate	Isobutylene, 3-chloro-	0.13		0			475
Vinyl acetate	Isopropenyl acetate	1.171	0.038	1.082	0.074	Y	100
Vinyl acetate	Itaconate, dimenthyl					Y	975
Vinyl acetate	Itaconic anhydride	−0.019	0.045	1.57	0.36	Y	365
Vinyl acetate	Itaconic anhydride	−0.04	0.024	2.87	0.32	Y	365
Vinyl acetate	Maleate, di-*tert*-butyl	0.005	0.024	0.199	0.02	Y	1049
Vinyl acetate	Maleate, diethyl	0.171	0.025	0.04	0.012	Y	137
Vinyl acetate	Maleate, dimethyl	−0.006	0.084	0.257	0.086	Y	1049
Vinyl acetate	Maleic anhydride	0.019	0.008	−0.058	0.074	Y	260
Vinyl acetate	Maleimide, *N*-(2-hydroxyethyl)-	−0.014	0.037	0.61	0.12	Y	323
Vinyl acetate	Maleimide, *N*-(2-hydroxyethyl)-	0.01	0.041	0.88	0.17	Y	323
Vinyl acetate	Maleimide, *N*-(2-hydroxyphenyl)-	−0.011	0.027	1.75	0.17	Y	323
Vinyl acetate	Maleimide, *N*-hydroxymethyl-	0.017	0.037	1.45	0.21	Y	323
Vinyl acetate	Maleimide, *N*-phenyl-	−0.003	0.006	1.284	0.046	Y	328
Vinyl acetate	Methacrylamide, 1-deoxy-D-glucitol	0.16		0.56			258
Vinyl acetate	Methacrylate, 2,2,6,6-tetramethyl-4-piperidinyl	0.2		13.7			664
Vinyl acetate	Methacrylate, butyl	−0.003	0.15	30.18	14.47	Y	165
Vinyl acetate	Methacrylate, di-, di-*n*-butylstannyl	0.013	0.018	0.013	0.036	Y	949
Vinyl acetate	Methacrylate, ethyl	−0.77	5.29	131.8	29.8	N	210
Vinyl acetate	Methacrylate, ferrocenylmethyl	0.2		1.52			293
Vinyl acetate	Methacrylate, isobutyl	−0.06	0.22	29.7	24.16	Y	165
Vinyl acetate	Methacrylate, methyl	−0.2	0.01	2.71	0.25	Y	158
Vinyl acetate	Methacrylate, methyl	−0.81	1.17	137.5	5.9	N	210
Vinyl acetate	Methacrylate, methyl	0.03		26			272
Vinyl acetate	Methacrylate, methyl	0.04		28.6			383
Vinyl acetate	Methacrylate, methyl	0.07		22.21			471
Vinyl acetate	Methacrylate acid	0.01		0.2			377
Vinyl acetate	Methacrylonitrile	0.01		12			75
Vinyl acetate	*N,N*-Divinylaniline	0.058	0.009	3.99	0.12	Y	45

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TABLE 1. *cont'd*

Monomer 1	Monomer 2	r_1	±95%	r_2	±95%	Conv.	Refs.
Vinyl acetate	Norbornadiene	0.818	0.019	1.354	0.07	Y	188
Vinyl acetate	Oxazolidone, *N*-vinyl-	0.602	0.038	1.55	0.28	Y	102
Vinyl acetate	Oxazolidone, *N*-vinyl-	0.55	0.18	2.04	0.13	Y	36
Vinyl acetate	Oxazoline, 2-, 2-isopropenyl-	0.25		7.1			862
Vinyl acetate	Oxazoline, 2-, 4-acryloxymethyl-dimethyl-2,4-dimethyl	0.03		1.41			596
Vinyl acetate	Oxazoline, 2-, 4-methacryloxy-2,4-dimethyl	0.05		6.2			596
Vinyl acetate	Oxazolinium, 2- tetrafluoroborate, 3-methyl	0.43	0.057	0.366	0.151	Y	877
Vinyl acetate	Phosphate, diethyl isopropenyl	1.56		0.44			650
Vinyl acetate	Phosphine oxide, diphenylvinyl-	0.38		1.7			843
Vinyl acetate	Phosphonate, α-carbomethoxyvinyl-, diethyl	0.09		0.6			684
Vinyl acetate	Phosphonate, isopropenyl-, dimethyl	0.14		0.99			684
Vinyl acetate	Phosphonate, vinyl-, bis(2-chloroethyl)	0.09		0.85			592
Vinyl acetate	Phosphonate, vinyl-, bis(2-chloroethyl)	0.09		0.85			594
Vinyl acetate	Phosphonate, vinyl-, bis(2-chloroethyl)	0.33		0.47			595
Vinyl acetate	Phosphonate, vinyl-, diethyl	0.04		0.74			592
Vinyl acetate	Phosphonate, vinyl-, dimethyl	0.04		0.74			592
Vinyl acetate	Phosphonate, vinyl-, dimethyl	0.04		0.74			594
Vinyl acetate	Propene, 1-chloro-, *cis*-	7.08	0.35	−0.012	0.061	Y	181
Vinyl acetate	Propene, 1-chloro-, *trans*-	3.13	0.15	0.011	0.074	Y	181
Vinyl acetate	Propene, 2-chloro-	0.186	0.091	1.65	0.36	Y	181
Vinyl acetate	Propene, 3,3,3-trichloro-	0.19		0.19			402
Vinyl acetate	Pyridine, 2-methyl-5-vinyl-	0.11		9			812
Vinyl acetate	Pyridine, 2-vinyl-	−0.11	0.17	13.65	3.64	Y	6
Vinyl acetate	Pyridine, 2-vinyl-	0		30			6
Vinyl acetate	Pyrrolidone, *N*-vinyl-	0.26	0.25	1.06	0.25	Y	103
Vinyl acetate	Pyrrolidone, *N*-vinyl-	0.19	1.77	1.75	2.79	N	121
Vinyl acetate	Pyrrolidone, *N*-vinyl-	0.195	0.057	3.4	0.21	Y	36
Vinyl acetate	*S*-Ethyl *N*-vinyl-*N*-methylthiolcarbamate	0.67	0.1	1.22	1.17	Y	197
Vinyl acetate	*S*-Vinyl *N,N*-diethylthiolcarbamate	0.133	0.025	1.89	0.77	Y	197
Vinyl acetate	Styrene	−0.04	0.072	42.48	26.85	Y	158
Vinyl acetate	Styrene	0.02	0.12	18.8	2.87	Y	241
Vinyl acetate	Styrene	0.01		56			481
Vinyl acetate	Styrene	0.05		48			481
Vinyl acetate	Styrene	0.16		60			481
Vinyl acetate	Styrene	0.08		57.8			812
Vinyl acetate	Styrene, 3-*tri-n*-butylstannyl-	5.33		0.38			985
Vinyl acetate	Succinimide, *N*-vinyl-	0.072	0.009	5.68	0.12	Y	104
Vinyl acetate	Succinimide, *N*-vinyl-	0.18	0.54	4.49	9.49	Y	167
Vinyl acetate	Succinimide, *N*-vinyl-	0.229	0.06	1.99	0.43	Y	80
Vinyl acetate	Tetrazole, 2-methyl-5-vinyl-	0.04	0.16	28.51	31.34	Y	670
Vinyl acetate	Triallyl citrate	0.222	0.025	2.97	0.38	Y	367
Vinyl acetate	Triallyl cyanurate	0.197	0.053	1.29	0.42	Y	201
Vinyl acetate	Triallyl isocyanurate	0.278	0.043	1.95	0.42	Y	201
Vinyl acetate	Triazole, 1,2,3-, 1-*p*-bromophenyl-4-vinyl-	−0.011	0.008	42.47	9.84	Y	670
Vinyl acetate	Urea, *N*-vinyl-*N'*-ethyl-	0.463	0.029	0.621	0.081	Y	101
Vinyl acetate	Urea, *N*-vinyl-*N'*-ethyl-	0.16		3.61			683
Vinyl acetate	Urea, *N*-vinyl-*N'*-ethyl-	0.38		1.45			683
Vinyl acetate	Vinyl 12-ketostearate	0.18		−0.28		Y	146
Vinyl acetate	Vinyl 2-chloroethyl ether	2.36		0.16			597
Vinyl acetate	Vinyl 4-chlorocyclohexyl ketone	0.1		0.15			668
Vinyl acetate	Vinyl benzenesulfonate	0.628	0.036	−1.34	1.7	Y	942
Vinyl acetate	Vinyl benzoate	0.455	0.069	1.07	0.27	Y	253
Vinyl acetate	Vinyl benzoate	0.35		0.99			253
Vinyl acetate	Vinyl benzoate	0.78	0.52	1.64	1.93	Y	26
Vinyl acetate	Vinyl benzoate	0.7		1.13			272
Vinyl acetate	Vinyl benzoate	0.66		1.74			430
Vinyl acetate	Vinyl benzoate	0.24	0.2	1.98	0.98	N	696
Vinyl acetate	Vinyl bromide	0.41	0.13	5.26	1.23	Y	158
Vinyl acetate	Vinyl bromide	0.6	0.09	1.92	0.35	N	268
Vinyl acetate	Vinyl bromide	0.38		3			268

TABLE 1. *cont'd*

Monomer 1	Monomer 2	r_1	±95%	r_2	±95%	Conv.	Refs.
Vinyl acetate	Vinyl butyl ether	3.72	0.09	0.01	0.02	N	345
Vinyl acetate	Vinyl butyl ether	0.71		0.2			448
Vinyl acetate	Vinyl butyl ether	2.5		0.16			553
Vinyl acetate	Vinyl butylsulfonate	0.025	0.006	0.13	0.33	Y	185
Vinyl acetate	Vinyl butyrate	1		0.97			272
Vinyl acetate	Vinyl butyrate	1.35		1.25			515
Vinyl acetate	Vinyl chloride	0.43	0.14	1.63	0.32	Y	109
Vinyl acetate	Vinyl chloride	0.981	0.036	1.032	0.097	Y	148
Vinyl acetate	Vinyl chloride	0.24	0.15	1.84	0.68	Y	158
Vinyl acetate	Vinyl chloride	0.263	0.028	2.13	0.2	Y	283
Vinyl acetate	Vinyl chloride	0.25	0.15	1.64	0.12	Y	3
Vinyl acetate	Vinyl chloride	0.65		1.35			450
Vinyl acetate	Vinyl chloride	0.26	0.14	2.3	0.64	N	86
Vinyl acetate	Vinyl chloroacetate	0.83	0.12	1.39	0.3	N	71
Vinyl acetate	Vinyl chloroacetate	0.803	0.089	0.88	0.19	Y	779
Vinyl acetate	Vinyl chloroacetate	0.8		1.18		Y	861
Vinyl acetate	Vinyl chloroformate	0.67	0.16	0.579	0.076	Y	675
Vinyl acetate	Vinyl chloroformate	0.66	0.12	0.586	0.052	Y	706
Vinyl acetate	Vinyl chloromethyl ketone	0.044	0.054	49.52	15.79		356
Vinyl acetate	Vinyl cinnamate	0.04		1.2			200
Vinyl acetate	Vinyl cyclohexyl ketone	0.08		13.76			846
Vinyl acetate	Vinyl cymantrene	0.072	0.003	7.21	1.01	Y	354
Vinyl acetate	Vinyl dodecyl ether	3.67		0			372
Vinyl acetate	Vinyl ethyl ether	3.42		0.26		Y	158
Vinyl acetate	Vinyl ethyl ketone	−0.13	0.18	10.18	6.62	Y	794
Vinyl acetate	Vinyl ethyl oxalate	1.35	0.84	9.89	8.44	Y	124
Vinyl acetate	Vinyl fluoride	3.5		0.25			755
Vinyl acetate	Vinyl formate	0.94	0.14	0.98	0.06	N	272
Vinyl acetate	Vinyl formate	1.41		0.68			401
Vinyl acetate	Vinyl isopropyl ketone	0.3		7.87			601
Vinyl acetate	Vinyl isopropyl ketone	−0.154	0.073	6.47	2.18	Y	794
Vinyl acetate	Vinyl laurate	1.4		0.7			503
Vinyl acetate	Vinyl methanesulfonate	0.639	0.014	0.206	0.427	Y	942
Vinyl acetate	Vinyl methyl ketone					Y	91
Vinyl acetate	Vinyl methyl sulfone	0	0.02	0.355	0.21	Y	195
Vinyl acetate	Vinyl octadecyl ether	4.5		0			372
Vinyl acetate	Vinyl octyl ether	3.47		0			372
Vinyl acetate	Vinyl phenyl carbonate	0.85	0.23	0.384	0.083	Y	675
Vinyl acetate	Vinyl phenyl carbonate	0.85	0.23	0.384	0.083	Y	705
Vinyl acetate	Vinyl phenyl ketone	−0.06	0.057	5.81	0.96	Y	794
Vinyl acetate	Vinyl phenyl sulfone	0.171	0.064	−0.35	0.37	Y	193
Vinyl acetate	Vinyl propionate	0.98		0.98			272
Vinyl acetate	Vinyl propionate	0.9		1			425
Vinyl acetate	Vinyl stearate	0.953	0.015	0.96	0.17	Y	1
Vinyl acetate	Vinyl stearate	0.9		0.73			537
Vinyl acetate	Vinyl *tert*-butyl sulfide	13		0.07			598
Vinyl acetate	Vinyl *tert*-butyl sulfide	13		0.07			601
Vinyl acetate	Vinyl thiolacetate	0.05		5.5			566
Vinyl acetate	Vinyl, *N*-, *N*-methylacetamide	0.49		0.93			631
Vinyl acetate	Vinylene carbonate	3.2	0.62	0.3	0.3	Y	103
Vinyl acetate	Vinylene carbonate	3		0.27			103
Vinyl acetate	Vinylene carbonate	7.16	0.64	0.05	0.16	Y	120
Vinyl acetate	Vinylene carbonate	7.3		0.13			120
Vinyl acetate	Vinylene carbonate	3.83	0.18	0.044	0.039	Y	144
Vinyl acetate	Vinylene carbonate	3.92	0.32	0.08	0.11	Y	90
Vinyl acetate	Vinylidene chloride	0.03	0.1	4.66	0.26	Y	3
Vinyl acetate	Vinylidene chloride	0.05		6.7			432
Vinyl acetate	Vinylidene chloride	0.05		5			436
Vinyl acetate	Vinylidene chloride	−0.002	0.026	3.49	0.17	Y	59
Vinyl acetate	Vinylidene chloride	0.12		4.7			812
Vinyl acetate	Vinylidene cyanide	0.003	0.002	0.1	0.11	Y	82
Vinyl acetate	Vinylidene fluoride	6		0.08			627
Vinyl acetoxymethyl ketone	Styrene	0.368	0.018	0.103	0.011		806
Vinyl benzenesulfonate	Vinyl acetate	−1.34	1.7	0.628	0.036	Y	942
Vinyl benzoate	Acrylonitrile	0.019	0.051	5.03	1.08	Y	47

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TABLE 1. *cont'd*

Monomer 1	Monomer 2	r_1	±95%	r_2	±95%	Conv.	Refs.
Vinyl benzoate	Allyl chloride	0.46		0.88			438
Vinyl benzoate	Methacrylate, methyl	0.07		20.3			272
Vinyl benzoate	Pyrrolidone, *N*-vinyl-	0.408	0.03	2.507	0.039	Y	253
Vinyl benzoate	Styrene	−0.02	1.62	34.8	29.3	Y	26
Vinyl benzoate	Styrene	0.06	0.15	31.56	4.33	N	696
Vinyl benzoate	Vinyl acetate	1.07	0.27	0.455	0.069	Y	253
Vinyl benzoate	Vinyl acetate	0.99		0.35			253
Vinyl benzoate	Vinyl acetate	1.64	1.93	0.78	0.52	Y	26
Vinyl benzoate	Vinyl acetate	1.13		0.7			272
Vinyl benzoate	Vinyl acetate	1.74		0.66			430
Vinyl benzoate	Vinyl acetate	1.98	0.98	0.24	0.2	N	696
Vinyl benzoate	Vinyl chloride	0.343	0.036	1.66	0.16	Y	283
Vinyl benzoate	Vinyl chloride	0.5		1.7			450
Vinyl benzoate	Vinyl chloride	0.28		0.72			519
Vinyl benzoate	Vinyl *p*-bromobenzoate	0.716	0.031	1.17	0.13	Y	110
Vinyl benzoate	Vinyl *p*-chlorobenzoate	0.832	0.028	0.81	0.072	Y	110
Vinyl benzoate	Vinyl *p*-cyanobenzoate	0.659	0.033	0.878	0.094	Y	110
Vinyl benzoate	Vinylidene chloride	0.065	0.093	5.58	1.76	Y	47
Vinyl benzoate	Vinylidene cyanide	0	0.017	0.061	0.047	Y	82
Vinyl benzyl sulfide	Methacrylic anhydride	−0.048	0.033	0.97	0.27	Y	106
Vinyl benzyl sulfide	Styrene	0.04	0.17	2.32	0.25	Y	303
Vinyl bromide	Acrylate, butyl	0.18	0.16	4.07	0.44	N	268
Vinyl bromide	Acrylate, butyl	0.19		3.7			268
Vinyl bromide	Acrylonitrile	0.06		2.25			268
Vinyl bromide	Acrylonitrile	0.06	0.04	2.79	0.2	N	286
Vinyl bromide	Methacrylate, methyl	0.12	0.06	14.11	0.67	N	268
Vinyl bromide	Methacrylate, methyl	0.33		17.1			268
Vinyl bromide	Methacrylate, methyl	0.052	0.026	25.1	0.88	Y	34
Vinyl bromide	Methacrylate, methyl	0.05	0.074	19.84	2.58	Y	34
Vinyl bromide	Styrene	0.012	0.049	16.88	0.94	Y	34
Vinyl bromide	Styrene	0.06		18			34
Vinyl bromide	Styrene	0.09	0.2	15	8.26	N	368
Vinyl bromide	Vinyl acetate	5.26	1.23	0.41	0.13	Y	158
Vinyl bromide	Vinyl acetate	1.92	0.35	0.6	0.09	N	268
Vinyl bromide	Vinyl acetate	3		0.38			268
Vinyl butyl ether	Acrylate, 2-chloroethyl	0		2.01			790
Vinyl butyl ether	Acrylate, methyl	0.01	0.01	3.65	0.07	N	345
Vinyl butyl ether	Acrylate, methyl	0		3.6			574
Vinyl butyl ether	Acrylonitrile					N	345
Vinyl butyl ether	Acrylonitrile	−0.03	0.01	0.98	0.13	N	347
Vinyl butyl ether	Benzenesulfamide, *p*-methacrylamide-	0		3.4	0.1		1005
Vinyl butyl ether	Caprolactam, *N*-vinyl-	0.03	0.73	3.1	5.3	Y	215
Vinyl butyl ether	Methacrylate, 2-bromoethyl	0		13.7			657
Vinyl butyl ether	Methacrylate, methyl					N	127
Vinyl butyl ether	Pyrrolidone, *N*-vinyl	−0.027	0.063	1.49	0.95	Y	215
Vinyl butyl ether	Styrene	−0.08	0.78	21.25	16.53	Y	241
Vinyl butyl ether	Toluenesulfonamide, *N,N*-methyl-vinyl-	3.37	1.65	−0.31	0.29	Y	80
Vinyl butyl ether	Vinyl acetate	0.01	0.02	3.72	0.09	N	345
Vinyl butyl ether	Vinyl acetate	0.2		0.71			448
Vinyl butyl ether	Vinyl acetate	0.16		2.5			553
Vinyl butyl ether	Vinyl chloride	0.023	0.001	2.084	0.016	Y	279
Vinyl butyl ether	Vinyl chloroacetate	0.12	4.39	1.49	34.5	Y	212
Vinyl butyl ether	Vinylidene chloride	0.004	0.001	1.75	0.11	Y	279
Vinyl butyl sulfide	Acrylonitrile	0.041	0.028	0.086	0.01	Y	303
Vinyl butyl sulfide	Styrene	−0.06	0.18	2.69	0.25	Y	303
Vinyl butylsulfonate	Acrylate, methyl	0	0.14	4.14	0.58	Y	185
Vinyl butylsulfonate	Styrene	0	0.16	1.74	0.27	Y	185
Vinyl butylsulfonate	Vinyl acetate	0.13	0.33	0.025	0.006	Y	185
Vinyl butylsulfonate	Vinyl chloride	0.267	0.046	0.325	0.013	Y	185
Vinyl butylsulfonate	Vinyl chloride	0.083	0.096	8.47	0.86	Y	185
Vinyl butyrate	Allyl chloride	0.31		1.15			438
Vinyl butyrate	Butadiene, 2-chloro-					N	247
Vinyl butyrate	Carbazole, *N*-vinyl-	0.07	0.12	1.33	0.34	Y	246
Vinyl butyrate	Ethylene	1.5		0.7			605
Vinyl butyrate	Methacrylate, methyl	0.03		25			272

TABLE 1. *cont'd*

Monomer 1	Monomer 2	r_1	±95%	r_2	±95%	Conv.	Refs.
Vinyl butyrate	Vinyl acetate	0.97		1			272
Vinyl butyrate	Vinyl acetate	1.25		1.35			515
Vinyl butyrate	Vinyl chloride	0.302	0.013	2.092	0.074	Y	283
Vinyl butyrate	Vinyl chloride	0.55		1.75			400
Vinyl butyrate	Vinyl chloride	0.65		1.35			494
Vinyl caproate	Vinyl chloride	0.348	0.05	2.26	0.22	Y	283
Vinyl chloride	Aconitate, trimethyl	0.04		0.19		Y	147
Vinyl chloride	Acrolein	0.03	0.11	5.22	0.13	N	271
Vinyl chloride	Acrylamide					Y	156
Vinyl chloride	Acrylamide, *N*-methylol-					Y	157
Vinyl chloride	Acrylate, 2-ethylhexyl	0.16		4.15			510
Vinyl chloride	Acrylate, butyl	0.07		4.4			518
Vinyl chloride	Acrylate, methyl	0.093	0.002	4.4	0.22	Y	151
Vinyl chloride	Acrylate, methyl	0.002	0.01	7.66	0.5	Y	46
Vinyl chloride	Acrylate, methyl	0		5			470
Vinyl chloride	Acrylate, methyl	0.06		4			518
Vinyl chloride	Acrylate, octyl	0.12		4.8			518
Vinyl chloride	Acrylate, trifluoro-, methyl	1.5		0			595
Vinyl chloride	Acrylate, trifluoro-, methyl	1.5		0			598
Vinyl chloride	Acrylic acid	0.107	0.011	6.69	0.88	Y	135
Vinyl chloride	Acrylic acid	0.03	0.09	9.28	0.51	N	229
Vinyl chloride	Acrylic acid	0.024	0.069	7.04	0.33	Y	288
Vinyl chloride	Acrylic acid	0.11		6.8			379
Vinyl chloride	Acrylonitrile	−0.01	0.037	3.26	0.34	Y	140
Vinyl chloride	Acrylonitrile	0.07	0.03	2.55	0.12	N	202
Vinyl chloride	Acrylonitrile	0.02	0.08	2.62	0.25	N	22
Vinyl chloride	Acrylonitrile	0.044	0.002	3.62	0.21	Y	238
Vinyl chloride	Acrylonitrile	0.052	0.01	3.65	0.22	Y	46
Vinyl chloride	Acrylonitrile	0.04		4			529
Vinyl chloride	Acryloyl chloride	0.02	0.029	3.03	0.22	Y	288
Vinyl chloride	Allyl acetate	1.2					470
Vinyl chloride	Allyl acetate	1.16		0			475
Vinyl chloride	Allyltriethoxysilane	1.68	0.38	−0.94	0.48	Y	237
Vinyl chloride	Butadiene	0.04		8.8			517
Vinyl chloride	Butadiene	−0.11	0.31	5.27	3.35	Y	717
Vinyl chloride	Butene-1	3.34	0.58	0.12	0.12	Y	230
Vinyl chloride	Butene-1, 2-ethyl-	1.56	0.26	−1.05	0.89	N	329
Vinyl chloride	Butene-1, 2-methyl-	1.01	0.31	−1.18	1.2	N	329
Vinyl chloride	Butene-1,3, 3-dimethyl-	5.64	0.2	−0.44	0.28	N	329
Vinyl chloride	Butene-1,3, 3-dimethyl-	6.18	13.57	−0.07	2.5	Y	6
Vinyl chloride	Butene-2	3.3	2.18	−1.79	5.22	N	329
Vinyl chloride	Butene-2, 2-methyl-	8.52	10.54	0.3	5.31	N	329
Vinyl chloride	Butene-2, *cis*-	8.8		0			230
Vinyl chloride	Carbazole, *N*-vinyl-	0.17		4.77			427
Vinyl chloride	Carbon monoxide	13.52	0.25	0.121	0.011	Y	184
Vinyl chloride	Crotonaldehyde	1.55	0.26	−0.56	0.25	N	271
Vinyl chloride	Diallyl phthalate	0.833	0.012	0.7	0.046	Y	296
Vinyl chloride	Diallylcyanamide	0.44		0.68			602
Vinyl chloride	Diallylcyanamide	0.44		0.68			603
Vinyl chloride	Ethylene	3.82	0.59	0.02	0.06	N	161
Vinyl chloride	Ethylene	1.99	0.42	0.19	0.17	N	180
Vinyl chloride	Ethylene	1.74	0.58	0.24	0.13	N	270
Vinyl chloride	Ethylene	4.38	0.44	0.34	0.13	N	42
Vinyl chloride	Ethylene	2		0.2			472
Vinyl chloride	Ethylene	3.21		0.21			536
Vinyl chloride	Ethylene	1.85	0.1	0.21	0.01	N	63
Vinyl chloride	Ethylene	0.96	0.22	0.14	0.12	N	63
Vinyl chloride	Ethylene	1.63	0.22	0.23	0.01	N	64
Vinyl chloride	Ethylene	1.55	0.18	0.16	0.01	N	68
Vinyl chloride	Ethylene, chlorotrifluoro-	2.53		0.01			454
Vinyl chloride	Fumarate, diethyl	0.13	0.1	0.48	0.1	Y	137
Vinyl chloride	Fumarate, diisopropyl	0.29		0.49			1038
Vinyl chloride	Hexene-1	1.54	0.98	−1.72	9.23	N	329
Vinyl chloride	Imidazole, 1-vinyl-2-methyl-	0.188	0.077	2.15	0.26	Y	154
Vinyl chloride	Isobutylene	2.04	1.82	0.06	0.8	Y	140

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TABLE 1. *cont'd*

Monomer 1	Monomer 2	r_1	±95%	r_2	±95%	Conv.	Refs.
Vinyl chloride	Isobutylene	2.12	0.2	0.268	0.043	Y	155
Vinyl chloride	Isobutylene	1.2	2.05	−0.54	5.8	N	329
Vinyl chloride	Isobutylene	1.54		0.08			560
Vinyl chloride	Isobutylene, 3-chloro-	0.31		0			475
Vinyl chloride	Isopropenyl acetate	2.26	0.13	0.23	0.16	Y	100
Vinyl chloride	Isopropenylisocyanate	0.39		3			777
Vinyl chloride	Itaconate, diethyl	0.06		5.65			480
Vinyl chloride	Itaconate, dimethyl	0.05		5			479
Vinyl chloride	Maleate, diethyl	0.768	0.078	−0.003	0.044	Y	137
Vinyl chloride	Maleate, diethyl	0.8		0			449
Vinyl chloride	Maleate, diethyl	0.9	0.11	0.046	0.07	Y	6
Vinyl chloride	Maleate, dioctyl	0.05	0.14	0.608	0.099	Y	3
Vinyl chloride	Maleic anhydride	0.098	0.042	−0.22	0.38	Y	260
Vinyl chloride	Maleic anhydride	0.04		0.4			521
Vinyl chloride	Maleic anhydride	0.1		0.67			521
Vinyl chloride	Maleimide, *N*-(4-carboxyethylphenyl)-	0.04	0.03	3.29	0.18	N	306
Vinyl chloride	Maleimide, *N*-(4-chlorophenyl)-	0.026	0.044	3.65	0.39	Y	306
Vinyl chloride	Maleimide, *N*-(4-methylphenyl)-	0.022	0.048	4.49	0.34	Y	306
Vinyl chloride	Maleimide, *N*-butyl-	0.24	1.13	−12.7	106.2	Y	305
Vinyl chloride	Maleimide, *N*-phenyl-	0.023	0.026	4.01	0.18	Y	306
Vinyl chloride	Maleimide, *N*-propyl-	0.06	0.05	2.38	0.16	N	305
Vinyl chloride	Methacrylate, 3,5-dimethyladamantyl	0.21	0.04	1.85	8.87	N	335
Vinyl chloride	Methacrylate, β-(2-benzothiazolylthio)-ethyl	0.64		0.26			741
Vinyl chloride	Methacrylate, butyl	0.05		13.5			519
Vinyl chloride	Methacrylate, methyl	0.07	0.047	8.99	2.97	Y	3
Vinyl chloride	Methacrylate, octyl	0.04		14			511
Vinyl chloride	Methacrylic acid	0.064	0.008	23.52	0.98	Y	135
Vinyl chloride	Methacrylic acid	−0.022	0.02	23.26	0.96	Y	229
Vinyl chloride	Methacrylic acid	0.07		9.05			46
Vinyl chloride	Methacryloyl chloride	0.3		2			432
Vinyl chloride	Methacryloyloxy-, *o*-, benzoic acid	0.004	0.052	11.26	3.5	Y	938
Vinyl chloride	Norbornadiene	0.67	0.02	0.41	0.01	N	267
Vinyl chloride	Octene-1	3.26	0.45	−0.57	0.85	N	329
Vinyl chloride	Oxazolidone, *N*-vinyl-	0.313	0.095	0.822	0.048	Y	36
Vinyl chloride	Pentene-1	4		0.001		Y	3
Vinyl chloride	Pentene-1	2.08	1.78	0.81	5.2	N	329
Vinyl chloride	Pentene-1, 2-methyl-	1.59	0.68	−1.16	2.31	N	329
Vinyl chloride	Phosphate, vinyl diethyl	3.4	0.21	0.15	0.047	Y	779
Vinyl chloride	Phosphate, vinyl diphenyl	3.009	0.077	0.327	0.023	Y	779
Vinyl chloride	Propene, 1-chloro-, *cis*-	11.52	2.14	0.1	0.63	Y	181
Vinyl chloride	Propene, 1-chloro-, *trans*-	4.45	0.81	0.33	0.4	Y	181
Vinyl chloride	Propene, 2-chloro-	0.095	0.085	4.75	5.12	Y	181
Vinyl chloride	Propene, 2-chloro-	0.75		0.58			517
Vinyl chloride	Propenyl, 2-, acetate	2.2		0.25			189
Vinyl chloride	Propenyl, 2-chloro-, acetate	0.7		0			445
Vinyl chloride	Propenyltriethoxysilane					Y	237
Vinyl chloride	Propylene	2.35	0.14	0.196	0.023	Y	155
Vinyl chloride	Propylene	−0.05	0.1	3.1	0.21	N	329
Vinyl chloride	Propylene	5.16	0.06	−0.02	0.04	N	355
Vinyl chloride	Propylene	2.45		0.09			560
Vinyl chloride	Propylene	2.9					588
Vinyl chloride	Pyridine, 4-vinyl-					Y	154
Vinyl chloride	Pyrrolidone, *N*-vinyl-	0.53		0.38			40
Vinyl chloride	Pyrrolidone, *N*-vinyl-	0.55		0.34			582
Vinyl chloride	Pyrrolidone, *N*-vinyl-	0.74		0.73			582
Vinyl chloride	Styrene	−0.06	0.08	27.54	7.35	Y	109
Vinyl chloride	Styrene	0.058	0.003	17.24	1.12	Y	238
Vinyl chloride	Styrene	0.16	0.08	23.92	3.6	N	242
Vinyl chloride	Styrene	0.005	0.031	25	5	Y	46
Vinyl chloride	Styrene	0.04		12.4			516
Vinyl chloride	Styrene	0.01	0.87	14.7	29.2	Y	59
Vinyl chloride	Styrene, pentachloro-	0.43		5.3			516
Vinyl chloride	Triallyl citrate	0.605	0.033	1.03	0.17	Y	367
Vinyl chloride	Vinyl 12-ketostearate	0.03		−0.01		Y	146

TABLE 1. *cont'd*

Monomer 1	Monomer 2	r_1	±95%	r_2	±95%	Conv.	Refs.
Vinyl chloride	Vinyl 2-chloroethyl ether	2.46	0.52	−0.07	0.11	Y	304
Vinyl chloride	Vinyl acetate	1.63	0.32	0.43	0.14	Y	109
Vinyl chloride	Vinyl acetate	1.032	0.097	0.981	0.036	Y	148
Vinyl chloride	Vinyl acetate	1.84	0.68	0.24	0.15	Y	158
Vinyl chloride	Vinyl acetate	2.13	0.2	0.263	0.028	Y	283
Vinyl chloride	Vinyl acetate	1.64	0.12	0.25	0.15	Y	3
Vinyl chloride	Vinyl acetate	1.35		0.65			450
Vinyl chloride	Vinyl acetate	2.3	0.64	0.26	0.14	N	86
Vinyl chloride	Vinyl benzoate	1.66	0.16	0.343	0.036	Y	283
Vinyl chloride	Vinyl benzoate	1.7		0.5			450
Vinyl chloride	Vinyl benzoate	0.72		0.28			519
Vinyl chloride	Vinyl butyl ether	2.084	0.016	0.023	0.001	Y	279
Vinyl chloride	Vinyl butylsulfonate	0.325	0.013	0.267	0.046	Y	185
Vinyl chloride	Vinyl butylsulfonate	8.47	0.86	0.083	0.096	Y	185
Vinyl chloride	Vinyl butyrate	2.092	0.074	0.302	0.013	Y	283
Vinyl chloride	Vinyl butyrate	1.75		0.55			400
Vinyl chloride	Vinyl butyrate	1.35		0.65			494
Vinyl chloride	Vinyl caproate	2.26	0.22	0.348	0.05	Y	283
Vinyl chloride	Vinyl chloroacetate	1.64	0.34	0.421	0.055	Y	283
Vinyl chloride	Vinyl dichloroacetate	1.3	0.55	0.91	0.49	Y	283
Vinyl chloride	Vinyl dodecyl ether	1.93		0.15			370
Vinyl chloride	Vinyl fluoride	11		0.05			590
Vinyl chloride	Vinyl fluoride	11.6		0.11			755
Vinyl chloride	Vinyl hendecanoate	1.081	0.016	0.38	0.022	Y	145
Vinyl chloride	Vinyl isobutyl ether	2.19	1.43	0.04	0.37	Y	47
Vinyl chloride	Vinyl laurate	7.4		0.2			450
Vinyl chloride	Vinyl *m*-cresyl ether	1.23	0.04	0.13	0.02	Y	279
Vinyl chloride	Vinyl methyl ketone	0.1		8.3			375
Vinyl chloride	Vinyl *o*-cresyl ether	1.33	0.02	0.14	0.01	Y	279
Vinyl chloride	Vinyl octadecyl ether	2.1		−0.1			370
Vinyl chloride	Vinyl octyl ether	1.9		0.1			370
Vinyl chloride	Vinyl *p*-chlorophenyl ether	1	0.04	0.63	0.05	Y	279
Vinyl chloride	Vinyl *p*-cresyl ether	1.17	0.02	0.13	0.01	Y	279
Vinyl chloride	Vinyl *p-tert*-butylphenyl ether	1.08	0.06	0.14	0.02	Y	279
Vinyl chloride	Vinyl *p*-vinyloxybenzoate	0.58	0.06	0.78	0.07	N	497
Vinyl chloride	Vinyl pelargonate	1.16		0.28			145
Vinyl chloride	Vinyl phenyl ether	1.28	0.14	0.01	0.59	Y	172
Vinyl chloride	Vinyl phenyl ether	1.06		0.16			279
Vinyl chloride	Vinyl phenyl ether	1.21	0.03	0.17	0.03	N	280
Vinyl chloride	Vinyl propionate	1.6		0.6			400
Vinyl chloride	Vinyl propionate	1.35		0.65			450
Vinyl chloride	Vinyl stearate	0.71	0.097	0.24	0.64	Y	145
Vinyl chloride	Vinyl *tert*-butyl sulfide	3		0.15			598
Vinyl chloride	Vinyl *tert*-butyl sulfide	3		0.15			601
Vinyl chloride	Vinyl valerate	2.006	0.071	0.277	0.014	Y	283
Vinyl chloride	Vinylene carbonate	4.82	0.49	0.03	0.12	Y	103
Vinyl chloride	Vinylene carbonate	15.38	1.44	0.069	0.068	Y	319
Vinyl chloride	Vinylene carbonate	17.81	7.84	0	0.22	Y	319
Vinyl chloride	Vinylethyldiethoxysilane	0.94	1.53	−0.44	2.97	Y	237
Vinyl chloride	Vinylidene chloride	0.071	0.025	2.06	0.32	Y	238
Vinyl chloride	Vinylidene chloride	0.14	0.32	3.39	1.16	N	29
Vinyl chloride	Vinylidene chloride	0.25		8.92		Y	3
Vinyl chloride	Vinylidene chloride	0.3		3.2			470
Vinyl chloride	Vinylidene chloride	0.2		4.5			517
Vinyl chloride	Vinylidene chloride	0.2		1.8			539
Vinyl chloride	Vinylidene chloride	0.16		4.5			585
Vinyl chloride	Vinylidene chloride	0.205	0.003	3.068	0.076	Y	67
Vinyl chloride	Vinylidene cyanide	0.01		0.72			409
Vinyl chloride	Vinylidene cyanide	0.016	0.002	0.6	0.068	Y	82
Vinyl chloride	Vinylisocyanate	0.46		3.7			777
Vinyl chloride	Vinylphenylisocyanate, *p*-	0.01		11.9			777
Vinyl chloride	Vinyltriethoxysilane	0.82	0.16	−0.04	0.44	Y	237
Vinyl chloride	Vinyltrimethoxysilane	0.93		0.09		Y	237
Vinyl chloroacetate	Acrylonitrile	−0.007	0.016	4.18	0.33	Y	362
Vinyl chloroacetate	Acrylonitrile	0.09		0.34			542

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TABLE 1. *cont'd*

Monomer 1	Monomer 2	r_1	±95%	r_2	±95%	Conv.	Refs.
Vinyl chloroacetate	Phosphate, vinyl diethyl	2.01	0.2	0.374	0.046	Y	779
Vinyl chloroacetate	Phosphate, vinyl diphenyl	1.42	0.15	0.53	0.12	Y	779
Vinyl chloroacetate	Styrene	−0.04	0.24	14.57	62.41	Y	212
Vinyl chloroacetate	Styrene	0.03		45			542
Vinyl chloroacetate	Vinyl acetate	1.39	0.3	0.83	0.12	N	71
Vinyl chloroacetate	Vinyl acetate	0.88	0.19	0.803	0.089	Y	779
Vinyl chloroacetate	Vinyl acetate	1.18		0.8			861
Vinyl chloroacetate	Vinyl butyl ether	1.49	34.5	0.12	4.39	Y	212
Vinyl chloroacetate	Vinyl chloride	0.421	0.055	1.64	0.34	Y	283
Vinyl chloroacetate	Vinyl ethyl ether	1.92	17.19	0.43	3.9	Y	212
Vinyl chloroacetate	Vinyl phenyl ether	0.84	1.67	0.55	0.61	Y	212
Vinyl chloroacetate	Vinylidene cyanide	0	0.006	0.137	0.037	Y	82
Vinyl chloroethyl ether	Acrylonitrile	−0.02	0.02	1.04	0.05	N	116
Vinyl chloroethyl ether	Methacrylic anhydride					Y	106
Vinyl chloroformate	Vinyl acetate	0.579	0.076	0.67	0.16	Y	675
Vinyl chloroformate	Vinyl acetate	0.586	0.052	0.66	0.12	Y	706
Vinyl chloromethyl ketone	Acrylonitrile	0.88	0.12	0.064	0.019	Y	356
Vinyl chloromethyl ketone	Methacrylate, methyl	0.593	0.092	0.121	0.021	Y	356
Vinyl chloromethyl ketone	Styrene	0.507	0.039	0.127	0.047	Y	353
Vinyl chloromethyl ketone	Styrene, α-methyl-	0.386	0.034	0.009	0.01	Y	356
Vinyl chloromethyl ketone	Vinyl acetate	49.52	15.79	0.044	0.054	Y	356
Vinyl chloromethyl ketone	Vinylidene chloride	6.8	0.3	0.018	0.009	Y	356
Vinyl cinnamate	Methacrylonitrile	0.15		4.6			200
Vinyl cinnamate	Pyrrolidone, *N*-vinyl-	1.2		0.01			200
Vinyl cinnamate	Vinyl acetate	1.2		0.04			200
Vinyl cyclohexyl ether	Pyrrolidone, *N*-vinyl-	−0.11	0.59	1.91	9.39	Y	214
Vinyl cyclohexyl ketone	Vinyl 4-chlorocyclohexyl ketone	1.6		0.5			668
Vinyl cyclohexyl ketone	Vinyl acetate	13.76		0.08			846
Vinyl cymantrene	Acrylate, methyl	0.211	0.067	0.46	0.14	Y	354
Vinyl cymantrene	Acrylonitrile	−0.065	0.093	0.446	0.048	Y	354
Vinyl cymantrene	Pyrrolidone, *N*-vinyl-	0.093	0.053	0.037	0.03	Y	308
Vinyl cymantrene	Styrene	0.096	0.014	2.324	0.06	Y	354
Vinyl cymantrene	Vinyl acetate	7.21	1.01	0.072	0.003	Y	354
Vinyl dichloroacetate	Acrylonitrile	0.044	0.015	7.45	0.32	Y	362
Vinyl dichloroacetate	Acrylonitrile	0.18		0.25			542
Vinyl dichloroacetate	Styrene	0.28		20			542
Vinyl dichloroacetate	Vinyl chloride	0.91	0.49	1.3	0.55	Y	283
Vinyl diethylphosphinate	Ethylene	−11.99	80.64	0.15	0.16	Y	311
Vinyl diethylphosphinate	Ethylene	−62.84	34.66	0.05	0.01	Y	311
Vinyl dodecyl ether	Acrylonitrile	0		0.82			373
Vinyl dodecyl ether	Styrene	0		27			374
Vinyl dodecyl ether	Styrene	0		56			374
Vinyl dodecyl ether	Vinyl acetate	0		3.67			372
Vinyl dodecyl ether	Vinyl chloride	0.15		1.93			370
Vinyl dodecyl ether	Vinylidene chloride	0		1.3			371
Vinyl ether	Acrylonitrile	0.02		0.94			386
Vinyl ether	Methacrylate, methyl	−0.15	0.16	4.9	0.99	Y	45
Vinyl ether	Pyridine, 4-vinyl-	0.03		32			395
Vinyl ether	Styrene	1.2	5.3	152	185	Y	45
Vinyl ethyl ether	Acrylate, methyl	0		3.3			470
Vinyl ethyl ether	Acrylonitrile	0.06	0.12	0.69	0.12	N	194
Vinyl ethyl ether	Ethylene	0		2.7			584
Vinyl ethyl ether	Fumarate, diethyl	−0.124	0.059	1.63	0.16	Y	194
Vinyl ethyl ether	Methacrylate methyl	0.01		37			106
Vinyl ethyl ether	Styrene	0		90			140
Vinyl ethyl ether	Styrene	−0.122	0.066	111	15.5	Y	194
Vinyl ethyl ether	Vinyl acetate	0.26		3.42		Y	158
Vinyl ethyl ether	Vinyl chloroacetate	0.43	3.9	1.92	17.19	Y	212
Vinyl ethyl ether	Vinylidene chloride	0		3.2			470
Vinyl ethyl ketone	Methacrylate, methyl	0.65	0.42	0.42	0.17	Y	794
Vinyl ethyl ketone	Styrene	−0.033	0.023	13.83	1.44	Y	112
Vinyl ethyl ketone	Styrene	0.43	0.06	0.2	0.08	N	344
Vinyl ethyl ketone	Styrene	0.332	0.043	0.29	0.16	Y	353
Vinyl ethyl ketone	Styrene	0.122	0.017	0.665	0.021	Y	550
Vinyl ethyl ketone	Vinyl acetate	10.18	6.62	−0.13	0.18	Y	794

TABLE 1. *cont'd*

Monomer 1	Monomer 2	r_1	±95%	r_2	±95%	Conv.	Refs.
Vinyl ethyl oxalate	Acrylonitrile	0	0.28	1.34	0.45	Y	124
Vinyl ethyl oxalate	Methacrylate, methyl	−0.05	0.44	4.74	2.95	Y	124
Vinyl ethyl oxalate	Styrene	−0.12	0.19	5.62	1.06	Y	124
Vinyl ethyl oxalate	Vinyl acetate	9.89	8.44	1.35	0.84	Y	124
Vinyl ethyl sulfide	Acrylonitrile	0.06	0.03	0.09	0.01	N	285
Vinyl ethyl sulfide	Acrylonitrile	0.05	0.03	0.06	0.01	N	336
Vinyl ethyl sulfide	Methacrylate, methyl	0.036	0.017	1.03	0.11	Y	303
Vinyl ethyl sulfide	Methacrylate, methyl	0.3		2.7			507
Vinyl ethyl sulfide	Styrene	0.113	0.032	4.76	0.2	Y	303
Vinyl ethyl sulfide	Styrene	0.25		6			507
Vinyl ethyl sulfoxide	Acrylonitrile	−0.08	0.14	1.63	0.16	Y	286
Vinyl ethyl sulfoxide	Methacrylate, methyl	−0.037	0.06	11.17	0.48	Y	286
Vinyl ethyl sulfoxide	Styrene	0.101	0.044	9.64	0.54	Y	286
Vinyl ethyl sulfoxide	Styrene	0.1		6			286
Vinyl ethylene glycol glycidyl ether	Pyrrolidone, *N*-vinyl-	0.06		1.4			369
Vinyl ethylene glycol glycidyl ether	Pyrrolidone, *N*-vinyl-	0.06		1.4			818
Vinyl fluoride	Acrylate, butyl	0.01		19			604
Vinyl fluoride	Acrylate, butyl	0.01		19			606
Vinyl fluoride	Acrylate, methyl	0.01		43			604
Vinyl fluoride	Acrylate, methyl	0.01		43			606
Vinyl fluoride	Acrylonitrile	0.005		44			528
Vinyl fluoride	Acrylonitrile	1		24			590
Vinyl fluoride	Ethylene	0.01	0.15	2.52	0.32	N	42
Vinyl fluoride	Ethylene	0.3		1.7			590
Vinyl fluoride	Ethylene, chlorotrifluoro-	0.8		1.2			406
Vinyl fluoride	Vinyl acetate	0.25		3.5			755
Vinyl fluoride	Vinyl chloride	0.05		11			590
Vinyl fluoride	Vinyl chloride	0.11		11.6			755
Vinyl fluoride	Vinylidene chloride	0.16		6			607
Vinyl formate	Acrylonitrile	−0.004	0.12	2.54	1.79	Y	47
Vinyl formate	Allyl chloride	0.57		0.78			438
Vinyl formate	Butadiene, 2-chloro-	−0.04		15			127
Vinyl formate	Butadiene, 2-chloro-	−0.05	0.01	11.91	3.89	N	247
Vinyl formate	Carbazole, *N*-vinyl-	0.192	0.001	4.142	0.011	Y	246
Vinyl formate	Vinyl acetate	0.98	0.06	0.94	0.14	N	272
Vinyl formate	Vinyl acetate	0.68		1.41			401
Vinyl hendecanoate	Acrylate, methyl	0.033	0.008	3.615	0.012	Y	145
Vinyl hendecanoate	Acrylonitrile	0.09	0.91	1.88	0.44	Y	145
Vinyl hendecanoate	Butadiene	−0.22	1.26	22.56	24.54	Y	145
Vinyl hendecanoate	Styrene	−0.17	0.18	24.89	1.22	Y	145
Vinyl hendecanoate	Vinyl chloride	0.38	0.022	1.081	0.016	Y	145
Vinyl hendecanoate	Vinylidene chloride	0.04	0.16	2.72	0.37	Y	145
Vinyl iodide	Styrene	0.126	0.035	7.401	0.315		806
Vinyl isobutyl ether	Acrylate, 2-chloroethyl	0		2.24			790
Vinyl isobutyl ether	Acrylate, methyl	0	0.002	3.63	0.04	N	347
Vinyl isobutyl ether	Acrylonitrile	0.7	0.09	−0.24	0.26	N	322
Vinyl isobutyl ether	Acrylonitrile	0.99	0.06	−0.05	0.07	N	322
Vinyl isobutyl ether	Acrylonitrile	−0.04	0.01	0.98	0.15	N	347
Vinyl isobutyl ether	Acrylonitrile	−0.04	0.02	1.26	0.19	N	347
Vinyl isobutyl ether	Ethylene, trichloro-	0.05	0.009	0.014	0.003	Y	332
Vinyl isobutyl ether	Fumarate, diethyl	0		0.52			640
Vinyl isobutyl ether	Maleate, diethyl	0		0.17			640
Vinyl isobutyl ether	Styrene	0.65	0.39	11.58	1.91	N	349
Vinyl isobutyl ether	Styrene	0.29	0.33	11.96	2.32	N	349
Vinyl isobutyl ether	Styrene	0.01		50			490
Vinyl isobutyl ether	Vinyl chloride	0.04	0.37	2.19	1.43	Y	47
Vinyl isobutyl ether	Vinylene carbonate	0.18		0.16			322
Vinyl isobutyl sulfide	Acrylate, ethyl	0.05	0.04	0.36	0.02	N	285
Vinyl isobutyl sulfide	Acrylate, ethyl	0.05	0.05	0.32	0.02	N	336
Vinyl isobutyl sulfide	Acrylate, methyl	0.05	0.02	0.3	0.01	N	285
Vinyl isobutyl sulfide	Acrylate, methyl	0.06	0.02	0.29	0.01	N	336
Vinyl isobutyl sulfide	Acrylonitrile	0.03	0.01	0.08	0.005	N	285
Vinyl isobutyl sulfide	Acrylonitrile	0.022	0.038	0.062	0.004	Y	303
Vinyl isobutyl sulfide	Acrylonitrile	0.03	0.01	0.08	0.004	N	336
Vinyl isobutyl sulfide	Methacrylate, methyl	0.05	0.03	0.89	0.01	N	285

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TABLE 1. *cont'd*

Monomer 1	Monomer 2	r_1	±95%	r_2	±95%	Conv.	Refs.
Vinyl isobutyl sulfide	Methacrylate, methyl	0.021	0.034	0.985	0.077	Y	303
Vinyl isobutyl sulfide	Methacrylate, methyl	0.03	0.02	0.88	0.02	N	336
Vinyl isobutyl sulfide	Styrene	−0.11	0.2	2.38	0.41	Y	303
Vinyl isopropyl ether	Caprolactam, *N*-vinyl-	0.01	0.96	0.22	1.95	Y	215
Vinyl isopropyl ether	Pyrrolidone, *N*-vinyl-	0.03	2.09	0.87	9.3	Y	215
Vinyl isopropyl ketone	Methacrylate, methyl	1.44		0.81			601
Vinyl isopropyl ketone	Methacrylate, methyl	0.6	0.47	0.54	0.22	Y	794
Vinyl isopropyl ketone	Styrene	0.26	0.07	0.46	0.05	N	344
Vinyl isopropyl ketone	Styrene	0.272	0.046	0.36	0.1	Y	353
Vinyl isopropyl ketone	Styrene	0.3		0.4			599
Vinyl isopropyl ketone	Vinyl acetate	7.87		0.3			601
Vinyl isopropyl ketone	Vinyl acetate	6.47	2.18	−0.154	0.073	Y	794
Vinyl isopropyl sulfide	Methacrylate, methyl	0.046	0.025	0.822	0.064	Y	303
Vinyl isopropyl sulfide	Styrene	0.16	0.068	4.61	0.18	Y	303
Vinyl isothiocyanate	Acrylonitrile	1.4		0.36			542
Vinyl isothiocyanate	Methacrylate, methyl	0.6		0.85			422
Vinyl isothiocyanate	Styrene	0.37		0.65			422
Vinyl isothiocyanate	Styrene	0.5		0.8			542
Vinyl 1-methyl ether	Indene	0.67	2.82	12.64	12.59	Y	750
Vinyl laurate	Acrylonitrile	0.04		4			381
Vinyl laurate	Vinyl acetate	0.7		1.4			503
Vinyl laurate	Vinyl chloride	0.2		7.4			450
Vinyl *m*-cresyl ether	Methacrylate, methyl	0.2		3.3			605
Vinyl *m*-cresyl ether	Vinyl chloride	0.13	0.02	1.23	0.04	Y	279
Vinyl *m*-cresyl ether	Vinylidene chloride	0.04	0.004	1.95	0.07	Y	279
Vinyl methanesulfonate	Vinyl acetate	0.206	0.427	0.639	0.014	Y	942
Vinyl methyl ketone	Acrylamide	0.47	0.44	3.99	0.7	Y	609
Vinyl methyl ketone	Acrylamide	0.75	0.23	1.02	0.13	Y	609
Vinyl methyl ketone	Acrylamide, *N,N*-dimethyl	0.1	0.43	0.82	0.36	Y	609
Vinyl methyl ketone	Acrylate, butyl	1.81	0.24	0.8	0.06	N	53
Vinyl methyl ketone	Acrylonitrile	1.75	0.11	0.59	0.13	Y	140
Vinyl methyl ketone	Acrylonitrile	1.39		0.63			504
Vinyl methyl ketone	Indene	2.63		0.2			606
Vinyl methyl ketone	Indene	2.9		0.25			606
Vinyl methyl ketone	Methacrylamide	0.25	0.12	3	0.18	Y	609
Vinyl methyl ketone	Methacrylamide	0.28	0.24	1.72	0.26	Y	609
Vinyl methyl ketone	Methacrylate, 2,2,6,6-tetramethyl-4-piperidinyl	0.41		0.53			664
Vinyl methyl ketone	Methyleneglutaronitrile, 2-	5.05		1.24			512
Vinyl methyl ketone	Styrene	0.349	0.068	0.288	0.092	Y	140
Vinyl methyl ketone	Styrene	0.348	0.009	0.237	0.023	Y	353
Vinyl methyl ketone	Styrene	0.27		0.35			550
Vinyl methyl ketone	Styrene, 2,5-dichloro-	0.5		2			375
Vinyl methyl ketone	Triazine, 4,6-diamino-2-vinyl-	0.17	0.11	1.35	0.68	Y	243
Vinyl methyl ketone	Vinyl acetate					Y	91
Vinyl methyl ketone	Vinyl chloride	8.3		0.1			375
Vinyl methyl ketone	Vinyl phenyl ether	4.4		0.01			423
Vinyl methyl ketone	Vinyl phenyl ketone	0.74		0.671			946
Vinyl methyl ketone	Vinylidene chloride	1.8		0.55			375
Vinyl methyl sulfide	Acrylate, methyl	0.084	0.086	0.209	0.034	Y	195
Vinyl methyl sulfide	Methacrylate, methyl	0.03		1			106
Vinyl methyl sulfide	Styrene	0.15		4.5			193
Vinyl methyl sulfide	Styrene	0.066	0.056	4.46	0.11	Y	195
Vinyl methyl sulfide	Styrene	0.046	0.084	5	0.24	Y	303
Vinyl methyl sulfide	Vinylene carbonate	7.72	1.68	−0.08	0.17	Y	120
Vinyl methyl sulfone	Styrene	−0.22	0.17	1.146	0.087	Y	195
Vinyl methyl sulfone	Vinyl acetate	0.55	0.21	0	0.02	Y	195
Vinyl methyl sulfoxide	Styrene	0.01		3.57			737
Vinyl methyl sulfoxide	Styrene, *p*-chloro-	0.01		6.46			737
Vinyl methyl sulfoxide	Styrene, *p*-methyl-	0.01		2.73			737
Vinyl mono-diethyleneglycol ether	Methacrylic acid	2.2		0			831
Vinyl mono-ethyleneglycol ether	Methacrylate, glycidyl	0		4.41			780
Vinyl *o*-cresyl ether	Methacrylate, methyl	0.1		1.8			605
Vinyl *o*-cresyl ether	Vinyl chloride	0.14	0.01	1.33	0.02	Y	279
Vinyl *o*-cresyl ether	Vinylidene chloride	0.04	0.01	2.1	0.1	Y	279

TABLE 1. *cont'd*

Monomer 1	Monomer 2	r_1	±95%	r_2	±95%	Conv.	Refs.
Vinyl octadecyl ether	Acrylonitrile	0		0.85			373
Vinyl octadecyl ether	Vinyl acetate	0		4.5			372
Vinyl octadecyl ether	Vinyl chloride	−0.1		2.1			370
Vinyl octadecyl ether	Vinylidene chloride	0		1.5			371
Vinyl octyl ether	Acrylonitrile	0		0.81			373
Vinyl octyl ether	Styrene	0		65			374
Vinyl octyl ether	Vinyl acetate	0		3.47			372
Vinyl octyl ether	Vinyl chloride	0.1		1.9			370
Vinyl *p*-benzylethylcarbinol	Acrylate, butyl	0.4		0.17			591
Vinyl *p*-benzylethylcarbinol	Acrylate, methyl	0.48		0.18			591
Vinyl *p*-benzylethylcarbinol	Acrylonitrile	0.31		0.04			591
Vinyl *p*-benzylmethylcarbinol	Acrylonitrile	0.54	0.2	0.11	0.17	N	48
Vinyl *p*-benzylmethylcarbinol	Methacrylate, methyl	0.98	0.28	0.24	0.26	Y	48
Vinyl *p*-benzylmethylcarbinol	Styrene	0.94	0.15	0.98	0.32	Y	48
Vinyl *p*-benzylmethylcarbinol	Styrene, *p*-chloro-	1		1		Y	48
Vinyl *p*-bromobenzoate	Vinyl benzoate	1.17	0.13	0.716	0.031	Y	110
Vinyl *p*-bromobenzoate	Vinyl *p*-cyanobenzoate	0.83	0.021	0.901	0.034	Y	110
Vinyl *p*-bromobenzoate	Vinyl *p*-methoxybenzoate	1.08	0.29	0.72	0.1	Y	110
Vinyl *p*-bromobenzoate	Vinyl *p*-methylbenzoate	1.05	0.17	0.594	0.045	Y	110
Vinyl *p*-chlorobenzoate	Vinyl benzoate	0.81	0.072	0.832	0.028	Y	110
Vinyl *p*-chlorobenzoate	Vinyl *p*-cyanobenzoate	0.813	0.014	1.031	0.028	Y	110
Vinyl *p*-chlorobenzoate	Vinyl *p*-methoxybenzoate	1	0.14	0.699	0.057	Y	110
Vinyl *p*-chlorobenzoate	Vinyl *p*-methylbenzoate	0.853	0.054	0.682	0.021	Y	110
Vinyl *p*-chlorophenyl ether	Vinyl chloride	0.63	0.05	1	0.04	Y	279
Vinyl *p*-chlorophenyl ether	Vinylidene chloride	0.14	0.01	2.44	0.04	Y	279
Vinyl *p*-cresyl ether	Methacrylate, methyl	0		2.6			605
Vinyl *p*-cresyl ether	Vinyl chloride	0.13	0.01	1.17	0.02	Y	279
Vinyl *p*-cresyl ether	Vinylidene chloride	0.03	0.004	1.97	0.06	Y	279
Vinyl *p*-cyanobenzoate	Vinyl benzoate	0.878	0.094	0.659	0.033	Y	110
Vinyl *p*-cyanobenzoate	Vinyl *p*-bromobenzoate	0.901	0.034	0.83	0.021	Y	110
Vinyl *p*-cyanobenzoate	Vinyl *p*-chlorobenzoate	1.031	0.028	0.813	0.014	Y	110
Vinyl *p*-cyanobenzoate	Vinyl *p*-methoxybenzoate	0.63	0.22	0.685	0.075	Y	110
Vinyl *p*-cyanobenzoate	Vinyl *p*-methylbenzoate	0.81	0.1	0.624	0.04	Y	110
Vinyl *p*-methoxybenzoate	Vinyl *p*-bromobenzoate	0.72	0.1	1.08	0.29	Y	110
Vinyl *p*-methoxybenzoate	Vinyl *p*-chlorobenzoate	0.699	0.057	1	0.14	Y	110
Vinyl *p*-methoxybenzoate	Vinyl *p*-cyanobenzoate	0.685	0.075	0.63	0.22	Y	110
Vinyl *p*-methylbenzoate	Vinyl *p*-bromobenzoate	0.594	0.045	1.05	0.17	Y	110
Vinyl *p*-methylbenzoate	Vinyl *p*-chlorobenzoate	0.682	0.021	0.853	0.054	Y	110
Vinyl *p*-methylbenzoate	Vinyl *p*-cyanobenzoate	0.624	0.04	0.81	0.1	Y	110
Vinyl *p*-*tert*-butylphenyl ether	Vinyl chloride	0.14	0.02	1.08	0.06	Y	279
Vinyl *p*-*tert*-butylphenyl ether	Vinylidene chloride	0.05	0.004	2.04	0.06	Y	279
Vinyl *p*-vinyloxybenzoate	Vinyl chloride	0.78	0.07	0.58	0.06	N	497
Vinyl pelargonate	Butadiene	0.02		26.3			145
Vinyl pelargonate	Styrene	0.01		49.5			145
Vinyl pelargonate	Vinyl chloride	0.28		1.16			145
Vinyl pelargonate	Vinylidene chloride	0		4.08			145
Vinyl phenyl carbonate	Vinyl acetate	0.384	0.083	0.85	0.23	Y	675
Vinyl phenyl carbonate	Vinyl acetate	0.384	0.083	0.85	0.23	Y	705
Vinyl phenyl ether	Acrylonitrile	0.23		2.5			556
Vinyl phenyl ether	Caprolactam, *N*-vinyl-	0.26	0.37	1.3	2.43	Y	214
Vinyl phenyl ether	Methacrylate, methyl	0.01	0.32	11.34	5.76	Y	172
Vinyl phenyl ether	Methacrylate, methyl	0		2.8			605
Vinyl phenyl ether	Pyrrolidone, *N*-vinyl-	0.253	0.007	4.48	0.1	Y	214
Vinyl phenyl ether	Styrene	0.01		1.7			423
Vinyl phenyl ether	Vinyl chloride	0.01	0.59	1.28	0.14	Y	172
Vinyl phenyl ether	Vinyl chloride	0.16		1.06			279
Vinyl phenyl ether	Vinyl chloride	0.17	0.03	1.21	0.03	N	280
Vinyl phenyl ether	Vinyl chloroacetate	0.55	0.61	0.84	1.67	Y	212
Vinyl phenyl ether	Vinyl methyl ketone	0.01		4.4			423
Vinyl phenyl ether	Vinylidene chloride	0.433	0.051	2.45	0.34	Y	240
Vinyl phenyl ether	Vinylidene chloride	0.04	0.03	2.11	0.11	N	280
Vinyl phenyl ketone	Methacrylate, glycidyl	0.697		0.719			946
Vinyl phenyl ketone	Methacrylate, methyl	0.59	1.9	0.71	0.6	Y	794
Vinyl phenyl ketone	Styrene	0.3	0.02	0.24	0.04	N	344
Vinyl phenyl ketone	Styrene	0.465	0.03	0.21	0.042	Y	353

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TABLE 1. *cont'd*

Monomer 1	Monomer 2	r_1	±95%	r_2	±95%	Conv.	Refs.
Vinyl phenyl ketone	Vinyl acetate	5.81	0.96	−0.06	0.057	Y	794
Vinyl phenyl ketone	Vinyl methyl ketone	0.671		0.74			946
Vinyl phenyl sulfide	Acrylate, methyl	−0.02	0.22	0.57	0.1	Y	193
Vinyl phenyl sulfide	Acrylonitrile	0.03	0.02	0.11	0.01	N	285
Vinyl phenyl sulfide	Acrylonitrile	0.03	0.01	0.11	0.01	N	336
Vinyl phenyl sulfide	Benzothiazole, vinylmercapto-	0.24	0.12	0.95	0.61	Y	763
Vinyl phenyl sulfide	Methacrylate, methyl	0.06	0.09	0.79	0.06	N	239
Vinyl phenyl sulfide	Methacrylate, methyl	0.08		0.85			239
Vinyl phenyl sulfide	Styrene	0.019	0.054	3.63	0.12	Y	193
Vinyl phenyl sulfide	Styrene	0.26	0.18	3.96	0.27	N	239
Vinyl phenyl sulfone	Styrene	−0.31	0.16	1.562	0.091	Y	193
Vinyl phenyl sulfone	Vinyl acetate	−0.35	0.37	0.171	0.064	Y	193
Vinyl propionate	Allyl chloride	0.62		0.68			438
Vinyl propionate	Butadiene, 2-chloro-					N	247
Vinyl propionate	Carbazole, *N*-vinyl-	0.081	0.073	1.69	0.21	Y	246
Vinyl propionate	Ethylene	1.5		0.67			605
Vinyl propionate	Methacrylate, methyl	0.03		24			272
Vinyl propionate	Vinyl acetate	0.98		0.98			272
Vinyl propionate	Vinyl acetate	1		0.9			425
Vinyl propionate	Vinyl chloride	0.6		1.6			400
Vinyl propionate	Vinyl chloride	0.65		1.35			450
Vinyl stearate	Acrylate, methyl	0.03		5.8			537
Vinyl stearate	Acrylonitrile	0.078	0.007	4.639	0.015	Y	145
Vinyl stearate	Butadiene	0.02	0.27	42.5	4.73	Y	145
Vinyl stearate	Styrene	−0.39	0.71	15.96	13.32	Y	145
Vinyl stearate	Vinyl acetate	0.96	0.17	0.953	0.015	Y	1
Vinyl stearate	Vinyl acetate	0.73		0.9			537
Vinyl stearate	Vinyl chloride	0.24	0.64	0.71	0.097	Y	145
Vinyl stearate	Vinylidene chloride	0.08	0.17	3.92	0.14	Y	145
Vinyl sulfone	Methacrylate, methyl	0.1	0.16	4.5	0.49	Y	45
Vinyl sulfone	Styrene	−0.027	0.047	0.731	0.058	Y	45
Vinyl *tert*-butyl ketone	Methacrylate, methyl	0.65	0.15	1.21	0.11	Y	794
Vinyl *tert*-butyl ketone	Styrene	3.2	0.46	0.3	0.31	N	344
Vinyl *tert*-butyl sulfide	Styrene	0.248	0.05	0.36	0.11	Y	353
Vinyl *tert*-butyl sulfide	Acrylonitrile	0	0.013	0.09	0.024	Y	303
Vinyl *tert*-butyl sulfide	Styrene	0.158	0.073	4.36	0.76	Y	303
Vinyl *tert*-butyl sulfide	Vinyl acetate	0.07		13			598
Vinyl *tert*-butyl sulfide	Vinyl acetate	0.07		13			601
Vinyl *tert*-butyl sulfide	Vinyl chloride	0.15		3			598
Vinyl *tert*-butyl sulfide	Vinyl chloride	0.15		3			601
Vinyl thiolacetate	Acrylate, methyl	0.23		0.8			566
Vinyl thiolacetate	Carbazole, *N*-vinyl-	0.45	0.15	0.44	0.28	N	97
Vinyl thiolacetate	Styrene	0.25		4			566
Vinyl thiolacetate	Succinimide, *N*-vinyl-	2.47	0.37	0.17	0.15	N	97
Vinyl thiolacetate	Vinyl acetate	5.5		0.05			566
Vinyl thiolacetate	Vinylene carbonate	13.57	1.04	0.041	0.01	Y	186
Vinyl trichloroacetate	Acrylonitrile	0.047	0.039	7.34	0.9	Y	362
Vinyl trimethylammonioethyl ether iodide	*N*-Vinylpyrrolidone	0	0.02	11.6	0.03		1037
Vinyl valerate	Vinyl chloride	0.277	0.014	2.006	0.071	Y	283
Vinyl, 2-, 2-methyl-4,4,6,6-tetraphenyl-cyclotrisiloxane	Styrene	0.8		0.11			626
Vinyl-tris(trimethoxysiloxy)silane	Acrylonitrile	0.07		3.9			209
Vinyl-tris(trimethoxysiloxy)silane	Acrylonitrile	0.08		3.85			573
Vinyl-tris(trimethoxysiloxy)silane	Methacrylate, methyl	0.02		34			482
Vinyl-tris(trimethoxysiloxy)silane	Styrene	0		26			209
Vinyl-tris(trimethoxysiloxy)silane	Styrene	0.01		24			482
Vinylacetophenone	Methacrylate, methyl	1.65	3.81	0.33	0.36	Y	266
Vinylacetophenone	Styrene	1.12	0.42	0.246	0.072	Y	266
Vinylanthracene, 9-	Acrylate, butyl	0.126	0.054	3.717	0.046	Y	123
Vinylanthracene, 9-	Acrylate, ethyl	0.295	0.056	3.498	0.041	Y	123
Vinylanthracene, 9-	Acrylate, methyl	0.08	0.092	2.998	0.067	Y	123
Vinylanthracene, 9-	Methacrylate, methyl	0.117	0.043	4.068	0.04	Y	123
Vinylanthracene, 9-	Styrene	0.25		2.12			123
Vinylanthracene, 9-	Styrene	0.3		2.12			48
Vinylbenzoate, *p*-, sodium	Acrylonitrile	0.23	0.34	0.174	0.04	Y	175

TABLE 1. *cont'd*

Monomer 1	Monomer 2	r_1	±95%	r_2	±95%	Conv.	Refs.
Vinylbenzoic acid, *p*-	Acrylonitrile	1.63	0.42	0.06	0.009	Y	175
Vinylbenzoic acid, *p*-	Methacrylate, methyl	1.16	0.3	0.398	0.097	Y	266
Vinylbenzoic acid, *p*-	Styrene	1.029	0.06	0.282	0.011	Y	266
Vinylbenzyl chloride	Methacrylate, methyl	1.02		0.46			792
Vinylene carbonate	Acrylamide	0.05		13.8			387
Vinylene carbonate	Acrylonitrile	0.08		14.9			579
Vinylene carbonate	Methacrylate, methyl	−0.04	0.85	126	298	Y	103
Vinylene carbonate	Pyrrolidone, *N*-vinyl-	0.056	0.059	1.08	0.11	Y	103
Vinylene carbonate	Styrene	3.16		411		Y	103
Vinylene carbonate	Styrene	−0.73	0.98	21.03	23.45	Y	120
Vinylene carbonate	Vinyl acetate	0.3	0.3	3.2	0.62	Y	103
Vinylene carbonate	Vinyl acetate	0.27		3			103
Vinylene carbonate	Vinyl acetate	0.05	0.16	7.16	0.64	Y	120
Vinylene carbonate	Vinyl acetate	0.13		7.3			120
Vinylene carbonate	Vinyl acetate	0.044	0.039	3.83	0.18	Y	144
Vinylene carbonate	Vinyl acetate	0.08	0.11	3.92	0.32	Y	90
Vinylene carbonate	Vinyl chloride	0.03	0.12	4.82	0.49	Y	103
Vinylene carbonate	Vinyl chloride	0.069	0.068	15.38	1.44	Y	319
Vinylene carbonate	Vinyl chloride	0	0.22	17.81	7.84	Y	319
Vinylene carbonate	Vinyl isobutyl ether	0.16		0.18			322
Vinylene carbonate	Vinyl 1-menthyl ether	0.14	1.91	0.25	3.32	Y	750
Vinylene carbonate	Vinyl methyl sulfide	−0.08	0.17	7.72	1.68	Y	120
Vinylene carbonate	Vinyl thiolacetate	0.041	0.01	13.57	1.04	Y	186
Vinylethyldiethoxysilane	Vinyl chloride	−0.44	2.97	0.94	1.53	Y	237
Vinylethynyl-4-piperidinol, 1,2,5-trimethyl-4-	Acrylonitrile	0.38		0.08			783
Vinylethynyl-4-piperidinol, 1,2,5-trimethyl-4-	Methacrylic acid	0.05		0.4			734
Vinylferrocene	Acrylonitrile	0.165	0.092	0.186	0.025	Y	294
Vinylferrocene	Acrylonitrile	0.15		0.16			294
Vinylferrocene	Butadiene	0.16	0.15	4.34	0.18	Y	802
Vinylferrocene	Methacrylate, methyl	0.52		1.22			294
Vinylferrocene	Pyrrolidone, *N*-vinyl-	0.71	0.16	0.364	0.068	Y	308
Vinylferrocene	Styrene	0.2	0.1	4.37	1.44	Y	274
Vinylferrocene	Styrene	0.14	0.14	2.76	0.22	Y	294
Vinylhydroquinone	Acrylic acid	0.026	0.092	0.29	0.11	Y	337
Vinylhydroquinone	Acrylonitrile	0.04	0.03	0.56	0.36	N	338
Vinylhydroquinone	Methacrylate, methyl	0.02	0.13	0.49	0.21	Y	337
Vinylhydroquinone	Pyridine, 4-vinyl-	−0.23	0.36	0.53	0.4	Y	337
Vinylhydroquinone dibenzoate	Acrylate, methyl	0.75		0.46			440
Vinylhydroquinone dibenzoate	Acrylic acid	0.95		0.44			444
Vinylhydroquinone dibenzoate	Methacrylate, methyl	0.41		0.34			440
Vinylhydroquinone dibenzoate	Styrene	0.43		0.22			440
Vinylhydroquinone dibenzoate	Styrene, α-methyl-	0.3		0.11			440
Vinylidene chloride	Aconitate, trimethyl	64.6	23.74	0.15	0.94	N	149
Vinylidene chloride	Acrylamide, *N*-octadecyl-	0.432	0.008	1.4	0.11	Y	119
Vinylidene chloride	Acrylate, butyl	0.934	0.006	0.873	0.022	Y	118
Vinylidene chloride	Acrylate, butyl	0.84		0.46			464
Vinylidene chloride	Acrylate, butyl	0.87		0.58			464
Vinylidene chloride	Acrylate, ethyl	0.58	0.15	0.72	0.39	Y	65
Vinylidene chloride	Acrylate, methyl	0.9	0.11	0.95	0.21	Y	107
Vinylidene chloride	Acrylate, methyl	0.7		0.8			107
Vinylidene chloride	Acrylate, methyl	1		1			377
Vinylidene chloride	Acrylate, octadecyl	0.9	0.037	1	0.14	Y	118
Vinylidene chloride	Acrylate, octyl	0.851	0.018	0.679	0.057	Y	118
Vinylidene chloride	Acrylic acid	0.437	0.065	1.246	0.042	Y	288
Vinylidene chloride	Acrylonitrile	0.32	0.14	0.92	0.11	Y	138
Vinylidene chloride	Acrylonitrile	0.28	0.034	1.04	0.2	Y	238
Vinylidene chloride	Acrylonitrile	0.4		0.44			404
Vinylidene chloride	Acrylonitrile	0.42		0.58			404
Vinylidene chloride	Acrylonitrile	0.49		0.65			404
Vinylidene chloride	Acrylonitrile	0.69		0.57			404
Vinylidene chloride	Acrylonitrile	0.76		0.5			404
Vinylidene chloride	Acrylonitrile	0.95		0.48			404
Vinylidene chloride	Acrylonitrile	0.95		0.65			404

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TABLE 1. *cont'd*

Monomer 1	Monomer 2	r_1	±95%	r_2	±95%	Conv.	Refs.
Vinylidene chloride	Acrylonitrile	1.3		0.65			404
Vinylidene chloride	Acrylonitrile	1.74		0.66			404
Vinylidene chloride	Acrylonitrile	1.43		0.63			404
Vinylidene chloride	Acrylonitrile	1.8		0.63			404
Vinylidene chloride	Acrylonitrile	0.39		0.58			468
Vinylidene chloride	Acryloyl chloride	0.5		1.12			288
Vinylidene chloride	Allyl acetate	6.6		0			470
Vinylidene chloride	Allyl chloride	3.49	1.4	0.24	0.24	Y	3
Vinylidene chloride	Allylstearamide, *N*-	5.22	0.15	−0.24	0.19	Y	119
Vinylidene chloride	Butadiene	−0.044	0.038	1.97	0.25	Y	257
Vinylidene chloride	Carbazole, *N*-vinyl-	−0.023	0.068	3.6	0.12	Y	13
Vinylidene chloride	Carbazole, *N*-vinyl-	−0.008	0.018	3.65	0.3	Y	98
Vinylidene chloride	Crotonaldehyde			0			405
Vinylidene chloride	Crotonic acid	18.1	43.7	−0.2	1.03	Y	47
Vinylidene chloride	Cyclopentene, 4-, 1,3-dione	1.88	0.35	0.113	0.027	Y	264
Vinylidene chloride	Diallyl phthalate	5		0.2			376
Vinylidene chloride	Ethylene	15.71	1.96	0.018	0.005	Y	299
Vinylidene chloride	Ethylene chlorotrifluoro-	17.14		0.02			454
Vinylidene chloride	Fumarate, diethyl	12.19	1.58	0.012	0.038	Y	59
Vinylidene chloride	Fumarate, diisopropyl	48		0.095			1038
Vinylidene chloride	Indene	0.49	0.15	0.293	0.095	Y	6
Vinylidene chloride	Indene	−0.02	1.15	0.34	0.85	Y	6
Vinylidene chloride	Isobutylene, 3-chloro-	1.1		0			470
Vinylidene chloride	Isopropenyl methyl ketone	0.134	0.099	4.06	0.66	Y	47
Vinylidene chloride	Isopropenylisocyanate	0.85		0.31			434
Vinylidene chloride	Maleate, diethyl	12.5					3
Vinylidene chloride	Maleimide	0.666	0.056	0.464	0.083	Y	251
Vinylidene chloride	Methacrylate, 2-(sulfonic acid)ethyl	0.22		3.6			564
Vinylidene chloride	Methacrylate, benzyl	0.34		3.3			432
Vinylidene chloride	Methacrylate, butyl	0.35	0.03	2.07	0.18	Y	3
Vinylidene chloride	Methacrylate, ethyl	0.353	0.02	2.18	0.1	Y	3
Vinylidene chloride	Methacrylate, methyl	0.3		2.6		Y	138
Vinylidene chloride	Methacrylate, methyl	0.36	0.03	2.38	0.02	N	324
Vinylidene chloride	Methacrylate, methyl	0.18	0.18	2.16	0.06	N	324
Vinylidene chloride	Methacrylate, methyl	0.5		2.5			426
Vinylidene chloride	Methacrylate, methyl	0.34		2.5			432
Vinylidene chloride	Methacrylate, methyl	0.09		2.1			538
Vinylidene chloride	Methacrylate, methyl	0.094	0.032	1.8	0.95	Y	65
Vinylidene chloride	Methacrylate, methyl	0.19		2.83			762
Vinylidene chloride	Methacrylate, methyl	0.02		1.23			762
Vinylidene chloride	Methacrylate, methyl	0.27	0.01	2.77	0.06	N	786
Vinylidene chloride	Methacrylic acid	0.154	0.047	3.368	0.098	Y	6
Vinylidene chloride	Methacrylonitrile	0.3	0.1	2.43	0.1	N	781
Vinylidene chloride	Methacrylonitrile	0.036	0.05	2.38	0.05	N	781
Vinylidene chloride	Norbornadiene	1.36	0.63	0.09	0.17	N	267
Vinylidene chloride	Oxazolidone, *N*-vinyl-	1.42	0.11	0.091	0.077	Y	102
Vinylidene chloride	Propenyl 2-methyl, acetate	2.4		0			470
Vinylidene chloride	Styrene	0.134	0.048	1.81	0.35	Y	138
Vinylidene chloride	Styrene	0.098	0.01	1.79	0.14	Y	238
Vinylidene chloride	Styrene	1.5		1.8			393
Vinylidene chloride	Styrene	0.087	0.007	1.839	0.024	Y	59
Vinylidene chloride	Styrene	0.15		1.81			812
Vinylidene chloride	Styrene	0.11	0.005	1.7	0.12	N	93
Vinylidene chloride	Succinimide, *N*-vinyl-	1.441	0.061	0.311	0.058	Y	104
Vinylidene chloride	Tetrazole, 2-methyl-5-(4′-vinyl)phenyl-	0.13		1.9			583
Vinylidene chloride	Tetrazole, 2-phenyl-5-(4′-vinyl)phenyl-	0.25		1.8			583
Vinylidene chloride	Tetrazole, 5-phenyl-2-(4′-vinyl)phenyl-	0.11		1.9			583
Vinylidene chloride	Vinyl 12-ketostearate	4.4	4.8	0.26	2.61	Y	146
Vinylidene chloride	Vinyl acetate	4.66	0.26	0.03	0.1	Y	3
Vinylidene chloride	Vinyl acetate	6.7		0.05			432
Vinylidene chloride	Vinyl acetate	5		0.05			436
Vinylidene chloride	Vinyl acetate	3.49	0.17	−0.002	0.026	Y	59
Vinylidene chloride	Vinyl acetate	4.7		0.12			812
Vinylidene chloride	Vinyl benzoate	5.58	1.76	0.065	0.093	Y	47
Vinylidene chloride	Vinyl butyl ether	1.75	0.11	0.004	0.001	Y	279

TABLE 1. *cont'd*

Monomer 1	Monomer 2	r_1	±95%	r_2	±95%	Conv.	Refs.
Vinylidene chloride	Vinyl chloride	2.06	0.32	0.071	0.025	Y	238
Vinylidene chloride	Vinyl chloride	3.39	1.16	0.14	0.32	N	29
Vinylidene chloride	Vinyl chloride	8.92		0.25		Y	3
Vinylidene chloride	Vinyl chloride	3.2		0.3			470
Vinylidene chloride	Vinyl chloride	4.5		0.2			517
Vinylidene chloride	Vinyl chloride	1.8		0.2			539
Vinylidene chloride	Vinyl chloride	4.5		0.16			585
Vinylidene chloride	Vinyl chloride	3.068	0.076	0.205	0.003	Y	67
Vinylidene chloride	Vinyl chloromethyl ketone	0.018	0.009	6.8	0.3	Y	356
Vinylidene chloride	Vinyl dodecyl ether	1.3		0			371
Vinylidene chloride	Vinyl ethyl ether	3.2		0			470
Vinylidene chloride	Vinyl fluoride	6		0.16			607
Vinylidene chloride	Vinyl hendecanoate	2.72	0.37	0.04	0.16	Y	145
Vinylidene chloride	Vinyl *m*-cresyl ether	1.95	0.07	0.04	0.004	Y	279
Vinylidene chloride	Vinyl methyl ketone	0.55		1.8			375
Vinylidene chloride	Vinyl *o*-cresyl ether	2.1	0.1	0.04	0.01	Y	279
Vinylidene chloride	Vinyl octadecyl ether	1.5		0			371
Vinylidene chloride	Vinyl *p*-chlorophenyl ether	2.44	0.04	0.14	0.01	Y	279
Vinylidene chloride	Vinyl *p*-cresyl ether	1.97	0.06	0.03	0.004	Y	279
Vinylidene chloride	Vinyl *p-tert*-butyl phenyl ether	2.04	0.06	0.05	0.004	Y	279
Vinylidene chloride	Vinyl pelargonate	4.08		0			145
Vinylidene chloride	Vinyl phenyl ether	2.45	0.34	0.433	0.051	Y	240
Vinylidene chloride	Vinyl phenyl ether	2.11	0.11	0.04	0.03	N	280
Vinylidene chloride	Vinyl stearate	3.92	0.14	0.08	0.17	Y	145
Vinylidene chloride	Vinylidene cyanide	0.009	0.001	0.049	0.02	Y	82
Vinylidene chloride	Vinylisocyanate	1.46		0.33			435
Vinylidene cyanide	Acrylate, α-chloro-, methyl	0.066	0.07	0.313	0.021	Y	82
Vinylidene cyanide	Acrylic acid	0.291	0.042	0.212	0.016	Y	82
Vinylidene cyanide	Butadiene, 2-chloro-					Y	82
Vinylidene cyanide	Ethylene, dichloro-, *cis*-					Y	82
Vinylidene cyanide	Ethylene, dichloro-, *cis*-					Y	82
Vinylidene cyanide	Maleic anhydride					Y	82
Vinylidene cyanide	Methacrylate, methyl	0.028	0.013	0.057	0.012	Y	82
Vinylidene cyanide	Phosphonic acid, 1-phenylvinyl	4.58		0.1			921
Vinylidene cyanide	Propene, 2-chloro-	0.204	0.079	0.001	0.03	Y	82
Vinylidene cyanide	Styrene	0.72	0.16	0.015	0.007	Y	134
Vinylidene cyanide	Styrene	0.001	0.001	0.003	0.001	Y	82
Vinylidene cyanide	Styrene, 2,5-dichloro-	0.005	0.009	0.026	0.006	Y	82
Vinylidene cyanide	Vinyl acetate	0.1	0.11	0.003	0.002	Y	82
Vinylidene cyanide	Vinyl benzoate	0.061	0.047	0	0.017	Y	82
Vinylidene cyanide	Vinyl chloride	0.72		0.01			409
Vinylidene cyanide	Vinyl chloride	0.6	0.068	0.016	0.002	Y	82
Vinylidene cyanide	Vinyl chloroacetate	0.137	0.037	0	0.006	Y	82
Vinylidene cyanide	Vinyl chloride	0.049	0.02	0.009	0.001	Y	82
Vinylidene fluoride	Methacryloyl fluoride, perfluoro-	7.6		0.02			669
Vinylidene fluoride	Vinyl acetate	0.08		6			627
Vinylisocyanate	Acrylate, methyl	0.14		1.38			435
Vinylisocyanate	Acrylonitrile	0.16		0.19			435
Vinylisocyanate	Methacrylate, methyl	0.01		3.3			422
Vinylisocyanate	Styrene	0.08		8.13			435
Vinylisocyanate	Styrene	0.1		6.9			533
Vinylisocyanate	Vinyl chloride	3.7		0.46			777
Vinylisocyanate	Vinylidene chloride	0.33		1.46			435
Vinylmethyldiacetoxysilane	Acrylonitrile	−0.11	0.23	2.246	0.054	Y	754
Vinylmethyldiacetoxysilane	Styrene	0	0.15	4.08	0.14	Y	754
Vinylmethyldiethoxysilane	Styrene	0.08	0.14	5.68	0.1	Y	754
Vinylmethyldiethoxysilane	Styrene	−0.08	0.2	11.29	0.43	Y	754
Vinylmethylphenylsulfonium tetrafluoroborate	Acrylamide	0.1		3.4			793
Vinylmethylphenylsulfonium tetrafluoroborate	Acrylonitrile	0.1		2.2			793
Vinylphenyldimethylsilane	Methacrylate, methyl	−0.009	0.034	29.79	1.89	Y	482
Vinylphenyldimethylsilane	Styrene	0.024	0.016	32.53	0.49	Y	482
Vinylphenylisocyanate, *p*-	Vinyl chloride	11.9		0.1			777
Vinylphenylpropanol, 2-*p*-	Styrene	0.41	0.4	0.48	0.3	Y	72

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TABLE 1. *cont'd*

Monomer 1	Monomer 2	r_1	±95%	r_2	±95%	Conv.	Refs.
Vinylsulfonic acid	Acrylamide	0.3	0.1	3.5	0.15		1066
Vinyltriethoxysilane	Acrylonitrile	0.41	0.38	6.59	0.6	Y	209
Vinyltriethoxysilane	Acrylonitrile	2.69	2.5	26.83	29.59	Y	237
Vinyltriethoxysilane	Styrene	−0.09	0.14	20.86	1.99	Y	209
Vinyltriethoxysilane	Vinyl chloride	−0.04	0.44	0.82	0.16	Y	237
Vinyltrimethoxysilane	Acrylonitrile	0.45		9.09		Y	2.37
Vinyltrimethoxysilane	Vinyl chloride	0.09		0.93		Y	237
Vinyltrimethylsilane	Acrylonitrile	0.1	0.27	4.08	0.76	Y	209
Vinyltrimethylsilane	Methacrylate, methyl	0.028	0.016	35.66	0.85	Y	482
Vinyltrimethylsilane	Styrene	−0.19	0.36	14.66	5.15	Y	209
Vinyltrimethylsilane	Styrene					Y	482
Vinyltrimethylsilane	Styrene	0.049	0.025	5.98	0.18	Y	73
Xanthate, *S*-methacryloyl *O*-ethyl	Methacrylate, methyl	0.6	0.08	0.76	0.04		1086
Xanthate, *S*-methacryloyl *O*-ethyl	Styrene	0.36	0.08	0.44	0.06		1086

TABLE 2. LISTING OF QUICK BASIC (MICROSOFT) PROGRAM FOR CALCULATING REACTIVITY RATIOS*

```
100  OPTION BASE 1
110  DIM eta (20)
120  DIM ksi (20)
130  DIM gee (20)
140  DIM ef (20)
150  DIM t (20)
151  FOR b = 1 TO 20
152  READ t(b)
153  NEXT b
170  DATA 12.71,4.3,3.18,2.78,2.57,2.45,2.37,2.31,2.26,2.23,2.2,2.18,2.16,2.14,2.13,2.12,2.11,2.1,2.09,2.09
180  DEF FNLog10(X) = LOG(X)/LOG(10#)
190  PRINT "Calculation of reactivity ratios by the method of Kelen and Tudos"
210  PRINT "Enter 0 for monomer 1 in the feed to start the calculation"
220  REM initialize all of the summing addresses
230  n = 0
231  m = 0
232  var = 0
233  sumasi = 0
234  sumi = 0
235  suma = 0
236  sumsqi = 0
237  sumnegi = 0
238  sum2i = 0
250  INPUT "Do you wish to stop (Y/N)?";f$
260  IF f$ = "y" THEN GO TO 1510
270  REM enter the names and molecular weights of the monomers
280  INPUT "Monomer 1 is:"; mone$
290  INPUT "Monomer 2 is:"; mtwo$
340  REM enter the feed, polymer and conversion values
350  PRINT "Are the feed and polymer values in mol fractions (mol),
mol ratios (ratio) or weight fractions (wt) ?"
370  INPUT type$
380  IF type$ = "ratio" THEN GOTO 1210
390  IF type$ = "wt" THEN GOTO 1360
400  PRINT "Mol fraction of"; mone$; "in the feed = "
410  INPUT m10
420  IF m10 = 0 THEN GOTO 800
430  n = n + 1
440  m20 = 1-m10
450  PRINT "Mol fraction of"; mone$; "in the polymer = "
460  INPUT p1
470  p2 = 1-p1
480  PRINT "Conversion, weight fraction = ? (If none given enter 0)"
490  INPUT w
500  IF w = 0 THEN GOTO 680
```

* Method of Kelen and Tűdös (803,804).

```
510  REM calculate G and F
520  X = m10/m20
530  y = p1/p2
540  mu = mw2/mw1
550  zeta2 = w*(mu + X)/(mu + y)
560  zeta1 = (y/X)*zeta2
570  z = (FNLog10(1-zeta1))/(FNLog10(1-zeta2))
580  g = (y-1)/z
590  f = y/(z^2)
600  IF n = 1 THEN fmin = f
610  IF n = 1 THEN fmax = f
620  IF fmin>f THEN fmin = f
630  IF fmax<f THEN fmax = f
640  gee(n) = g
650  ef(n) = f
660  GOTO 380
670  REM calculate G and f without conversion data
680  X = m10/m20
690  y = p1/p2
700  g = ((y-1)*X)/y
710  f = (X^2)/Y
720  IF n = 1 THEN fmin = f
730  IF n = 1 THEN fmax = f
740  IF fmin>f THEN fmin = f
750  IF fmax<f THEN fmax = f
760  gee(n) = g
770  ef(n) = f
780  GOTO 380
790  REM calculate eta and ksi
800  alpha = SQR(fmin*fmax)
810  m = m + 1
820  a = gee (m)/(alpha + ef(m))
830  si = ef(m)/(alpha + ef(m))
840  REM sum variables for least squares
850  sumasi = (a*si) + sumasi
860  sumi = si + sumi
870  suma = a + suma
880  sumsqi = (si^2) + sumsqi
890  sumnegi = (1-si) + sumnegi
900  sum2i = si*(1-si) + sum2i
910  eta(m) = a
920  ksi(m) = si
930  IF m = n THEN GOTO 960
940  GOTO 810
950  REM calculate the reactivity ratios
960  r1 = (sumasi*(n-sumi)-suma*(sumi-sumsqi))/((n*sumsqi)-(sumi^2))
970  r2 = (alpha*((sumasi*sumi)-(suma*sumsqi)))/((n*sumsqi)-(sumi^2))
980  REM calculate S squared
990  m = 0
1000 m = m + 1
1010 smin = ((eta(m)-(r1*ksi(m))) + ((r2/alpha)*(1-ksi(m))))^2
1020 var = smin + var
1030 IF m = n THEN GOTO 1050
1040 GOTO 1000
1050 d = sumsqi*(sumnegi^2)-(sum2i^2)
1060 REM calculate the delta r's
1070 deltr1 = t(m-2)*SQR((var/(n-2))*((sumnegi^2)/d))
1080 deltr2 = alpha*t(m-2)*SQR((var/(n-2))*(sumsqi/d))
1090 REM print out the answers
1100 PRINT "Reactivity ratios for"; mone$; "(M1) and"; mtwo$; "(M2)"
1110 PRINT "r1 = "; r1; "delta r1 = "; deltr1
1120 PRINT "r2 = "; r2; "delta r2 = "; deltr2
1130 PRINT "alpha = "; alpha
1140 PRINT "ksi"; "eta"
1150 m = 0
1160 m = m + 1
1170 PRINT ksi(m), eta (m)
1180 IF m = n THEN GOTO 220
1190 GOTO 1160
```

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```
1200 REM calculation of M1 and M2 from mol ratios
1210 PRINT "Mol ratio of"; mone$; "in the feed =";
1220 INPUT qf
1230 IF qf=0 THEN GOTO 800
1240 n=n+1
1250 m10=qf/(qf+1)
1260 m20=1-m10
1270 PRINT "Mole ratio of"; mone$ "in the polymer="
1280 INPUT qp
1290 p1=qp/(qp+1)
1300 p2=1-p1
1310 PRINT "Weight fraction conversion="
1320 INPUT w
1330 IF w=0 THEN GOTO 680
1340 GOTO 510
1350 REM calculation of M1 and M2 from weight fractions
1351 PRINT "The molecular weight of"; mone$; "is"
1352 INPUT mw1
1353 PRINT "The molecular weight of"; mtwo$; "is"
1354 INPUT mw2
1360 PRINT "Weight fraction of"; mone$ "in the feed="
1370 INPUT rf1
1380 If rf1=0 THEN GOTO 800
1390 n=n+1
1400 rf2=1-rf1
1410 m10=(rf1/mw1)/((rf1/mw1)+(rf2/mw2))
1420 m20=1-m10
1430 PRINT "Weight fraction of"; mone$; "in the polymer="
1440 INPUT rp1
1450 rp2=1-rp1
1460 p1=(rp1/mw1)/((rp1/mw1)+(rp2/mw2))
1470 PRINT "Weight fraction conversion="
1480 INPUT w
1490 IF w=0 THEN GOTO 680
1500 GOTO 510
1510 PRINT "FINI"
1520 END
```

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Q and e Values for Free Radical Copolymerizations of Vinyl Monomers and Telogens

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A. INTRODUCTION

The Alfrey and Price Q and e equation (A1) is well known:

$$Q_2 = (Q_1/r_1)\exp\{-e_1(e_1 - e_2)\} \qquad \text{(A1)}$$

Q and e are measures of the reactivity and polarity, respectively, of a vinyl monomer and $r_1 = k_{11}/k_{12}$, a reactivity ratio. This equation may be arranged to a logarithmic form (A2) which provides a more convenient linear solution:

$$\{[\ln(Q_1/r_1)] - e_1^2\} = -e_2e_1 + \ln Q_2. \qquad \text{(A2)}$$

When monomer 2 is the one to be characterized, its Q and e values may be determined from the slope $(-e_2)$ and intercept $(\ln Q_2)$ of the equation.

The first requirement for the use of Eq. (A2) is the selection of a small group of common monomers for which Q and e could be independently established. Since, by definition the Q and e scheme is based on styrene ($Q = 1.0$ and $e = -0.8$), the average Q and e values of these primary monomers were calculated using Eqs. (A1) and (A3) (Ref. 1).

$$e_2 = e_1 \pm (-\ln r_1r_2)^{1/2} \qquad \text{(A3)}$$

utilizing only their reactivity ratios with styrene. The six primary monomers (Group I) – acrylic acid, acrylonitrile, butadiene, methyl acrylate, methacrylonitrile and methyl methacrylate – were chosen because their reactivity ratios had been narrowly defined by several investigators. These primary reactivity ratios were taken from the compilation in the second edition of this Handbook.

The Q and e values of a secondary group (Group II) of ten common vinyl monomers were determined using Eq. (A2), with the primary monomer group supplying the Q_1 and e_1 values. The Q and e values were then calculated for a tertiary set (Group III) of reactivity ratios for which a set of reactivity ratios with four or more of the primary and secondary monomers was available. For all groups except Group I, recalculated reactivity ratios (see the preceding chapter) were used when available. Otherwise, reported values were included.

The Q and e values developed for the three groups during the first pass through the data were subsequently used to recalculate the Q and e values for Groups II and III. Group I was not redetermined so that the styrene bias of the system could be better maintained. After four iterations, no significant changes were observed. During the iterative process, a number of reactivity ratio citations were dropped due to a lack of fit with the majority of data points.

The final Q and e values for these three groups were then used to determine the Q and e values of other monomers with four or more reactivity ratio citations with at least three comonomers (Group IV), and monomers with three citations with three different comonomers (Group V).

By replacing r_1 in Eq. (A2) with the reciprocal of the chain transfer constant, $1/C_s$ (3), Q and e values of telogens may also be estimated (4) from their coreactivity with vinyl monomers.

The Monomer Table lists the monomer group designation, the Q and e values, and the correlation coefficient (r) for the regression. The Number column (n) represents the number of r_1 values actually used in the regression. If the monomer is in Group V, the number is understood to be 3. The data are listed alphabetically as well as in increasing values of Q and e.

*Retired.

Recent work by Jenkins (5) has uncovered another approach to characterizing the copolymerization character of vinyl monomers. By deriving data from r_1 and r_2 values, he was able to calculate three coefficients which appear to allow a more precise prediction of the actual reactivity ratios.

B. Q AND e VALUES FOR FREE RADICAL COPOLYMERIZATIONS

TABLE 1. MONOMERS

Monomer	Group	Q	e	n	r
Acenaphthalene	IV	0.72	−1.88	5	0.98
Acetylene, phenyl-	IV	0.45	0.10	6	0.75
Aconitate, trimethyl	III	0.25	2.27	5	0.63
Acrolein	IV	0.80	1.31	16	0.97
Acrolein, methyl-	IV	1.83	0.71	5	0.98
Acrylamide	IV	0.23	0.54	17	0.64
Acrylamide, *N*-methylol-	IV	0.52	1.15	6	0.91
Acrylamide, *N*-octadecyl-	IV	0.66	1.64	4	0.93
Acrylamide, *N,N*-diethyl	IV	0.48	−0.31	5	0.56
Acrylamide, *N,N*-dimethyl-glucitol	V	0.22	0.61		0.68
Acrylate, α-acetoxy-, ethyl	V	0.52	0.77		0.99
Acrylate, α-chloro-, ethyl	V	1.00	−1.03		0.87
Acrylate, α-chloro-, methyl	IV	2.43	0.35	4	0.38
Acrylate, α-cyano-, methyl	IV	4.91	0.91	4	0.99
Acrylate, α-phenyl-, methyl	IV	5.19	0.96	8	0.90
Acrylate, benzyl	IV	0.33	1.13	5	0.92
Acrylate, butyl	II	0.38	0.85	20	0.94
Acrylate, ethyl	III	0.41	0.55	12	0.91
Acrylate, ferrocenylmethyl	IV	0.15	0.51	4	0.65
Acrylate, glycidyl	IV	0.48	1.28	4	0.87
Acrylate, heptafluorobutyl	V	0.96	1.34		0.81
Acrylate, methyl	I	0.45	0.64		
Acrylate, octadecyl	IV	0.33	1.26	7	0.97
Acrylate, octyl	V	0.63	2.01		0.99
Acrylate, trifluoro-, methyl	V	0.048	1.20		0.55
Acrylate, 2-chloroethyl	V	0.49	1.03	5	0.95
Acrylate, 2-ethylhexyl	IV	0.37	0.24	4	0.37
Acrylate, 2-nitrobutyl	V	0.69	1.09		0.98
Acrylic acid	I	0.83	0.88		
Acrylic acid, α-bromo-	V	3.07	1.37		0.99
Acrylic anhydride	V	1.46	0.31		0.37
Acrylonitrile	I	0.48	1.23		
Acryloyl chloride	IV	1.82	1.92	6	0.90
Allyl acetate	III	0.24	−1.07	8	0.85
Allyl acrylate	V	0.32	−0.99		0.96
Allyl alcohol	IV	0.005	−1.48	5	0.98
Allyl chloride	III	0.026	−0.60	12	0.93
Allylbenzene	IV	0.038	0.40	4	0.60
N-Allylstearamide	V	0.024	−0.41		0.62
Benzothiazole, vinylmercapto-	IV	0.36	−0.44	4	0.95
Bicyclo[2.2.1]hept-2-ene-5,6-dicarboxamine, *N*-benzyl-	IV	0.01	−0.36	6	0.47
Butadiene	I	1.70	−0.50	24	0.82
Butadiene-1-carboxylate, ethyl	V	1.67	1.26		0.99
Butadiene, 1,4-dicarboxylate, diethyl	V	1.94	1.39		0.99
Butadiene, 2,3-dichloro-	V	9.08	0.14		0.93
Butadiene, 2,3-dimethyl-	V	1.42	−0.43		0.58
Butadiene, hexafluoro-	IV	0.82	0.58	4	0.93
Butadiene, 2-chloro-	II	10.52	1.20	10	0.98
Butadiene, 2-fluoro-	III	1.88	0.63	6	0.77
Butene-1	IV	0.007	−0.06	5	0.08
Butene-2	IV	0.002	−0.29	6	0.44
Carbamate, *N*-vinyl-, ethyl	V	0.037	−1.12		0.91
Carbamate, *N,N*-diethyl-, vinyl	IV	0.028	−1.11	4	0.95
Carbazole, *N*-vinyl-	III	0.26	−1.29	12	0.99
Carbon monoxide	V	0.013	1.68		0.70

TABLE 1. *cont'd*

Monomer	Group	*Q*	*e*	*n*	*r*
Citraconimide, *N*-methyl-	IV	0.87	1.58	4	0.94
Crotonaldehyde	IV	0.023	0.84	5	0.82
Crotonic acid	III	0.017	0.89	6	0.98
4-Cyclopentene-1,3-dione	IV	0.42	2.43	4	0.96
Diallyl melamine	V	0.059	−1.57		0.99
Diallyl phthalate	IV	0.031	−0.26	20	0.50
Diallycyanamide	IV	0.14	2.41	4	0.96
N,N-Divinylaniline	II	0.26	−0.68	5	0.78
Ethylene	III	0.016	0.05	6	0.52
Ethylene, 1,1-diphenyl-	IV	0.17	−1.71	5	0.84
Ethylene, chlorotrifluoro-	III	0.026	1.56	5	0.99
Ethylene, tetrachloro-	III	0.001	1.24	7	0.99
Ethylene, tetrafluoro-	IV	0.032	1.63	4	0.99
Ethylene, trichloro-	III	0.010	1.29	11	0.94
Fumarate, diethyl	IV	0.25	2.26	10	0.91
Fumarate, diisopropyl	IV	0.11	2.58	8	0.84
Fumaronitrile	IV	0.29	2.73	5	0.96
Hexatriene, tetrachloro-	IV	1.83	0.94	6	0.98
Hexene-1	V	0.035	0.92		0.69
Imidazole, 1-vinyl-	V	0.11	−0.68		0.98
Imidazole, 1-vinyl-2-methyl-	IV	0.14	−0.98	6	0.93
Indene	IV	0.13	−0.71	8	0.45
Isobutylene	III	0.023	−1.20	7	0.99
Isobutylene, 3-chloro-	IV	0.17	−0.86	4	0.98
Isoprene	II	1.99	−0.55	11	0.86
Isoprene, 3-acetoxy-	V	1.91	−0.11		0.10
Isopropenyl acetate	IV	0.023	−0.94	4	0.98
Isopropenyl methyl ketone	III	1.03	0.64	6	0.78
Isopropenyl, 3-(1-cyclohexenyl), acetate	V	0.57	−0.66		0.98
Isopropenylisocyanate	III	0.18	−1.05	8	0.94
Itaconate, dibutyl	V	0.82	0.57		0.88
Itaconate, diethyl	V	1.04	0.88		0.98
Itaconate, dimethyl	III	0.73	0.57	8	0.90
Itaconic acid	IV	0.78	1.07	5	0.99
Maleate, diethyl	IV	0.053	1.08	12	0.87
Maleic anhydride	IV	0.86	3.69	25	0.98
Maleimide	V	0.94	2.86		0.99
Maleimide, 2,3-dimethyl-*N*-(2-methacryloxyethyl)-	V	2.54	1.64		0.98
Maleimide, *N*-(2-hydroxyethyl)-	V	1.26	1.07		0.68
Maleimide, *N*-(2-chlorophenyl)-	IV	2.29	2.87	5	0.96
Maleimide, *N*-(4-chlorophenyl)-	V	2.98	2.75		0.99
Maleimide, *N*-butyl-	V	0.88	3.70		0.92
Maleimide, *N*-phenyl-	IV	2.81	3.24	4	0.99
Methacrylamide	IV	0.40	−0.05	8	0.29
Methacrylamide, *N*-phenyl-	V	0.40	0.19		0.70
Methacrylamide, 1-deoxy-D-glucital	V	0.15	−0.16		0.19
Methacrylate, 2-chloro-2,3,3,3-tetrafluoropropyl	V	2.09	0.62		0.56
Methacrylate, 2,2,6,6-tetra-methyl-4-piperidinyl	IV	0.52	−1.09	4	0.68
Methacrylate, 2,3-epithio-propyl	IV	1.04	0.29	4	0.84
Methacrylate, benzyl	IV	0.88	0.35	10	0.97
Methacrylate, butyl	III	0.82	0.28	10	0.68
Methacrylate, ethyl	III	0.76	0.17	7	0.62
Methacrylate, ferrocenylmethyl	IV	0.22	0.65	7	0.85
Methacrylate, glycidyl	III	0.96	0.20	9	0.92
Methacrylate, isobutyl	III	0.82	0.27	5	0.76
Methacrylate, isopropyl	IV	0.97	0.10	4	0.46
Methacrylate, methyl	I	0.78	0.40		
Methacrylate, phenyl	IV	1.25	0.79	7	0.91
Methacrylate, sulfolanyl	V	1.18	0.95		0.95

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TABLE 1. *cont'd*

Monomer	Group	*Q*	*e*	*n*	*r*
Methacrylate, 2-naphthyl	IV	1.04	−0.09	8	0.46
Methacrylate, 2-(*N,N*-dimethyl-carbamoyloxy)ethyl	IV	1.14	0.84	5	0.74
Methacrylate, 2-(sulfonic acid)ethyl	IV	1.09	0.25	4	0.52
Methacrylate, 2-acetoxyethyl	V	0.60	0.51		0.80
Methacrylate, 2-bromoethyl	IV	1.18	0.74	4	0.96
Methacrylate, 2-chloroethyl	IV	1.04	0.31	7	0.79
Methacrylate, 2-hydroxyethyl	IV	1.78	−0.39	7	0.67
Methacrylate, 2-hydroxypropyl	IV	4.38	1.86	7	0.81
Methacrylic acid	III	0.98	0.62	23	0.73
Methacrylic anhydride	IV	3.00	0.56	5	0.93
Methacrylonitrile	I	0.86	0.68		
Methacryloyl chloride	V	2.04	1.54		0.94
Methacryloylacetone	V	5.47	−0.76		0.79
Methylenebutyrolactone	V	2.48	0.83		0.90
2-Methyleneglutaronitrile	IV	0.41	1.25	6	0.83
Norbornadiene	III	0.051	−1.48	7	0.90
Oct-1-ene, 6,6-dimethyl-4,8-dioxaspiro(2.5)-	V	0.25	0.61		0.82
Oxazolidone, *N*-vinyl-	III	0.087	−1.70	6	0.95
Oxazoline, 2,-2-isopropenyl-4,4-dimethyl-	IV	0.87	0.34	4	0.65
Oxazoline, 2-isopropenyl-2-	IV	0.59	−0.64	7	0.54
Oxazoline, 2-,4-acryloxymethyl-2,4-dimethyl-	IV	0.97	−0.51	4	0.71
Oxazoline, 2-,4-methacryloxymethyl-2,4-dimethyl-	IV	0.44	−0.70	4	0.99
Pentadiene, *trans*-1,3-	IV	1.28	−0.13	8	0.54
Phosphonate, α-carbomethoxyvinyl-, diethyl	V	0.14	−0.04		0.96
Phosphonate, isopropenyl-, dimethyl	V	0.032	0.96		0.98
Phosphonate, vinyl-, bis(2-chloroethyl)	V	0.044	1.64		0.89
Phosphonate, vinyl-, diethyl	V	0.27	−0.40		0.54
Phosphonate, vinyl-, dimethyl	V	0.24	−0.25		0.53
Phosphonic acid, α-phenyl-vinyl-	IV	0.65	0.52	5	0.76
Phthalimide, *N*-(methacryloyloxy)-	V	1.89	0.96		0.74
Propene, 3,3,3-trichloro-	V	0.030	1.00		0.99
Propene, 1-chloro-, *cis*-	V	0.003	−0.46		0.84
Propene, 1-chloro-, *trans*-	V	0.006	−0.16		0.28
Propene, 2-chloro-	V	0.073	−0.16		0.99
Propene, 2-chloro-3-hydroxy-	V	0.091	−0.95		0.99
Propene, 2,3-dichloro-	IV	0.12	−0.40	4	0.67
Propenyl, 2-chloro-, acetate	IV	0.20	−0.85	5	0.61
Propenyl, 2-methyl-, acetate	V	0.040	−2.08		0.97
Propylene	V	0.009	−1.69	7	0.84
Pyridazinone, 3-(2-vinyl)-6-methyl-	V	0.57	0.24		0.58
Pyridazinone, 3-(2-vinyl)-6-methyl-4,5-dihydro-	V	0.18	−0.32		0.35
Pyridine, 2-methyl-5-vinyl-	III	1.32	−0.66	9	0.95
Pyridine, 2-vinyl-	II	1.41	−0.42	12	0.97
Pyridine, 2-vinyl-5-ethyl-	IV	1.29	−0.91	4	0.94
Pyridine, 4-vinyl-	III	2.47	0.84	7	0.86
Pyrrolidone, 1-benzyl-3-methylene-5-methyl-	V	1.50	−0.59		0.98
Quinoline, 2-vinyl-	IV	1.04	−0.09	4	0.46
Silane, γ-methacryloxypropyl-trimethoxy	V	1.08	0.07		0.35
Styrene	I	1.00	−0.80		
Styrene, 2,4,6-trimethyl-	IV	0.15	−0.58	4	0.41
Styrene, 2,5-dichloro-	II	1.50	0.94	12	0.96
Styrene, 3-tri-*n*-butylstannyl-	IV	0.014	−0.61	4	0.51
Styrene, α-methoxy-	IV	0.39	−1.02	5	0.77
Styrene, α-methyl-	III	0.97	−0.81	15	0.98
Styrene, *m*-bromo-	IV	1.25	−0.27	4	0.98
Styrene, *m*-chloro-	IV	2.46	−0.90	4	0.87
Styrene, *m*-methyl-	V	1.57	−0.03		0.06
Styrene, *m*-nitro-	IV	2.66	1.57	7	0.85
Styrene, *p*-bromo-	IV	1.30	−0.68	7	0.99
Styrene, *p*-chloro-	III	1.33	−0.64	12	0.92

TABLE 1. *cont'd*

Monomer	Group	Q	e	n	r
Styrene, *p*-chloromethyl-	IV	1.39	−0.38	7	0.74
Styrene, *p*-cyano-	IV	2.93	−0.38	5	0.75
Styrene, *p*-methoxy-	III	1.53	−1.40	6	0.99
Styrene, *p*-methyl-	III	1.10	−0.63	5	0.98
Styrene, *p*-1-(2-hydroxybutyl)-	V	0.70	−0.97		0.65
Styrene, *p*-1-(2-hydroxypropyl)-	IV	1.08	−0.35	4	0.51
Styrene, *p*-2-(2-hydroxypropyl)-	IV	1.15	−0.49	4	0.91
Styrene, pentachloro-	V	0.20	0.79		0.87
Succinimide, *N*-vinyl-	III	0.19	−1.42	8	0.96
Tetrazole, 1-vinyl-	V	0.13	−0.14		0.39
Tetrazole, 2-methyl-5-(4′-vinyl)phenyl-	V	0.86	0.51		0.49
Tetrazole, 2-methyl-5-vinyl-	V	0.55	−0.46		0.85
Tetrazole, 2-phenyl-5-(4′-vinyl)phenyl-	V	0.84	−0.52		0.97
Tetrazole, 5-phenyl-2-(4′-vinyl)phenyl-	V	1.11	0.53		0.53
Toluenesulfonamide, *N*,*N*-methyl-vinyl-	V	0.18	−0.53		0.78
Triallyl citrate	IV	0.054	0.26	4	0.50
Triallyl cyanurate	V	0.14	2.41		0.17
Triallyl isocyanurate	V	0.035	−0.23		0.35
Urea, *N*-vinyl-*N*′-ethyl-	V	0.17	−1.88		0.98
Vinyl acetate	II	0.026	−0.88	49	0.87
Vinyl benzoate	III	0.030	−0.89	9	0.95
Vinyl bromide	IV	0.038	−0.23	10	0.94
Vinyl butyl ether	IV	0.038	−1.50	10	0.87
Vinyl butylsulfonate	IV	0.16	1.06	4	0.97
Vinyl butyrate	IV	0.024	−0.89	8	0.91
Vinyl chloride	II	0.056	0.16	38	0.37
Vinyl chloroacetate	IV	0.039	−1.61	5	0.98
Vinyl chloromethyl ketone	IV	16.00	1.78	4	0.97
Vinyl cinnamate	IV	0.18	0.76	4	0.99
Vinyl cymantrene	IV	0.39	−0.57	4	0.88
Vinyl dichloroacetate	V	0.059	−1.38		0.95
Vinyl dodecyl ether	IV	0.041	−1.69	6	0.83
Vinyl ether	IV	0.029	−1.16	4	0.80
Vinyl ethyl ether	III	0.018	−1.80	8	0.90
Vinyl ethyl oxalate	IV	0.056	−0.65	4	0.53
Vinyl ethyl sulfide	IV	0.27	−1.31	6	0.96
Vinyl ethyl sulfoxide	IV	0.065	0.05	4	0.21
Vinyl fluoride	IV	0.008	0.72	8	0.71
Vinyl formate	III	0.043	−1.19	5	0.99
Vinyl hendecanoate	III	0.056	−0.84	5	0.82
Vinyl isobutyl ether	IV	0.030	−1.27	7	0.98
Vinyl isobutyl sulfide	IV	0.49	−0.95	7	0.99
Vinyl isopropyl ketone	V	0.58	−1.16		0.44
Vinyl isothiocyanate	IV	0.59	0.37	4	0.77
Vinyl laurate	V	0.011	−0.54		0.81
Vinyl-*m*-cresyl ether	V	0.016	−6.33		0.99
Vinyl methyl ketone	II	0.66	1.05	8	0.98
Vinyl methyl sulfide	IV	0.42	−1.66	5	0.99
Vinyl methyl sulfoxide	V	0.60	−1.79		0.46
Vinyl *o*-cresyl ether	V	0.010	−8.53		0.97
Vinyl octadecyl ether	IV	0.024	−1.93	4	0.87
Vinyl octyl ether	IV	0.020	−1.57	4	0.98
Vinyl *p*-cresyl ether	V	0.015	−6.86		0.99
Vinyl pelargonate	IV	0.046	−1.22	4	0.79
Vinyl phenyl ether	IV	0.046	−2.16	9	0.95
Vinyl phenyl ketone	IV	1.16	1.02	5	0.95
Vinyl phenyl sulfide	IV	0.33	−0.99	5	0.96
Vinyl propionate	IV	0.027	−0.68	7	0.82
Vinyl stearate	III	0.043	−0.97	7	0.85
Vinyl *tert*-butyl sulfide	IV	0.046	−2.20	4	0.72
Vinyl thiolacetate	IV	0.27	−0.52	5	0.85

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TABLE 1. *cont'd*

Monomer	Group	Q	e	n	r
Vinyl 4-chlorocyclohexyl ketone	IV	0.66	−0.82		0.50
Vinyl 2-chloroethyl ether	IV	0.019	−1.64	9	0.96
Vinyl-tris(trimethoxysiloxy)silane	IV	0.022	−0.12	5	0.75
p-Vinylbenzylethylcarbinol	V	0.69	−0.98		0.67
p-Vinylbenzylmethylcarbinol	V	1.70	−1.27		0.98
9-Vinylanthracene	IV	0.14	0.82	5	0.90
Vinyl *N,N*-diethylcarbamate	IV	0.028	−1.10	4	0.95
p-Vinylbenzoic acid	V	5.17	1.08		0.95
N-Vinylcaprolactam	IV	0.14	−1.18	4	0.72
Vinylene carbonate	III	0.004	−0.49	9	0.73
Vinylferrocene	IV	0.31	−1.34	6	0.91
Vinylhydroquinone	V	4.30	2.26		0.87
Vinylhydroquinone dibenzoate	IV	1.73	0.84	5	0.87
Vinylidene chloride	II	0.31	0.34	40	0.68
Vinylidene cyanide	IV	14.22	1.92	9	0.82
Vinylisocyanate	III	0.14	−0.95	6	0.98
N-Vinylpyrrolidone	II	0.088	−1.62	12	0.95
Vinyltriethoxysilane	V	0.021	0.82		0.61
Vinyltrimethylsilane	V	0.027	0.19		0.58

TABLE 2. TELOGENS

Telogen	Temp. (°C)	Q ($\times 10^4$)	e	No.	r
Acetone	60	0.11	0.35	5	0.80
	80	0.32	0.45	5	0.68
Benzene	60	0.05	−1.21	16	0.94
	80	0.07	−0.61	9	0.72
–, chloro-	60	0.07	0.08	7	0.30
	80	0.13	−0.06	5	0.30
–, ethyl-	60	0.95	−1.02	8	0.84
	80	0.91	−0.61	7	0.86
–, methyl-	60	0.16	−0.95	12	0.93
	80	0.34	−0.87	11	0.94
Benzoyl peroxide	60	36	−1.89	4	0.93
Butanol	60	0.53	−0.57	6	0.63
Butanone	60	0.82	0.53	4	0.60
	80	1.40	1.00	7	0.80
Cyclohexane	60	0.11	−0.64	6	0.86
	80	0.14	−1.41	7	0.77
1,2-Dichloroethane	60	0.62	1.34	3	0.96
	80	1.1	2.07	6	0.96
Ethyl acetate	60	0.07	−0.87	11	0.97
Mercaptan, alkyl-	60	14500	2.44	11	0.99
Mercaptoacetate, alkyl-	60	15100	3.27	4	0.99
Methane, dichloro-	60	0.10	−0.68	4	0.82
–, nitro-	60	3.26	−1.50	4	0.92
–, tetrabromo-	60	7300	2.90	8	0.99
Methane, tetrachloro-	60	3.64	3.21	13	0.99
	80	5.15	3.41	9	0.99
–, trichloro-	60	1.18	0.47	8	0.95
	80	1.24	0.70	10	0.82
Methanol	60	0.18	−0.93	5	0.76
Triethylamine	60	28.8	−2.39	7	0.99

TABLE 3. MONOMERS ARRANGED BY Q VALUES

Monomer	Q	e	Monomer	Q	e
Ethylene, tetrachloro-	0.001	1.24	Vinylene carbonate	0.004	−0.49
Butene-2	0.002	−0.29	Allyl alcohol	0.005	−1.48
Propene, 1-chloro-, *cis*-	0.003	−0.46	Propene, 1-chloro-, *trans*-	0.006	−0.16

TABLE 3. *cont'd*

Monomer	Q	e
Butene-1	0.007	−0.06
Vinyl fluoride	0.008	0.72
Propylene	0.009	−1.69
Bicyclo[2.2.1]hept-2-ene-5,6 dicarboxamine, *N*-benzyl-	0.010	−0.36
Ethylene, trichloro-	0.010	1.29
Vinyl *o*-cresyl ether	0.010	−8.53
Vinyl laurate	0.011	−0.54
Carbon monoxide	0.013	1.68
Styrene, 3-tri-*n*-butylstannyl-	0.014	−0.61
Vinyl *p*-cresyl ether	0.015	−6.86
Ethylene	0.016	0.05
Vinyl *m*-cresyl ether	0.016	−6.33
Crotonic acid	0.017	0.89
Vinyl ethyl ether	0.018	−1.80
Vinyl 2-chloroethyl ether	0.019	−1.64
Vinyl octyl ether	0.020	−1.57
Vinyltriethoxysilane	0.021	0.82
Vinyl-tris(trimethoxysiloxy)silane	0.022	−0.12
Crotonaldehyde	0.023	0.84
Isobutylene	0.023	−1.20
Isopropenyl acetate	0.023	−0.94
N-Allylstearamide	0.024	−0.41
Vinyl butyrate	0.024	−0.89
Vinyl octadecyl ether	0.024	−1.93
Allyl chloride	0.026	−0.60
Ethylene, chlorotrifluoro-	0.026	1.56
Vinyl acetate	0.026	−0.88
Vinyl propionate	0.027	−0.68
Vinyltrimethylsilane	0.027	0.19
Carbamate, *N,N*-diethyl-, vinyl	0.028	−1.11
Vinyl *N,N*-diethylcarbamate	0.028	−1.10
Vinyl ether	0.029	−1.16
Propene, 3,3,3-trichloro-	0.030	1.00
Vinyl benzoate	0.030	−0.89
Vinyl isobutyl ether	0.030	−1.27
Diallyl phthalate	0.031	−0.26
Ethylene, tetrafluoro-	0.032	1.63
Phosphonate, isopropenyl-, dimethyl	0.032	0.96
Hexene-1	0.035	0.92
Triallyl isocyanurate	0.035	−0.23
Carbamate, *N*-vinyl-, ethyl	0.037	−1.12
Allylbenzene	0.038	0.40
Vinyl bromide	0.038	−0.23
Vinyl butyl ether	0.038	−1.50
Vinyl chloroacetate	0.039	−1.61
Propenyl, 2-methyl-, acetate	0.040	−2.08
Vinyl dodecyl ether	0.041	−1.69
Vinyl formate	0.043	−1.19
Vinyl stearate	0.043	−0.97
Phosphonate, vinyl-, bis(2-chloroethyl)	0.044	1.64
Vinyl pelargonate	0.046	−1.22
Vinyl phenyl ether	0.046	−2.16
Vinyl *tert*-butyl sulfide	0.046	−2.20
Acrylate, trifluoro-, methyl	0.048	1.20
Norbornadiene	0.051	−1.48
Maleate, diethyl	0.053	1.08
Triallyl citrate	0.054	−0.26
Vinyl chloride	0.056	0.16
Vinyl ethyl oxalate	0.056	−0.65
Vinyl hendecanoate	0.056	−0.84
Diallyl melamine	0.059	−1.57
Vinyl dichloroacetate	0.059	−1.38
Vinyl ethyl sulfoxide	0.065	0.05
Propene, 2-chloro-	0.073	−0.16
Oxazolidone, *N*-vinyl-	0.087	−1.70
N-Vinylpyrrolidone	0.088	−1.62
Propene, 2-chloro-3-hydroxy-	0.091	−0.95
Fumarate, diisopropyl	0.11	2.58
Imidazole, 1-vinyl-	0.11	−0.68
Propene, 2,3-dichloro-	0.12	−0.40
Indene	0.13	−0.71
Tetrazole, 1-vinyl-	0.13	−0.14
N-Vinylcaprolactam	0.14	−1.18
Diallylcyanamide	0.14	2.41
Imidazole, 1-vinyl-2-methyl-	0.14	−0.98
Phosphonate, α-carbomethoxyvinyl-diethyl	0.14	−0.04
Triallyl cyanurate	0.14	2.41
9-Vinylanthracene	0.14	0.82
Vinylisocyanate	0.14	−0.95
Acrylate, ferrocenylmethyl	0.15	0.51
Methacrylamide, 1-deoxy-D-glucitol	0.15	−0.16
Styrene, 2,4,6-trimethyl-	0.15	−0.58
Vinyl butylsulfonate	0.16	1.06
Ethylene, 1,1-diphenyl-	0.17	−1.71
Isobutylene, 3-chloro-	0.17	−0.86
Urea, *N*-vinyl-*N'*ethyl-	0.17	−1.88
Isopropenylisocyanate	0.18	−1.05
Pyridazinone, 3-(2-vinyl)-6-methyl-4,5-dihydro-	0.18	−0.32
Toluenesulfonamide, *N,N*-methyl-vinyl-	0.18	−0.53
Vinyl cinnamate	0.18	0.76
Succinimide, *N*-vinyl-	0.19	−1.42
Propenyl, 2-chloro-, acetate	0.20	−0.85
Styrene, pentachloro-	0.20	0.79
1-Acrylamido-1-deoxy-D-glucitol	0.22	0.61
Methacrylate, ferrocenylmethyl	0.22	−0.65
Acrylamide	0.23	0.54
Allyl acetate	0.24	−1.07
Phosphonate, vinyl-, dimethyl	0.24	−0.25
Aconitate, trimethyl	0.25	2.27
Fumarate, diethyl	0.25	2.26
Oct-1-ene, 6,6-dimethyl-4,8-dioxaspiro(2,5)-	0.25	0.61
Carbazole, *N*-vinyl-	0.26	−1.29
N,N-Divinylaniline	0.26	−0.68
Phosphonate, vinyl-, diethyl	0.27	−0.40
Vinyl ethyl sulfide	0.27	−1.31
Vinyl thiolacetate	0.27	−0.52
Fumaronitrile	0.29	2.73
Vinylferrocene	0.31	−1.34
Vinylidene chloride	0.31	0.34
Allyl acrylate	0.32	−0.99
Acrylate, benzyl	0.33	1.13
Acrylate, octadecyl	0.33	1.26
Vinyl phenyl sulfide	0.33	−0.99
Benzothiazole, vinylmercapto-	0.36	−0.44
Acrylate, 2-ethylhexyl	0.37	0.24
Acrylate, butyl	0.38	0.85
Styrene, α-methoxy-	0.39	−1.02
Vinyl cymantrene	0.39	−0.57
Methacrylamide	0.40	−0.05
Methacrylamide, *N*-phenyl-	0.40	0.19
Acrylamide, *N,N*-dimethyl-	0.41	−0.26
Acrylate, ethyl	0.41	0.55
2-Methyleneglutaronitrile	0.41	1.25
4-Cyclopentene-1,3-dione	0.42	2.43
Vinyl methyl sulfide	0.42	−1.66
Oxazoline, 2-,4-methacryloxymethyl-2,4-dimethyl-	0.44	−0.70
Acetylene, phenyl-	0.45	0.10

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TABLE 3. *cont'd*

Monomer	Q	e
Acrylate, methyl	0.45	0.64
Acrylamide, *N,N*-diethyl	0.48	−0.31
Acrylate, glycidyl	0.48	1.28
Acrylonitrile	0.48	1.23
Acrylate, 2-chloroethyl	0.49	1.03
Vinyl isobutyl sulfide	0.49	−0.95
Acrylamide, *N*-methylol-	0.52	1.15
Acrylate, α-acetoxy-, ethyl	0.52	0.77
Methacrylate, 2,2,6,6-tetramethyl-4-piperidinyl	0.52	−1.09
Tetrazole, 2-methyl-5-vinyl-	0.55	−0.46
Isopropenyl, 3-(1-cyclohexenyl)acetate	0.57	−0.66
Pyridazinone, 3-(2-vinyl)-6-methyl-	0.57	0.24
Vinyl isopropyl ketone	0.58	−1.16
Oxazoline, 2-isopropenyl-2-	0.59	−0.64
Vinyl isothiocyanate	0.59	0.37
Methacrylate, 2-acetoxyethyl	0.60	0.51
Vinyl methyl sulfoxide	0.60	−1.79
Acrylate, octyl	0.63	2.01
Phosphonic acid, α-phenyl-	0.65	0.52
Acrylamide, *N*-octadecyl-	0.66	1.64
Vinyl methyl ketone	0.66	1.05
Vinyl 4-chlorocyclohexyl ketone	0.66	−0.82
Acrylate, 2-nitrobutyl	0.69	1.09
p-Vinylbenzylethylcarbinol	0.69	−0.98
Styrene, *p*-1-(2-hydroxybutyl)-	0.70	−0.97
Acenaphthalene	0.72	−1.88
Itaconate, dimethyl	0.73	0.57
Methacrylate, ethyl	0.76	0.17
Itaconic acid	0.78	1.07
Methacrylate, methyl	0.78	0.40
Acrolein	0.80	1.31
Butadiene, hexafluoro-	0.82	0.58
Itaconate, dibutyl	0.82	0.57
Methacrylate, butyl	0.82	0.28
Methacrylate, isobutyl	0.82	0.27
Acrylic acid	0.83	0.88
Tetrazole, 2-phenyl-5-(4′-vinyl)-phenyl-	0.84	−0.52
Maleic anhydride	0.86	3.69
Methacrylonitrile	0.86	0.68
Tetrazole, 2-methyl-5-(4′-vinyl)-phenyl-	0.86	0.51
Citraconimide, *N*-methyl-	0.87	1.58
Oxazoline, 2-, 2-isopropenyl-4,4-dimethyl-	0.87	0.34
Maleimide, *N*-butyl-	0.88	3.70
Methacrylate, benzyl	0.88	0.35
Maleimide	0.94	2.86
Acrylate, heptafluorobutyl	0.96	0.20
Methacrylate, isopropyl	0.97	0.10
Oxazoline, 2-,4-acryloxymethyl-2,4-dimethyl-	0.97	−0.51
Styrene, α-methyl-	0.97	−0.81
Methacrylic acid	0.98	0.62
Acrylate, α-chloro-, ethyl	1.00	−1.03
Styrene	1.00	−0.80
Isopropenyl methyl ketone	1.03	0.64
Itaconate, diethyl	1.04	0.88
Methacrylate, 2-naphthyl	1.04	−0.09
Methacrylate, 2,3-epithiopropyl	1.04	0.29
Methacrylate, 2-chloroethyl	1.04	0.31
Quinoline, 2-vinyl-	1.04	−0.09
Silane, γ-methacryloxypropyl-trimethoxy	1.08	0.07
Styrene, *p*-1-(2-hydroxypropyl)-	1.08	−0.35
Methacrylate, 2-(sulfonic acid)ethyl	1.09	0.25
Styrene, *p*-methyl-	1.10	−0.63
Tetrazole, 5-phenyl-2-(4′-vinyl)-phenyl-	1.11	0.53
Methacrylate, 2-(*N,N*-dimethylcarbamoyloxy)ethyl	1.14	0.84
Styrene, *p*-2-(2-hydroxypropyl)-	1.15	−0.49
Vinyl phenyl ketone	1.16	1.02
Methacrylate, sulfolanyl	1.18	0.95
Methacrylate, 2-bromoethyl	1.18	0.74
Methacrylate, phenyl	1.25	0.79
Styrene, *m*-bromo-	1.25	−0.27
Maleimide, *N*-(2-hydroxyethyl)-	1.26	1.07
Pentadiene, *trans*-1,3-	1.28	−0.13
Pyridine, 2-vinyl-5-ethyl-	1.29	−0.91
Styrene, *p*-bromo-	1.30	−0.68
Pyridine, 2-methyl-5-vinyl-	1.32	−0.66
Styrene, *p*-chloro-	1.33	−0.64
Styrene, *p*-chloromethyl-	1.39	−0.38
Pyridine, 2-vinyl-	1.41	−0.42
Butadiene, 2,3-dimethyl-	1.42	−0.43
Acrylic anhydride	1.46	0.31
Pyrrolidone, 1-benzyl-3-methylene-5-methyl-	1.50	−0.59
Styrene, 2,5-dichloro-	1.50	0.94
Styrene, *p*-methoxy-	1.53	−1.40
Styrene, *m*-methyl-	1.57	−0.03
Butadiene-1-carboxylate, ethyl	1.67	1.26
Butadiene	1.70	−0.50
p-Vinylbenzylmethylcarbinol	1.70	−1.27
Vinylhydroquinone dibenzoate	1.73	0.84
Methacrylate, 2-hydroxyethyl	1.78	−0.39
Acryloyl chloride	1.82	1.92
Acrolein, methyl-	1.83	0.71
Hexatriene, tetrachloro-	1.83	0.94
Butadiene, 2-fluoro-	1.88	0.63
Phthalimide, *N*-(methacryloyloxy)-	1.89	0.96
Isoprene, 3-acetoxy-	1.91	−0.11
Butadiene, 1,4-dicarboxylate, diethyl	1.94	1.39
Isoprene	1.99	−0.55
Methacryloyl chloride	2.04	1.54
Methacrylate, 2-chloro-2,3,3,3-tetrafluoropropyl	2.09	0.62
Styrene, *m*-nitro-	2.19	0.20
Maleimide, *N*-(2-chlorophenyl)-	2.29	2.87
Acrylate, α-chloro-, methyl	2.43	0.35
Styrene, *m*-chloro-	2.46	−0.90
Pyridine, 4-vinyl-	2.47	0.84
Methylenebutyrolactone	2.48	0.83
Maleimide, 2,3-dimethyl-*N*-(2-methacryloxyethyl)-	2.54	1.64
Styrene, *o*-chloro-	2.66	1.57
Maleimide, *N*-phenyl-	2.81	3.24
Styrene, *p*-cyano-	2.93	−0.38
Maleimide, *N*-(4-chlorophenyl)-	2.98	2.75
Methacrylic anhydride	3.00	0.56
Acrylic acid, α-bromo-	3.07	1.37
Vinylhydroquinone	4.30	2.26
Methacrylate, 2-hydroxypropyl	4.38	1.86
Acrylate, α-cyano-, methyl	4.91	0.91
p-Vinylbenzoic acid	5.17	1.08
Acrylate, α-phenyl-, methyl	5.19	0.96
Methacryloylacetone	5.47	−0.76
Butadiene, 2,3-dichloro-	9.08	0.14
Butadiene, 2-chloro-	10.52	1.20
Vinylidene cyanide	14.22	1.92
Vinyl chloromethyl ketone	16.00	1.78

TABLE 4. MONOMERS ARRANGED BY *e* VALUES

Monomer	*Q*	*e*
Vinyl ethyl sulfoxide	0.065	0.05
Ethylene	0.016	0.05
Silane, γ-methacryloxypropyl-trimethoxy	1.08	0.07
Acetylene, phenyl-	0.45	0.10
Methacrylate, isopropyl	0.97	0.10
Butadiene, 2,3-dichloro-	9.08	0.14
Vinyl chloride	0.056	0.16
Methacrylate, ethyl	0.76	0.17
Vinyltrimethylsilane	0.027	0.19
Methacrylamide, *N*-phenyl-	0.40	0.19
Methacrylate, glycidyl	0.96	0.20
Styrene, *m*-nitro-	2.19	0.20
Acrylate, 2-ethylhexyl	0.37	0.24
Pyridazinone, 3-(2-vinyl)-6-methyl-	0.57	0.24
Methacrylate, 2-(sulfonic acid)ethyl	1.09	0.25
Methacrylate, isobutyl	0.82	0.27
Methacrylate, butyl	0.82	0.28
Methacrylate, 2,3-epithiopropyl	1.04	0.29
Methacrylate, 2-chloroethyl	1.04	0.31
Acrylic anhydride	1.46	0.31
Vinylidene chloride	0.31	0.34
Oxazoline, 2-,2-isopropenyl-4,4-dimethyl-	0.87	0.34
Methacrylate, benzyl	0.88	0.35
Acrylate, α-chloro-, methyl	2.43	0.35
Vinyl isothiocyanate	0.59	0.37
Allylbenzene	0.038	0.40
Methacrylate, methyl	0.78	0.40
Acrylate, ferrocenylmethyl	0.15	0.51
Methacrylate, 2-acetoxyethyl	0.60	0.51
Tetrazole, 2-methyl-5-(4′-vinyl)-phenyl-	0.86	0.51
Phosphonic acid, α-phenylvinyl-	0.65	0.52
Tetrazole, 5-phenyl-2-(4′-vinyl)-phenyl-	1.11	0.53
Acrylamide	0.23	0.54
Acrylate, ethyl	0.41	0.55
Methacrylic anhydride	3.00	0.56
Itaconate, dimethyl	0.73	0.57
Itaconate, dibutyl	0.82	0.57
Butadiene, hexafluoro-	0.82	0.58
1-Acrylamideo-1-deoxy-D-glucitol	0.22	0.61
Oct-1-ene, 6,6-dimethyl-4,8-dioxaspiro(2.5)-	0.25	0.61
Methacrylic acid	0.98	0.62
Butadiene, 2-fluoro-	1.88	0.63
Acrylate, methyl	0.45	0.64
Isopropenyl methyl ketone	1.03	0.64
Methacrylonitrile	0.86	0.68
Acrolein, methyl-	1.83	0.71
Vinyl fluoride	0.008	0.72
Methacrylate, 2-bromoethyl	1.18	0.74
Vinyl cinnamate	0.18	0.76
Acrylate, α-acetoxy-, ethyl	0.52	0.77
Styrene, pentachloro-	0.20	0.79
Methacrylate, phenyl	1.25	0.79
Vinyltriethoxysilane	0.021	0.82
9-Vinylanthracene	0.14	0.82
Methylenebutyrolactone	2.48	0.83
Vinylhydroquinone dibenzoate	1.73	0.84
Crotonaldehyde	0.023	0.84
Methacrylate, 2-(*N*,*N*-dimethylcarbamoyloxy)ethyl	1.14	0.84
Pyridine, 4-vinyl-	2.47	0.84
Acrylate, butyl	0.38	0.85
Acrylic acid	0.83	0.88
Itaconate, diethyl	1.04	0.88
Crotonic acid	0.017	0.89
Acrylate, α-cyano-, methyl	4.91	0.91
Hexene-1	0.035	0.92
Styrene, 2,5-dichloro-	1.50	0.94
Hexatriene, tetrachloro-	1.83	0.94
Methacrylate, sulfolanyl	1.18	0.95
Phosphonate, isopropenyl-, dimethyl	0.032	0.96
Phthalimide, *N*-(methacryloyloxy)-	1.89	0.96
Acrylate, α-phenyl-, methyl	5.19	0.96
Propene, 3,3,3-trichloro-	0.030	1.00
Vinyl phenyl ketone	1.16	1.02
Acrylate, 2-chloroethyl	0.49	1.03
Vinyl methyl ketone	0.66	1.05
Vinyl butylsulfonate	0.16	1.06
Itaconic acid	0.78	1.07
Maleimide, *N*-(2-hydroxyethyl)-	1.26	1.07
p-Vinylbenzoic acid	5.17	1.08
Maleate, diethyl	0.053	1.08
Acrylate, 2-nitrobutyl	0.69	1.09
Acrylate, benzyl	0.33	1.13
Acrylamide, *N*-methylol-	0.52	1.15
Acrylate, trifluoro-, methyl	0.048	1.20
Butadiene, 2-chloro-	10.52	1.20
Acrylonitrile	0.48	1.23
Ethylene, tetrachloro-	0.001	1.24
2-Methyleneglutaronitrile	0.41	1.25
Acrylate, octadecyl	0.33	1.26
Butadiene-1-carboxylate, ethyl	1.67	1.26
Acrylate, glycidyl	0.48	1.28
Ethylene, trichloro-	0.010	1.29
Acrolein	0.80	1.31
Acrylate, heptafluorobutyl	0.96	1.34
Acrylic acid, α-bromo-	3.07	1.37
Butadiene, 1,4-dicarboxylate, diethyl	1.94	1.39
Methacryloyl chloride	2.04	1.54
Ethylene, chlorotrifluoro-	0.026	1.56
Styrene, *o*-chloro-	2.66	1.57
Citraconimide, *N*-methyl-	0.87	1.58
Ethylene, tetrafluoro-	0.032	1.63
Phosphonate, vinyl-, bis(2-chloro-ethyl)	0.044	1.64
Acrylamide, *N*-octadecyl-	0.66	1.64
Maleimide, 2,3-dimethyl-*N*-(2-methacryloxyethyl)-	2.54	1.64
Carbon monoxide	0.013	1.68
Vinyl chloromethyl ketone	16.00	1.78
Methacrylate, 2-hydroxypropyl	4.38	1.86
Vinylidene cyanide	14.22	1.92
Acryloyl chloride	1.82	1.92
Acrylate, octyl	0.63	2.01
Methacrylate, 2-chloro-2,3,3,3-tetrafluoropropyl	0.62	2.09
Vinylhydroquinone	4.30	2.26
Fumarate, diethyl	0.25	2.26
Aconitate, trimethyl	0.25	2.27
Fumarate, diisopropyl	0.11	2.58
Triallyl cyanurate	0.14	2.41
Diallylcyanamide	0.14	2.41
4-Cyclopentene-1,3-dione	0.42	2.43
Fumaronitrile	0.29	2.73
Maleimide, *N*-(4-chlorophenyl)-	2.98	2.75
Maleimide	0.94	2.86
Maleimide, *N*-(2-chlorophenyl)-	2.29	2.87
Maleimide, *N*-phenyl-	2.81	3.24
Maleic anhydride	0.86	3.69
Maleimide, *N*-butyl-	0.88	3.70
Styrene, *m*-methyl-	1.57	−0.03
Phosphonate, α-carbomethoxyvinyl-, diethyl	0.14	−0.04

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TABLE 4. *cont'd*

Monomer	Q	e
Methacrylamide	0.40	−0.05
Butene-1	0.007	−0.06
Methacrylate, 2-naphthyl	1.04	−0.09
Quinoline, 2-vinyl-	1.04	−0.09
Isoprene, 3-acetoxy-	1.91	−0.11
Vinyl-tris(trimethoxysiloxy)silane	0.022	−0.12
Pentadiene, *trans*-1,3-	1.28	−0.13
Tetrazole, 1-vinyl-	0.13	−0.14
Propene, 1-chloro-, *trans*-	0.006	−0.16
Propene, 2-chloro-	0.073	−0.16
Methacrylamide,1-deoxy-D-glucitol	0.15	−0.16
Triallyl isocyanurate	0.035	−0.23
Vinyl bromide	0.038	−0.23
Phosphonate, vinyl-, dimethyl	0.24	−0.25
Triallyl citrate	0.054	−0.26
Diallyl phthalate	0.031	−0.26
Acrylamide, *N,N*-dimethyl-	0.41	−0.26
Styrene, *m*-bromo-	1.25	−0.27
Butene-2	0.002	−0.29
Acrylamide, *N,N*-diethyl	0.48	−0.31
Pyridazinone, 3-(2-vinyl)-6-methyl-	0.18	−0.32
Styrene, *p*-1-(2-hydroxypropyl)-	1.08	−0.35
Bicyclo[2.2.1]hept-2-ene-5,6 dicarboxamine, *N*-benzyl-	0.01	−0.36
Styrene, *p*-chloromethyl-	1.39	−0.38
Styrene, *p*-cyano-	2.93	−0.38
Methacrylate, 2-hydroxyethyl	1.78	−0.39
Propene, 2,3-dichloro-	0.12	−0.40
Phosphonate, vinyl-, diethyl	0.27	−0.40
N-Allylstearamide	0.024	−0.41
Pyridine, 2-vinyl-	1.41	−0.42
Butadiene, 2,3-dimethyl-	1.42	−0.43
Benzothiazole, vinylmercapto-	0.36	−0.44
Tetrazole, 2-methyl-5-vinyl-	0.55	−0.46
Propene, 1-chloro-, *cis*-	0.003	−0.46
Vinylene carbonate	0.004	−0.49
Styrene, *p*-2-(2-hydroxypropyl)-	1.15	−0.49
Butadiene	1.70	−0.50
Oxazoline, 2,4-acryloxymethyl-2,4-dimethyl-	0.97	−0.51
Vinyl thiolacetate	0.27	−0.52
Tetrazole, 2-phenyl-5-(4′-vinyl)-phenyl-	0.84	−0.52
Toluenesulfonamide, *N,N*-methyl-vinyl-	0.18	−0.53
Vinyl laurate	0.011	−0.54
Isoprene	1.99	−0.55
Vinyl cymantrene	0.39	−0.57
Styrene, 2,4,6-trimethyl-	0.15	−0.58
Pyrrolidone, 1-benzyl-3-methylene-5-methyl-	1.50	−0.59
Allyl chloride	0.026	−0.60
Styrene, 3-tri-*n*-butylstannyl-	0.014	−0.61
Styrene, *p*-methyl-	1.10	−0.63
Oxazoline, 2-isopropenyl-2-	0.59	−0.64
Styrene, *p*-chloro-	1.33	−0.64
Vinyl ethyl oxalate	0.056	−0.65
Methacrylate, ferrocenylmethyl	0.22	−0.65
Isopropenyl, 3-(1-cyclohexenyl)-acetate	0.57	−0.66
Pyridine, 2-methyl-5-vinyl-	1.32	−0.66
Vinyl propionate	0.027	−0.68
Imidazole, 1-vinyl-	0.11	−0.68
N,N-Divinylaniline	0.26	−0.68
Styrene, *p*-bromo-	1.30	−0.68
Oxazoline, 2-,4-methacryloxymethyl-2,4-dimethyl-	0.44	−0.70
Indene	0.13	−0.71
Methacryloylacetone	5.47	−0.76
Styrene	1.00	−0.80
Styrene, α-methyl-	0.97	−0.81
Vinyl 4-chlorocyclohexyl ketone	0.66	−0.82
Vinyl hendecanoate	0.056	−0.84
Propenyl, 2-chloro-, acetate	0.20	−0.85
Isobutylene, 3-chloro-	0.17	−0.86
Vinyl acetate	0.026	−0.88
Vinyl butyrate	0.024	−0.89
Vinyl benzoate	0.030	−0.89
Styrene, *m*-chloro-	2.46	−0.90
Pyridine, 2-vinyl-5-ethyl-	1.29	−0.91
Isopropenyl acetate	0.023	−0.94
Vinylisocyanate	0.14	−0.95
Vinyl isobutyl sulfide	0.49	−0.95
Propene, 2-chloro-3-hydroxy-	0.091	−0.95
Vinyl stearate	0.043	−0.97
Styrene, *p*-1(2-hydroxybutyl)-	0.70	−0.97
p-Vinylbenzylethylcarbinol	0.69	−0.98
Imidazole, 1-vinyl-2-methyl-	0.14	−0.98
Vinyl phenyl sulfide	0.33	−0.99
Allyl acrylate	0.32	−0.99
Styrene, α-methoxy-	0.39	−1.02
Acrylate, α-chloro-, ethyl	1.00	−1.03
Isopropenylisocyanate	0.18	−1.05
Allyl acetate	0.24	−1.07
Methacrylate, 2,2,6,6-tetramethyl-piperidinyl	0.52	−1.09
Vinyl *N,N*-diethylcarbamate	0.028	−1.10
Carbamate, *N,N*-diethyl-, vinyl	0.028	−1.11
Carbamate, *N*-vinyl-, ethyl	0.037	−1.12
Vinyl ether	0.029	−1.16
Vinyl isopropyl ketone	0.58	−1.16
N-Vinylcaprolactam	0.14	−1.18
Vinyl formate	0.043	−1.19
Isobutylene	0.023	−1.20
Vinyl pelargonate	0.046	−1.22
Vinyl isobutyl ether	0.030	−1.27
p-Vinylbenzylmethylcarbinol	1.70	−1.27
Carbazole, *N*-vinyl-	0.26	−1.29
Vinyl ethyl sulfide	0.27	−1.31
Vinylferrocene	0.31	−1.34
Vinyl dichloroacetate	0.059	−1.38
Styrene, *p*-methoxy-	1.53	−1.40
Succinimide, *N*-vinyl-	0.19	−1.42
Allyl alcohol	0.005	−1.48
Norbornadiene	0.051	−1.48
Vinyl butyl ether	0.038	−1.50
Vinyl octyl ether	0.020	−1.57
Diallyl melamine	0.059	−1.57
Vinyl chloroacetate	0.039	−1.61
N-Vinylpyrrolidone	0.088	−1.62
Vinyl 2-chloroethyl ether	0.019	−1.64
Vinyl methyl sulfide	0.42	−1.66
Vinyl dodecyl ether	0.041	−1.69
Propylene	0.009	−1.69
Oxazolidone, *N*-vinyl-	0.087	−1.70
Ethylene, 1,1-diphenyl-	0.17	−1.71
Vinyl methyl sulfoxide	0.60	−1.79
Vinyl ethyl ether	0.018	−1.80
Urea, *N*-vinyl-*N*′ethyl-	0.17	−1.88
Acenaphthalene	0.72	−1.88
Vinyl octadecyl ether	0.024	−1.93
Propenyl, 2-methyl-, acetate	0.040	−2.08
Vinyl phenyl ether	0.046	−2.16
Vinyl *tert*-butyl sulfide	0.046	−2.20
Vinyl *m*-cresyl ether	0.016	−6.33
Vinyl *p*-cresyl ether	0.015	−6.86
Vinyl *o*-cresyl ether	0.010	−8.53

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Patterns of Reactivity (U,V) Parameters for the Prediction of Monomer Reactivity Ratios and Transfer Constants in Radical Polymerization

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A. INTRODUCTION

The relation between monomer reactivity ratios and the Alfrey–Price Q–e parameters is explained in the introduction to the tables of monomer reactivity ratios and Q–e values, compiled by Robert Z. Greenley and published in the present volume (1,2). Although very widely used, the Q–e scheme is well known to have serious limitations (3), which have prompted several attempts to improve upon it. One such endeavour was the "Patterns of Reactivity" scheme, first described as long ago as 1959 (4–7), when the Q–e scheme was only about ten years old; despite the indisputably more satisfactory basis of this procedure, it did not achieve popularity but recent revisions have greatly improved both its accessibility and its accuracy (3,8,9).

In the Q–e scheme, four parameters (Q_1, Q_2, e_1, e_2; two for each monomer) are necessary for the prediction of a monomer reactivity ratio (e.g. $r_{12} = k_{11}/k_{12}$, where subscript 1 refers to the radical and subscript 2 to the monomer) but the same four parameters also facilitate the prediction of the partner monomer reactivity ratio ($r_{21} = k_{22}/k_{21}$) because identical Q and e parameters are used to characterise both a given monomer and its derived radical. This device is certainly economical on input data but it introduces an approximation of very doubtful validity.

In the "Patterns" scheme (to use the abbreviated title), different parameters are designated for the monomer and its conjugate radical. Hence, while four input parameters are again necessary for the calculation of a single monomer reactivity ratio, eight are required to calculate both r_{12} and r_{21}. The reward for the greater input of data is a substantial increase in the precision of the result; furthermore, all four parameters for each monomer/radical conjugate pair are experimentally determined from polymerization data, specifically monomer reactivity ratios from Greenley's tabulation, so no arbitrary assignment is involved, as it is with the Q–e scheme.

The fundamental equation for the calculation of a reactivity ratio, r_{12}, is given below.

$$\log r_{12} = \log r_{1S} - u_2\pi_1 - v_2. \qquad \text{(A1)}$$

Here, the symbol S denotes the monomer styrene, and $\log r_{1S}$ is the counterpart of Q_1 in the Q–e scheme. The counterpart of e_1 is the polarity parameter π_1; this is usually almost exactly equal to the Hammett σ parameter for the substituent(s) present on the α-carbon atom of the radical derived from monomer 1 but it is best calculated (8) from monomer reactivity ratio data according to Eq. (A2).

$$\pi_1 = 0.385 \log[(r_{1A})/0.377(r_{1S})] \qquad \text{(A2)}$$

Here, the symbol A denotes the monomer acrylonitrile. It is truly an astonishing fact that the Hammett σ parameter, derived originally from studies of the dissociation of substituted benzoic acids, is equal in value to a simple quantity derived from a knowledge of the monomer reactivity ratios for the reactions of a monomer 1 with (separately) acrylonitrile and styrene.

The values of u_2 and v_2, the respective counterparts of the Q–e scheme's e_2 and Q_2, are determined by reference to data for the (separate) copolymerizations of monomer 2 with the members of a Basic Monomer Set. These are five monomers for which reliable data exist in the literature: styrene (S); methyl methacrylate (MM); methyl acrylate

(MA); methacrylonitrile (MAN); and acrylonitrile (A). Ideally, monomer reactivity ratios should be known for the copolymerization of the monomer of interest (labelled 2 in this case) with each of these five reference monomers. If the reference monomer is monomer 1 in this context, a plot is made of $[\log r_{12} - \log r_{1S}]$ against π_1; the slope of the resulting straight line is $-u_2$ and the intercept on the ordinate axis is $-v_2$, in conformity with Eq. (A1).

If data for reactions with all five members of the Basic Monomer Set are not available, use can be made of such data as exists, always provided that styrene and acrylonitrile are among the monomers included. This condition ensures that the data are spread over a wide range of radical polarity, represented by π_1, because styrene has a very low value (zero), while acrylonitrile has one of the highest values known (0.701).

In Table 1, each monomer is designated either as Basic or assigned to a category according to the number of members of the Basic Monomer Set for which data have been employed in the determination of its u_2 and v_2; for category 5, all five Basic monomers were involved, and so on down to category 2, where data for only styrene and acrylonitrile are available. Clearly, the higher the category number, the more reliable the u_2 and v_2 values. The procedure described thus far is known as the *Patterns U,V Scheme* (3).

For Group 2 monomers, there is no need to make a plot because the use of just two data points permits algebraic solutions to be found. In fact, it can be shown (3) that the following relations hold.

$$u_2 = [\log r_{AS} - \log r_{A2} + \log r_{S2}]/\pi_A \quad \text{and} \quad v_2 = -\log r_{S2} \tag{A3}$$

Substitution in Eq. (A1) leads to the following relationships (A4, A5), giving the two monomer reactivity ratios for the copolymerization of any two monomers, 1 and 2.

$$\log(r_{12}) = \log[(r_{1S})(r_{S2})] - \frac{\{\log[(r_{AS})(r_{S2})/(r_{A2})]\}\{\log[(r_{SA})(r_{1S})/(r_{1A})]\}}{\log[(r_{AS})(r_{SA})]} \tag{A4}$$

$$\log(r_{21}) = \log[(r_{2S})(r_{S1})] - \frac{\{\log[(r_{AS})(r_{S1})/(r_{A1})]\}\{\log[(r_{SA})(r_{2S})/(r_{2A})]\}}{\log[(r_{AS})(r_{SA})]} \tag{A5}$$

Application of Eqs. (A3–A5) corresponds to the *Patterns A,S Scheme* (4), so-called, because data for reaction with only acrylonitrile and styrene are involved. According to the Patterns A,S Scheme, it is possible to calculate the two monomer reactivity ratios for copolymerization of monomers 1 and 2, if each of them has separately been copolymerized with acrylonitrile and styrene. (The two monomer reactivity ratios for copolymerization of acrylonitrile and styrene are also required. These are taken to be: $r_{AS} = 0.04$, $r_{SA} = 0.38$ (3).)

The π, u, and v values listed in the table below have been derived as explained above, with the Patterns U,V Scheme being used for the monomers in categories 3–5 and the Patterns A,S Scheme for those in category 2. The r_{1S} values are mean values from the figures supplied in Greenley's table, making due allowance for the consistency of the data.

B. EXAMPLE

Suppose one wants to evaluate the monomer reactivity ratios for the copolymerization of 2-chlorobutadiene (CB) and 2-vinylpyridine (VP). To use the Patterns U,V Scheme for this purpose, it is first necessary to consult Greenley's table of monomer reactivity ratios for data characterizing the copolymerizations of each of these monomers with as many members of the Basic Monomer Set as possible. In fact, in both cases, values exist for reactions with styrene, methyl methacrylate, methyl acrylate and acrylonitrile, but not methacrylonitrile. The π values for the four useful basic monomers are, respectively, 0.000, 0.339, 0.423 and 0.701. The relevant monomer reactivity ratios are listed in the table below.

MONOMER REACTIVITY RATIOS FOR 2-CHLOROBUTADIENE AND 2-VINYLPYRIDINE AND MEMBERS OF THE BASIC MONOMER SET

Monomer reactivity ratio	2-Chlorobutadiene	2-Vinylpyridine
$r_{X,S}$	6.91	1.26
$r_{X,A}$	5.18	0.44
$r_{S,X}$	0.038	0.53
$r_{A,X}$	0.05	0.10
$r_{MM,X}$	0.08	0.35
$r_{MA,X}$	0.06	0.25

X = 2-chlorobutadiene or 2-vinylpyridine.

Plots of $[\log r_{12} - \log r_{1S}]$ against π_1, where 2 = CB or VP, are linear with slopes and intercepts that provide the following u and v values (9). For CB, $u = -2.18$, $v = 1.44$, and for VP, $u = -0.982$ and $v = 0.323$. All the data are now available for substitution in Eq. (A1), first for CB = monomer 1 and VP = monomer 2, and secondly with the monomers' roles reversed, to obtain values of r_{12} and r_{21}. The results are $r_{12} = 4.26$ and $r_{21} = 0.04$. The Patterns A,S Scheme can be applied by simply substituting the appropriate monomer reactivity ratio data in Eqs. (A4) and (A5), giving $r_{12} = 4.71$ and $r_{21} = 0.05$. The corresponding experimental results are $r_{12} = 5.19$ and $r_{21} = 0.06$, while the $Q = e$ scheme predicts that $r_{12} = 1.07$ and $r_{21} = 0.07$.

C. TRANSFER CONSTANTS

Transfer constants can be predicted by exactly parallel reasoning (3). It is necessary only to realise that whereas the rate constant for the propagation step of a radical with its own parent monomer appears in the *numerator* of a monomer reactivity ratio ($r_{12} = k_{11}/k_{12}$), where both rate

constants refer to propagation reactions, it figures in the *denominator* of a transfer constant because $(C_2)_1 = k_{12}/k_{11}$, where k_{12} represents a transfer reaction between the radical derived from a monomer (species 1) and a transfer agent (species 2); the equations for calculating transfer constants are thus easily obtained from the equations above by replacing $\log r_{12}$ by $-\log (C_2)_1$. The only formal difference between the two cases is that, for transfer, there is no symmetrical counterpart of the equations representing reaction of a radical of type 2 with a transfer agent of type 1. Thus, the equivalent of Eq. (A1), for transfer is Eq. (A6), and this enables the Patterns U,V Scheme to be applied to chain transfer.

$$-\log(C_2)_1 = \log r_{1S} - u_2\pi_1 - v_2 \qquad \text{(A6)}$$

For use of the Patterns A,S Scheme in transfer, a parallel derivation to that used in copolymerization leads to the following equation, where $(C_2)_S$ and $(C_2)_A$ are, respectively, the (known) transfer constants for reaction of the same transfer agent (species 2) with radicals derived from styrene and acrylonitrile (species 1).

$$\log(C_2)_1 = \log[(C_2)_S/r_{1S}] + (\pi_1/\pi_A)\log[r_{AS}(C_2)_A/(C_2)_S] \qquad \text{(A7)}$$

Since $\pi_A = 0.701$ and $r_{AS} = 0.04$, this equation can be reduced to Eq. (A8) for general use.

$$\log(C_2)_1 = \log[(C_2)_S/r_{1S}] + (1.43\pi_1)\log[0.04(C_2)_A/(C_2)_S] \qquad \text{(A8)}$$

The transfer constants used here are taken from two tabulations, one due to Eastmond (10) and one in the *Polymer Handbook* (11).

D. TABLES OF PARAMETERS

As explained above, each monomer or transfer agent is assigned to a category, designated by Basic or the number 2, 3, 4, or 5, according to the number of members of the Basic Monomer Set with which this reagent has been reacted to obtain data for the evaluation of u, v and (in the case of monomers) π. Although it must be true that the higher the category, the more reliable the derived parameters, the difference between Categories 2 and 5 is not so great as might appear at first sight. In *all* cases, two of the basic monomers involved are styrene, S, (the least polar) and acrylonitrile, A, (the most polar), so the role played by other basic monomers is merely to add intermediate points to what should be a straight line joining the data points for S and A; if the data for these two latter monomers are accurate, intermediate points add little or no value beyond confirmation of the slope and intercept. They do contribute valuable weighting when there are some discrepancies in the data, but parameters have not been recorded here in cases where the discrepancies are large.

Where *either* r_{1S} *or* r_{1A} was reported as zero, the value 0.05 has been assigned arbitrarily in order to make it possible to calculate an approximate value for the π parameter but the values of the u and v parameters are not influenced by this device; entries of this type are printed in italics in Table 1. Sometimes both r_{1S} *and* r_{1A} are reported to be zero; when this happens, π cannot usefully be estimated but u and v can still be determined, if positive values of r_{S1} and r_{A1} are available.

Nomenclature In the tables below, compounds are listed in alphabetical sequence in accordance with the following rules:

The primary listing is based on the root name of the compound and the secondary sequence on the name(s) of the substituent(s) or the esterifying moiety. For example, the compounds, *p*-methyl styrene, *N*-vinyl carbazole, and ethyl acrylate, will be found listed under Styrene, *p*-methyl, Carbazole, *N*-vinyl, and Acrylate, ethyl, respectively.

In deciding on the appropriate order of names, *all prefixes (alphanumeric, Greek or whatever) and spaces* are ignored, and reliance is placed solely on the alphabetical priority of the strictly chemical part of the name. In styrene, *p*-methyl, for example, the prefix *p*- plays no part in determining the place of this name in the list; this is governed by the *m* in methyl.

TABLE 1. MONOMERS

Monomer	Category	r_{1S}	r_{1A}	r_{A1}	r_{S1}	$\log(r_{1S})$	π	u	v
Acenaphthalene	4	0.33	2.56	0.02	3.81	−0.4815	0.506	1.33	−0.46
Acetylene, phenyl	5	0.33	0.33	0.27	0.32	−0.4815	0.159	−1.88	0.37
Aconitate, trimethyl	2			4.24	1.026			−2.88	−0.01
Acrolein	5	0.27	1.11	0.78	0.23	−0.5686	0.397	−2.75	0.59
Acrolein, methyl	4	0.60	3.10	0.15	0.26	−0.2219	0.436	−1.73	0.77
Acrylamide	3	0.70	1.10	0.90	1.20	−0.1549	0.237	−1.82	−0.07
Acrylamide, *N*-methylol	4	0.48	2.43	0.60	0.03	−0.3188	0.432	−3.94	1.18
Acrylamide, *N*-octadecyl	3	0.54	1.40	1.03	2.08	−0.2676	0.321	−1.56	−0.35
Acrylate, benzyl	3	0.20	0.72	1.49	0.49	−0.6990	0.376	−2.68	0.28
Acrylate, butyl	3	0.18	0.97	1.11	0.77	−0.7447	0.443	−2.22	0.12
Acrylate, 2-chloroethyl	4	0.12	0.87	1.03	0.53	−0.9208	0.492	−2.38	0.25
Acrylate, α-chloro-, methyl	3	0.30	1.76	0.12	0.25	−0.5229	0.457	−1.55	0.64

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TABLE 1. *cont'd*

Monomer	Category	r_{1S}	r_{1A}	r_{A1}	r_{S1}	$\log(r_{1S})$	π	u	v
Acrylate, α-cyano-, methyl	5	0.61	0.68	0.01	0.05	−0.2147	0.180	−1.09	1.20
Acrylate, 3,4-epoxyhexahydrobenzyl	2	1.97	0.39	0.25	0.27	0.2945	−0.110	−1.95	0.57
Acrylate, β-ethoxy-, ethyl	2			2.42	46.98			−0.16	−1.67
Acrylate, ethyl	3	0.17	0.87	0.80	0.81	−0.7696	0.436	−1.99	0.08
Acrylate, methyl	B	0.18	0.85	1.42	0.75	−0.7447	0.421	−2.34	0.16
Acrylate, octadecyl	3	0.26	1.20	3.15	0.61	−0.5850	0.417	−3.01	0.24
Acrylate, octyl	2	0.125	0.84	1.98	0.39	−2.0000	0.482	−3.01	0.41
Acrylate, 2-nitrobutyl	3	0.12	1.76	0.67	0.35	−0.9208	0.610	−2.39	0.44
Acrylate, α-phenyl-, methyl	5	1.28	6.70	0.08	0.06	0.1072	0.438	−2.13	1.20
Acrylate, di-zinc	2	0.90	0.24	0.41	1.10	−0.0458	−0.060	−1.39	−0.04
Acrylonitrile	B	0.04	1.00	1.00	0.38	−1.3980	0.701	−2.60	0.42
Acryloyl chloride	4	0.02	1.00	1.20	0.10	−1.6990	0.815	−3.50	1.09
Allyl acetate	3			6.57	90			−0.37	−1.97
Allyl chloride	3	0.04	0.04	2.80	36	−1.3980	0.162	−0.39	−1.53
Aniline, N,N-divinyl	*2*	*0.033*	*0.05*	*0.246*	*5.38*	*−1.482*	*0.231*	*−0.08*	*−0.73*
Benzothiazole, vinylmercapto-	3	0.42	0.18	0.19	2.6	−0.3768	0.020	−0.38	−0.38
Butadiene	5	1.40	0.29	0.06	0.57	0.1461	−0.100	−0.30	0.41
Butadiene-1-carboxylic acid	2	5.55	7.5	0.12	0.115	0.7443	0.213	−2.00	0.94
Butadiene-1-carboxylate, ethyl	2	0.3	3.2	0.3	0.12	−0.5229	0.559	−2.57	0.92
Butadiene-1,4-dicarboxylic acid	2	0.52	4.00	0.20	0.15	−0.2840	0.502	−2.18	0.82
Butadiene, 1,4-dicarboxylate-, diethyl	2	0.55	2.79	0.29	0.09	−0.2596	0.433	−2.73	1.05
Butadiene, 2-chloro-	4	6.91	5.18	0.05	0.038	0.8395	0.113	−2.18	1.44
Butadiene, 2-fluoro-	3	1.67	0.60	0.077	0.22	0.2227	−0.0095	−1.32	0.51
Butadiene, 2-trimethylsilyloxy-	2	1.20	0.07	0.036	0.64	0.0792	−0.324	−0.21	0.19
Carbazole, *N*-vinyl	4			0.39	5.82			−0.25	−0.58
Cinnamonitrile	*2*	*0.05*	*0.36*	*8.46*	*2.55*	*−1.3010*	*0.491*	*−2.74*	*−0.41*
Citraconimide, *N*-methyl-	3	0.24	0.60	0.53	0.145	−0.6198	0.315	−2.77	0.59
Crotonaldehyde	2	0.07	0.01	25	14.7	−1.1549	−0.164	−2.33	−1.17
Crotonate, α-acetyl-, methyl	2			8.68	2.7			−2.72	−0.43
Crotonate, α-carboethoxy-, ethyl	2			18.7	8.24			−2.51	−0.92
Crotonate, α-chloro-, ethyl	2			9.53	5.13			−2.38	−0.71
Crotonate, α-cyano-, ethyl	2	0.02	0.06	11.4	0.26	−1.6990	0.345	−4.35	0.59
Crotonate, ethyl	2			25.2	27			−1.96	−1.43
Crotonate, α-methoxy-, methyl	*2*	*0.04*	*0.05*	*1.00*	*18.4*	*−1.3980*	*0.199*	*−0.19*	*−1.26*
Crotonate, α-methyl-, methyl	*2*	*0.02*	*0.05*	*2.97*	*30.7*	*−1.699*	*0.315*	*−0.55*	*−1.49*
Crotonic acid	2			21	20	−1.301		−2.03	−1.30
Diallyl phthalate	4	0.076	0.0385	3.5	23.5	−1.12	0.048	−0.77	−1.35
Ethylene	*3*	*0.05*	*0.05*	*7*	*14.88*	*−1.301*	*0.162*	*−1.57*	*−1.23*
Ethylene, tetrachloro-	3			463	195			−2.60	−2.36
Ethylene, trichloro-	4			64.5	14.6			−2.87	−1.20
Ethylene, diphenyl-	5			0.05	0.335			−0.74	0.23
Fumarate, diethyl	3	0.06	0.05	9	0.33	−1.222	0.131	−4.05	0.56
Fumarate, diisopropyl	5	0.055	0.20	16	0.4	−1.26	0.377	−4.31	0.17
Hexatriene, tetrachloro-	4	0.85	4.01	0.234	0.123	−0.0706	0.421	−2.39	0.86
Imidazole, *N*-vinyl	3	0.68	0.832	3.39	8.38	−0.1675	0.195	−1.44	−0.92
Isoprene	4	1.84	0.45	0.03	0.458	0.2648	−0.074	−0.32	0.34
Isopropenyl isocyanate	3	0.096	0.1	0.24	7.48	−1.0177	0.170	0.14	−0.87
Isopropenyl methyl ketone	2	0.48	0.95	0.33	0.38	−0.3188	0.276	−1.91	0.42
Itaconic acid	3	0.12	0.86	0.59	0.26	−0.9208	0.491	−2.50	0.54
Itaconic anhydride	2	0.55	4.83	0.034	0.031	−0.2596	0.526	−2.06	1.51
Maleate, diethyl	*3*	*0.04*	*0.05*	*16*	*7.03*	*−1.398*	*0.199*	*−2.51*	*−0.83*
Maleic anhydride	*4*	*0.011*	*0.05*	*6*	*0.36*	*−1.959*	*0.416*	*−5.20*	*1.22*
Maleimide, *N*-(2-chlorophenyl)-	3	0.021	1.078	0.956	0.0245	−1.688	0.826	−4.23	1.32
Methacrylamide, *N*-phenyl-	3	0.88	0.71	0.381	1.24	−0.0555	0.126	−1.26	−0.08
Methacrylate, benzyl	3	0.47	0.96	0.2	0.52	−0.3279	0.281	−1.40	0.26
Methacrylate, 2-bromoethyl	3	0.41	2.38	0.31	0.32	−0.3872	0.455	−1.97	0.47
Methacrylate, butyl	4	0.53	0.98	0.291	0.6	−0.2757	0.267	−1.49	0.26
Methacrylate, isobutyl	4	0.42	1.05	0.217	0.54	−0.3768	0.315	−1.43	0.27

TABLE 1. *cont'd*

Monomer	Category	r_{1S}	r_{1A}	r_{A1}	r_{S1}	$\log(r_{1S})$	π	u	v
Methacrylate, 2-chloroethyl	3	0.3	1.30	0.14	0.37	−0.5229	0.406	−1.39	0.42
Methacrylate, ferrocenylmethyl	2	0.01	0.82	0.15	3.6	−2	0.898	−0.03	−0.56
Methacrylate, glycidyl	3	0.5	1.32	0.14	0.415	−0.301	0.325	−1.32	0.34
Methacrylate, 2-hydroxyethyl	3	0.64	1	0.2	0.48	−0.1938	0.238	−1.45	0.34
Methacrylate, methyl	B	0.46	1.32	0.138	0.5	−0.3372	0.339	−1.18	0.23
Methacrylate, 3,5-dimethyladamantyl	3	0.63	1.30	0.19	0.89	−0.2007	0.283	−1.04	0.10
Methacrylate, 2,2,6,6-tetramethyl-4-piperidinyl-	2	0.30	14	0.02	0.63	−0.5229	0.806	0.14	0.20
Methacrylate, phenyl	3	0.51	0.46	0.36	0.25	−0.2924	0.146	−2.22	0.62
Methacrylic acid	4	0.524	0.2	0.04	0.24	−0.2807	0.002	−0.95	0.39
Methacrylonitrile	B	0.33	1.67	0.43	0.38	−0.4815	0.432	−2.08	0.44
Methacryloylacetone	2	1.66	3.74	0.01	0.067	0.2202	0.297	−0.82	1.17
Methylenebutyrolactone	3	0.7	1.10	0.09	0.09	−0.1549	0.237	−1.98	0.88
Naphthalene, 1-vinyl-	2	2.02	0.451	0.107	0.699	0.3054	−0.089	−0.83	0.16
Oct-1-ene,6,6-dimethyl-4,8-dioxaspiro(2,5)-	2	0.271	1.484	0.985	1.93	−0.567	0.446	−1.58	−0.29
Oxazoline, 2,2-isopropenyl-	4	0.64	0.52	0.13	0.67	−0.1938	0.127	−0.95	0.19
Oxazoline, 2,2-isopropenyl-4,4-dimethyl-	4	0.68	1.83	0.24	0.55	−0.1675	0.327	−1.51	0.31
Pentadienoate, *trans*-4-ethoxy-2,4-,ethyl	2	12.2	5.40	0.01	0.04	1.0864	0.025	−1.14	1.40
Phthalimide, *N*-vinyl-	2	0.07	0.24	0.43	6.27	−1.155	0.367	−0.33	−0.80
Propene, 3,3,3-trichloro-	*2*	*0.05*	*0.10*	*12.2*	*6.9*	*−1.301*	*0.277*	*−2.35*	*−0.84*
Pyridazinone, 3-(2-vinyl)-6-methyl-	3	0.85	0.19	0.32	0.90	−0.0706	−0.089	−1.36	0.09
Pyridazinone, 3-(2-vinyl)-6-methyl-4,5-dihydro-	3	0.13	0.02	0.74	5.92	−0.8861	−0.151	−0.73	−0.57
Pyridine, 2-methyl-5-vinyl-	4	0.85	0.31	0.16	0.70	−0.0706	−0.007	−1.04	0.28
Pyridine, 2-vinyl-	4	1.26	0.44	0.10	0.53	0.1004	−0.014	−0.98	0.32
Pyridine, 2-vinyl-5-ethyl-	4	1.09	0.43	0.04	0.74	0.03743	0.006	−0.20	0.12
Pyridine, 4-vinyl-	4	0.69	0.375	0.10	0.52	−0.1612	0.06	−0.94	0.30
Silane, 3-methacryloxypropyl, trimethoxy-	2	0.868	3.79	0.094	0.425	−0.0615	0.408	−1.06	0.37
Styrene	B	1.00	0.38	0.04	1.00	0	0	0.00	0.00
Styrene, *p*-acetoxy-	2	1.26	0.40	0.07	0.86	0.1004	−0.030	−0.44	0.07
Styrene, 3-tri-*n*-butylstannyl-	2	0.03	0.001	4.88	18.5	−1.5229	−0.407	−1.17	−1.27
Styrene, 2,5-dichloro-	4	0.40	0.08	0.24	0.236	−0.3979	−0.107	−1.98	0.67
Styrene, *p*-chloromethyl-	2	1.12	0.56	0.067	0.62	0.0492	0.046	−0.62	0.21
Styrene, *p*-1-(2-hydroxypropyl)-	3	0.91	0.53	0.10	0.97	−0.041	0.071	−0.60	0.16
Styrene, α-methoxy	5	0.07	0.05	0.06	2.51	−1.1549	0.105	0.41	−0.49
Styrene, α-methyl	3	0.60	0.143	0.047	1.1	−0.2219	−0.077	−0.04	−0.03
Styrene, *p*-methyl	4	0.993	0.33	0.05	0.891	−0.0031	−0.021	−0.20	0.08
Succinimide, *N*-vinyl	4	0.033	0.516	0.116	7.71	−1.4815	0.623	0.75	−1.02
Tetrazole, 1-vinyl-	2	0.184	0.314	0.54	3.85	−0.7352	0.251	−0.78	−0.59
Tetrazole, 5-phenyl-2-(4′-vinyl)-phenyl-	2	2.2	1.4	0.32	0.48	0.3424	0.088	−1.75	0.32
Toluenesulfonamide, N,N-methyl-vinyl-	*3*	*0.05*	*0.04*	*0.42*	*5.6*	*−1.301*	*0.126*	*−0.40*	*−0.66*
Triallyl citrate	*2*	*0.076*	*0.05*	*1.76*	*20*	*−1.12*	*0.092*	*−0.49*	*−1.30*
Vinyl acetate	5	0.02	0.05	4.78	48	−1.699	0.315	−0.44	−1.56
Vinyl benzoate	3	0.06	0.019	5.03	31.56	−1.222	−0.031	−0.86	−1.45
Vinylbenzoic acid, *p*-	3	1.03	1.63	0.06	0.282	0.0124	0.238	−1.03	0.50
Vinyl benzyl methyl carbinol	3	0.94	0.54	0.11	0.98	−0.027	0.069	−0.66	0.18
Vinyl bromide	3	0.054	0.06	2.52	16.6	−1.268	0.179	−0.82	−1.27
Vinyl isobutyl ether	*3*	*0.32*	*0.40*	*0.49*	*24.5*	*−0.495*	*0.200*	*0.41*	*−1.41*
Vinyl butyl sulfide	2	0.05	0.041	0.086	2.69	−1.301	0.128	0.14	−0.43
Vinyl isobutyl sulfide	*4*	*0.05*	*0.027*	*0.074*	*2.38*	*−1.301*	*0.059*	*0.18*	*−0.36*
Vinyl tert-butyl sulfide	*2*	*0.158*	*0.05*	*0.09*	*4.36*	*−0.8013*	*−0.029*	*0.41*	*−0.64*
Vinyl chloride	4	0.055	0.045	3.29	18.7	−1.26	0.128	−0.90	−1.16
Vinyl chloroacetate	2	0.03	0.09	0.34	45	−1.523	0.345	1.04	−1.65
Vinyl dichloroacetate	2	0.28	0.04	3.85	20	−0.553	−0.162	−0.98	−1.30

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TABLE 1. *cont'd*

Monomer	Category	r_{1S}	r_{1A}	r_{A1}	r_{S1}	$\log(r_{1S})$	π	u	v
Vinyl 2-chloroethyl ether	4	0.07	0.05	1.09	160	−1.155	0.105	1.18	−2.06
Vinyl chloromethyl ketone	3	0.507	0.88	0.064	0.127	−0.295	0.255	−1.58	0.97
Vinyl cymantrene	*2*	*0.096*	*0.05*	*0.446*	*2.32*	*−1.018*	*0.053*	*−0.97*	*−0.37*
Vinyl dodecyl ether	2			0.82	41.5			0.44	−1.62
Vinylene carbonate	3	0.05	0.08	14.9	70	0.29	0.252	−1.03	−1.95
Vinyl ethyl ether	4	0.05	0.06	0.69	100	−1.301	0.192	1.11	−2.00
Vinyl ethyl oxalate	3			1.34	5.62			−1.11	−0.71
Vinyl ethyl sulfide	3	0.182	0.055	0.075	5.38	−0.740	−0.038	0.66	−0.77
Vinyl ethyl sulfoxide	*3*	*0.10*	*0.05*	*1.63*	*7.82*	*−1.000*	*0.046*	*−1.02*	*−0.94*
Vinylferrocene	3	0.17	0.158	0.173	3.57	−0.7696	0.149	−0.12	−0.50
Vinyl hendecanoate	*3*	*0.05*	*0.09*	*1.88*	*24.89*	*−1.301*	*0.260*	*−0.34*	*−1.33*
Vinylidene chloride	5	0.1075	0.32	0.64	1.79	−0.9686	0.346	−1.34	−0.24
Vinyl isocyanate	3	0.08	0.16	0.19	8.13	−1.097	0.277	0.29	−0.90
Vinyl isothiocyanate	3	0.435	1.40	0.36	0.725	−0.3615	0.357	−1.56	0.18
Vinyl methyl ketone	2	0.32	1.57	0.61	0.29	−0.495	0.427	−2.46	0.54
Vinyl phenyl ether	3	0.01	0.23	2.50	1.70	−2.000	0.685	−2.23	−0.30
Vinyl phenyl sulfide	3	0.14	0.03	0.11	3.8	−0.854	−0.090	0.20	−0.58
Vinyl stearate	*3*	*0.05*	*0.078*	*4.64*	*15.96*	*−1.301*	*0.236*	*−1.19*	*−1.15*
Vinyltriethoxysilane	*2*	*0.05*	*0.41*	*6.59*	*20.86*	*−1.301*	*0.513*	*−1.28*	*−1.32*
Vinyl-tris(trimethoxysiloxy) silane	3	0.005	0.075	3.90	25	−2.301	0.616	−0.84	−1.46
Vinyltrimethylsilane	3	0.05	0.10	4.08	10.32	−1.301	0.277	−1.41	−1.15

TABLE 2. TRANSFER AGENT

Transfer agent	Category	C_S	C_A	u	v
Acetaldehyde	3	0.00085	0.0047	−0.93	−3.12
Acetamide, *N,N*-dimethyl-	2	0.00046	0.0005	−1.94	−3.34
Acetic acid	3	0.000222	0.000081	−2.61	−3.80
Acetone	4	0.000032	0.000113	−1.28	−4.59
Acetonitrile	2	0.000044	0.0002	−1.06	−4.36
Allyl chloride	2	0.00151	0.000595	−2.57	−2.82
Aluminium, hydrodiisobutyl	3	27.5	0.394	−4.60	1.21
Aluminium, triethyl	4	12.5	0.059	−5.46	0.79
Aluminium, triisobutyl	2	28.5	28	−2.01	1.45
Aniline	4	0.0020	0.0050	−1.43	−2.70
Aniline, *N,N*-dimethyl-	4	0.0053	0.0547	−0.55	−2.20
Anthracene	3	2	1.8	−2.29	−0.01
Benzene	4	0.000003	0.000246	0.80	−5.65
Benzene, bromo-	3	0.000178	0.000136	−2.07	−4.73
Benzene, *tert*-butyl-	3	0.000005	0.000193	0.26	−5.20
Benzene, chloro-	4	0.000041	0.000079	−1.49	−4.51
Benzene, ethyl-	4	0.00007	0.003573	0.49	−4.28
p-Benzoquinone	3	227	1.3	−5.19	2.29
Borane, tributyl	3	0.00348	0.647	1.29	−2.95
Butanone	3	0.0005	0.000643	−1.82	−3.55
Butyl alcohol	3	0.00016	0.001542	−0.57	−4.05
sec-Butyl alcohol	3	0.000056	0.009755	1.23	−4.62
tert-Butyl alcohol	3	0.00003	0.000044	−1.75	−4.62
Butyl mercaptan	4	21.99	0.409	−4.42	1.23
Butyric acid, 4-hydroxy-γ-lactone	2	0.00004	0.00007	−1.66	−4.39
Cadmium, dibutyl	2	0.117	5.5	0.39	−0.93
Carbonic acid, cyclic ethylene ester	2	0.000024	0.000013	−2.36	−4.63
Carbon tetrabromide,		See methane, tetrabromo-			
Carbon tetrachloride,		See methane, tetrachloro-			
Chloroform	3	0.00005	0.000577	−0.49	−4.17
Copper(II) chloride	5	10300	67.19	−4.61	4.33
Cumene	3	0.00009	0.004141	0.38	−4.07
Cyclohexane	3	0.000005	0.000206	0.25	−4.63

TABLE 2. *cont'd*

Transfer agent	Category	C_S	C_A	u	v
Dimethyl sulfoxide	3	0.00005	0.000029	−2.32	−4.44
Diphenylamine-T	3	0.00009	0.07	2.18	−4.57
Ethane, 1,2-dichloro-	3	0.0002	0.000147	−2.17	−3.82
Ethane, 1,1,2,2-tetrachloro-	3	0.00108	0.000311	−2.73	−3.39
Ether, dodecyl vinyl	2	0.000372	0.000495	−1.82	−3.43
Ethyl acetate	3	0.00155	0.000254	−3.07	−3.28
Formamide, *N,N*-dimethyl-	2	0.0001	0.000278	−1.36	−4.00
α-D-Glucoside, methyl, 6-deoxy-6-mercapto-	2	5.5	0.13	−4.31	0.74
α-D-Glucoside, methyl-, di-*O*-benzyl-	2	0.0062	0.009	−1.76	−2.21
α-D-Glucoside, methyl-, 2,3,4,6-tetra-*O*-acetyl-	2	0.0002	0.003	−0.32	−3.70
α-D-Glucoside, methyl-, 6-(*p*-toluene sulfonyl)-	2	0.0002	0.001	−1.00	−3.70
α-D-Glucoside, methyl-, 6-*O*-triphenylmethyl-	2	0.0021	0.008	−1.17	−2.68
β-D-Glucoside, methyl-, 6-deoxy-6-dipropylamino-	2	0.0022	0.11	0.43	−2.66
Glycerol	2	0.002864	0.00235	−2.12	−2.54
Heptanol, dodecafluoro-	3	0.001333	0.00019	−3.20	−2.85
Indium, triethyl	3	1.76	0.222	−3.25	−0.08
Iron(III) chloride	3	536	3.33	−5.44	2.43
Isobutyl alcohol	3	0.00005	0.002406	0.41	−4.54
Isobutyronitrile	2	0.00027	0.00029	−1.95	−3.57
Lead, tetraethyl	2	0.000124	0.0243	1.28	−3.91
Mercury, diethyl	3	0.000034	0.00722	1.35	−4.60
Methane, dichloro-	2	0.000015	0.000306	−0.13	−4.82
Methane, tetrabromo-	4	2.2	0.085	−4.04	0.37
Methane, tetrachloro-	3	0.01	0.000099	−4.85	−2.09
Methane, nitro-	3	0.001	0.0006	−2.30	−3.09
Methanol	3	0.000074	0.00005	−2.23	−4.18
Octadiene, 2,6-dimethyl-	3	0.0002	0.045	1.37	−3.79
Oxime, acrolein-	3	1.08	62.6	0.53	−0.02
Oxime, crotonaldehyde-	3	0.15	2.05	−0.35	−1.06
Oxime, ethyl isopropenyl ketone-	3	0.43	1.03	−1.45	−0.37
Oxime, methacrolein-	3	1.3	9.41	−0.77	0.13
Oxime, methylacrolein-	3	0.04	5.35	1.03	−1.25
Oxime, methyl isopropenyl ketone-	3	0.11	1.71	−0.30	−0.90
Oxime, methyl vinyl ketone-	3	0.27	1.20	−1.06	−0.67
Pentanol, octafluoro-	3	0.001136	0.00019	−3.10	−2.93
Silane, tetraethyl	4	0.000812	0.0021	−1.30	−3.02
Stibine, tributyl	3	0.0058	11.1	2.78	−3.27
Tin, tetrabutyl	3	0.000371	0.00808	−0.06	−3.69
Toluene	5	0.000012	0.00032	0.26	−4.84
Triethylamine	4	0.00071	0.304	1.85	−3.04
Tripropylamine	4	0.00242	0.428	1.32	−2.89
Zinc, diethyl	2	0.366	1.6	−1.08	−0.44

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Copolymerization Parameters of Metallocene-Catalyzed Copolymerizations

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A. INTRODUCTION

In contrast to radical and ionic polymerization reactions in which the incoming monomer always adds to the *end* of the growing chain

$$\text{R–M}_n\text{–M}_{n+1}\text{–M}_{n+2}\text{–M}_{n+3}\text{–M}_{n+4}^{\bullet}$$

the most distinct feature of Ziegler–Natta-catalysis is the attachment of a monomer molecule to a highly structured catalyst complex (which may be homogeneously solvated or heterogeneously fixed to a surface) and its insertion *between* the catalyst complex and the growing chain:

$$\text{R–M}_{n+4}\text{–M}_{n+3}\text{–M}_{n+2}\text{–M}_{n+1}\text{–M}_n$$

Since the structural features of the catalyst – in particular the steric bulk of ligands, the bite angle of metallocenes, the configuration and conformation on the one hand, and the increasing space-filling demand of the growing chain and of the various monomers on the other – do influence the addition of the monomers, elucidation of the copolymerization behavior, and, in particular, determination of copolymerization parameters requires correct modeling, i.e. adequate Markov-statistics.

B. A BRIEF THEORETICAL OUTLINE OF COPOLYMERIZATION REACTIONS

Various mathematical models have been applied to copolymerization reactions induced by Ziegler–catalysts. Wall (1) assumed the velocity of the monomer addition M_1 and M_2 to be independent of the previously integrated monomeric unit (zero-order Markov model):

$$\text{R–Kat} + \text{M}_1 \xrightarrow{k_1} \text{R–M}_1\text{–Kat}$$

$$\text{R–Kat} + \text{M}_2 \xrightarrow{k_2} \text{R–M}_2\text{–Kat}$$

$$\text{R} = \text{Polymer chain}$$

This scheme gives rise to the following equation for a copolymerization reaction:

$$\frac{d[M_1]}{d[M_2]} = r\frac{[M_1]}{[M_2]} \qquad r = \frac{k_1}{k_2}$$

Mayo and Lewis (2) extended this model by including the influence of the last built-in monomer into the chain during the subsequent step (first-order Markov model):

$$\text{R–M}_1\text{–Kat} + \text{M}_1 \xrightarrow{k_{11}} \text{R–M}_1\text{–M}_1\text{–Kat}$$

$$\text{R–M}_1\text{–Kat} + \text{M}_2 \xrightarrow{k_{12}} \text{R–M}_1\text{–M}_2\text{–Kat}$$

$$\text{R–M}_2\text{–Kat} + \text{M}_1 \xrightarrow{k_{21}} \text{R–M}_2\text{–M}_1\text{–Kat}$$

$$\text{R–M}_2\text{–Kat} + \text{M}_2 \xrightarrow{k_{22}} \text{R–M}_2\text{–M}_2\text{–Kat}$$

This results in the so-called Mayo–Lewis equation,

$$\frac{d[M_2]}{d[M_1]} = \frac{[M_2]\, r_2([M_2]/[M_1]) + 1}{[M_1]\,([M_2]/[M_1]) + r_1}$$

with $r_1 = k_{11}/k_{12}$ and $r_2 = k_{22}/k_{21}$. Taking the effect of

the last *two* built-in monomers into account, Merz, *et al.* (3) developed a second-order Markov model. This 'penultimate model' necessarily results in a more complex kinetic scheme:

$$\text{R-M}_1\text{-M}_1\text{-Kat} + \text{M}_1 \xrightarrow{k_{111}} \text{R-M}_1\text{-M}_1\text{-M}_1\text{-Kat}$$
$$\text{R-M}_1\text{-M}_1\text{-Kat} + \text{M}_2 \xrightarrow{k_{112}} \text{R-M}_1\text{-M}_1\text{-M}_2\text{-Kat}$$
$$\text{R-M}_2\text{-M}_1\text{-Kat} + \text{M}_1 \xrightarrow{k_{211}} \text{R-M}_2\text{-M}_1\text{-M}_1\text{-Kat}$$
$$\text{R-M}_2\text{-M}_1\text{-Kat} + \text{M}_2 \xrightarrow{k_{212}} \text{R-M}_2\text{-M}_1\text{-M}_2\text{-Kat}$$
$$\text{R-M}_1\text{-M}_2\text{-Kat} + \text{M}_1 \xrightarrow{k_{121}} \text{R-M}_1\text{-M}_2\text{-M}_1\text{-Kat}$$
$$\text{R-M}_1\text{-M}_2\text{-Kat} + \text{M}_2 \xrightarrow{k_{122}} \text{R-M}_1\text{-M}_2\text{-M}_2\text{-Kat}$$
$$\text{R-M}_2\text{-M}_2\text{-Kat} + \text{M}_1 \xrightarrow{k_{221}} \text{R-M}_2\text{-M}_2\text{-M}_1\text{-Kat}$$
$$\text{R-M}_2\text{-M}_2\text{-Kat} + \text{M}_2 \xrightarrow{k_{222}} \text{R-M}_2\text{-M}_2\text{-M}_2\text{-Kat}$$

With $r_{11} = k_{111}/k_{112}$, $r_{21} = k_{211}/k_{212}$, $r_{22} = k_{222}/k_{221}$ and $r_{12} = k_{122}/k_{121}$, the following copolymerization equation is obtained:

$$\frac{d[\text{M}_1]}{d[M_2]} = \frac{1 + r_{21}x(1 + r_{11}x)/(1 + r_{21}x)}{1 + (r_{12}/x)(1 + r_{22}/x)/(1 + r_{12}/x)}$$

with $x = [\text{M}_1]/[\text{M}_2]$.

Expanding this model even further to the influence of the last *three* monomeric units, Ham (4) proposed a third-order Markov model. However, due to the many parameters involved, it has been of little practical use.

Thus, most authors restrict themselves to first- or second-order Markov models when dealing with Ziegler–Natta-catalysis for copolymerization, and this is elaborated below.

1. First-Order Markov Model

The Mayo–Lewis equation describes the composition of a copolymer as a function of the composition of the monomer mixture and their respective copolymerization parameters. These parameters not only determine the composition of the resulting copolymer, but also its microstructure, e.g. the distribution of the sequence length.

A knowledge of the ratio of the starting monomers and their copolymerization parameters enables the sequence length distribution to be calculated. The reactivity probabilities P_{ij} are defined (5,6) that give the probability of the monomer j adding to the polymer chain with the terminating monomer i:

$$P_{11} = \frac{k_{11}[\text{R-M}_1\text{-Kat}][\text{M}_1]}{k_{11}[\text{R-M}_1\text{-Kat}][\text{M}_1] + k_{12}[\text{R-M}_1\text{-Kat}][M_2]} = \frac{r_1}{r_1 + [\text{M}_2]/[\text{M}_1]}$$

$$P_{12} = \frac{k_{12}[\text{R-M}_1\text{-Kat}][\text{M}_2]}{k_{11}[\text{R-M}_1\text{-Kat}][\text{M}_1] + k_{12}[\text{R-M}_1\text{-Kat}][M_2]} = \frac{1}{r_1[\text{M}_1]/[\text{M}_2] + 1}$$

$$P_{21} = \frac{k_{21}[\text{R-M}_2\text{-Kat}][\text{M}_1]}{k_{21}[\text{R-M}_2\text{-Kat}][\text{M}_1] + k_{22}[\text{R-M}_2\text{-Kat}][M_2]} = \frac{1}{1 + r_2[\text{M}_2]/[\text{M}_1]}$$

$$P_{22} = \frac{k_{22}[\text{R-M}_2\text{-Kat}][\text{M}_2]}{k_{21}[\text{R-M}_2\text{-Kat}][\text{M}_1] + k_{22}[\text{R-M}_2\text{-Kat}][M_2]} = \frac{r_2}{[\text{M}_1]/[\text{M}_2] + r_2}$$

with $P_{11} + P_{12} = 1$ and $P_{21} + P_{22} = 1$

The proportion of the M_1 and M_2 units (${}^1P_1$ or ${}^1P_2$) in the copolymer is also determined by reactivity probabilities:

$${}^1P_1 = {}^1P_1P_{11} + {}^1P_2P_{21}$$
$${}^1P_2 = {}^1P_1P_{12} + {}^1P_2P_{22}$$

giving ${}^1P_1 = P_{21}/(P_{12} + P_{21})$ and ${}^1P_2 = P_{12}/(P_{12} + P_{21})$.

All the potential sequence distributions can thus be calculated. Consider, for example, the triad distributions:

$$\begin{aligned}
\text{M}_1\text{M}_1\text{M}_1 &= {}^1P_1P_{11}P_{11} \\
&= [P_{21}(1 - P_{12})^2]/[P_{12} + P_{21}] \\
\text{M}_1\text{M}_1\text{M}_2 + \text{M}_2\text{M}_1\text{M}_1 &= 2\,{}^1P_1P_{11}P_{12} \\
&= 2[P_{21}(1 - P_{12})P_{12}]/[P_{12} + P_{21}] \\
\text{M}_2\text{M}_1\text{M}_2 &= {}^1P_2P_{21}P_{12} \\
&= [P_{12}^2P_{21}]/[P_{12} + P_{21}] \\
\text{M}_2\text{M}_2\text{M}_2 &= {}^1P_2P_{22}P_{22} \\
&= [P_{12}(1 - P_{21})^2]/[P_{12} + P_{21}] \\
\text{M}_2\text{M}_2\text{M}_1 + \text{M}_1\text{M}_2\text{M}_2 &= 2\,{}^1P_1P_{12}P_{22} \\
&= 2[P_{21}P_{12}(1 - P_{21})]/[P_{12} + P_{21}] \\
\text{M}_1\text{M}_2\text{M}_1 &= {}^1P_1P_{12}P_{21} \\
&= [P_{21}^2P_{12}]/[P_{12} + P_{21}]
\end{aligned}$$

The triad distribution allows the calculation of the true copolymerization parameters. For a given polymer, the triad distribution is deduced from experimental ^{13}C-NMR spectra (7) (see below).

2. Second-Order Markov Model

The kinetic scheme for this model gives rise to eight reaction probabilities P_{ijk} that result from the probability of the monomer k adding to the polymer chain with the terminating monomers ij. The reactivity probability P_{121} is

given for instance as

$$P_{121} = \frac{k_{121}[\text{R-M}_1\text{-M}_2\text{-Kat}][\text{M}_1]}{k_{121}[\text{R-M}_1\text{-M}_2\text{-Kat}][\text{M}_1] + k_{122}[\text{R-M}_1\text{-M}_2\text{-Kat}][\text{M}_2]}$$
$$= \frac{1}{1 + r_{12}([\text{M}_2]/[\text{M}_1])}$$

with $P_{111} + P_{112} = 1$, $P_{222} + P_{221} = 1$, $P_{122} + P_{121} = 1$, $P_{211} + P_{212} = 1$.

The triad distribution is calculated in a manner analogous to the first-order Markov model:

$$\begin{aligned}
\text{M}_1\text{M}_1\text{M}_1 &= {}^1P_{11}P_{111} \\
\text{M}_1\text{M}_1\text{M}_2 + \text{M}_2\text{M}_1\text{M}_1 &= 2\,{}^1P_{11}P_{112} \\
\text{M}_2\text{M}_1\text{M}_2 &= {}^1P_{21}P_{212} \\
\text{M}_2\text{M}_2\text{M}_2 &= {}^1P_{22}P_{222} \\
\text{M}_2\text{M}_2\text{M}_1 + \text{M}_1\text{M}_2\text{M}_2 &= 2\,{}^1P_{22}P_{221} \\
\text{M}_1\text{M}_2\text{M}_1 &= {}^1P_{12}P_{121}
\end{aligned}$$

${}^1P_{ij}$ is the frequency of the diad ij, and is calculated as follows:

$$\begin{aligned}
{}^1P_{11} &= {}^1P_{11}P_{111} + {}^1P_{21}P_{211} \\
{}^1P_{22} &= {}^1P_{22}P_{222} + {}^1P_{12}P_{122} \\
{}^1P_{12} &= {}^1P_{11}P_{112} + {}^1P_{21}P_{212} \\
{}^1P_{21} &= {}^1P_{22}P_{221} + {}^1P_{12}P_{121}
\end{aligned}$$

It results in

$${}^1P_{21} = \frac{(1 - P_{111})(1 - P_{222})}{2(1 - P_{111})(1 - P_{222}) + P_{211}(1 - P_{222}) + P_{122}(1 - P_{111})}$$

$${}^1P_{11} = \frac{(1 - P_{222})P_{211}}{2(1 - P_{111})(1 - P_{222}) + P_{211}(1 - P_{222}) + P_{122}(1 - P_{111})}$$

$${}^1P_{22} = \frac{(1 - P_{111})P_{122}}{2(1 - P_{111})(1 - P_{222}) + P_{211}(1 - P_{222}) + P_{122}(1 - P_{111})}$$

The diad frequency ${}^1P_{ij}$ is ${}^1P_{12} = {}^1P_{21}$ and ${}^1P_{11} + 2\,{}^1P_{12} + {}^1P_{22} = 1$

C. CALCULATION OF THE COPOLYMERIZATION PARAMETERS

Once the copolymerization parameters of a catalyst system with a given ratio of monomers are known, the composition of the copolymer and all its sequence distributions result, e.g., the complete microstructure of the copolymer is revealed. These parameters characterize any catalyst system and enable different systems to be compared. The major practical problem is the choice of the adequate statistical model.

1. First-Order Markov Model

1.1. Copolymerization Parameters Deduced from the Mayo–Lewis Equation The Mayo–Lewis equation calculates the composition of the copolymer formed as a function of the ratio of the monomer concentration at a given time. At arbitrary intervals these values are generally inaccessible; thus a sufficiently small interval (a small percent of the total conversion) is taken and the relative change of the monomer concentration $\text{d}[\text{M}_2]/\text{d}[\text{M}_1]$ is assumed to be the composition of the copolymer $([\text{m}_1], [\text{m}_2])$ itself according to

$$\lim_{\text{d}U \to 0}(\text{d}[\text{M}_2]/\text{d}[\text{M}_1] = [m_2]/[m_1]$$

It is advisable to keep the monomer ratio $[\text{M}_2]/[\text{M}_1]$ constant during polymerization by constantly feeding both monomers, or at least the most reactive monomer. To determine the copolymerization parameters the experiments are run with varying ratios of the starting monomers, and their compositions are subsequently measured. The data obtained can be analyzed by linear or nonlinear methods.

Linear Methods: Mayo and Lewis (2), Fineman and Ross (8), Kelen and Tüdös (9)
Nonlinear Methods: Behnken (10), Tidwell and Mortimer (11), Braun et al. (12)

Independent of the analytical methods the copolymerization parameters derived from the Mayo–Lewis equation have some major drawbacks, but do enable a part of the information contained in each copolymerization experiment to be extracted, namely the integral composition of the copolymer. A series of experiments is necessary to obtain the copolymerization parameters. Furthermore, using this approach it cannot be decided whether the application of the first-order Markov model is valid or not. One may even obtain a nearly perfect Fineman–Ross plot, where other methods show that a first-order Markov model cannot be applied.

1.2. Determination of Copolymerization Parameters from the Sequence Distribution (Triad Distribution) As mentioned above, a knowledge of the copolymerization parameters enables all the sequence distributions to be calculated. Or inversely, experimentally determined sequence distributions yield the copolymerization parameters. In the simplest case, intensities of appropriate single sequences can be compared. The results are even more reliable, if the determination of the copolymerization parameters is based on the maximal accessible information on the microstructure of the copolymer. To derive the r-parameters from the overall triad distribution is the safest way (13). This may be done by calculating a triad distribution based on a first-order Markov model and optimizing by variation of the reaction probabilities P_{ij} until the best fit between calculated and experimental data

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is reached. Based on the optimized reaction probabilities the copolymerization parameters r_1 and r_2 are calculated according to the following equations:

$$r_1 = ([1/P_{12}] - 1)([M_2]/[M_1])$$
$$r_2 = ([1/P_{21}] - 1)([M_1]/[M_2])$$

This, procedure for determining the copolymerization parameters is superior to the Mayo–Lewis approach. While the latter requires several experiments, using the above approach, all the information can be obtained from one experiment.

To determine the copolymerization parameters from the triad distribution, six variables are available, five of which are independent. The system is over-determined and thus allows critical evaluation.

2. Second-Order Markov Model

The second-order Markov model gives four copolymerization parameters, which are gained from the sequence distribution (full triad distribution) with a high degree of reliability. The calculated triad distribution from the second-order Markov model is optimized by varying the reaction probabilities P_{ijk} until the best fit is reached. The four copolymerization parameters are calculated from reaction probabilities P_{ijk} as follows (13–15):

$$r_{11} = ([1/P_{112}] - 1)([M_2]/[M_1])$$
$$r_{21} = ([1/P_{212}] - 1)([M_2]/[M_1])$$
$$r_{22} = ([1/P_{221}] - 1)([M_1]/[M_2])$$
$$r_{12} = ([1/P_{121}] - 1)([M_1]/[M_2])$$

The second-order Markov model results in four copolymerization parameters from six variables based on triad distribution. A higher degree of determination clearly is desirable to justify this copolymerization model. However, the complete distribution is not obtained from ^{13}C-NMR spectra of ethene/α-olefin copolymers. The full triad distribution does not exhaust the full information of the spectra, since some peaks exhibit tetrad or even pentad sensitivity. Cheng (16,17) suggested that all recorded peaks of a ^{13}C-NMR spectrum should be included to calculate the copolymerization parameters. Arbitrarily chosen reaction probabilities give rise to a polymer chain built at random, and its ^{13}C-NMR spectrum is calculated. This spectrum is superimposed on the experimental one and optimized by varying the starting values, until the minimal difference is reached. Since the ^{13}C-NMR spectra of ethene/α-olefin copolymers display many overlapping peaks, the quality of the spectra simulation very much influences the success of this method.

Randall (7) found a way to avoid this problem by creating a "collective assignment method". Here the complete triad distribution results from combining the experimental spectral information with the relation between different n-ades. In the first step the ^{13}C-NMR spectrum of an ethene/α-olefin copolymer is split into several spectral areas given by signal overlap. The ^{13}C-NMR spectra of ethene/propene copolymers, for example, are divided into eight appropriate spectral areas A to H, as shown in Fig. 1. The integrals T_x of different spectral areas are expressed by the number of contributing triads ending up in the complete triad distribution by appropriately combining several T_x-data. Randall exemplified this method in detail for ethene/propene-, ethene/1-butene-, and ethene/1-hexene-copolymerizations (7).

The resulting triad distribution allows the composition of the copolymer

$$[m_1] = M_1M_1M_1 + M_2M_1M_2 + M_2M_1M_1 + M_1M_1M_2$$
$$[m_2] = M_2M_2M_2 + M_1M_2M_1 + M_2M_2M_1 + M_1M_2M_2$$

and the average sequence length:

$$n(M_1) = [m_1]/[M_2M_1M_2 + 0.5\,(M_2M_1M_1 + M_1M_1M_2)]$$
$$n(M_2) = [m_2]/[M_1M_2M_1 + 0.5\,(M_2M_2M_2 + M_2M_2M_1)]$$

to be calculated.

3. Example

To demonstrate which model describes the experimental results best, the following table from a recent publication by Fink is reproduced (15). It is based on ethene/1-octene copolymerization experiments using a homogeneous metallocene/MAO catalyst.

Figure 1. ^{13}C-NMR spectrum of an ethene/propene copolymer.

COMPARISON BETWEEN THE EXPERIMENTAL MEASURED TRIAD DISTRIBUTION AND THE CALCULATED TRIAD DISTRIBUTION ACCORDING TO THE FIRST- (M1) AND THE SECOND-ORDER (M2) MARKOVIAN-STATISTIC OF THE ETHYLENE (E)/1-OCTADECENE (O) COPOLYMERIZATION[a]

[O]/[E] in solution	Model	EEE	EEO + OEE	OEO	OOO	EOO + OOE	EOE	R^b ($\times 10^6$)
0.28	Exp.	0.976	0.014	0.000	0.000	0.001	0.008	–
	M1	0.980	0.004	0.000	0.011	0.004	0.000	50
	M2	0.976	0.014	0.001	0.000	0.001	0.008	0.22
1.39	Exp.	0.878	0.077	0.004	0.000	0.004	0.038	–
	M1	0.878	0.078	0.002	0.000	0.004	0.038	0
	M2	0.878	0.078	0.003	0.000	0.004	0.039	0.3
1.41	Exp.	0.883	0.074	0.005	0.000	0.005	0.033	–
	M1	0.883	0.074	0.002	0.000	0.006	0.035	0
	M2	0.882	0.072	0.003	0.000	0.006	0.036	6.27
2.84	Exp.	0.795	0.118	0.011	0.006	0.008	0.063	–
	M1	0.798	0.124	0.005	0.000	0.010	0.062	20
	M2	0.795	0.117	0.010	0.006	0.008	0.064	0.64
7.14	Exp.	0.878	0.143	0.020	0.011	0.011	0.084	–
	M1	0.738	0.158	0.008	0.001	0.014	0.080	90
	M2	0.731	0.143	0.019	0.011	0.011	0.085	0.27
14.18	Exp.	0.718	0.112	0.046	0.010	0.030	0.084	–
	M1	0.733	0.153	0.008	0.005	0.035	0.066	610
	M2	0.718	0.111	0.045	0.010	0.031	0.085	0.60

[a] $T_p = 60\,°C$, Kat: iPr(CpFlu)$ZrCl_2$ and MAO, $[Zr] = 7.56 \times 10^{-6}$ mol/l, Al/Zr = 9800.
[b] R is the sum of the least squares divided by the number of measured values.

If the experimentally determined triad distribution is compared with the calculated values based on a first-order or alternatively on a second-order Markov model (M_1 or M_2 of the table), both models give a reasonable good fit up to a monomer/comonomer ratio in solution of 1.5. Beyond a ratio of 3, however, the second-order Markov model proves to be the better approximation as indicated by the sum of the error squares divided by the number of experimental values (R of the table).

Second-order Markov statistics is only applicable when there is a sufficiently high comonomer concentration in solution, and enables the formation of α-olefin/α-olefin dual-blocks. Now the insertion of another α-olefin unit into this dual-block sequence is preferred to that into in a single-block. The complete triad distribution is gained by this procedure and it has to be performed over a wide range of the monomer/comonomer ratio in solution.

D. TABLE OF COPOLYMERIZATION PARAMETERS

Monomer/ comonomer	r_1	r_2	r_{11}	r_{21}	r_{22}	r_{12}	Cat./ cocat.	Remarks	T_{Poly} (°C)	Model tested	Analytical method*	Refs.
Ethene/propene			3.4	2.2	0.270	0.153	19		25	M1; M2	C.T.A.	13
			4.1	3.9	0.153	0.065	28		25	M1; M2	C.T.A.	13
	6.26	0.11					24		25	M1	F.-R.	18
	6.61	0.06					24		50	M1	F.-R.	18
	18.6	0.032					2		36	M1	F.-R.	19
	2.57	0.39					24		50	–	See Ref. 20	20
	2.90	0.28					25		50	–	See Ref. 20	20
	15.7	0.009					1		50	–	See Ref. 20	20
	16.1	0.025					7		50	–	See Ref. 20	20
	20.6	0.074					35		50	–	See Ref. 20	20
	12.43	0.08					29	A[a]	120–220	M1	F.-R.	21
	5.1	0.14					24		0	M1	F.-R.	22
	1.3	0.2					19		25	M1	F.-R.	22
	5.60	0.13					24	B[b]	40	M1	See Ref. 24	23
	4.23	0.12					28	B	40	M1	See Ref. 24	23
	25.42	–					13	B	40	M1	See Ref. 24	23
	13.75	0.18					12	B	40	M1	See Ref. 24	23
	16.53	–					7	B	40	M1	See Ref. 24	23
	19.61	–					11	B	40	M1	See Ref. 24	23
	24	0.0085					4		50	M1	F.-R.	25

*C.T.A. – Complete Triad Analysis (7); D.A. – Diad Analysis (28); F.-R. – Fineman–Ross (8); K.-T. – Kelen–Tüdös (9); M.-L. – Mayo–Lewis (2).

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Monomer/ comonomer	r_1	r_2	r_{11}	r_{21}	r_{22}	r_{12}	Cat./ cocat.	Remarks	T_{Poly} (°C)	Model tested	Analytical method	Refs.
	19.5	0.015					3		50	M1	F.-R.	25
	50	0.007					8		50	M1	F.-R.	25
	48	0.015					6		50	M1	F.-R.	25
	24	0.029					27		50	M1	F.-R.	25
	250	0.002					10		50	M1	F.-R.	25
	60	–					9		50	M1	F.-R.	25
	3.9	0.12					37	B	40	M1	see ref. 24	26
	4.4	0.12					37	B	60	M1	see ref. 24	26
	5.5	0.11					24	B	40	M1	see ref. 24	26
Ethene/ 1-butene			3.6	2.9	0.21	0.041	19		25	M1; M2	C.T.A.	13
			7.9	6.8	0.085	0.017	28		25	M1; M2	C.T.A.	13
	19.4	0.05					24		30	M1	F.-R.	27
	23.6	0.03					24		50	M1	F.-R.	27
	29.2	0.04					24		70	M1	F.-R.	27
	5.4	0.17					37		30	M1	F.-R.	27
	6.6	0.10					37		50	M1	F.-R.	27
	6.8	0.21					37		70	M1	F.-R.	27
Ethene/ 1-hexene			3.2	2.6	0.150	0.065	19		25	M1; M2	C.T.A.	13
			10.3	6.4	0.111	0.022	28		25	M1; M2	C.T.A.	13
	32.67	0.027					26		60	M1	F.-R.	29
	44.75	0					26		60	M1	D.A.	29
	62.31	0.003					6		60	M1	F.-R.	29
	74.60	0					6		60	M1	D.A.	29
	31.00	0.013					24		60	M1	F.-R.	29
	36.00	0					24		60	M1	D.A.	29
	88.00	0.005					12		60	M1	F.-R.	29
	86.70	0					12		60	M1	D.A.	29
	55	0.004					6		20	M1	F.-R.	30
	54	0.005					6		40	M1	F.-R.	30
	52	0.005					6		60	M1	F.-R.	30
	79	0.005					6		70	M1	F.-R.	30
			5.93	4.58	0.130	0.034	19		25	M1; M2	C.T.A.	15
			7.95	6.60	0.109	0.024	19		40	M1; M2	C.T.A.	15
			10.08	8.85	0.098	0.022	19		60	M1; M2	C.T.A.	15
Ethene/ 1-octene	20.2	–					6	B	85	M1	D.A.	31
	2.5	0.55					5	B	85	M1	D.A.	31
	42.28	0.035					26		60	M1	F.-R.	29
	43.35	0					26		60	M1	D.A.	29
	61.56	0.03					6		60	M1	F.-R.	29
	99.43	0					6		60	M1	D.A.	29
	4.71	0.23					32		0	M1	C.T.A.	32
	6.36	0.18					32		20	M1	C.T.A.	32
	8.16	0.14					32		40	M1	C.T.A.	32
	10.6	0.11					32		60	M1	C.T.A.	32
	10.1	0.03					24		40	M1	see ref. 24	26
	7.5	0.07					24		60	M1	see ref. 24	26
	10.1	0.118					32		40	M1	C.T.A.	33
	18.9	0.014					28		40	M1	C.T.A.	33
	19.5	0.013					30		40	M1	C.T.A.	33
	10.7	0.076					31		40	M1	C.T.A.	33
Ethene/ 1-dodecene			7.2	5.0	2.9	0.057	19		28	M1; M2	C.T.A.	34
			12.0	5.7	0.3	0.036	28		28	M1; M2	C.T.A.	34
Ethene/ 1-octadecene			11.2	6.3	1.6	0.044	19		28	M1; M2	C.T.A.	34
			14.7	8.4	0.4	0.035	28		28	M1; M2	C.T.A.	34
			38.45	18.58	0.085	0.041	19		60	M1; M2	C.T.A.	15
Ethene/styrene	23.4	0.015					5		40	M1	F.-R.	35,46
Ethene/2-allyl-norbornane	43.7	0.038					6		35	M1	F.-R.	36
	42.6	0.027					6		35	M1	K.-T.	36

Monomer/ comonomer	r_1	r_2	r_{11}	r_{21}	r_{22}	r_{12}	Cat./ cocat.	Remarks	T_{Poly} (°C)	Model tested	Analytical method	Refs.
Ethene/												
cyclopentene	80	<0.05					24		−10	M1	F.-R.	39
	120	<0.02					24		0	M1	F.-R.	39
	250	<0.02					24		10	M1	F.-R.	39
	300	<0.07					24		20	M1	F.-R.	39
	1.9	<1					25		0	M1	F.-R.	40
	2.2	<1					25		25	M1	F.-R.	40
Ethene/												
norbornene	2.66	n.d.[c]					28		30	M1	F.-R.	37
	3.44	n.d.					34		30	M1	F.-R.	37
	2.93	n.d.					19		30	M1	F.-R.	37
	2.61	n.d.					23		30	M1	F.-R.	37
	1.85	n.d.					23		0	M1	F.-R.	37
	1.5	n.d.					25		−25	M1	F.-R.	38
	1.9	n.d.					25		0	M1	F.-R.	38
	2.2	n.d.					25		25	M1	F.-R.	38
	3.2	n.d.					25		50	M1	F.-R.	38
	20	n.d.					6		25	M1	F.-R.	38
	6.6	n.d.					24		25	M1	F.-R.	38
	2.6	<2					28		30	M1	F.-R.	40
	3.4	0.06					19		30	M1	F.-R.	40
	2.0	0.05					23		0	M1	F.-R.	40
	3.0	0.05					23		30	M1	F.-R.	40
	3.1	0					22		30	M1	F.-R.	40
Ethene/norbornene												
	0.88	0.05					15		70	M1	K.-T.	41
	1.14	0.1					16		70	M1	K.-T.	41
	1.1	0.026					17		70	M1	K.-T.	41
	0.83	0.29					14		70	M1	K.-T.	41
	1.3	0.03					19		70	M1	K.-T.	41
			1.2	3.6	0	0	20	C[d]	70	M2	C.T.A.	41
			2.2	2.7	0	0	21	C	70	M2	C.T.A.	41
			2.2	8.9	0	0	22	C	70	M2	C.T.A.	41
			5.2	18.2	0	0	33	C	70	M2	C.T.A.	41
			2.2	54	0	0	5	C	70	M2	C.T.A.	41
Ethene/5-phenyl-2-norbornene												
	7.8	0.1					28		30	M1	M.-L.	43
	7.0	0.05					19		30	M1	M.-L.	43
Ethene/dimethanooctahydronaphthalene												
	7.8	0.1					23		50	M1	F.-R.	40,42
	7.0	0.05					18		50	M1	F.-R.	40,42
	7.1	0.04					38		50	M1	F.-R.	40,42
Ethene/phenyldimethanooctahydronaphthalene												
	11.5	0.05					28		30	M1	M.-L.	43
	7.1	0.03					19		30	M1	M.-L.	43
Ethene/trimethanododecahydroanthracene												
	15.6	0.06					23		50	M1	F.-R.	40
Propene/1-octene	3.3	0.39					28		40	M1	D.A.	44
	3.6	0.32					30		40	M1	D.A.	44
	2.6	0.37					31		40	M1	D.A.	44
	2.4	0.48					32		40	M1	D.A.	44
Propene/cyclopentene												
	40	0.001					28		60	M1	K.-T.	45

[a] High pressure copolymerization (100–150 MPa).
[b] [Monomer]/[Comonomer] ratio varied. The cited r-values hold only for a selected ratio of [Ethene]/[Propene].
[c] Not determined.
[d] Alternating copolymerization, hence, $r_{12} = r_{22} = 0$.

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E. LIST OF CATALYSTS/COCATALYSTS USED

1	$[Cp]_2TiCl_2$	MAO	
2	$[Cp]_2TiMe_2$	$AlMe_3$	
3	$[Cp]2TiPh_2$	MAO : $AlMe_3$	(1 : 1 mixture)
4	$[Cp]_2Ti=CH_2$	$AlMe_2Cl$	(Tebbe reagent)
5	$Me_2Si[Me_4CpNt\text{-}Bu]TiCl_2$	MAO	
6	$[Cp]_2ZrCl_2$	MAO	
7	$[Cp]_2ZrCl_2$	MAO : $AlMe_3$	(1 : 1 mixture)
8	$([Cp]_2ZrCl_2)O$	MAO : $AlMe_3$	(1 : 1 mixture)
9	$[MeCp]_2ZrCl_2$	MAO : $AlMe_3$	(1 : 1 mixture)
10	$[C_5Me_4]_2ZrCl_2$	MAO : $AlMe_3$	(1 : 1 mixture)
11	$[n\text{-}Bu\text{-}Cp]_2ZrCl_2$	MAO	
12	$[Ind]_2ZrCl_2$	MAO	
13	$[Ind]_2ZrBenzyl_2$	MAO	
14	$MeCH[Cp]_2ZrCl_2$	MAO	
15	$Me_2C[CpInd]ZrCl_2$	MAO	
16	$Me_2C[MeCpInd]ZrCl_2$	MAO	
17	$Me_2C[3\text{-}t\text{-}BuCpInd]ZrCl_2$	MAO	
18	$Ph_2C[CpInd]ZrCl_2$	MAO	
19	$Me_2C[CpFlu]ZrCl_2$	MAO	
20	$Me_2C[3\text{-}MeCpFlu]ZrCl_2$	MAO	
21	$Me_2C[3\text{-}PropCpFlu]ZrCl_2$	MAO	
22	$Me_2C[3\text{-}t\text{-}BuCpFlu]ZrCl_2$	MAO	
23	$Ph_2C[CpFlu]ZrCl_2$	MAO	
24	$C_2H_4[Ind]_2ZrCl_2$	MAO	
25	$C_2H_4[IndH4]_2ZrCl_2$	MAO	
26	$Me_2Si[Cp]_2ZrCl_2$	MAO	
27	$Me_2Si[Cp]_2ZrCl_2$	MAO : $AlMe_3$	(1 : 1 mixture)
28	$Me_2Si[Ind]_2ZrCl_2$	MAO	
29	Modified silylbridged $[IndH4]_2ZrCl_2$	MAO	
30	$Me_2Si[2\text{-}MeInd]_2ZrCl_2$	MAO	
31	$Me_2Si[Benz(e)Ind]_2ZrCl_2$	MAO	
32	$Me_2Si[2\text{-}MeBenz(e)Ind]_2ZrCl_2$	MAO	
33	$Me_2Si[3\text{-}t\text{-}BuCpFlu]ZrCl_2$	MAO	
34	$Ph_2Si[Ind]_2ZrCl_2$	MAO	
35	$[Cp]_2HfCl_2$	MAO	
36	$Me_2C[CpFlu]HfCl_2$	MAO	
37	$C_2H_4[Ind]_2HfCl_2$	MAO	
38	$Ph_2C[CpFlu]HfCl_2$	MAO	

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Rates of Polymerization and Depolymerization, Average Molecular Weights, and Molecular Weight Distributions of Polymers

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A. INTRODUCTION

An attempt is made to present a systematic guide to the literature dealing with rates of polymerization, average molecular weights, and molecular weight distributions of polymers for various types of polymerization. This chapter is based on a review of molecular weight distributions (1) in which many of the equations are given in detail along with graphs showing the interrelationship among various distributions; here, we present only references to the literature. In addition, sections have been added on the effects of degradation and reactor design on the reaction rates and the molecular weight distributions. Literature references beyond (312) are those that have been added since the third edition of Polymer Handbook.

The theoretical description of the molecular weight distribution of a polymer and its rate of polymerization is dependent on the assumed mechanism of polymerization and on the mathematical simplifications used to obtain analytical expressions. As the number of distinct reactions is increased, such as the various transfer reactions, the mathematical expressions can become quite complex and unwieldy. In general, the equations for the rate of polymerization are the most difficult to describe, the distribution equations are somewhat easier, and the average molecular weights the simplest. In condensation polymerization, many of the distribution formulas are derived by considering the statistics or the probability of a given reaction instead of the kinetics of the reactions. Depending on which assumptions are made, quite different average molecular weights are derived, despite the rigor of the derivation. The emphasis in this section is, therefore, on the distribution functions and their averages; the rates of polymerization are given only if they have been explicitly derived.

This chapter is divided into several tables and sections, each treating various types of polymerization. The Stockmayer distribution function for condensation polymers is given in detail because of its general applicability and usefulness. Some general distribution functions are given in Section C. For all the other expressions, the reader must refer to the original literature. Many of the simpler functions are adequately described in textbooks of polymer chemistry. Flory (2), Bamford et al. (3), Odian (4), Billmeyer (5), and Kuechler (6) give extended descriptions of many systems. Bagdasarian (7) gives an extended discussion of methods of determining absolute values of propagation and termination constants, the influence of cage effects on the rate of initiation, and the influence

of retardation, inhibition, and diffusion-controlled termination on the rate of polymerization. A review of the various ways of deriving molecular weight distributions and the moments of a distribution is given by Chappelear and Simon (8).

Section B presents a series of tables describing the main assumption or conditions imposed on the theoretical models and references to the articles where the corresponding equations may be found. Tables 1 and 2 present rate equations and the distribution formulas for addition polymerization by a variety of mechanisms. No distinction is made among free radical, cationic, anionic, or coordination-type polymerization. While Table 1 treats those cases where termination reactions predominate and where steady-state assumptions are usually made, Table 2 treats those cases where termination reactions either do not exist, or may be considered as side reactions, having a minor to major control over the molecular weight distribution. The sequence length distributions for addition-type copolymers are omitted. However, see Kuechler (6) for an extended discussion of copolymerization distributions. Table 3 contains distribution formulas for linear condensation polymers in which the polymer is assumed to be perfectly linear and to contain no rings. Table 4 treats equilibrium polymerization. Table 5 describes nonlinear systems. Table 6 treats those cases where polymers are degraded (or altered) by the application of heat, light, or ionizing radiation. In the latter case, the polymer may undergo scission, crosslinking, or both reactions simultaneously. Several references on crosslinking are included here but not in Table 5. Finally, Table 7 is concerned with the influence of reactor design on molecular weight distribution; the kinetic equations for addition polymerization (with and without termination) and condensation polymerization are considered.

Section C lists a number of distribution functions and their properties. Among them is the generalized exponential function which is a good approximation to many real systems (Eq. C29).

Section D presents the Stockmayer distribution function for condensation polymerization wherein molecules of various types of kind A react with molecules of various types of kind B.

B. REFERENCE TABLES FOR THE CALCULATION OF RATES OF POLYMERIZATION, AVERAGE MOLECULAR WEIGHTS, AND MOLECULAR WEIGHT DISTRIBUTIONS OF POLYMERS FOR VARIOUS TYPES OF POLYMERIZATION

The following symbols are used in this chapter. R_p: rate of polymerization; R_d: rate of depolymerization; R_1^*: active, growing polymer containing one monomer unit; R_n^* and Q_n^*: active, growing polymer chains containing n monomer units; P_r: molecular weight distribution; k_i: rate constant for initiation; k_p: rate constant for propagation; I: initiator concentration; M: monomer concentration; M_n and M_w: number-average and weight-average molecular weights, respectively; 1° and 2° represent first and second order, respectively. No distinction is made among free radical, cationic, anionic, or coordination-type polymerizations.

The rate of initiation may be held constant (const) throughout the polymerization, or it may depend on some function of the catalyst and monomer concentrations, or it may be instantaneous (instant), in which case only the total number of initiating species need be known.

The rate of propagation is normally only the consumption of monomer; in some cases, the rate of propagation through terminal or pendant double bonds is also considered.

Transfer reactions may occur to initiator, momomer, solvent, or polymer.

Termination of active species may occur by a first-order deactivation, by second-order combination (comb) or disproportionation (disprop), or not at all ("living" polymers).

Confusion exists over the meaning of the transfer-to-catalyst reaction. In free radical systems, it means transfer of the active species to the initiator by a second-order mechanism. In ionic polymerization, it means the expulsion of an active fragment from a growing chain by a first-order mechanism to form dead polymer and an active initiator fragment. The first-order mechanism is called here the "catalyst expulsion reaction" (cat ex).

The nomenclature of distribution functions can be quite confusing. In this work, the Flory distribution (Eq. C41) is also known as the Schulz–Flory distribution, the "most probable" distribution, and the exponential distribution. The Schulz distribution (Eq. C36) is also known as the Schulz–Zimm distribution or the generalized Poisson distribution; at large values of k it approximates the Poisson distribution (Eq. C48). The Pearson Type III distribution is a variation of the Schulz distribution. If an addition polymer is made at constant monomer concentration, no transfer reactions occur, termination is only by second-order combination, and the distribution of the polymer is described by the Schulz distribution with $k = 2$. This distribution is sometimes called the self-convolution distribution or the convoluted exponential distribution. In a uniform distribution, all molcules have the same size – it is monodisperse. A rectangular or box distribution has no molecules below r_a, an equal number (or weight) of molecules between r_a and r_b, and no molecules whose size is above r_b.

In Table 5, systems are treated where branching reactions, ring formation, or gel formation may occur. See also Table 6 for crosslinking reactions during degradation. The symbol RA_f means a monomer containing f reactive A units. The problem of calculating the species distribution of polyfunctional condensation polymers where branched, cyclic, and crosslinked species can be formed is exceedingly complex. Most treatments apply the restriction that ring formation does not occur prior to the gel point, which obviously is incorrect. The restriction is invoked because of the transition from the pre-gel condition, where all unreacted functional groups can react without steric limitations to a condition containing rings in which some of the unreacted groups are sterically unable to react with all of the remaining unreacted groups. The problem is

further compounded because each different reacting monomer will have various degrees of steric hindrance. Therefore, a general treatment must ignore this aspect. An examination of the Stockmayer distribution function in Section D shows that in-depth calculations are required even for simple oligomer species. A number of attempts have been made to provide simpler expressions for the number or weight of individual species and the average molecular weights before and after the gel point. These include the theory of stochastic processes (271), stochastic graph theory (272), the theory of cascade processes which is based on probability generating functions (151), the use of link distribution functions (273), the recursive nature of branching processes and elementary probability laws (274), Monte Carlo methods (275), graph theory (276), and a kinetic approach (277).

TABLE 1. ADDITION POLYMERIZATION WITH TERMINATION

					References		
Set	**Initiation**	**Monomer**	**Transfer**	**Termination**	R_p	P_r	M_n, M_w
1.1. INVARIANT MONOMER CONCENTRATION							
1.1.1	Const	Const	None	2° Disprop or comb	2–4	1–4	1–4
1.1.2	Const	Const	Monomer, solvent	2° Disprop	2,3,10–12	1–3	1–3
1.1.3	Const	Const	Monomer, solvent	2° Disprop and comb	3	1,3	1,3
1.1.4	Const, redox	Const	Activator	2° Comb	13	13	13
1.1.5	Const, initiation by activator	Const	None	2° With catalyst; redox system	14	–	14
1.1.6	k_iM^2	Const	Dimer, Monomer Initiator	2° Term	15	–	15
1.1.7	Instant	Const	None	2° Term; 1° or 2° reactivation	16	–	16
1.2. VARYING MONOMER CONCENTRATION, NO TRANSFER-TO-MONOMER REACTION							
1.2.1	Const	Varies	None	2° Comb or disprop	3	1,3	1,3
1.2.2	Const	Varies	Solvent	2° Comb and disprop	3	1,3	1,3
1.2.3	Photosensitized	Varies	None	2° Disprop	39	39	–
1.2.4	Const	Varies	None	2° Disprop and comb pseudo 1° with scavenger	17 (rate of scavenger disappearance)	–	–
1.3. VARYING MONOMER CONCENTRATION, TRANSFER-TO-MONOMER REACTION OCCURS							
1.3.1	Const	Varies	Monomer, solvent	2° Disprop or comb	3,18	1,3,18	1
1.3.2	Const	Varies	Monomer, solvent	2° Disprop and comb	–	–	19
1.3.3	k_iM^2	Varies	Monomer	2° Comb and disprop	3,4	1,3,4	1,3,4
1.3.4	k_iMI	Varies	Monomer, initiator	2° Disprop; degradative chain transfer	20	–	20
.3.5	Instant	Varies	Monomer	Non-steady state conditions, term by comb or disprop	313	313	313
1.4. 1° TERMINATION OR DEACTIVATION, STEADY-STATE KINETICS							
1.4.1	Const	Const	Monomer	1° Deactivation	4	1,4	1,4
1.4.2	k_iMI	Const	Monomer, solvent	1° Deactivation	4	1.4,21,22	1,4,21,22
1.4.3	k_iM^2	Const	Monomer	1° Deactivation	4	1,4	1,4
1.4.4	k_iMI	Varies	Solvent	1° Plus solvent term	4,23	1,4	1,4
1.4.5	k_iM^2	Varies	None	1° Deactivation	4,23	1,4	1,4
1.4.6	k_iMI	Const	None	Deactivation by init. expulsion	21	1,21	1,21
1.5. TERMINATION BY 2° REACTION WITH MONOMER, STEADY-STATE KINETICS							
1.5.1	Const	Varies	None	2° With monomer	4,23	1,4	1,4
1.5.2	k_iMI	Varies	Monomer	2° With monomer	23	1	1
1.5.3	Const	Const	Monomer	2° With monomer	4	1,4	1,4
1.6. TWO ACTIVE ENDS PER CHAIN							
1.6.1	Const	Const	None	2° Disprop	3	1,3	1,3
1.6.2	Const	Const	Monomer	2° Disprop	–	18	18
1.6.3	Const	Const	Monomer	2° Comb; two active chains couple to form a chain with two active ends	3	1,3	1,3
1.7. SLOW EXHAUSTION OF INITIATOR, NONSTEADY-STATE KINETICS							
1.7.1	k_iI	Const	None	2° Disprop* or comb	25*,26	–	1,25*,26
1.7.2	k_iI	Varies	None	2° Comb	27	–	27

*Data belong together.

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TABLE 1. *cont'd*

Set	Initiation	Monomer	Transfer	Termination	References R_p	P_r	M_n, M_w
1.8. DEAD-END POLYMERIZATION, RAPID DECAY OF INITIATOR, MONOMER CONCENTRATION INVARIANT							
1.8.1	k_iI	Const	Monomer, solvent	2° Disprop or comb	28	1,28	1,28
1.8.2	k_iI^2	Const	None	2° Disprop or comb	28	1,28	1,28
1.9. DEAD-END POLYMERIZATION, SLOW DECAY OF INITIATOR, MONOMER CONCENTRATION VARIES							
1.9.1	k_iI	Varies	Monomer, solvent	2° Disprop* or comb	30	–	1,19*
1.9.2	k_iI	Varies	Monomer, solvent	2° Comb	30	–	1
1.9.3	k_iIM	Varies	None	1° Term, bimolecular monomer addition. I^* and R_I^* do not terminate	31	–	–
1.9.4	Instant	Varies	Monomer	1° Term, or 2° with monomer	40	–	–
1.9.5	Redox	Varies	None	2° Term	41	–	–
1.10. COPOLYMERIZATION: TWO DIFFERENT MONOMERS PRESENT							
1.10.1	Const	Const	Monomer	2° Disprop or comb	1,2,3,4,10 32,33	34	1,35
1.10.2	Const	Varies	None	Diffusion controlled and inversely proportional to viscosity	239	239	239
1.10.3	Const	Const	None	Rate const for term is known as fn(conc). Comparison of cross term parameter Φ	314	–	–
1.10.4	Const	Const	None	Alternating copolymerization	315	–	–
1.10.5	Varies	Varies	Agent	Various; Monte Carlo calculations; initiation and term influences composition	–	316	316
1.11. DIFFUSION-CONTROLLED TERMINATION (see also 1.10.2 and 5.1.4)							
1.11.1	Const	Varies	None or solvent*	2° Disprop or comb* and diffusion controlled	37*	1,36	–
1.11.2	k_iI	Varies	None	2° Comb, $R_t = k_tM_n, n > 1$	27	–	27
1.11.3	Const	Varies	None	2° Process	42	–	–
1.11.4	k_iI	Varies	Monomer	2° Disprop and diffusion controlled	240	240	–
1.11.5	k_iI	Varies	None	2° Disprop and comb, diffusion controlled	241	241	–
1.11.6	k_i	Varies	None	2° Disprop, term rate for long chains depends on entanglement density	242	242	242
1.11.7	k_i	Varies	Monomer, solvent	2° Disprop, term rate for long chains depends on entanglement density	243	243	243
1.11.8	k_iI or none	Varies	Monomer, solvent	2° Comb. and disprop term depends on free volume or free volume plus entanglement, Calc. of gel point	317	–	317
1.11.9	Const	Const	Solvent	$k_{t(n,m)} = k_o(nm)^{-a}$. Term by comb and disprop.	318	–	–
1.12. PRIMARY RADICAL TERMINATION							
1.12.1	Const	Varies	Monomer	2° Comb and disprop and primary radicals	38	–	1,38
1.12.2	Const	Const	None or init. and monomer*	2° Term and primary radicals	33,43–45	–	44,45,15*
1.13. MIXED SPECIES PROPAGATION							
1.13.1	Const	Varies	Monomer	Propagation, transfer and termination rates depend on species type, i.e. free radical and cationic occurring simultaneously	46 244	46 244	– 244
1.13.2	Const	Const	None	Zwitter-ion polymerization; distance between ions varies as $r^{3/2}$, equilibrium between free and solvated ions; 1° term	47	–	47
1.13.3	Const	Varies	None	Bifunctional initiator, term by comb	319	–	319

*Data belong together.

TABLE 1. *cont'd*

Set	Initiation	Monomer	Transfer	Termination	References R_p	P_r	M_n, M_w
1.14. EMULSION POLYMERIZATION (see also Tables 2 and 7)							
1.14.1	Const	Const within particles	None	General theory; particles act as independent units; 2° term within particles; number of particles remain constant; number of radicals per particle	48–54	–	53
1.14.2	Const	Const within particles	None	General theory; Slow-term rate within particles	55	–	55
1.14.3	Const	Const within particles	None	Inst. term within particles; number of particles varies	56	–	–
1.14.4	Const	Const within particles	Monomer	Normal 2° term within particles; rapid interchange between phases of small-sized radicals; number of radicals per particle	57	–	–
1.14.5	Const	Const within particles varies outside	Monomer	Rapid exchange between phases of small-sized radicals; term in aq phase and in particles	58		
1.14.6	Slow and const	Const	None	Slow 2° comb; calcn. of number of radicals per particle	–	59	59
1.14.7	Const	Const within particles	None	Const number of particles; term by 2° comb	60	–	60
1.14.8	Const	Const	None	Inst term on entering a particle; const number of particles	–	–	61
1.14.9	Varies	Varies	Minimize	Adjust initiation and term rates while minimizing transfer to obtain "monodisperse" polymer	72	72	72
1.14.10	Const	Const within particles	Monomer, agent	Instant 2° term when a free radical enters a particle containing two growing chains and reacts with one of them. No term by disprop or comb within particles	245	245	245
1.14.11	Const	Const within particles	Monomer, agent	Same as case 1.14.10 but plus term by disprop or particle by comb	245	245	245
1.14.12	Varies	Varies	Monomer	Varying rate of entry, desorption of oligometic radicals, term by comb and disprop, Monte Carlo simulation model	–	320	–
1.14.13	Const	Const	None	Any number of chains per particle, 1° term, 2° term by disprop or by comb. Use of Markov chains	–	321	–
1.14.14	Const	Const	None	See 1.14.13. Copolymerization, chain composition distribution	–	322	–
1.15. HETEROGENEOUS POLYMERIZATION							
1.15.1	k_iMI, I varies	Varies	Monomer	Polymerization in monomer rich and monomer poor phases; 2° disprop	62	62	62
1.15.2	Instant	Varies	None	Term by precipitation onto growing solid particle	63	–	63
1.15.3	Const	Const	None	2° Comb, 1° occlusion onto particle surfaces, and primary radical term	64	–	–
1.15.4	Const	Const	None	2° Term in liquid phase, 1° radical precipitation, propagation and 2° term at solid–liquid interface	65	–	–
1.16. INHIBITION AND RETARDATION							
1.16.1	Const	Varies	None	2° Term, 2° addition to inhibitor	3,66,67,73	–	–
1.16.2	Const	Const	Inhibitor	2° Term, inhibitor term, inhibitor coupling	68	–	68
1.16.3	Const	Const	Retarder	2° Term, retarder reinitiation and term	69	–	69

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TABLE 1. *cont'd*

Set	Initiation	Monomer	Transfer	Termination	References R_p	P_r	M_n, M_w
1.16.4	Const	Const	Retarder	2° Term, retarder reinitiation, term and coupling	3,12,70 71,74	–	–
1.16.5	Const	Const	Retarder	2° Term, rate of transfer equals rate of reinitiation	10	–	–
1.16.6	Const	Const	Retarder	2° Term, copolymerization of retarder	11	–	11
1.16.7	Const	Varies	None	Pseudo 1° with scavenger	17	–	–
1.16.8	Const	Const	Inhibitor	2° Disprop, 2° reaction with inhibitor	75	–	75
1.16.9	k_iI	Const	Inhibitor	2° with inhibitor or with monomer to assess the efficiency of initiation	246	–	–
1.17. POLYFUNCTIONAL INITIATOR WITH VARIOUS THERMAL STABILITIES							
1.17.1	k_iMI On raising the temp., other peroxide groups can initiate	Const	None	2° disproportionation	–	–	247
1.18. PERIODIC MODULATION OF TERMINATION OR INITIATION							
1.18.1	Const	Varies	None	Periodic modulation of term by disprop by addition of an inhibitor or by magnetic or electric fields	–	323	–
1.18.2	Varies	Varies	None	Periodic modulation of initiation, term by comb and/or disprop, computer calculation	324	324	324
1.18.3	Varies	Varies	None	Periodic modulation of initiation, term by comb. Calcn. of MWD by generating functions	–	325	–

TABLE 2. ADDITION POLYMERIZATION – "LIVING" POLYMERS WITH PARTIAL DEACTIVATION

Set	Initiation	Monomer	Transfer	Termination	References R_p	P_r	M_n, M_w
2.1. THE POISSON DISTRIBUTION: $k_i = k_p$							
2.1.1	k_pMI	Varies	None	None	2,101,102	1,2,101, 102	1,2,101, 102
2.1.2	k_pMIt	Varies	None	None; initiator added at a constant rate	103	–	103
2.2. THE GOLD DISTRIBUTION: $k_i \neq k_p$							
2.2.1	k_iMI	Varies	None	None	102, 104	1,102	1,102
2.3. PARTIAL DEACTIVATION BY A 1° PROCESS OR A 2° PROCESS WITH AN IMPURITY							
2.3.1	Instant	Varies	None	1° or 2°	105	1,106	1,106
2.3.2	Instant	Varies	None	Rate of term/R_p = const.	–	1,106,107	1,106,107
2.3.3	Instant initiator has two active sites	Varies	None	Rate of term/R_p = const.	–	1,107	1,107
2.3.4	Instant	Varies	None	Rate of term independent of R_p	1,106	–	1,106
2.3.5	Instant	Varies	None	1° at infinite time	108,109	–	108,109
2.3.6	Instant	Const	None	Probability that a chain will terminate rather than propagate is k_t/k_pM	–	–	248
2.4. MULTIPLE PROPAGATING SPECIES: R_n^* CAN TRANSFORM INTO Q_n^*, ETC.							
2.4.1	Instant	Const	None	None, two propagating species	–	76	76
2.4.2	k_iMI	Varies	None	None, two propagating species	1, 77–79	1,77,78 80	1,77–80

TABLE 2. *cont'd*

Set	Initiation	Monomer	Transfer	Termination	References R_p	P_r	M_n, M_w
2.4.3	Instant	Varies	None	None, multiple propagating species	249	249	249
2.4.4	Activated monomer addition	Varies; volume also varies	None	None; two prop constants k_p can increase	–	326	326
					–	327	327
2.5. SIMULTANEOUS POLYMERIZATION AND DEPOLYMERIZATION							
2.5.1	k_iMI	Const	None	None	–	1,81	1,81
2.5.2	k_iMI	Varies	None	None	82,83	81	83
2.5.3	k_pM^2	Varies	None	None	84	–	–
2.6. THE k_p VARIES WITH CHAIN LENGTH (see also 2.4.4, 3.3, and 3.4)							
2.6.1	k_iMI	Varies	None	None			
	(a) all propagation constants (k_r) are different				–	1,85,86	–
	(b) $k_i : k_1 : k_2 : k_3 : \cdots k_n = m : (m-1) : (m-2) : (m-3) : \cdots$				–	1,85	–
	(c) $k_1 \neq k_2 \cdots \neq k_m = k_{m+1} = \cdots = k_n$			–	1,85	1,85	
	(d) $k_i \neq k_1 \neq k_2 = k_m$				–	1,85	–
2.6.2	Instant, $k_1 = k_2 \cdots = k_m, k_{m+1}$, etc.= 0			86	86	86	–
2.6.3	Instant, k_p is a linear decreasing function of r				86	86	86
2.6.4	Const	Varies	None	None; k_p for monomer, dimer, and trimer different from remaining molecules	–	328	328
2.6.5	Rate constants can vary with extent of conversion; determination of rate constants from P_r and the use of generating functions; termination by monomolecular decay, disprop and/or comb.				–	329	–
2.7. DEACTIVATION BY TRANSFER TO MONOMER							
2.7.1	k_iMI	Varies	Monomer	None	1,87	1,87	1,74,87,88
2.7.2	Instant	Varies	Monomer	None	1,74,90	1,89,90	1,74,90
2.7.3	Instant	Varies	Monomer	None, two active ends per initiator	1,91	1,91,92	1,91
2.8. DEACTIVATION BY SLOW 1° TERMINATION							
2.8.1	Instant	Varies	None	Slow 1°	1,74	–	1,74
2.8.2	Instant	Varies	Monomer	Slow 1°, at infinite time	1,74	–	1,74
2.9. DEACTIVATION BY INITIATOR EXPULSION REACTION							
2.9.1	Instant	Varies	None	None	–	–	1,93
2.9.2	k_iMI	Varies	Monomer	1° term	67	–	67
2.9.3	Instant	Varies	Monomer	None	250	250	250
2.10. DEACTIVATION BY DEGRADATIVE CHAIN TRANSFER							
2.10.1	k_iMI	Varies	Degradative transfer to polymer	None	94	–	95
2.11. COPOLYMERIZATION							
2.11.1	Instant	Varies	None	None	–	96	
2.12. HETEROGENEOUS POLYMERIZATION							
2.12.1	Instant	Varies	None	None; diffusion of monomer through solid polymer	97	–	97
2.12.2	Instant	Varies	None	2° Term with monomer; diffusion of monomer through solid polymer	98	–	98
2.12.3	Const	Const	None	Sorption and desorption of chains from the surface; slow 1° term which depends on chain length	–	99	99
2.13. SPONTANEOUS POLYMERIZATION							
2.13.1	Const	Const	None	Vinyl compound and activator form monomer; monomer both initiates and propagates; no term	100	–	100

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TABLE 2. *cont'd*

Set	Initiation	Monomer	Transfer	Termination	References R_p	P_r	M_n, M_w
2.14. REVERSIBLE INITIATION AND REACTIVATION							
2.14.1	Rev 2° with monomer	Const	Monomer	No termination; dead species in equilibrium with living species, irreversible propagation	251	251	251
2.15. DEACTIVATION BY TRANSFER TO AGENT							
2.15.1	k_iMI	Const or varies	Agent const varies	No termination. Transfer creates dead polymer and active initiator	–	–	252
2.15.2	k_iMI	Varies	Agent	Numerical method for calc. of MWD with mono- or polyfunctional transfer agent. Latter leads to branching.	–	330	–
2.16. SLOW EQUILIBRIA							
2.16.1	Varies	Varies	None	3-State mechanism consisting of two successive equilibria	–	–	331
2.16.2	Varies	Varies	None	Equilibrium between dormant aggregated polymer and "living" polymer	332	–	–
2.17. POLYMER MICROSTRUCTURE							
2.17.1	Varies	Varies	None	None; concentration of head-to-head and tail-to-tail, sequence length distributions, various dyad and triad fractions	–	–	334
2.17.2	NA	NA	NA	Block copolymers	–	–	335

TABLE 3. LINEAR CONDENSATION POLYMERIZATION WITHOUT RING FORMATION

Set	Conditions	References
3.1	Condensation of bifunctional monomer AB; the Flory distribution. See Eq. (C41)	1,2,110
3.2	Bifunctional monomer AA reacting with bifunctional monomer BB; the nylon case of hexamethylene diamine and adipic acid	1,24,111
3.3	Deviations from the principle of equal reactivity; the "substitution effect"	1,112,253,254
3.4	Rate of condensation varies	
	3.4.1 Rate of condensation proportional to chain size	1,113,114,134
	3.4.2 Condensation requires rotation into colinear orientation prior to reaction	255
	3.4.3 The order of reaction varies with conversion, or a catalytic influence of unreacted A or B groups, or both effects occurring simultaneously	256
3.5	Other simple linear condensation cases	
	3.5.1 AA reacting with BC. BC is an anhydride; within a given molecule, B must react before C	1,111
	3.5.2 AA reacting with BC. BC is an unsymmetrical acid or glycol; B reacts only with A at a different rate from that of C reacting with A	1,111
	3.5.3 AB reacting with C and itself. B and C react only with A; C is a terminator or capping material	1,111
	3.5.4 AA reacting with BB and C; the nylon case again with acetic acid as terminator	1,111
	3.5.5 AA reacting with BC; A and B react with C	1,111
	3.5.6 AB reacts with CC or DD kinetics	115
	3.5.7 AA and A reacting with BB and B	336
3.6	Further polymerization of polymers with an initial geometric distribution	
	3.6.1 Further polymerization of AB when the initial distribution is geometric	1,116
	3.6.2 Further polymerization of AB when the initial distribution is a superposition of two geometric distributions	1,116
	3.6.3 Further polymerization of AA with BB when the initial distribution of both is geometric	1,116
3.7	Copolymerization of condensation polymers	
	3.7.1 AB reacting with CD; AB and CD can be hydroxy acids or similar materials	1,111
	3.7.2 AA reacting with BB and CC. A reacts with B and C only and vice versa; BB and CC can be adipic and sebacic acids	111,257
	3.7.3 AA and BB reacting with CC and DD; A and B react only with C and D and vice versa	111
	3.7.4 AA reacting with BC and DD; A reacts only with B, C, and D	111
	3.7.5 AA and DD reacting with BC; A and B react only with C and D and vice versa	111
	3.7.6 AA reacting with BC–BC, the latter can be a dianhydride; B must react before C	258,259

TABLE 3. *cont'd*

Set	Conditions	References
3.8	Coupled polymers	
	3.8.1 AB polymerized to extent of conversion α, then coupled with CC	1,117,118
	3.8.2 AB polymerized to extent of conversion α, then coupled with CD. A and B can react with C or D	1,117
	3.8.3 AA and BB polymerized to extent of conversion α, then coupled with an excess of CC. A and B to react completely on coupling	1,117
	3.8.4 Poisson-distribution polymer of AA coupled with BC	1,117
	3.8.5 Monomer AB polymerized to extent of conversion α, then coupled with excess CC to extent of conversion γ, then recoupled with excess DD	1,117
	3.8.6 Particularly narrow distributions via coupling reaction	
	I. AA and BB (great excess)→BBAABB, then remove excess BB. CC and BBAABB (great excess)→ BBAABBCCBBAABB, then remove excess BBAABB, and continue in like manner	119
	II. AA and 2BC→CBAABC then CBAABC and 2DE→EDCBAABCDE, etc	119
	III. AB and CD→ABCD then ABCD and EF→ABCDEF, etc	119
	3.8.7 Blocks of polymers of known distribution are coupled together	
	I. A series of Poisson-type-polymers coupled together	
	II. Poisson-type-polymers coupled to "most probable"-type polymers	
	III. A series of "most probable"-type polymers coupled together	120,118
3.9	AB reacts with CC or CD; rate of reaction of A dependent upon whether or not B has reacted	115
3.10	Segmented block copolymers; distribution of block sizes	260–262
3.11	Reacted sequences in homopolymers	263, 264

TABLE 4. EQUILIBRIUM POLYMERIZATION

Set	Conditions	References
4.1	The "most probable" distribution of Flory has been derived for condensation polymerization when all reactions are assumed to have the same probability, regardless of chain length, and whether or not exchange reactions occur:	Eq. C41
	$$P_r + P_s = P_{r+s-i} + P_i, \quad i < r + s$$	
	Here, P_i can be a byproduct such as water, or a polymer molecule whose size is smaller than $r + s$. The same distribution results when random scission occurs to infinitely long chains. See also (265) for multifunctional monomers.	2,121
4.2	The theoretical equilibrium molecular weight distribution for the system	122
	$$rM = P_r$$	
	depends upon the thermodynamic definition of the final product. If the change in Gibbs free energy of formation and polymerization is a linear function of molecular size r, then two cases can be considered:	
	4.2.1 The monomer is polymerized to a pure perfectly ordered state (solid); this gives the "most probable" distribution	Eq. C41
	4.2.2 The monomer is polymerized to a pure randomly ordered state (liquid); a completely different distribution results	123
	If the free-energy change upon disordering of the pure polymer is independent of the molecular weight distribution, a new distribution arises	124
4.3	Thermodynamics of living equilibrium polymers	125
4.4	Given an initial distribution, find the distribution as a function of time when chain ends react at random with all monomer units	126
4.5	Initiation, propagation, and termination reactions are all equilibrium reactions; an initiator is required	127
4.6	Initiation, propagation, and termination reactions are all equilibrium reactions; the system is self-initiating	127
4.7	Equilibrium initiation and equilibrium propagation with a multifunctional initiator	128,266
4.8	Equilibrium initiation and equilibrium propagation; no termination; nonequilibrium solution.	129
4.9	The catalyst can form an active species with any polymer molecule, and the total number of *moles* of the system is kept constant (constant pressure and volume if all polymer molecules are ideal gases)	130
4.10	Addition polymerization, instantaneous initiation, no transfer, no termination, monomer concentration held constant, active species in equilibrium with inactive species	77
4.11	Addition polymerization, rate of initiation equals k_iMC, no transfer, no termination, two active species in equilibrium, monomer concentration varies	78
4.12	Addition polymerization, instantaneous initiation, no transfer, no termination, active species in equilibrium with inactive species, monomer concentration varies	77
4.13	Poly(phosphate) equilibria	131
4.14	Instantaneous initiation, polymerization and depolymerization, 1° termination	132
4.15	Instantaneous initiation, polymerization and depolymerization, degradative transfer to monomer	133
4.16	Copolymerization: bimolecular addition of one monomer, equilibrium addition of other monomer	230
4.17	Copolymerization: equilibrium growth with monomer A or B adding to a chain with a terminal group of either A or B. Three cases: 2° reaction with initiator; 1° formation of active radical; 2° reaction with another monomer	267

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TABLE 4. *cont'd*

Set	Conditions	References
4.18	Equilibrium copolymerization of two or more comonomers	268
4.19	Polycondensation where groups have different equilibrium constants	269,270
4.20	Equilibrium copolymerization initiated by polymer chains with active sites: average mol. wts, grafting ratio, grafting efficiency, grafting success, branching distribution, frequency of grafts	337

TABLE 5. NONLINEAR POLYMERIZATION SYSTEMS

Set	Conditions	References
5.1	Vinyl polymerization; self-grafting	
	5.1.1 General case; molecular weight averages for grafted and ungrafted polymer	278
	5.1.2 Constant rate of initiation, monomer concentration invariant, transfer to monomer and to polymer, termination by 2° disproportionation	1,3,18
	5.1.3 Constant rate of initiation, monomer concentration varies, transfer to polymer, termination by 2° combination	135
	5.1.4 Constant rate of initiation, monomer concentration can vary, transfer to monomer and to polymer, termination by 2° disproportionation and/or combination	279
	5.1.5 Instantaneous initiation, monomer varies, either no transfer occurs or transfer to monomer, solvent, or polymer is allowed; termination by coupling and varies with chain length	280
5.2	Vinyl polymerization; grafting onto a performed polymer whose initial distribution is either (i) of constant length or (ii) a geometric distribution	18
5.3	Vinyl polymerization; all segments of the backbone chains have equal probability to be grafted	136
5.4	Vinyl polymerization; terminal double-bond polymerization, monomer concentration varies, transfer to monomer and to polymer, terminal double bond polymerization	
	5.4.1 Termination predominantly by transfer, constant rate of initiation; batch or continuous polymerization	1,137–139
	5.4.2 Termination by disproportionation, constant rate of initiation, includes transfer to solvent	338
	5.4.3 Termination by combination, constant rate of initiation, amount of short and long chain branching, transfer to a tertiary site	338,339
	5.4.4 Termination by combination, initiator and monomer concentration vary, transfer to monomer and to polymer	340
	5.4.5 Termination by combination, initiator and monomer concentration vary, transfer to monomer and to polymer, characterization following saponification and reacetylation	341
5.5	Vinyl polymerization; long-chain branching.	
	5.5.1 constant rate of initiation, monomer concentration invariant, transfer to monomer and to polymer, termination by 2° disproportionation	1,140
	5.5.2 "Living polymer". Instantaneous initiation, β-hydride or β-methyl elimination to form a terminal double bond, transfer with agent to form a saturated end	355
5.6	Vinyl polymerizaton; "living" branched polymer; polyfunctional initiator RA_f; rate of initiation equals rate of propagation, no transfer, no termination	141
5.7	Vinyl polymerization; R_p, in a diffusion controlled gelling system; termination by disproportionation or combination, no transfer	142
5.8	Vinyl polymerization; branching density as a function of conversion; branches formed by polymerization through a vinyl group (diene polymers) or by transfer-to-polymer reaction	
	5.8.1 Batch polymerization	1,2
	5.8.2 Continuous polymerization	1,138
5.9	Vinyl polymerization	
	5.9.1 Branching density as a function of conversion of (1) long-chain branching, (2) short-chain branching (backbiting), (3) very short chain branching (radical migration)	143
	5.9.2 Copolymerization with divinyl, no ring formation prior to gelation	274,281
	5.9.3 Copolymerization with divinyl; ring formation permitted; Monte Carlo calculations for crosslinking density, weight fraction of gel; chain-length distribution between crosslinks	342,343
	5.9.4 Circuits in a network, elastically active chains	282,283
5.10a	Emulsion polymerization; branch density	144,344
5.10b	Emulsion polymerization; Monte Carlo calculations; can account for desorption of oligomers, chain-length dependence of kinetic parameters, chain transfer to monomer and solvent, polymerization through terminal double bonds and long-chain branching	345
5.11	Cyclopolymerization: the concentration of pendent double bonds per molecule	145–149
5.12	Gelation condition in a system when cyclopolymerization also occurs; transfer to monomer reaction occurs. Molecular weight given	150
5.13	General theory of gelation for polyaddition- and polycondensation-type polymers	151
5.14	The general distribution function for various molecules of type A reacting with various molecules of type B; A can only react with B	
	5.14.1 All functional groups have equal reactivity, independent of position within the molecule or the size of the molecule. Ring formation excluded	Section D 276

TABLE 5. *cont'd*

Set	Conditions	References
	5.14.2 Monomers of type RA_f (f can vary) can only react with monomers of type RB_g (g can vary) where the various B's can have different reactivities. No ring formation	284
	5.14.3 Monomers of type RA_f and RB_g where f and g can vary, the reactivity of a given B can depend on whether or not an adjacent B on the same molecule has reacted. No ring formation	285
	5.14.4 Monomers of type RA_f and RB_g where f and g can vary; no ring formation; calculation of higher distribution moments	346
5.15	Crosslinking or coupling of a polymer with a known primary distribution (see also Table 6)	
	5.15.1 General case. No ring formation prior to gelation	1,152–155, 286
	5.15.2 All primary chains have the same size; no ring formation prior to gelation	1,2,152, 155–157
	5.15.3 Primary chains of the Poisson type, (Eq. C48); no ring formation prior to gelation	155,157
	5.15.4 Primary chains of the Schulz type, (Eq. C36); no ring formation prior to gelation	286
	5.15.5 Primary chains of the "most probable" type; ring formation allowed prior to gelation	287
	5.15.6 Formation of star-type polymers	288
5.16	Homopolymer of ARB_{r-1}. A can react only with B; the B's may have different reactivities. Formation of rings excluded prior to gelation	
	5.16.1 All B groups have the same reactivity	1,2,158,265, 289
	5.16.2 Let B groups have different reactivities	1,159,160
	5.16.3 A controversy over the statistical approach	161,162,163, 164
5.17	Copolymer of ARB_{f-1} and AB; A can react only with B; formation of rings excluded prior to gelation	1,2,158
5.18	Homopolymer of RA_f; formation of rings excluded prior to gelation	
	5.18.1 All A's equally reactive	1,2,121,158, 165,166, 265,274, 277,281, 290–292
	5.18.2 Reactivity of A depends on number of A's previously reacted	167,273,293
5.19	Various copolymers	
	5.19.1 Copolymer of RA_f and AA; formation of rings excluded prior to gelation	1,2,165
	5.19.2 Copolymer of RA_f, AA, and BB; A can react only with B; formation of rings excluded prior to gelation; all branch points completely reacted. See set 5.16.3 for a controversy	1,168,169
	5.19.3 A mixture of self-condensing monomers R_1A_g, R_2A_h, etc., no ring formation	277,294,295
	5.19.4 A stoichiometric mixture of RA_f and RB_f of the same functionality f, indistinguishable reactivity, no ring formation. Note that different authors get different equations for M_n and M_w	277
	5.19.5 A stoichiometric mixture of RA_f, RA_g, ... and RB_h, RB_i ... ,f, g, h, i being different functionalities, indistinguishable reactivities, no ring formation	277,294
	5.19.6 A copolymer of RA_f and BB; no ring formation prior to gelation	274,281,290
	5.19.7 A copolymer of RA_f, AA, and $B'B''$ where B' has a different reaction rate from B''; no rings prior to gelation	293
	5.19.8 Copolymer of RA_f, AA, and BB where the A's in RA_f can have different rates of reaction	293
5.20	Polymers of RA_fB_g	
	5.20.1 Homopolymer of RA_fB_g; A can only react with B; formation of rings excluded prior to gelation	170,265
	5.20.2 A mixture of monomers RA_fB_g, where $f, g = 0, 1, 2, \ldots$, stoichiometry not required	295
5.21	Branching without gelation; copolymer of RA_f and AB. A can react only with B	1,171
5.22	Gelation conditions; formation of rings excluded prior to gelation	
	5.22.1 AA reacting with B_fC_g. A can react with B and C, but with different velocities. B cannot react with C	1,172
	5.22.2 AA, BB, and C reacting with DDE and FF; A, B, and C individually can react with D, E, and F, but with different velocities	1,172
	5.22.3 AAB, RC_4, and GC reacting with DE and F. DE is an anhydride or similar material. D must react first and may have a different velocity from E. A, B, C. and G may react with different velocities	1,172
	5.22.4 AB and CD reacting with EEF and GG. AB and CD are anhydrides or similar materials, where A must react before B and C must react before D. A, B, C, and D may react with different velocities	1,172
	5.22.5 AA and BC reacting with DDE and FG. BC is an anhydride, B reacting first, and FG is like an unsymmetrical glycol	1,172
5.23	Ring formation in linear polymers	
	5.23.1 Homopolymer of type AA	1,173,174
	5.23.2 Homopolymer of type AA. Formation of catenanes	296
	5.23.3 Homopolymer of type AB	1,173,175
	5.23.4 Copolymer of type AABB	1,173,176
	5.23.5 Distribution for chain fraction	1,2
	5.23.6 Copolymer of AA with BC. BC can be an anhydride; within a given molecule, B must react before C; A single cyclic oligomer is permitted to form	297
	5.23.7 Ring-chain equilibrium constant, R_p of rings, cut-off point of monomer conc below which only cyclics formed	347
5.24	Crosslinking of a polymer with a known distribution; rings are permitted prior to gelation	153

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TABLE 5. *cont'd*

Set	Conditions	References
5.25	Gelation conditions for RA_f when rings are permitted prior to gelation	1,177
5.26	Homopolymer of RA_f. Ring formation permitted prior to gelation	1,178,179, 298
5.27	Copolymer of RA_f and BB when rings are permitted prior to gelation	180
5.28	Gelation condition for RA_f, AA, and BB when rings are permitted prior to gelation	1,181
5.29	Monte Carlo calculations on small amounts of crosslinking	299
5.30	Monte Carlo calculations for RA_3, the reactivity of an A group depends on the number of previously reacted groups on that monomer, no ring formation prior to gelation	275
5.31	Monte Carlo calculations for vinyl and divinyl copolymerization	300
5.32	Grafting of reactive polymers of the type AA, AAB, BB, and BBA where rings can form prior to gelation; M_w and the gel point	348
5.33	Star type molecules prepared by anionic polymerization and different precursors (see also 5.19.1, 5.21 and 5.27)	349

TABLE 6. DEGRADATION OF POLYMERS – MAY BE ACCOMPANIED BY CROSSLINKING

Set	Initiation	Mass	Initial distribution	Transfer	Termination	References R_d	P_r	M_n, M_w
6.1. RANDOM SCISSION ONLY								
6.1.1	Proportional to time	Const	Arbitrary	None	None	–	183–186	182–184
6.1.2	Proportional to time	Const	Infinite or uniform	None	None	–	183–187	183,184,188
6.1.3	Random at all bonds	Const	Uniform	None	None	–	189	189
6.1.4	Random at chain ends	Const	Uniform	None	None	–	190	–
6.1.5	Random at all chains	Const	Uniform	None	None	–	191	191
6.1.6	Random	Const	Rectangular	None	None	–	184,187	184
6.1.7	Random	Const	Flory	None	None	–	184,187	184,188
6.1.8	Random	Const	Schulz	None	None	–	184,187, 301	187,301
6.1.9	Random	Const	Poisson	None	None	–	187	–
6.1.10	Random at normal and weak bonds	Const	Uniform	None	None	–	–	192
6.1.11	Gaussian about the midpoint	Const	Schulz	None	None	301	301	–
6.1.12	Central	Const	Schulz	None	None	301	301	–
6.2. UNZIPPING-TYPE REACTION								
6.2.1	1° end	Varies	Uniform	None	1°	193	–	193
6.2.2	1° end	Varies	Uniform	Polymer	2° Disprop	194	–	194
6.2.3	1° end	Varies	Schulz	None	1°	193	–	193
6.2.4	1° end	Varies	Schulz	None	2° Disprop	195	–	195
6.2.5	1° end	Varies	Schulz ($k = 2$)	None	1°	196	–	196
6.2.6	1° end	Varies	Schulz ($k = 2$)	None	2° Comb	196	–	196
6.2.7	1° end; various rates of initiation	Varies; monomer radicals may evaporate	Flory	None	1° or 2° Disprop	197	–	–
6.2.8	Random scission only	Varies	Uniform	Polymer	2° Disprop	194	–	194
6.2.9	Random scission only	Varies	Schulz	None	2° Disprop	198	–	198
6.2.10	1° end and random scission	Varies	Unspecified	None	1° and 2° Process	199 (all molecules must terminate) 200 (some molecules can completely disappear)		
6.2.11	1° end and random scission	Varies	Flory	Polymer	1° and 2° Disprop	201	–	201
6.2.12	1° end and random scission	Varies	Flory	Polymer	2° Comb	201	–	201

TABLE 6. *cont'd*

Set	Initiation	Mass	Initial Distribution	Transfer	Termination	References R_d	P_r	M_n, M_w
6.2.13	1° end and random scission	Varies	Flory	Polymer	1° and 2° Process; comparison of random scission, weak link, and transfer theories.	202 203	– –	– 203
6.2.14	1° end and random scission	Varies	Uniform	Polymer	Comparison of various term mechanisms	204	–	–
6.2.15	1° end and random scission	Varies; units other than monomer may evaporate	Uniform	Polymer	2° Disprop	205	–	205
6.2.16	1° end and random scission	Varies; units other than monomer may evaporate	Flory	polymer	1° and 2° Disprop or 2° comb	206	206	206
6.2.17	Unzipping reactions	Varies	Various	Various	Various, a review	207	–	–
6.3.	**RANDOM SCISSION AND CROSSLINKING**							
6.3.1	Proportional to time	Const	Arbitrary	None	Unspecified term, with and without ring formation	153 208 – 302 303	153 208 282 302 303	153 208 – 302 –
6.3.2	Varies with depth of penetration	Const	Flory	None	1° and 2° Disprop without ring formation	209	210 209	210
6.3.3	Proportional to time	Const	Arbitrary	None	End-linking (grafting) rather than crosslinking; without ring formation	211 208	211 208	211 28
6.3.4	Proportional to time	Const	Arbitrary	None	End-linking; with ring formation	211	211	211
6.3.5	Proportional to time	Const	Schulz	None	Unspecified term, without ring formation	29	–	29
6.3.6	Proportional to time	Const	Various	Unspecified	Various initial distributions	–	–	350
6.4.	**CROSS LINKING ONLY**							
6.4.1	Proportional to time	Const	Arbitrary	None	Ring formation prohibited	153	153	153
6.4.2	Proportional to time	Const	Uniform	None	Ring formation prohibited	182	182	182
6.4.3	Proportional to time	Const	Schulz	None	Ring formation prohibited	182,212, 213	182	182
6.4.4	Proportional to time	Const	Beasley (140)	None	Ring formation prohibited	–	182	–
6.4.5	Proportional to time	Const	Arbitrary	None	Ring formation permitted	153	153	153
6.5.	**RANDOM SCISSION FOLLOWED BY UNZIPPING**							
6.5.1	Random macromolecular fragmentation to form defective groups which subsequently initiates depolymerization							351
6.5.2	Random macromolecular fragmentation to form defective groups which subsequently initiates depolymerization with bimolecular kinetic chain termination							352

TABLE 7. INFLUENCE OF REACTOR CONDITIONS AND DESIGN ON THE MOLECULAR WEIGHT DISTRIBUTION

Set	Conditions	References
7.1	Comparison of 1° term, 2° term with monomer, 2° disprop, 2° comb, and no term for 1° and 2° self-initiation and initiation by light in a CFSTR[a]: R_p, P_r and M_n are given	214
7.2	Emulsion polymerization	
	7.2.1 Emulsion polymerization in a CFSTR. Instantaneous 2° termination	215
	7.2.2 Emulsion polymerization in isothermal BR[a]; 1° init, termination with initiator, four stages of polymerization	304
7.3	Effect of inadequate stirring in a CFSTR; comparison with BR and normal CFSTR. Term. by 2° or no term. R_p, P_r M_n's	216
7.4	Control of MWD[a] by use of temperature variation; term by 2° disprop or 2° comb. M_n's	217
7.5	Effect of expanding drop of monomer in a catalyst solution on MWD of "living" polymers	218
7.6a	Effect of inadequate mixing by a laminar shear model on MWD of "living" polymers	219
7.6b	Effect of different flow lines spending different times in the reactor on the MWD of "living" polymers; the bimodal MWD changes with reactor length	353
7.7	Effect of varying rate of addition of initiator and/or monomer, transfer agent, or terminator, in a BR, neglecting change in volume	220
7.8	Effect of varying the rate of addition of an instantaneous initiator on MWD of "living" polymers	103,221
7.9	Effect of back mixing on MWD of "living" polymers prepared in BR, semi-BR, and CFSTR	222
7.10	See also Table 3, set 3.6: Further polymerization of polymers with an initial geometric distribution	
7.11	Linear condensation of a multifunctional monomer in a BR	305
7.12	"Living" polymer, inst. initiation, no transfer, no termination in a TR[a], monomer varies	306,307
7.13	Effect of mixing in a BR	308
7.14	Condensation polymerization when monomer is R times more reactive with monomer or with polymer molecules, CFSTR, and references to BRs	309,310
7.15	Effect of recycling a portion of a TR; chain-stopper control	311
7.16	Production of monodisperse particles	312
7.17	Reversible polymerization with multifunctional monomers. Comparison of MWD from CFSTR with BR	354

[a]CFSTR: Continuous-flow, stirred tank reactor; BR: batch reactor; TR: tube reactor; MWD: molecular weight distribution.

C. SOME DISTRIBUTION FUNCTIONS AND THEIR PROPERTIES

The frequency function, $F(r)$, is the fraction of molecules of size r. Furthermore, $F(r)$ is normalized

$$\sum_{1}^{\infty} F(r) = \int_{0}^{\infty} F(r)\,\mathrm{d}r = 1 \tag{C1}$$

The weight fraction of molecules of size r is

$$W(r) = rF(r) \Big/ \sum_{1}^{\infty} rF(r) = rF(r) \Big/ \int_{0}^{\infty} rF(r)\,\mathrm{d}r \tag{C2}$$

Averages of any distribution are defined by

$$\sum_{1}^{\infty} r^i F(r) \Big/ \sum_{1}^{\infty} r^{i-1} F(r) = \int_{0}^{\infty} r^i F(r)\,\mathrm{d}r \Big/ \int_{0}^{\infty} r^{i-1} F(r)\,\mathrm{d}r \tag{C3}$$

The number-average degree of polymerization is defined by

$$\bar{r}_n = \sum_{1}^{\infty} rF(r) \Big/ \sum_{1}^{\infty} F(r) = \sum_{1}^{\infty} W(r) \Big/ \sum_{1}^{\infty} [W(r)/r] \tag{C4}$$

Thus, by the definitions of $F(r)$ and $W(r)$

$$W(r) = rF(r)/\bar{r}_n \tag{C5}$$

The weight-average degree of polymerization is

$$\bar{r}_w = \sum_{1}^{\infty} r^2 F(r) \Big/ \sum_{1}^{\infty} rF(r) = \sum_{1}^{\infty} rW(r) \Big/ \sum_{1}^{\infty} W(r) \tag{C6}$$

The z and $z+1$ averages are defined by Eq. (C3) with i set equal to 3 and 4. There is no need to restrict averages of a distribution to positive integers – any useful average can be defined; such as the $(-5/2)$ average. If the intrinsic viscosity of a polymer is related to the degree of polymerization through the equation

$$[\eta] = k\bar{r}_v^{\,a}, \tag{C7}$$

where $\bar{r}_v$ is the viscosity-average degree of polymerization, it is related to the frequency function by

$$\bar{r}_v = \left[\sum_{1}^{\infty} r^{1+a} F(r) \Big/ \sum_{1}^{\infty} rF(r)\right]^{1/a} \tag{C8}$$

As a approaches unity, $\bar{r}_v$ approaches $\bar{r}_w$. In principle, a distribution function can be determined if sufficient averages of the distribution can be determined. In practice, only the number, weight, and perhaps z averages can be found, which are insufficient to define any distribution without making further assumptions.

The degree of polymerization is a useful concept as long as one is describing polymers made with a single monomer or with monomers of equal molecular weight. When considering copolymers, one must work with the actual molecular weight of the reacted unit. This is done in condensation polymerization. The molecular weight distribution of addition copolymers is not included here because of the extreme complexity of these systems.

When performing the summation of a distribution equation to find an average of the distribution, use is frequently made of the following sums:

$$\sum_{x=1}^{\infty} p^{x-1} = 1/(1-p) \quad p < 1 \tag{C9}$$

$$\sum_{x=1}^{\infty} xp^{x-1} = 1/(1-p)^2 \quad p < 1$$

$$\sum_{x=1}^{\infty} x^2p^{x-1} = (1+p)/(1-p)^3 \quad p < 1$$

$$\sum_{x=1}^{\infty} x^np^{x-1} = \frac{\mathrm{d}}{\mathrm{d}p}\left[p\sum_{x=1}^{\infty} x^{n-1}p^{x-1}\right] \quad p < 1$$

$$\sum_{i=0}^{\infty} a^{n-i}b^in!/(n-i)!\,i! = (a+b)^n \quad n \text{ is an integer}$$

$$\sum_{i=0}^{\infty} a^iin!/(n-i)!\,i! = na(1+a)^{n-1}$$

$$\sum_{i=0}^{\infty} a^ii^2n!/(n-i)!\,i! = na(1+na)(1+a)^{n-2}$$

$$\sum_{n=1}^{\infty} A^{n-1}/(n-1)! = \exp A$$

$$\sum_{n=1}^{\infty} nA^{n-1}/(n-1)! = (1+A)\exp A$$

$$\sum_{n=1}^{\infty} n^2A^{n-1}/(n-1)! = (1+3A+A^2)\exp A$$

$$\sum_{n=1}^{\infty} n^pA^{n-1}/(n-1)! = \frac{\mathrm{d}}{\mathrm{d}A}\left[A\sum_{n=1}^{\infty} n^{p-1}A^{n-1}/(n-1)!\right]$$

1. Normal Distribution Function (Gaussian Distribution)

$$F(r) = \frac{\exp\{-(r-\bar{r})^2/2\sigma^2\}}{(2\pi)^{1/2}\sigma} \tag{C10}$$

$$W(r) = (r/\bar{r})F(r) \tag{C11}$$

$$\bar{r} = \int_{-\infty}^{+\infty} \frac{r\exp\{-(r-\bar{r})^2/2\sigma^2\}}{(2\pi)^{1/2}\sigma} = \bar{r}_n \tag{C12}$$

$$\sigma^2 = \int_{-\infty}^{+\infty} \frac{(r-\bar{r})^2\exp\{-(r-\bar{r})^2/2\sigma^2\}}{(2\pi)^{1/2}\sigma} \tag{C13}$$

$$\bar{r}_w = \frac{\sigma^2}{\bar{r}} + \bar{r} \tag{C14}$$

Values of $F(r)$ and $\int_0^t F(r)\,\mathrm{d}r$ are found in many statistical tables (223).

2. Logarithmic Normal Distribution Function

Under the assumption that the weight distribution of the logarithm of molecular size is normally distributed, we can replace r in the normal distribution function by $\ln r$ and $\bar{r}$ by $\ln \bar{r}_\mathrm{m}$

$$W(\ln r) = \frac{\exp\{-(\ln r - \ln \bar{r}_\mathrm{m})^2/2\sigma^2\}}{(2\pi)^{1/2}\sigma} \tag{C15}$$

where

$$\int_1^{\infty} W(\ln r)\,\mathrm{d}(\ln r) = 1 \tag{C16}$$

or in the alternate form

$$W(r) = \frac{\exp\{-(\ln r - \ln \bar{r}_\mathrm{m})^2/2\sigma^2\}}{r(2\pi)^{1/2}\sigma} \tag{C17}$$

where

$$\int_0^{\infty} W(r)\,\mathrm{d}r = 1 \tag{C18}$$

and

$$\ln \bar{r}_\mathrm{m} = \int_0^{\infty} (\ln r)W(r)\,\mathrm{d}r \tag{C19}$$

Here $\bar{r}_\mathrm{m}$ is the median value of the distribution, that is, one-half of the values of r are less than $\bar{r}_\mathrm{m}$.

$$\sigma^2 = \int_0^{\infty} (\ln r - \ln \bar{r}_\mathrm{m})^2 W(r)\,\mathrm{d}r \tag{C20}$$

$$\bar{r}_\mathrm{n} = \bar{r}_\mathrm{m}\exp(-\sigma^2/2) \tag{C21}$$

$$\bar{r}_\mathrm{w} = \bar{r}_\mathrm{m}\exp(+\sigma^2/2) \tag{C22}$$

$$\bar{r}_\mathrm{z} = \bar{r}_\mathrm{m}\exp(+3\sigma^2/2) \tag{C23}$$

$$\bar{r}_\mathrm{i} = \bar{r}_\mathrm{m}\exp\{(2i-3)\sigma^2/2\} \tag{C24}$$

Note that

$$\bar{r}_\mathrm{m} = (\bar{r}_\mathrm{n}\bar{r}_\mathrm{w})^{1/2} \tag{C25}$$

$$\bar{r}_\mathrm{w}/\bar{r}_\mathrm{n} = \bar{r}_\mathrm{z}/\bar{r}_\mathrm{w} = \bar{r}_{\mathrm{z}+1}/\bar{r}_\mathrm{z} = \exp\sigma^2 \tag{C26}$$

The logarithmic normal distribution sometimes is given in a "generalized" form (224)

$$W_s(r) = \frac{r^s\exp\left[-(\ln r/\bar{r}_\mathrm{s})^2/2\sigma^2\right]}{(2\pi)^{1/2}\sigma\bar{r}_\mathrm{s}^{s+1}\exp\{(s+1)^2\sigma^2/2\}} \tag{C27}$$

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but Honig (225) has shown that

$$\ln \bar{r}_m = \ln \bar{r}_s + (s+1)\sigma^2 \tag{C28}$$

Thus, the normalized Lansing–Kramer function ($s = 0$) (226) is identical to the normalized Wesslau function ($s = -1$) (227).

The generalized logarithmic normal distribution is skewed to large values of r, but Kotliar (237, 238) shows that this distribution is not a good representation of a polymer after either low- or high-molecular weight material is removed or degradation has occurred.

3. Generalized Exponential Distribution (1,228)

$$F_{m,k,y}(r) = my^{k/m}r^{k-1}[\exp(-yr^m)]/\Gamma(k/m) \tag{C29}$$

$$W_{m,k,y}(r) = my^{(k+1)/m}r^k[\exp(-yr^m)]/\Gamma[(k+1)/m] \tag{C30}$$

$$\bar{r}_n = \Gamma[(k+1)/m]/y^{1/m}\Gamma(k/m) \tag{C31}$$

$$\bar{r}_w = \Gamma[(k+2)/m]/y^{1/m}\Gamma[(k+1)/m] \tag{C32}$$

$$\bar{r}_z = \Gamma[(k+3)/m]/y^{1/m}\Gamma[(k+2)/m] \tag{C33}$$

$$\bar{r}_i = \Gamma[(k+i)/m]/y^{1/m}\Gamma[(k+i-1)/m] \tag{C34}$$

and

$$r_v = \{\Gamma[(k+a+1)/m]/y^{a/m}\Gamma[(k+1)/m]\}^{1/a} \tag{C35}$$

where a is defined by equation (C7).

The variance of a distribution σ^2, the usual measure of distribution breadth for small populations, depends strongly on the average molecular weight of the distribution:

$$\sigma^2 = \bar{r}_n(\bar{r}_w - \bar{r}_n)$$

Hence, the preferred measure of the molecular weight distribution breadth is $\bar{r}_w/\bar{r}_n$.

(a) The distribution function of Schulz (9) and Zimm (229) is obtained by setting $m = 1$ and requiring that $k > 0$. This distribution is equivalent to the Pearson Type III distribution

$$F(r) = y^k r^{k-1}[\exp(-yr)]/\Gamma(k) \tag{C36}$$

$$W(r) = y^{(k+1)}r^k[\exp(-yr)]/\Gamma(k+1) \tag{C37}$$

The distribution reduces to the "most probable" distribution where $k = 1$.

The cumulative number or weight fraction of the Schulz distribution may be computed from

$$\int_0^r F_{1,k,y}(r) = \frac{ky^k}{\Gamma(1+k)} \sum_{i=0}^{\infty} \frac{(-1)^i y^i r^{k+i}}{i!\,(k+i)} \tag{C38}$$

$$\int_0^r W_{1,k,y}(r) = \frac{y^{k+1}}{\Gamma(1+k)} \sum_{i=0}^{\infty} \frac{(-1)^i y^i r^{k+i+1}}{i!\,(a+i+1)}. \tag{C39}$$

(b) The Weibull (231) or Tung (232) distribution is obtained by setting $m = 1 + k$ and $k > 0$. This distribution is usually seen in the form

$$\int_0^r W(r)\,\mathrm{d}r = 1 - \exp[-yr^{(1+k)}] \tag{C40}$$

Kotliar (233) shows that evaluation of y and k by the Tung method can lead to erroneous values of $\bar{r}_w/\bar{r}_n$.

(c) The Flory distribution, as noted above, occurs when $k = m = 1$, provided that $\ln p$ can be replaced by $-(1-p)$, i.e. $p \approx 1$. The Flory distribution is also written as:

$$F(r) = p^{r-1}(1-p) \tag{C41}$$

$$W(r) = rp^{r-1}(1-p)^2 \tag{C42}$$

$$\bar{r}_n = 1/(1-p) \tag{C43}$$

$$\bar{r}_w = (1+p)/(1-p) \tag{C44}$$

$$\bar{r}_v = \bar{r}_n([\Gamma(2+a)]^{1/a} \tag{C45}$$

and with the approximation $\ln p = p - 1$

$$\int_0^r W(r)\,\mathrm{d}r \cong (1/p) - [1 + (1-p)r]p^{r-1} \tag{C46}$$

For high molecular weights $p \approx 1$, hence

$$r_n : r_w : r_z = 1:2:3. \tag{C47}$$

4. Poisson Distribution

$$F(r) = \exp(-\nu)\,\nu^{r-1}/(r-1)! \tag{C48}$$

$$W(r) = [\nu/(\nu+1)]r\exp(-\nu)\,\nu^{r-2}/(r-1)! \tag{C49}$$

$$\bar{r}_n = 1 + \nu \tag{C50}$$

$$\bar{r}_w = 1 + \nu + \nu/(1+\nu) \tag{C51}$$

D. MOLECULAR WEIGHT DISTRIBUTION IN CONDENSATION POLYMERS: THE STOCKMAYER DISTRIBUTION FUNCTION

Stockmayer (234) has presented a generalized distribution formula for a variety of monomers containing end groups of type A which can only react with a variety of monomers containing end groups of type B. In the original mixture there are $A_1, A_2, A_3, \ldots, A_i, \ldots$ moles of reactants bearing respectively, $f_1, f_2, f_3, \ldots, f_i, \ldots$ functional groups of type A each, together with $B_1, B_2, \ldots, B_j, \ldots$ moles of reactants of functionalities $g_1, g_2, \ldots g_j, \ldots$ in groups of type B. all functional groups of a given type are equally reactive and ring formation does not occur appreciably; which obviously is not true near the gel point. The system reacts until a fraction α of the A groups and a fraction β of the B groups

have reacted. Further

$$\alpha \sum_i f_i A_i = \beta \sum_j g_j B_j$$

Now $N\{m_n, n_j\}$ represents the number of moles of that species which consists of $m_1, m_2, \ldots, m_i, \ldots$ monomer units of the A type combined with $n_1, n_2, \ldots, n_j$ units of the B type.

$$N\{m_i, n_j\} = \frac{K(\sum_i f_i m_i - \sum_i m_i)!\,(\sum_j g_j n_j - \sum_j n_j)!\,\Pi_i(x_i^{m_i}/m_i!)\Pi_j(y_j^{n_j}/n_j!)}{(\sum_i f_i m_i - \sum_i m_i - \sum_j n_j + 1)!\,(\sum_j g_j n_j - \sum_j n_j - \sum_i m_i + 1)!} \tag{D1}$$

where

$$\begin{aligned} x_i &= \left[\frac{f_i A_i}{(\sum_i f_i A_i)}\right]\left[\frac{\beta(1-\alpha)^{f_i - 1}}{(1-\beta)}\right] \\ y_j &= \left[\frac{g_j B_j}{(\sum_j g_j B_j)}\right]\left[\frac{\alpha(1-\beta)^{g_j - 1}}{(1-\alpha)}\right] \\ K &= \left(\sum_i f_i A_i\right)(1-\alpha)(1-\beta)/\beta \\ &= \left(\sum_j g_j B_j\right)(1-\alpha)(1-\beta)/\alpha \end{aligned} \tag{D2}$$

An example will illustrate the use of Eq. (D1).

Suppose we have the monomers acetic acid (CH_3COOH, $A_1, f_1 = 1$) and adipic acid ($HOOC(CH_2)_4COOH$, $A_2, f_2 = 2$) reacting with ethylene glycol ($HOCH_2CH_2OH$, $B_1, g_1 = 2$) and glycerol ($HOCH_2CHOHCH_2OH$, $B_2, g_2 = 3$) (all hydroxyl groups of the glycerol are considered equally reactive). What is the number of molecules which contain exactly 1 acetic acid unit, 4 adipic acid units, 3 glycol units, and 2 glycerol units? It is $N\{1,4,3,2\}$ and

$$\begin{aligned} N\{1,4,3,2\} = {} & K(1+8-1-4)!\,(6+6-3-2)! \\ & \div (1+8-1-4-3-2+1)! \\ & \div (6+6-3-2-1-4+1)! \\ & \times \left(\frac{x_1^1}{1!}\right)\left(\frac{x_2^4}{4!}\right)\left(\frac{y_1^3}{3!}\right)\left(\frac{y_2^2}{2!}\right) \end{aligned} \tag{D3}$$

where

$$\begin{aligned} x_1 &= \left[\frac{A_1}{A_1 + 2A_2}\right]\left[\frac{\beta}{1-\beta}\right], \\ x_2 &= \left[\frac{2A_2}{A_1 + 2A_2}\right]\left[\frac{\beta(1-\alpha)}{(1-\beta)}\right] \\ y_1 &= \left[\frac{2B_1}{2B_1 + 3B_2}\right]\left[\frac{\alpha(1-\beta)}{(1-\alpha)}\right], \\ y_2 &= \left[\frac{3B_2}{2B_1 + 3B_2}\right]\left[\frac{\alpha(1-\beta)^2}{(1-\alpha)}\right] \\ K &= (A_1 + 2A_2)(1-\alpha)(1-\beta)/\beta \end{aligned} \tag{D4}$$

If each species i has an effective molecular weight M_i, which is lower than the original molecular weight by the term $W_0 f_i/2$, where W_0 is the molecular weight of the by-product, then

$$W = \sum_i M_i A_i + \sum_j B_j M_j \tag{D5}$$

The number of molecules of the end of the reaction is, neglecting byproduct,

$$N = \sum_i A_i + \sum_j B_j - \alpha \sum_i f_i A_i \tag{D6}$$

The number-average molecular weight is

$$\bar{M}_n = W/N \tag{D7}$$

The weight-average molecular weight is

$$\begin{aligned} \bar{M}_w = {} & \left[\beta \frac{\sum_i M_i^2 A_i}{\sum_i f_i A_i} + \alpha \frac{\sum_j M_j^2 B_j}{\sum_j g_j B_j} \right. \\ & \left. + \frac{\alpha\beta\,[\alpha(f_c - 1)M_b^2 + \beta(g_c - 1)M_a^2 + 2M_a M_b]}{1 - \alpha\beta(f_c - 1)(g_c - 1)}\right] \\ & \times \left[\beta \frac{\sum_i M_i A_i}{\sum_i f_i A_i} + \alpha \frac{\sum_j M_j B_j}{\sum_j g_j B_j}\right]^{-1} \end{aligned} \tag{D8}$$

where

$$\begin{aligned} f_c &= \left(\sum_i f_i^2 A_i\right) \Big/ \left(\sum_i f_i A_i\right) \\ g_c &= \left(\sum_j g_j^2 B_j\right) \Big/ \left(\sum_j g_j B_j\right) \\ M_a &= \left(\sum_i M_i f_i A_i\right) \Big/ \left(\sum_i f_i A_i\right) \\ M_b &= \left(\sum_j M_j g_j B_j\right) \Big/ \left(\sum_j g_j B_j\right) \end{aligned} \tag{D9}$$

Simpler expressions for M_n and M_w are given by Ziegel et al. (235) for the case when only bifunctional B monomers are present.

The gel point is

$$(\alpha\beta)_c = 1/(f_c - 1)(g_c - 1) \tag{D10}$$

Extensive computations of $N\{m_i, n_j\}$ for the case $f_1 = 1, f_2 = 2, f_4$, and $g_2 = 2$ have appeared (236).

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Heats and Entropies of Polymerization, Ceiling Temperatures, Equilibrium Monomer Concentrations, and Polymerizability of Heterocyclic Compounds*

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A. HEATS OF POLYMERIZATION

Symbols: The subscripts xx to ΔH denote the state of the monomer (first letter) and the state of the polymer (second letter), as follows:

g Gaseous state (hypothetical in case of polymer)
c Condensed amorphous state
c′ Crystalline or partially crystalline state
l Liquid state
s In solution; solvent specified in the sixth column (ls denotes polymer dissolved in monomer).

For emulsion polymerization the subscript lc is used and a note added in the sixth column. In all cases where monomer or polymer is present in solution etc., the value of ΔH will depend on the composition to some extent. Where the polymer is crystalline, ΔH will depend on the degree of crystallinity. ΔH values are in kJ per mol of monomer and are generally the limiting values for high degree of polymerization n [1 kcal = 4.187 kJ]. Where more than one value is available in the literature for given states of monomer and polymer and a given method, only one value is shown in the tables. This corresponds to one of the references indicated N_i refers to the ith note given at the end of the table.

Example: $C_2H_4(g) \rightarrow (1/n)(C_2H_4)_n(g)$, $\Delta H_{gg} = -93.5$ kJ

Precision: generally 0.5–4.0 kJ/mol (for details see Ref. 1).

Methods of determination: These are summarized below, using the numbering system in Ref. 1.

2 Combustion of monomer or polymer or both.
3 Reaction calorimetry.
4a Thermodynamic (van't Hoff Equation).
4b Semiempirical rules applied to evaluate heat of formation of polymer or monomer or both. Such rules may be found in Refs. 25,143,223,224,335.
5 Heat capacity and heat of transition (Kirchhoff's equation).

TABLE 1. MONOMERS GIVING POLYMERS CONTAINING CARBON ATOMS ONLY IN THE MAIN CHAIN

Monomer	State of monomer and polymer (xx)	$-\Delta H_{xx}$ (kJ/mol)	Temp. (°C)	Method	Solvent/Notes	Refs.
1.1. WITH ACYCLIC CARBONS ONLY IN THE MAIN CHAIN						
1.1.1. DIENES						
1,3-Butadiene	gg	73	25	4b	1:2 Polymerization	10
	gg	78	25	4b	1:4 Polymerization	10
	lc	73	25	2	N_1	45
Chloroprene	lc	68	61.3	3		41
Cyclopentadiene	ss	59	−70	3	Methylene chloride	190
Isoprene	gg	70.5	25	4b		10
	lc	75	25	2		46
	ls	71	74.5	3		15
	ls	65.5	34.6	3	N_2	47
1.1.2 MONOMERS GIVING POLYMERS WITH OR WITHOUT ALIPHATIC SIDE CHAINS THAT CONTAIN ONLY C, H						
1.1.2.1. Olefins (listed by increasing carbon number)						
Ethylene	gg	93.5	25	4b		2
	gc′	108.5	25	2		2,3
	gc′	107.5	25	3		183
	gc	101.5	25	2	ΔH_{fus} (Polymer) taken as 5.0	2,4
	c′c′	173	−173	5	Polymer is poly(1-butene), iso	385
	c′c	169	−173	5	Polymer is poly(1-butene), iso	385
	gc′	212	173	5	Polymer is poly(1-butene), iso	385
	gc	209	173	5	Polymer is poly(1-butene), iso	385
	gc′	212	25	4b	Polymer is poly(1-butene), iso	385
	gc	209	25	4b	Polymer is poly(1-butene), iso	385
	gc′	211	127	5	Polymer is poly(1-butene), iso	385
	gc	204	127	5	Polymer is poly(1-butene), iso	385
	gl	198	227	5	Polymer is poly(1-butene), iso	385
Propene	gg	86.5	25	4b		5
	gc′	104	25	2		3
	lc	84	25	4b		5
	sc	69	−78	3	*n*-Butane	6

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TABLE 1. *cont'd*

Monomer	State of monomer and polymer (xx)	$-\Delta H_{xx}$ (kJ/mol)	Temp. (°C)	Method	Solvent/Notes	Refs.
1-Butene	gg	86.5	25	4b		5
	lc	83.5	25	4b		5
	lc′	78	−173	5	Isotactic polymer	385
	lc	74	−173	5	Isotactic polymer	385
	lc′	83	−73	5	Isotactic polymer	385
	lc	79	−73	5	Isotactic polymer	385
	gc′	108	25	4b	Isotactic polymer	385
	gc	103	25	4b	Isotactic polymer	385
	gc′	107	127	5	Isotactic polymer	385
	gc	99	127	5	Isotactic polymer	385
	gl	94	227	5	Isotactic polymer	385
2-Butene, *cis*	gg	80	25	4b		5
	lc	75	25	4b		5
	c′c′	63	−173	5	Isotactic polymer	385
	c′c	59	−173	5	Isotactic polymer	385
	lc′	75	−73	5	Isotactic polymer	385
	lc	71	−73	5	Isotactic polymer	385
	gc′	101	25	4b	Isotactic polymer	385
	gc	96	25	4b	Isotactic polymer	385
	gc′	99	127	5	Isotactic polymer	385
	gc	92	127	5	Isotactic polymer	385
	gl	86	227	5	Isotactic polymer	385
2-Butene, *trans*	gg	75.5	25	4b		5
	lc	71	25	4b		5
	c′c′	57	−173	5	Isotactic polymer	385
	c′c	54	−173	5	Isotactic polymer	385
	lc′	71	−73	5	Isotactic polymer	385
	lc	67	−73	5	Isotactic polymer	385
	gc′	96	25	4b	Isotactic polymer	385
	gc	91	25	4b	Isotactic polymer	385
	gc′	96	127	5	Isotactic polymer	385
	gc	89	127	5	Isotactic polymer	385
	gl	83	227	5	Isotactic polymer	385
Isobutene	gc	72	25	2		7
	lc	48	25	2	Low polymer	3,8
	ss	53.5	25	?	Solvent? low polymer	8
	ss	54	−35	3	CH_2Cl_2, polymer swollen, N_3	9
1-Pentene	c′c′	84	−173	5		386
	c′c	81	−173	5		386
	lc′	95	−73	5		386
	lc	93	−73	5		386
	lc′	99	25	2,4b		386
	lc	95	25	2,4b		386
	gl	117	127	5		386
	gl	113	227	5		386
–, 4-methyl	c′c′	82	−173	5		387
	c′c	79	−173	5		387
	lc′	93	−73	5		387
	lc	90	−73	5		387
	lc′	97	25	4b		387
	lc	95	25	4b		387
	gc′	124	127	5		387
	gc	117	127	5		387
	gc′	122	227	5		387
	gc	112	227	5		387
	gl	105	327	5		387
2-Pentene, *cis*	gg	80.5	25	4b		10
	c′c′	75	−173	5		386
	c′c	72	−173	5		386
	lc′	87	−73	5		386
	lc	85	−73	5		386
	lc′	91	25	2,4b		386
	lc	87	25	2,4b		386

TABLE 1. *cont'd*

Monomer	State of monomer and polymer (xx)	$-\Delta H_{xx}$ (kJ/mol)	Temp. (°C)	Method	Solvent/Notes	Refs.
	gl	109	127	5		386
	gl	105	227	5		386
–, 4-methyl	lc′	90	25	4b		387
	lc	88	25	4b		387
	gc′	118	127	5		387
	gc	111	127	5		387
	gc′	116	227	5		387
	gc	114	227	5		387
	gl	100	327	5		387
2-Pentene, *trans*	gg	75.5	25	4b		10
	c′c′	70	−173	5		386
	c′c	68	−173	5		386
	lc′	83	−73	5		386
	lc	81	−73	5		386
	lc′	87	25	2,4b		386
	lc	83	25	2,4b		386
	gl	106	127	5		386
	gl	103	227	5		386
–, 4–methyl	lc′	86	25	4b		387
	lc	83	25	4b		387
	gc′	115	127	5		387
	gc	107	127	5		387
	gc′	113	227	5		387
	gc	103	227	5		387
	gl	97	327	5		387
1-Hexene	lc	83	25	4b		5
1-Heptene	gg	86	25	4b		5
1.1.2.2. *Cycloalkanes* (listed by increasing ring size)						
Cyclopropane	lc	113	25	2		11
–, methyl-	lc	105	25	4b		11
–, 1,1-dimethyl-	lc	97.5	25	4b		11
Cyclobutane	lc	105	25	2		12
–, methyl-	lc	100	25	4b		11
–, 1,1-dimethyl-	lc	93.5	25	4b		11
Cyclopentane	lc	22	25	2		12
–, methyl-	lc	17	25	4b		11
– 1,1-dimethyl-	lc	13.5	25	4b		11
Cyclohexane	lc	−3	25	2		12
–, methyl-	lc	−9	25	4b		11
–, 1,1-dimethyl-	lc	−7.5	25	4b		11
Cycloheptane	lc	21.5	25	2		12
Cyclooctane	lc	34.5	25	2		12
Cyclononane	lc	47	25	2		13
Cyclodecane	lc	48	25	2		13
Cycloundecane	lc	45	25	2		13
Cyclododecane	lc	14	25	2		13
Cyclotridecane	lc	22	25	2		13
Cyclotetradecane	lc	7	25	2		13
Cyclopentadecane	lc	12	25	2		13
Cyclohexadecane	lc	8	25	2		13
Cycloheptadecane	lc	8.5	25	2		13
1.1.2.3. *Cycloalkenes*						
Cyclobutene	ll	121	25	2,4b	*cis*-Polybutadiene	388
	gl	145	25	2,4b	*cis*-Polybutadiene	388
Cyclopentene	lc	17.5	25	2	N_{66}	361
	c′(I)c	11	−173	5	*cis*-Polymer	388
	lc	16	−73	5	*cis*-Polymer	388
	lc	15	25	2,4b	*cis*-Polymer	388
	c′(I)c	23	−173	5	*trans*-Polymer	388
	lc	19	−73	5	*trans*-Polymer	388
	lc	18	25	2,4b	*trans*-Polymer	388
	lc	18	77	5	*trans*-Polymer	388

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TABLE 1. *cont'd*

Monomer	State of monomer and polymer (xx)	$-\Delta H_{xx}$ (kJ/mol)	Temp. (°C)	Method	Solvent/Notes	Refs.
Cyclopentadiene	ss	59	−173	3	Butyl chloride, N_{70}	371
Cyclohexene	ss	1	−65	4a	Toluene, N_{78}	389
Cycloheptene	c′(III)c	12	−173	5	70% *trans*, 30% *cis*-Polymer, N_{54}	388
	c′(III)c′	18	−173	5	70% *trans*, 30% *cis*-Polymer, N_{54}	388
	c′(II)c	18	−73	5	70% *trans*, 30% *cis*-Polymer, N_{54}	388
	c′(II)c′	26	−73	5	70% *trans*, 30% *cis*-Polymer, N_{54}	388
	lc	18	25	2,4b	70% *trans*, 30% *cis*-Polymer	388
	lc′	29	25	2,4b	70% *trans*, 30% *cis*-Polymer	388
	ll	17	51	5	70% *trans*, 30% *cis*-Polymer	388
Cyclooctene	c′(II)c′	18	−173	5	48% *trans*, 52% *cis*-Polymer, N_{54}	388
	c′(II)c	6	−173	5	48% *trans*, 52% *cis*-Polymer, N_{54}	388
	c′(I)c′	27	−73	5	48% *trans*, 52% *cis*-Polymer, N_{54}	388
	c′(I)c	19	−73	5	48% *trans*, 52% *cis*-Polymer, N_{54}	388
	lc′	30	25	2,4b	48% *trans*, 52% *cis*-Polymer	388
	lc	13	25	2,4b	48% *trans*, 52% *cis*-Polymer	388
	ll	13	57	5	48% *trans*, 52% *cis*-Polymer	388
1.1.3. MONOMERS GIVING POLYMERS WITH ALIPHATIC SIDE CHAINS THAT CONTAIN HETEROATOMS						
1.1.3.1. Acrylic Derivatives (listed alphabetically)						
Acrolein	lc	80	74.5	3		15
	ss	57.5	74.5	3	Hexane	17
	ss	81.5	74.5	3	Water	17
Acrylamide	ss	81.5	74.5	3	Water	17,14
	lc	79.4	90	3		332
	ss?	70.5	74.5	3	Acetone	17
	sc	60	74.5	3	Benzene	17
	sc	57.5	74.5	3	Hexane	17
–, *N*-methylol-	lc	74.5	190	3		332
–, *N,N′*-methylene bis-	lc	82.7	190	3		332
Acrylic acid	lc	67	74.5	3		15
	ss	77.5	20	3	Water	36,37
	sc	73.5	74.5	3	Benzene	15
	sc	72	74.5	3	Carbon tetrachloride	15
	sc	74.5	74.5	3	Hexane	15
–, *n*-butyl ester	lc	78	74.5	3		17,37
	ss	77	74.5	3	Acetone	17
	ss	79	74.5	3	Butanone	17
	ss	76	74.5	3	Benzene	17
	ss	75.5	74.5	3	Carbon tetrachloride	17
	ss	78	74.5	3	Hexane	17
–, ethyl ester	lc	78	74.5	3		34,37
	lc	80.7	90	3		318
–, ethylhexyl ester	lc	78.2	90	3		318
–, lauryl ester	lc	80.5	30	3		352
–, methyl ester	lc	78	76.8	3		21,34,37
	lc	81.8	80	3		319
	ss	84.5	20	3	Ethyl alcohol	36
	ss	81	74.5	3	Hexane	34
Acrylonitrile	lc′	76.5	74.5	3		17,21,38,201
	sc′	77.5	74.5	3	Benzene	17
1.1.3.2. α-Substituted Acrylic Derivatives (listed alphabetically)						
α-Chloroacrylic acid, methyl ester	lc	52.7	80	3		319
α-Cyanoacrilic acid, methyl ether	lc	42	60	3		354
–, ethyl ester	c′c	28	−173	5		390
	c′c	29	−73	5		390
	lc	47	25	2		390
	lc	53	127	5		390
	lc	54	177	5		390
–, allyl ester	c′c	41	−173	5		391
	c′c	42	−73	5		391
	c′c	43	−8	5		391
	lc	62	−8	5		391

TABLE 1. *cont'd*

Monomer	State of monomer and polymer (xx)	$-\Delta H_{xx}$ (kJ/mol)	Temp. (°C)	Method	Solvent/Notes	Refs.
	lc	64	25	2,4b		391
	lc	68	127	5		391
–, *n*-decyl ester	c′c	29	– 173	5		392
	c′c	29	– 73	5		392
	lc	69	25	2,4b		392
	lc	74	127	5		392
–, allyloxyethyl	cc	41	– 173	5		393
	lc	43	– 73	5		393
	lc	49	25	2,4b		393
	lc	51	57	5		393
Ethacrylic acid, methyl ester	ls	31	87	4a		395
Methacrolein	lc	65.5	74.5	3		15
Methacrylamide	ss	56	74.5	3	Water	17
	ss	42.5	74.5	3	Chloroform	17
	ss	39.5	74.5	3	Acetone	17
	ss	35	74.5	3	Benzene	17
Methacrylic acid	lc	42.5	74.5	3		15
	lc	64.5	25	2		206
	ss	66	20	3	Water	36
	ss	56.5	25	3	Water	37
	ss	54	25	3	Dimethylformamide, N_7	203,316
	sc	57	74.5	3	Methanol, N_5	15
–, benzoic acid ester	c′c	55	– 173	5		394
	c′c	56	– 73	5		394
	c′c	59	25	5		394
	ss	57	77	2,3	1,4 Dioxane	394
	ll	90	227	5		394
–, benzyl ester	lc	56	76.8	3	N_6	39
–, *n*-butyl ester	lc	57.5	74.5	3		34,37,39
	ls	60	26.9	3		14
–, *tert*-butyl ester	ls	54.5	26.9	3		14
–, cyclohexyl ester	lc	51	76.8	3		39
	ls	53	26.9	3		14
–, 2-ethoxyethyl ester	lc	57.5	74.5	3		34
	ls	62	26.9	3		14
–, ethyl ester	lc	60	120	4a		40
	lc	59.5	74.5	3		34,37
	ls	57.5	26.9	3		14
–, β(*N*-piperidyl)ethyl ester	lc	57	40	3		188
–, *n*-hexyl ester	lc	58.5	25	3	Emulsion (aq.)	37
	ls	60	26.9	3		14
–, 2-hydroxyethyl ester	lc	50	25	3	Emulsion (aq.)	37
–, 2-hydroxypropyl ester	lc	50.5	25	3	Emulsion (aq.)	37
–, isobutyl ester	lc	60		3		34
–, isopropyl ester	lc	60	74.5	3		34
–, methyl ester	lc	56	130	4a		42,43,29
	lc	55.5	74.5	3		17,34,36,37, 41,201,235
	lc	55	25	2		206
	ls	57.5	26.9	3		14
	c′c	34	– 173	5		414
	c′c	36	– 73	5		414
	lc	55	25	5		414
	lc	56	77	3		414
	ss	54	130	4a	*o*-Dichlorobenzene	42,29
	ss	58.5	74.5	3	Acetonitrile	34
	ss	57.5	74.5	3	Tetrahydrofuran	34
	ss	58.5	74.5	3	Hexane	34
–, methyl ester deuterated	c′c	33	– 173	5		414
	c′c	35	– 73	5		414
	lc	55	25	5		414
	lc	57	77	3		414
–, *n*-octyl ester	lc	57	65	3		188

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TABLE 1. *cont'd*

Monomer	State of monomer and polymer (xx)	$-\Delta H_{xx}$ (kJ/mol)	Temp. (°C)	Method	Solvent/Notes	Refs.
–, phenyl ester	lc	51.5	76.8	3	N_6	39
–, *n*-propyl ester	lc	57.5	74.5	3		34
Methacrylonitrile	lc	56.5	74.5	3		15
	ss	64	130	4a	Benzonitrile	44,29
1.1.3.3. Vinyl Ethers						
Vinyl *n*-butyl ether	lc?	60	50	3	N_6	216
1.1.3.4. Vinyl Alcohol, Ketones, Halogens						
Vinyl alcohol					see Acetaldehyde	195
Methyl vinyl ketone	ls	74	74.5	3		17
Vinyl chloride	gc	132	25	2		18.19,20
	lc	71	25	4b		10
	lc	111.5	25	2	ΔH_{fus} (Monomer) taken as 20	18
	lc	96	74.5	3		215
1.1.3.5. Vinyl Esters						
Vinyl acetate	lc	88	74.5	3		17,34,21
	ls	89.5	25	3		35
	ss	90	74.5	3	Acetone	17
	ss	86.5	74.5	3	Hexane	17
	ss	86	74.5	3	Benzene	17
Vinyl propionate	lc	86	74.5	3		17,34
Vinyl 2-ethylhexoate	lc	88	74.5	3		34
1.1.3.6. Others (listed alphabetically)						
Allyl chloride	ls	77.5	74.5	3		15
	lc	88	20	2		214
	ss	91	20	3	Dimethylformamide, tetrahydrofuran	214
Ethylene, nitro						
–, tetrafluoro-	gg	155	25	2		22
	gc′	172	25	2		22,23
	lc′	163 ± 17	25	2		1
Fumaric acid, diethyl ester	lc	65	100	3		235
Itaconic acid, dimethyl ester	ss	60.5	26.9	3	*o*-Dichlorobenzene	14
Maleic anhydride	ls	59	74.5	3		15
Maleimide	ss	67.5	74.5	3	Chlorobenzene	24
	ss	89.5	74.5	3	Dioxane	24
	ss	88.5	74.5	3	Acetonitrile	24
	ss	87.5	74.5	3	Dimethylformamide	24
–, phenyl	ss	37	55	4a	DMF, N_{78}, N_{75}	440
α-Methylene pentanolactone	ss	38.8	83	4a	DMF	315
Vinyl cyclohexane	c′c′	88	−173	5		396
	c′c	68	−173	5		396
	lc′	100	−73	5		396
	lc	79	−73	5		396
	lc′	105	25	2,4b		396
	lc	85	25	2,4b		396
	lc′	111	127	5		396
	lc	86	127	5		396
Vinylidene chloride	lc′	60	76.8	3		21
	lc′	75.5	25	2		18
	lc′	73	74.5	3		15
	c′c′	67	−173	5		397
	c′c	56	−173	5		397
	lc′	77	−73	5		397
	lc	66	−73	5		397
	lc′	81	25	2		397
	lc	70	25	2		397
	gc′	108	25	2		397
	gc	97	25	5		397
	gc′	107	127	5		397
	gc	95	127	5		397
N-Vinyl succinimide	ls	54.7	97	3		384

TABLE 1. *cont'd*

Monomer	State of monomer and polymer (xx)	$-\Delta H_{xx}$ (kJ/mol)	Temp. (°C)	Method	Solvent/Notes	Refs.
1.1.4. MONOMERS GIVING POLYMERS WITH AROMATIC SIDE CHAINS THAT CONTAIN ONLY C, H (listed alphabetically)						
Acenaphthalene	ss	87.8	0	3	Dichloromethane	320
	ss	84.8	18	3	Dichloromethane	320
	ss	98.5	26.9	3	*o*-Dichlorobenzene	14
	ss	67	74.5	3	*o*-Dichlorobenzene	15
	ss	67	74.5	3	Benzene	15
	c'c	82	26.9	3		14
Acenaphthylene	ss	43	60	4a	Toluene, N_{78}, N_{75}	399
Biphenyl, *p*-isopropenyl-	ss	34	−15	4a	Tetrahydrofuran	16
Indene	ss	58	−30	3	Methylene chloride indep. of *T* [−70° to 10°]	190
–, 5-methyl-	ss	58	−50	3	Methylene chloride	175
–, 6-methyl-	ss	57.5	−60	3	Methylene chloride	175,169
–, 7-methyl-	ss	58.5	−70	3	Methylene chloride	175,169
–, 4,6-dimethyl-	ss	77.5	−40	3	Methylene chloride	175
–, 4,7-dimethyl-	ss	65	−40	3	Methylene chloride	175
–, 5,6-dimethyl-	ss	79	−40	3	Methylene chloride	175
–, 4,5,6,7-tetramethyl-	ss	75	−40	3	Methylene chloride	175
Naphthalene, 2-isopropenyl-	ss	36.5	−5	4a	Tetrahydrofuran	16
	ss	38	10	4a	Toluene, N_{78}	400
Styrene	gg	74.5	25	4b		25
	lc	70	25	2		26
	lc	68.5	26.9	3		14,17,27,201,235
	lc	73	127	4a		28,29
	ls	73	25	2		26
	ls	73	26.9	3		14
	ss	66.5	−60	3	Methylene chloride	30,190
– α-acetoxy	ss	26	64	4a	Toluene, N_{78}, N_{75}	401
–, *o*-chloro-	lc	68.5	76.8	3		27
–, *p*-chloro-	lc	67	76.8	3		27
–, 2,5-dichloro-	lc	69	76.8	3		27
–, ar-ethyl-	lc	68	76.8	3		27
–, α-methyl-	lc	35	25	2		31
	lc	34.5	−20	4a		32,29
	lc	39	25		N_9	123
	ss	33.5	−20	4a	Tetrahydrofuran	32,29,33,16
	ss	47.7	22	4a	Cyclohexane	341
	ss	15	−10	4a	*n*-Heptane, N_{78}	402
	ss	14	−10	4a	Toluene, N_{78}	402
–, α-methyl, *p-tert*-butyl-	ss	29.7		4a	Solvent and temp. not stated	381
–, 2,4,6-trimethyl-	lc	70	26.9	3		14
1.1.5. MONOMERS GIVING POLYMERS WITH AROMATIC SIDE CHAINS AND THAT CONTAIN HETEROATOMS						
2-Amino-4-alkyl/aryl-amino-6-isopropenyl-1,3,5-triazine,						
R_1 = H, R_2 = ethyl	ls	64.8	170	3	N_{65}	370
R_1 = H, R_2 = propyl	ls	63.5	160	3	N_{65}	370
R_1 = ethyl, R_2 = ethyl	ls	53.9	161	3	N_{65}	370
R_1 = propyl, R_2 = propyl	ls	47.7	153	3	N_{65}	370
R_1 = methyl, R_2 = phenyl	ls	50.2	140	3		379
R_1 = methyl, R_2 = phenyl	ls	53.1	150	4a		379
R_1 = H, R_2 = *p*-methoxyphenyl	ls	50.2	160	3		378
R_1 = H, R_2 = *p*-methoxyphenyl	ls	46.8	160	4a		378
2-Amino-4-(*N*-R. anilino)-6-isopropenyl-1,3,5-triazine						
R = *n*-alkyl = *n*-propyl	lc	46	60	3		403
= *n*-hexyl	lc	43	60	3		403
= *n*-octyl	lc	42	60	3		403
= *n*-decyl	lc	41	60	3		403
= *n*-dodecyl	lc	41	60	3		403
= *n*-tetradecyl	lc	40	60	3		403
= *n*-hexadecyl	lc	39	60	3		403
R = alkyl = isopropyl	lc	44	60	3		404
= isobutyl	lc	44	60	3		40
= *sec*-butyl	lc	43	60	3		404

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TABLE 1. *cont'd*

Monomer	State of monomer and polymer (xx)	$-\Delta H_{xx}$ (kJ/mol)	Temp. (°C)	Method	Solvent/Notes	Refs.
= *n*-pentyl	lc	44	60	3		404
= isopentyl	lc	43	60	3		404
= 1-methylbutyl	lc	42	60	3		404
R = benzyl	lc	44	60	3		404
R = chloro	ls	11	170	3		405
R = – 4-methoxy-	ls	14	183	3		406
R = – 4-ethoxy-	ls	14	182	3		406
2-Anilo-4-R-6-isopropenyl-1,3,5-triazine						
R = methoxy	ls	12	174	3		406
R = ethoxy	ls	12	174	3		406
Atropic acid, methyl ester	ss	28	– 40	4b	Toluene, N_{10}	149
Atroponitrile	ss	39	50	4b	Toluene, N_{10}	149
Benzoic acid, *n*-methacryloyloxy-	lc	59	25	2		363
–, vinyl ester	lc	84.5	74.5	3		34
Carbazole, *N*-vinyl-	sc′	63.5	74.5	3	Hexane	15
	ss	94.9	0	3	Dichloromethane	321
2,4-Hexadiyne-1,6-di(R group)						
R = $-SO_3C_6H_4CH_3$(p)	c′c′	152.6	187	3		372
R = $-NHC_6H_3(NO_2)_2$(2,4 posn.)	c′c′	77.5	135	3		373
R = $-SO_3C_6H_4NNC_6H_5$(p)	c′c′	138	140	3		374
R = $-OCONHCH_2COOH$	c′c′	130	137	3		375
Oxazole, 2-isopropenyl-	ss	39.5	20	4a	Tetrahydrofuran	284
Pyridine						
–, 2-isopropenyl-	ss	26	20	4a	Tetrahydrofuran	284
	ss	40	– 15	4a	Toluene, N_{78}	407
–, 2-vinyl-	lc	71.5	74.5	3		15
	ls	75.5	74.5	3		15
	sc	73.5	74.5	3	Benzene	15
–, 4-vinyl-	lc	78	74.5	3		17
	ss	78	74.5	3	Benzene, hexane	17
Silane, benzyl dimethyl vinyl-	c′c′	48.2	– 73	2		355
	lc	66.7	25	3	N_{62}	366
	lc	67.1	77	3	N_{62}	366
–, dimethyl phenyl vinyl-	lc	56.5	25	3	N_{62}	362
–, trimethyl vinyl-	lc	65.8	25	3	N_{62}	367
N,N,N′,N′-Tetraethyl-4-isopropenyl-phenylphosphonous diamide	ss	27	– 55	4a	Tetrahydrofuran	408
Thiazole, 2-isopropenyl-	ss	28.5	20	4a	Tetrahydrofuran	284
p-[bis(Trimethylsilyl)methyl]isopropenylbenzene	ss	30	– 30	4a	Tetrahydrofuran	409

1.2. WITH AROMATIC OR CYCLIC CARBONS IN THE MAIN CHAIN

– 11,12-Dicyano-2,6-naphtoquinodimethane						
11,12-bis (alkylthio)						
alkyl = butyl	ss	67	30	4a	Oligomer, benzene, N_{78}, N_{80}	410
= s-butyl	ss	59	30	4a	Oligomer, benzene, N_{78}, N_{80}	410
= isopropyl	ss	65	30	4a	Oligomer, benzene, N_{78}, N_{80}	410
= ethyl	ss	69	30	4a	Oligomer, benzene, N_{78}, N_{80}	410
= methyl	ss	70	30	4a	Oligomer, benzene, N_{78}, N_{80}	410
–, 7,8-Dicyanoquinodimethane						
7,8-bis(butoxycarbonyl)-	ss	26	60	4a	Chloroform, N_{78}, N_{81}	411
7,8-diacetyl-	ss	25	55	4a	Chloroform, N_{78}, N_{81}	412
7,8-dibenzoyl-	ss	22	55	4a	Chloroform, N_{78}, N_{81}	412
7,8-dibutoxycarbonyl-	ss	26	55	4a	Chloroform, N_{78}, N_{81}	412
7,8-diisobutyryl-	ss	23	55	4a	Chloroform, N_{78}, N_{81}	413
7,8-dipropionyl-	ss	24	55	4a	Chloroform, N_{78}, N_{81}	413
7,8-bis(ethylthio)-	ss	23	60	4a	Chloroform, N_{78}, N_{81}	411
7,8-bis(phenylacetyl)-	ss	25	55	4a	Chloroform, N_{78}, N_{81}	413
7,8-bis(phenylthio)-	ss	23	50	4a	Chloroform, N_{78}, N_{81}	411
Norbornylene	c′(II)c	56	– 173	5	55% *cis*/45% *trans* Polymer, N_{54}	415
	c′(I)c	62	– 73	5	55% *cis*/45% *trans* Polymer, N_{54}	415
	c′(I)c	62	25	4b	55% *cis*/45% *trans* Polymer, N_{54}	415
	lc	65	57	5	55% *cis*/45% *trans* Polymer, N_{54}	415
5-Trimethylsilyl-2-	c′c	38	– 173	5		416
	cc	40	– 173	5	Overcooled monomer	416

TABLE 1. *cont'd*

Monomer	State of monomer and polymer (xx)	$-\Delta H_{xx}$ (kJ/mol)	Temp. (°C)	Method	Solvent/Notes	Refs.
	c'c	39	−73	5		416
	cc	46	−73	5	Overcooled monomer	416
	lc	52	25	4b		416
	lc	55	107	5		416
N-7,7-Triacyanobenzoquinonemethideimine	ss	22	55	4a	Toluene N_{78}, N_{82}	438

TABLE 2. MONOMERS GIVING POLYMERS CONTAINING HETEROATOMS IN THE MAIN CHAIN

Monomer	State of monomer and polymer (xx)	$-\Delta H_{xx}$ (kJ/mol)	Temp. (°C)	Method	Solvent/Notes	Refs.
2.1. MONOMERS GIVING POLYMERS CONTAINING O IN THE MAIN CHAIN, BONDED TO CARBON ONLY						
2.1.1. ETHERS AND ACETALS (listed by increasing ring size of monomer)						
2-RINGS (aldehydes and ketones)						
Acetaldehyde	lc	0	25	4b	N_{11}	48
	lc'	64.5	25	2	To poly(vinyl alcohol)	195
	lc	62.5	25	2	To poly(vinyl alcohol)	195
	c'c	31	−173	5		417
	lc	34	−73	5		417
	lc	36	25	2,4b		417
–, bromochlorofluoro-	sc'	36.0		4a	Toluene, N_{74}	233
–, bromodichloro-	sc'	31.2		4a	Toluene, N_{74}	344
–, bromodifluoro-	sc'	43.4		4a	Toluene, N_{74}	344
–, dibromochloro-	sc'	26.0		4a	Toluene, N_{74}	344
–, dibromofluoro-	sc'	29.0		4a	Toluene, N_{74}	344
–, dichlorofluoro-	sc'	56.2		4a	Toluene, N_{74}	344
–, difluorochloro-	sc'	51.0		4a	Toluene, N_{74}	344
–, tribromo-	sc'	19.6		4a	Toluene, N_{74}	344
–, trichloro-	gc'	71 ± 8	50	4a		50
	gc'	65.5	−50	4a		166
	gc	51	−50	4a		166
	lc'	17	57	5		418
	lc'	38 ± 8	50	4a		50
	lc'	34	25	3		418
	lc'	34.5	−50	4a		166
	lc	20	−50	4a		166
	lc'	30	−73	5		418
	cc'	25	−173	5		418
	ss	14.5	−50	4a	Tetrahydrofuran	167
	sc'	33.5	13	4a	Pyridine	50
	sc'	39	10	4a	*n*-Heptane	166
	sc'	37.8		4a	Toluene, N_{74}	344
–, trifluoro-	gc	64.5	45	4a		129
	lc	47	25	4a	Dichloromethane	322
	sc	50.8	25	4a	Dichloromethane	322
	sc'	54.9		4a	Toluene, N_{74}	344
Acetone	gg	−12	25	4b		234
	gc	10	25	4b		144,148
	lc	−25	25	4b		48,234
Butanal	lc	20.5	20	3		161
	sc	35.5	18	4a	*n*-Hexane (9 kbar), N_{12}	161
	sc	21.5	20	3	*n*-Hexane (1 bar, 1M), N_{12}	161
4,7-Dioxaoctanal	lc	15.9	−80	4a	N_{69}	330
	ss	16.7	−80	4a	THF	330
Formaldehyde	gc'	66	25	4a	N_{13}	49,164, 165,132
	gc'	55	25	2		7,49
Heptanal	c'c'	20	−173	5		419
	c'c	10	−173	5		419

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TABLE 2. *cont'd*

Monomer	State of monomer and polymer (xx)	$-\Delta H_{xx}$ (kJ/mol)	Temp. (°C)	Method	Solvent/Notes	Refs.
	c′c′	22	−73	5		419
	c′c	8	−73	5		419
	lc(I)	39	25	3	N_{77}	419
	lc	33	25	3		419
	ll	36	97	5		419
Hexanal	c′c′	8	−173	5		420
	c′c	7	−173	5		420
	c′c′	12	−73	5		420
	c′c	10	−73	5		420
	ll	27	25	3		420
	ll	28	67	5		420
Octanal	lc	14.7	−75	4a	N_{69}	330
	sc	14.2	−75	4a	THF	330
4-Oxapentanal	lc	19.7	−80	4a	N_{69}	329
	ls	20.1	−80	4a		329
Pentanal	lc	22.7	−75	4a	N_{69}	328
	sc	22.2	−75	4a	THF	328
o-Phthalaldehyde	ss	22	−70	4a	Dichloromethane, cyclopolymer	154
Propanal	c′c′	5	−173	5		421
	c′c	2	−173	5		421
	lc′	15	−73	5		421
	lc	12	−73	5		421
	lc′	19	25	3		421
	lc	14	25	3		421
	lc′	21	57	5		421
	lc	15	57	5		421
–, 2,2-dichloro-	gc	50	−65	4a		172
	lc	20.5	−65	4a		172
	ss	17	−65	4a	Tetrahydrofuran	172
–, 2-chloro, 2-methyl-	gc	47	−65	4a		172
	lc	19.5	−65	4a		172
	ss	19.5	−65	4a	Tetrahydrofuran	172
–, 2-methyl-	gc	46	−65	4a		166
	lc	16	−65	4a		166
	ss	15.5	−65	4a	Tetrahydrofuran	167,172
	ss	16.5	−65	4a	Diethyl ether	166
	ss	22	−65	4a	*n*-Pentane	166
3-RINGS						
Cyclohexene oxide	lc	97	25	2		422
Ethylene oxide	gg	104	25	4b		14
	gc′	140	25	3		168
	gc	127.3	25	2		306
	lc′	102.4	25	2		306
	lc	94.5	25	2		51
Propylene oxide	gg	75.5	25	4b		14,52
Styrene oxide	lc	101.5	26.9	3		14
–, 3-nitro-	lc	101	26.9	3		14
4-RINGS						
Oxetane	gc	81.8	25	4a		325
	lc	51.4	25	4a	N_{17}	325
	ss	81	−9	3	Chloromethane + chloroethane	53
–, 3,3-di(chloromethyl)-	lc	84.5	26.9	3		14
–, 3,3-dimethyl-	ss	67.5	−9	3	Chloromethane + chloroethane	53
– 3,3-di(phenoxymethyl)-	ss	83.5	26.9	3	*o*-Dichlorobenzene	14
5-RINGS						
1,3-Dioxolane	gg	26	20	4b		54
	gc	50	25	4a		292
	gc	52.0	57	4a	N_{60}	353
	lc	24	100	4b	N_{14}	198
	lc	17	90	4a	N_{69}, N_{78}	437
	lc	15	25	4a	N_{17}	292

TABLE 2. *cont'd*

Monomer	State of monomer and polymer (xx)	$-\Delta H_{xx}$ (kJ/mol)	Temp. (°C)	Method	Solvent/Notes	Refs.
	lc	23	40	4a	N_{15}	159
	ls	6.5	55	4a		219
	ss	22	0	4a/3	Dichloromethane	133,159,220
	ss	27	20	4a	Chloroethane	293
	ss	15	30	4a	Benzene	134
	ss	17.5	70	3	Dichloromethane	220
	ss	8	75	4a	Toluene, N_{78}	423
–, 4-ethyl-	lc	13.0	–24	4a		333
–, 4,4-dimethyl-	lc	9.6	80	4b		335
–, *cis*-4,5-dimethyl-	lc	12.1	80	4b		335
–, *trans*-4,5-dimethyl-	lc	7.5	80	4b		335
–, 4-isopropyl-	lc	12.1	80	4b		335
–, 4-methyl-	lc	13.4	–8	4a		334
trans-7-Oxabicyclo[4.3.0]nonane	lc	14.0				357
7-Oxa-bicyclo[2.2.1]heptane, 2-alkyl-						
R = H	lc	44.3	25	2		308
R = exo-CH_3	lc	49.7	25	2		308
R = endo-CH_3	lc	45.4	25	2		308
Tetrahydrofuran	gg	21	20	4b		55
	gg	12	25	4b		56
	gc	39.5	25	4a		292
	gc	47.1	50	4a	N_{61}	353
	lc′	29.6	25	2		358
	lc′	38	25	2		56,57
	lc	18.6	25	2		358
	lc	7.5	25	4a	N_{17}	292
	lc	12.5	50	4a		130
	lc	15	30	4a	N_{16}	231
	lc	25.5	25	2		140,208
	ls	23	40	4a		57,58,211
	ss	23	40	4a	Diethyl ether	211
–, 3-methyl-	ls	22.6	–6	4a		342
6-RINGS						
m-Dioxane	gg	0	20	4b		54,59,60
p-Dioxane	ls	–4	20	4a	N_{78}	436
Tetrahydropyran	gg	1.5	20	4b		55,56,59
Trioxane	sc′	17.5	40	4a	1,2-Dichloroethane	178
	sc′	26.5	58	3	1,2-Dichloroethane	212
	sc′	19.5	30	3	Dichloromethane	182,202
	sc′	12.5	30	4a	Nitrobenzene	182
	sc′	21.5	30	3	Nitrobenzene	202
	c′c′	6	30	3	N_{18}	202
	c′c′	11.5	58	3	N_{19}	212
	c′c′	4.5	25	4a		164
	c′c′	5.5	25	2		see 202
7-RINGS						
1,3-Dioxepane	gg	19.5	20	4b		54
	gc	53.9	25	4a		323
	lc	13.0	25	4a	N_{17}	323
	ss	12	75	4a	Toluene, N_{78}	423
	ss	13.5	60	4a	Benzene	134,87
	ss	14	0	4a	1,2-Dichloroethane, N_{78}	424
	ss	15	–30	4a/3	Dichloromethane	136
– 2-butyl	ss	7	–5	4a	1,2-Dichloroethane, N_{78}	424
–, 4-methyl-	ss	9.3	–15	4a	1,2-Dichloroethane	339
–, 2-methyl-	ss	8.8	–15	4a	1,2-Dichloroethane	340
	ss	9	–10	4a	1,2-Dichloroethane, N_{78}	424
1-Oxa-4,5-dithiepane $\boxed{-O(CH_2)_2S_2(CH_2)_2-}$	lc	7.5	26.9	3		61
	ss	9	26.9	3	Dioxane	61
	ss	8	26.9	3	Benzene	61

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TABLE 2. *cont'd*

Monomer	State of monomer and polymer (xx)	$-\Delta H_{xx}$ (kJ/mol)	Temp. (°C)	Method	Solvent/Notes	Refs.
Oxepane	gc	38.6	25	4a		323
	lc	−1.7	25	4a	N_{17}	323
8- AND LARGER RINGS						
2-Butyl-1,3,6-trioxocane	ss	8	10	4a	Toluene, N_{78}	425
1,3-Dioxocane	gg	53.5	20	4b		54
	gc	62.1	25	4a		324
	lc	18.3	25	4a	N_{17}	324
Tetraoxane	sc′	26	30	3	Nitrobenzene	202
	c′c′	3.5	30	3		131,202
	c′c′	4	25	2		see 202
1,3,6-Trioxocane	gc	62.2	5	4a		324
	lc	12.0	25	4a	N_{17}	324
	ss	13	20	4a	Toluene, N_{78}	425
	ss	22	60	4a	Benzene	134
(1,3,6-Trioxocane)$_n$						
$n=1$	ss	16.7	0	4a	Dichloromethane	343
$n=2$	ss	4.6	0	4a	Dichloromethane	343
$n=3-8$	ss	0	0	4a	Dichloromethane	343
(1,3,6,9-Tetraoxacycloundecane)$_n$						
$n=1$	ss	13.4	0	4a	Dichloromethane	343
$n=2$	ss	3.8	0	4a	Dichloromethane	343
$n=3$	ss	3.8	0	4a	Dichloromethane	343
$n=4-8$	ss	0	0	4a	Dichloromethane	343
1,3,6,9,12-Pentaoxacyclotetradecane)$_n$						
$n=1$	ss	11.3	5	4a	Dichloromethane	343
$n=2$	ss	7.5	5	4a	Dichloromethane	343
$n=3-7$	ss	0	5	4a	Dichloromethane	343
1,3,6,9,12,15-Hexaoxacycloheptadecane)$_n$						
$n=1$	ss	10.5	−2	4a	Dichloromethane	343
$n=2$	ss	2.9	−2	4a	Dichloromethane	343
$n=3-5$	ss	0	−2	4a	Dichloromethane	343
2.1.2. CYCLIC ESTERS						
4-RINGS						
β-Propiolactone	lc	75	25	3		368
	lc′	82	25	3		368
	lc′	80.5	25	2/4b		137
	lc	74	127	3		368
5-RINGS						
γ-Butyrolactone	lc	−5	25	3		368
	lc′	7	25	3		368
	lc	−6	77	3		368
6-RINGS						
2,2-Dimethyltrimethylene carbonate	c′(II)c′(II)	7	−173	5	N_{54}, N_{63}, N_{77}	426
	c′(II)c	−9	−173	5	N_{54}, N_{63}	426
	c′(II)c′(II)	7	25	4b		426
	c′(II)c	−8	25	4b		426
	lc′(I)	18	117	5	N_{63}, N_{77}	426
	ll	12	147	5	N_{63}	426
p-Dioxanone	c′c′	21	−173	5		427
	c′c	6	−173	5		427
	c′c′	21	−73	5		427
	c′c	6	−73	5		427
	c′c′	21	25	2		427
	c′c	4	25	2		427
	ll	17	127	5		427
Ethylene oxalate	c′c	8.6	−173	5		312
	c′c	9.0	−73	5		312
	c′c	10.1	25	2		312
	c′c	8.3	87	5		312

TABLE 2. *cont'd*

Monomer	State of monomer and polymer (xx)	$-\Delta H_{xx}$ (kJ/mol)	Temp. (°C)	Method	Solvent/Notes	Refs.
Glycollide	lc	20.0	142	2		312
	c′c′	34.0	25	2		364
	cc	10.8	25	2		364
DL-Lactide	lc	31.4	277	2		364
	c′c	8.7	25	2		311
	lc	27.0	127	2		311
L-Lactide	ss	25	40	4a	Nitrobenzene, N_{78}	428
	ss	23	105	4a	1,4-Dioxane, N_{78}	429
8-Oxo-7-oxabicyclo[2,2,2]octane	c′c′	20.9	25	2	N_{53}	307
	gc′	90.5	25	2	N_{53}	307
	lc′	34.5	25	2	N_{53}	307
Pentanolactone	lc′	27.5	25	2		314
	lc	10.5	25	2		314
	lc	9.9	77	3		314
7-RINGS						
ε-Caprolactone	lc	17	25	3		368
	lc′	31	25	3		368
	lc	13.7	77	3		368
	ss	15	40	4a	Nitrobenzene, N_{78}	428
Spiroorthoester 2-R-1,4,6-trioxaspiro[4.6] undecane						
R = H	ss	11	−30 to 5	4b	Dichloromethane	430
R = CH_3	ss	8	−50 to 5	4b	Dichloromethane	430
R = CH_3Br	ss	5	−35 to −5	4b	Dichloromethane	430
R = Ph	ss	7	−50 to −10	4b	Dichloromethane	430
8-AND LARGER RINGS						
Heptanolactone	lc	16	127	4b		368
Octanolactone	lc	19	127	4b		368
Nonanolactone	lc	22	127	4b		368
Decanolactone	lc	24	127	4b		368
Undecanolactone	lc	28	25	3		368
	lc′	62	25	3		368
	lc	27	127	3		368
Dodecanolactone	lc	17	127	4b		368
Tridecanolactone	c′c	−2	25	3		368
	c′c′	38	25	3		368
	lc	6	127	3		368
Tetradecanolactone	lc	2	127	4b		368
Pentadecanolactone	c′c	−10	25	1		313
	c′c′	39	25	1		313
	lc	−3	97	1		313
	c′(II)c	−37	−73	1	N_{54}	313
Hexadecanolactone	lc	0	127	4b		368
2.2. MONOMERS GIVING POLYMERS CONTAINING O IN THE MAIN CHAIN, BONDED TO OTHER HETEROATOMS (S, Si, P)						
Cyclotrisiloxane, 1,1,3,3,5,5-hexaethyl	c′(III)c′(II)	4.6	−173	3	N_{54}, N_{63}, N_{77}	431
	c′(II)c′(II)	5	−73	3	N_{54}, N_{63}, N_{77}	431
	c′(II)c	−10	−23	3	N_{54}, N_{63}	431
	c′(I)c′(I)	10	−23	3	N_{54}, N_{63}, N_{77}	431
	c′(I)c	1	25	3	N_{54}, N_{63}	431
	ll	14	25	3	N_{63}	431
	ls	15	170	3	95% Conversion	431
–, hexamethyl	lc	14.5	25	3		84
	lc	23.4	77	3	N_{62}	365
	c′c	2.79	25	3	N_{63}	365
Cyclotetrasiloxane, octamethyl-	lc	−13.4	77	3	N_{62}	365
	lc	−6.4	25	3	N_{63}	365
N,N-Diethylamino-1,3,2-dioxaphosphorinane	ls	−6.3	−20	4a	N_{58}	346
1,3,2-Dioxaphospholan, 2-methoxy-	ss	15		3	Dichloromethane	309
	ss	14		4a	1,1,2,2-Tetrachloroethane	309

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TABLE 2. *cont'd*

Monomer	State of monomer and polymer (xx)	$-\Delta H_{xx}$ (kJ/mol)	Temp. (°C)	Method	Solvent/Notes	Refs.
2-Oxo-1,3,2-dioxaphosphorinane	lc	−6.28	90	4a	N_{59}	347
–, 2-alkoxy-						
R = methyl	ls	2.9	140	4a	Diglyme or DMSO	348
R = methyl	ss	0.8	100	4a	Dichloromethane	356
R = ethyl	ss	−1.0	100	4a	Dichloromethane	356
R = propyl	ss	−2.4	100	4a	Dichloromethane	356
R = trimethyl silyl	ss	−2.7	100	4a	Dichloromethane	356
Sulfur trioxide	gc′	56	13	4a		86
	lc′	12.5	25	4a		86

2.3. MONOMERS GIVING POLYMERS CONTAINING S IN THE MAIN CHAIN, BONDED IN THE CHAIN TO CARBON ONLY (listed by increasing ring size) (polysulfones listed under Table 3. Copolymers)

Carbon disulfide	lc′	23	25	2		179
Thiirane	gg	81	25	4b	N_{20}	69,70,71
	lc	73 ± 4	20	3		173
	sc′	80 ± 4	20	3	Various solvents	173
–, 2,2-dimethyl-	gg	70.5	25	4b	N_{20}	69,70,71
–, *cis*-2,3-dimethyl-	gg	63	25	4b	N_{20}	69,70,71
–, *trans*-2,3-dimethyl-	gg	5.5	25	4b	N_{20}	69,70,71
–, 2-methyl-	gg	71	25	4b	N_{20}	69,70,71
Thietane	gg	80	25	4b	N_{20}	69,70,71
Thioacetone	ls	10.8	50–90	4a	Monomer	327
Thiolane	gg	7.5	25	4b	N_{20}	69,70,71
1,2-Dithiolane $\overline{SSCH_2CH_2CH_2}$	ss	26.5	30	4a	Ethyl alcohol	72
Thiane	gg	−2.5	25	4b	N_{20}	69,70,71
o-Dithiane $\overline{SS(CH_2)_3CH_2}$	lc	2	26.9	3		14
exo-3,4,5-Trithiatricyclo-[5.2.2.0^{2,6}]decane	ss	5.8	40	4a	Toluene, N_{78}	377
exo-3,4,5-Trithiatetracyclo-[5.5.1.0^{2,6}.0^{8,12}]tridec-10-ene	ss	6.6	50	4a	Toluene, N_{78}	376
Thiepane	gg	14.5	25	4b	N_{20}	69,70,71
1,2-Dithiepane $\overline{SS(CH_2)_4CH_2}$	lc	10.5	26.9	3		14
	sc	11.5	26.9	3	Dioxane	14
1,2-Dithiocane $\overline{SS(CH_2)_5CH_2}$	lc	16	26.9	3		14

2.4. MONOMERS GIVING POLYMERS CONTAINING N IN THE MAIN CHAIN, BONDED IN THE CHAIN TO CARBON ONLY (listed by increasing ring size)

2-RINGS						
Butylisocyanate	ss	24	−55	4a	Dimethylformamide, N_{78}	432
3-RINGS						
Ethyleneimine	lc	96.2	27	2		360
–, *N*-(β-trimethylsilylethyl)(TEI)	lc	119	27	2		360
–, – $ZnCl_2 \cdot (TEI)_2$ (complex)	c′c	264	27	2		360
4-RINGS						
Trimethyleneimine,						
–, *N*-(β-trimethylsilylethyl)(TMI)	lc	115	27	2		360
–, –, $ZnCl_2 \cdot (TMI)_2$(complex)	c′c	258	27	2		360
5-RINGS						
8-Oxa-6-azabicyclo[3.2.1]octan-7-one	ss	24	38	4a	Dimethylsulfoxide, N_{78}	433
2-Pyrollidinone	lc	4.5	75	2/4b		62
	lc	3.5	43	3		135
	lc′	12	43	3		135
	c′c′	−5.5	25	2/4b		63
–, 1-methyl-	lc	3.5	25	4b		64
Pyrrole	ss	145	15	3	Acetonitrile	434
	ss	104	30	3	Acetonitrile	434
	ss	60	50	3	Acetonitrile	434

TABLE 2. *cont'd*

Monomer	State of monomer and polymer (xx)	$-\Delta H_{xx}$ (kJ/mol)	Temp. (°C)	Method	Solvent/Notes	Refs.
6-RINGS						
2-Piperidone	lc	9	75	2/4b		62
	c′c′	4.5	25	2/4b		63
–, 1-methyl-	lc	−2	25	4b		64
7-RINGS						
ε-Caprolactam	lc	16.3	186	3		310
	lc	16	75	2		62
	lc	15.5	200	3		65,135,138
	ls	16.5	250	4a		68,67,66
	c′c′	12.5	25	2		63
–, 1-methyl	lc	9.5	25	4b		64
–, 3-methyl	ls	12.5	260	4a		194
–, 3-ethyl	ls	16	240	3		191
–, 3-propyl	ls	16.5	240	3		191
–, 4-ethyl	ls	14.5	240	3		171
–, 5-methyl	lc	16	75	4b		62
	ls	11	200	4a		225
–, 7-methyl	lc	16	75	4b		62
	ls	16.5	225	4a		226
–, 7-ethyl	ls	14.5	240	3		191
–, 7-propyl	ls	14.5	240	3		191
8-RINGS						
2-Oxo-hexamethyleneimine	lc	22	75	4b		62
	lc	22	230	3		138,207
	c′c′	24	25	2		63
–, 1-methyl-	lc	16.5	25	4b		64
–, 4-ethyl-	ls	22	240	3		171
–, 7-ethyl-	ls	21.5	240	3		171
9–13-RINGS						
Ω-Dodecalactam	lc	10.6	186	3		310
2-Oxo-heptamethyleneimine	lc	32.5	230	3		138,189
2-Oxo-octamethyleneimine	c′c′	23.5	25	2/4b		138
2-Oxo-nonamethyleneimine	c′c′	11.5	25	2/4b		138
2-Oxo-decamethyleneimine	c′c′	−2	25	2/4b		138
2-Oxo-undecamethyleneimine	lc	~0	230	3		138,139
	ls	13	290	4a		139
2.5. MONOMERS GIVING POLYMERS CONTAINING N IN THE MAIN CHAIN, BONDED TO OTHER HETEROATOMS (P)						
Phosphonitrile chloride						
–, cyclic trimer	gc	61	230	3		125
	lc	6	230	3		125
–, cyclic tetramer	gc	68	230	3		125
	lc	4	230	3		125
–, cyclic pentamer	gc	79.5	230	3		125
	lc	3.5	230	3		125
–, cyclic hexamer	gc	88	230	3		125
	lc	1.5	230	3		125
–, cyclic heptamer	gc	96.5	230	3		125
	lc	0	230	3		125
2.6. OTHER MONOMERS GIVING POLYMERS NOT LISTED ABOVE						
Carbon C (graphite)	c′c′	−39.5	25	2	Linear polymer (carbyne)	187
4,7-bis[Cyano(ethoxycarbonyl) methylene]-4,7-dihydrobenzofuran	ss	21.6	60		Chloroform, N_{78}, N_{79}	435
4-(2,3-Diphenyl cyclopropenyl-idene)cyclohexa-2,5-dienone	ss	21.2	−15	4a	Dichloromethane, N_{67}	317
1,3-Disilacyclobutane, 1,1,3,3-tetramethyl-	lc	73.9	25	2		359
Selenium Se_8	ls	−9.5	400	4a		85

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TABLE 2. *cont'd*

Monomer	State of monomer and polymer (xx)	$-\Delta H_{xx}$ (kJ/mol)	Temp. (°C)	Method	Solvent/Notes	Refs.
1-Silacyclobutane, 1,1-dimethyl-	lc′	92.7	25	2		359
	lc	85.4	25	2		359
–, 1-phenyl, 1-methyl-	lc	91.5	25	2		359
Sulfur, S_6	ls	10	138	2	N_{72}	380
–, S_7	ls	4	138	2	N_{72}	380
–, S_8	ls	−19	160	4a	N_{71}	380
–, S_8	ls	−13.5	200	4a		73,74

TABLE 3. COPOLYMERS (listed alphabetically under Monomer A) N_{21}

Monomer A	Monomer B	State of monomer and polymer xx	$-\Delta H_{xx}$ (kJ/mol)	Temp. (°C)	Method	Solvent/Notes	Refs.
Acrylonitrile	Methacrylic acid,	sc		25	3	Emulsion (aq.)	38
	Methyl ester	ss		30.5	3		76
	Styrene	ss		20	3		76,201
	Vinyl acetate	ss		20	3		76
	Vinylidene chloride	sc		25	3	Emulsion(aq.), N_{22}	75
Allyl chloride	Maleic anhydride	ss	74	74.5	3		34
bis-(*o*-Aminophenyl)-2,2′ dibenzymidazoleoxide	Terephthalic acid	c′c	24	−173	5	Polymer + H_2O (c′)	445
		c′c	18	−73	5	Polymer + H_2O (c′)	445
		c′c	6.5	25	2	Polymer + H_2O (l)	445
	–, dichloride	c′c	136	−173	5	Polymer + HCl (c′)	445
		c′c	96	−73	5	Polymer + HCl (g)	445
		c′c	83.5	25	2	Polymer + HCl (g)	445
	–, dimethylether	c′c	31.5	−173	5	Polymer + CH_3OH (c′)	445
		c′c	16.5	−73	5	Polymer + CH_3OH (l)	445
		c′c	5.5	25	2	Polymer + CH_3OH (l)	445
1,3-Butadiene	Styrene	lc		25	2		45
	Sulfur dioxide						197
1-Butene	Sulfur dioxide	ss	44.5	26.9	3	Excess B	5
		ss	43.5	55	4a	Excess B	77
–, 3-methyl-	Sulfur dioxide	lc′	46	35	4a	From B-rich mixture	199,200
		lc	22	25	4a	From A-rich mixture	199,200
2-Butene, *cis*	Sulfur dioxide	ss	42.5	26.9	3	Excess B	5
		ss	43.5	25	4a	Excess B	5
–, *trans*	Sulfur dioxide	ss	39.5	26.9	3	Excess B	5
		ss	40.5	25	4a	Excess B	5
Cyclohexene	Sulfur dioxide	ss	38	25	4a	Excess B	78
Cyclopentene	Sulfur dioxide	ss	45	26.9	3	Excess B	5
1,3-Dioxane	1,3-Dioxolane	ss	16	20	4a	Methylene dichloride, N_{78} $\Delta H_{BA} = -11$	446
Fumaric acid, diethyl ester	Vinyl acetate	ss?	78	76.8	3	Excess B, N_{22}	79
Fumaroyl chloride	Styrene	ss	80	74.5	3	Hexane	34
	Styrene, α-methyl-	ss	71.5	74.5	3	Excess B	34
Isobutene	Sulfur dioxide	lc	31	25	2		82
		lc	39.5	0	4a	N_{23}	83
1-Hexadecene	Sulfur dioxide	ss	42	26.9	3	Chloroform	5
		ss	40	30	4a	Chloroform	80
1-Hexene	Sulfur dioxide	ss	43.5	26.9	3	Excess B	5
Isopropenyl acetate	Maleic anhydride	sc	74.5	76.8	3		79
Maleic acid, diethyl ester	Vinyl acetate	ss?	83.5	76.8	3	Excess B, N_{22}	79
Maleic anhydride	Allyl chloride	ss	74	74.5	3		34
	Isopropenyl acetate	sc	74.5	76.8	3		79
	Styrene	ss	81	74.5	s	Benzene	34
		ss	82.5	74.5	3	Acetonitrile	34

TABLE 3. *cont'd*

Monomer A	Monomer B	State of monomer and polymer xx	$-\Delta H_{xx}$ (kJ/mol)	Temp. (°C)	Method	Solvent/Notes	Refs.
	Styrene, α-methyl-	ss	72.5	74.5	3	Excess B	34
	Vinyl acetate	sc	84.5	76.8	3	Excess B	79
	Vinyl *n*-butyl ether	ss	90	74.5	3	Benzene	34
Maleimide	Styrene	ss	87.5	74.5	3	Acetonitrile	34
	Styrene, α-methyl-	ss	72	74.5	3	Acetonitrile	34
Methacrylic acid	Methacrylic acid, methyl ester	lc		25	2		206
–, methyl ester	Acrylonitrile	sc		25	3	Emulsion (aq.)	38
		ss		30.5	3		76
	Methacrylic acid	lc		25	2		206
	Styrene	ss		24	3		81
	Vinyl acetate	ss		24	3		81
Propene	Sulfur dioxide	sc	42.5	26.9	3	Excess B	5
Styrene	Acrylonitrile	ss		20	3		76,201
	1,3-Butadiene	lc		25	2		45,
	Fumaroyl chloride	ss	80	74.5	3	Hexane	34
	Maleic anhydride	ss	81	74.5	3	Benzene	34
		ss	82.5	74.5	3	Acetonitrile	34
	Maleimide	ss	87.5	74.5	3	Acetonitrile	34
	Methacrylic, acid, methyl ester	ss		24	3		81
	Vinyl acetate	ss		35	3		81
–, α-methyl-	Fumaroyl chloride	ss	71.5	74.5	3	Excess A	34
	Maleic anhydride	ss	72.5	74.5	3	Excess A	34
	Maleimide	ss	72	74.5	3	Acetonitrile	34
Sulfur dioxide	Butadiene						197
	1-Butene	ss	44.5	26.9	3	Excess A	5
		ss	43.5	55	4a	Excess A	77
	–, 3-methyl-	lc′	92	35	4a	From A-rich mixture	199
		lc	44.5	25	4a	From B-rich mixture	199
	2-Butene, *cis*	ss	42.5	26.9	3	Excess A	5
		ss	43.5	25	4a	Excess A	5
	–, *trans*	ss	39.5	26.9	3	Excess A	5
		ss	40.5	25	4a	Excess A	5
	Cyclohexene	ss	38	25	4a	Excess A	78
	Cyclopentene	ss	45	26.9	3	Excess A	5
	1-Hexadecene	ss	42	26.9	3	Chloroform	5
		ss	40	30	4a	Chloroform	80
	1-Hexene	ss	43.5	26.9	3	Excess A	5
	Isobutene	lc	31	25	2		82
		lc	39.5	0	4a	N_{24}	83
	Propene	sc	42.5	26.9	3	Excess A	5
Vinyl acetate	Acrylonitrile	ss		20	3		76
	Fumaric acid, diethyl ester	ss?	78	76.8	3	Excess A, N_{22}	79
	Maleic acid, diethyl ester	ss?	83.5	76.8	3	Excess A, N_{22}	79
	Maleic anhydride	sc	84.5	76.8	3	Excess A	79
	Methacrylic acid, methyl ester	ss		24	3		81
	Styrene	ss		35	3		81
Vinyl *n*-butyl ether	Maleic anhydride	ss	90	74.5	3	Benzene	34
Vinylidene chloride	Acrylonitrile	sc		25	3	Emulsion (aq.), N_{22}	75

B. ENTROPIES OF POLYMERIZATION

Symbols: The subscripts to $\Delta S°$ denote the state of the monomer (first letter) and the state of the polymer (second letter) as in Section A. The standard state of the monomer is 1 atm for the gaseous state and 1*M* in solution, unless otherwise stated. In all cases where monomer or polymer is present in solution, the value of $\Delta S°$ will depend to some extent on the composition. Where the polymer is crystalline, $\Delta S°$ will depend on the degree of crystallinity. ΔS values are in (J/K) per mol of monomer and are generally the limiting values for high degree of polymerization (1 kcal = 4.187 kJ).

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Precision: generally 0.5–8.0 (J/K/mol)

Methods of determination: (numbering conforms with that in Section A)
1 Third law or statistical.
4a Thermodynamic (van't Hoff Equation).
4b Semiempirical rules applied to evaluate entropy of monomer or polymer or both.

TABLE 4. MONOMERS GIVING POLYMERS CONTAINING MAIN CHAIN CARBON ONLY

Monomer	State of monomer and polymer xx	$-\Delta S^{\circ}_{xx}$ (J/K/mol)	Temp. (°C)	Method	Solvent/Notes	Refs.
4.1. MAIN CHAIN ACYCLIC CARBON ONLY						
4.1.1. DIENES						
1,3-Butadiene	lc	89	25	1		95,96
	lc	84	25	1	*cis*-1,4-Polymer	97
Isoprene	lc	101	25	1		100,101
4.1.2. MONOMERS GIVING POLYMERS WITHOUT OR WITH ALIPHATIC SIDE CHAINS WHICH CONTAIN ONLY C, H						
4.1.2.1. Olefins (listed by increasing carbon number)						
Ethylene	c′c′	66	−173	1	Isotactic poly(-1-butene)	385
	c′c	59	−173	1	Isotactic poly(-1-butene)	385
	gc′	338	−73	1	Isotactic poly(-1-butene)	385
	gc	331	−73	1	Isotactic poly(-1-butene)	385
	gg	142	25	4b		2,87
	gc	155	25	4b		11
	gc	158	25	1		88–91
	gc′	172	25	4b		11
	gc′	174	25	1	100% Cryst. polymer	88–91
	gc′	336	25	1	Isotactic poly(-1-butene)	385
	gc	325	25	1	Isotactic poly(-1-butene)	385
	gc′	334	127	1	Isotactic poly(-1-butene)	385
	gc	317	127	1	Isotactic poly(-1-butene)	385
	gl	311	227	1	Isotactic poly(-1-butene)	385
Propene	gg	167	25	4b		5
	gc′	191	25	1	Syndiotactic polymer	186
	gc′	205	25	1	Isotactic polymer	207
	lc	113	25	4b		5
	lc	116	25	1	Isotactic polymer	88
	lc	116	25	1	Atactic polymer	88,92
	lc′	136	25	1	100% Cryst. isotactic	88,92
1-Butene	lc′	75	−173	1	Isotactic polymer	385
	lc	69	−173	1	Isotactic polymer	385
	lc′	114	−73	1	Isotactic polymer	385
	lc	107	−73	1	Isotactic polymer	385
	gg	166	25	4b		5
	gc′	213	25	1	Isotactic polymer	88,385
	gc	193	25	1	Isotactic polymer	88,385
	lc	113	25	4b		5
	lc	112	25	1	Isotactic polymer	88
	lc′	141	25	1	100% Cryst. isotactic	88
	gc′	204	127	1	Isotactic polymer	385
	gc	187	127	1	Isotactic polymer	385
	gl	182	227	1	Isotactic polymer	385
2-Butene, *cis*	c′c′	21	−173	1	Isotactic polymer	385
	c′c	14	−173	1	Isotactic polymer	385
	lc′	106	−73	1	Isotactic polymer	385
	lc	99	−73	1	Isotactic polymer	385
	gg	163	25	4b		5
	lc	104	25	4b		5
	gc′	201	25	1	Isotactic polymer	385
	gc	190	25	1	Isotactic polymer	385
	gc′	196	127	1	Isotactic polymer	385
	gc	179	127	1	Isotactic polymer	385
	gl	172	227	1	Isotactic polymer	385

TABLE 4. *cont'd*

Monomer	State of monomer and polymer xx	$-\Delta S^{\circ}_{xx}$ (J/K/mol)	Temp. (°C)	Method	Solvent/Notes	Refs.
–, *trans*	c′c′	17	– 173	1	Isotactic polymer	385
	c′c	10	– 173	1	Isotactic polymer	385
	lc′	100	– 73	1	Isotactic polymer	385
	lc	93	– 73	1	Isotactic polymer	385
	gg	159	25	4b		5
	lc	100	25	4b		5
	gc′	195	25	1	Isotactic polymer	385
	gc	194	25	1	Isotactic polymer	385
	gc′	193	127	1	Isotactic polymer	385
	gc	175	127	1	Isotactic polymer	385
	gl	170	227	1	Isotactic polymer	385
Isobutene	gg	172	25	4b		5
	lc	112	25	4b		5
	lc	121	25	1		11,93
1-Pentene	c′c′	24	– 173	1		386
	c′c	20	– 173	1		386
	lc′	117	– 73	1		386
	lc	113	– 73	1		386
	lc′	133	25	1		386
	lc	124	25	1		386
	gl	198	127	1		386
	gl	190	227	1		386
–, 4-methyl	c′c′	28	– 173	1		387
	c′c	28	– 173	1		387
	lc′	111	– 73	1		387
	lc	111	– 73	1		387
	gc′	216	25	1	Isotactic polymer	196
	lc′	131	25	1		387
	lc	131	25	1		387
	gc′	214	127	1		387
	gc	200	127	1		387
	gc′	209	227	1		387
	gc	188	227	1		387
	gl	176	327	1		387
2-Pentene, *cis*	c′c′	20	– 173	1		386
	c′c	16	– 173	1		386
	lc′	114	– 73	1		386
	lc	111	– 73	1		386
	lc′	129	25	1		386
	lc	120	25	1		386
	gl	195	127	1		386
	gl	185	227	1		386
–, 4-methyl	lc′	134	25	1		387
	lc	134	25	1		387
	gc′	220	127	1		387
	gc	205	127	1		387
	gc′	215	227	1		387
	gc	215	227	1		387
	gl	183	327	1		387
2-Pentene, *trans*	c′c′	18	– 173	1		386
	c′c	14	– 173	1		386
	lc′	111	– 73	1		386
	lc	102	– 73	1		386
	lc′	127	25	1		386
	lc	118	25	1		386
	gl	194	127	1		386
	gl	186	227	1		386
–, 4-methyl	lc′	130	25	1		387
	lc	130	25	1		387
	gc′	216	127	1		387
	gc	202	127	1		387
	gc′	214	227	1		387

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TABLE 4. *cont'd*

Monomer	State of monomer and polymer xx	$-\Delta S^{\circ}_{xx}$ (J/K/mol)	Temp. (°C)	Method	Solvent/Notes	Refs.
	gc	194	227	1		387
	gl	182	327	1		387
1-Hexene	lc	113	25	4b		5
1-Heptene	gg	168	25	4b		5
4.1.2.2. Cycloalkanes (listed by increasing ring size)						
Cyclopropane	lc	69	25	4b		11
–, methyl-	lc	85	25	4b		87
–, 1,1-dimethyl-	lc	93	25	4b		87
Cyclobutane	lc	55	25	4b		11
–, methyl-	lc	72	25	4b		87
–, 1,1-dimethyl-	lc	75	25	4b		87
Cyclopentane	lc	43	25	4b		11
–, methyl-	lc	64	25	4b		87
–, 1,1-dimethyl-	lc	66	25	4b		87
Cyclohexane	lc	11	25	4b		11,87
–, methyl-	lc	32	25	4b		87
–, 1,1-dimethyl-	lc	36	25	4b		87
Cycloheptane	lc	16	25	4b	N_{25}	11,94
Cyclooctane	lc	3	25	4b	N_{25}	11,94
Cycloalkenes						
Cyclobutene	ll	52	25	1,4b	*cis*-Polybutadiene	388
	gl	131	25	1,4b	*cis*-Polybutadiene	388
Cyclopentene	c′(I)c	17	– 173	1	*cis*-Polymer	388
	lc	54	– 73	1	*cis*-Polymer	388
	lc	52	25	1,4b	*cis*-Polymer	388
	lc	47.2	25	1	N_{66}	361
	c′(I)c	18	– 173	1	*trans*-Polymer	388
	lc	56	– 73	1	*trans*-Polymer	388
	lc	52	25	1,4b	*trans*-Polymer	388
	lc	51	77	1	*trans*-Polymer	388
Cyclohexene	ss	17	– 65	4b	Toluene, N_{78}	389
Cycloheptene	c′(III)c	– 7	– 173	1	70% *trans*, 30% *cis* Polymer, N_{54}	388
	c′(III)c′	6	– 173	1	70% *trans*, 30% *cis* Polymer, N_{54}	388
	c′(II)c	37	– 73	1	70% *trans*, 30% *cis* Polymer, N_{54}	388
	c′(II)c′	56	– 73	1	70% *trans*, 30% *cis* Polymer, N_{54}	388
	lc	37	25	4b	70% *trans*, 30% *cis* Polymer	388
	lc′	70	25	4b	70% *trans*, 30% *cis* Polymer	388
	ll	36	51	1	70% *trans*, 30% *cis* Polymer	388
Cyclooctene	c′(II)c′	10	– 173	1	48% *trans*, 52% *cis* Polymer, N_{54}	388
	c′(II)c	– 25	– 173	1	48% *trans*, 52% *cis* Polymer, N_{54}	388
	c′(I)c′	49	– 73	1	48% *trans*, 52% *cis* Polymer, N_{54}	388
	c′(I)c	8	– 73	1	48% *trans*, 52% *cis* Polymer, N_{54}	388
	lc′	63	25	1,4b	48% *trans*, 52% *cis* Polymer	388
	lc	9	25	1,4b	48% *trans*, 52% *cis* Polymer	388
	ll	9	57	1	48% *trans*, 52% *cis* Polymer	388
4.1.3. MONOMERS GIVING POLYMERS WITH ALIPHATIC SIDE CHAINS THAT CONTAIN HETEROATOMS						
Acrylonitrile	lc′	109	25	1		193
–, allylester	c′c	– 6	– 173	1		391
	c′c	1	– 73	1		391
	c′c	24	– 8	1		391
	lc	97	– 8	1		391
	lc	85	25	1		391
	lc	96	127	1		391
–, allylloxyethyl	cc	16	– 173	1		393
	lc	29	– 73	1		393
	lc	56	25	1		393
	lc	60	57	1		393
–, *n*-decylester	c′c	4	– 173	1		392
	c′c	8	– 73	1		392

TABLE 4. *cont'd*

Monomer	State of monomer and polymer xx	$-\Delta S^{\circ}_{xx}$ (J/K/mol)	Temp. (°C)	Method	Solvent/Notes	Refs.
	lc	141	25	1		392
	lc	155	127	1		392
–, ethylester	c′c	3	– 173	1		390
	c′c	16	– 73	1		390
	lc	88	25	1		390
	lc	104	127	1		390
	lc	107	177	1		390
Ethacrylic acid						
-methyl ester	ls	105	87	4b		395
Ethylene, tetrafluoro-	gc′	197	– 75.7	1		98,99
	lc′	112	– 75.7	1		98,99
Methacrylic acid	ss	146	80	4b		316
–, ethyl ester	lc	126	120	4a		40
–, methyl ester	lc	117	127	4a		42,43,102
	c′c	9	– 173	1		414
	c′c	24.1	– 73	1		414
	c′c′	40	– 63	1		102,103
	lc	105	25	1		414
	lc	115	77	1		414
	ss	130	127	4a	*o*-Dichlorobenzene	42,49
–, methyl ester deuterated	c′c	10	– 173	1		414
	c′c	26	– 73	1		414
	lc	110	25	1		414
	lc	118	77	1		414
Methacrylonitrile	ss	151	127	4a	Benzonitrile	44,29
α-Methylene pentanolactone	ss	108.8	83	4a	DMF	315
Vinylidene chloride	c′c′	31	– 173	1		397
	c′c	25	– 173	1		397
	lc′	97	– 73	1		213,397
	lc	91	– 73	1		397
	lc′	112	25	1		397
	lc	106	25	1		397
	gc′	201	25	1		397
	gc	195	25	1		397
	gc′	198	127	1		397
	gc	191	127	1		397
4.1.4. MONOMERS GIVING POLYMERS WITH AROMATIC SIDE CHAINS THAT CONTAIN ONLY C, H						
Acenaphtylene	ss	98	60	4a	Toluene, N_{78}	399
Biphenyl, *p*-isopropenyl-	ss	118	– 20	4a	Tetrahydrofuran	16
Naphthalene, 2-isopropenyl-	ss	122	– 5	4a	Tetrahydrofuran	16
	ss	125	10	4a	Toluene, N_{78}	400
Styrene	gg	149	25	4b		25
	lc	90	– 23	1		104
	lc	104	25	1		104
	lc	116	127	1		104
	lc	104	127	4a	N_{26}	28
	lc	105	25	1	Isotactic polymer	88
	lc	112	25	1		105
	lc′	111	25	1	100% Cryst. isotactic	88
–, α-methyl-	lc	110	– 20	4a		32
	ss	130	– 20	4a	Tetrahydrofuran	32,29,16
	ss	51	– 10	4a	*n*-Heptane, N_{78}	402
	ss	47	– 10	4a	Toluene, N_{78}	402
	ss	163.3	22	4a	Cyclohexane	341
–, α-methyl, *p-tert*-butyl-	ss	106.6		4a	Solvent and temp. not stated	381
4.1.5. MONOMERS GIVING POLYMERS WITH AROMATIC SIDE CHAINS AND THAT CONTAIN HETEROATOMS						
α-Acetoxystyrene	ss	83	64	4a	Toluene, N_{78}	401
2-Amino-4-(*N*-alkalino)-6-isopropenyl-1,3,5-triazine						
alkyl = *n*-propyl	ls	117	157	4a		402
isopropyl	ls	114	151	4a		403
isobutyl	ls	114	154	4a		403

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TABLE 4. *cont'd*

Monomer	State of monomer and polymer xx	$-\Delta S^{\circ}_{xx}$ (J/K/mol)	Temp. (°C)	Method	Solvent/Notes	Refs.
sec-butyl	ls	112	148	4a		403
1-methylbutyl	ls	111	146	4a		403
n-pentyl	ls	114	150	4a		403
isopentyl	ls	113	151	4a		403
n-hexyl	ls	112	149	4a		402
n-octyl	ls	110	143	4a		402
n-decyl	ls	109	140	4a		402
n-dodecyl	ls	109	134	4a		402
n-tetradecyl	ls	105	132	4a		402
n-hexadecyl	ls	102	130	4a		402
benzyl	ls	113	157	4a		403
2-Amino-4-alkyl/aryl-amino-6-isopropenyl-1,3,5-triazine						
R_1 = H, R_2 = ethyl	ls	160.5	150	4a		370
R_1 = H, R_2 = propyl	ls	153.8	145	4a		370
R_1 = ethyl, R_2 = ethyl	ls	137.5	130	4a		370
R_1 = propyl, R_2 = propyl	ls	124.6	125	4a		370
R_1 = methyl, R_2 = phenyl	ls	131.7	150	4a		379
R_1 = H, R_2 = *p*-methoxyphenyl	ls	117	160	4a		378
Benzoic acid, *n*-methacryloyloxy-	c′c	−2	−173	4a		394
	c′c	5	−73	4a		394
	c′c	8	25	1,4a		363,394
	ll	85	227	4a		394
Oxazole, 2-isopropenyl, 4,5-dimethyl-	ss	96	20	4a	Tetrahydrofuran	284
Pyridine, 2-isopropenyl-	ss	70	20	4a	Tetrahydrofuran	284
Silane, benzyl dimethyl vinyl-	c′c	0.7	−73	1		355
	lc	83.5	25	1		366
	lc	107.3	77	3		366
–, dimethyl phenyl vinyl-	lc	127.5	25	1		362
–, trimethyl vinyl-	lc	109.5	25	1		367
Thiazole, 2-isopropenyl-	ss	69	20	4a	Tetrahydrofuran	284
p-[bis(Trimethylsilyl)methyl] isopropenylbenzene	ss	110	−30	4a	Tetrahydrofuran	409
N,N,N′,N′-Tetraethyl-4-isopropenylphenyl-phosphonous diamide	ss	10	−55	4a	Tetrahydrofuran	408
4.1.6. OTHER MONOMERS GIVING POLYMERS NOT LISTED ABOVE						
Vinylcyclohexane	c′c	28	−173	1		396
	c′c	3	−173	1		396
	lc′	95	−73	1		396
	lc	75	−73	1		396
	lc′	120	25	1		396
	lc	85	25	1		396
	lc′	136	127	1		396
	lc	102	127	1		396
4.2. WITH AROMATIC OR CYCLIC CARBONS IN THE MAIN CHAIN						
–11,12-Dicyano-2,6-naphtoquinodimethane						
11,12-bis(alkylthio)						
alkyl = butyl	ss	109	30	4a	Oligomer, benzene, N_{78}, N_{80}	410
= *sec*-butyl	ss	109	30	4a	Oligomer, benzene, N_{78}, N_{80}	410
= isopropyl	ss	116	30	4a	Oligomer, benzene, N_{78}, N_{80}	410
= ethyl	ss	115	30	4a	Oligomer, benzene, N_{78}, N_{80}	410
= methyl	ss	114	30	4a	Oligomer, benzene, N_{78}, N_{80}	410
–7,8-Dicyanoquinodimethane						
7,8-bis(butoxycarbonyl)-	ss	37	60	4a	Chloroform, N_{78}, N_{81}	411
7,8-diacetyl-	ss	37	55	4a	Chloroform, N_{78}, N_{81}	412
7,8-dibenzoyl-	ss	38	55	4a	Chloroform, N_{78}, N_{81}	412
7,8-dibutoxycarbonyl-	ss	37	55	4a	Chloroform, N_{78}, N_{81}	412
7,8-diisobutyryl-	ss	39	55	4a	Chloroform, N_{78}, N_{81}	413
7,8-dipropionyl-	ss	37	55	4a	Chloroform, N_{78}, N_{81}	413
7,8-bis(ethylthio)-	ss	37	60	4a	Chloroform, N_{78}, N_{81}	411

TABLE 4. *cont'd*

Monomer	State of monomer and polymer xx	$-\Delta S^\circ_{xx}$ (J/K/mol)	Temp. (°C)	Method	Solvent/Notes	Refs.
7,8-bis(phenylacetyl)-	ss	37	55	4a	Chloroform, N_{78}, N_{81}	413
7,8-bis(phenylthio)-	ss	34	50	4a	Chloroform, N_{78}, N_{81}	411
–4,7-Dihydrobenzofuran						
4,7-bis-[cyano(ethoxycarbonyl)methylene]	ss	41	60	4a	Chloroform, N_{78}	435
Norbornylene	c′(II)c	5	– 173	3	55% *cis*/45% *trans* Polymer N_{54}	415
	c′(I)c	50	– 73	3	55% *cis*/45% *trans* Polymer N_{54}	415
	c′(I)c	50	25	4b	55% *cis*/45% *trans* Polymer N_{54}	415
	lc	58	57	3	55% *cis*/45% *trans* Polymer N_{54}	415
5-trimethylsilyl–2-	c′c	4	– 173	1		416
	cc	13	– 173	1	Overcooled monomer	416
	c′c	14	– 73	1		416
	cc	48	– 73	1	Overcooled monomer	416
	lc	70	25	1		416
	lc	81	107	1		416
N,7,7-Tricyanobenzoquinonemethideimine	ss	38	55	4a	Toluene, N_{78}, N_{81}	438

TABLE 5. MONOMERS GIVING POLYMERS CONTAINING HETEROATOMS IN THE MAIN CHAIN

Monomer	State of monomer and polymer xx	$-\Delta S^\circ_{xx}$ (J/K/mol)	Temp. (°C)	Method	Solvent/Notes	Refs.
5.1. MONOMERS GIVING POLYMERS CONTAINING O IN THE MAIN CHAIN, BONDED TO CARBON ONLY						
5.1.1. ETHERS AND ACETALS (listed by increasing ring size of monomer)						
2-RINGS (aldehydes and ketones)						
Acetaldehyde	c′c	– 6	– 173	1		417
	lc	14	– 73	1		417
	lc	21	25	1		417
–, bromochlorofluoro-	sc′	122		4a	Toluene, N_{74}	233
–, bromodichloro-	sc′	122		4a	Toluene, N_{74}	344
–, bromodifluoro-	sc′	135		4a	Toluene, N_{74}	344
–, dibromochloro-	sc′	116		4a	Toluene, N_{74}	344
–, dibromofluoro-	sc′	114		4a	Toluene, N_{74}	344
–, dichlorofluoro-	sc′	179		4a	Toluene, N_{74}	344
–, difluorochloro-	sc′	152		4a	Toluene, N_{74}	344
–, tribromo-	sc′	100		4a	Toluene, N_{74}	344
–, trichloro-	gc′	190 ± 30	50	4a		50
	lc′	95 ± 30	50	4a		50
	sc′	134		4a	Toluene, N_{74}	344
	sc′	117	13	4a	Pyridine, N_{27}	50
	ss	52	– 50	4a	Tetrahydrofuran	167
	sc′	142	10	4a	*n*-Heptane	166
–, trichloro	cc′	37	– 173	1		418
	lc′	69	– 73	1		418
	lc′	80	25	1		418
	lc′	30	57	1		418
–, trifluoro-	gc	187	45	4a		129
	lc	97	25	4a	Dichloromethane	322
	sc′	155		4a	Toluene, N_{74}	344
	sc	142.7	25	4a	Dichloromethane	322
Acetone	gc	188	25	4b		144,148
Butanal	sc	122	10	4a	*n*-Hexane [9 kbar], N_{12}	161
4,7-Dioxaoctanal	lc	67.4	– 80	4a	N_{69}	330
	ss	77.0	– 80	4a	THF	330
Formaldehyde	gg	124	25	1		141,142
	gc′	174	25	1		106
	gc′	169	25	4a	N_{28}	164,165
Heptanal	c′c′	25	– 173	1		419
	c′c	1	– 173	1		419
	c′c′	32	– 73	1		419

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TABLE 5. *cont'd*

Monomer	State of monomer and polymer xx	$-\Delta S^{\circ}_{xx}$ (J/K/mol)	Temp. (°C)	Method	Solvent/Notes	Refs.
	c′c	4	−73	1		419
	lc′(I)	111	25	1	N_{77}	419
	lc	101	25	1		419
	ll	110	97	1		419
Hexanal	c′c′	19	−173	1		420
	c′c	16	−173	1		420
	c′c′	43	−73	1		420
	c′c	41	−73	1		420
	ll	117	25	1		420
	ll	121	67	1		420
Octanal	lc	57.8	−75	4a	N_{69}	330
	sc	65.7	−75	4a	THF	330
4-Oxapentanal	lc	81.6	−80	4a	N_{69}	329
	ls	93.6	−80	4a		329
Pentanal	lc	97.1	−75	4a	N_{69}	328
	sc	107.6	−75	4a	THF	328
o-Phthalaldehyde	ss	96	−70	4a	Dichloromethane	154
Propanal	c′c′	8	−173	1		421
	c′c	6	−173	1		421
	lc′	69	−73	1		421
	lc	67	−73	1		421
	lc′	85	25	1		421
	lc	76	25	1		421
	lc′	90	57	1		421
	lc	77	57	1		421
–, 2-chloro 2-methyl-	ss	90	−65	4a	Tetrahydrofuran	172
–, 2,2-dichloro-	ss	69	−65	4a	Tetrahydrofuran	172
–, 2-methyl-	ss	74	−65	4a	Tetrahydrofuran	172
	ss	78	−65	4a	Diethyl ether	166
	ss	94	−65	4a	*n*-Pentane	166
3-RINGS						
Ethylene oxide	gc′	174	25		100% Cryst. polymer	210
Propylene oxide	gc′	189	25		Estimated for 100% cryst. polymer	210
4-RINGS						
Oxetane	gc	162.7	25	4a		325
	lc	68.4	25	4a	N_{17}	325
–, 3,3-dichloromethyl	lc	83	25	1		107
5-RINGS						
1,3-Dioxolane	gc′	205	25	1		177
	gc	167	25	1		177
	gc	139	25	4a		292
	gc	147	57	4a	N_{60}	353
	lc′	100	25	1		177
	lc	37	25	4a	N_{17}	292
	lc	67	25	1		177
	lc	63	40	4a	N_{15}	159
	lc	76	100	4a	N_{14}	198
	lc	18	90	4a	N_{69}, N_{78}	398
	ss	78	0	4a	Dichloromethane	133,154
	ss	94	20	4a	Chloromethane	213
	ss	22	75	4a	Toluene, N_{78}	423
	ss	59	30	4a	Benzene	134
–, 4,4-dimethyl-	lc	54.8	80	b4		335
–, *cis* 4,5-dimethyl-	lc	55.3	80	4b		335
–, *trans* 4,5-dimethyl-	lc	55.3	80	4b		335
–, 4-ethyl-	lc	59.4	−24	4a		333
–, 4-isopropyl	lc	60.7	80	4b		335
–, 4-methyl-	lc	53.2	−8	4a		334
7-Oxa-bicyclo[2,2,1]heptane	lc	75.3	25	4b		308
–, 2-exo-methyl-	lc	96.2	25	4b		308
–, 2-endo-methyl-	lc	96.2	25	4b		308

TABLE 5. *cont'd*

Monomer	State of monomer and polymer xx	$-\Delta S^{\circ}_{xx}$ (J/K/mol)	Temp. (°C)	Method	Solvent/Notes	Refs.
trans-7-Oxabicyclo[4.3.0]nonane	lc	55.7				357
Tetrahydrofuran	gc′	177	25	1		140
	gc	112	25	4a		292
	gc	139	25	1		140
	gc	143	50	4a	N_{61}	353
	lc′	100	25	1		140
	lc′	81.9	25	1		358
	lc	47.6	25	1		358
	lc	16	25	4a	N_{17}	292
	lc	62	25	1		140
	lc	41	50	4a		130
	lc	49	30	4a	N_{16}	231
	ls	67	40	4a		57,58
	ss	87	40	4a	Diethyl ether	211
–, 3-methyl-	ls	100.9	−6	4a		342
6-RINGS						
1,3-Dioxane	ls	−23	20	4a	N_{78}, Cyclic oligomer	436
Paraldehyde	gc′	201	25	1	Isotactic polymer	184
	gc′	159	25	1	Syndiotactic polymer	184
Trioxane	gg	64	25	1		141
	gc′	156	25	1		141
	ss	41	40	4a	1,2-Dichloroethane	178
	sc′	42	25	4a	Nitrobenzene	182
	c′c′	18 ± 16	25	4a		164
7-RINGS						
1,3-Dioxepane	gc′	181	25	1		170
	gc′	144	25	1		170
	gc	131.4	25	4a		323
	lc	25.1	25	4a	N_{17}	323
	lc′	77	25	1		170
	lc	39	25	1		170
	ss	48	−30	4a	Dichloromethane	136
	ss	39	60	4a	Benzene	134
	ss	26	75	4a	Toluene, N_{78}	423
	ss	43	0	4a	1,2-Dichloroethane, N_{78}	424
–, 2-butyl	ss	33	−5	4a	1,2-Dichloroethane, N_{78}	424
–, 2-methyl-	ss	37.2	−15	4a	1,2-Dichloroethane	340
	ss	39	−10	4a	1,1-Dichloromethene, N_{78}	424
–, 4-methyl-	ss	38.8	−15	4a	1,2-Dichloroethane	339
Oxepane	gc	91.8	25	4a		323
	lc	−12.4	25	4a	N_{17}	323
1-Oxa-4,5-dithiepane	ss	>12	25	4a	Benzene	61
8-AND LARGER RINGS						
2-Butyl-1,3,6-trioxocane	ss	16	10	4a	Toluene, N_{78}	425
1,3-Dioxocane	gc	121.7	25	4a		324
	lc	10.2	25	4a	N_{17}	324
Tetraoxane	gg	51	25	1		142
	c′c′	−3	27	1		131
1,3,6-Trioxocane	gc	129.1	25	4a		324
	lc	8.0	25	4a	N_{17}	324
	ss	39	60	4a	Benzene	134
	ss	13	20	4a	Toluene, N_{78}	425
$(1,3,6\text{-Trioxocane})_n$						
$n=1$	ss	34.3	0	4a	Dichloromethane	343
$n=2$	ss	12.6	0	4a	Dichloromethane	343
$n=3$	ss	36.4	0	4a	Dichloromethane	343
$n=4$	ss	43.1	0	4a	Dichloromethane	343
$n=5$	ss	47.7	0	4a	Dichloromethane	343
$n=6$	ss	51.5	0	4a	Dichloromethane	343
$n=7$	ss	54.8	0	4a	Dichloromethane	343
$n=8$	ss	57.8	0	4a	Dichloromethane	343

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TABLE 5. *cont'd*

Monomer	State of monomer and polymer xx	$-\Delta S^{\circ}_{xx}$ (J/K/mol)	Temp. (°C)	Method	Solvent/Notes	Refs.
(1,3,6,9-Tetraoxacycloundecane)$_n$						
$n=1$	ss	13.0	0	4a	Dichloromethane	343
$n=2$	ss	20.1	0	4a	Dichloromethane	343
$n=3$	ss	28.9	0	4a	Dichloromethane	343
$n=4$	ss	48.2	0	4a	Dichloromethane	343
$n=5$	ss	52.3	0	4a	Dichloromethane	343
$n=6$	ss	56.9	0	4a	Dichloromethane	343
$n=7$	ss	59.9	0	4a	Dichloromethane	343
$n=8$	ss	62.8	0	4a	Dichloromethane	343
(1,3,6,9,12-Pentaoxacyclotetradecane)$_n$						
$n=1$	ss	8.4	5	4a	Dichloromethane	343
$n=2$	ss	10.0	5	4a	Dichloromethane	343
$n=3$	ss	43.1	5	4a	Dichloromethane	343
$n=4$	ss	49.8	5	4a	Dichloromethane	343
$n=5$	ss	54.4	5	4a	Dichloromethane	343
$n=6$	ss	58.2	5	4a	Dichloromethane	343
$n=7$	ss	61.1	5	4a	Dichloromethane	343
(1,3,6,9,12,15-Hexaoxacycloheptadecane)$_n$						
$n=1$	ss	8.4	−2	4a	Dichloromethane	343
$n=2$	ss	28.1	−2	4a	Dichloromethane	343
$n=3$	ss	44.8	−2	4a	Dichloromethane	343
$n=4$	ss	50.7	−2	4a	Dichloromethane	343
$n=5$	ss	54.8	−2	4a	Dichloromethane	343
5.1.2. CYCLIC ESTERS						
4-RINGS						
β-Propiolactone	lc	54	25	1		368
	lc′	74	25	1		368
	lc	51	127	1		368
5-RINGS						
γ-Butyrolactone	lc	30	25	1		368
	lc′	65	25	1		368
	lc	29	77	1		368
6-RINGS						
2,2-Dimetyltrimethylene carbonate	c′(II)c′(II)	7.7	−173	1	N_{63}	426
	c′(II)c	−35.3	−173	1	N_{63}	426
	c′(II)c′(II)	5.8	25	1	N_{63}	426
	c′(II)c	−35.2	25	1	N_{63}	426
	lc′(I)	38.7	117	1	N_{63}	426
	ll	24.0	147	1	N_{63}	426
p-Dioxanone	c′c′	6	−173	1		427
	c′c	−28	−173	1		427
	c′c′	9	−73	1		427
	c′c	−25	−73	1		427
	c′c′	10	25	1		427
	c′c	−32	25	1		427
	ll	13	127	1		427
Ethylene oxalate	c′c	−12	−173	1		312
	c′c	−9	−73	1		312
	c′c	−5	25	1		312
	lc	15	142	1		312
Glycollide	c′c′	0.3	25	1		364
	cc	−10.5	25	1		364
	lc	17.5	277	1		364
DL-Lactide	c′c	−31.3	25	1		311
	lc	13.0	127	1		311
L-Lactide	ss	41	105	4a	1,4-Dioxane, N_{78}	429
	ss	25	40	4a	Nitrobenzene, N_{78}	428
8-Oxo-7-oxabicyclo[2,2,2]octane	gg	127.7	25	4b	N_{53}	307
	lc′	76.2	25	4b	N_{53}	307

TABLE 5. *cont'd*

Monomer	State of monomer and polymer xx	$-\Delta S^{\circ}_{xx}$ (J/K/mol)	Temp. (°C)	Method	Solvent/Notes	Refs.
Pentanolactone	lc′	65	25	1		314
	lc	15	25	1		314
	lc	13	77	1		314
7-RINGS						
ε-Caprolactone	lc	4	25	1		368
	lc′	54	25	1		368
	lc	8	77	1		368
Spiroorthoester 2-R-1,4,6-trioxaspiro[4.6] undecane						
R = H	ss	−39.6	−10	4a	Dichloromethane, N_{78}	430
= CH_3	ss	−30.7	−25	4a	Dichloromethane, N_{78}	430
= CH_2Br	ss	−20.8	−20	4a	Dichloromethane, N_{78}	430
= Ph	ss	−25.7	−30	4a	Dichloromethane, N_{78}	430
8-AND LARGER RINGS						
Heptanolactone	lc	1	127	4b		368
Octanolactone	lc	−5	127	4b		368
Nonanolactone	lc	−12	127	4b		368
Decanolactone	lc	−18	127	4b		368
Undecanolactone	lc	−24	25	1		368
	lc′	69	25	1		368
	lc	−25	127	1		368
Dodecanolactone	lc	−25	127	4b		368
Tridecanolactone	c′c	−57	25	1		368
	c′c′	50	25	1		368
	lc	−26	127	1		368
Tetradecanolactone	lc	−25	127	4b		368
Pentadecanolactone	c′c	−41	25	1		313
	c′c′	86	25	1		313
	lc	−23	97	1		313
	c′(II)c	−109	−73	1	N_{54}	313
Hexadecanolactone	lc	−21	127	4b		368
5.2. MONOMERS GIVING POLYMERS CONTAINING O IN THE MAIN CHAIN, BONDED TO OTHER HETEROATOMS (S, Si, P)						
Cyclotrisiloxane, 1,1,3,3,5,5-hexaethyl	c′(III)c′(II)	7	−173	1	N_{54}, N_{63}, N_{77}	431
	c′(II)c′(II)	0	−73	1	N_{54}, N_{63}, N_{77}	431
	c′(II)c	−62	−23	1	N_{54}, N_{63}	431
	c′(I)c′(I)	9	−23	1	N_{54}, N_{63}, N_{77}	431
	c′(I)c	−22	25	1	N_{54}, N_{63}	431
	ll	25	25	1	N_{63}	431
hexamethyl-	lc	3.03	77	1		365
	c′c	−51.0	25	1		365
Cyclotetrasiloxane, octamethyl-	lc	−190	77	1		365
	lc	−194.4	25	1		365
N,N-Diethylamino-1,3,2-dioxaphosphorinane	ls	−20.9	−20	4a	N_{58}	346
1,3,2-Dioxaphospholan, 2-methoxy-	ss	13.5		4a	1,1,2,2-Tetrachloroethane	309
2-Oxo-1,3,2-dioxaphosphorinane	lc	−19.3	90	4a	N_{59}	347
−, 2-alkoxy-						
R = methyl	ls	11.7	140	4a	Diglyme or DMSO	348
R = methyl	ss	2.5	100	4a	Dichloromethane	356
R = ethyl	ss	−1.5	100	4a	Dichloromethane	356
R = propyl	ss	−4.5	100	4a	Dichloromethane	356
R = trimethyl silyl	ss	−6.0	100	4a	Dichloromethane	356
Sulfur trioxide	gc′	178	41	4a		86
5.3. MONOMERS GIVING POLYMERS CONTAINING N IN THE MAIN CHAIN, BONDED IN THE CHAIN TO CARBON ONLY (listed by increasing ring size)						
3-RINGS						
Ethyleneimine	lc	51.9	27	1		360
−, *N*(β-trimethylsilyl ethyl)-(TEI)	lc	113	27	1		360

Notes page II-406; References page II-407

TABLE 5. *cont'd*

Monomer	State of monomer and polymer xx	$-\Delta S^{\circ}_{xx}$ (J/K/mol)	Temp. (°C)	Method	Solvent/Notes	Refs.
–,–, $ZnCl_2(TEI)_2$(complex)	c′c	114	27	1		360
4-RINGS						
Trimethyleneimine, *N*-(β-trimethylsilyl ethyl)-(TMI)	lc	83.0	27	1		360
–, $ZnCl_2(TEI)_2$(complex)	c′c	37.2	27	1		360
5-RINGS						
Bicyclic oxalactam	ss	72	38	4a	Dimethylsulfoxide	433
2-Pyrrolidinone	c′c′	31	25	1/4b		63
6-RINGS						
2-Piperidone	c′c′	25	25	1/4b		63
7-RINGS						
ε-Caprolactam	ls	29	250	4a		68
	c′c′	– 5	25	1		63
–, 3-methyl-	ls	11	260	4a		194
–, 5-methyl-	ls	16	200	4a		225
–, 7-methyl-	ls	21	225	4a		226
8-RINGS						
2-Oxo-hexamethyleneimine	c′c′	– 17	25	1		63
N. B. Values for 9–13 rings by probably unreliable extrapolation of $\Delta S_{c'c'}$ for 5–8 rings are given in Ref. 138						
13-RINGS						
2-Oxo-undecamethyleneimine	ls	16	290	4a		139
5.4. OTHER MONOMERS GIVING POLYMERS NOT LISTED ABOVE						
4-(2,3-Diphenyl cyclopropenylidene)cyclohexa-2,5-dienone	ss	69.4	– 15	4a	Dichloromethane, N_{67}	317
1,3-Disilacyclobutane, 1,1,3,3-tetramethyl-	lc	18.1	25	1		359
N-Phenylmaleimide	ss	86	55	4a	DMF, N_{78}	440
Selenium Se_g	ls	– 27	200	4a	From estimated T_e	88,111
1-Silacyclobutane, 1,1-dimethyl-	lc′	85.4	25	1		359
	lc	71.2	25	1		359
–, 1-phenyl 1-methyl-	lc	57.4	25	1		359
Sulfur, S_6	ls	2	80	1	N_{73}	380
–, S_7	ls	– 11	80	1	N_{73}	380
–, S_8	ls	– 44.7	160	4a	N_{71}	380
	ls	– 31	159	4a		73,74,111
Thioacetone	ls	48.9	50–90	4a	Monomer	327
exo-3,4,5-Trithiatricyclo-[5.2.1.0^{2,6}]decane	ss	31.4	40	4a	Toluene, N_{76}	377
exo-3,4,5-Trithiatetracyclo-[5.5.1.0^{2,6}.0^{8,12}]tridec-10-ene	ss	29.3	50	4a	Toluene, N_{76}	376

TABLE 6. COPOLYMERS (listed alphabetically under Monomer A)

Monomer A	Monomer B	State of monomer and polymer, xx	$-\Delta S^{\circ}_{xx}$ (J/K/mol)	Temp. (°C)	Method	Solvent/Notes	Refs.
Bis-(*o*-aminophenyl)-2,2′ dibenzimidazoleoxide	Terephthalic acid	c′c	19	– 173	1	Polymer + H_2O (c′)	445
		c′c	– 17	– 73	1	Polymer + H_2O (c′)	445
		c′c	– 112	25	1	Polymer + H_2O (l)	445

TABLE 6. *cont'd*

Monomer A	Monomer B	State of monomer and polymer, xx	$-\Delta S^\circ_{xx}$ (J/K/mol)	Temp. (°C)	Method	Solvent/Notes	Refs.
	–, dichloride	c′c	−33	−173	1	Polymer + Hcl (c′)	445
		c′c	−295	−73	1	Polymer + Hcl (g)	445
		c′c	−320	25	1	Polymer + HCl (g)	445
	–, dimethylester	c′c	−13	−173	1	Polymer + CH_3OH (c′)	445
		c′c	−108	−73	1	Polymer + CH_3OH (l)	445
		c′c	−160	25	1	Polymer + CH_3OH (l)	445
1,3-Butadiene	Styrene	lc		30	1		108
1-Butene	Sulfur dioxide	lc	116	25	1		109
		ss	145	64	4a	Excess B	110
–, 3-methyl-	Sulfur dioxide	lc	162	35	4a	Excess B	199,200
		lc	81	25	4a	Excess A	199,200
2-Butene, *cis*	Sulfur dioxide	ss	146	25	4a	Excess B	5
–, *trans*	Sulfur dioxide	ss	140	25	4a	Excess B	5
Cyclopentene	Sulfur dioxide	ss	134	102	4a	Excess B	110
1,3 Dioxane	1,3 Dioxolane	ss	57	20	4a	Methylene dichloride, N_{78}, $\Delta S_{BA} = -34$	446
1-Hexadecene	Sulfur dioxide	ss	139	30	4a	Chloroform	110
1-Hexene	Sulfur dioxide	lc	116	25	1		109
		ss	145	60	4a	Excess B	110
Isobutene	Sulfur dioxide	lc	134	0	4a	N_{23}	83
Methacrylic acid	Methacrylic acid, methyl ester						206
Propene	Sulfur dioxide	lc	117	25	1		109
		sc	130	90	4a	Excess B	110
	Ethylene	gc	172	25	1	31 mol% A in copolymer, N_{30}	222

C. CEILING TEMPERATURES AND EQUILIBRIUM MONOMER CONCENTRATIONS

Most addition polymerization reactions are exothermic and exentropic. The free energy of polymerization per monomer unit therefore becomes less negative as the temperature is raised. At the *ceiling temperature* T_c, the free energy of polymerization under the prevailing conditions is zero, and above this temperature, polymerization to long-chain polymer is impossible (just as in physical aggregation a liquid cannot form a solid when the temperature is above the melting point). The reverse phenomenon of a *floor* temperature is also known, e.g., for sulfur.

In general a pure liquid monomer which gives an *insoluble polymer* will have a single well-defined ceiling temperature, given by $T_c = \Delta H_{lc}/\Delta S_{lc}$. A pure liquid monomer which gives a *soluble* polymer will have a series of ceiling temperatures corresponding to different percentage conversions of monomer to polymer. The condition for equilibrium is then

$$-\Delta\bar{G}_1 + \Delta G_{lc} + \Delta\bar{G}_2 = 0$$

The partial molar free energy per mol of monomer, $\Delta\bar{G}_1$ and per base mol of polymer, $\Delta\bar{G}_2$ are then functions of composition and may be evaluated from an appropriate equation for mixing of monomer and polymer, e.g., the Flory–Huggins equation. For a monomer dissolved in a solvent the situation is more complex and the ceiling temperature at a given monomer concentration (or the equilibrium concentration of monomer at a given temperature) is dependent on the nature of the solvent and the composition of the medium (Refs. 28,29,112,113,114,160). For the case where both monomer and polymer are in solution the variation of T_c with concentration is given to a first approximation by

$$T_c = \Delta H^\circ_{ss}/(\Delta S_{ss} + R\ln[M])$$

where $[M]$ is the concentration of monomer and ΔH°_{ss} and ΔS°_{ss} refer to the heat and entropy changes in an appropriate standard state. A more general expression may be derived from the free energy condition by insertion of suitable expressions for $\Delta\bar{G}_1$ and $\Delta\bar{G}_2$. These will contain the various interaction parameters appropriate to the polymer–monomer–solvent system.

The values of T_c quoted in the table are mostly obtained from experimental values by interpolation or short extrapolation. Some unpolymerizable monomers are included where these are structurally closely related to monomers which do polymerize and where the cause of nonpolymerization appears to be thermodynamic. This is amplified for cyclic monomers in Section D.

Section C is divided into three sections

1 Equilibria involving pure liquid monomers (lc, lc′, ls)
2 Equilibria involving gaseous monomers (gc, gc′)
3 Equilibria involving monomers in solution (sc, sc′, ss) and copolymerizations

For meaning of symbols, see Section A.

Notes page II-406; References page II-407

1. Equilibria Involving Pure Liquid Monomers

TABLE 7. MONOMERS GIVING POLYMERS CONTAINING MAIN CHAIN ACYCLIC CARBON ONLY

Monomer	State of monomer and polymer	T_c [°C]	Wt. fraction monomer at equilibrium	Notes	Refs.
2-Amino-4-(*N*-alkylanilino)-6-isopropenyl-1,3,5-triazine					
alkyl = *n*-propanyl	lc	157	1		402
= *n*-hexanyl	lc	149	1		402
= *n*-octanyl	lc	143	1		402
= *n*-decanyl	lc	140	1		402
= *n*-dodecanyl	lc	134	1		402
= *n*-tetradecanyl	lc	132	1		402
= *n*-hexadecanyl	lc	130	1		402
= isopropyl	lc	151	1		403
= isobutyl	lc	154	1		403
= *sec*-butyl	lc	148	1		403
= *n*-pentyl	lc	150	1		403
= isopentyl	lc	151	1		403
= 1-methylbutyl	lc	146	1		403
= benzyl	lc	157	1		403
2-Amino-4-alkyl/aryl-amino-6-isopropenyl-1,3,5-triazine					
R_1 = H, R_2 = ethyl	ls	181	1		370
R_1 = H, R_2 = propyl	ls	177	1		370
R_1 = ethyl, R_2 = ethyl	ls	163	1		370
R_1 = propyl, R_2 = propyl	ls	161	1		370
R_1 = methyl, R_2 = phenyl	ls	169	1		379
R_1 = H, R_2 = *p*-methoxyphenyl	ls	169	1		378
2-Amino-4-(*p*-chloroanilino)-6-isopropenyl-1,3-5-triazine	lc	170	1		404
2-Amino-4-methoxy	ls	183	1		405
-4-ethoxy	ls	182	1		405
6-isopropenyl-1-3,5-triazine					
2-Anilo-4-methoxy	ls	174	1		405
-4-ethoxy	ls	174	1		405
6-isopropenyl-1,3,5-triazine					
Atropic acid, methyl ester	ls	−8	1		149
1-Butene	lc	247	1	Isotactic polymer, N_{57}	385
2-Butene, *cis*	lc	227	1	Isotactic polymer, N_{57}	385
, *trans*	lc	217	1	Isotactic polymer, N_{57}	385
–, 2-methyl-	ll	−29	1	Calculated, N_{31}	143
–, 2,3-dimethyl-	ll	−223	1	Calculated, N_{31}	143
α-Cyanoacrilic acid					
–, allyl ester	lc	307	1	N_{57}	391
–, *n*-decyl ester	lc	217	1	N_{57}	392
–, allyloxyethyl	lc	607	1	N_{57}	393
Cyclopentene	lc	97	1	N_{66}	361
Ethacrylic acid					
–, methyl ester	ls	87	1	N_{75}	395
Ethylene	lc	367	1	Polymer is polybutene-1-iso	385
Methacrylic acid					
–, benzoil acid ester	lc	787	1	N_{57}	394
–, methyl ester	lc	102	1		414
–, methyl ester deuterated	lc	93	1		414
Naphtalene, 2-isopropenyl	ls	69	1	N_{43}	400
Pentene-1	lc	317	1	N_{57}	386
Pentene-2, *cis*	lc	287	1	N_{57}	386
Pentene-2, *trans*	lc	277	1	N_{57}	386
–, 4-methyl, *cis*	lc	317	1	N_{57}	387
–, 4-methyl, *trans*	lc	267	1	N_{57}	387
Silane, benzyl dimethyl vinyl-	lc	397	1		366
–, dimethyl phenyl vinyl-	lc	197	1		362
Styrene, α-methyl-	ls	61	1	1 bar	119
	ls	54	1		341
	ls	170	1	6.57 kbar	119

TABLE 7. *cont'd*

Monomer	State of monomer and polymer	T_c [°C]	Wt. fraction monomer at equilibrium	Notes	Refs.
Vinylcyclohexane	lc	567	1	N_{57}	396
Vinylidenechloride	lc	387	1	N_{57}	397
Vinyldimethylbenzylsilane	lc	397	1	N_{57}	367
Vinyldimethylphenylsilane	lc	117	1	N_{57}	367
Vinyltrimethylsilane	lc	327	1	N_{57}	367

N.B. The following compounds are not polymerizable for thermodynamic reasons but can sometimes be copolymerized with other monomers (see Ref. 205): α-trifluoromethyl vinyl acetate, α-methoxystyrene, 1,1-diphenylethylene, *trans*-crotonitrile, *trans*-stilbene, *trans*-1,2-di(2-pyridyl)-ethylene, *trans*-1,2-dibenzoylethylene, *trans*-1,2-diacetylethylene, α-stillbazole, methyl 2-*tert*-butylacrylate, 1-isopropenylnaphthalene, 2,4-dimethyl-α-methyl-styrene.

TABLE 8. MONOMERS GIVING POLYMERS CONTAINING HETEROATOMS IN THE MAIN CHAIN

Monomer	State of monomer and polymer	T_c [°C]	Wt. fraction monomer at equilibrium	Notes	Refs.
8.1. MONOMERS GIVING POLYMERS CONTAINING O IN THE MAIN CHAIN, BONDED TO CARBON ONLY					
Acetaldehyde	gg	−31	1	Atactic polymer (1 bar)	115
	ls	−39	1	Isotactic polymer (1 bar)	115
	ls	20	1	< 10 kbar	158
–, trichloro-	lc′	58	1		233
	lc	177	1	N_{57}	418
–, trifluoro-	lc	212	1	N_{68}	322
2,2-Dimethyltrimethylene carbonate	lc	227	1	N_{57}	426
4,7-Dioxaoctanal	lc	−38	1	N_{69}	330
1,3-Dioxepane	ls	100	0.1	N_{22}	116
	ls	192	1	N_{43}	423
	ls	144	1		398
–, 2-phenyl-	ls	20	0.36	N_{22}	116
$(1,3\text{-Dioxolane})_n$ $n=1$	ls	100	0.3		116,219
	ls	165	1		198
	ls	100	1	N_{43}	423
	lc	98	1		353
$n=1-8$	ls	60		K_n determined for cyclic monomers	232
1,3-Dioxolane, 4,4-dimethyl-	lc	−98	1	N_{57}	335
–, *cis* 4,5-dimethyl-	lc	−54	1	N_{57}	335
–, *trans* 4,5-dimethyl-	lc	−137	1	N_{57}	335
–, 4-ethyl-	ls	−48	4.74 Md/l	N_{56}	333
	lc	−54	1	N_{57}	333
–, 4-isopropyl-	lc	−74	1	N_{57}	335
–, 4-methyl-	ls	−20	4.47 Md/l	N_{56}	334
	lc	−21	1	N_{57}	334
–, 4-phenyl-	ls	20	1		285
Heptanal	lc	74	1	N_{57}	419
Hexanal	lc′	−43	1	N_{57}	420
	lc	−25	1	N_{57}	420
L-Lactide	lc	640	1	N_{57}, calculated	429
Octanal	lc	−19	1	N_{69}	330
7-Oxabicyclo[2,2,1]heptane	lc	320	1	N_{57}	308
–, 2-exo-methyl-	lc	240	1	N_{57}	308
–, 2-endo-methyl-	lc	200	1	N_{57}	308
trans-7-Oxabicyclo[4,3,0]nonane	lc	12	1		357
4-Oxapentanal	lc	−35	1	N_{69}	329
	ls	−59	1		329
1,2-Oxathiolane-2,2-dioxide	ls	95	0.74	N_{22}	152
Oxepane	ls	41.5	1		147
	lc	−136	1	N_{32}, N_{57}	323
Oxetane	lc	478	1	N_{31}	325
8-Oxo-7-oxabicyclo[2,2,2]octane	lc′	180	1	N_{53}	307

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TABLE 8. *cont'd*

Monomer	State of monomer and polymer	T_c [°C]	Wt. fraction monomer at equilibrium	Notes	Refs.
Pentanal	lc	−42	1	N_{69}	328
Propanal	ls	−31	1	Atactic polymer	115
	ls	−39	1	Isotactic polymer	115
	lc′	−48	1	N_{57}	421
	lc	−83	1	N_{57}	421
Spiroorthoester					
2-R-1,4,6-trioxaspiro[4,6]undecane					
R = H	lc	172	1	N_{68}	430
= CH_3	lc	254	1	N_{68}	430
= CH_2Br	lc	498	1	N_{68}	430
= Ph	lc	258	1	N_{68}	430
Tetrahydrofuran	ls	80	1	1 bar	58,130
	ls	129	1	12.5 kbar	146
–, 3-methyl	ls	4	1		342
Tri(ethylene terephthalate)	ls	297	0.014		see 174

N.B. The following compounds are not polymerizable for thermodynamic reasons but can sometimes be copolymerized with other monomers (see Ref. 205); benzaldehyde (Refs. 297–299), hexafluoroacetone, 1,1-dimethylpropanal; also numerous cyclic ethers – see Section D.

8.2. MONOMERS GIVING POLYMERS CONTAINING O IN THE MAIN CHAIN, BONDED TO OTHER HETEROATOMS (S, Si, P)

Sulfur trioxide		lc′	30.4	1		86
Sodium metaphosphate $Na_n(OPO_2)_n$						
$n = 3$		ls	800	0.043	K_n determined for cyclic monomers, $n = 3$–7	300,301
$n = 4$		ls	800	0.026		300,301
$n = 5$		ls	800	0.008		300,301
Siloxanes $(R_1R_2SiO)_n$						
R_1, R_2						
Me, H	$n = 3$–5	ls	0	0.045	K_n determined for cyclic monomers, $n = 4$–15	176
	$n = 6$–18	ls	0	0.034		176
	$n = 19$–∞	ls	0	0.046		176
	$n = 3$–∞	ls	0	0.125		176
Me, Me	$n = 3$–5	ls	110	0.100	K_n determined for cyclic monomers, $n = 4$–40	176
	$n = 6$–18	ls	110	0.036		176
	$n = 19$–∞	ls	110	0.047		176
	$n = 3$–∞	ls	110	0.183		176
	$n = 4$–40	ls	110		K_n determined for values of n indicated	180
	$n = 4$–30	ls	145		K_n determined for values of n indicated	180
Me, Et	$n = 3$–5	ls	110	0.170	K_n determined for cyclic monomers, $n = 4$–20	176
	$n = 6$–18	ls	110	0.049		176
	$n = 19$–∞	ls	110	0.039		176
	$n = 3$–∞	ls	110	0.258		176
Me, Pr	$n = 3$–5	ls	110	0.270	K_n determined for cyclic monomers, $n = 4$–8	176
	$n = 3$–8	ls	110	0.310		176
Me, $CF_3(CH_2)_2$	$n = 3$–5	ls	110	0.711	K_n determined for cyclic monomers, $n = 4$–20	176
	$n = 6$–18	ls	110	0.089		176
	$n = 19$–∞	ls	110	0.027		176
	$n = 3$–∞	ls	110	0.827		176
Et, Et	$n = 3$	lc	247	1	Calculated	431

8.3. MONOMERS GIVING POLYMERS CONTAINING S IN THE MAIN CHAIN, BONDED IN THE CHAIN TO CARBON ONLY

Thiacetone	lc	95	1		148
	ls	−52	1	N_{55}	327
Thioacetophenone	ls	approx. 40	1		288

N.B. Isothiocyanates (Ref. 295) are not polymerizable for thermodynamic reasons, but can be copolymerized with thiiranes; carbon disulfide (Ref. 296) can also be copolymerized with thianes

TABLE 8. *cont'd*

Monomer	State of monomer and polymer	T_c [°C]	Wt. fraction monomer at equilibrium	Notes	Refs.
8.4. MONOMERS GIVING POLYMERS CONTAINING N IN THE MAIN CHAIN, BONDED IN THE CHAIN TO CARBON ONLY					
(ε-Caprolactam)$_n$ $n=1$	ls	220	0.055		68
	ls	225	0.067		192
	ls	277	0.084		See 181
$n=2$	ls	277	0.0078	Cyclic monomer	See 181
$n=3$	ls	277	0.0052	Cyclic monomer	See 181
$n=4$	ls	277	0.0056	Cyclic monomer	See 181
$n=5$	ls	277	0.0048	Cyclic monomer	See 181
$n=\geq 6$	ls	277	0.0076	Cyclic monomer	See 181
–, 3-methyl-	ls	225	0.086		192,194
–, 3-ethyl-	ls	240	0.1		191
–, 3-propyl-	ls	240	0.1		191
–, 4-ethyl-	ls	240	0.35		171
–, 5-methyl-	ls	172	0.18		225,302
–, 7-methyl-	ls	225	0.107		226,302
–, 7-ethyl-	ls	240	0.1		191,302
–, 7-propyl-	ls	240	0.1		191,302
2,5-Dioxopiperazine	ls	171	1	From calorimetric data	437
2-Oxo-hexamethylenimine	ls	240			302
–, 4-ethyl-	ls	240	0.03		171
–, 7-ethyl-	ls	240	0.06		171
–, 8-propyl-	ls	240			302
2-Oxo-undecamethylenimine	ls	290	0.02		139
2-Piperidone	ls	60	0.32		118
2-Pyrrolidone	lc	76	1	N_{75}	383
	ls	70	1	T_c varies with the accelerator, N_{75}	439
8.5. OTHER MONOMERS GIVING POLYMERS NOT LISTED ABOVE					
Norbornene	lc	777	1	55% *cis*/45% *trans* polymer, N_{57}	415
5-trimethylsilyl-2-	lc	417	1		416
Selenium Se_8	ls	83	1	N_{32}	85
Sulfur S_8	ls	159	1	N_{33}	73,,111
				Effect of pressure	145
	ls	157	1	N_{33}	380

2. Equilibria Involving Gaseous Monomers (listed alphabetically)

Monomer	State of monomer and polymer xx	T_c (°C)	Equilibrium pressure (mbar)	Notes	Refs.
Acetaldehyde, trichloro-	gc′	98	1013		50
–, trifluoro-	gc	73	1013		129
Acetone	gc	−220		Estimated, N_{36}	144
1,3-Dioxepane	gc	149	1013		323
1,3-Dioxocane	gc	288	1013		324
1,3-Dioxolane	gc	87	1013		292
Ethylene, tetrafluoro-	gc	560	128	N_{34}	23,120
Formaldehyde	gc′	119	1013	N_{28}	49,164,165
Methacrylic acid					
–, ethyl ester	gs	173	1013	N_{35}	40
–, methyl ester	gs	164	1013	N_{35}	43
Oxepane	gc	135	1013		323
Oxetane	gc	319	1013		325
Sulfur trioxide	gc′	27.0	372		86
		0.0	40.8		86
Tetrahydrofuran	gc	83	1013		292
1,3,6-Trioxocane	gc	243	1013		324

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3. Equilibria Involving Monomers in Solution

TABLE 9. MONOMERS GIVING POLYMERS CONTAINING MAIN CHAIN CARBON ONLY

Monomer	State of monomer and polymer xx	T_c (°C)	M (mol/l)	Solvent/Notes	Refs.
9.1. MONOMERS GIVING POLYMERS CONTAINING MAIN CHAIN ACYCLIC CARBON ONLY					
Acrylonitrile		25	3×1^{-8}	Estimated from $\Delta G_{1c'}$	193
Atropic acid					
–, methyl ester	ss	–40	1.0	Toluene	149
–, ethyl ester	ss	–67	1.0	Toluene	150
–, *n*-propyl ester	ss	–72	1.0	Toluene	150
–, *n*-butyl ester	ss	–80	1.0	Toluene	150
–, *p*-methyl-, methyl ester	ss	–37	1.0	Toluene	150
Atroponitrile	ss	50	1.0	Toluene	149
Biphenyl, *p*-isopropenyl-	ss	0	0.515	Tetrahydrofuran	16
Cyclohexene	ss	–23	5	Toluene	389
Cyclooctene	ss	20		Benzene, N_{38}	229,230
Isobutylene	ss	88	1.2	Supercritical CO_2	441
Methacrylamide, *N*-butyl-	ss	122	0.651	Ethyl benzoate	326
–, *N*-phenyl-	ss	125	0.611	Ethyl benzoate	326
Methacrylic acid, methyl ester	ss	155.5	0.82	*o*-Dichlorobenzene	42
	ss	135	0.611	Ethyl benzoate	326
–, *o*-methyl phenyl ester	ss	140	0.64	*p*-Xylene	345
–, phenyl ester	ss	146	0.64	Benzene or *p*-xylene, N_{75}	442
–, *o*-*tert*-butyl phenyl ester	ss	81	0.64	*p*-Xylene	345
–, *o*-*sec*-butylphenyl ester	ss	100	0.64	Benzene or *p*-xylene, N_{75}	442
–, *o*-chlorophenyl ester	ss	139	0.64	Benzene or *p*-xylene, N_{75}	442
–, 2,6-diisopropylphenyl ester	ss	33	0.64	Benzene or *p*-xylene, N_{75}	442
–, 2,6-dimethyl phenyl ester	ss	77	0.64	*p*-Xylene	345
–, *o*-ethylphenyl ester	ss	118	0.64	Benzene or *p*-xylene, N_{75}	442
–, *o*-isopropylphenyl ester	ss	112	0.64	Benzene or *p*-xylene, N_{75}	442
–, *o*-methoxyphenyl ester	ss	145	0.64	Benzene or *p*-xylene, N_{75}	442
–, *o*-methoxycarbonylphenyl ester	ss	112	0.64	Benzene or *p*-xylene, N_{75}	442
–, *o*-nitrophenyl ester	ss	108	0.64	Benzene or *p*-xylene, N_{75}	442
–, *o*-phenylphenyl ester	ss	100	0.64	Benzene or *p*-xylene, N_{75}	442
–, *o*-propylphenyl ester	ss	118	0.64	Benzene or *p*-xylene, N_{75}	442
2,4,6-tribromophenyl ester	ss	92	0.64	Benzene or *p*-xylene, N_{75}	442
2,4,6-trichlorophenyl ester	ss	104	0.64	Benzene or *p*-xylene, N_{75}	442
2,4,6-trimethylphenyl ester	ss	69	0.64	Benzene or *p*-xylene, N_{75}	442
Methacrylonitrile	ss	145	0.27	Benzonitrile	44
Methyl-α-*p*-chlorobenzylacrylate	ss	85	5	Toluene	443
α-Methylene pentanolactone	ss	83	1	DMF	315
	ss	55	0.324	DMF	315
Methyl-α-*p*-methoxybenzylacrylate	ss	95	5	Toluene	443
Methylphenylitaconate	ss	120	2,22	Dichlorobenzene	444
Naphthalene, 2-isopropenyl-	ss	0	0.284	Tetrahydrofuran	16
Oxazole,					
–, 2-isopropenyl-4,5-dimethyl-	ss	0	0.0025	Tetrahydrofuran	284
Pyridine, 2-isopropenyl-	ss	0	0.043	Tetrahydrofuran	284
Styrene	ss	150	9.1×10^{-4}	Benzene	28
	ss	150	6.5×10^{-4}	Cyclohexane	28
–, α, acetoxy	ss	47	1.0	Toluene	401
–, α-methyl-	ss	0	0.76	Tetrahydrofuran, N_{37}	16,32,33
	ss	53	1.8	*n*-Heptane	402
	ss	58	1.8	Toluene	402
–,–, *o*-methoxy-	ss	–25	~2	Methylene chloride	155
N,N,N′,N′-Tetraethyl-4-isopropenylphenylphosphorous diamide	ss	10	1.0	Tetrahydrofuran	408
Thiazole, 2-isopropenyl-	ss	0	0.010	Tetrahydrofuran	284
p-[Bis(Trimethylsilyl)methyl] isopropenylbenzene	ss	1.2	1.0	Tetrahydrofuran	409

TABLE 9. *cont'd*

Monomer	State of monomer and polymer xx	T_c (°C)	M (mol/l)	Solvent/Notes	Refs.
9.2. MONOMERS GIVING POLYMERS CONTAINING MAIN CHAIN CYCLIC CARBON					
–, 7,8-Dycyanoquinodimethane					
7,8-bis(butoxycarbonyl)	ss	93	0.014	Chloroform, N_{75}	411
	ss	442	1.0	Chloroform, N_{43}	411
7,8-Diacetyl-	ss	87	0.018	Chloroform, N_{75}	412
	ss	415	1.0	Chloroform, N_{43}	412
7,8-Dibenzoyl-	ss	88	0.069	Chloroform, N_{75}	412
	ss	301	1.0	Chloroform, N_{43}	412
7,8-Dibutoxycarbonyl	ss	93	0.014	Chloroform, N_{75}	412
	ss	442	1.0	Chloroform, N_{43}	411
	ss	79	0.014	Chloroform, N_{75}	411
	ss	422	1.0	Chloroform, N_{43}	411
	ss	67	0.014	Chloroform, N_{75}	411
	ss	481	1.1	Chloroform, N_{43}	411

TABLE 10. MONOMERS GIVING POLYMERS CONTAINING HETEROATOMS IN THE MAIN CHAIN

Monomer	State of monomer and polymer xx	T_c (°C)	M (mol/l)	Solvent/Notes	Refs.
10.1. MONOMERS GIVING POLYMERS CONTAINING O IN THE MAIN CHAIN, BONDED TO CARBON ONLY					
Acetaldehyde	sc	~ – 80	6	Toluene, N_{22}	228
–, bromochlorofluoro-	sc′	23	1	Toluene	233
–, bromodichloro-	sc′	– 17	1	Toluene	344
–, bromodifluoro-	sc′	48	1	Toluene	344
–, dibromochloro-	sc	– 40	1	Toluene	337
–, dibromofluoro-	sc′	– 19	1	Toluene	344
–, dichlorofluoro-	sc	52	1	Methyl cyclohexane	336
	sc′	41	1	Toluene	344
–, chlorodifluoro-	sc	70	1	Methyl cyclohexane	336
	sc′	63	1	Toluene	344
–, tribromo-	sc′	– 75	1	Toluene	338
–, trichloro-	ss	11	1.0	Tetrahydrofuran	167
	sc′	12.5	(0.1)	Pyridine, N_{39}, N_{40}	50
	sc′	35	1.0	*n*-Heptane	166
	sc′	18	1	Methyl cyclohexane	336
	sc′	9	1	Toluene	344
–, trifluoro-	sc′	81	1	Toluene	344
	sc	9	1	Dichloromethane	322
Butanal	sc	– 18	~2	Toluene, isotactic polymer	227
	sc	12	1.0	*n*-Hexane [8 kbar], N_{12}	161
	sc	27	1.0	*n*-Hexane [10 kbar], N_{12}	161
4,7-Dioxaoctanal	ss	– 56	1	THF	330
1,3-Dioxepane	ss	78	1.0	Benzene	116,134
	ss	27	1.0	Dichloromethane	136
	ss	32	1.0	1,2-Dichloroethane, N_{57}	424
–, 2-butyl	ss	– 51	1.0	1,2-Dichloroethane, N_{57}	424
–, 2-methyl-	ss	– 37	1	1,2-Dichloroethane	340
	ss	– 40	1.0	1,2-Dichloroethane, N_{57}	424
–, 4-methyl-	ss	– 33	1	1,2-Dichloroethane	339
$(1,3\text{-Dioxolane})_n$ $n = 1$	ss	1	1.0	Dichloromethane	133,159
	ss	– 8	1.0	Benzene, N_{41}	134,159
	ss	20	2.0	1,3-Dioxane, N_{41}	159
	ss	20	1.0	Chloroethane	293
	ls	60	2.0	A few percent dichloromethane present	198
	ls	145	10.0	A few percent dichloromethane present	198
$n = 1–8$	ss	60		Dichloroethane, N_{42}	232

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TABLE 10. *cont'd*

Monomer	State of monomer and polymer xx	T_c (°C)	M (mol/l)	Solvent/Notes	Refs.
Formaldehyde	sc′	30	0.06	Dichloromethane	122
	sc′	25	0.004	Nitrobenzene	182
L-Lactide	ss	284	1.0	1,4-Dioxane	429
Octanal	sc	−59	1	THF	330
trans-8-Oxabicyclo[4,3,0]nonane	ss	−51	1	Dichloromethane	357
trans-2-Oxabicyclo[3,3,0]octane	ss	0	0.63	Dichloromethane	357
Oxa-4,5-dithiepane	ss	25	<0.005	Benzene	61
Oxepane	ss	30	0.08	Dichloromethane	236
Pentanal	sc	−68	1	THF	328
o-Phthalaldehyde	ss	−43	1.0	Dichloromethane, cyclopolymer	154
Propanal, 2-chloro-, 2-methyl-	ss	−54	1.0	Tetrahydrofuran	172
–, 2,2-dichloro-	ss	−24	1.0	Tetrahydrofuran	172
	ss	approx. 5	(0.25)	Dichloromethane, N_{22}, N_{40}	153
–, 2-methyl-	ss	−36.6	1.0	*n*-Pentane	166
	ss	−63	1.0	Tetrahydrofuran	172
	ss	−61.6	1.0	Diethyl ether	166
Tetrahydrofuran	ss	25	4.45	Benzene, N_{37}, N_{44}	231
	ss	20	2.8	Diethyl ether	211
Tetraoxane	sc′	50	<0.008	1,2-Dichloroethane	178
	sc′	25	0.12	Dichloromethane	182
	sc′	25	0.10	Nitrobenzene	182
Trioxane	sc′	50	0.20	1,2-Dichloroethane	178
	sc′	30	0.13	1,2-Dichloroethane	178
	sc′	30	0.05	Benzene	178
	sc′	30	0.19	Nitrobenzene, N_{45}	178
	sc′	25	1.5	Nitrobenzene, N_{45}	182
	sc′	25	2.5	Dichloromethane	182
1,3,6-Trioxocane	ss	297	1.0	Benzene, N_{45}	134
	ss	330	1.0	Toluene, N_{57}	425
–, 2-Butyl-	ss	220	1.0	Toluene, N_{57}	425
10.2. MONOMERS GIVING POLYMERS CONTAINING O IN THE MAIN CHAIN, BONDED TO OTHER HETEROATOMS (Si, P)					
1,3,2-Dioxaphospholan, 2-methoxy-	ss	157	0.1	1,1,2,2-Tetrachloroethane	309
1,3-Dioxepane, 4-methyl-	ss	−33	1	1,2-Dichloroethane	339
–, 2-methyl-	ss	−37	1	1,2-Dichloroethane	340
Siloxanes $(R_1R_2SiO)_n$					
R_1, R_2					
H, Me	ss	0	(0.2)	Toluene, N_{46}	176
Me, Me	ss	110	0.3	Toluene, N_{47}	217,218
Me, Et	ss	110	(0.4)	Toluene, N_{46}	176
Me, $CF_3(CH_2)_2$	ss	110	(0.9)	Cyclohexanone, N_{46}	176
10.3. MONOMERS GIVING POLYMERS CONTAINING S IN THE MAIN CHAIN, BONDED IN THE CHAIN TO CARBON ONLY					
1,3-Dithiolane, 2-phenylimino-4-methyl-	ss	65	2.7	Benzene	290
exo-3,4,5-Trithiatetracyclo-[5,5,1,$0^{2,6}$.$0^{8,12}$]tridec-10-ene	ss	25	2.37	Toluene, N_{76}	376
	ss	90	3.72	Toluene, N_{76}	376
exo-3,4,5-Trithiatricyclo-5.2.1.$0^{2,6}$]decane	ss	10	3.8	Toluene, N_{76}	377
	ss	70	6.0	Toluene, N_{76}	377
10.4. MONOMERS GIVING POLYMERS CONTAINING N IN THE MAIN CHAIN, BONDED IN THE CHAIN TO CARBON ONLY					
Bicyclic oxalactam	ss	60	1.0	Dimethylsulfoxide	433
n-Hexyl isocyanate	sc	−22	2	Dimethylformamide	127
Pyrrole	ss	77	0.017	Acetonitrile	434
N,7,7-Tricyanobenzoquinone methide imine	ss	74	0.14	Toluene, N_{75}, N_{81}	438

TABLE 11. COPOLYMERS

Monomer A	Monomer B	State of monomer and polymer	T^a (°C)	[A][B] (mol^2/l^2)	Solvent/Notes	Refs.
11.1. 1:1 COPOLYMERS						
Allyl acetate	Sulfur dioxide	ss	45	27	Excess B	110
Allyl alcohol	Sulfur dioxide	sc	76	27	Excess B	110
Allyl ethyl ether	Sulfur dioxide	ss	68	27	Excess B	110
Allyl formate	Sulfur dioxide	sc	45	27	Excess B	110
1-Butene	Sulfur dioxide	ss	64	27	Excess B	110
–, 2-ethyl-	Sulfur dioxide		<– 80		All compositions	110
–, 3-methyl-	Sulfur dioxide	sc	36	27	Excess B	110,199
2-Butene, *cis*	Sulfur dioxide	ss	46	27	Excess B, N_{48}	110
–, *trans*	Sulfur dioxide	ss	38	27	Excess B, N_{48}	110
2-Butene, (50% *cis*)	Sulfur dioxide	ss	34.6	27	Excess B, N_{49}	110
–, 2-methyl-	Sulfur dioxide		<– 80		All compositions	110
Cycloheptene	Sulfur dioxide	ss	11	27	Excess B	124
Cyclohexene	Sulfur dioxide	ss	24	27	Excess B	110
1,3-Cyclooctadiene	Sulfur dioxide	ss	37	10	Excess B (1,2 addition)	156
Cyclopentene	Sulfur dioxide	ss	103	27	Excess B	110
Ethene	Carbon monoxide	gg	150 (– 35)		N_{64}	369
	Carbon dioxide	gg	– (50)		N_{64}	369
	Sulfur dioxide	sc′	>135	27	Excess B	110
Ethene oxide	Carbon monoxide	gg	350 (– 127)		N_{64}	369
	Carbon dioxide	gg	220 (– 58)		N_{64}	369
Formaldehyde	Carbon monoxide	gg	190 (– 47)		N_{64}	369
	Carbon dioxide	gg	– 150 (46)		N_{64}	369
2-Heptene (88% *cis*)	Sulfur dioxide	ss	– 38	33	Excess B, N_{49}	110
1-Hexadecene	Sulfur dioxide	sc	69	27	Excess B	110
		ss	30	1.15	Chloroform	80
1-Hexene	Sulfur dioxide	ss	60	27	Excess B	110
–, 2-ethyl-	Sulfur dioxide		<– 80		All compositions	110
Isobutene	Sulfur dioxide	sc	5	27	Excess B	110
1-Pentene	Sulfur dioxide	ss	63	27	Excess B	110
–, 2-methyl-	Sulfur dioxide	ss	– 34	27	Excess B	110
–, 4,4-dimethyl-	Sulfur dioxide	sc	14	27	Excess B	110
–, 2,4,4-trimethyl-	Sulfur dioxide		<– 80		All compositions	110
2-Pentene (50% *cis*)	Sulfur dioxide	ss	8.5	32	N_{49}	110
–, 4-methyl-			<– 80		All compositions	110
4-Pentenoic acid	Sulfur dioxide	sc	66	27	Excess B	110
Propene	Sulfur dioxide	sc	90	27	Excess B	110
	Carbon monoxide	gg	140 (– 39)		N_{64}	369
	Carbon dioxide	gg	– 120 (39)		N_{64}	369
Propene oxide	Carbon monoxide	gg	490 (– 129)		N_{64}	369
	Carbon dioxide	gg	180 (– 49)		N_{64}	369
3-Propenyl phenyl ether	Carbon monoxide	gg	590 (– 136)		N_{64}	369
	Carbon dioixde	gg	190 (– 36)		N_{64}	369
Styrene	Carbon monoxide	gg	– 190 (53)		N_{64}	369
Tetrafluoroethene	Carbon monoxide	gg	280 (– 74)		N_{64}	369
	Carbon dioxide	gg	30 (– 2)		N_{64}	369
Vinyl chloride	Carbon monoxide	gg	230 (– 55)		N_{64}	369
	Carbon dioxide	gg	– 45 (18)		N_{64}	369
11.2. GENERAL COPOLYMERS						
ε-Caprolactam	ε-Caprolactam, 3-methyl-	ls	225		N_{50}	192,194

[a] Values in parentheses are for ΔG°_{298} in (kJ/mol).

D. POLYMERIZABILITY OF 5-, 6- AND 7-MEMBERED HETEROCYCLIC RING COMPOUNDS

The free energy of polymerization is generally negative for 3-, 4-, 8-, and higher-membered ring compounds. With heterocyclic rings there is generally an ionic mechanism available which allows these compounds to polymerize. With 5-, 6- and 7-membered ring compounds the sign of ΔG, and hence the polymerizability, is critically dependent on the nature of the ring and on the extent and position of substitution. Substitution generally makes ΔG less negative (more positive) and reduces polymerizability in the thermodynamic sense.

Tables 12–14 summarize the polymerizability of 5-, 6- and 7-membered rings, respectively, as a function of the nature of the ring and extent of substitution. Table 15 provides a comparison of polymerizability of unsubstituted 5-, 6-, and 7-membered rings.

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11.1. 1:1 COPOLYMERS						
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Allyl alcohol	Sulfur dioxide	sc	76	27	Excess B	110
Allyl ethyl ether	Sulfur dioxide	ss	68	27	Excess B	110
Allyl formate	Sulfur dioxide	sc	45	27	Excess B	110
1-Butene	Sulfur dioxide	ss	64	27	Excess B	110
–, 2-ethyl-	Sulfur dioxide		<– 80		All compositions	110
–, 3-methyl-	Sulfur dioxide	sc	36	27	Excess B	110,199
2-Butene, *cis*	Sulfur dioxide	ss	46	27	Excess B, N_{48}	110
–, *trans*	Sulfur dioxide	ss	38	27	Excess B, N_{48}	110
2-Butene, (50% *cis*)	Sulfur dioxide	ss	34.6	27	Excess B, N_{49}	110
–, 2-methyl-	Sulfur dioxide		<– 80		All compositions	110
Cycloheptene	Sulfur dioxide	ss	11	27	Excess B	124
Cyclohexene	Sulfur dioxide	ss	24	27	Excess B	110
1,3-Cyclooctadiene	Sulfur dioxide	ss	37	10	Excess B (1,2 addition)	156
Cyclopentene	Sulfur dioxide	ss	103	27	Excess B	110
Ethene	Carbon monoxide	gg	150 (– 35)		N_{64}	369
	Carbon dioxide	gg	– (50)		N_{64}	369
	Sulfur dioxide	sc′	>135	27	Excess B	110
Ethene oxide	Carbon monoxide	gg	350 (– 127)		N_{64}	369
	Carbon dioxide	gg	220 (– 58)		N_{64}	369
Formaldehyde	Carbon monoxide	gg	190 (– 47)		N_{64}	369
	Carbon dioxide	gg	– 150 (46)		N_{64}	369
2-Heptene (88% *cis*)	Sulfur dioxide	ss	– 38	33	Excess B, N_{49}	110
1-Hexadecene	Sulfur dioxide	sc	69	27	Excess B	110
		ss	30	1.15	Chloroform	80
1-Hexene	Sulfur dioxide	ss	60	27	Excess B	110
–, 2-ethyl-	Sulfur dioxide		<– 80		All compositions	110
Isobutene	Sulfur dioxide	sc	5	27	Excess B	110
1-Pentene	Sulfur dioxide	ss	63	27	Excess B	110
–, 2-methyl-	Sulfur dioxide	ss	– 34	27	Excess B	110
–, 4,4-dimethyl-	Sulfur dioxide	sc	14	27	Excess B	110
–, 2,4,4-trimethyl-	Sulfur dioxide		<– 80		All compositions	110
2-Pentene (50% *cis*)	Sulfur dioxide	ss	8.5	32	N_{49}	110
–, 4-methyl-			<– 80		All compositions	110
4-Pentenoic acid	Sulfur dioxide	sc	66	27	Excess B	110
Propene	Sulfur dioxide	sc	90	27	Excess B	110
	Carbon monoxide	gg	140 (– 39)		N_{64}	369
	Carbon dioxide	gg	– 120 (39)		N_{64}	369
Propene oxide	Carbon monoxide	gg	490 (– 129)		N_{64}	369
	Carbon dioxide	gg	180 (– 49)		N_{64}	369
3-Propenyl phenyl ether	Carbon monoxide	gg	590 (– 136)		N_{64}	369
	Carbon dioixde	gg	190 (– 36)		N_{64}	369
Styrene	Carbon monoxide	gg	– 190 (53)		N_{64}	369
Tetrafluoroethene	Carbon monoxide	gg	280 (– 74)		N_{64}	369
	Carbon dioxide	gg	30 (– 2)		N_{64}	369
Vinyl chloride	Carbon monoxide	gg	230 (– 55)		N_{64}	369
	Carbon dioxide	gg	– 45 (18)		N_{64}	369
11.2. GENERAL COPOLYMERS						
ε-Caprolactam	ε-Caprolactam, 3-methyl-	ls	225		N_{50}	192,194

[a] Values in parentheses are for ΔG°_{298} in (kJ/mol).

D. POLYMERIZABILITY OF 5-, 6- AND 7-MEMBERED HETEROCYCLIC RING COMPOUNDS

The free energy of polymerization is generally negative for 3-, 4-, 8-, and higher-membered ring compounds. With heterocyclic rings there is generally an ionic mechanism available which allows these compounds to polymerize. With 5-, 6- and 7-membered ring compounds the sign of ΔG, and hence the polymerizability, is critically dependent on the nature of the ring and on the extent and position of substitution. Substitution generally makes ΔG less negative (more positive) and reduces polymerizability in the thermodynamic sense.

Tables 12–14 summarize the polymerizability of 5-, 6- and 7-membered rings, respectively, as a function of the nature of the ring and extent of substitution. Table 15 provides a comparison of polymerizability of unsubstituted 5-, 6-, and 7-membered rings.

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TABLE 12. 5-MEMBERED RING COMPOUNDS

Ring	Polymerized	Not polymerized	Refs.
C_2N_2O	N_{51}	R = Me, Ph	237
C_2S_3	(exo)		376
	(exo)		377
C_3NO	R = Me, Ph etc. N_{52}		238,239,433
C_3NS			239,240
C_3N_2		R = Me, MeCO	239
C_3OS			152
C_3O_2	R = Me, CH_2Cl, Ph $R_1 = R_2 = R_3 = H$ $R_1 = R_2 = R_3 = Me$ $R_1 = R_2 = R_3 = CH_2Ph$ $R_1 = R_3 = CH_2Ph, R_2 = H$ $R_1 = R_2 = CH_2Ph, R_3 = H$	R = Me, Ph; R = Me, CH_2Cl	116,133,134, 159,177. 239,241–244, 285–287, 350,351,349, 398,423
			331
C_3S_2			245,246,290
C_4N			239,240,243
			240,247–249
C_4O			51,58,117, 130,140,146, 239,243,250–256, 291,303,304
	$R' = H, R = H$ $R' = H, R = endo - Me$ $R' = H, R = exo - Me$ $R' = endo - Me, R = exo - Me$	$R' = exo\text{-}Me$ $R = exo\text{-}Me$	

TABLE 12. *cont'd*

Ring	Polymerized	Not polymerized	Refs.
	(*trans*)	(*cis*)	357
	(*trans*)	(*cis*)	357
	(*trans*)	(*cis*)	357
	(*trans*)	(*cis*)	357
C_4S			185,256

TABLE 13. 6-MEMBERED RING COMPOUNDS

Ring	Polymerized	Not polymerized	Refs.
C_3N_2O			239
C_3N_3			239
C_3O_2P			346
	R = H R = OCH_3		347 348
C_3O_3			141,178,184,257
C_3S_3			148,258,259,260
C_4NO			185,239,240
C_4NS			240
C_4N_2		R = Me, Ph	239,240,261

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TABLE 13. *cont'd*

Ring	Polymerized	Not polymerized	Refs.
C_4OS			152
C_4O_2			116,136,239,243,262,426,436
		R = Me, Ph; R = Me, Ph	239,243,262,263,428,429
			427
			382
C_4S_2			246,265
C_5N		R = H, Et, Ph	118,209,239,240,243,266
C_5O			153,239,243,264,226–270,283
			331
C_5S			185,256
Si_3O_3			431

TABLE 14. 7-MEMBERED RING COMPOUNDS

Ring	Polymerized	Not polymerized	Refs.
C_4OS_2			61
C_5NS			240
C_5N_2			239,240

TABLE 14. *cont'd*

Ring	Polymerized	Not polymerized	Refs.
C_5O_2			116,136,170,241, 262,271,423,424
C_5S_2			246
C_6N	R = 3 – Me, 4 – Me, R = H, Me 5 – Me, 5 – Et, 5 – n – propyl, 5–*i*–propyl 5 – Cyclohexyl 6 – Me, 7 – Me	R = Ph, $PhCH_2$ *n* – Heptyl	R = Me, Ph, CH_2OH, $EtSCH_2$	63,68,240, 249,272–279
			240,243,276, 277,280,305
C_6O			153,239,243, 281,282
C_6S			256

TABLE 15. COMPARISON OF POLYMERIZABILITY (+ OR –) OF UNSUBSTITUTED 5-, 6- AND 7-MEMBERED RING COMPOUNDS[a]

Type of ring		Name of 5-ring	5-Ring	6-Ring	7-Ring
1,3-C_nNO		2-Oxazolidinone	–	+	
1,3-C_nN_2		2-Imidazolidinone	+	–	+
1,2-C_nOS		1,2-Oxathiolane-2,2-dioxide	+	–	
1,3-C_nO_2		1,3-Dioxolane	+	–	+
		Ethylene carbonate	–	+	
1,2-C_nS_2		1,2-Dithiolane	+	+	+
C_nN		Pyrrolidine	–	–	+
		2-Pyrrolidinone	+	+	+
		Succinimide	–	–	+

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TABLE 15. *cont'd*

Type of ring		Name of 5-ring	5-Ring	6-Ring	7-Ring
		2-Pyrrolidinethione	–		+
C_nO		Tetrahydrofuran (oxolane)	+	–	+
		Oxolane-2-one (γ-butyrolactone)	+	+	+
		Oxolane-2,5-dione(succinic anhydride)	–	–	+
C_nS		Thiolan-2-one (γ–thiobutyrolactone)	–	+	+

[a] The formulae denote rings of any size. Thus in the first line 1,3C_4NO is drawn as and represents

E. NOTES

N_1 Corrected for end-group effects.

N_2 Is assumed.

N_3 Partial allowance for unreacted monomer.

N_4 Semi-empirical values for a number of other olefins are given in Ref. 143.

N_5 Value given is for dilute solution. Values determined for complete range of composition; maximum (14.4) at 50 mol% monomer.

N_6 No allowance for unreacted monomer.

N_7 Strongly dependent on both monomer concentration and temperature.

N_9 Corrected for enthalpy of glassy state.

N_{10} $-\Delta S_{ss}$ assumed to be 120.3 J/K mol.

N_{11} Zero heat not necessarily in conflict with observed polymerizability below −40°C. Additional loss of free energy may be provided by the crystallization of the polymer.

N_{12} Polymer largely insoluble and remains in suspension.

N_{13} After correction for species in vapour other than formaldehyde.

N_{14} In the presence of a few per cent methylene chloride.

N_{15} From measurements in methylene chloride, benzene and 1,4-dioxane.

N_{16} From measurements in benzene.

N_{17} From measurements on vapor–solid equilibrium.

N_{18} From measurements in both methylene chloride and nitrobenzene.

N_{19} From measurements in 1,2-dichloroethane.

N_{20} Value calculated by the compiler of this table from data in Ref. cited.

N_{21} Numerical values for heats of copolymerization are listed only for those systems yielding 1 : 1 copolymers. The values refer to the copolymerization of 0.5 mol of each monomer. In all other cases listed the copolymers have a range of composition; details of the corresponding heats of copolymerization are given in the Ref. cited. Where no solvent is specified in the seventh column, the symbol ΔH_{ss} denotes that the measured heat is for a liquid mixture of monomers going to a solution of copolymers. ΔH_{lc} denotes the heat change for pure liquid monomers going to condensed amorphous polymer. (This symbolism differs from that in Ref. 1.)

N_{22} The states of monomer and/or polymer are not stated in Ref. but are likely to be the ones given.

N_{23} Value calculated from measurements on mixtures containing excess B.

N_{24} Value calculated from measurements on mixtures containing excess A.

N_{25} Value in Ref. 11 corrected using entropy of monomer in Ref. 94.

N_{26} From measurements in both benzene and cyclohexane.

N_{27} Standard state: mol fraction of monomer = 0.1.

N_{28} After correction for species in vapor other than formaldehyde.

N_{29} Numerical values for entropies of polymerizaiton listed are for systems yielding 1:1 copolymers. The values refer to the copolymerization of 0.5 mol of each monomer. The symbolism and standard states are the same as used for the heats of copolymerization (see N_{21}).

N_{30} Value of $\Delta S°$ for the composition of polymer indicated.

N_{31} No allowance for free energy of mixing of polymer and monomer.

N_{32} Floor temperature (hypothetical for supercooled liquid).

N_{33} Floor temperature.

N_{34} Calculated value. Not measurable experimentally because of side reactions.

N_{35} Small amount of vapor dissolved in the polymer: approximately gc.

N_{36} Hypothetical value for acetone as a gas at 1013 mbar pressure.

N_{37} Decreases with increasing polymer concentration (Ref. 112,160,289).

N_{38} Recognised that polymerization over $WCl_6/EtAlCl_2/EtOH$ yields an equilibrium mixture of unsaturated cyclic rings $(C_8H_{14})_n$. Species up to $n = 15$ have been identified and higher cyclic polymers are also likely to be present. No firm equilibrium data exist as yet.

N_{39} $dT_c/dP = 19$ deg/kbar.

N_{40} Value in [*M*] column is the mol fraction of monomer.

N_{41} Decreases with increasing polymer concentration in methylene chloride, in benzene and in 1,4-dioxane (Ref. 159).

N_{42} K_n values determined for cyclic monomers, $n = 1-8$.

N_{43} Extrapolated value.

N_{44} For equilibrium concentrations of linear oligomeric species see Ref. 294.

N_{45} Note the substantial discrepancy between the two sets of results with nitrobenzene as solvent.

N_{46} Value in [*M*] column is the volume fraction of cyclic monomer (rings of all sizes).

N_{47} Concentration of rings, $n = 13-\infty$, taking mol. wt. = 74 (value for $n = 1$); K_n determined for cyclic monomers, $n = 3-400$.

N_{48} Corrected for isomerization effect.

N_{49} Uncorrected for isomerization effect.

N_{50} Equilibrium concentrations of A and B lower than expected from values for homopolymerizations.

N_{51} Polymer is $\text{-}CONHN(COMe)\text{-}$.

N_{52} Polymer is $\text{-}CH_2CH_2N(COR)\text{-}$.

N_{53} *cis* and *trans* forms of polymer.

N_{54} c′(I),c′(II),c(III) refer to crystal forms I, II, III of monomer.

N_{55} Standard state is 1M, calculated from data in Ref. 148.

N_{56} Polymer dissolved in monomer; equilibrium concentration in mol/L.

N_{57} T_c calculated from $\Delta H^\circ_{lc}/\Delta S^\circ_{lc}$ or $\Delta H^\circ_{ss}/\Delta S^\circ_{ss}$.

N_{58} Valid in concentration range 2.3 to 4.6 M.

N_{59} Corrected for monomer–polymer interactions; required temperature variable interaction parameter.

N_{60} Data from Ref. 292, with corrections for monomer adsorbed in polymer.

N_{61} lc data from Ref. 231 combined with vaporization data.

N_{62} Calorimetry in solution with adjustments for solution enthalpies.

N_{63} With heat capacity adjustment for T change: may apply to N_{62}.

N_{64} From group method calculations; ΔG° (298 K) value given in brackets in kJ/mol; T_c refers to standard state conditions, $p_A = p_B = 1$ atm.

N_{65} ΔH_p by method 4a in close agreement.

N_{66} Ring opening polymerization giving 78% *trans* polymer.

N_{67} Polymer is

N_{68} Calculated from solution values with experimentally determined data.

N_{69} Calculated from solution data utilizing monomer-polymer interaction parameters, see Ref. 130.

N_{70} Mixture of 1,2 and 1,4 polymerization.

N_{71} Includes adjustment for the presence of small concentrations of other cyclics; $S_n \neq S_8$.

N_{72} Calculations based on standard enthalpies of formation of S_n and ΔH_p (S_8).

N_{73} Calculation based on standard entropies of S_n and ΔS_p (S_8).

N_{74} Values apply in temperature range below the appropriate ceiling temperature, see Section C, Table 10, under "Monomers Giving Polymers Containing O in the Main Chain, Bonded to C Only."

N_{75} Obtained by extrapolation of kinetic data.

N_{76} Ring opening at S–C bond.

N_{77} c′(I), c′(II) refer to crystal forms I, II of polymer.

N_{78} Average Temperature

N_{79} Polymer is

N_{80} Polymer is

N_{81} Polymer is

N_{82} Polymer is

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Activation Energies of Propagation and Termination in Free Radical Polymerization

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A. INTRODUCTION

The conversion of a free radical homopolymerization as a function of time is usually expressed by the following equation:

$$\frac{1}{1-x}\frac{\partial x}{\partial t} = k_p\left(\frac{2fk_dI}{k_t}\right)^{0.5}$$

where x is the conversion, t the time, k_p, k_t, and k_d the propagation, termination and initiator decomposition rate constants, respectively, f the initiator efficiency and I the initiator concentration.

It is generally assumed that the temperature dependence of free radical polymerization rate constants can be expressed using the well-known Arrhenius equation:

$$k = A_0 \exp\left(\frac{-E}{RT}\right)$$

where A_0 is the frequency factor, R the universal gas constant, T the absolute temperature, and E the activation of the reaction in question. Measurement of k_p and k_t at different temperatures allows one to determine values of the activation energies of the same two reactions, E_p and E_t, respectively.

If we accept this representation, then the overall activation energy of a homopolymerization can be written as

$$E_{OV} = E_p - \frac{1}{2}E_t + \frac{1}{2}E_d$$

The value of the activation energy for the initiator decomposition reaction, E_d, can often be estimated separately. When data are not available for E_p and E_t as separate quantities, the term $\left(E_p - \frac{1}{2}E_t\right)$ can be used to model the polymerization reaction.

In the following tables, all energies are reported in terms of kJ/mol, and any appropriate remark(s) associated with the data are presented.

B. TABLES

TABLE 1. DIENES

Monomer	E_p	E_t	$E_p - \frac{1}{2}E_t$	Remarks	Refs.
Butadiene	10.9			In gas phase	13
	38.9			In emulsion	14
	24.3 & 20.9			In gas phase	16
	20.5			In gas phase	21
	35.7	5.9		Solution polymerization in CCl_4; temperature range: 303–333 K	90
	38.9			For emulsion polymerization, supposing $\bar{n} = 0.5$	91
1,3-Hexadiene	8.42			Thermal and photoinitiation; temperature range: 278–333 K; k_p measured by ESR	92
Chloroprene	40.6			In emulsion	35
Dimethyl butadiene	37.7			In emulsion	45
Isoprene	46.0			In emulsion	15

TABLE 2. OLEFINS

Monomer	E_p	E_t	$E_p - \frac{1}{2}E_t$	Remarks	Refs.
Acetylene	21.4			In gas phase	21
Ethylene	34.3			In gas phase	21
	18.4	1.3	17.8	Calculated using results of Ref. 24	35
	23.9			In gas phase	44
	46.4	33.5	29.7	High pressure in gas phase (up to 300 NPa); initiated by oxygen; temperature range: 60–250 °C; conversion found by gravimetry	73
			31.0	High pressure polymerization (up to 300 MPa); initiated by DTBPO; temperature range: 130–165 °C	82
	36.8	6.22			93
	29.7	10.0			94
	40.0	15.2		Activation volumes (cal/mol/atm): propagation: − 19.7, termination: 13.0	95
	25.1	− 1.59			96
	20.8	3.13			97
	29.7	10.0			98
	32.5	4.19			99
	36.9	1.05			100
	31.4			Estimation for simulation of emulsion copolymerization with vinyl acetate	101
		14.2			102
			31.6	Activation volume $= -26.2E \times 10^{-6}$ m^3/gmol	103
	30.3	4.2		Activation volume for propagation = − 0.5 cal/mol/atm	104
	17.6 ± 0.31	15.3 ± 0.26		Activation volumes (cal/mol/atm): propagation: − 16.8 ± 0.1; termination: 9.2.	105
	30.2	6.44		Optimized from values of industrial runs	106
Propene	23.4			In gas phase	21
Isoprene	41.0			In emulsion	15

TABLE 3. ACRYLIC DERIVATIVES

Monomer	E_p	E_t	$E_p - \frac{1}{2}E_t$	Remarks	Refs.
Acrylamide					
A	11.7 ± 1.2	11.7 ± 0.8	5.8 ± 1.6	Solution polymerization in H_2O/DMSO mixture with potassium persulfate; initiators: H_2O : DMSO : (A) 100 : 0	68
B	16.3 ± 0.8	10.9 ± 0.4	10.9 ± 1.3	(B) 88 : 12	
C	18.8 ± 1.9	10.9 ± 0.4	13.4 ± 0.3	(C) 65 : 35	
D	20.5 ± 0.8	7.9 ± 0.4	16.9 ± 1.0	(D) 38 : 62	
E	25.1 ± 0.9	0 ± 0.8	25.1 ± 1.3	(E) 0 : 100	
	22 ± 0.2			pH 1	
	20 ± 0.2			pH 4	
	11.5	6.2		Compilation of data, validated for inverse suspension polymerization	111
	57.8	10.46		Compilation from various sources, validated for solution polymerization	112
N,N-methylene-bis-acrylamide			9.3	Aqueous polymerization with temperature range: 293–313 K	113
Acrylic acid					
			23.4	Initiation with APS; temperature range: 309.5–324.5 K; solution polymerization at pH_0 4.38	107
			21.7	Precipitation polymerization; temperature range: 313–333 K	108
			14.1		109
				By PLP; temperature range: 288–328 K	110
–, sodium salt	(1) 67.5 (2) 72.1			Thermally induced solid state polymerization; two methods to find E_p: (1) ESR, (2) DSC; temperature range: 60–160 °C	87
–, chromium salt			33.5	Polymerized with styrene–arsenic sulfide complex initiator in DMF	114
–, zinc salt			13.0	Initiated with an As2S3–styrene complex in DMSO at 363 K	115
–, butyl ester	8.8	0			8
	52.3	73.7		At 20% conversion	26
	15.5			From PLP–GPC; temperature range: (208–266 K); bulk polymerization	116
		38.1			109
	14 ± 6			From PLP; temperature range: (298–353 K); conversion range: (10–80%); bulk polymerization; $P = 1$ bar.	117
			$E_p - E_T = 0$	From PLP; conversion = 30% in bulk polymerization	118
	9.6 ± 0.56			By PLP–GPC; bulk polymerization with photoinitiators: benzoin and 2,2-dimethoxy-2-phenylacetophenone; temperature range: 298–303 K	119
–, ethyl ester	41	12.3			109
–, methyl ester	29.7	22.2			
	19.7	~0			
	31.8 ± 2.5	20.1 ± 0.8		Gamma ray induced solid state polymerization; temperature range: 243–283 K	
			40.7		109
–, 1,3-hydroxyneopentyl ester			31.8	Measured by dilatometry in both benzene and 1,4 dioxane ($k_p/k_t^{0.5}$ higher in dioxane)	120
–, methyl α-acetoxy ester	35.5	46.8		By ESR; temperature range: 303–333 K; solution polymerization in 1,1,2-trichloroethane; initiator: 2,2′-azobis(4-methoxy-2,4-dimethylvaleronitrile) (V-70)	121
–, methyl α-butoxy ester	30.5	25.1		By ESR; assuming $E_d = 109.5$; solution polymerization in 1,1,2-trichloroethane; initiator: 2,2′-azobis(4-methoxy-2, 4-dimethylvaleronitrile (V-70)	121
Acrylonitrile	17.2	22.6	5.9	In water solvent	25
	16.2	15.5	8.5	In DMF solvent	32

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TABLE 3. *cont'd*

Monomer	E_p	E_t	$E_p - \frac{1}{2}E_t$	Remarks	Refs.
Acrylonitrile (*cont'd*)	26.8	~0	6.8	In DMF solvent	37
			21.4		109
	29.6	7.0		Estimated from data on solution copolymerization with styrene as azeotrope	122
	42.7				123
			23.9	Polymerization in NaSCN solution with $Mn(C_5H_7O_2)_2$ as free radical initiator; temperature range: 295–313 K; value estimated from overall activation energy with $E_d = 58.6$ kJ/mol	124
D-Fluoroacrylic acid					
–, methyl ester			9.6	Solution: acrylonitrile; initiator: AIBN; (assume $E_d = 128$ kJ/mol)	71

TABLE 4. METHACRYLIC DERIVATIVES

Monomer	E_p	E_t	$E_p - \frac{1}{2}E_t$	Remarks	Refs.
Methacrylamide	15.5	16.7	7.1	Solvent: water	34
	22.1			By PLP; temperature range: (288–328 K); pH 1	110
Methacrylic acid	17.7			By PLP–GPC; 33% monomer in methanol; temperature range: 293–333 K	125
	17.4				109
–, butyl ester	18.4	4.6	16.1	Gamma ray initiation	27
	20.4	12.7	14.1	Kinetics from calorimetry	55
	20.9	8.8	16.7	Temperature range: 35–27°C	Quoted in 58
–, butyl ester	21.8 ± 0.27			By PLP	131
	22.9 ± 1.1			By PLP–GPC; $P = 1000$ bars; temperature range: – 10 to 60°C	141
	23.3			Temperature range: 25–55°C; by PLP bulk polymerization; photoinitiator: benzoin	135
	20.4				126
	20.5 ± 0.24			By PLP–MWD; bulk polymerization; pressure: 1 bar; photoinitiator: benzoin	127
–, *i*-butyl ester	22.5 ± 0.42				131
	21.5 ± 0.35			By PLP–MWD; bulk polymerization; pressure: 1 bar; photoinitiator: benzoin	127
–, *t*-butyl ester	27.7 ± 2.5			Temperature range: 9–66°C; by PLP with benzoinethyl ether as free rapid initiator	128
–, chloromethyl ester			5.5	Ampoule and emulsion polymerization; AIBN initiator	78
–, cyanomethyl ester			~8.4	Solution: acetonitrile AIBN initiator calculated, assuming E_d of AIBN = 128 kJ/mol from overall activation energy; temperature range: 50–70 °C	87
–, dodecyl ester (lauryl ester)		15.5			Quoted in 58
			29.8	Bulk polymerization with BPO initiator; temperature range 60–80 °C; maximum conversion 1%	66
	21.5 ± 0.34			By PLP	131
	13.7				135
	16.2			By PLP–MWD; bulk polymerization; photoinitiator: benzoin	135
–, ethyl ester	23.2	8.9	18.0	Gamma ray initiation; temperature range: – 30 to 55 °C; kinetics from calorimetry	52
	21.3	7.1	17.7		Quoted in 58
			16.5	Data from bulk and solution (50% DMF); AIBN initiator; kinetics from GLC and gravimetry	63

TABLE 4. *cont'd*

Monomer	E_p	E_t	$E_p - \frac{1}{2}E_t$	Remarks	Refs.
Methacrylic acid, ethyl ester (*cont'd*)	27.0	−6.6	30.4		Quoted in 79
	22.8 ± 0.35			By PLP	131
	20.46			By PLP; temperature range: 298–328 °C; bulk polymerization; photoinitiator: benzoin	135
	27.0			Evaluated for emulsion polymerization	129
	22.9 ± 0.46			By PLP–GPC; bulk polymerization, pressure: 1 bar; photoinitiator: benzoin	127
			22.2	Bulk polymerization; initiator: AIBN	130
			16.3	Solution polymerization in benzene; initiator: AIBN	130
–, hexadecyl ester	20.1	18.8	10.5		Quoted in 58
–, hexyl ester	18.0		~8.4		Quoted in 58
–, methyl ester	26.4	11.9	20.5		4
	18.4	0	18.4		7
	24.3	2.1	23.2		28
	20.9	0–16.7	20.9–12.6	Termination by combination or disproportionation	30
	18.8				47
	22.4			In emulsion	31
	22.8	13.2	11.2	Gamma ray induced; temperature range: −25 to 55 °C; used a combination of DCS and inhibition with DPPH to find kinetic parameters	48
				Polymerization in benzene; DMDM initiator; temperature range: 50–80 °C	49
	22.6 ± 2.5	Tends to 0	22.6 ± 2.5	Bulk polymerization; DBPO initiator; maximum conversion 25%; ESR used to find kinetic parameters	53
			13.0	Isothermal bulk; polymerization with AIBN initiator; DCS used to follow reaction; value found assuming E_d AIBN = 128 kJ/mol	56
	19.7	3.3	18.0		Quoted in 58
	18.2 ± 0.2	2.9 ± 0.0	16.7 ± 0.2	Bulk polymerization; AIBN initiator temperature range 15–30 °C; reaction followed by spatially intermittent polymerization; DP 10000–15000	64
			23.4	Bulk polymerization; AIBN initiator; 1-butanethiol used as CTA; value assumes E_d AIBN = 128 kJ/mol	65
	20.4	~10.5	15.1	Solution: benzene; AIBN initiator; kinetic data from molecular weight data; maximum conversion 5%	68
	29.1			Emulsion data; particle sizes from turbidity; potassium persulfate initiator	72
	20.9 ± 3.3	1.6 ± 0.4	20.1 ± 3.6	Solution: benzene; AIBN initiator; kinetic parameters from intermittent illumination	77
	31.3			Bulk polymerization	85
	21.3 ± 0.25			By PLP	131
	18.2				132
	26.4	11.7			133
			3.55		109
	22.6	0 ± 2.5		Temperature range: 293–353 K	156
	18.9	2.93		Suspension polymerization	134
	15.7			Spatially intermittent polymerization/ emulsion polymerization	164
	18.0				135
	18.2	2.9			136
	24.2	26.9			137
	18.3	2.94		Solution polymerization in toluene	138
	31.3	21.1			139
		36		1 Bar; temperature range: 323–353 K, low conversion	140
		−14 ± 8		100 bars	
		−16 ± 15		1000 bars	
	22.2 ± 0.3				141

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TABLE 4. *cont'd*

Monomer	E_p	E_t	$E_p - \frac{1}{2}E_t$	Remarks	Refs.
Methcrylic acid, methyl ester (*cont'd*)	22.4			PLP plus GPC for bulk polymerization; temperature range: 272–363 K	142
	22.2				143
		2.9			144
	23.9			By PLP–GPC; bulk polymerization; pressure: 1 bar; photoinitiator: 2-hydroxy-2,2-dimethylacetophenone; temperature range: 272–363 K	145
	22.2			By PLP–GPC; bulk polymerization; pressure: 1 bar; photoinitiator: benzoin; temperature range: 272–363 K	146
–, nonyl ester	17.2	13.0	10.9		Quoted in 58
–, octyl ester	15.9	12.1	9.7		Quoted in 58
–, phenyl ester			9.2		147
–, *o*-methylphenyl ester			9.6		147
–, *o*-ethylphenyl ester			12.2		147
–, *o*-iso-propylphenyl ester			14.4		147
–, *p*-methylphenyl ester			10.6		147
–, *p*-ethylphenyl ester			9.3		147
–, *p*-iso-propylphenyl ester			13.2		147
–, *p-tert*-butylphenyl ester			9.5		147
–, ethyl α-Benzoyloxymethyl ester			11.5	By ESR, assuming $E_d = 129$; solution polymerization in benzene; initiator: AIBN	148
–, ethyl α-acetacetoxymethyl ester			24.55		149
–, 2-(3-chloro-3-methylcyclobutyl)-2-hydroxyethyl ester			30.68	Polymerization in dioxane using Bz_2O_2 as initiator	150
Methacryloyl fluoride			10.4	Solution: MEK; AIBN initiator; calculated using E_d AIBN = 128 kJ/mol; temperature range: 50–70 °C	81
Methacrylonitrile	48.1	20.9	37.7		20
	29.7 ± 1.5			By PLP; solution polymerization in benzylactone; temperature range: 283–333 K	151
–, *n*-Phenyl-α-methylene-β-lactam			22.8	Solution polymerization in *n*-methyl-2-pyrrolidone with AIBN (calculated from E_{OV} assuming E_d of AIBN = 129 kJ/mol)	152

TABLE 5. VINYL HALOGENS

Monomer	E_p	E_t	$E_p - \frac{1}{2}E_t$	Remarks	Refs.
Tetrafluoroethylene	17.4	13.6	10.6		46
	5.4	0.8	5.0		43
Vinyl bromide	30.0	16.3	21.8		42
Vinyl chloride	16.0	17.6	7.4		17
			12	Validated for model of suspension polymerization	153
	27.6	18.2		For suspension polymerization	154
Vinylidene chloride	104	167	20.5	Solvent: hexane	9
	37.7 ± 5.9	20.9 ± 10.5	27.2 ± 11.1	Solution: *N*-methylpyrrolidone; AIBN used as photoinitiator; most runs ≤ 1% conversion	67

TABLE 6. VINYL ETHERS AND VINYL ESTERS

Monomer	E_p	E_t	$E_p - \frac{1}{2}E_t$	Remarks	Refs.
Butyl vinyl ether			46.4	Bulk polymerization; initiator DTBPO; assume E_d = 51.5 kJ/mol (Ref. 82) at given conditions; GPC data used to find kinetic parameters	84
Vinyl acetate	18.0	0	18.0		1
	30.6	21.9	19.6		5
	13	0	13		6
	18	<4	16–18		18
	18	0	0		22
	39 ± 3				38
	19.6 ± 2.9	0	19.6 ± 2.9	Bulk polymerization; DBPO and cyclohexyloxyperoxide initiators; ESR used to find kinetics	53
			~26.4	Bulk polymerization; DBPO and cyclohexyloxyperoxide initiators; temperature range: 55–70 °C; DSC used for kinetics; maximum conversion 20%	57
	20.5 ± 0.39				131
	26.4	11.7			133
	23.5			Validated for emulsion copolymerization with ethylene; temperature range: 293–323 K; pressure range: 0–34 bar	102
		14.2			155
			28.1		109
	19.7 ± 2.9	0		Temperature range: 293–353 K	156
	23.7			For emulsion polymerization	157
	23.6			Emulsion polymerization	158
	24.2	4.0			159
	26.4	13.4			160
	35.2	14.2		Rotating-sector method; bulk polymerization; photoinitiator: benzoin	155
	27.8			By PLP–MWD; bulk polymerization; photoinitiator: benzoin	161

TABLE 7. STYRENE AND DERIVATIVES

Monomer	E_p	E_t	$E_p - \frac{1}{2}E_t$	Remarks	Refs.
Styrene	49.0			In emulsion	2
	27.2 ± 4.2	11.7 ± 4.2	21.3 ± 6.3		3
	26.0	8.0	22.0		10
	32.5	9.9	27.5		11
	31.0 & 35.0			In emulsions	15
	54.0 & 59.0			In emulsions	19
	25.0	2.0	24.0		29
	73.6				36
	29.0				42
			25.1	Gamma ray induced; bulk liquid phase polymerization; maximum conversion 10%; temperature range: 19–74 °C	50
	37.7			Low conversion; bulk polymerization; ESR spectroscopy used for kinetics	51
	29.5 ± 0.1	9.2 ± 0.5	24.9 ± 0.4	Bulk photopolymerization; kinetics from spatially intermittent polymerization technique; temperature range: 15–36 °C DP 2400–2700	64
			34.1	AIBN initiator; assume E_d = 128 kJ/mol; bulk polymerization 1-butanethiol as CTA; maximum conversion 0.4%	65
	29.0 ± 3.0			In emulsion; reaction followed by dilatometry	70

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Table 7. *cont'd*

Monomer	E_p	E_t	$E_p - \frac{1}{2}E_t$	Remarks	Refs.
	32.2			Emulsion data; assume $N = 0.5$, sodium persulfate and sodium bisulfite initiators	76
	32.5	14.5	25.2	Bulk polymerization; AIBN initiator; temperature range: 45–100 °C	79
	17.7			In emulsion; sodium persulfate initiator	89
	29.6				132
			25.2		109
	37.8 ± 1.7				156
	39.8	15.6		By ESR; temperature range: 273–403 K	162
	36.1	18.7		Suspension polymerization; conversion less than 0.8; temperature range: 283–353 K	163
	29.5			Spatially intermittent polymerization/emulsion polymerization	164
	44.4	36.4		High conversion suspension polymerization	165
	29			Emulsion polymerization; temperature range: 318–338 K	166
	37.5 ± 1.6	10.91		ESR; temperature range: 323–363 K	167
	30.8			By PLP; temperature range: 298–328 K	168
				By PLP; temperature range: 293–353	169
	30.0			For d_p (degree of polymerization) > 4	
	29.0			For all chain lengths together	
			32.3	Bulk and diluted systems initiated by (*p*-acetylbenzylidene)triphenylarsonium	170
				Measurements by rotating sector method; initiators: AIBN (30–50 °C), BPO (70–90 °C)	171
	31.5	9.5		Styrene	
	31.5	14.2		Perdeuterated styrene	
	31.5			PLP; temperature range: 303–363 K; in bulk	172
	18			Measurments by ESR; photo and thermal initiation; temperature range: 293–363 °C	173
	32.5			PLP; temperature range: 261–366 K; bulk polymerization with photoinitiators: benzoin and 2,2-dimethoxy-2-phenylacetophenone (DMPA)	174
p-Bromostyrene	32.0				39
o-Methylstyrene	58.2			In emulsion	36
p-Methylstyrene	32.0			In emulsion	36
			25.4		109
	29.6	30.5			175
	29.6	8.27			176
α-Methyl styrene	54.3	8.4			177
Divinylbenzene	35.5	29.8		Searched by EVM	178

TABLE 8. VINYL HETEROAROMATICS

Monomer	E_p	E_t	$E_p - \frac{1}{2}E_t$	Remarks	Refs.
3-Methylene-5,5-dimethyl-2-pyrrolidone			8.2	Solution polymerization in DMSO with AIBN (calculated from E_{OV} assuming E_d of AIBN = 129 kJ/mol)	179
Methylene-*N*-methylpyrrolidone			20.1	In bulk and in solution with acetonitrile; AIBN initiator (assume $E_d = 128$ kJ/mol)	86
N-Vinylcarbazole	28.9				42
2-Vinylpyridine	33.5	20.9	23.0		40
N-Vinylpyrrolidone	29.7	6.7	26.4	Low conversion	41
(A)	68.0	19.0	58.5	In various solvents: (A) Water	61
(B)	40.0 ± 2.0	13.0	33.5 ± 2.0	(B) L-Propanol	
(C)	31.6 ± 3.0	9.0	27.5 ± 3.0	(C) Methanol	
(D)	23.0	8.0	19.0	(D) Ethyl acetate; rates followed by dilatometry	

Table 8. *cont'd*

Monomer	E_p	E_t	$E_p - \frac{1}{2}E_t$	Remarks	Refs.
			4.8	Template polymerization in DMF; AIBN initiator; DSC used to follow reaction	74
			(1) 12.8 (2) 10.8	Solution polymerization In DMF; assume E_d of AIBN in DMF = 142 kJ/mol; reaction followed by DSC in 2 modes: (1) dynamic (2) isothermal	75
			65.8 ± 0.1	Aqueous phase polymerization with potassium peroxydiphosphate Ag^+; temperature range: 293–323 K	180
	29.7	6.7			181
4-Methylene-4H-1,3-benzodioxin-2-one			11.2	Solution polymerization in *n*-methyl-2-pyrrolidone with AIBN (calculated from E_{OV} assuming E_d of AIBN = 129 kJ/mol)	182

TABLE 9. MISCELLANEOUS COMPOUNDS

Monomer	E_p	E_t	$E_p - \frac{1}{2}E_t$	Remarks	Refs.
Acetaldehyde	46.0 ± 6.3			Radiation induced in solid phase; calorimetry used to follow reaction; temperature range: 130–150 °K	54
Diethyl fumarate			25.0 ± 2.0	Bulk polymerization; AIBN initiator; (assume E_d = 128 kJ/mol) dilatometry used to follow the reaction; temperature range: 60–80 °C	59
			26.5	Assuming E_d = 129; by dilatometry; bulk polymerization; initiator: AIBN	183
Diisopropyl fumarate	16.8	16.3			184
Formaldehyde	8.4				Quoted in 54
D-Methylene-γ-butyrolactone			12.1	Solution: DMF; AIBN initiator (assume E_d = 128 kJ/mol); $E_p - E_t \approx 12.1$	80
Vinylferrocene	20.0	7.9		Note nonclassical kinetics; overall activation energy does not equal $E_d + E_p - E_t/2$; can approximate E_t = that of styrene	62
N-Vinyl-methylacetamide			26.9	Solution: methanol; AIBN initiator; maximum conversion 10%; temperature range: 25–75 °C	83
α-Ethyl, β-hexafluoroisopropyl itaconate	18.0	57.4		Polymerization in benzene catalyzed by dimethyl 2,2-azobisisobutyrate	185
Diethyl itaconate				Polymerization in benzene catalyzed by dimethyl 2,2-azobisisobutyrate	186
	29.0	30.0		(no $SnCl_4$)	
	21.0	24.0		(0.342 mol/l $SnCl_4$)	
Diisopropyl itaconate	28.5	66.1		Polymerization in benzene catalysed by dimethyl 2,2-azobisisobutyrate	187
Di-*n*-Butyl itaconate (DBI)			0.5	Assuming E_d = 129; by ESR; solution polymerization in benzene; initiator: AIBN	188
			4.35	Assuming E_d = 129.1; By ESR; solution polymerization in benzene; initiator: 2,2′-azobis(isobutyrate): MAIB	188
1,1-bis[(1-adamantyloxy)carbonyl]-2-vinyl-cyclopropane			87.1	Ring-opening solution homopolymerization in benzene; temperature range: 323–343 K; with AIBN (assume $E_{D,AIBN}$ = 123.5 kJ/mol)	189
Diethylene glycol bis-allyl carbonate (DEAC)	53.6			Rotating sector method; Initiator: BPO	190
N-Acryloyl-2,2-dimethyl-5®-phenyl-1, 3-oxazolidine (ADPO)	29	21		Assuming E_d = 124.3; temperature range: 323–343 °C; solution polymerization in benzene; initiator: 2,2′-azobis(isobutyrate): MAIB	191

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Table 9. *cont'd*

Monomer	E_p	E_t	$E_p - \frac{1}{2}E_t$	Remarks	Refs.
N-Cyclohexylmaleimide (CHMIm)	40.9	20.1		By ESR; temperature range: 313–333 K; solution polymerization in benzene; initiator: AIBN	192
N-Acryloyl-*p*-aminobenzoic acid			48.3	Assuming $E_d = 129$; solution polymerization in dioxane; initiator: AIBN	193

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Activation Volumes of Polymerization Reactions

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A. INTRODUCTION

The activation volume is included in the pressure dependence of the reaction rate constant (1–4):

$$\left(\frac{\partial \ln k}{\partial p}\right)_T = -\frac{\Delta v^*}{RT} + \frac{1}{V}\left(\frac{\partial v}{\partial p}\right)_T \qquad \text{(A1)}$$

where k is the reaction rate constant, p is the pressure, T, the temperature V, the volume, and Δv^*, the activation volume (analogous to the activation energy). It is the difference between the partial molar volume of the activated complex, as formed in the transition state theory by the efficient collision of molecules, and those of the initial reactants. The sign of the activation volume depends on the type of the chemical reaction. If new bonds are formed in the transition state, the activated complex is larger than the initial species, and hence the activation volume is positive. Inversely the activation volume is negative if bonds are stretched and broken.

For a rough calculation of the activation volume, we can assume that the formation of new bonds as well as stretching occurs along the axis of a cylinder, whose constant cross section is determined by the van der Waal's radii $d_{mA/2}$, $d_{mB/2}$, and $d_{mC/2}$ of the atoms A, B, C:

$$\Delta v^* = \frac{\pi}{8} N\left[(d_{mA}^2 + d_{mB}^2)(\Delta_{AB}) + (d_{mB}^2 + d_{mC}^2)(\Delta_{B,C})\right] \qquad \text{(A2)}$$

with $\Delta_{AB} = (0.10–0.35)\, d_{mAB}$, $\Delta_{B,C} = (1.10–1.35) d_{mBC} - d_{mB,C}$ (see Refs. 2,5,6), N is the Avogadro number, d_{mAB}, d_{mBC} = bond length (values, see Ref. 7), and d_{mBC} is the interatomic distance at the minimum of potential (sum of van der Waal's radii), $d_{mA/2}$, $d_{mB/2}$ (see Ref. 8).

The stretching of the bonds in the transition state is about 0.01–0.1 nm, whereas the change in the distance $d_{mB,C}$ between the unbonded atoms is usually larger (up to 0.25 nm).

If the decomposition of the activated complex causes only small changes in the bond length or in the distance between the atoms, its partial molar volume differs from that of the activated complex only slightly. Hence we can assume

$$\Delta v^* \cong \Delta v$$

where Δv is the excess of the partial molar volume of the reaction products over the partial molar volumes of the initial species.

This simplification is valid for reactions in which products of cyclic structure are formed, as in the dimerization of cyclopentadiene, with $\Delta v^* \approx \Delta v = -30\,\text{cm}^3/\text{mol}$ (9, 10).

*Table 3. Activation Volumes.

A second term is added to the volume change of the reacting molecules in the transition state if a polar solvent is involved. This term takes into account the change in the packing density of the surrounding solvent molecules due to the arising or disappearing of electrostatic charges between the solvent and the reactant species. This volume change is negative in bimolecular association and positive in unimolecular dissociation and tends therefore to counteract the effect of volume change during the reaction. The activation volume can be determined according to Eq. (A1) from rate measurements at different pressures and constant temperature using a semilog plot of reaction rate constant versus pressure. In this evaluation the value of $(\partial V/\partial p)_T/V$ can often be neglected, because the compressibility of fluid reactants and compressed gases is generally small at pressures above 100–200 MPa.

At very high pressures the increase of the reaction rate constant at negative activation volume is retarded by the lower mobility of the molecules due to the increased viscosity. This effect was first measured by Hamann (11) in an examination of the alkaline etherification of ethyl bromide at pressures up to 4000 MPa. It was also found in the polymerization of styrene by Nicholson and Norrish (12).

In order to obtain the reaction rate as an explicite function of pressure, Eq. (A1) can be integrated, neglecting the compressibility and assuming that the activation volume does not change greatly with pressure (13):

$$k_p = k_0 \times \exp - \frac{\Delta v*}{RT}(p - p_0) \qquad \text{(A3)}$$

where k_p is the reaction rate constant at pressure p and k_0 is the reaction rate constant at reference pressure p_0.

According to Eq. (A3) the reaction rate constant increases exponentially with pressure if the activation volume is negative and decreases if Δv^* is positive. Eq. (A3) is valid only in the high pressure range ($p > 50$ MPa). At low pressures the compressibility cannot be neglected anymore, and the activation volume changes noticeably with pressure, especially in the neighborhood of the critical point. Simmons and Mason (14) studied the dimerization of chlorotrifluoroethylene at pressures up to 10 MPa. They found that the value of the negative activation volume decreases first with pressure and then increases rapidly. It has a maximum at the critical point and after decreasing again it approaches asymptotically a constant value.

The authors describe the pressure dependence of the rate constant, taking account of the partial molar volume of the initial reactants as well as that of the activated complex by the use of suitable equations of state (e.g., Redlich–Kwong or virial coefficient equations).

In order to appreciate the influence of pressure on the reaction rate constant one can compare it with the influence of the temperature: an increase in pressure (activation volume $\Delta v^* = -25\,\text{cm}^3/\text{mol}$) at a temperature of 50°C from 0.1 to 450 MPa corresponds to a temperature increase (activation energy $E = 84$ kJ/mol) from 50 to 105°C.

Experimentally determined overall activation volumes of some polymerization reactions are listed in Section B. The data were determined from the dependence of the overall rate constant of the polymerization reactions on pressure. The values are more or less negative, hence the rate of polymerization increases with pressure.

The overall activation volume is composed of the activation volumes of the different polymerization steps, initiation, or initiator decomposition, chain propagation and chain termination:

$$\Delta v^* = \Delta v_p^* + \Delta v_d^*/2 - \Delta v_t^*/2 \qquad \text{(A4)}$$

where Δv_p^* is the activation volume of chain propagation, Δv_d^* is the activation volume of initiation with respect to initiator decomposition, and Δv_t^* the activation volume of chain termination.

The activation volumes of initiator decomposition (values in Section C) are always positive because this reaction is a unimolecular dissociation, in which a bond (e.g., the O–O bond in peroxides and peresters or the N–N bond in azo-compounds) is stretched in the transition state and finally broken. As mentioned before, Δv_d^* depends on the solvent. It can significantly be influenced by a change of electrostatic charges, viscosity, and cage effects. The activation volume of initiator decomposition is different when induced decomposition is involved at high concentration of the initiator or when the initiator decomposes in a concerted mechanism. Δv_d^* is small for two-bond scission initiators (15). The activation volume is higher for one-bond scission initiator, bulky molecules, and when more bonds brake simultaneously. The data collected in Section C were obtained in separate measurements, observing the decrease of the initiator concentration with time at different pressures. The disappearance of the initiator can also be measured during polymerization by observing the light absorption at a characteristic waver length or using scavenger techniques.

In the chain propagation reaction, the decrease in the distance between the radical and the monomer molecule is greater than the increase in length of the double bond of the monomer. Hence the activation volumes Δv_p^* listed in Section D are always negative. The data for Δv_p^* are measured at high pressures by the method of the rotating sector together with Δv_t^*, the activation volume of chain termination.

The activation volumes Δv_t^* are also negative as shown in Section E. Mostly the termination reactions are diffusion-controlled. The reactant molecules undergo translational diffusion at first to form a collision pair. It follows the movement of the reactive sites on these molecules into a position favorable to chemical reaction. This process has been considered to be the rate-determining step. The activation volume involved in this so-called segment diffusion is observed. When chain termination is governed by translational diffusion, the activation volume, Δv_{vis}^* for viscous flow, is the key parameter for the evaluation of the influence of pressure.

The chain transfer of a radical to the monomer, to a "dead" polymer, or to a modifier molecule is mostly favored by the pressure which means that the activation volumes should be negative, whereas the activation volume of the intramolecular transfer (by "back biting"), which initiates the formation of short side chains, can be negative or positive. The activation volumes of these reactions are determined from the change in short- and long-chain branching or from the change of the average molar mass or degree of polymerization of the formed polymers with pressure.

Under the assumption that the monomer and the polymer concentration do not change over a wide range and that the temperature is kept constant, the following relation can be derived from kinetic considerations:

$$\Delta v_{\mathrm{p}}^{*} - \Delta v_{\mathrm{tr}}^{*} = RT\left(\frac{\partial \ln \mathrm{VZG}}{\partial p}\right)_{T} \qquad \text{(A5)}$$

where VZG is the number of branches and $\Delta v_{\mathrm{tr}}^{*}$ is the activation volume of the chain transfer reaction.

Analogously, the influence of the pressure on the chain transfer to a modifier can be described by the expression

$$\Delta v_{\mathrm{p}}^{*} - \Delta v_{\mathrm{tr}}^{*} = RT\left(\frac{\partial \ln(k_{\mathrm{tr}}/k_{\mathrm{p}})}{\partial p}\right)_{T} = RT\left(\frac{\partial \ln(1/\bar{P} - 1/\bar{P}_{\mathrm{no}})}{\partial p}\right)_{T} \qquad \text{(A6)}$$

where P is the average degree of polymerization obtained in the presence of a transfer agent and $\bar{P}_{\mathrm{no}}$ is the average degree of polymerization obtained in the absence of a transfer agent.

Because of the mostly negative sign of the activation volumes (listed in Section F), the radical transfer to the modifier molecule is often slightly decreased at high pressures.

The activation volume of degradation reactions which can occur at high temperatures should be positive because bond cleavage increases the volume of the activated complex more than the formation of double bonds from single bonds decreases it.

The difference in the activation volumes of the various component reactions results in a different influence of the pressure on the rate constants and leads to modified polymers. Because of its larger negative activation volume the chain propagation reaction is more favored by high pressures than the termination. The chain length and consequently the tensile strength as well as the tensile modulus increase with pressure:

$$\left(\frac{\partial \ln \nu}{\partial p}\right)_{T} = -\frac{1}{RT}\left[\Delta v_{\mathrm{p}}^{*} - \frac{1}{4}(3\Delta v_{\mathrm{p}}^{*} + \Delta v_{\mathrm{td}}^{*}\right] \qquad \text{(A7)}$$

where ν = chain length.

The small negative activation volume of the intramolecular chain transfer shows that this reaction step, which determines the short chain branching, is less favored by high pressures, which means that polymers with high density and crystallinity can be synthesized at high pressures.

Similar considerations also show that the composition of copolymers and thus their molecular structure is influenced by the synthesis pressure. The pressure dependence of the copolymerization parameters r_1 and r_2, which determine the composition of a copolymer, is expressed by the relationship

$$\left(\frac{\partial \ln(r_1/r_2)}{\partial p}\right)_{T} = -\frac{1}{RT}(\Delta v_{\mathrm{p11}}^{*} - \Delta v_{\mathrm{p12}}^{*} - \Delta v_{\mathrm{p22}}^{*} + \Delta v_{\mathrm{p21}}^{*}) \approx -\frac{1}{RT}(\Delta v_{\mathrm{p11}}^{*} - \Delta v_{\mathrm{p22}}^{*}) \qquad \text{(A8)}$$

where $\Delta v_{\mathrm{p11}}^{*}$, $\Delta v_{\mathrm{p22}}^{*}$ are the activation volumes of the propagation reaction between a monomer molecule and a radical formed from the same monomer, and $\Delta v_{\mathrm{p12}}^{*}$, $\Delta v_{\mathrm{p21}}^{*}$ are the activation volumes of the propagation reaction between a monomer molecule and a radical formed from the comonomer.

Equation (A8) is valid if the composition of the initial reaction mixture does not change appreciably with pressure. According to Eq. (A8), an increase in pressure favors the inclusion of monomers, which in homopolymerization show a large negative activation volume (e.g., substituted olefins). Values of copolymerization parameters obtained at different pressures and activation volumes of some copolymerization reactions are listed in Section G.

When r_1 and r_2 should be calculated for high-pressure copolymerization, following Alfrey and Price, the pressure dependence of Q, e data must be taken into account. Some values of Q and e for high pressures are collected in Section G. The dependence of the e data of two monomers on pressure is given by the equation

$$\left(\frac{\partial\left[-(e_1 - e_2)^2\right]}{\partial p}\right)_{T} = -\frac{1}{RT}[(\Delta v_{\mathrm{p11}}^{*} - \Delta v_{\mathrm{p12}}^{*}) + (\Delta v_{22}^{*} - \Delta v_{21})] \qquad \text{(A9)}$$

B. ACTIVATION VOLUMES (cm^3/mol) OF SOME POLYMERIZATION REACTIONS

Monomer	Maximum pressure (MPa)	Temp. (°C)	Solvent	Initiator[a]	Δv^*	Refs.
Acenaphthylene	390	60		AIBN	−5.8	16
Acetaldehyde	150	100–200		Diethyamine	−12.5	127
	844	−60			−11.1	142
	844	−70			−8.0	
	844	−78			−6.2	
Acrylic acid anhydride	400	50	DMF	AIBN	−14	51
Acrylonitrile	200	50	DMF	AIBN	−22[b]	52
Allyl acetate	850	80		BPO	−13.4	17
N-(4-Anilinophenyl)acrylamide	100	60	THF	AIBN	−36.1	150
	200	60			−31.2	
	300	60			−22.3	
	500	60			−15.4	
	1500	60			−6.4	
3,3-Bis(chloromethyl)oxetane	500	60	Toluene	BF_3/diethyl ether	−16	55
Butadiene	500	50			−8.8	141
	500	70			−13.3	
	500	95			−17.2	
	100	30		ACN	−26.3	91
Butyl acrylate	100	30		ACN	−26.3	154
Butyl acrylate	100	20		Radiation	−21.0	147
	300	20			−21.2	
	460	20			−5.7	
	700	20			−11.4	
Butyl methacrylate	100	60	Benzene	AIBN	−25.6	128
	100	30		ACN	−17.4	90
	100	20		Radiation	−21	
	300	20			−21.2	94,95
	460	20			−5.7	
	>460	20			−14.4	
2-Cyclopropylpropene-1	140	70		AIBN	−23	53
	140	20		Stannic chloirde	−15	53
Diallyl cyanamide	600	80	Toluene	TBPB	−14	54
Diallyl phthalate	500	70		AIBN	−9.9 to −11.8	130
	500	70	Benzene	AIBN	−14.3	
3,3-Dichloropropene-1	1000	40		DCPC	0 to 8[b]	57
1,1-Dichloro-2-vinylcyclopropane	1000	80		AIBN	−14[b]	56
	1000	20		Stannic chlorde	−30 to −70	
Diethyl fumarate	300	60			−14	18
3,3,3-Difluorochloropropene-1	1400	30		DCPC	−15	58
1,1-Difluoro-2-vinylcyclopropane	1000	50		AIBN	−15	59
	1000	20		Stannic chloride	−45	59,60
2,3-Dimethyl-1,3-butadiene			Heptane	BuLi	−36	133
			DEE	BuLi	−48	
Ethylene	250	129		DTBP	−20 to −23	46,20
	760	50–70		AIBN	−3 to −6	19
	200	225–235		Peroxide	−20 to −26	73
	190	80		DCPC	−10	74
				Enanthylperoxide	−58 to −68	151
	100–210	200–300		Methylinobutylketone	−18	114
	110–220	190		TBPO	−18 to −22	61
	250	130–165		TBPP	−22.6	79
	110–550	170–240		Oxygen	−12 to −18	21
	175	127–197		Diphenyl disulfide	−29	85
	300	135–165		DTBP	−17.5	79
1,2-Epoxycyclohexane	840–1250	60		BPO	−13	55
n-Hexyl methacrylate	450	20		Radiation	−24	94
	800	20			−17.4	
Indene	800	64	Heptane		−21.0	22
Isobutyl methacrylate	100	60	Benzene	AIBN	−23.9	122
Isoprene	1400	20–30		Oxygen	−11.0	23
	1400	20–30		BPO	−7.9 to 18.0	
	1400	20	Toluene	HI/H_2O	−7.9	24
	1400	20	Ethyl acetate	HI/H_2O	−9.8[c]	

Monomer	Maximum pressure (MPa)	Temp. (°C)	Solvent	Initiator[a]	Δv^*	Refs.
	1400	20	Dichloromethane	HI/H_2O	−10.8	
Isopropenylcyclopropane	1400	70		AIBN	−23.0	158
	1400	20		Stannic chloride	−15.0	
Itaconic acid	500	40	DMF	AIBN	−23.2	140
	500	50	DMF	AIBN	−27.4	
	500	60	DMF	AIBN	−30.8	
	500	70	DMF	AIBN	−32.3	
Maleic anhydride					−4.6	132
Maleimide	500	20–40	Methanol	BPO	−15 to −25	122
Methyl acrylate	100	50	Benzene	AIBN	−17.6	129
	180	20		Radiation	−21.4	147
	270	20			−22.9	
	400	20			−3.6	
	700	20			−12.8	
Methyl methacrylate	200	40		Peroxide	−19	25
	300	40		Peroxide	−19	26
	100	30		ACN	−15.6	87,153
					−21.8[c]	
	300	20		Radiation	−23.6	93,95
	550	20			−13.7	
	100	50	Acetone	Peroxide	−26.0	27
	100	50	Benzene	AIBN	−21.6	129
	100	40	Benzene	Peroxide	−17	27
	100	50	Benzene	Peroxide	−19	27
	100	60	Benzene	Peroxide	−21	27
	100	70	Benzene	Peroxide	−23	27
	400	50	Butyraldehyde	AIBN	−25	62
	100	50	Carbon tetrachloride	AIBN	−19	27
	100	50	Dichloroethane	AIBN	−21	27
	100	50	Ethanol	AIBN	−20	27
	100	50	Ethyl acetate	Peroxide	−24	27
	100	50	*n*-Hexane	Peroxide	−19	27
	100	50	Trichloromethane	Peroxide	−22	27
α-Methylstyrene	350	60			−18	18
	500	50		AIBN	−14.5	135
	500	60		AIBN	−13.8	
	500	70		AIBN	−11.8	
	500	80		AIBN	−10.7	
Octyl methacrylate	100	30		ACN	−26.3	99
					−25.6[c]	
Propylene	1600	21		Radiation	−9.6	28
	1600	48		Radiation	−9.6	
	1600	83		Radiation	−12.2	
	800	80–100		AIBN	−14	144
	400	80		BPO	−9.0	
	400	90		BPO	−10.8	
	400	100		BPO	−12.7	
Sodium allylsulfonate	900		H_2O	Radiation	−5 to −7	145
Styrene	208	22		Radiation	−20.5	137
					−18.6[c]	
					+5.8	
	273	25		Radiation	−20.9	136
	400	30		Radiation	−18	126
	100	30		ACN	−17.1	89
					−17.6[c]	
	200	40		Radiation	−15.8	146
	280	40		Radiation	−50.5	146
	400	40		Radiation	−4.3	146
	600	40		Radiation	−29.5	146
	300	50		AIBN	−21	64
	100	50		AIBN	−20.2	27
	200	60		AIBN	−15	149

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Monomer	Maximum pressure (MPa)	Temp. (°C)	Solvent	Initiator[a]	Δv^*	Refs.
	293	60		AIBN	−18	29
	265	80		BPO	−17	125
	265	80		Thermal	−25.8	125
	274	25	Emulsion	Radiation	138	
			Emulsion with SDS		−18.7[c]	138
			SDS		−17.9[c]	138
			Emulsion with aerosol OT		−18.3[c]	138
	274	25	Emulsion	Radiation		139
			Emulsion with nonionic emulsifier		−21.6	139
	200–500	60	Emulsion		−11.1	35
	100	50	Acetone	AIBN	−25.5	27
	100	50	Benzene	AIBN	−19.2	27
			Benzene	AIBN	−23.0	63
	100	50	Benzene	Peroxide	−18	30
	400	50	Butyraldehyde	AIBN	−25	65
	400	50	Butyraldehyde	AIBN	−22	63
	100	50	Carbon tetrachloride	AIBN	−19.1	27
	300	25–30	Chlorobenzene	$HClO_4$	−20 to −25	155
	100	50	Chloroform	AIBN	−21.9	27
	100	50	Dichloroethene	AIBN	−21.2	27
	100	50	Ethanol	AIBN	−19.6	27
	100	50	Ethyl acetate	AIBN	−24.3	27
	400	60	Isopropyl aldehyde	AIBN	−6.8	157
	100	50	Hexane	AIBN	−19.1	27
	400	60	Propionaldehyde	AIBN	−15.5	157
	268	60	Tetrachloroethylene	Peroxide	−16	31
	293	60	Toluene	AIBN	−17	29
	440	60	Triethylamine	AIBN	−17	29
	300	30	Triethylamine	BPO	−18	32
	300	40	Triethylamine	BPO	>−11.5	33
	100–600	72	Triethylamine	Thermal	−17.5	34
1,1,2,2-Tetrachloro-1,3-butadiene	1400	25–80			−36	159
Tetrahydrofuran	250–540	60		BF_3/diethyl ether	−22	55
Vinyl acetate	100	30		ACN	−17.2	86
	600	20		Radiation	−9	148
	400	40	Acetone	AIBN	−19	62
	400	40	Butyraldehyde	AIBN	−21	62
	300	40	Carbon tetrachloride	AIBN	−13	36
	400	65	Trichloroethylene	AIBN	−10.5	65
Vinyl chloride	500	60			−16.7	131
	390	40		BPO	−4.6	143
	390	50		BPO	−6.8	
	390	60		BPO	−8.1	
	390	70		BPO	−10.4	
	250	50		LPO	−18	124
	200	60	Benzaldehyde	AIBN	−4.1	98
	300	60	Benzene	AIBN	−20.5	131
	200	60	Benzonitrile	AIBN	−12.0	98
	400	60	Toluene	AIBN	−8.2	98

[a]Abbreviation: ACN: 1,1′-azobiscyclohexane-1-carbonitrile; AIBN: 2,2′-azobisisobutyronitrile; BPO: benzoyl peroxide; DCPC: dicyclohexyl peroxidicarbonate; DEE: diethyl ehter; DMF: dimethylformamide; DTBP: di-*tert*-butyl peroxide; LPO: lauroyl peroxide; TBPB: *tert*-butyl perbenzoate; TBPO: *tert*-butyl peroctoate; THF: tetrahydrofuran; SDS: sodium dodecylsulfate; Aerosol OT: sodium dioctyl sulfosuccinate; TBPP: *tert*-butyl pervivalate.
[b]Calculated by other authors.
[c]Cationic polymerization.

C. ACTIVATION VOLUMES OF INITIATOR DECOMPOSITION

Initiator	Solvent	Absolute pressure (MPa)	Temperature (°C)	Activation volume Δv_d^* (cm^3/mol)	Refs.
AIBN[a]	Toluene	0.1–150	70	13.1	37
	Toluene	0.1–1000	62.5	3.8[b] to 9.4[c]	37
Azobis-*tert*-butanolate	Octane	0.1–630	55	4.3	104
Benzoyl peroxide	Acetophenone	0.1–650	80	4.8	38
	Allyl acetate	0.1–550	80	4.7	17
	Carbon tetrachloride	0.1–300	60	9.7	39
	Carbon tetrachloride	0.1–300	70	8.6	39
2,2-Bis(*tert*-butyl peroxy)butane	Iso-dodecane	0.1–200	135–212	22.3	81
Decanoyl peroxide	Benzene	0.1–300	<100	3	78
Dicyclohexyl peroxydicarbonate	Iso-dodecane	0.1–300	95–200	4.3	75
Di-*n*-propyl peroxydicarbonate	Benzene	0.1–300	<100	4	78
Dioctanoyl peroxide	Iso-dodecane	0.1–300	80–200	5.9	75
Di-*tert*-butyl peroxide	Benzene	0.1–300	<100	15	78
		0.1–730	120	12.6	40
	Iso-dodecane	0.1–300	143–230	13.4	75
	Carbon tetrachloride	0.1–730	120	13.3	40
	n-Heptane	10–230	140–200	10.1	77
	Cyclohexane	0.1–730	120	6.7	40
	Toluene	0.1–730	120	5.4	40
Pentaphenylethane	Toluene	0.1–150	60	7	37
	Toluene	100–270	50	5	37
tert-Amyl perneodecanoate	Iso-dodecane	0.1–300	100–200	7.0	75
tert-Amyl perpivalate	Iso-dodecane	0.1–300	120–200	9.4	75
tert-Butyl cyclohexanecarboxylate	Cumene	0.1–410	80	3.9	101
tert-Butyl perbenzoate	Cumene	0.1–410	80	10	102
	Benzene	0.1–300	<100	7	78
tert-Butyl perneodecanoate	Iso-dodecane	0.1–300	100–200	6.1	75
tert-Butyl perpivalate	Iso-dodecane	0.1–300	120–200	6.1	88
	n-Heptane	0.1–200	65–105	1.6	78
tert-Butyl peroxy-2-ethylhexanoate	Benzene	0.1–300	<100	6	78
tert-Butyl phenylperacetate	Cumene	0.1–410	80	1	103
1-Methyl-1 propylpentyl perpivalate	Iso-dodecane	0.1–300	120–200	13	76
1,1,4-Trimethylpentyl perpivalate	Iso-dodecane	0.1–300	120–200	14	76
1,1,4-Trimethylpentyl perneodecanoate	Iso-dodecane	0.1–300	100–200	9	76

[a]Azobisisobutyronitrile.
[b]Photometric analysis.
[c]By I_2 scavenger technique.

D. ACTIVATION VOLUMES OF CHAIN PROPAGATION

Monomer	Solvent	Initiator	Absolute pressure (MPa)	Temperature (°C)	Activation volume Δv^* (cm^3/mol)	Refs.
Butyl acrylate	–	ACN[a]	0.1–100	30	–22.5	91
Butyl methacrylate	–	ACN	0.1–100	30	–23.2	90
Ethylene	*t*-Butanol	Radiation	–40	24	–39	152
Ethylene	–	Diphenyl disulfide	50–175	130–200	–25.5	85
Methyl methacrylate	–	ACN	0.1–100	30	–19	87
Octyl methacrylate	–	ACN	0.1–100	30	–24.7	99
Styrene	–	ACN	0.1–100	30	–17.9	89
Vinyl acetate	–	ACN	0.1–100	30	–23.3	86

[a]ACN: 1,1-azocyclohexane-1,1′-dicarbonitrile.

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E. ACTIVATION VOLUMES OF CHAIN TERMINATION

Monomer	Solvent	Initiator	Absolute pressure (MPa)	Temperature (°C)	Activation volume Δv^* (cm^3/mol)	Refs.
Butyl acrylate	–	ACN[a]	0.1–100	30	20.8	91
Butyl methacrylate	–	ACN	0.1–100	30	17.8	90
Ethylene	–	Diphenyl disulfide	50–175	130–200	7	85
Methyl methacrylate	–	ACN	0.1–100	30	25.0	87
Octyl methacrylate	–	ACN	0.1–100	30	20.8	99
Styrene	–	ACN	0.1–100	30	13.1	89
Vinyl acetate	–	ACN	0.1–100	30	16.3	86

[a]ACN: 1,1-azocyclohexane-1,1′-dicarbonitrile.

F. ACTIVATION VOLUMES OF CHAIN TRANSFER REACTIONS

Monomer	Transfer agent	Absolute pressure (MPa)	Temperature (°C)	Activation volume (cm^3/mol)		Refs.
				Δv^*_{tr}	$\Delta v^*_p - \Delta v^*_{tr}$	
Acrylonitrile	Butyraldehyde	0.1–400	50		−6.6	62
3,3-Dichloropropene-1	3,3-Dichloropropene-1	0.1	50		−8	62
Ethylene	Acetone	136–238	130		−1.1	41
		138–240	130–200	−24.9	−1.1	83
	Butane	136–238	130		−3.2	41
	Butanone	136–238	130		−2.9	41
	Cyclohexane	136–238	130		−1.5	41
		138–240	130–200	−24.5	−1.5	83
	Cyclopentane	198–240	130–200	−21.3	−4.7	83
		136–238	130		−4.7	41
	Ethanol	138–240	130–200	−22.9	−3.1	83
		136–238	130		−3.1	41
	Ethylbenzene	138–240	130–200	−19.3	−6.7	83
		136–238	130	–	−6.7	41
	Ethylene	−250	130–255	−20.1	–	96
	Isopropanol	138–240	130–200	−19.9	−6.1	83
		136–238	130	–	−6.1	41
	Polyethylene – intermolecular	110–200	100–300	−23	3	82,85
	intramolecular	110–200	100–300	−21	5	82,85
		180–300	175–275		20–24	83,84
	Propane	138–240	130–200	−22.9	−3.1	83
		136–238	130		−3.1	41
	Toluene	138–240	130–200	−30.7	4.7	83
		136–238	130	4.7	4.7	41
	Xylene	138–240	130–200	−33.8	7.8	83
		138–238	130		7.8	83
Methyl methacrylate	Butyraldehyde	0.1–400	50		−6.6	67
Styrene	Butyraldehyde	0.1–400	50		−15	63,65,68
	Carbon tetrachloride	600	60	−11		33
	Isobutyraldehyde	0.1–400	50		−6.6	68
	Triethylamine	181–440	60	−2 to −3		42
Vinyl acetate	Butyraldehyde	0.1–400	50		−3.2	67
Vinyl chloride	Butyraldehyde	0.1–400	50		−3.8	67

G. INFLUENCE OF PRESSURE ON COPOLYMERIZATION

TABLE 1. COPOLYMERIZATION PARAMETERS

Monomer 1	Monomer 2	Solvent	Absolute pressure (MPa)	Temperature (°C)	Copolymerization parameters r_1	r_2	Refs.
Acrylonitrile	Ethyl cinnamate	–	0.1	60	2.4	0.17	69
			80		2.8	0.21	69
			280		3.9	0.36	69
	Ethyl fumarate		0.1		5.5	0.15	105
			300		9.20	0.10	105
	Methyl acrylate		0.1		0.65	0.46	105
			300		0.76	0.43	105
	α-Methylstyrene		0.1		0.05	0.15	105
			300		0.04	0.10	105
	Styrene		0.1		0.02	0.65	105
			300		0.05	0.53	105
	Vinyl acetate		0.1		3.10	0.10	105
			300		3.50	0.05	105
Butyl acrylate	Styrene		0.1		0.20	0.62	105
			300		0.17	0.50	105
Cyclopentene	Maleic anhydride	Benzene	0.1	60	0.49	0.049	100
			200		0.21	0.041	100
			400		0.10	0.030	100
Ethylene	Vinyl acetate	–	3.5	62	0.74	1.51	97
			60	62	0.94	1.20	97
		–	51	120	0.6	0.95	41
			102–204		0.82	0.99	41
		Benzene	3.5	62	0.80	1.39	116
		Isopropyl alcohol	3.5	62	0.77	1.485	116
		N,N-Dimethylformamide	3.5	62	0.92	1.13	116
		tert-Butyl alcohol	3.5	62	0.74	1.50	116
			60	62	0.79	1.40	117
			120	62	0.80	1.37	118
	Vinyl butyrate	*tert*-Butyl alcohol	3.5	62	0.696	1.505	120
	Vinyl chloride	–	34	74	0.16	2.7	41
			102		0.16	2.1	41
			204		0.21	2.0	41
	Vinyl formate	*tert*-Butyl alcohol	3.5	62	0.586	1.29	120
	Vinyl isobutyrate	*tert*-Butyl alcohol	3.5	62	0.609	1.49	120
	Vinyl pivalate	*tert*-Butyl alcohol	3.5	62	0.645	1.49	120
	Vinyl propionate	*tert*-Butyl alcohol	3.5	62	0.674	1.50	120
			118	62	0.68	1.26	115
Maleic anhydride	Acenaphthylene	Acetic anhydride	0.1	60	0.07	0.43	43
			288		0.10	0.32	43
	2-Ethyl-1-hexene		0.1	70	0.15	0.015	106
			300		0.11	0.011	106
	1-Hexene		0.1	70	0.15	0.015	106
			200		0.10	0.010	106
	2-Methyl-2-butene		0.1	70	0.10	0.035	106
			300		0.005	0.025	106
	α-Methylstyrene		0.1	70	0.005	0.04	106
			300		0.03	0.03	106
	Norbornene		0.1	70	0.03	0.05	106
			300		0.02	0.03	106
	Thiophene		0.1	70	0.20	0	106
			320		0.15	0	106
Methyl acrylate	α-Methylstyrene		0.1	50	0.10	0.27	105
			300		0.08	0.23	105
	Croton aldehyde		0.1	50	20	0.02	105
			600		20	0.02	105
	Methyl vinyl ketone		0.1	50	0.50	1.80	105
			300		0.60	1.20	105
	Vinyl-2-pyridine		0.1	50	0.20	1.10	105
			300		0.30	1.05	105

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TABLE 1. *cont'd*

Monomer 1	Monomer 2	Solvent	Absolute pressure (MPa)	Temperature (°C)	Copolymerization parameters r_1	r_2	Refs.
Methyl methacrylate	Acenaphthylene	Toluene	0.1	60	0.57	3.1	43
			190		0.60	1.9	43
			390		0.58	1.6	43
	Acrylonitrile	Toluene	0.1	70	1.34	0.12	44
			10		1.46	0.37	44
			100		2.01	0.45	44
	Methyl acrylate	Toluene	3.4	62	2.42	0.31	119
			590	62	2.36	0.31	119
			118	62	2.40	0.30	119
Styrene	Acrylic acid	–	0.1	60	0.25	0.07	69
			100		0.27	0.08	69
			250		0.31	0.095	69
	Acrylonitrile	Toluene	0.1	70	0.37	0.07	44
			10		0.43	0.13	44
			100		0.55	0.14	44
	Diethyl fumarate	Benzene	0.1	60	0.26	0.06	70
			10		0.29	0.09	70
			100		0.32	0.15	70
	Diethyl maleate	Benzene	0.1	60	6.53	0.01	70
			10		7.08	0.02	70
			100		9.50	0.02	70
	Ethyl methacrylate	Benzene	0.1	50	0.56	0.50	45
			10		0.62	0.55	45
			100		0.72	0.67	45
	Methyl methacrylate	–	0.1	60	0.704	0.159	69
			100		0.710	0.163	69
			300		0.718	0.171	69
	Methyl acrylate	Toluene	3.4	62	1.20	0.09	119
			59	62	1.12	0.11	119
			118	62	1.10	0.13	119
	Methylacrylate	Toluene	3.4	62	0.86	0.38	119
			59	62	0.82	0.39	119
			118	62	0.77	0.41	119
	Vinyl acetate	Benzene	0.1	60	44	0.01	46
			10		46	0.01	46
			100		47	0.01	46
	Vinylidene chloride	–	0.1	60	2.6	0.04	47
			150		2.5	0.04	47
			200		2.5	0.01	47
	Vinylidene chloride	–	0.1	60	0.54–0.55	0.80–1.135	69,105
			200		0.560	1.145	69
			300		0.605–0.70	0.80–1.165	69,105
Vinyl acetate	Isopropyl acetate		0.1		0.90	0.30	105
			300		0.60	0.35	105
	Vinylidene chloride	–	0.1	60	0.025	3.2	47
			150		0.025	3.1	47
			250		0.03	3.1	47
Vinylidene chloride	Indene	–	0.1	60	0.475	0.205	69
			200		0.500	0.215	69
			400		0.525	0.225	69

TABLE 2. REACTIVITY RATIOS OF TERPOLYMERIZATION[a]

Pressure (MPa)	r_{12}	r_{21}	r_{13}	r_{31}	r_{23}	r_{32}	Refs.
0.1	5.5	0.15	0.02	0.65	0.06	0.15	107,108
300	3.2	0.10	0.05	0.53	0.15	0.25	

[a]Monomers: (i) acrylonitrile; (ii) diethyl fumarate; (iii) styrene.

TABLE 3. ACTIVATION VOLUMES

Monomer 1	Monomer 2	Solvent	Absolute pressure (MPa)	Temperature (°C)	Activation volume (cm^3/mol) Δv^*	$\Delta v^*_{11} - \Delta v^*_{12}$	$\Delta v^*_{22} - \Delta v^*_{21}$	Refs.
Acrylonitrile	Ethylfumarate		0.1–300	50		−5.0	3.7	107
	Methyl acrylate		0.1–300	50		−1.5	~0	105
	α-Methylstyrene		0.1–300	50		~0	3.7	105
	Styrene		0.1–300	50		−8.5	1.9	105
	Vinyl acetate		0.1–300	50		−1.1	6.3	105
Butyl acrylate	Styrene		0.1–300	50		0	1.0	105
Cyclopentene	Maleic anhydride	Benzene	0.1	60	−26.4 to −37.4			100
Ethylene	Vinyl acetate	–	−0.1–600	60		9.3	2.7	100
			2.5–60	62		−11.3	11.9	97
Ethylene	Vinyl acetate	–	110–190	240	−36			72
Indene	Acrylonitrile	Heptane		50	−17.5	0	−4.3	48
		Dioxane		50	−18.0	0	−3.6	48
	Methyl vinyl ketone	Heptane		50	−24.0	2.5	−1.0	49
	Methyl methacrylate	Heptane		50	−20.1	0	0	48
	Vinylidiene chloride				−17.8 to −19.1			71
Isoprene	Acrylonitrile	Heptane		50	−27.0	–	–	50
Maleic anhydride	2-Ethyl-1-hexene		0.1–300	70	−36			106
	2,3-Dimethyl-2-butene		0.1–300	70	−25			106
	1,1-Diphenyl ethylene		0.1–300	70	−50 to −60			106
	1-Hexane		0.1–200	70	−18			106
	Cyclohexene		0.1–300	70	−23			121
	2-Methyl-2-butene		0.1–300	70	−25			106
	α-Methylstyrene		0.1–300	70	−35			106
	Norbornene		0.1–300	70	−28			106
	Thiophene		0.1–320	70	−26			106
	trans-Stilbene		0.1–300	60	−25			106

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Substitution	Comonomer	Activation volume (cm^3/mol)
mono-	=CH(Pr)	−16.6
	=CH(Bu)	−18.0
	=CH(*i*-Pr)	−17.0
	=CH(*i*-Bu)	−17.5
	=CH(*t*-Bu)	−31
	=CH(Ph)	−18.5
di-(1,2)	CH(Me)=CH(Et)	−19.0
	CH(Me)=CH(*i*-Pr)	−20.0
	CH(Me)=CH(*t*-Bu)	−35
	CH(*i*-Pr)=CH(*i*-Pr)	−18.5
	CH(Ph)=CH(Ph)	−25.0
gem-	=C(Me)(Pr)	−31
	=C(Me)(*i*-Pr)	−33
	=(Me)(*t*-Bu)	−60
	=C(Me)(CH_2*t*-Bu)	−46
	=C(Me)(Ph)	−35
	=C(Et)(Et)	−34
	=C(Et)(Bu)	−36
	=(Ph)(Ph)	−50
tri-	CH(Me)=C(Me)(Me)	−25
	CH(Et)=C(Me)(Me)	−31
tetra-	C(Me)(Me)=C(Me)(Me)	−25

Methyl acrylate	α-Methylstyrene		0.1–300	50		1.0	0.7	105
	Croton aldehyde		0.1–300	50		0	0	105
	Maleic anhydride				−18 to −25			71
	Methyl vinyl ketone		0.1–300	50		−1.9	1.9	105
	Vinyl-2- pyridine		0.1–300	50		−3.7	~0	105

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TABLE 3. *cont'd*

Monomer 1	Monomer 2	Solvent	Absolute pressure (MPa)	Temperature (°C)	Activation volume (cm^3/mol) Δv^*	$\Delta v^*_{11} - \Delta v^*_{12}$	$\Delta v^*_{22} - \Delta v^*_{21}$	Refs.
Methyl methylacrylate	Methyl acrylate		3.4–118	62		0.9	1.8	119
Styrene	Diethyl fumarate				−18 to −25			71,105
	Methyl acrylate				−13.8 to −14.5			71
	Methyl methacrylate				−18 to −25			71
	Vinyl-2-pyridine				−23.5 to −26	−2.2	0	71

TABLE 4. *Q, e* VALUES

Monomer	Q^a At 0.1 MPa	Q^a At 300 MPa	e^a At 0.1 MPa	e^a At 300 MPa	Refs.
Acrylic acid	0.53 (0.83)[b]	0.45	+0.91 (0.88)[b]	+0.64	108
Acrylonitrile	0.53 (0.50)	0.62	+0.90 (1.20)	+0.95	105
n-Butyl acrylate	0.40 (0.30)	0.40	+0.35 (0.74)	+0.35	105
n-Butyl methacrylate	0.62 (0.66)	0.70	−0.08 (0.34)	−0.54	92
Crotonaldehyde	0.015 (0.02)	0.015	+0.80 (0.84)	+0.80	105
Diethyl fumarate	0.20 (0.03)	0.25	+1.35 (2.17)	+1.25	105,109,25
Diethyl maleate	0.03 (0.04)	0.03	+0.62 (1.40)	+0.40	109
Ethylene	0.015 (0.013)	0.05	−0.15 (−0.15)	−0.02	110
Ethyl methacrylate	0.62 (0.57)	0.66	0.00 (0.35)	−0.35	92
Indene	0.30 (0.36)	0.28	−1.10 (−1.03)	−1.05	111,108
Isobutylene	0.025 (0.029)	0.022	−1.72 (−1.06)	−1.25	112
Isopropenyl acetate	0.08 (0.02)	0.12	−1.30 (−0.34)	−1.60	105
Methyl acrylate	0.44 (0.44)	0.44	+0.60 (0.60)	+0.60	105
Methyl methacrylate	0.63 (0.74)	0.63	−0.20 (0.38)	−0.05	108,25
α-Methylstyrene	1.40 (1.00)	1.65	−1.30 (−1.27)	−1.40	105
Methyl vinyl ketone	1.07 (0.65)	1.03	+0.95 (1.11)	+1.15	105
Propylene	0.010 (0.008)	0.015	−1.50 (−2.20)	−1.05	112
Styrene	1.20 (1.00)	1.35	−1.10 (−0.80)	−1.22	105,108,92
Vinyl acetate	0.06 (0.03)	0.05	−0.20 (−0.22)	−0.35	105,108,110
Vinyl chloride	0.0450 (0.056)	0.045	+0.16 (0.20)	+0.19	112,41
Vinyl pivalate	0.023 (–)	0.046	−0.19 (–)	−0.02	113
2-Vinylpyridine	1.05 (1.03)	0.95	−0.60 (−0.50)	−0.50	105
Vinylidene chloride	0.27 (0.26)	0.24	+0.42 (0.40)	+0.43	108

[a]Reference monomer is methyl acrylate (105).
[b]Values in parentheses refer to the values of styrene.

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Activation Enthalpies and Entropies of Stereocontrol in Free Radical Polymerizations

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A. INTRODUCTION

In free radical polymerization, the tacticity of the resulting polymer depends on the propagation step, i.e., on stereocontrol by the propagating end. The following simple cases exist:

(a) The last monomeric unit does not control the stereospecificity of the propagation step. Isotactic (i) and syndiotactic (s) additions thus exhibit the same conditional probabilities ($p_i = p_s$). The mole fractions x of the resulting isotactic and syndiotactic diads are equal ($x_i = x_s$). If all steps occur at random, the four conditional probabilities for the formation of triads are equal ($p_{i/i} = p_{i/s} = p_{s/i} = p_{s/s}$), and so are the conditional probabilities for the formation of tetrads, pentads, etc. The resulting polymer is a true atactic polymer. It follows that

$$p_i = x_i = 1/2 \qquad p_s = x_s = 1/2 \tag{A1}$$

$$x_{ii} = x_{is} = x_{si} = x_{ss} = 1/4 \tag{A2}$$

(b) The last monomeric unit of the chain, but not the last diad, controls the propagation step. The probabilities for the formation of isotactic and syndiotactic diads are thus different ($p_i \neq p_s$). The process is Bernoullian (zeroth order Markov statistics) with respect to the formation of diads. Consequently, the probability of forming an isotactic diad at an existing isotactic diad equals the probability of forming an isotactic diad at an existing syndiotactic diad ($p_{i/i} = p_{s/i}$), and, by analogy, $p_{s/s} = p_{i/s}$. It follows for the diads (6,8)

$$p_i = x_i \neq 1/2 \qquad p_s = x_s \neq 1/2 \tag{A3}$$

and for the triads

$$x_{ii} = p_i^2 = x_i^2 \qquad x_{ss} = p_s^2 = x_s^2 \tag{A4}$$

$$x_{ht} = p_i p_s + p_s p_i = 2\,x_i x_s = 2x_i(1 - x_i) \tag{A5}$$

where x_{ii} is the mole fraction of isotactic triads and x_{ss} is the mole fraction of syndiotactic triads. x_{ht} is the mole fraction of heterotactic triads, regardless of whether formed by the formation of an isotactic unit at a syndiotactic one (conditional probability $p_{s/i}$) or vice versa (conditional probability $p_{i/s}$).

(c) The last two monomeric units of the chain, i.e., the last monomeric diad, regulate the stereocontrol of the propagation step. The four conditional probabilities do not equal each other ($p_{i/i} \neq p_{i/s} \neq p_{s/i} \neq p_{s/s}$). The mole fractions of isotactic (x_{ii}), syndiotactic (x_{ss}) and heterotactic triads (x_{ht}) are thus given by (8,11)

$$x_{ii} = x_i\, p_{i/i} \qquad x_{ss} = x_s\, p_{s/s} \tag{A6}$$

$$x_{ht} = x_i\, p_{i/s} + x_s p_{s/i} \tag{A7}$$

This process corresponds to a Markov trial of first order.

(d) Second order Markov statistics are present if the last two diads (i.e., the last triad or the last three monomeric

units) control the propagation step. In this case

$$x_{iii} = x_{ii}p_{i/i} \qquad x_{sss} = x_{ss}p_{s/s} \tag{A8}$$

$$x_{iis} = x_{ii}p_{i/s} \qquad x_{ssi} = x_{ss}p_{s/i} \tag{A9}$$

$$x_{iss} = x_{is}p_{s/s} \qquad x_{sii} = x_{si}p_{i/i} \tag{A10}$$

$$x_{isi} = x_{is}p_{s/i} \qquad x_{sis} = x_{si}p_{i/s} \tag{A11}$$

In order to distinguish between Markov second order and Markov first order mechanisms, at least tetrads must be known.

The probability of the addition of a 'b' diad (b = i, s) to an existing end 'a' (a = i, s) is given by the corresponding rates R:

$$P_{a/b} = \frac{R_{a/b}}{R_{a/a} + R_{a/b}} \tag{A12}$$

with a = i, s or b = i, s, in the Markov first order case, or a = ii, is, si, ss b = ii, is, si, ss, in the Markov second order case.

Using these definitions and assuming steady states and the equality of instantaneous and final diad and triad fractions, one can express ratios of all diads, triads, and tetrads in terms of rate constants (Table 1) or ratios of rate constants in terms of diad, triad, etc. fractions (Table 2). The rate constants themselves can be calculated if the rate constants of propagation are known for the corresponding experimental conditions (1).

From the temperature dependence of the expressions given in Table 2, differences in activation enthalpies ($\Delta HA^{\ddagger} - \Delta H_B^{\ddagger}$) and differences in activation entropies ($\Delta S_A^{\ddagger} - \Delta S_B^{\ddagger}$) can be calculated:

$$\frac{k_A}{k_B} = \exp\left(\frac{\Delta S_A^{\ddagger} - \Delta S_B^{\ddagger}}{R}\right)\exp\left(\frac{\Delta H_A^{\ddagger} - \Delta H_B^{\ddagger}}{RT}\right) \tag{A13}$$

The quantities ($\Delta H_A^{\ddagger} - \Delta H_B^{\ddagger}$) and ($\Delta S_A^{\ddagger} - \Delta S^{\ddagger}$) may reflect activation parameters (2,3), conformation parameters (4,5), or combinations thereof.

Table 3 gives the difference $\Delta\Delta H^{\ddagger} = \Delta H_A^{\ddagger} - \Delta H_B^{\ddagger}$ and $\Delta\Delta S^{\ddagger} = \Delta S_A^{\ddagger} - \Delta S_B^{\ddagger}$ calculated from the temperature dependence of diad ratios x_i/x_s. In the case of Bernoulli trials, they represent $\Delta H_i^{\ddagger} - \Delta H_s^{\ddagger}$ and $\Delta S_i^{\ddagger} - \Delta S_s^{\ddagger}$, respectively. For first order Markov trials, they stand for $\Delta H_{s/i}^{\ddagger} - \Delta H_{i/s}^{\ddagger}$ and $\Delta S_{s/i}^{\ddagger} - \Delta S_{i/s}^{\ddagger}$, respectively. In general, both $\Delta\Delta H^{\ddagger}$ and $\Delta\Delta S^{\ddagger}$ depend on the solvent (9,10), and consequently on the monomer/solvent ratio (11,12), but they are nearly independent of monomer conversion.

Table 4 gives the differences in activation enthalpies for modes of addition other than s/i vs. i/s, and Table 5 gives the corresponding differences in activation entropies. Only a few of these activation parameters could be calculated from literature data as very few triad fractions have been reported.

For any two modes of addition, the compensation effect between $\Delta\Delta H^{\ddagger}$ and $\Delta\Delta S^{\ddagger}$ (10,12,43) for the polymerization of a given monomer, in different solvents and/or at different monomer/solvent ratios, can be described by

$$\Delta H_A^{\ddagger} - \Delta H_B^{\ddagger} = \Delta\Delta H_0^{\ddagger} - (\Delta S_A^{\ddagger} - \Delta S_B^{\ddagger})T_0 \tag{A14}$$

The compensation temperature T_0 has been found to be independent, of the mode of addition (e.g., $A = i/i$ vs. $B = i/s$) within the limits of error (12,43). However, the compensation enthalpy $\Delta\Delta H_0^{\ddagger}$ depends on the mode of addition.

B. TABLES

TABLE 1. RATIOS OF SOME *i*-ADS FOR DIFFERENT MECHANISMS[a]

	Mechanism		
i-ad Ratio	Bernoulli	Markov 1st order	Markov 2nd order
$\frac{x_i}{x_s}$	$\frac{k_i}{k_s}$	$\frac{k_{s/i}}{k_{i/s}}$	$\frac{k_{ss/i}(k_{si/i} + k_{ii/s})}{k_{ii/s}(k_{is/s} + k_{ss/i})}$
$\frac{x_{ii}}{x_{ss}}$	$\frac{k_i^2}{k_s^2}$	$\frac{k_{i/i}k_{s/i}}{k_{s/s}k_{i/s}}$	$\frac{k_{ss/i}k_{si/i}}{k_{ii/s}k_{is/s}}$
$\frac{x_{iii}}{x_{sss}}$	$\frac{k_i^3}{k_s^3}$	$\frac{k_{i/i}^2k_{s/i}}{k_{s/s}^2k_{i/s}}$	$\frac{k_{ss/i}k_{si/i}k_{ii/i}}{k_{ii/s}k_{is/s}k_{ss/s}}$
$\frac{x_{is}}{x_{ss}}$	$\frac{k_i}{k_s}$	$\frac{2k_{s/i}}{k_{s/s}}$	

[a] From Ref. 42.

TABLE 2. RATIOS OF RATE CONSTANT FOR MARKOV FIRST ORDER MECHANISMS[a]

Ratios of rate constants	Expressions giving ratios of rate constants
$\frac{k_{i/i}}{k_{i/s}}$	$\frac{2x_{ii}}{x_{is}}$
$\frac{k_{i/i}}{k_{s/i}}$	$\frac{2x_s x_{ii}}{x_i x_{is}} = \frac{1 + (2x_{ss}/x_{is})}{1 + (x_{is}/(2x_{ii}))}$
$\frac{k_{i/i}}{k_{s/s}}$	$\frac{x_s x_{ii}}{x_i x_{is}} = \frac{1 + (x_{is}/(2x_{ss}))}{1 + (x_{is}/(2x_{ii}))}$
$\frac{k_{i/s}}{k_{s/i}}$	$\frac{x_s}{x_i} = \frac{x_{ss} - (x_{is}/2)}{x_{ii} - (x_{is}/2)}$
$\frac{k_{i/s}}{k_{s/s}}$	$\frac{x_s x_{is}}{2x_i x_{ss}} = \frac{1 + (x_{is}/(2x_{ss}))}{1 + (2x_{ii}/(x_{is}))}$
$\frac{k_{s/i}}{k_{s/s}}$	$\frac{x_{is}}{2x_{ss}}$

[a] From Ref. 43.

TABLE 3. $\Delta H^{\ddagger}_{s/i} - \Delta H^{\ddagger}_{i/s}$ AND $\Delta S^{\ddagger}_{s/i} - \Delta S^{\ddagger}_{i/s}$ OF FREE RADICAL POLYMERIZATIONS IN DIFFERENT SOLVENTS*

Monomer (+ additive)	Vol.%	Solvent	$\Delta H^{\ddagger}_{s/i} - \Delta H^{\ddagger}_{i/s}$ (J/mol)	$\Delta S^{\ddagger}_{s/i} - \Delta S^{\ddagger}_{i/s}$ (J/mol/K)	Remarks	Refs.
Acrylonitrile	30	Toluene	3770 ± 59	2.7 ± 0.19	–	10,14
	100	Bulk	0	0	–	13
Acrylic acid, isopropyl ester	?	?	0	−5.9	[a]	15
–, methyl ester	?	?	0	−5.9	[a]	15
α-Chloroacrylic acid, methyl ester	?	Toluene	3800 ± 190	2.5 ± 0.59	–	16
Methacrylonitrile	100	Bulk	250 ± 50	3.0 ± 0.14	–	17
	100	Bulk	−4100 ± 71	−10.8 ± 0.21	–	18
–, (+1 mol $SnCl_4$/2 mol monomer)	3:1[b]	Toluene	−630 ± 54	−0.7 ± 0.18	–	18
–, (+1 mol $SnCl_4$/1 mol monomer)	2:1[b]	Toluene	170 ± 63	−0.1 ± 0.18	–	18
–, (+1 mol $SnCl_4$/1 mol monomer)	1:1[b]	Benzene	251	0.75 ± 0.88	–	18
–, (+1 mol $SnCl_4$/2 mol monomer)	1:1[b]	Benzene	2350 ± 38	9.76 ± 0.096	–	18
Methacrylic acid	10	1-Propanol	3980 ± 92	−2.2 ± 0.32	–	19
	20	1-Propanol	3850 ± 80	−1.8 ± 0.28	–	19
	20	2-Propanol	7800 ± 180	10.5 ± 0.63	–	19
	20	Methanol	3140 ± 42	−4.1 ± 0.13	–	19
–, anhydride	?	Benzene	13300 ± 210	44.4 ± 0.63	–	20
–, benzyl ester	50	Toluene	2300 ± 130	−1.7 ± 3.8	[a]	21
–, *s*-butyl ester	50	Toluene	3430 ± 63	2.0 ± 0.22	–	10,22
–, *t*-butyl ester	50	Toluene	2090 ± 80	−2.6 ± 0.29	–	10,22
–, *p*-carboxyphenyl ester	?	Dimethylformamide	4310	2.09	[c]	23
	?	*p*-Cetyloxybenzoic acid	0	−6.87	–	10,23
–, cyclohexyl ester	100	Bulk	1210 ± 80	−5.0 ± 0.20	–	10,24
–, glycidyl ester	45	Acetone	700 ± 100	9.5 ± 0.36	–	10,25
	50	Dimethylformamide	5780 ± 42	5.0 ± 0.15	–	10,25
	57	Toluene	8600 ± 130	14.2 ± 0.042	–	10,25
	100	Bulk	9800 ± 110	17.5 ± 0.28	–	10,25
–, α-methylbenzyl ester	50	Toluene	3640 ± 59	2.2 ± 0.22	–	10,22
–, methyl ester	9.1[d]	Acetone	6280 ± 75	10.2 ± 0.23	–	12
	9.1[d]	Acetonitrile	5360 ± 75	7.3 ± 0.26	–	12
	9.1[d]	Benzene	3480 ± 71	2.3 ± 0.23	–	12
	9.1[d]	Butanone	3900 ± 160	4.2 ± 0.46	–	12
	9.1[d]	γ-Butyrolactone	3140 ± 88	1.4 ± 0.27	–	12
	9.1[d]	Chloroform	5100 ± 71	7.5 ± 0.23	–	12
	9.1[d]	Dimethylformamide	3500 ± 150	3.4 ± 0.46	–	12
	9.1[d]	Dimethyl sulfoxide	3350 ± 96	2.5 ± 0.28	–	12
	9.1[d]	1,4-Dioxane	5317 ± 8	7.4 ± 0.30	–	12
	9.1[d]	Methylene chloride	3100 ± 67	2.0 ± 0.22	–	12
	9.1[d]	Pyridine	4860 ± 75	7.7 ± 0.22	–	12
	9.1[d]	Tetrachloroethane	5200 ± 100	7.2 ± 0.29	–	12
	9.1[d]	Tetrahydrofuran	3900 ± 110	4.4 ± 0.33	–	12
	9.1[d]	Toluene	2810 ± 96	0.8 ± 0.26	–	12
	20	Paraffin	2720 ± 34	1.6 ± 0.13	–	27
	25	Acetone	7030 ± 75	9.0 ± 0.23	IR	9
	25	Carbon tetrachloride	5860 ± 21	5.36 ± 0.067	IR	9
	25	Chloroform	9380 ± 71	16.0 ± 0.21	IR	9
	25	Dichloroethylene	6700 ± 46	8.4 ± 0.13	IR	9
	25	Ethanol	4980 ± 50	3.6 ± 0.14	IR	9
	25	*n*-Heptane	5200 ± 210	3.69 ± 0.059	IR	9
	25	*n*-Hexane	6700 ± 29	8.50 ± 0.092	IR	9
	28.5	Toluene	5650 ± 80	3.9 ± 0.26	–	10,26
	50	Toluene	2900 ± 420	1.3 ± 1.3	[a]	21
	100	Bulk	6200 ± 110	9 ± 3.8	–	27
	100	Bulk	4480	4.2	[a]	7
	100	Bulk	3800 ± 230	−0.04 ± 0.63	[a]	25
	100	Bulk	2300 ± 54	−1.8 ± 0.16	–	28
	100	Bulk	3560 ± 84	3.3 ± 0.24	–	12
–, –, (+8.7 mol $ZnCl_2$/1 mol MMA)	1.1[e]	Water	2850 ± 71	2.2 ± 0.20	–	10,29
–, –, (+1 mol $ZnCl_2$/1 mol MMA)	3.2[e]	Ethyl acetate	4100 ± 71	5.2 ± 0.2	–	10,29
–, –, (+0.04 mol $ZnCl_2$/1 mol MMA)	100	Bulk	2700 ± 190	1.13 ± 0.054	–	10,29
–, –, (+1 mol $ZnCl_2$/2 mol MMA)	100	Bulk	−130 ± 80	−9.80 ± 0.67	–	27
–, –, (+1 mol $ZnCl_2$/1 mol MMA)	100	Bulk	−40 ± 130	−6.7 ± 0.46	–	27
–, –, (+1 mol $SnCl_4$/2 mol MMA)	100	Bulk	800 ± 100	−8.2 ± 0.33	–	27

*In all cases, except those marked by IR (infrared) (see Remarks column), diad fractions were determined via NMR.

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TABLE 3. *cont'd*

Monomer (+ additive)	Vol.%	Solvent	$\Delta H^{\ddagger}_{s/i} - \Delta H^{\ddagger}_{i/s}$ (J/mol)	$\Delta S^{\ddagger}_{s/i} - \Delta S^{\ddagger}_{i/s}$ (J/mol/K)	Remarks	Refs.
–, –, (+1 mol $SnCl_4$/1 mol MMA)	100	Bulk	420 ± 13	– 14.07 ± 0.054	–	27
–, L-menthyl ester	50	Toluene	960 ± 46	0.3 ± 0.18	–	30
–, phenetyl ester	50	Toluene	5600 ± 1700	4.6 ± 4.6	[a]	21
Trifluorochloroethylene	0.4[f]	Carbon tetrachloride	0	– 5.8	[a]	31
Vinyl bromide	100	Bulk	710	2.5	[a]	32
	?	*n*-Butyl acetate	250	2.1	[a]	32
Vinyl bromide	6.5	*o*-Dichlorobenzene	1930 ± 54	5.3 ± 0.17	–	34
	100	Bulk	2140 ± 17	5.99 ± 0.080	–	34
	100	Bulk	1270 ± 30	2.72	–	44
N-Vinyl carbazole	?	Dimethylacetamide	– 4600 ± 300	– 20 ± 1	–	45
	?	Dimethylformamide	– 2850 ± 100	– 13.5 ± 0.4	–	45
	?	Dimethylsulfoxide	– 3300 ± 500	– 15.4 ± 1.4	–	45
	?	Hexamethylphosphoric triamide	– 3400 ± 200	– 14.7 ± 0.7	–	45
	?	Hexane/nonane	– 1500 ± 200	– 10.5 ± 0.7	–	45
	?	Methylene dichloride	– 2650 ± 100	– 11.7 ± 0.4	–	45
	?	Toluene	– 3650 ± 1000	– 16.0 ± 0.8	–	45
Vinyl chloride	10	Cyclohexane	1300 ± 84	2.5 ± 0.42	[a]	36
	33.3	Water/ethanol	5000 ± 1000	18 ± 4.2	–	35
	33.3	Water	1500 ± 630	2.9 ± 2.0	–	35
	100	Bulk	2900 ± 160	6.78 ± 0.067	IR	37
	100	Bulk	2260 ± 50	5.7 ± 0.14	–	34
	100	Bulk	1090 ± 20	1.9	–	44
– β, β-d_2	100	Bulk	– 2650 ± 4	– 6.28 ± 0.04	–	34
Vinyl formate	50[d]	Acetone	340 ± 25	0.21 ± 0.80	–	41
	50[d]	Chloroform	290 ± 50	0.08 ± 0.16	–	41
	50[d]	Dimethylformamide	250 ± 38	0.5 ± 0.12	–	41
	100	Bulk	1050 ± 54	3.3 ± 0.17	–	38
	100	Bulk	880 ± 25	3.4 ± 0.080	–	41
Vinyl trichloroacetate	100	Bulk	2830	84	[a]	32
	?	*n*-Butyl acetate	1800	4.6	[a]	32
	100	Bulk	1590	4.2	[a]	32
	?	*n*-Butyl acetate	880	2.1	[a]	32

[a] Data directly from literature, mechanistic assumptions unknown.
[b] Solvent/monomer molar ratio.
[c] Literature data, calculated under the assumption of Bernoulli statistics.
[d] mol%.
[e] mol/l.
[f] g/ml.

TABLE 4. ACTIVATION ENTHALPY DIFFERENCE ($\Delta H^{\ddagger}_{A} - \Delta H^{\ddagger}_{B}$) CALCULATED FROM VARIOUS LITERATURE DATA

Monomer	Solvent	$\Delta H^{\ddagger}_{A} - \Delta H^{\ddagger}_{B}$ (J/mol)					
		A = i/i B = i/s	A = s/i B = i/i	A = i/i B = s/s	A = i/s B = s/s	A = s/i B = s/s	Refs.
Glycidyl methacrylate	Acetone	33000 ± 2300	–	–	–	7100 ± 110	25
	Bulk	–	–	–	–	9300 ± 140	25
	Dimethylformamide	–	–	–	–	580 ± 33	25
	Toluene	–	–	–	–	10000 ± 1000	25
Methacrylic acid (20 vol.%)	Methanol	25000 ± 1400	38000 ± 2500	6500 ± 750	420 ± 80	3300 ± 110	19
	1-Propanol	14000 ± 1500	20000 ± 1800	300 ± 160	– 1240 ± 75	4010 ± 96	19
	2-Propanol	27000 ± 1800	33000 ± 2600	5556 ± 8	150 ± 29	8000 ± 220	19
Methyl methacrylate/$ZnCl_2$							
9.34/0.369 (mol/mol)	Bulk	2800 ± 120	– 130 ± 110	2430 ± 59	– 340 ± 59	2310 ± 54	29
2.00/1.00 (mol/mol)	Bulk	– 13 ± 110	– 100 ± 75	– 42 ± 88	– 29 ± 29	– 140 ± 75	27
1.00/1.00 (mol/mol)	Bulk	– 20 ± 160	– 21 ± 110	– 29 ± 130	– 8 ± 17	– 46 ± 130	27
3.19/3.19 (mol/mol)	Ethyl acetate	2300 ± 230	1800 ± 180	2600 ± 170	370 ± 63	4480 ± 54	29
1.10/9.6 (mol/mol)	70% $ZnCl_2/H_2O$	700 ± 240	2200 ± 180	1400 ± 150	700 ± 92	3550 ± 38	29
Vinyl formate	Acetone	670 ± 25	– 1060 ± 88	– 419 ± 4	– 1060 ± 92	– 2150 ± 92	41
	Bulk	2850 ± 84	– 1700 ± 100	650 ± 25	– 1900 ± 130	– 900 ± 130	41
	Chloroform	1700 ± 180	– 3200 ± 190	– 520 ± 46	– 300 ± 190	– 3700 ± 1250	41
	Dimethylformamide	0 ± 150	– 250 ± 190	– 180 ± 200	– 180 ± 200	– 440 ± 230	41
Vinyl chloride	Water	423	1210	170	980	2500	35
	Water/methanol	3600 ± 63	– 1230 ± 54	4420 ± 29	830 ± 84	5600 ± 140	35
Vinyl chloride, β, β-d_2	Bulk	3180 ± 46	540 ± 46	2860 ± 21	– 330 ± 29	2320 ± 25	39

TABLE 5. ACTIVATION ENTROPY DIFFERENCES ($\Delta S_A^{\ddagger} - \Delta S_B^{\ddagger}$) CALCULATED FROM VARIOUS LITERATURE DATA

		$\Delta S_A^{\ddagger} - \Delta S_B^{\ddagger}$ (J/mol/K)					
Monomer	Solvent	A = i/i B = i/s	A = s/i B = i/i	A = i/i B = s/s	A = i/s B = s/s	A = s/i B = s/s	Refs.
Glycidyl methacrylate	Acetone	85 ± 8.8	–	–	–	10.3 ± 0.42	25
	Bulk	–	–	–	–	16.1 ± 0.54	25
	Dimethylformamide	–	–	–	–	5.8 ± 0.13	25
	Toluene	–	–	–	–	17 ± 3.9	25
Methacrylic acid (20 vol.%)	Methanol	54 ± 4.2	125 ± 8.4	− 1.3 ± 2.3	2.3 ± 0.25	− 1.1 ± 0.13	19
	1-Propanol	32 ± 7.1	72 ± 8.0	− 15.8 ± 0.54	− 3.4 ± 0.25	− 0.9 ± 0.38	19
	2-Propanol	75 ± 7.5	100 ± 11	− 1.84 ± 0.04	0.7 ± 0.13	11.1 ± 0.75	19
Methyl methacrylate/$ZnCl_2$							
9.34/0.369 (mol/mol)	Bulk	4.0 ± 0.34	− 2.9 ± 0.29	1.8 ± 0.17	− 2.2 ± 0.17	− 1.1 ± 0.13	29
2.00/1.00 (mol/mol)	Bulk	− 7.0 ± 0.46	− 2.8 ± 0.29	− 8.0 ± 0.38	− 1.5 ± 0.13	− 10.8 ± 0.29	27
1.00/1.00 (mol/mol)	Bulk	− 5.2 ± 0.63	− 1.7 ± 0.38	− 6.0 ± 0.46	− 0.8 ± 0.21	− 7.7 ± 0.42	27
3.19/3.19 (mol/mol)	Ethyl acetate	1.4 ± 0.88	3.9 ± 0.71	1.8 ± 0.63	0.4 ± 0.25	5.7 ± 0.13	29
1.10/9.6 (mol/mol)	70% $ZnCl_2$ in water	3.1 ± 0.71	5.2 ± 0.54	− 1.5 ± 0.42	1.6 ± 0.25	3.8 ± 0.13	29
Vinyl formate	Acetone	5.1 ± 0.25	− 5.6 ± 0.29	− 0.75 ± 0.04	− 5.8 ± 0.29	− 9.3 ± 0.29	41
	Bulk	11.1 ± 0.25	− 7.6 ± 0.25	2.55 ± 0.080	− 8.6 ± 0.34	− 5.0 ± 0.38	41
	Chloroform	7.7 ± 0.54	− 13.0 ± 0.63	− 1.1 ± 0.13	− 13.9 ± 0.59	− 13.9 ± 0.75	41
	Dimethylformamide	4.6 ± 0.46	− 3.9 ± 0.59	− 0.3 ± 0.13	− 4.3 ± 0.39	− 3.9 ± 0.71	41
Vinyl chloride	Water	− 1.3	4.6	4.5	3.8	6.8	35
	Water/methanol	11.7 ± 0.25	− 4.1 ± 0.21	15.3 ± 0.54	3.6 ± 0.34	20.6 ± 0.54	35
Vinyl chloride, β, β-d_2	Bulk	8.3 ± 0.17	2.1 ± 0.17	7.03 ± 0.080	− 1.30 ± 0.08	4.98 ± 0.08	39

TABLE 6. CALCULATED COMPENSATION TEMPERATURES T_0 AND COMPENSATION ENTHALPIES $\Delta\Delta H_0^{\ddagger}$ FOR VARIOUS MONOMERS AND MODES OF ADDITION, ASSUMING MARKOV FIRST ORDER TRIALS

	Modes of addition			
Monomer	A	B	T_0 (K)	$\Delta\Delta H_0^{\ddagger}$ (J/mol)
Acrylonitrile	s/i	i/s	1400	0
Methacrylic acid, in alcohols	s/i	i/s	455	2780
	i/i	i/i	294 ± 26	6300 ± 1260
	s/i	i/i	323 ± 5	− 2300 ± 510
	i/i	s/s	403 ± 140	6600 ± 200
	s/i	i/s	323 ± 10	4480 ± 21
	i/s	s/s	302 ± 74	− 180 ± 63
	s/i	s/s	333 ± 23	4250 ± 25
−, *i*-butyl ester	s/i	i/s	294 ± 3	3304 ± 4
−, *n*-butyl ester	s/i	i/s	236 ± 4	3576 ± 8
−, *p*-carboxyphenyl ester	s/i	i/s	481	3308
−, glycidyl ester	s/i	i/s	345 ± 15	3800 ± 200
	s/i	s/s	373 ± 11	3500 ± 120
−, hexyl ester	s/i	i/s	303 ± 11	3260 ± 29
−, methyl ester	i/i	i/s	315 ± 49	120 ± 160
	s/i	i/i	310 ± 20	2600 ± 130
	i/i	s/s	323 ± 124	1440 ± 84
	s/i	i/s	362 ± 15	1470 ± 50
	i/s	s/s	338 ± 51	1400 ± 92
	s/i	s/s	334 ± 54	4010 ± 75
−, −, (+$ZnCl_2$)	i/i	i/s	314 ± 39	1650 ± 67
	s/i	i/i	321 ± 9	540 ± 33
	i/i	s/s	331 ± 24	1930 ± 42
	s/i	i/s	336 ± 21	2250 ± 50
	i/s	s/s	304 ± 10	243 ± 4
	s/i	s/s	328 ± 42	2530 ± 80
−, *i*-propyl ester	s/i	i/s	230 ± 54	3420 ± 67
−, *n*-propyl ester	s/i	i/s	248 ± 41	3300 ± 176
Vinyl acetate	s/i	i/s	1100	− 2050
Vinyl chloride	i/i	i/s	283 ± 25	820 ± 130
	s/i	i/i	282 ± 6	− 75 ± 17
	i/i	s/s	235 ± 28	900 ± 160
	s/i	i/s	305 ± 124	− 220 ± 420

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TABLE 6. *cont'd*

Monomer	Modes of addition A	Modes of addition B	T_0 (K)	$\Delta\Delta H_0^{\ddagger}$ (J/mol)
	i/s	s/s	248 ± 9	− 13 ± 33
	s/i	s/s	219 ± 10	1130 ± 59
Vinyl formate	i/i	i/s	362 ± 23	− 1400 ± 130
	s/i	i/i	315 ± 16	850 ± 80
	i/i	s/s	323 ± 27	− 200 ± 25
	s/i	i/s	330 ± 95	− 290 ± 42
	i/s	s/s	320 ± 18	970 ± 96
	s/i	s/s	316 ± 5	740 ± 21
N-Vinyl carbazole	s/i	i/s	− 243	288
Vinyl chloroacetate	s/i	i/s	300	419
Vinyl trifluoroacetate	s/i	i/s	340	167

[a]Based on data in Tables 3–5; see also Refs. 40,43.

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Products of Thermal Degradation of Polymers

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A. INTRODUCTION

Polymer degradation is a complex phenomenon, and the nature of the chemistry occurring during thermal decomposition can be difficult to determine precisely. The observed products of degradation can be the result of a mixture of primary, secondary or even tertiary decomposition processes, and as a consequence, the distribution of products will depend on such factors as sample thickness and melt viscosity, in addition to the more obvious factors such as temperature, atmosphere and the chemical structure of the polymer itself. It is often overlooked that abnormal structures (terminal unsaturation, head-to-head structures, peroxide links etc.) can also markedly effect polymer stability and product distribution.

Products are of three types. Firstly, there are the volatile small molecules (typically of the size of monomer or smaller) which are fairly readily separated and characterized. Secondly, there are the larger molecules that represent fragments of the chain. These species are volatile at the degradation temperature but condense outwith the degradation zone. Generally produced as a complex spectrum of oligomers, these fragments are more difficult to separate and characterize in detail, particularly as internal rearrangements of the backbone often occur before and during fragmentation. In many cases, identification is limited to key functionalities but the advent of sophisticated chromatographic and mass spectrometric techniques is leading to increasingly detailed analyses. In particular, the smaller fragments such as dimer and trimer are in principle more readily fully characterized than the larger fragments; nevertheless there often remains some uncertainty, particularly in relation to end groups. The most intractable product is the third type, the residue, which is often (but not always) insoluble, and characterization may again be limited to identification of key functionalities.

Naturally, most of the information in the literature relates to the easily identified low molecular weight species, and the data in this section reflects this. In addition, most thermal degradation studies focus on inert rather than oxidizing environments. Following the lead of the previous author, Norman Grassie, the vast majority of the entries included here are concerned with products of the first two types from purely thermal degradation processes under inert atmospheres.

B. TABLES

TABLE 1. MAIN-CHAIN ACYCLIC CARBON POLYMERS

Polymer	Temperature range (°C)	Degradation products	Refs.
1.1. UNSATURATED POLYMERS			
Poly(acetylene)	650	Methane (0.87 moles relative to benzene = 1), ethylene (0.47), ethane (0.26), propylene (0.27), propane (0.047), 1,3-butadiene (0.19), cyclopentadiene (0.086), cyclopentene (0.063), benzene (1.0), toluene (0.18), *m*-xylene (0.091), *p*-xylene (0.015), styrene (0.041), *o*-xylene (0.013), methylstyrene (0.010), *trans*-β-methylstyrene (0.011), indane (0.0074), indene (0.036), methylindene (0.0072), naphthalene (0.052), 2-methylnaphthalene (0.015), 1-methylnaphthalene (0.018), biphenyl (0.0091), fluorene (1.0), anthracene (0.005)	82
Poly(butadiene)	325–475	14.1% of products are volatile at 25°C including 1.5% of monomer among other saturated and unsaturated hydrocarbons; 85.9% of products are larger fragments involatile at 25°C	16
	20°C/min to 15% weight loss	Effect of *cis/trans* ratio; increasing *trans* content gives more cyclopentene and 1,3-cyclohexadiene and less 4-vinyl-1-cyclohexene and 1,3-butadiene	83

TABLE 1. *cont'd*

Polymer	Temperature range (°C)	Degradation products	Refs.
Poly(butadiene-*co*-acrylonitrile) (70/30)	310–400	14.5% of products are volatile at 25°C, consisting of saturated hydrocarbons	10
25–100 mol% butadiene	350–400	Main product is structurally modified chain fragments; ammonia and hydrogen cyanide increasing with acrylonitrile content to approximately 4% each by weight of copolymer containing mole 75% acrylonitrile; traces of hydrogen and hydrocarbons up to C_7	98
Poly(butadiene)-*blend*-poly(styrene) (0–100 wt.%)	Ambient to 500	Volatile products as for individual polymers	84
Poly(butadiene-*co*-sytrene) (75/25)	327–430	11.8% of products are volatile at 25°C; 1.9% butadiene with other saturated and unsaturated hydrocarbons	10,16
Poly(chloroprene)	377	Hydrogen chloride	19
	170–400	HCl (90% of theoretical), ethylene, chloroprene (trace), chloroprene dimers and other modified chain fragments	85
	400–500	HCl (trace), methane, ethylene, propylene (trace)	85
Poly(chloroprene)-*blend* poly(methyl methacrylate)	Ambient to 500	Methyl methacrylate, HCl, CO_2, CO, methyl chloride, methanol.	86
Poly(isoprene), synthetic	287–400	3.4% isoprene, 8.8% dipentene, small amounts of *p*-menthene.	2,16,31
97% *cis*-1,4; 3%, 3,4	384	In helium; methane (0.04 wt.%), ethylene (0.08), ethane (0.03), propylene (0.15), propane (0.06), isobutylene (0.09), butenes (0.07), methyl butene (0.09), isoprene (29), toluene (0.02), 2,3-dimethyl cyclopentene (1.2), octene (0.05), 2,4-dimethyl cyclohexene (0.16), *m*-xylene (0.33), 1-methyl-4-ethyl cyclohexene (0.18), 1,5-dimethyl-5-vinyl cyclohexene (2.5), dipentene (60), $C_{11}H_{18}$ (0.2), $C_{12}H_{18}$ (0.2), $C_{15}H_{24}$ (3.5), $C_{16}H_{26}$ (1.8)	87
natural rubber	287–400	3.9% isoprene, 13.2% dipentene, small amounts of *p*-menthene	2,16,31
	450–800	Dipentene main product at 450°C, optimum yields of isoprene in range 675–800°C, e.g., 58% at 750°C and 13 mbar	32
	500	Monomer, dimers (1,7,7-trimethyl-2,2,1-bicyclohept-2-ene, 2,5,6-trimethyl 1,3,6-heptatriene, dipentene/d,1-limonene), trimers	259
gutta percha	287–400	3.0% Isoprene, 15.6% dipentene, small amounts of *p*-menthene	2,16,31
Poly(isoprene)-*blend*-poly(styrene) (4/1 to 1/4, w/w)	Ambient to 500	Styrene, isoprene, dipentene larger chain fragments of both polymers, traces of ethylene, ethane, and propane	88
chlorinated rubber	Ambient to 500	HCl (almost quantitative), CH_4, C_2H_4, and H_2 are minor products formed in the later stages of reaction	89
chlorinated rubber-*blend*-poly(vinyl chloride)	160–350	HCl	90
Poly(perfluoro-4-chloro-1,6-heptadiene)	320–400	Completely volatilized – products unknown.	49
1.2. POLY(ALKENES)			
Poly(ethylene)	335–450	Continuous spectrum of saturated and unsaturated hydrocarbons from C_2–C_{90}; lower temperature favors larger fragments	13,16
–, low density	Ambient to 500	Continuous spectrum of saturated and unsaturated hydrocarbons C_1–C_{15}; trace of hydrogen	243
	264–289	In air; CO_2, H_2O, ethene, propene, propane, cyclopropane, butene, butane, pentene, pentane, hexene, hexane, heptene, heptane, octene, octane, methanol, ethanol, furan, tetrahydrofuran, formaldehyde, acetaldehyde, propanal, acrolein, butanal, isobutanal, pentanal, acetone, methyl vinyl ketone, methyl ethyl ketone, 2-pentanone, 2-hexanone, 2-heptanone, formic acid, acetic acid, propionic acid, acrylic acid, butyric acid, isovaleric acid, hydroxyvaleric acid, crotonic acid, caproic acid, butyrolactone, valerolactone	91
Poly(ethylene-*co*-carbon monoxide) Alternating copolymer	500	CO, H_2O, ethene, series of ketones with general structure $R-[-CO-CH_2-CH_2-]_n-CO-R'$ where R, $R' = -CH_3$, $-CH_2-CH_3$ or $-CH=CH_2$	270
Poly(ethylene-*co*-ethyl acrylate) 18 : 1 mole ratio	Ambient to 500	Broad spectrum of saturated and unsaturated hydrocarbons, ethyl esters and carboxylic acids; ethanol, ethylene, CO_2, CO and small amounts of ketene and ethyl acrylate	243
Poly(ethylene-*co*-vinyl acetate) (12–33 mol% vinyl acetate)	Ambient to 500	Acetic acid, ketene, CO_2, ethylene, saturated and usaturated hydrocarbons, chain fragment fraction containing some vinyl acetate units	92
(38.5% (wt.%) of ester groups)	260–290	Acetic acid > 99%	93
Poly(isobutene)	288–425	18.1% monomer together with methane, isobutane, and C_5 and higher saturated and unsaturated hydrocarbons	16
	Up to 1200	As temperature is increased the yields of fragments smaller than monomer increase at the expense of larger fragments	28

TABLE 1. *cont'd*

Polymer	Temperature range (°C)	Degradation products	Refs.
	325	At 4.9% weight loss, products are isobutene (64.3%), CH_4 (13.6%), neopentane (10.3%); remainder C_2–C_{12} hydrocarbons	29
	345	At 15.7% weight loss, products are isobutene (78.9%), CH_4 (5.9%), neopentane (4.7%); remainder C_2–C_{12} hydrocarbons	29
	365	At 46.8% weight loss, products are isobutene (81.6%), CH_4 (3.9%), neopentane (3.1%); remainder C_2–C_{12} hydrocarbons	29
	300–320	Two types of *t*-butyl ended and two types of isopropyl ended terminal monoolefins in range 2-mers to 12-mers	249
Poly(isopropenylcyclohexane)	400–900	Methylenecyclohexane and/or methyl-1-cyclohexene, ethylcyclohexane, toluene, isopropenylcyclohexane, isomer of isopropenylcyclohexane, ethyl benzene, isopropylcyclohexadiene, pentadienylcyclohexane (5 isomers), dicyclohexylpropane, 3-cyclohexenyl-1-cyclohexylpentadiene, dicyclohexylhexadiene	94
Poly(isopropenylcyclohexane-*co*-α-methylstyrene) (92/8 and 33/67)	400–900	Methylenecyclohexane and/or methyl-1-cyclohexane, benzene, toluene, isopropenylcyclohexane, ethylbenzene (92/8 only), decalin (92/8 only), cumene (33/67 only), α-methylstyrene, styrene, (33/67 only), pentadienylcyclohexane (92/8 only), indene and methyleneindene (33/67 only), naphthalene, dicyclohexylhexadiene (92/8 only). The following from the 33/67 copolymer only: 2-methylnaphthalene, 1-methylnaphthalene, biphenyl, methylstilbene, α-methylstilbene, anthracene/phenanthrene, dihydropyrene	94
Poly(4-methyl-1-pentene)	291–341	After 22 hours at 341°C, 20% residue, 71% saturated and chain fragments; 9% of products volatile at 25°C, comprising isobutene (56%), propane (34%), traces of monomer, and hydrocarbons	43
Poly(propylene)	328–410	Saturated and hydrocarbons from C_2 upwards, monomer yield 0.17%	13
	400–1200	As temperature is raised, yield of small fragments increases at expense of large fragments	28
	360–400	At 400°C, chain fragments with 7.05 wt.% of volatile products comprising principally, methane 0.057 wt.%, ethane 0.13, propane 0.078, propene 0.83, isobutene 0.16, butane 0.004, 2-methyl-1-butene 0.010, 1-pentene 0.008, pentane 1.62, 2-pentene (*cis* and *trans*) 0.015, 2-methyl pentane 0.074, 2-methyl-1-pentene 1.19, 2,4-dimethylpentane 0.032, 2,4-di-methyl-1-pentene 0.089, 4-methylheptane 0.24, 2,4-dimethyl-1-heptene 2.20, 4,6-dimethylnonane (threo form) 0.042 (erythro form) 0.052, 2,4,6-trimethyl-1-nonene (threo form) 0.055 (erythro form) 0.066	95
	120–280	In air; ethene, ethane, propene, propane, isobutene, butane, isobutane, pentadiene, 2-methyl-1-pentene, 2,4-dimethyl-1-pentene, 5-methyl-1-heptene, dimethylbenzene, methanol, ethanol, 2-methyl-2-propene-1-ol, 2-methyl furan, 2,5-dimethylfuran, formaldehyde, acetaldehyde, acrolein, propanal, methacrolein, 2-methyl propanal, butanal, 2-vinyl crotonaldehyde, 3-methyl pentanal, 3-methyl hexanal, octanal, nonanal, decanal, ethenone, acetone, 3-buten-2-one, 2-butanone, 1-hydroxy-2-propanone, 1-cyclopropylethanone, 3-methyl-2-buten-2-one, 3-penten-2-one, 2-pentanone, 2,3-butanedione	96
	200–356	Under 254 nm radiation; additional methane and ethylene are formed compared with the thermal reaction	97
Poly(propylene)-*blend*-poly(methyl methacrylate)	Ambient to 500	Poly(methyl methacrylate) stabilized by blending with polypropylene; pre-irradiation with 2537 Å radiation at ambient temperature reduces amount of methyl methacrylate formed on subsequent thermal degradation; missing methyl methacrylate units appear in a chain fragment fraction	99
Poly(vinylcyclohexane)	335–391	Small amounts of cyclohexane, cyclohexane, methylcyclohexene, methyl cyclohexane, vinylcyclohexene, vinylcyclohexane, ethylcyclohexane with larger chain fragments	2,3
	360–380	Cyclohexane (main product), cyclohexene, vinylcyclohexane, vinylcyclo hexane oligomers, methane, ethane, ethylene, propane, propylene, butane, butylene, hydrogen	100
Poly(chlorotrifluoro-ethylene)	Ambient to 500	Monomer, traces of dichlorodifluoroethene, chloropentafluoropropene, trichlorotrifluoroethane	261

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TABLE 1. *cont'd*

Polymer	Temperature range (°C)	Degradation products	Refs.
1.3. POLY(ACRYLICS), POLY(METHACRYLICS)			
Poly(acrylic acid)	Ambient to 500	CO, CO_2, H_2O, CH_4, acetone, ketene, ethene, propylene, 1-butene, methyl vinyl ketone, benzene, acrylic acid, toluene, xylene, short chain fragments such as dimer to octamer with unsaturated and anhydride functionalities	297
–, methyl ester	292–399	26% of products are volatile at 25°C, mainly methyl alcohol and carbon dioxide with traces of monomer and methyl methacrylate and C_4–C_6 oxygenated compounds (74% of products are large chain fragments involatile at 25°C)	2,3
	Up to 980	Methanol (1.9%), methyl formate (trace), methyl acetate (1.4%), methyl acrylate (19.0%), methyl methacrylate (1.9%), saturated ester (2.1%), dimethyl glutarate (7.5%), methyl 4-methoxycarbonyl-pent-4-enoate (11.6%), trimethyl pentane 1,3,5-tricarboxylate (0.6%) methyl 4,6-di-methoxycarbonylhept-6-enoate (53%), saturated and tetramers (1.0%)	101
	50	Irradiated with high-pressure mercury lamp; methanol, formaldehyde, methyl acetate, methyl formate, CO_2, CO, H_2, CH_4	102
–, ethyl ester	300–500	Major products, carbon dioxide, ethylene, ethanol, and chain fragments; minor products, ethane, ethyl acrylate, and ethyl methacrylate	103
	50	Irradiated with high-pressure mercury lamp; CO, CO_2, ethanol, acetaldehyde, ethane, ethyl formate, acetal, ethyl propionate	104
	Ambient to 500	Ethylene, carbon dioxide, trace of ketene, ethanol (major product), various ethyl esters (see Ref.)	243
–, *n*-propyl ester	300–500	Major products carbon dioxide, propene, propanol, and chain fragments; minor products, propane, carbon monoxide, hydrogen, *n*-propyl acrylate, and *n*-propyl methacrylate	103
–, isopropyl ester	250–500	Major products carbon dioxide, propene; minor products isopropanol with trace carbon monoxide	105
–, *n*-butyl ester	300–500	Major products carbon dioxide, 1-butene, butanol, and chain fragments; minor products, butane, *n*-butyl acrylate, and *n*-butyl methacrylate	103
	50	Irradiated with high-pressure mercury lamp. CO, CO_2 *n*-butanol, butyraldehyde, *n*-butene, *n*-butyl formate, *n*-butyl valerate (after prolonged exposure)	104
–, *tert*-butyl ester	>160	86% isobutylene, 11% water, 3% carbon dioxide	4
–, 2-ethyl hexyl ester	300–500	Carbon dioxide, 2-ethyl-1-hexene, 2-ethyl-1-hexanol	103
–, benzyl ester	260–300	Major products are benzyl alcohol, chain fragments, partially crosslinked residue; minor products are CO_2, toluene, CO, CH_4, H_2	1
	–	CO_2, benzyl alcohol, and low polymers	106
–, 1,1,5-trihydroperfluoroamyl ester	300–315	Oligomers, 1,1,5-trihydroperfluoroamyl alcohol, monomer, 1,1,5-trihydroperfluoroamyl methacrylate	107
–, 2,2,2-trichloroethyl ester	319	2,2,2-Trichloroethanol (80%), monomer (9%), 1,1-dichloroethene, 2-chloroethanal, 2,2-dichloroethanal, 1,1-dichloropropane, 1,1,1-trichloroethane, 2,2,2-trichloroethylethanoate, 2,2,2-trichloroethyl chloromethanoate, 2,2,2-trichloroethylpropanoate, 2,2,2-trichloroethylmethacrylate, 2,2,2-trichloroethyl chloroethanoate, 2,2,2-trichloroethyl-2-chloroacrylate	263
–, α-bromo-, methyl ester	110–150	Methylbromide, hydrogen bromide	5
	600	CO_2, propene, methyl bromide, vinyl bromide	305
–, α-chloro-, methyl ester	600	CO_2, propene, methyl chloride, monomer	306
–, α-chloro-, *sec*-butyl ester	190	*sec*-Butyl chloride, butylene, hydrogen chloride	7
–, α-cyano-, methyl ester	>180	Yellows and some monomer formed	6
–, α-phenyl-, methyl ester	210–280	Monomer is the sole product	8
Poly(acrylic acid, magnesium salt)	Ambient to 500	CO, CH_4, CO_2, acetone, ketene, ethene, propene, 1-butene, benzene, toluene, xylene, cyclopentene, methyl ethyl ketone, diethyl ketone, methyl-*n*-propyl ketone, di-*n*-propyl ketone, methyl vinyl ketone, methyl isopropenyl ketone, methyl isopropyl ketone, ethyl vinyl ketone, trace amounts of methyl-*n*-butyl ketone, cyclopentanone, cyclohexanone, acrolein, ethanal and butanal, chain fragments, some monomer	312
Poly(acrylic acid, calcium salt)	Ambient to 500	CO, CH_4, CO_2, acetone, ketene, ethene, propene, 1-butene, benzene, toluene, mesitylene, xylene, methyl ethyl ketone, diethyl ketone, methyl-*n*-propyl ketone, methyl-*n*-butyl ketone, ethyl vinyl ketone, methyl propenyl ketone (trace), ethyl propyl ketone (trace), 3-methyl-cyclopentanone, cyclohexanone (trace), cyclohexa-2-enone,	312

TABLE 1. *cont'd*

Polymer	Temperature range (°C)	Degradation products	Refs.
		2-methyl-cyclohexanone, 1-methyl-cyclohexa-1-ene-3-one (trace), acrolein, mesityl oxide, ethanal, propanal, butanal, chain fragments, some monomer	
Poly(acrylic acid, sodium salt)	Ambient to 500	CO, CH_4, CO_2, ketene, 1-butene, propene, acetone, methyl ethyl ketone, methyl isopropyl ketone, methyl-*n*-propyl ketone, diethyl ketone, methyl propenyl ketone, 3-hexanone, toluene, 2-hexanone, 1,3-cyclopentadiene, cyclopentanone, 2-methyl cyclopentanone, mesityl oxide, xylenes, benzene, propionaldehyde, acrolein, acetaldehyde, ethene, short chain fragments, traces of monomer	303
Poly(acrylic acid, potassium salt)	Ambient to 500	CO, CH_4, CO_2, ketene, 1-butene, propene, acetone, methyl ethyl ketone, methyl *n*-propyl ketone, 1,4-cyclohexadiene, toluene, 1-methyl-1,3-cyclohexadiene, 2-hexanone, cyclopentene, 1-methyl cyclopentene, mesityl oxide, xylenes, benzene, ethene, cyclopentanone, 1,3-cyclopentadiene, diethyl ketone, short chain fragments, traces of monomer	303
Poly(methyl acrylate-*co*-methyl methacrylate) (mole ratios 112/1–2/1)	Ambient to 500	Monomers, CO_2, chain fragments larger than monomer, H_2; more stable than poly(methyl methacrylate); rapid decrease in molecular weight; products of phtodegradation at 170° by 254 nm radiation are qualitatively similar	108,109
Poly(methyl acrylate-*co*-acryloyl chloride) 6, 15, 41, 83 mol% AC	Ambient to 500	Acrylic acid, HCl, H_2O, CO, CO_2, acryloyl chloride, methyl acrylate, methyl acrylate chain fragments, anhydride and γ-lactone structures, chloro-methane, methyl methacrylate, methanol, 3,5-(6-chloro-2-pyrone) and fragments thereof, C_6, C_9, C_{12}, C_{15} fragments. Relative yields depend upon copolymer composition	262
Poly(methyl acrylate-*co*-2-bromoethyl methyacrylate) (10–82 mol% methyl acrylate)	Ambient to 500	CO_2, ketene, methyl bromide, acetaldehyde, methyl acrylate, methanol, 1,2-dibromoethane, methyl methacrylate, 2-bromoethanol, ethyl methacrylate, CH_4, CO, H_2 modified chain fragments	110
Poly(methyl acrylate)-*blend*-poly((2-bromoethyl methacrylate) (50/50, w/w)	Ambient to 500	CO_2, ketene (minor), methyl bromide, vinyl bromide (minor), acetaldehyde, methanol, methyl methacrylate, methyl acrylate, 1,2-dibromoethane, 2-bromoethyl methacrylate	111
Poly(*n*-butyl acrylate-*co*-methyl methacrylate) (3.9–93.4 mol% butyl acrylate)	313–332	1-Butene, carbon dioxide, butanol methyl methacrylate, butyl acrylate, and butyl methacrylate; small quantities of methane, ethane, propane, butane, ethylene, propene, *cis*, and *trans* 2-butene, hydrogen, and carbon monoxide increase with butyl acrylate content of the copolymer	112
	165	Under 2537 Å radiation; methyl methacrylate with smaller quantities of *n*-butyl acrylate, *n*-butanol, *n*-butyraldehyde, hydrogen, carbon monoxide, and methane; a chain fragment fraction increases with *n*-butyl acrylate content	113
Poly(*tert*-butyl acrylate-*co*-glycidyl methacrylate) (34/66)	0–700	CO, CO_2, propene, ethanal, isobutene, acrolein, allyl alcohol	114
Poly(methyl-α-chloroacrylate-*co*-2,2,2-trifluoroethyl methacrylate) (70/30)	Ambient	Gamma Radiolysis; CH_4, CO, ethylene, ethane, CH_3OH, CHF_3, HCl, C_3H_6, CO_2, C_2H_3F, CH_3Cl, methyl formate, CH_3CH_2Cl, CHF_3, CH_3CF_3, $CH_2{=}C(CH_3)COOCH_2CF_3$	115
Poly(methyl-α-chloroacrylate-*co*-2,2,2-trifluoroethyl methacrylate) (70/30)	Ambient	Gamma Radiolysis; CH_4, CO, ethylene, ethane, CH_3OH, HCl, C_3H_6, CO_2, CH_3Cl, methyl formate, CH_3CH_2Cl, CH_2Cl_2, $CHCl_3$	115
Poly(acrylonitrile)	<200	Colours through yellow, orange, red, and black	9
	250–280	12% of products are volatile at 25°C, consisting of hydrogen cyanide, acrylonitrile, and vinyl acetonitrile; 88% of products are involatile at room temperature	10,11
	280–450	Five major volatile products are cyanogen, HCN, acrylonitrile, acetonitrile, vinyl acetonitrile; involatile residue remains	12
	250–350	NH_3, HCN	116
	235	HCN, hydrogenated acrylonitrile, dimer and trimer, acetonitrile, methacrylonitrile	117
–, α-chloro	150–200	Hydrogen chloride	118
	Ambient to 500	Hydrogen chloride and small amount of HCN at higher temperatures	119
–, α-phenyl	Ambient to 500	High yields of monomer	119
Poly(acrylonitrile-*co*-2-bromoethyl methacrylate (50/50, mol/mol)	Below 310	Ethylene, CO_2, vinyl bromide acetaldehyde, 1,2-dibromoethane	120
	310–500	Propane, isobutene, CO_2, HCN, isocyanic acid, yellow-chain fragment fraction	121
Poly(acrylonitrile-*co*-methyl methacrylate)(1/410–1/8)	220–280	Only methyl methacrylate from 410/1 and 40/1 (molar ratio) copolymers; methyl methacrylate and small amounts of acrylonitrile from 16/1 and 8/1 copolymers; rapid decrease in the molecular weight of all copolymers	121

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TABLE 1. *cont'd*

Polymer	Temperature range (°C)	Degradation products	Refs.
	160	Photodegradation by 254 nm radiation gives methyl methacrylate from 410/1 to 8/1 copolymers with a 8/1 copolymer; rapid decrease in the molecular weight of all copolymers	121
Poly(acrylonitrile-*co*-methyl vinyl ketone)	–	Production of water from poly(methyl vinyl ketone) accelerated by copolymerization with acrylonitrile	122
Poly(acrylonitrile-*co*-styrene) (0/100–50/50, mol/mol)	292	Acrylonitrile causes increase in rate of chain scission; proportion of acrylonitrile among degradation products greater than from pure polyacrylonitrile; chain fragments increase with acrylonitrile content of copolymer; styrene, acrylonitrile, toluene, benzene, four dimers, and four trimers	123
(1.86–96.62 mol% acrylonitrile)	500	Hydrocyanic acid, acetonitrile, acrylonitrile, propionitrile, toluene, ethyl benzene, styrene, methane, ethylene, ethane, C_3 hydrocarbons, but-1-ene, prop-1-ene-3-nitrile, isopropylnitrile, benzene	124
Poly(acrylonitrile-*co*-vinyl acetate) (7.5 wt.% vinyl acetate)	260	HCN, hydrogenated acrylonitrile, dimer and trimer, acetonitrile, methacrylonitrile, acetic acid	117
Poly(acrylonitrile-*co*-methyl acrylate-*co*-vinyl bromide) (methyl acrylate, 10 wt.%; vinyl bromide, 5 wt.%)	180–320	CH_3Br, HBr, H_2O, CO_2, CH_3OH, NH_3, HCN, hydrogenated acrylonitrile, dimer and trimer, acetonitrile, methacrylonitrile, naphthyridine fragments	117
Poly(α-chloroacrylonitrile-*co*-methyl methacrylate)	>150	Hydrogen chloride, methyl methacrylate, α-chloroacrylonitrile	125
(0–50 mol% α-chloroacrylonitrile)	Ambient	Under 254 nm radiation. HCl, CO_2, methyl chloride, methyl formate, methanol, methyl methacrylate, CO, CH_4, H_2	126
Poly(acrylonitrile)-*blend*-poly(methyl methacrylate) (50/50, w/w)	Up to 320	NH_3, HCN, MMA	127
	320–500	Chain-fragment fraction and small amounts of CO, CO_2, methanol, CH_4	
Poly(acryloyl chloride)	Ambient to 500	Acrylic acid, HCl, H_2O, CO, acryloyl chloride, 3,5-(6-chloro-2-pyrone) and fragments thereof, C_6, C_9, C_{12}, C_{15} fragments	262
Poly(methacrylic acid)	200	Almost quantitative yields of H_2O, traces of monomer, residue of poly(methacrylic anhydride)	33
	900	CO_2, propene, butenes, pentenes, pentadienes, hexene, hexadienes, hexatrienes, benzene, toluene, heptene, heptatriene, methacrylic acid, xylene, octatriene, octadienyne, nonatriene, hexadienoic acid, decatriene, decatetraene, decapentaene, undecatriene, methylbenzoic acids, trimethylbenzoic acid	128
–, methyl ester	170–300	100% monomer	34, 35
	246–400	As temperature is raised fragmentation increases to give complex series of products and monomer yields correspondingly decreases	2
	160	100% monomer under 253.7 nm radiation	36
	100–400	Under 254 nm radiation; 100% monomer	129
–, ethyl ester	250	Monomer	37
	245	Monomer, ethanol, ethanoic acid	300
–, *n*-propyl ester	250	Monomer	37
–, *iso*-propyl ester	250	Monomer	37
–, *n*-butyl ester	250	40% monomer and traces of 1-butene	38
	170	100% monomer under 253.7 nm radiation	38
–, *iso*-butyl ester	250	Monomer	37
–, *sec*-butyl ester	250	Monomer and small amount of olefin by cracking of side chain	37
–, *tert*-butyl ester	180–200	High yields of isobutylene and water, 1% monomer, trace of methacrylic acid, residue of poly(methacrylic anhydride)	39
	<180	100% monomer under 253.7 nm radiation	
–, *n*-amyl ester	250	Monomer	37
–, *iso*-amyl ester	250	Monomer	37
–, 1,2-dimethylpropyl ester	250	Monomer and small amount of olefin by side chain cracking	37
–, neopentyl ester	250	Monomer	37
–, 3,3-dimethylbutyl ester	250	Monomer	37
–, 1,3-dimethylbutyl ester	250	Monomer and small amount of olefin by side chain cracking	37
–, 2-bromoethyl ester	Ambient to 500	2-Bromoethyl methacrylate (>95%), CO_2 (<1%), vinyl bromide (<1%)	130
–, 2-sulfoethyl ester	50–600	CO, CO_2, H_2O, SO_2, ethene	290
	600	CO, CO_2, propene, acetaldehyde, methyl bromide, butene, vinyl bromide, ethyl bromide, methyl methacrylate	305
–, 2-chloroethyl ester	600	CO_2, propene, acetaldehyde, vinyl chloride, ethyl chloride, monomer	306
	268	Monomer (99%), traces of acetaldehyde, methyl methacrylate, 1,2-dichloroethane, ethylene methacrylate	268

TABLE 1. *cont'd*

Polymer	Temperature range (°C)	Degradation products	Refs.
Poly(methacrylic acid), 2-fluoroethyl ester	600	CO_2, vinyl fluoride, acetaldehyde, fluoroacetaldehyde	310
–, 2,2-dichloroethyl ester	242	Monomer (90.7%), chloroacetaldehyde (8%), 1,1,2-trichloroethane (0.5%), 2,2-dichloroethanol, methacrylic acid (0.1%), 2-chloroethylene methacrylate (0.1%)	268
–, 2-methoxyethyl ester	Ambient to 300	Monomer, CO_2	309
	Ambient to 500	Monomer, CO_2, CO, CH_4, ethene, formaldehyde, isobutene, methyl vinyl ether, methanol	309
–, 2,3-dibromopropyl ester	600	CO_2, propene, acetaldehyde, methyl bromide, butene, ethyl bromide, bromocyclopropane or 2-bromopropane	305
–, 2-hydroxyethyl ester	375–500	2-Hydroxyethyl methacrylate (20% at 500°C), ethylene dimethacrylate (6%at 500°C)(main products), ethylene glycol, 3-methyl-5-hydroxy-δ-valerolactone (probably), 1,2-di-iospropenyl-oxyethane (probably), CO, CO_2, methane, ethylene, ethane, propane, H_2O	131
–, 2,2,2-trifluoroethyl ester	Ambient	Gamma radiolysis; CH_4, CO, ethylene, ethane, CH_3OH, CH_3F, C_3H_6, CO_2, C_2H_3F, methyl formate, CH_3CHFOH, CHF_3, CF_3CH_3, CF_3OH, $CH_2{=}C(CH_3){-}COOCH_2CF_3$	115
	600	CO_2, vinylidene fluoride, trifluoroacetaldehyde, trifluorethanol, monomer	310
–, 2,2,2-trichloroethyl ester	600	CO_2, propene, vinyl chloride, vinylidene chloride	306
	240	1,1-Dichloroethene, chloroform, methyl methacrylate, methacrylic acid, 2,2,2-trichloroethanol, 2,2,2-trichloroethyl acrylate, 2,2,2-trichloroethyl methacrylate, 2,2-dichloroethyl methacrylate, $CH_2{=}C(CH_3){-}COOCH{=}CCl_2$ or $CH_2{=}C(CH_3){-}COOCCl{=}CHCl$	300
–, hexafluoroisopropyl ester	600	CO_2, trifluoracetaldehyde, acetaldehyde, 1,1,1,3,3,3-hexafluoropropane, hexafluoro-isopropylformate	310
–, bisphenol S ester	464	CO_2, SO_2, phenol, bisphenol S, hydroquinone, fragments of backbone, benzene sulfonic acid	248
–, allyl ester	Ambient to 500	CO_2, CH_4, CO, H_2, propene, isobutene, dimethyl ketene, acrolein, diallyl ether, allyl methacrylate monomer and dimer, chain fragments including anhydride structures from side-group cyclization and an aliphatic ketone in the vicinity of unsaturation	283
–, phenyl ester	Ambient to 500	Monomer, some CO_2	314
–, glycidyl ester	Ambient to 500	CO, CO_2, dimethyl ketene, isobutene, propene, acrolein, allyl alcohol, glycidyl methacrylate, glycidol, short chain fragments with some unsaturation	302
–, ammonium salt	Ambient to 500	Isocyanic acid, NH_3, HCN, isobutene, CO_2 (trace), methacrylonitrile (trace)	132
–, Li, Na, K, and Co salts	Ambient to 500	Ethylene, butene-1, isobutene, acetylene, CO_2, CH_4, CO, acetone, isopropylaldehyde, methacrolein, butyraldehyde, methyl ethyl ketone, benzene (trace), methyl isopropyl ketones, methyl isopropenyl ketone, diethyl ketone, methyl *n*-propenyl ketone, cyclopentanone, methyl cyclopentanone, dimethyl cyclopentanone, dimethyl cyclopentenone and traces of toluene, di-isopropyl ketone, mesitylene, mesityl oxide	133
–, Mg, Ca, Sr, and Ba salts	Ambient to 500	CO_2, dimethyl ketene trace amounts of CO, CH_4, isobutene, butene-1, ethylene, acetylene, benzene toluene isobutyraldehyde, methyl ethyl ketone, methyl isopropenyl ketone, diethyl ketone, methyl isopropenyl ketone, di-isopropyl ketone, cyclopentanone, 2-methyl cyclopentanone, 2,5-dimethyl-cyclopentanone, 2,5-dimethylcyclopent-3-ene-1-one, methacrolein, butyraldehyde	134
Poly[α-ω-(diethylene glycol phthalate)dimethacrylate]	300	Monomer	194
	400	Monomer, phthalic anhydride, diethylene glycol, C_2H_4, propylene, CO_2	194
Poly(methyl methacrylate-*co*-alkali (metal methacrylates) (Li, Na, K) (0–100 mol%)	Ambient to 500	CO_2, alkenes, CH_4, CO, propanal methanol (major), acetone, 2-methyl propanal, methacrolein, butanal, methyl ethyl ketone, methyl isopropyl ketone, methyl isopropenyl ketone, methyl methacrylate (major), methyl prop-2-enyl ketone, toluene, di-isopropyl ketone, cyclopentanone, 2-methyl cyclopentanone, 2,5-dimethyl cyclopentanone, 2,5-di-methyl cyclopent-3-enone. Relative yields depend upon salt and copolymer composition	135
Poly(methyl methacrylate-*co*-2-bromoethyl methacrylate) (50/50, mol/mol)	Ambient to 500	Methyl methacrylate, 2-bromoethyl methacrylate, traces of vinyl bromide and CO_2	130
Poly(methyl methacrylate-*co*-methacrylamide)	Up to 340	> 35 mol% methacrylamide. MMA, methanol, NH_3, H_2O	146

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TABLE 1. *cont'd*

Polymer	Temperature range (°C)	Degradation products	Refs.
	>340	Methacrylamide; chain fragments and small amounts of CH_4, CO_2, CO, HCN, methacrylonitrile and isobutene	146
	–	<10 mol% methacrylamide. Degradation becomes progressively more like that of PMMA	146
Poly(methyl methacrylate-*co*-methacrylic acid)	<300	Water and methanol	136
	>300	Methyl methacrylate, CO_2, CO, CH_4	
	900	(50/50 and 75/25); CO_2, propene, butenes, pentenes, pentadienes, hexene, hexadienes, hexatrienes, benzene, methyl isobutyrate, methyl methacrylate, toluene, heptene, heptatriene, methyl pentenoate, methacrylic acid, xylene, octatriene, octadienyne, nonatriene, hexadienoic acid, decatriene, decatetraene, decapentaene, undecatriene, methylbenzoic acids	128
Poly(methyl methacrylate-*co*-2-chloroethylmethacrylate) 22 mol% CEMA	600	CO_2, propene, acetaldehyde, vinyl chloride, ethyl chloride, methyl methacrylate	306
Poly(methyl methacrylate-*co*-2,2,2-trichloroethyl methacrylate) 24 mol% TCEMA	600	CO_2, propene, vinyl chloride, vinylidene chloride, dichloroacetaldehyde, methyl methacrylate	306
Poly(methyl methacrylate-*co*-methyl-α-chloroacrylate) 38 mol% MCA	600	CO_2, propene, methyl chloride, methyl methacrylate	306
Poly(methyl methacrylate-*co*-2-bromoethyl methacrylate) 22 mol% BEMA	600	CO_2, propene, acetaldehyde, methyl bromide, butene, vinyl bromide, methyl methacrylate	305
Poly(methyl methacrylate-*co*-2,3-dibromopropyl methacrylate) 16 mol% DBPMA	600	CO, CO_2, ethene, propene, methyl bromide, butene, vinyl bromide, ethyl bromide, 1-bromopropene, 2-bromopropene, cyclopropyl bromide, methyl methacrylate	305
Poly(methyl methacrylate-*co*-methyl-α-bromoacrylate) 22 mol% MBA	600	CO_2, acetaldehyde, methyl bromide, butene, vinyl bromide, unidentified alkenyl bromides, methyl methacrylate	305
Poly(methyl methacrylate-*co*-chlorotrifluoroethylene) 7.7 mol% MMA	Ambient to 500	HCl, CO_2, CH_3Cl, C_2F_3Cl (monomer), C_3F_5Cl, $C_2F_3Cl_3$, methyl methacrylate, chain fragments possibly with some lactonization	281
77.7 and 85.7 mol% MMA	Ambient to 500	HCl, CO_2, CH_3Cl, C_2F_3Cl (monomer), methyl methacrylate	281
Poly(methyl methacrylate-*co*-2-sulfoethyl methacrylate) 20, 40, 60 mol% MMA	50–600	CO, CO_2, H_2O, SO_2, ethene, methanol, methyl methacrylate (only 60 and 80 mol% methyl methacrylate copolymers)	290
Poly(methyl methacrylate-*co*-4-vinylpyridine) 22, 35, 46, 56 mol% 4-vinyl pyridine	Ambient to 500	4-vinyl pyridine, methyl methacrylate, traces of pyridine and 4-methyl pyridine	260
Poly(methyl methacrylate-*co*-phenyl methacrylate) 9, 18, 47, 88 mol% PMA	Ambient to 500	CO_2, isobutene, ketene, formaldehyde, methanol, methyl methacrylate, phenyl methacrylate, chain fragments including six-membered anhydride ring structures. Product distribution varies with copolymer composition with non-monomer products most pronounced at low PMA contents	314
Poly(methyl methacrylate-*co*-glycidyl methacrylate)	Ambient to 500	CH_4, CO, CO_2, propene, isobutene, dimethyl ketene, acrolein, allyl alcohol, glycidol, glycidyl methyl ether, methyl methacrylate, glycidyl methacrylate, chain fragments. Distribution varies with copolymer composition	286
Poly(methyl methacrylate -*block*-*t*-butylaziridine) ABA type copolymer with MW 12000 butylaziridine (B) and MW 16000 MMA (A)	Ambient to 600	CO, CH_4, CO_2, ethene, propene, isobutene, aziridine, methanol, methyl methacrylate, α-methylstyrene, 2-phenyl-2-butene, 1-*t*-butylamino-2-isopropenylamino-ethane, 2-*t*-butylaminoethyl-ethyl-isopropenylamine, 2-aminoethyl-2-*t*-butylaminoethyl-isopropenylamine, oligomers – principally butylaziridine based	287
Poly(methyl methacrylate-*co*-styrene)	260–340	Methyl methacrylate, styrene and oligomers of styrene; formation of oligomers of styrene strongly inhibited by presence of methyl methacrylate units	137
Poly (methyl methacrylate-*co*-vinyl acetate) (5–40 mol% vinyl acetate)	Ambient to 500	Acetic acid, methyl methacrylate, methyl acetate, chain fragment fraction, ketene, CO_2	92

TABLE 1. *cont'd*

Polymer	Temperature range (°C)	Degradation products	Refs.
Poly(methyl methacrylate-*co*-vinyl bromide) (6–75 mol% vinyl bromide)	Ambient to 500	Methyl methacrylate, methyl bromide, methanol, CO_2, methanol, HBr, CO, H_2 and other unidentified minor products. Relative amounts depend upon copolymer composition	138
Poly(2-bromoethyl methacrylate-*co*-styrene) (50/50, mol/mol)	Ambient to 500	Styrene, 2-bromoethyl methacrylate, modified chain fragement fraction. Minor products; ethylene, CO_2, HBr, vinyl bromide, acetaldehyde	139
Poly(methyl methacrylate)-*blend*-ammonium polyphosphate	Ambient to 450	H_2O and NH_3 from ammonium polyphosphate. Methyl methacrylate (major product), CO, CO_2, methanol, dimethyl ether, hydrocarbons, high boiling chain fragments	140
Poly(methyl methacrylate)-*blend*-poly(styrene)	Ambient to 500	Polymers degrade separately without interaction to give same products as polymers degraded separately; copolymers and mixtures of the same molar compositions can be distinguished by degradation behavior	141
Poly(methyl methacrylate)-*blend*-poly(vinyl acetate) (10/1–1/1, w/w)	Ambient to 500	Methyl methacrylate, acetic acid, methyl acetate, methanol, CO_2, butene, benzene, ketene	142
Poly(methyl methacrylate)-*blend*-poly(vinyl bromide) (50/50, mol/mol)	Ambient to 500	Methyl methacrylate, HBr, CO, CO_2 and other unidentified products	143
Poly(methyl methacrylate)-*blend*-poly(vinyl chloride)	Ambient to 500	Major products: HCl, methyl methacrylate; minor products: CO_2, methyl chloride, benzene	144,145
Poly(methacrylamide)	Up to 340	NH_3 and H_2O	146
	Above 340	Chain fragments (50%) in which a high proportion of amide groups have been converted to cyclic imides; small amounts of CO_2, CH_4, HCN	146
	Ambient to 500	NH_3, HCN, isobutene, CO_2(trace), methacrylonitrile (trace)	132
Poly(methacrylonitrile)	<200	Non-volatile material, coloration through yellow, orange, and red	40
	220–270	50–100% monomer depending upon pretreatment and purity of polymer	40
	Ambient to 500	Ethene, propene, isobutene, HCN, CO_2(from benzoyl peroxide end groups), methacrylonitrile (major product), 2-cyanobutane, 2-cyanopentene, CH_4	277
Poly(methacrylonitrile-*co*-styrene) 10 : 1 mole ratio	Ambient to 500	Ethene, isobutene, HCN, methacrylonitrile, styrene, toluene, α-methylstyrene, β-methylstyrene, 2-phenylbutene, 4-cyano-2,4-dimethylpentene, 4-phenyl-2-methylbutene, 3-phenyl-2-propenenitrile, chain fragments	279
Poly(methacrylonitrile-*co*-styrene) 1 : 1 mole ratio	Ambient to 500	Ethene, isobutene, HCN, methacrylonitrile, styrene, toluene, α-methylstyrene, 4-phenylbutene, 4-phenyl-2-methylbutene, 3-phenyl-2-propenenitrile, chain fragments	279
Poly(methacrylonitrile-*co*-styrene) 1 : 10 mole ratio	Ambient to 500	Ethene, isobutene, HCN, methacrylonitrile, styrene, toluene, α-methylstyrene, β-methylstyrene, 4-phenylbutene, allylbenzene, 4-phenyl-2-methylbutene, 3-phenyl-2-propenenitrile, chain fragments	279
1.4. POLY(VINYLS)			
Poly(tert-butyl-*N*-vinyl carbamate)	185–220	Equal amounts of CO_2 and isobutylene, in yields ranging from 43 to 60%	196
Poly(chlorotrifluoroethylene) (KEL-F)	347–418	25% of products volatile at 25°C–monomer with traces of C_3F_5Cl and $C_3F_4Cl_2$; 72.1% of larger chain fragments involatile at 25°C	14
Poly(1,1-dichloro-2,2-difluoroethylene)	240	20% black involatile residue; 80% monomer	22
Poly(perfluoroheptene)	210–270	100% monomer	49
Poly(perfluoropropylene)	280–400	100% monomer	49
Poly(tetrafluoroethylene)	504–538	>95% monomer, 2–3% C_3F_6, no larger fragments (in vacuum)	14
	1200	Monomer yield drops, larger fragments appear (in vacuum)	23
	600–700	At 6.66 mbar pressure; pure monomer; at 1013 mbar pressure, 15.9% monomer, 25.7% C_3F_6, 58.4% C_4F_8	24
Poly(trifluoroethylene)	380–800	High yields of HF and products involatile at 25°C	23
Poly(vinyl acetate)	213–235	Quantitative yields of acetic acid	71
	300	Small amounts of aromatics including benzene	71
	280–350	Acetic acid, benzene, naphthalene, toluene, styrene, ethyl benzene, propenyl benzene, propylbenzene, methylnaphthalene, ethylnaphthalene, propenylnaphthalene, propylnaphthalene, anthracene, methylanthracene, ethylanthracene, propylanthracene	147
Poly(vinyl acetate) in presence of zinc bromide	Ambient to 500	Acetic acid produced as low as 100°C	148
Poly(vinyl acetate-*co*-maleic anhydride) alternating copolymer	Ambient to 500	Acetic acid, CO_2, H_2O, maleic anhydride, CO	240
Poly(vinyl acetate-*co*-crotonic acid) alternating copolymer	Ambient to 500	Ethene, propene, acetic acid, CO_2, propanoic acid, 2-methylpropanoic acid, butanoic acid, cyclopentanone, some unsaturated cyclic and acyclic aliphatic ketones, some chain fragments containing lactones	241

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TABLE 1. *cont'd*

Polymer	Temperature range (°C)	Degradation products	Refs.
Poly(vinyl acetate-*co*-methylvinylidene cyanide) Alternating with 10-15 mol% VA homosequence	285–350	Vinyl acetate, acetonitrile, HCN, acetic acid, acetamide, 2-methyl-1-aminonaphthalene, 3-cyano-3-pentene	266
Poly(vinyl acetate-*co*-styrene) (5–20 mol% vinyl acetate)	Ambient to 500	Acetic acid, styrene, chain fragment fraction, ketene, CO_2	92
Poly(vinyl acetate-*co*-vinyl alcohol) (50–99 mol% vinyl alcohol)	0–600	Acetaldehyde, acetone, benzene, crotonaldehyde, acetic acid	154
Poly(vinyl acetate-*co*-vinyl chloride)	Ambient to 500	Bulk polymer; hydrogen chloride and acetic acid in the proportions of the monomers in the copolymer; at each end of the composition range, incorporation of the comonomer results in a copolymer less stable than the homopolymer; minimum stability at 40–50 mol% vinyl acetate	155
	180	In tritolyl phosphate solution; similar to bulk polymer with minimum in stability at 30–40 mol% vinyl acetate	156
Poly(vinyl acetate-*co*-vinyl fluoride) (91 : 9 to 1 : 89)	200–500	Hydrogen fluoride, acetic acid, hydrocarbons	150
(80 : 20 to 23 : 77)	200–500	Hydrogen fluoride, HCl, hydrocarbons	150
Poly(vinyl acetate)-*blend*-poly(styrene) (1/1, w/w)	Ambient to 500	Products as for individual polymers	158
Poly(vinyl acetate-*blend*-poly(vinyl chloride)	Ambient to 500	Acetic acid, HCl, and traces of CO_2, ketene, acetyl chloride, CO and CH_4	157
Poly(vinyl alcohol)	250	Quantitative yields of H_2O	72
	240	Main products H_2O and C_2H_5OH, with aldehydes $CH_3—(CH=CH)_n—CHO$ and ketones $CH_3—(CH=CH)_n—COCH_3$ where $n = 0,1,2$, etc.	73
Poly(vinyl bromide)		HBr, ethylene, benzene, and other unidentified minor products	143
Poly(vinyl butyrate)	300–325	Butyric acid	74
Poly(*N*-vinylcarbazole)	230–410	Below 350°, monomer; above 350°, monomer and low-molecular weight oligomers	175
	300–500	Monomer (49% of total volatiles at 300°C, 39% at 500°C) ethane, ethene, propene, *n*-butane, isobutene, *cis* and *trans* but-2-ene, 1,3-butadiene, 2-methylbutadiene, trace amounts of C_5 and C_6 hydrocarbons	244
Poly(3,6-dichloro *N*-vinylcarbazole)	300–500	Monomer (83% of total volatiles at 300°C, 67% at 500°C), ethane, ethene, propene, *n*-butane, isobutene, *cis* and *trans* but-2-ene, 1,3- butadiene, 2-methylbutadiene, trace amounts of C_5 and C_6 hydrocarbons	244
Poly(3,6-dibromo *N*-vinylcarbazole)	350–500	Monomer (48% of total volatiles at 350°C, 40% at 500°C), ethane, ethene, propene, *n*-butane, isobutene, *cis* and *trans* but-2-ene, 1,3-butadiene, 2-methylbutadiene, trace amounts of C_5 and C_6 hydrocarbons	244
Poly(vinyl chloride)	200–300	Quantitative yields of HCl	75
	400	Saturated and unsaturated, aliphatic and aromatic hydrocarbons are produced with benzene and toluene in high yield	75
	600	In helium; quantitative yield of HCl, remainder residue and hydrocarbons; benzene is major volatile hydrocarbons product	76
	200–800	Aliphatic hydrocarbons, benzene (major product), toluene, ethylbenzene, *o*-xylene, monochlorobenzene, styrene, vinyl toluene, *p*-dichlorobenzene, *o*-dichlorobenzene, indene, 1,3,5-trichlorobenzene, 1,2,4-trichlorobenzene, naphthalene, α-methylnaphthalene, β-methylnaphthalene; effect of ZnO, SnO_2, and Al_2O_3 on the yields of products is also recorded	149
	Ambient to 1000	HCl, CO_2, ethene, ethane, propane, 1-butene, 2-butene, 1-pentene, cyclopentene, *n*-pentane, 2-methylbutane, 1,3-pentadiene, 2-methyl-1,3-pentadiene, complex series (60 identified) of aromatic and polyaromatic species, including benzene, styrene, methylstyrenes, toluene, *o*-xylene, *m*-xylene, *p*-xylene, biphenyl, naphthalene, anthracene, phenanthrene, pyrene, etc. (see Ref.)	267
Poly(vinyl chloride)-*blend*-poly(α-methylstyrene)	Ambient to 500	HCl, α-methyl styrene	159
Poly(vinyl chloride)-*blend*-poly(styrene)	Ambient to 500	HCl, styrene	159
(10/1 to 1/10, w/w)	Ambient to 500	Products as for individual polymers	160
PVC 1 : 1 blend with bisphenol A polycarbonate	Ambient to 500	CO_2, HCl, benzene, traces of toluene, phenol and other phenolic compounds, bisphenol A, polycarbonate chain fragments	291

TABLE 1. *cont'd*

Polymer	Temperature range (°C)	Degradation products	Refs.
PVC 1 : 1 blend with poly(dimethylsiloxane)	Ambient to 500	HCl, benzene, traces of toluene, octamethylcyclotetrasiloxane, oligomeric siloxanes	292
Poly(vinyl fluoride)	372–480	High yields of HF and products involatile at 25°C – little carbonization	23
	200–500	Hydrogen fluoride, C_2–C9 fractions	150
	450	85% wt. loss, 33 ± 5% volatile products, remainder was oily green liquid; Volatile products: HF (82 mol%), CH_4 (5.2), C_2H_6 (0.6), ethylene (0.8), acetylene (0.03), fluoroethylene (0.07), propene (0.5), C_3H_5F (0.4), butane (0.06), butene (1.1), 1,4-butadiene (0.2), 1,3-butadiene (0.7), C_4H_5F (0.06), Cyclopentadiene (0.05), benzene (4.5), fluorobenzene (0.3), toluene (1.0), $C_6H_4(CH_3)F$ (0.04), $C_6H_5C_2H_5$ or $C_6H_4(CH_3)_2$, and styrene (0.9), *n*-propylbenzene (0.2), iso-propylbenzene (0.3), C_6H_5–C_3H_5 (0.2), indene (0.3), naphthalene (0.8), fluoronaphthalene (0.3)	151
Poly(vinylidene chloride)	225–275	High yields of HCl	77
	170	Polymer prepared in presence of oxygen; phosgene, formaldehyde, HCl	152
Poly(vinylidene cyanide)	>160	High yields of monomer	78
Poly(vinylidene fluoride)	400–530	35% HF and high yields of products involatile at 25°C – some carbonization	23
	Ambient to 500	Monomer, dimer ($C_4F_3H_3$), SiF_4, (from reaction of HF with glass)	265
Poly(vinylidene fluoride-*co*-chlorotrifluoroethylene) 80 mol% vinylidene fluoride	Ambient to 500	HCl, HF, vinylidene fluoride, chlorotrifluoroethylene, dimer ($C_4F_3H_3$)	265
3, 10 mol% vinylidene fluoride	Ambient to 500	HCl, chlorotrifluoroethylene, dichlorodifluoroethene, chloropentafluoropropene, trichlorotrifluoroethane, dimer ($C_4F_3H_3$)	265
Poly(vinyltrimethylsilane)	300–600 in argon	Tetramethylsilane, trimethylvinylsilane, 2-trimethylsilylpropene, 1,3-tri-methylsilylpropane, 1,3-trimethylsilylpropene, 2,4-trimethylsilylbutene-1,2,4,6-trimethylsilylhexene-1	153
Poly(4-vinyl pyridine)	Ambient to 500	Monomer, traces of pyridine and 4-methyl pyridine	260
Poly(vinylacetophenone)	380	CO, CH_4, ethane, 4-acetyl styrene, 4-acetyl toluene, styrene, toluene, 4-vinyl acetaldehyde, α-methylstyrene, α-methyl-4-acetylstyrene, 4-methylstyrene	307
Poly(*N*-acryloyl-*N'*-cyanoacetohydrazide)	600	Cyanoactetamide	289
1.5. POLY(VINYL KETONES), POLY(VINYL ETHERS)			
Poly(methyl isopropenyl ketone)	270–360	H_2O	41
	Ambient to 500	Methyl isopropenyl ketone (50%), modified chain fragments, water, small amounts of CH_4 and CO	161
	150–190	Monomer under 313 nm radiation	42
Poly(methyl vinyl ketone)	270–360	H_2O, 3-methyl-2-cyclohexene-1-one and other six-membered ring ketones	44
	Ambient to 500	Water, modified chain fragments, small amounts of CH_4 and CO	161
Poly(trifluorovinyl phenyl ether)	275–500	Maximum of 75% volatilization–products unknown	49
1.6. POLY(STYRENES)			
Poly(styrene)	300–400	40.6% monomer, 2.0% toluene, 0.1% CO, remainder dimer, trimer, and tetramer – monomer yield increases with pressure of nitrogen – 62% at 1013 mbar	62,63
	500–1200	Small hydrocarbon fragments appear (C_1–C_6) – fragmentation is greater the higher the temperature and the greater the pressure of inert gas	28
	300–570	Pulsed pyrolysis and 40 μg of polymer. Styrene (92.4–99.8% depending upon temperature), benzene, toluene, and ethyl benzene	163
	Ambient to 500	Thin films (1000 Å or less), monomer yield about 55%	164
–, (crosslinked)	346–450	Crosslinking with increasing quantities of divinyl or trivinyl benzene progressively decreases the styrene yield–the yield of larger chain fragments and the amount of carbonization also increase	11,64
–, (head-to-head)	320	Monomer, dimer, trimer, tetramer, pentamer, stilbene	165
	500 under N_2	Hydrocarbons (C_1–C_4) (2.2 relative GC peak intensity), benzene (0.4), toluene (3.3), ethylbenzene (2.0), styrene (20.4), 3-phenyl-1-propene (1.5), 1-phenylpropane (2.3), α-methylstyrene (0.3), 1-phenylbutadiene (1.0), diphenylmethane (0.3), 1,1-diphenylethylene (2.6), 1,2-diphenylethane (1.3), 1,2-diphenylpropane, (0.7), 1,2-diphenyl-1-propene (0.5), 2,3-diphenyl-1-propene (2.2), 3,4-diphenyl-1-butene (0.5), 2,3-diphenylbutadiene (2.0), 1,2-diphenylethylene (6.5), 1,4-diphenylbutane (3.5), 1,4-diphenyl-1-butene (3.8), 1,4-diphenyl-1-pentene (1.3),	166

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TABLE 1. *cont'd*

Polymer	Temperature range (°C)	Degradation products	Refs.
		1,3-diphenylpropadiene (2.1), 1,2-diphenylbutadiene (1.8), 1,4-diphenylbutadiene (1.9), 1,3,4-triphenylbutene (0.6), 1,2,5-triphenylpentane (1.5), 1,2,5-triphenyl-1-pentene (4.6), 2,3,6-triphenyl-1-hexene and 2,5,6-triphenyl-1-hexene (8.9), 1,4,5-triphenyl-1-pentene (4.4)	
	Ambient to 600	Styrene, 1,2-diphenylethene, 1,2-diphenylpropane, 1,4-diphenylbutane, 1,4-diphenyl-1-butene, 1,4-diphenylpentane, 4,5-diphenyl-1,8-octadiene, 2,3,6-triphenyl-1-hexene, 1,4,5-triphenyl-1-pentene	271
–, (poly(divinyl benzene))	385–450	Volatile products include toluene, benzene, styrene, and xylene	11,64
–, (poly(trivinyl benzene))	470–500	Mixture of aliphatic and aromatic hydrocarbons	11,64
–, α-acetoxy-	270	Acetic acid (99%), mixture of α-acetoxystyrene and acetophenone (1%)	167
–, *m*-amino-	340–500	Gaseous fraction CO_2, CH_4, C_2H_6, C_3H_6, C_3H_8; liquid fraction *m*-aminostyrene, *m*-toluidine; gum fraction mainly dimer and trimer; crosslinked residue remains	65
	320–500	Monomer yield rises from 41% (320°C) to 61%(500°C); minor product is *m*-toluidine, with traces of aniline, *m*-ethylaniline, α-methyl-*m*-aminostyrene, H_2, CO_2, CH_4; remainder comprises chain fragments and residue	66
–, *p*-chloro-α-methyl-	Ambient	Gamma radiolysis: CH_4 (12.9 relative mass spec. ion current), C_2H_6 (21.8), C_3H_6 (13.6), C_3H_8 (10.5), C_4H_{10} (61), HCl (4.2), CH_3Cl (17.4), C_3H_4Cl (20), C_2H_5Cl (28.1), C_3H_7Cl (3.3), CH_2Cl_2 (9.9), C_6H_5Cl (3.0), *p*-chlorostyrene (1.5), *p*-chloro-α-methyl styrene (12.5)	168
–, α-deutero-	334–387	68.4% monomer, 1.5% α-deuterostyrene, 0.6% α-methylstyrene, 29.5% larger chain fragments	2,13
–, β-deutero-	345–384	39.7% monomer, 1,2% toluene, 0.1% deuterotoluene, 59% larger chain fragments	2,13
–, *p*-fluoro-α-methyl-	Ambient	Gamma radiolysis: CH_4 (0.4 relative mass spec. ion current), C_3H_4 (3.0), C_3H_6 (0.6), C_3H_8 (0.8), C_4H_4 (3.5), C_4H_6 (6.0), C_3H_7F (3.2), C_4H_3F (6.0), C_4H_9F (14.5), C_5H_5F (9.37), C_6H_5F (29), *p*-fluorotoluene (23), *p*-fluorostyrene (6.45), *p*-fluoro-α-methyl styrene (175.5), *p*-fluoro-isopropyl benzene (11.5)	168
–, *p*-methoxy-α-methyl-	Ambient	Gamma radiolysis: CH_4 (32 relative mass spec. ion current), H_2O (26), C_2H_4 (35), C_3H_4 (7.3), C_3H_6 (15.2), C_3H_8 (68.7), C_4H_{10} (8.2), CH_3OH (24.2), phenol (63.8), methoxybenzene (38.6), *p*-methoxytoluene (19.6)	168
–, 3-methyl-	309–399	44.4% monomer, 7.3% xylene, 48.3% larger chain fragments	3
–, 4-methyl-	200–350	Ratio of monomer to oligomer rises from 40% at 200°C to 95% at 350°C	79
	560	C_1–C_4 hydrocarbons, benzene, toluene, ethylbenzene, styrene, ethyltoluene, vinyltoluene, naphthalene, ethylstyrene	278
Poly(*o*-propionylstyrene)	385	CO, CH_4, ethane, ethene, butane, 2-propionylstyrene, 2-propionyltoluene, styrene, toluene, α-methylstyrene, α-methyl-2-propionylstyrene, various dimeric and trimeric species not fully characterized	313
–, α-methyl-	200–500	95–100% monomer	28
	520–1200	Fragments both larger and smaller than monomer appear in increasing amounts the higher the temperature, particularly CH_4, C_2H_4, and C_6H_6 until at 1200°C the monomer yield is only 33.9%	28
	Ambient	Gamma radiolysis: CH_4 (1.0 relative mass spec. ion current) C_2H_6 (1.2), C_3H_4 (6.7), C_3H_6 (1.8), C_3H_8 (2.7), C_4H_4 (22), C_4H_{10} (9.9), cyclopentadiene (6.1), benzene (72.8), toluene (20), styrene (50.5), α-methyl styrene (184), isopropyl benzene (10)	168
	400–900	Benzene, toluene, ethylbenzene, cumene, styrene, α-methyl styrene, indene/phenylpropyne, methyl-1,2-dihydronaphthalene, methylene indene, naphthalene, 2-methylnaphthalene, 1-methylnaphthalene, biphenyl, anthracene/phenanthrene, dihydropyrene	169
–, *p*-*N*,*N*-diethylamino-	350–500	Toluene, styrene, *p*-ethylstyrene, *N*,*N*-diethyl-*p*-toluidine, *N*,*N*-diethyl-*p*-ethylaniline, *p*-*N*,*N*-diethylaminostyrene, α-methyl-*N*,*N*-diethylaminostyrene, 2-(*p*-*N*,*N*-diethylaminophenyl) butane, α-propyl-*p*-*N*,*N*-diethylaminostyrene, *N*-ethyl-*p*-toluidine, *N*-ethyl-*p*-toluidine, *N*-ethyl-*p*-ethylaniline, *N*-ethyl-*p*-aminostyrene and closely related compounds	170
–, *m*-*N*,*N*-dimethylamino-	350–500	*m*-*N*,*N*-Dimethylaminostyrene, *N*,*N*-dimethyl-*m*-toluidine, *m*-xylene, styrene, *N*,*N*-dimethyl-*m*-ethylaniline, toluene, *m*-methylstyrene, α-methyl-*m*-*N*,*N*-dimethylaminostyrene, *trans*-β-methyl-*m*-*N*,*N*-dimethylaminostyrene, α-ethyl-*m*-*N*,*N*-dimethylaminostyrene, *N*-methyl-*m*-toluidine, *N*-methyl-*m*-ethylaniline, *N*-methyl-*m*-aminostyrene, oligomers of *m*-*N*,*N*-dimethylaminostyrene and closely related compounds	171

TABLE 1. *cont'd*

Polymer	Temperature range (°C)	Degradation products	Refs.
–, *p*-*N*,*N*-dimethylamino-	500 for 30 min	*N*,*N*-dimethylaniline (0.2% of original polymer weight), *N*,*N*-dimethyl-*p*-toluidine (2.8%), *N*-methylaniline (0.4%), *N*,*N*-dimethyl-*p*-ethylaniline (0.4%), *N*-methyl-*p*-toluidine (0.4%), *N*-methyl-*o*-toluidine (0.4%), *p*-toluidine (0.4%), *N*-methyl-*p*-ethylaniline (0.4%), *p*-*N*,*N*-dimethylaminostyrene (36.3%), α-methyl-*p*-*N*,*N*-dimethylaminostyrene (0.7%)	172
Poly(*p*-(2,4-dichlorobenzyl)styrene)	Ambient to 500	Benzene, toluene, ethylbenzene, styrene, α-methylstyrene, 1,3-dichlorobenzene, 2,4-dichlorotoluene, monomer (major product), complex series of halogenated and dehalogenated chain fragments (see Ref.)	275
–, *p*-isopropyl-α-methyl-	Ambient	Gamma radiolysis: CH_4 (8, relative mass spec. ion current), C_2H_4 (4.6), C_3H_4 (7.2), C_3H_6 (21.2), C_3H_8 (108), C_4H_{10}, (57.4)	168
–, 2,3,4,5,6-pentafluoro-	390–446	63% of the products are volatile at 25°C – contains some monomer	67
–, α,β,β-trifluoro-	333–382	72% monomer, 28% larger chain fragments	14
Polystyrene (chain brominated on α-position)	150–300	HBr, trace styrene	271
	300–500	Styrene, HBr, toluene, benzene	271
	Ambient to 500	HBr, styrene, traces of toluene and benzene, *p*-bromostyrene	271
Poly(styrene-*co*-methylene) $\sim\sim CH(\phi)-CH_2-CH_2-CH(\phi)-(CH_2)_n\sim\sim$ $n = 0,1,3,4$ and 5	350 for 4 hr	Benzene, toluene, ethylbenzene, styrene (major volatile product), *n*-propylbenzene (except with $n = 2$), phenylpropene, butylbenzene (except with $n = 0$), phenylbutene (with $n = 4$ and 5 only), amylbenzene (with $n = 4$ and 5 only) hexylbenzene (with $n = 4$ and 5 only), chain fragment fraction (major product)	173
Poly(styrene-*co*-SO_2) (1.85 : 1)	200	At 26.7 mbar pressure; 40% weight loss; main product is 2,4-diphenyl thiophene; at least 11 unidentified minor products	68
Poly(styrene-*co*-methacrylic acid) 18, 44 and 72 mol% MAA	Ambient to 500	CO_2, H_2O, butene, isobutene, dimethyl ketene, styrene, methacrylic acid, succinic-type 5-membered cyclic anhydrides	294
Poly(styrene-*co*-chlorotrifluoroethylene) 7.7, 14, 20 mol% CTFE	Ambient to 500	Chlorotrifluoroethylene, styrene, HCl, chloropentafluoropropene, ethene, chloroethene, toluene, α-methylstyrene, dimer and trimer structures with some unsaturation; SiF_4 (from reaction of HF with glass). Distribution of products varies with polymer composition	261
Poly(styrene-*co*-glycidyl methacrylate) 10, 23, 51, 62, 78, 86 mol% GMA	Ambient to 500	CO, CO_2, propene, isobutene, dimethyl ketene, acrolein, allyl alcohol, toluene, styrene, α-methylstyrene, ethylbenzene, glycidol, glycidylmethacrylate; product distribution depends on copolymer composition	264
Poly(styrene-*co*-phenyl methacrylate) 10–90 mol% PMA	Ambient to 500	CH_4, CO, CO_2, propene, dimethyl ketene, toluene, styrene, 4-phenylbutene, 4-phenyl-2-methylbutene, phenyl methacrylate, α-methylstyrene, short chain fragments	280
Poly(styrene-*co*-1,2,2,2,-tetrachloroethyl acrylate) (4.7/1)	310 and 500	Styrene, benzene, toluene, ethylbenzene, α-methyl styrene, diphenyl, 5,6-benzo-2-methyl-3,5-cyclohexadienone, diphenylethane, 1,3-diphenylpropane, dimers and trimers of styrene, chloroacetaldehyde, dichloroacetaldehyde, trichloroacetaldehyde, trichloropropanal	174
Poly(styrene-*co*-1,2,2,2-tetrachloroethyl methacrylate) (3.8/1)	310 and 500	Styrene, benzene, toluene, allylbenzene, α-methylstyrene, indane, isopropenylstyrene, 5,6-benzo-2-methyl-3,5-cyclo-hexadienone, propyl-propenylbenzene, diphenylethane, 1,3-diphenylpropane, dimers and trimers of styrene chloroacetaldehyde, dichloroacetaldehyde, trichloroacetaldehyde, trichloropropanal, benzyl chloride, 2-chloroethylstyrene, 2,2-dichloroethenyl methacrylate, 1,2,2,2-tetrachloroethyl methacrylate	174
Poly(styrene-*co*-bis-(1,2,2,2-tetrachloroethyl)fumarate) (8.9/1)	310 and 500	Styrene, benzene, toluene, ethylbenzene, allylbenzene, α-methylstyrene, indane, diphenyl propylpropenylbenzene, diphenylethane, 1,3-diphenylpropane, dimers and trimers of styrene, chloroacetaldehyde, dichloroacetaldehyde, trichloroacetaldehyde, benzyl chloride	174
Poly(styrene-*co*-bis-(1,2,2,2-tetrachloroethyl) muconate) (7.72/1)	310 and 500	Styrene, benzene, toluene, ethylbenzene, α-methylstyrene, diphenyl, propylpropenylbenzene, diphenylethane, 1,3-diphenylpropane, dimers and trimers of styrene, chloroacetaldehyde, dichloroacetaldehyde, trichloroacetaldehyde, trichloropropanal, benzyl chloride	174
Poly(styrene-*co*-*N*-(2,4,6-tribromophenyl)-maleimide) (6.4/1)	310 and 500	Styrene, benzene, toluene, ethylbenzene, allylbenzene, α-methylstyrene, indane, diphenylethane, 1,3-diphenylpropane, dimers and trimers of styrene, *N*-(2,4,6-tribromophenyl) maleimide, *N*-dibromophenyl maleinimide	174

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TABLE 1. *cont'd*

Polymer	Temperature range (°C)	Degradation products	Refs.
Poly(styrene-*co*-*N*-(pentachlorophenyl)-maleimide) (4.9/1)	310 and 500	Styrene, benzene, toluene, ethylbenzene, allylbenzene, α-methylstyrene, indane, diphenylethane, 1,3-diphenylpropane, dimers and trimers of styrene, pentachlorophenyl isocyanate, *N*-pentachlorophenyl formamide, *N*-tetrachlorophenyl maleinimide, *N*-(pentachlorophenyl) maleimide, methyl maleic acid pentachlorophenylimide	174
Poly(styrene) 1 : 1 (w/w) *blend* with bisphenol A polycarbonate	Ambient to 500	CO_2 styrene, α-methylstyrene, *p*-cresol, phenol, *p*-ethylphenol, *p*-vinylphenol, *p*-isopropylphenol, polystyrene short chain fragments with vinylidene and saturated ends, polycarbonate cyclic dimer and chain fragments, bisphenol A	272
Poly(vinyl toluene-*co*-divinyl benzene) 10-50% DVB	560	C_1–C_4 hydrocarbons, benzene, toluene, ethylbenzene, styrene, ethyltoluene, α-methylstyrene, vinyltoluene, divinylbenzene, naphthalene, ethylstyrene; distribution varies with copolymer composition	278
Poly(4-methoxystyrene) 1 : 1 (w/w) *blend* with bisphenol A polycarbonate	Ambient to 500	CO_2, 4-methoxystyrene, α-methyl-4-methoxystyrene, *p*-cresol and other phenols in small amounts, poly(4-methoxystyrene) dimer and trimer with vinylidene and saturated ends, polycarbonate cyclic dimer and chain fragments, bisphenol A	272

TABLE 2. MAIN-CHAIN CARBOCYCLIC POLYMERS

Polymer	Temperature range (°C)	Degradation products	Refs.
Poly((E,E)-[6.2]paracyclophane-1,5-diene)	460, 515, 620	Primary product is monomer; in addition, a series of secondary products based on ring-opened monomer are formed by H-abstraction (see Ref.); also detected: toluene (not 460°C) and *p*-xylene	251
Poly(perfluoro-*m*-phenylene)	700	Volatiles comprise SiF_4 (from silica vessel), CO_2, with traces of C_6F_6 and C_6F_5H; white sublimate on vessel walls; residue contains 1% fluorine	50
Poly(perfluoro-*p*-phenylene) high molecular weight (15000)	700	Volatiles comprise SiF_4 (from silica vessel), CO_2, with traces of C_6F_6 and C_6F_5H; white sublimate on vessel walls; residue contains 1% fluorine	50
low molecular weight (3700)	700	Volatiles comprise SiF_4 (from silica vessel), CO_2, with traces of C_6F_6 and C_6F_5H; no white sublimate; residue contains 33–41% fluorine	50
Poly(1,4-phenylene)	250–620	79% residue, 10% chain fragments, 11% volatiles comprising H_2, CH_4, H_2O, HCl (from catalyst)	55
–, 2-hydroxy-	300–620	60% residue, 24% chain fragments, 16% volatiles comprising CO, CO_2 H_2, CH_4	55
Poly(1,4-phenylene ethylene)	420–465	3.6% of products are volatile at 25°C and consist of 2.83% xylene, 0.29% toluene, 0.28% methylethyl benzene, 0.14% methylstyrene, 0.06% benzene, products involatile at 25°C consist of dimeric–octameric fragments	13,14,80
	408–515	Mainly chain fragments (dimer–pentamer); traces of H_2, monomer	81
	436–475	H_2, CH_4, C_2H_4, C_2H_6, toluene, *p*-xylylene, *p*-ethyltoluene, *p*-methylbibenzyl, 1,2-di-*p*-tolylethane, 4,4′-dimethylstilbene	176
Poy(1,3-phenylene-hexafluoro-trimethylene	660 for 30 s	C_2F_4 (21.6% of original weight of polymer), HF (17), CF_2 (13.9%), $C_6H_5(CF_2)_5C_6H_5$ (10.2%), C_6H_6 (8.5%), $C_6H_5(CF_2)_3C_6H_5$ (7.9%)	177
Poly(1,4-phenylenemethylene)	386–416	7.4% of products are volatile at 25°C; 5.9% toluene, 1.4% benzene, 0.1% xylene	13,14
Poly α-(ethoxycarbonyl-vinyl)-ω-[4-(ethoxycarbonyl-vinyl)-phenyl] (1,4-phenylene-2,4-bis-ethoxycarbonyl-1,3-cyclobutylene)	320–360 for 1 h under N_2	Low-molecular-weight polymer and small amount of monomer	195

TABLE 3. MAIN-CHAIN HETEROATOM POLYMERS

Polymer	Temperature range (°C)	Degradation products	Refs.
3.1. POLY(OXIDES) AND POLY(KETONES)			
Poly(fluoro ethers)	510–540		178
a. $-[O-CH_2-(CF_2)_3CH_2O-CH_2]_n-$		$CH_3-(CF_2)_3CH_2-OCH_3$ (46.9%) relative areas of glc traces, $CH_3(CF_2)_3CH_3$(14%), $CH_3CF_2CF_2H$ (6.7%), $CF_2=CH_2$ (6.7%), CF_2H-CF_2H (2.3%)	
b. $-[OCH_2(CF_2)_3CH_2O-p\text{-}C_6F_4]_n-$		$CF_2=CH_2$ (17.0%), $CH_3(CF_2)_3H$ (16.5%), CF_2HCF_2H (6.4%), $CH_3CF_2CF_2H$ (4.1%), C_6F_5H (9.6%), $C_6F_4(CF_2)_2CF_2$ (9.4%), C_6F_5CHO (7.2%), C_6F_4HCHO (4.9%), $C_6F_4H_2$ (3.3%)	
c. $-[OCH_2(CF_2)_3CH_2O-p\text{-}C_6F_4-p\text{-}C_6F_4]_n-$		HF (31%), $CF_2=CH_2$ (22.0%), $CH_3(CF_2)_3H$ (19.7%), CF_2HCF_2H (10.1%), $C_6F_5C_6F_4H$ (5.6%), $C_6F_4-CF_2$ / $C_6F_4-CF_2$ CF_2 (8.1%), $C_6F_4HC_6F_4H$ (9.3%)	
d. $-[OCH_2(CF_2)_3CH_2O-m\text{-}C_5NF_5]_n-$		HF (50%), $CH_3(CF_2)_3H$ (27.6%), $CF_2=CH_2$ (7.8%), CF_2HCF_2H (4.3%), $C_5NF_3(CF_2)_2CF_2$ (5.6%), $C_5NF_3H_2$ (3.1%)	
Poly(oxybutylethylene)	321–365	Mixture of saturated and hydrocarbons (C_1-C_6), aldehydes (C_1-C_6), H_2, H_2O	20
Poly(oxy-2,5-dimethoxy-1,4-phenylene)	100–550	41% residue, 29% fragments, 30% volatiles comprising H_2, CH_4, CO, CO_2, CH_3OH, traces of H_2O, C_2H_6, other hydrocarbons	55
Poly(oxy-2,6-dimethyl-1,4-phenylene)	100–550	26% residue, 66% chain fragments, 8% volatiles comprising H_2, CH_4, H_2O, CO, CO_2	55
	400–550	*o*-Cresol, 2,6-dimethyl phenol, 2,4-dimethyl phenol, 2,4,6-trimethyl phenol, various ketones, dimers, and more complicated structures (see Ref.), various combinations of the monomeric skeletons	179
Poly(oxyethylene)	324–363	9.7% of products volatile at 25°C–3.9% monomer with smaller amounts of CO_2, formaldehyde, ethanol, and saturated and C_1-C_7 compounds	25
	280	Diethyl ether, ethyl methyl ether, acetaldehyde, formaldehyde, CO_2, CO, ethene, cyclohex-3-ene-1-one	252
Poly(oxymethylene)	222	100% Monomer	27
	100–180	100% Formaldehyde; inverse relationship between molecular weight and rate for hydroxyl terminated polymers; acetylation of terminal hydroxy groups inhibits the reaction	181
Poly(oxymethyleneoxyethylene)	314–338	Major volatile products CH_4, C_2H_6, C_2H_4, C_2H_2, $HCO_2C_2H_5$	20
Poly(oxy-2-methylphenylene)	250–500	*p*-Xylene, phenol, 2-methylphenol, 4-methylphenol, 2,4-dimethylphenol, and a variety of more complex structures (see Ref.)	180
Poly(oxy-1,3-phenylene)	300–620	34% Residue, 53% chain fragments, 13% volatiles comprising H_2O, CO, H_2, CH_4, CO_2, trace of C_6H_6	55
Poly(oxy-1,4-phenylene)	550	Hydroquinone, phenol, benzene, diphenylether, 4,4′-dihydroxydiphenylether, 4-phenoxyphenol. In addition, a broad spectrum of phenyl and phenolic terminated oligomers with up to 10 aromatic units	255
	585	As 550°C plus dibenzofuran and dibenzofuran-containing oligomers	255
Poly(oxy-1,4-phenylene)-*blend*-polystyrene (60 : 40)	300–360	Ethylbenzene, styrene, α-methylstyrene, 2-methylphenol, 2,6-dimethylphenol, 2,4-dimethylphenol, 2,4,6-trimethylphenol, 1,3-diphenylpropane, 2,4-diphenyl-1-butene, 2,4,6-triphenyl-1-hexene, PPO dimers	318
Poly(oxypropylene) atactic	270–330	12.8% of products volatile at 25°C, including 4.00% acetaldehyde, 2.22% acetone, 1.43% dipropyl ether and 0.75% propylene	25
isotactic	275–355	20% of products volatile at 25°C, including 6.34% acetaldehyde, 2.39% acetone, 2.19% dipropyl ether, and 2.22% propylene	25
Poly(oxytetramethylene)	347	Volatiles comprise a mixture of CH_4, C_2H_6, C_3H_8, C_4H_{10}, C_2H_4, C_3H_6, CH_3CHO, C_2H_5CHO, C_3H_7CHO	20
Poly(oxytrichloromethyl methylene) (Poly(trichloro acetaldehyde))	Ambient	Monomer	182

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TABLE 3. *cont'd*

Polymer	Temperature range (°C)	Degradation products	Refs.
Poly(oxy-1,4-phenylene-carbonyl-1,4-phenylene) (Poly(ether ketone), PEK)	390, 490, 530	Low MW polymer at 490°C produces benzene, phenol, benzaldehyde, 4-hydroxybenzaldehyde, diphenyl ether, biphenylene, benzophenone, series of –H, –OH and –CHO terminated chain fragments containing <8 aromatic units and fragments containing dibenzofuran units. High MW polymer at 530°C as above. Low MW polymer at 390°C produces significant quantities of 4-hydroxy benzaldehyde and benzophenone-4,4′-diol	250
	506	Phenol, dibenzofuran, benzofuran derivatives, mixtures of oligomers mostly hydroxy terminated	315
Poly(oxy-1,4-phenylene-oxy-1,4-phenylene -carbonyl-1,4-phenylene) (Poly(ether ether ketone), PEEK)	506	Phenol, dibenzofuran, benzofuran derivatives, mixtures of oligomers mostly hydroxy terminated	315
Poly(etherketone-*co*-ethersulphone) Mole ratio 1 : 3, 3 : 1, 1 : 1 (random), 1 : 1 (alternating)		All polymers have same products with distribution varying with composition. Biphenyl, hydroquinone, 4-phenoxyphenol, benzaldehyde, 4-hydroxybenzaldehyde, diphenyl sulphone, diphenylether, phenol, benzophenone-4,4′-diol. Also two series of chain fragments containing PEK and PES units with –H, –OH and –CHO ends. Analogous fragments with biphenyl units	250
3.2. POLY(ESTERS)			
Poly(3-oxybenzoyl)	330	Monomer, cyclic dimer–heptamer	187
Poly(4-oxybenzoyl)	505–565	CO, CO_2, phenol, *p*-hydroxy phenyl benzoate	197
Poly(oxycarbonyl-1,3-phenylene-hexafluoroisopropylidene-1,3-phenylene carbonyloxy-1,3-phenylene-hexafluoro-isopropylidene-1,3-phenylene)		HF (12%), cyclic structures (see Ref.)	177
Poly(oxycarbonyl-1-chloroisopropylidene)	253–384	HCl and a compound with a glycollidic structure	185
Poly(oxycarbonylcyclohexylidene)	200–500	Cyclohexen-1-carboxylic acid, cyclohexanone	198
Poly(oxycarbonylcyclopentylidene)	200–500	Cyclopenten-1-carboxylic acid, cyclopentanone, dicyclopentyl glycollide	198
Poly(oxycarbonyl-3-pentylidene)	200–300	*Cis*- and *trans*-2-ethyl crotonic acid (major products)	188
Poly(oxyethyleneoxyterephthaloyl) (Poly(ethylene terephthalate))	283–306	Acetaldehyde major gaseous product with CO_2, CO, C_2H_4, H_2O, CH_4, benzene, 2-methyl-dioxolane, terephthalic acid, and more complex chain fragments	26
	900	CO, CH_4, CO_2, ethylene, acetylene, ethane, H_2O, propylene, ethanal, acetone, propanal, ethanol, benzene, toluene, ethyl benzene, styrene, *p*-vinyl toluene, benzaldehyde, *p*-ethyl toluene, acetophenone, methyl benzoate, vinyl benzoate, ethyl benzoate, *p*-methyl acetophenone, benzoic acid, *p*-methyl vinyl benzoate, *p*-vinyl acetophenone, propyl benzoate, *p*-ethyl vinyl benzoate, *p*-vinyl vinyl benzoate, biphenyl, 1-hydroxy ethyl benzoate, diacetyl benzene, *p*-acetyl vinyl benzoate, divinyl terephthalate, ethyl vinyl terephthalate, ethyl vinyl terephthalate, *p*-acetyl benzoic acid, methyl 1-hydroxyethyl terephthalate, ethylene dibenzoate	192
	Ambient to 500	CO, CH_4, CO_2, ethene, ketene, acetaldehyde, 1,4-dioxane, toluene, benzaldehyde, vinylbenzoate, divinylterephthalate, benzoic acid, terephthaldehydic acid, terephthalic acid, hydroxyethyl methyl terephthalate, short chain fragments	298
Polyester from terephthaloyl chloride and $n = 4$ polyethylene glycol	Ambient to 500	CO, CH_4 (trace), CO_2, ethene (trace), formaldehyde, acetaldehyde, 1,3-dioxalane, ethoxyacetaldehyde, 1,4-dioxane, glycidol, diethylether, 1,2-dimethoxyethane, 2-methoxyethanol, 2-ethoxyethanol, $-CH_2CH_2COCH_2-$(ring), $HOCH_2CH_2OCH_2CHO$, $CH_3OCH_2CH_2OC_2H_5$, terephthalic acid, triethylene glycol, tetraethylene glycol, chain fragments	274
Polyester from terephthaloyl chloride and $n = 22$ polyethylene glycol		CO, CH_4 (trace), CO_2, ethene (trace), formaldehyde, acetaldehyde, 1,3-dioxalane, methoxyacetaldehyde, 1,4-dioxane, 7-membered cyclic ether, methyl benzoate, ethyl benzoate, benzaldehyde, $-CH_2CH_2COCH_2-$(ring), $HOCH_2CH_2OCH_2CHO$, $CH_3OCH_2CH_2OC_2H_5$, $-(CH_2CH_2O)_2CH_2CO-$(ring), $CH_2{=}CHOCH_2CH_2OCH_2CHO$, $HO(CH_2CH_2O)_2C_2H_5$, $C_2H_5(OCH_2CH_2)_3H$, terephthalic acid, triethylene glycol, tetraethylene glycol, chain fragments	274

TABLE 3. *cont'd*

Polymer	Temperature range (°C)	Degradation products	Refs.
Poly(oxyisophthaloyl-oxy-1,3-phenylene)	330	Cyclic monomer (10 relative abundance), cyclic dimer (83.5), cyclic trimer (24.5), benzoic acid, isophthalic acid, resorcinol and various fragments of the main chain (see Ref.)	187
Poly(oxyisophthaloyl-oxy-1,4-phenylene)	330	Cyclic dimer (17), cyclic trimer (4), *m*-phthalic acid (26), benzoic acid (7.5), hydroquinone (46), and various fragments of the main chain (see Ref.)	187
Poly(oxy-1-oxohexamethylene)	220	Monomer (ε-caprolactone)	184
Poly((D)-oxy-1-oxo-3-methyl-trimethylene) (Poly(3-hydroxybutyrate))	Ambient to 338	Dimer (41.2 wt.%), crotonic acid (35.3), trimer (12.5), tetramer (2.9), iso-crotonic acid (0.9). Small amounts of CO_2, propene, ketene, acetaldehyde, and β-butyrolactone are formed at higher temperatures due to decomposition of primary products	186
	250	Crotonic acid (64.4% of original polymer), dehydrated dimer (7.2%), dehydrated trimer (1.2%)	245
	400	Crotonic acid (65.4% of original polymer), dehydrated dimer (8.2%), dehydrated trimer (2.1%)	245
	600	Crotonic acid (58.3% of original polymer), dehydrated dimer (9.0%), dehydrated trimer (2.7%)	245
	350	Crotonic acid (*trans*), dehydrated dimer (*trans*), dehydrated trimer and tetramer (*cis/trans* not resolved)	246
Poly((D)-oxy-1-oxotetramethylene) (Poly(4-hydroxybutyrate))	320	Cyclic oligomers (γ-butyrolactone and higher homologues)	257
Poly(oxy-1-oxo-2-methylethylene) (Poly(l-lactic acid))	500	CO, CO_2, acetaldehyde, acetone, acrylic acid, acetic acid, DL-lactide, meso-lactide, cyclic oligomers up to nonamer, 2,3 pentanedione (?), lactoyl lactic acid (?)	282
Poly(oxy-1-oxo-2,2-dimethyltrimethylene (Poly(α,α-dimethyl-β-propiolactone))	250–600	Isobutylene and CO_2	183
Poly(oxy-1-oxo-trimethylene) (Poly(β-propiolactone))	180–220	Acrylic acid	189
Poly(oxyterephthaloyloxy-1,2-phenylene)	Ambient to 500	CO_2, benzene, phenol, benzaldehyde, catechol, cyclic dimer	285
Poly(oxyterephthaloyloxy-1,3-phenylene)	345	Cyclic dimer (2), cyclic trimer (0.3), terephthalic acid (0.4), benzoic acid (1.5), resorcinol (20) and various fragments of the main chain (see Ref.)	187
	Ambient to 500	CO_2, benzene, phenol, benzaldehyde, biphenyl, benzoic acid, 3-hydroxyphenylbenzoate, resorcinol, mono and di(3-hydroxyphenyl) terephthalate, terephthalic acid, terephthaldehydic acid, short chain fragments	285
Poly(oxyterephthaloyloxy-1,4-phenylene)	350	Cyclic dimer (0.1), terephthalic acid (0.5), benzoic acid (6), hydroquinone (40.5), and various fragments of the main chain (see Ref.)	187
	Ambient to 500	Benzene, phenol, benzaldehyde, biphenyl, benzoquinone, 4-hydroxyphenylbenzoate, benzoic acid, mono and di(4-hydroxyphenyl) terephthalate, terephthalic acid, terephthaldehydic acid, short chain fragments	285
Poly(oxyterephthaloyloxy-4,4′-diphenylene)	Ambient to 500	CO_2, benzene, phenol, benzaldehyde, biphenyl, 4-phenylphenol, *p,p′*-dihydroxybiphenyl, 4-hydroxybiphenylbenzoate, di(4-hydroxybiphenyl) terephthalate	285
Poly(oxytetramethyleneoxyterephthaloyl) (Poly(butylene terephthalate))	240–280	Butadiene, terephthalic acid, mono-3-butenyl terephthalate, and di-3-butenyl terephthalate	190
	200–400	Tetrahydrofuran, 1,3-butadiene, CO_2, CO, H_2O, benzoic acid, terephthalic acid, terephthalic acid mono-3-butenyl, toluene, phenol, benzene	191
	Ambient to 500	CO, CO_2, butadiene, tetrahydrofuran, toluene, benzene, 1,5-hexadiene, dihydrofuran, 4-vinyl cyclohexene, 1,4-butane diol, benzaldehyde, benzoic acid, terephthaldehydic acid, terephthalic acid, mono-3-butenyl terephthalate, cyclic dimer, short chain fragments	298
Poly(oxydecamethylene-oxyterephthaloyl)	Ambient to 500	CO, CO_2, 1,9-decadiene, 1,10-decane diol, 1-decene-10-ol, benzoic acid, terephthalic acid, mono-decenyl terephthalate	298
Poly(oxyethyleneoxyadipoyl)	Ambient to 500	Cyclic oligomers, CO, CO_2, acetaldehyde, 2-ethylacrolein	269
Poly(oxytetramethylene-oxysebacoyl)	Ambient to 500	CO_2, H_2O, butadiene, tetrahydrofuran	299
Polyester from maleic anhydride, hexolic acid and butanediol; mole ratio 1 : 1 : 2.2	100–440	Tetrahydrofuran, 1-butanol, toluene, maleic anhydride, chlorosuccinic acid isomers, chlorovalerolactone isomers, hydroxypyran, allylpyran, trichlorocylopentadiene, tetrachlorocylopentadiene, pentachlorocylopentadiene, hexachlorocylopentadiene, phthalic anhydride, 1,4-butanediol, 1,4-butanediol dibenzoate, benzoic acid, 4-cyclohexene-1,2-dicarboxylic acid anhydride, benzoic acid butenyl ester, cyclohexadiene carboxylic acid propyl ester, hexolic anhydride,	311

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TABLE 3. *cont'd*

Polymer	Temperature range (°C)	Degradation products	Refs.
		unidentified butenyl ester, compound containing C_5HCl_5 unit, $CH_3-CH=CH-CH_2-O-CH_3$, $CH_3-CH=CH-CH_2-O-CH=CH_2$, $Cl-CH=CH-O-CH_2-CH_3$	
Polyester from maleic anhydride, phthalic anhydride and butanediol; mol ratio 1 : 1 : 2.2	100–440	Tetrahydrofuran, 1-butanol, 3-butene-1-ol, toluene, maleic anhydride, phthalic anhydride, 1,4-butanediol, 1,4-butanediol dibenzoate, phthalic acid butenyl ester, various esters containing butenyl, maleate and phthalate units, $CH_3-CH=CH-CH_2-O-CH_3$, $CH_3-CH=CH-CH_2-O-CH=CH_2$	311
Unsaturated polyester resins	300–800		
a. Maleic acid–phthalic acid–propylene glycol–styrene		Ethane (above 600°C), propionaldehyde (above 400°C), styrene (major product), phthalic anhydride (major product), benzene (above (450°C), toluene (above 500°C), xylene (above 400°C)	193
b. Maleic acid–tetrabromophthalic acid–phthalic acid–propylene glycol–styrene		Styrene (major product), phthalic anhydride (major product), benzene (above 550°C), toluene (above 450°C), xylene (above 500°C)	193
c. Maleic acid–phthalic acid–dibromoneopentyl glycol–styrene		Ethane (above 500°C), propionaldehyde (above 400°C), styrene (major product), phthalic anhydride (major product), benzene (above 500°C), toluene (above 500°C), xylene (above 500°C)	193
3.3. POLY(CARBONATES)			
Poly(oxycarbonyloxy-1,3-phenylene)	270	Cyclic trimer, tetramer, and pentamer, and various chain fragments	226
Poly(oxycarbonyloxy-1,4-phenyleneisopropylidene-1,4-phenylene)	300–389	Major products: CO_2, bisphenol A; minor products: CO, CH_4, 4-alkyl phenols	60
	200–400	CO, CO_2, CH_4, phenol, diphenyl carbonate, 4-(4-hydroxyphenyl)-2-phenyl propane	225
	290	Cyclic dimer, cyclic trimer, bisphenol A, and other chain fragments	226
	Ambient to 500	CO, CH_4, CO_2, H_2O, phenol, *p*-cresol, *p*-ethyl phenol, *p*-isopropyl phenol, *p*-vinyl phenol, bisphenol A, cyclic dimer, chain fragments including some ester structures	304
	300	Phenol, *p*-cresol	304
	375	CO_2, phenol, *p*-cresol	304
Poly(oxycarbonyloxy-1,4-phenylene-isopropylidene-1,4-phenylene-oxy-carbonyl-tetramethylene)	240	Cyclic monomer and dimer, and higher cyclic fragments	226
Poly(oxycarbonyloxy-1,3-phenylene hexafluorotrimethylene-1,3-phenylene)		HF (3%), cyclic dimer	177
Poly(oxycarbonyloxy-1,4-phenylene-oxycarbonyloxy-tetramethylene)	270	Cyclic dimer and trimer, and higher cyclic fragments	226
Poly(oxycarbonyloxy-1,4-phenylene-phthalidylidene-1,4-phenylene)	350	CO_2, CO, O_2, H_2O, phenol, fluorenone, diphenyl carbonate, xanthone, anthraquinone, 2-hydroxyanthraquinone, 2-benzoxyanthraquinone, phenolphthalein, traces of benzoxyphenol and hydroquinone	227
Poly(trimethylene carbonate)	Ambient to 500	CO_2, H_2O (possibly desorbed), trimethylene carbonate, cyclic oligomers	295
Poly(neopentylene carbonate)	Ambient to 500	CO_2, monomer, oligomer	296
Poly(2-phenyl trimethylene carbonate)	Ambient to 500	CO, CO_2, H_2O (possibly desorbed), α-methylstyrene, chain fragments (85%, w/w)	296
3.4. POLY(ANHYDRIDES)			
Poly(oxycarbonyl-1,3-phenylene-hexafluorotrimethylene-1,3-phenylene-carbonyl)	350	Cyclic dimer	177
Poly(maleic anhydride-*co-trans* stilbene) (alternating copolymer)	Ambient to 500	CO_2, styrene, maleic anhydride; small amounts benzene, cyclohexadiene, dimethylbutene, ethylcyclobutanol and 4-methoxystyrene; major products (79%) are chain fragments, including aromatic, ketonic and unsaturated structures	242
3.5. POLY(SULFIDES) AND POLY(SULFONES)			
Poly(thioacetone)	145	Main product is cyclic trimer [$(CH_3)_2CS$]	69
Poly(thioethylene)	220–260	Ethylene, H_2S, ethanethiol	199
Poly(thio-1,4-perfluorophenylene)	500	73% Residue; remainder, chain fragments, H_2, SiF_4 (from silica vessel), CO_2	51
Poly(thiomethylene-1,4-phenylene-methylene)	250–350	Sulphur, styrene, thiobenzaldehyde, 4-methyl styrene, *p*-xylene, 4-ethyl toluene, H_2S, 4-methyl thiobenzaldehyde, stilbene and chain	254

TABLE 3. *cont'd*

Polymer	Temperature range (°C)	Degradation products	Refs.
		fragments containing stilbene units, chain fragments containing polymer repeat units with $-CH_2SH$, $-CH{=}S$ and $-CH_3$ terminal units	
	650	Toluene, ethylbenzene, *p*-xylene, 1,4-diethylbenzene, 4-ethyltoluene; series of polycyclic aromatics containing phenanthrene and dihydrophenanthrene	254
Poly(dithiomethylene-1,4-phenylene-methylene)	250–350	Sulphur, styrene, thiobenzaldehyde, 4-methyl styrene, *p*-xylene, 4-ethyl toluene, H_2S, 4-methyl thiobenzaldehyde, stilbene and chain fragments containing stilbene units, chain fragments containing polymer repeat units with $-CH_2SH$, $-CH{=}S$ and $-CH_3$ terminal units	254
	650	Toluene, ethylbenzene, *p*-xylene, 1,4-diethylbenzene, 4-ethyltoluene; series of polycyclic aromatics containing phenanthrene and dihydrophenanthrene	254
Poly(thio-1,2-phenylene)	430	Cyclic dimer (thianthrene), some cyclic trimer	258
Poly(thio-1,3-phenylene)	540	Cyclic oligomers (trimer to heptamer) in decreasing yield	258
Poly(thio-1,4-phenylene)	460	72% Residue; remainder chain fragments, H_2, dibenzthiophene	51
	300–620	38% Residue, 47% chain fragments, 15% volatiles comprising mainly H_2S and H_2	59
	325–625	Benzene, thiophenol, diphenyl, diphenylsulfide, dibenzothiophene, chlorobenzene (from polymers with terminal chlorine atoms)	200
	560	Cyclic oligomers tetramer to heptamer (pentamer dominates)	258
Poly(oxy-1,4-phenylene-sulfonyl-1,4-phenylene-oxy-1,4-phenylene-isopropylidene-1,4-phenylene)	380	Phenol with smaller amounts of *p*-cresol, *p*-ethyl phenol, *p*-isopropyl-phenyl phenol, bisphenol A, diphenyl ether, *p*-tolyl phenyl ether, *p*-ethyl diphenyl ether, *p*-isopropenyl diphenyl ether, isomers of tolyl (ethyl–phenyl)ether	201
	350–450	In 90 min at 450°C, 15% (of initial weight) of gaseous products are formed; SO_2 (76% of gaseous products), CO_2 (15%), CO (4.5%), CH_4 (4.5%)	202
	470 for 2 h	Benzene, toluene, *p*-xylene, isopropylbenzene, phenol (main product), diphenyl oxide, diphenyl sulfide	203
	800	SO_2, benzene, toluene, styrene, phenol, methylphenol, diphenylether, methyl diphenylether	288
Poly(oxy-1,4-phenylene-sulfonyl-1,4-phenylene)	470 for 2 h	Phenol (main product), diphenyl oxide	203
	550–600	SO_2, diphenylsulfone, phenol, diphenylether, hydroquinone, benzenesulfonic acid, 4-hydroxybenzenesulfonic acid, 4,4′-dihydroxydiphenylether, 4-phenoxyphenol; series of –H and –OH terminated fragments up to trimer, series of compounds containing consecutive diphenylether and dibenzofuran units, fragments containing biphenyl units as a result of SO_2 elimination; complex ring structures with sulfonate links	255
	800	SO_2, benzene, phenol, diphenyl ether, dibenzofuran	288
Poy(tris-(oxy-1,4-phenylene)-sulfonyl-1,4-phenylene)		Benzene, phenol (major product), diphenyl oxide, *p*-hydroxydiphenyl, or *p*-hydroxydiphenyl oxide	203
Poly(oxy-4,4′-diphenylene-oxy-1,4-phenylene sulfonyl-1,4-phenylene)		Phenol (main product), diphenyl oxide	203
Poly(oxy-1,4-phenylene-sulfonyl-1,4-phenylene-oxy-1,4-phenylenemethylene-1,4-phenylene)		Benzene, toluene, *p*-xylene, phenol (main product), diphenyl oxide	203
Poly(sulfur dioxide-*co*-1-butene)	700–800	Monomers	204
Poly(sulfur dioxide-*co*-1-hexene)	700–800	Monomers	204
Poly(sulfur dioxide-*co*-1-octadecene)	700–800	Monomers	204
Poly(sulfur dioxide-*co*-bicycloheptene)	700–800	SO_2, bicycloheptene, cyclopentadiene, ethylene, methyl cyclohexadiene, benzene, indene, naphthalene, dihydronaphthalenes	204
Poly(sulfur dioxide-*co*-cyclopentene)	700–800	SO_2, cyclopentene, xylenes, ethylbenzene, styrene, indene, decadienes, dihydronaphthalenes, tetralin, napthalene	204
Poly(sulfur dioxide-*co*-*cis*-2-butene)	700–800	SO_2, butenes, benzene, toluene, octadienes, xylenes, styrene, indene, naphthalene	204
Poly(sulfur dioxide-*co*-methyl methacrylate-*co*-1-hexene) (24.2/1)	700–800	SO_2, hexenes, hexadienes, methyl methacrylate, toluene, naphthalene, dodecadienes	204
Poly(sulfur dioxide-*co*-methyl methacrylate-*co*-bicycloheptene) (2.5/1)	700–800	SO_2, ethylene cyclopentadiene, benzene, methyl methacrylate, bicyclo-heptene, methylcyclohexa-2,4-diene, ethylbenzene, xylenes, styrene, indene, naphthalene, dihydronaphthalenes	204

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TABLE 3. *cont'd*

Polymer	Temperature range (°C)	Degradation products	Refs.
3.6. POLY(AMIDES)			
Poly(2,5-dimethyl-1,4-piperazinediyl-isophthaloyl)	475	After 1 h, 5.1% residue, 73.8% chain fragments, 20.5% volatiles comprising mainly CO, H_2O, CH_4, CO_2, H_2, with traces of hydrocarbons, pyrazines, pyrroles	30
Poly(2,5-dimethyl-1,4-piperazinediyloxaloyl)	475	After 1 h, 1% residue, 73.5% chain fragments, comprising mainly CO, with traces of H_2, CO_2, H_2O, hydrocarbons, pyrazines, pyrroles	47
Poly(2,5-dimethyl-1,4-piperazinediyl-terephthaloyl)	475	After 1 h, 9.4% residue, 3.2% chain fragments 87.4% volatiles comprising mainly CO, H_2O, CO_2, CH_4, NH_3, with traces of hydrocarbons, pyrazines, and pyrroles	47
Poly(iminoisophthaloylimino-1,3-phenylene) (Nomex)	300–500	Mixture of H_2, CO, CO_2, H_2O, HCN, benzene, toluene, benzonitrile	57
	300–500	CO_2, H_2O, CO	205
	450–550	Benzene, HCN, toluene, benzonitrile, H_2	205
		CO, CO_2, H_2O, benzene, benzonitrile, 1,3-dicyanobenzene, 3-cyanobenzoic acid, other trace compounds	319
Poly(iminoisophthaloylimino-1,3-perchlorophenylene)	550	Water (46 mol%), CO (18), CO_2 (31), CH_4 (1.2), HCN (1.3), and smaller quantities of, N_2O, NO, CH_3Cl, ethylene, acetylene, cyanogen, acetonitrile, acetone, acetic acid, cyanogen chloride, propenenitrile, benzene, toluene, benzonitrile, phenol, chlorobenzene	206
Poly(iminoisophthalylimino-1,4-phenylene)	300–500	Mixture of H_2, CO, CO_2, H_2O, HCN, benzene, toluene, benzonitrile	57
Poly(iminoisophthaloyl-*co*-terephthaloyl-imino-1,4-phenylene)	250–620	36% residue, 24% chain fragments, 40% volatiles comprising H_2, CO, CO_2, CH_4	58
Poly(imino(1-oxohexamethylene) (Nylon 6)	327	Cyclic monomer, acetonitrile, HCN, NH_3, acrylonitrile, 3-cyanopropene, 4-cyanobutadiene, 4-cyano-1-butene, 5-cyano-1,3-pentadiene, 4-pentenal, 5-cyano-1-pentene, 3,5-hexadienal, 5-isocyanato-1-pentene, linear dimer	293
Poly(iminohexamethyleneiminoadipoyl) (Nylon 66)	310–380	H_2O, CO_2, cyclopentanone, traces of saturated and hydrocarbons; purification from water and acid polymerization catalysts increases stability and decreases yield of CO_2	45,46
	305	H_2O, CO_2, NH_3, cyclic monomer, cyclopentanone, cyclopentylidine-cyclopentanone, cyclopentylcyclopentanone, hexylamine, hexamethyleneimine, hexamethylenediamine	207
	305	CO_2, NH_3, H_2O, cyclic monomer, cyclopentanone, 2-cyclopentylidenecyclo pentanone, 2-cyclopentylcyclopentanone, hexylamine, hexamethyleneimine, hexamethylenediamine, 1,2,3,5,6,7-hexahydro dicyclopenta[b,e]pyridine	207
	400	Hexamethylenediamine, aminohexamethylene isocyanate, hexamethylenediamine-monocyclopentanimine, hexamethylenediamine-dicyclopentanimine and larger oligomers related to above; cyclopentanone	247
Poly(imino(1-oxoundecamethylene) (Nylon 11)	800	CO_2, HCN, saturated and olefinic hydrocarbons C_5–C_{11}, saturated and olefinic mononitriles $C_nH_{(2n+1)}CN$ and $C_nH_{(2n-1)}CN$, undecalactam, hydrocarbons and nitriles containing amide units	308
Poly(imino(1-oxododecamethylene) (Nylon 12)	800	CO_2, HCN, saturated and olefinic hydrocarbons C_5–C_{11}, saturated and olefinic mononitriles $C_nH_{(2n+1)}CN$ and $C_nH_{(2n-1)}CN$, dodecalactam, hydrocarbons and nitriles containing amide units	308
Poly(iminoterephthaloylimino-1,3-phenylene)	300–500	Mixture of H_2, CO, CO_2, H_2O, HCN, benzene, toluene, benzonitrile	57
Poly(iminoterephthaloylimino-1,4-phenylene) (Kevlar)	300–500	Mixture of H_2, CO, CO_2, H_2O, HCN, benzene, toluene, benzonitrile	57
	370–450	CO_2, H_2O, CO	205
	450–550	Benzene, HCN, toluene, benzonitrile, H_2	
	527	Cyanobenzene, dicyanobenzene, aniline, 1,4-diaminobenzene, 4-cyanoaniline, benzaldehyde, benzene, CO, NH_3, CO_2, H_2O, benzamide, benzoic acid, phenylisocyanate, terephthaldehyde, benzanilide, NH_2–Ph–NH–CO–Ph, NC–Ph–NH–CO–Ph, NH_2–Ph–NH–CO–Ph–CN, Ph–NH–CO–Ph–CHO	293
Poly(2-methylpiperazinediylterephthaloyl)	475	After 1 h, 11.3% residue, 46.2% chain fragments, 42.5% volatiles comprising mainly CO, H_2O, CO_2, CH_4, NH_3, H_2, with traces of hydrocarbons, pyrazines, and pyrroles	30
Poly(1,4-piperazinediylterephthaloyl)	475	After 1 h, 21.1% residue, 45.6% chain fragments, 33.3% volatiles comprising mainly H_2O, CO, H_2, CO_2, NH_3, with traces of hydrocarbons, pyrazines, and pyrroles	30

TABLE 3. *cont'd*

Polymer	Temperature range (°C)	Degradation products	Refs.
3.7. POLY(SILOXANES)			
Poly(oxy-dimethylsilylene) (Poly(dimethyl siloxane))	Ambient to 500	Predominantly cyclic trimer with smaller amounts of cyclic tetramer and higher cyclics; threshold degradation temperature of about 300°C reduced to 100°C by 5% KOH and CH_4 formed as additional product	208
	470	Distribution of cyclic oligomers, $n = 3$ (243.9 relative mass spec. intensity), $n = 4$ (100), $n = 5$ (35.6), $n = 6$ (37.6), $n = 7$ (13.1), $n = 8$ (1.1), $n = 9$ (0.2)	317
Poly(oxy-methylphenylsilylene)	Ambient to 500	Mixture of all possible stereoisomeric cyclic trimers and tetramers with small amounts of pentamer, benzene, and two more complex oligomers	209
Poly(oxy-methyl-3,3,3-trifluoro-propylsilylene)	400	Low-molecular-weight cyclic oligomers, $CF_2{=}CH{-}CH_3$, CHF_3	70
	615 for 30 s	Cyclic methyl-(3,3,3-trifluoropropyl)siloxanes, CH_4, CHF_3, $CF_2{=}CH{-}CH_3$, $CH_2{=}CH{-}CF_3$	210
Poly(oxy-phenylbutoxysilylene)	430–500	CO, H_2 and hydrocarbons	211
Poly(dimethyl siloxane-*co*-diphenyl siloxane)	Ambient to 500	Complex mixture of cyclic oligomers, which have been individually identified, whose composition varies with the dimethyl/diphenyl ratio; small amounts of benzene	212
Poly(dimethyl siloxane-*co*-phenylmethyl siloxane)	Ambient to 500	Complex mixture of cyclic oligomers, which have been individually identified, whose composition varies with the dimethyl/methyl phenyl ratio; small amounts of benzene	213
Poly(dimethyl-1,4-silphenylene)	400 in argon	Methane, dimethylsilane, benzene, dimethylphenylsilane, dimethyldiphenylsilane,	214
Poly(oxy-methylphenyl-1,4-silphenylene-silylene)	Ambient to 500	Benzene, diphenylmethylsilane, triphenylmethylsilane, and higher linear oligomers	215
Poly(oxy-tetramethyl-1,4-silphenylene-silylene)	500 in argon	Methane, benzene, cyclic trimer of dimethylsiloxane, and various higher chain fragments (see Ref.)	214
	Ambient to 500	Cyclic trimer and tetramer of dimethylsiloxane and a complex mixture of higher linear and cyclic oligomers	216
Poly(oxy-tetramethyl-1,3-silphenylene-silylene-hexafluoropropylenephenylene)	615 for 30 s	HF (15–18%), methane, methyltrifluorosilane, dimethyldifluorosilane, benzene, toluene, phenyldifluoromethane	210
Poly(oxy-tetramethyl-1,3-silphenylene-silylene-tetrafluoroethylenephenylene)	615 for 30 s	HF (15–18%), methane, methyltrifluorosilane, dimethyldifluorosilane, benzene, toluene, phenyldifluoromethane	210
Poly(oxy-tetramethyl-1,3-silphenylene-siloxane-*co*-dimethylsiloxane)	Ambient to 500	Cyclic trimer and tetramer of dimethylsiloxane and a complex mixture of higher linear and cyclic oligomers	216
Poly(boron tri(dimethylsiloxane)), nonlinear	250–350	Molecular weight increases; traces of cyclic products $[(CH_3)_2SiO]_3$ and $[(CH_3)_2SiO]_4$	15
3.8. POLY(URETHANES)			
Poly(oxy-2,2-dimethyltrimethylene) oxycarbonyl-*N*-imino-1,4-phenylenemethylene-1,4-phenylene-*N*-iminocarbonyl)	350	Various fragments of the main chain (see Ref.)	231
Poly(oxy-1,4-phenyleneisopropylidene-1,4-phenyleneoxycarbonylimino-1,4-phenylene methylene-1,4-phenylene-iminocarbonyl)	190	4,4′-Diphenylmethane diisocyanate, bisphenol A	231
Poly(oxy-1,4-phenyleneisopropylidene-1,4-phenylene-oxycarbonyl-*N*-methylimino-1,4-phenylenemethylene-1,4-phenylene-*N*-methyliminocarbonyl)		Bisphenol A, 4,4′-*N*-methyldiphenyl methane and linear and cyclic fragments of the main chain (see Ref.)	231
Poly(oxy-1,4-phenyleneisopropylidene-1,4-phenylene-oxycarbonyl-*N*-methyliminohexa-methylene-*N*-methyliminocarbonyl)	330	Cyclic monomer and dimer, and various chain fragments	232
Poly((oxy-1,4-phenyleneisopropylidene-1,4-phenylene-oxycarbonyl-piperazine-1,4-diyl-carbonyl)	330	Cyclic dimer, bisphenol A and various chain fragments	232

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TABLE 3. *cont'd*

Polymer	Temperature range (°C)	Degradation products	Refs.
Poly(oxy-1,3-phenylene-oxycarbonyl-*N*-methylimino-hexamethylene-*N*-methyliminocarbonyl)	320	Cyclic monomer, dimer and trimer, resorcinol	232
Poly(oxy-1,4-phenyleneoxycarbonyl-*N*-methylimino-1,4-phenylenemethylene-1,4-phenylene-*N*-methyliminocarbonyl)	325	Cyclic dimer, 4,4′-*N*-methyldiphenylmethane, hydroquinone, and higher chain fragments (see Ref.)	232
Poly(oxy-1,3-phenylene-oxycarbonyl-piperazine-1,4-diyl-carbonyl)	360	Cyclic dimer and trimer, resorcinol, and various chain fragments (see Ref.)	232
Poly(oxytetramethylene oxycarbonyl-imino-1,4-phenylenemethylene-1,4-phenylene-iminocarbonyl)	Ambient to 500	1,4-Butanediol, methylene bis-(4-phenyl isocyanate), tetrahydrofuran, CO_2, H_2O, butadiene, HCN, CO	228
with 10% (w/w) ammonium polyphosphate	Ambient to 500	Methylene bis-(4-phenyl isocyanate), tetrahydrofuran, H_2O, aniline, formaldehyde, CO_2	229
Poly(oxy-xylylene-oxycarbonylimino-xylylene-iminocarbonyl)	300	CO_2, *trans*-1,4-cyclohexane-dimethanol, 4-methylene-cyclohexane-methanol, xylylene diamine	230
Polyurethane from methylene bis-(4-phenyl isocyanate) (105 parts) and propoxylated trimethyl propane (100 parts)	600	Methane, CO_2, ethylene ethane, H_2O, propene, propane, ethanol, isobutene, acrolein, propanal, 2-methyl-1-butene, 2-methylpropenal, 2-butanone, benzene, dihydropyran, 2,2,4-trimethyl-1,3-dioxalane	234
	250–350	CO_2, propene, some methane and propanal	256
	350–500	Methane, ethane, ethene, propane, propene, ethanal, propanal, diminishing quantities of CO_2	256
	500–650	Methane (max. rate of production at 600°C), ethane, ethene, propene, ethanal, propanal	256
	650–800	Methane, ethane, ethene, propene, ethanal, propanal	256
Polyurethane from butane diol, phenylphosphonic dichloride, and methylene bis-(4-phenyl isocyanate)	Ambient to 500	CO_2 tetrahydrofuran, dihydrofuran, aniline, *p*-toluidine, *N*-phenyl pyrrolidine, *N*-(*p*-tolyl) pyrrolidine, cyclobutylene phenylphosphonate, butane diol, methylene bis-(4-phenyl isocyanate), 4,4′-methylene dianiline	235
Polyester urethane from an ethylene/propylene glycol/adipic acid polyester, butane diol and methyl bis-(4-phenyl isocyanate)	Ambient to 500	Modified chain fragments, ethylene, propylene, CO_2, ethylene oxide, propylene oxide, acetaldehyde, tetrahydrofuran, water, cyclopentanone, ethylene, glycol, propylene glycol, adipic anhydride (trace), aniline (trace)	236
Poly(urethane-*co*-carbonates)	330	Cyclic monomer, bisphenol A and higher linear and cyclic fragments of the chain (see Ref.)	237

	290	Cyclic monomer, resorcinol, and various fragments of the chain (see Ref.)	237

3.9. OTHER NITROGEN CONTAINING POLYMERS

Poly(*t*-butyl aziridine)	Ambient to 500	Ethene, propane, propene, isobutane, isobutene, ethylamine, aziridine, 1-*t*-butyl-perhydro-1,4-diazine, *N*-*t*-butyl ethylamine, 1-*t*-butyl-4-isopropenyl-1,2,3,4-tetrahydro-1,4-diazine, 1,4-di-(*t*-butyl)-perhydro-1,4-diazine, oligomers	276

3.10. PHOSPHOROUS CONTAINING POLYMERS

Poly(oxytetramethylene oxyphenyl phosphono)	Ambient to 550	Butadiene, tetrahydrofuran, dihydrofuran, H_2O, cyclic ester of phenylphosphonic acid and 1,4-butanediol, phenylphosphonic acid, butane diol	233
Poly(oxytetramethylene oxyphenyl-phosphono) capped with phenylisocyanate)	Ambient to 500	Butadiene, tetrahydrofuran, dihydrofuran, H_2O, cyclic ester of phenylphosphonic acid and butanediol, phenylphosphonic acid, butane diol, CO_2, aniline	233

Poly(bis(trifluoroethoxy)phosphazene)	150–400	Cyclic trimer, tetramer, pentamer, hexamer, and higher oligomers, 1,1,1-trifluoro-2-chloroethane (due to residual chlorine in the polymer)	238
Poly(diphenoxyphosphazene)	100–400	Cyclic tetramer, trimer and higher oligomers, chlorobenzene (due to residual chlorine in the polymer), phenol, triphenylphosphate	239

TABLE 3. *cont'd*

Polymer	Temperature range (°C)	Degradation products	Refs.
Poly(diphenoxy-phosphazene) (residual chlorine content: <0.05%)	Ambient to 480	Traces of phenol, phenoxy cyclic trimer and monochlorophenoxy cyclic trimer	316
Poly(diphenoxy-phosphazene) (residual chlorine content: 2.4%)	Ambient to 480	Phenoxy cyclic trimer and tetramer, monochloropentaphenoxy cyclic trimer, monochloroheptaphenoxy cyclic tetramer, dichlorohexaphenoxy cyclic tetramers	316
Poly(diphenoxy-phosphazene) (residual chlorine content: 9.9%)	Ambient to 480	Phenoxy cyclic trimer and tetramer, monochloropentaphenoxy cyclic trimer, monochloroheptaphenoxy cyclic tetramer, dichlorohexaphenoxy cyclic tetramers, dichlorotetraphenoxy cyclic trimers, trichloropentaphenoxy cyclic tetramers, HCl	316

TABLE 4. MAIN-CHAIN HETEROCYCLIC POLYMERS

Polymer	Temperature range (°C)	Degradation products	Refs.
Phenol-formaldehyde resin	250–400	Volatiles comprise xylene (76%), traces of phenol, cresol, benzene	53
Poly(1-methylene-2-imidazolidinone)	240	Formaldehyde (trace)	253
(Poly(ethyleneurea formaldehyde))	Ambient to 600	Low boiling fraction consists of NH_3, CO_2, HCN, CH_4, CO (trace); IR data also suggests presence of isocyanate, ketamine and carbodiimide or cyanogen compounds; high boiling fraction (77% of total volatiles) consists of chain fragments up to pentamer, including *N*-methylethylene urea, corresponding unsaturated compounds and higher homologues; similarly, *N,N'*-dimethylethylene urea and homologues	253
Poly(*N*-phenylmaleimide)	100–400	Aniline, Ph–N=CH–CH_2–CH_3, *N*-phenylsuccinimide, *N*-phenylmaleimide (trace), Ph–N=CH–CH=CH–CO–NH–Ph	301
Poly(5,5'-bibenzimidazole-2,2'-diyl-1,4-phenylene)	400–700	Phenol, terephthalodinitrile, benzonitrile, 4,4'-diaminodiphenyl, H_2, CO, NH_3, HCN, traces of aniline, carbonaceous residue	56
	570, 700, 1000	H_2 (700 and 1000°C), NH_3 (570 and 700), N_2O, HCN, cyanogen (570 only), CH_4, C_2H_6, ethylene, acetylene (700 and 1000), acetonitrile (700 and 1000), propene (570 and 700), benzene, toluene, benzonitrile (700 only), ethylbenzene, methylbenzonitrile (700 only)	217
Poly(5,5'-bibenzimidazole-2,2'-diyl-1,3-phenylene)	599–667	Gaseous products; H_2, NH_3, HCN, and CH_4; products involatile at ambient temperature after approx. 50% weight loss; benzimidazole (29.8%), benzoxazole (4.9%), 2-methylbenzimidazole (7.3%), 2-phenyl-benzimidazole (24.3%), 2-(3-methylphenyl)benzimidazole (5.3%), 5-(3-aminophenyl)benzimidazole (9.6%), 2-(3-cyanophenyl)benzimidazole (7.8%), 5,5'-bibenzimidazole (4.4%), 2-phenyl-5-(3-aminophenyl)-benzimidazole (4.4%), 2-phenyl-5,5'-bibenzimidazole (1.9%), 2-phenyl-5-(benzoxazolo)-benzimidazole (0.3%)	218
Poly(1,3,5,7-tetraoxo-2,3,6,7-tetrahydro-(1H,5H)-2,6-benzo[1,2-c : 4,5-c']-dipyrroldiyl-1,4-phenylene-carbonyl-1,4-phenylene) (Poly(pyromellitimide))	700	H_2, CO, CH_4, CO_2, H_2O, benzene, benzonitrile, chain fragments, 60% residue	61
Poly(1,3,5,7-tetraoxo-2,3,6,7-tetrahydro-(1H,5H)-2,6-benzo[1,2-c : 4,5-c']-dipyrroldiyl-1,4-phenylene-methylene-1,4-phenylene) (Poly(pyromellitimide))	700	H_2, CO, CH_4, CO_2, H_2O, benzene, toluene, benzonitrile, chain fragments, 60% residue	61
Poly(1,3,5,7-tetraoxo-2,3,6,7-tetrahydro-(1H,5H)-2,6-benzo[1,2-c : 4,5-c']-dipyrroldiyl-1,4-phenylene-oxy-1,4-phenylene) (Poly(pyromellitimide))	700	H_2, CO, CH_4, CO_2, H_2O, benzene, benzonitrile, phenol, chain fragments, 60% residue	61
Poly(1,5-diimino-3,7-dioxo-2,3,6,7-tetrahydro-(1H,5H)-2,6-benzo [1,2-c : 4,5-c']dipyrroldiyl-1,3-phenylene)	450–500	CO, CO_2, HCN, NH_3, H_2 and traces of CH_4 and C_6H_6; NH_3 is the main product at 440°C, CO increases at higher temperatures	219
Poly(1,5-diimino-3,7-dioxo-2,3,6,7-tetrahydro-(1H,5H)-2,6-benzo [1,2-c : 4,5-c']dipyrroldiyl-1,4-phenyleneoxy-1,4-phenylene)	450–500	CO, CO_2 HCN, NH_3, H_2 and traces of CH_4 and C_6H_6; NH_3 is the main product at 440°C, CO increases at higher temperatures	

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TABLE 4. *cont'd*

Polymer	Temperature range (°C)	Degradation products	Refs.
Poly(triazines)			
	415–505	C_2F_4, C_2F_6, and smaller amounts of C_3H_6 and C_3H_8 and larger chain fragments	48
	430–503	C_2F_4 with traces of CF_4, C_3H_6, and larger chain fragments	48
	305–465	Only volatile product is benzonitrile	54
	480–660	HCN and NH_3	54
	690–760	H_2 and carbonaceous residue	54
	424–550	Perfluoroethane, perfluoromethane, perfluoroethylene, perfluoropropane, perfluoropropylene, acetal fluoride, carbonyl fluoride	220
Poly(perfluoropyridine)	600	Volatiles comprise CO_2, CO, SiF_4 (all from silica vessel); carbonaceous residue remains	52
Poly(parabanic acid)			
	300	CO_2, CO, NO	221
Poly(bismaleimides)			
R = $-(CH_2)_2-$, $-(CH_2)_6-$, $-(CH_2)_8-$, $-(CH_2)_{10}-$, $-(CH_2)_{12}-$,	350–500	Aliphatic: C_2–C_6 fractions, maleimide (MI), succinimide (SI) MI–CH_3, SI–CH_3, MI–C_2H_5, SI–C_2H_5, MI–C_3H_7, SI–C_3H_7, MI–C_4H_9, SI–C_4H_9, MI–C_5H_{11}, SI–C_5H_{11}, MI–$(CH_2)_2$–MI, SI–$(CH_2)_2$–SI, MI–$(CH_2)_6$–MI, MI–$(CH_2)_8$–MI, MI–$(CH_2)_{10}$–MI, MI–$(CH_2)_{12}$–MI	222
R =	350–500	Benzene, toluene, aniline, SI, methylaniline, phenylisocyanate, tolylisocyanate, and various other products (see Ref.)	222
R =	350–500	Aniline, phenol, SI, anisidine, phenylisocyanate, and various other products (see Ref.)	222
Poly(3-(4-octylphenyl)-2,2′-bithiophene)	800	H_2S, COS, SO_2, CH_3SH, CS_2, S_8, C_1–C_8 alkanes and alkenes, benzene, ethylbenzene, toluene, styrene, octylbenzene, thiophene, methylthiophene, bithiophene	284
Poly(3-octylthiophene)	550–1400	C_1–C_8 alkanes and alkenes, H_2S, CS_2, benzene, toluene	284
Poly(3-octyl-2,2′-bithiophene)	550–1400	C_1–C_8 alkanes and alkenes, H_2S, CS_2, benzene, toluene	284
Poly(3-(4-octylphenyl)thiophene)	550–1400	C_1–C_8 alkanes and alkenes, H_2S, CS_2, benzene, toluene	284

TABLE 5. CELLULOSE AND ITS DERIVATIVES

Polymer	Temperature range (°C)	Degradation products	Refs.
Cellulose	250–397	H_2O with smaller amounts of CO_2 and CO and a tar containing principally levoglucosan	17,18
	Ambient to 500	H_2, CO, CO_2, H_2O, furan, furancarboxyaldehyde, methylfurans, acetone, hydroxypropanone, butenal, butanone, butanedione, levoglucosan	273
–, α form	330–440	Fixed gases (not identified), pentene, acetaldehyde, furan, propionaldehyde, acetone, acrolein, 2-methylfuran, butyraldehyde, methyl ethyl ketone, benzene, 2,5-dimethylfuran, methyl vinyl ketone, 2,3-butanedione, toluene, crotonaldehyde, H_2O, cyclopentanone, cyclooctatetraene, acetol, pyruvaldehyde, acetic acid, furfural, formic acid, 5-methyl-2-furfural, furfuryl alcohol, butyrolactone, 2-hydroxy-3-methyl-3-cyclopenten-2-one, phenol, *o*-cresol, *m*-cresol, *p*-cresol, 2,5-dimethylphenol, 3,4-dimethylphenol, 5-hydroxymethylfurfural	162
Cellulose (oxidized)	180–331	Mainly H_2O and CO_2, smaller amounts of CO, formaldehyde, methanol, acetic acid, ethanol and acetaldehyde, and very little tar	
Cellulose triacetate	250–310	Product fraction volatile at 25°C contains acetic acid, CO_2, CO, CH_4, H_2, acetaldehyde and acetone; heavier fractions do not contain levoglucosan acetate	18
	250–900	Main products: acetic acid, water, CO, CH_4, H_2, CO_2; minor products: ketene, acetaldehyde, acetone, acetylene, ethylene, ethane, propylene, and C_4, C_5 and C_6 hydrocarbons	223
	230–320	Acetic acid, acetyl derivatives of D-glucose	224
Ethyl cellulose	306	H_2O, CO, CO_2, C_2H_4, C_2H_6, C_2H_5OH, CH_3CHO, aliphatic compounds, furan derivatives	224

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	230–320	Acetic acid, acetyl derivatives of D-glucose	224
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Radiation Chemical Yields: *G* Values

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A. INTRODUCTION

The *G* values quoted in the following tables are defined as the radiation chemical yields of individual atomic or molecular events for 100 eV of energy absorbed by the system. *G*(R) represents the yield of free radicals, *G*(X) the yield of crosslinks, *G*(S) the yield of main chain scission, and *G*(products) the yield of product molecules per 100 eV of absorbed radiation.

This table has been compiled from the polymer literature that has been published since the third edition of the "Polymer Handbook" (i.e. 1986–1997). In many cases, the tabulated data are only representative of the total data in the paper, and the original publication should be consulted.

B. TABLES OF *G* VALUES

Notes to the Tables

General: Unless otherwise stated, the conditions applying are γ-rays, vacuum, room temperature (ambient).

Symbols/Abbreviations

+	cation radical	d.b.	double bond
−	anion radical	*t*-v	*trans*-vinylene
vac	vacuum	Y	crosslinks
RT	room temperature	X	crosslinks
e	electron beam	n	neutron

TABLE 1. HOMOPOLYMERS

Polymer	*G*(R)	*G*(X)	*G*(S)	*G*(products)	Radiation conditions	Comments	Refs.
1.1. POLYDIENES							
Polybutadiene				38.7 (d.b.)	e, 263 K	Excitation scavenger	64
			610 (1,2)			1, 2-PBD	138
	0.0054				77 K	Radical pairs, isotactic	74
		9.3		112 (Vinyl)		Syndiotactic	97
		105		Various	e	*cis* 1,4	84
	2.1	3.36/9.4	0.34/0.19		77 K/RT		98
		5.3	90		Air, 295 K	Effect of pressure	104
	Various	Various		Various	Various	Review	186
						G(Cy) > *G*(X) *G*(X) depend on MW	261
						G (initiation), *G*(X) increases *G*(Cy), *G*(db) decreases with Crosslinker	262
		41			Vac, 303 K		180
Poly(2-phenyl butadiene)		7.2			Vac/303 K, ethylene dichloride		178
Polyisoprene	0.009				77 K	Radical pairs	74
	0.5–0.8	1.6–2.1		94–168 (d.b.), CH_4, H_2		Var *cis* content	15
	Various	Various		Various	Various	Review	186
NR latex		Various				+ acrylate	248
Polychloroprene	3.0	3.9		2.8 (–Cl)	Vac/77, 303 K		179
1.2. POLYOLEFINS							
Squalene				3.0 (H_2)			235
Poly(butene-1)		1.0	3.2	13.9 (–isotactic pentad)	RT, vac		226
Poly(ethylene)		1.09–1.39			e, air		89
		0.63	4	7 (COOH)	Vac/O_2		101
			4.1	9.1 (O_2)			107
	4			–2 (*t*-v)	300 K		172
		1.4	0.48				116
		15–30	8–15	Carries	Air, 300/450 K	Pressure effects	169
		0.25					30
		1.50–2.40	1.08–1.69	Various	303–373 K	e pre-irradiated	63
	2.8, 5.8 (C_2D_4)				He, 77 K		52
			2.4		O_2, CCl_4		147
						Fibers, *G*(S)/*G*(X) = 1	151
		1.1–2.8	0.05–2.7			e, N_2	155
				Various gases	Air	Various compounds	70
		1.1	<0.05			e, N_2	87
		1.5	0.48			Gamma/n	174
	2.6/0.56 (alkyl)				Gamma/alpha, 77 K		163
		0.74 G (H) 0.27 G (Y)			Vac, molten state		183
		1.0	0.2	3.9 (H_2)			228
				3.5 (damage)		Crystalline region units	270

TABLE 1. *cont'd*

Polymer	G(R)	G(X)	G(S)	G(products)	Radiation conditions	Comments	Refs.
–, LDPE	2.5 (alkyl)				77 K		177
				12.4–15.4 (O_2)	O_2		96
					air	$G(S)/G(X) = 1.6$	117
				4.45 (butanes)	303 K		10
				Various	298–423 K	$+I_2$	27
				– 1.9 (*t*-v)		$+CH_3SH$ antioxidants	71
				Alkanes			129
	3.0 (total)				77 K		164
	2.8 (alkyl)						
				Various *G*(*t*-v)			231
–, LLDPE		2.4	0.4				105
				Various	Air	Butene-1, hexene-1	184
–, HDPE		1.3			Air		88
	2.9–3.6				77 K		92
	2.3–4.5(alkyl)				77 K	Morphology	177
				0.16 (butanes)	303 K		10
	0.3*					Allylic	28
	0.21						32
				Alkanes			125
		0.3, 0.43		Y, C=C, (*t*-v)		Monolayer crystals	45
		3.7			303 K		47
		0.76 (bulk)		– 9.6 (*t*-v)	Air, 77 K/RT	Warming, morphology	134
		1.6*				*G(X/unsat.)	75
–, HDLPE	5.5	0.76				77 K	79
				2.4 (*trans*)			240
				0.7 (*cis*)			
–, Chlorosulfonated polyisobutylene				4–5 (gas)			119
			4.0		e		131
	2.5				77 K		133
			3.8–11.1		Various temperatures		78,90,100
	Various		Various	Various	Various		186
	2.1		3.6	Various	Vac/77, 303 K		
Poly(4-methylpentene-1)				0.3,0.6*	N2/air	*G(S)/G(X)	43
polypropylene	4.8, 2.7(dPP)				He, e, 77 K		52
			3.1/0.64		Air/vac	Also 373–623 K	129
			9.4		$O_2 + CCl_4$		147
				2.9 (H_2)		Also O_2	158
			2.19*		$+CCl_4$	Decreases with dose *G(S)– G(X)	159
				Various	Air		118
				Various	Air		40
i-Polypropylene				94 (-*i*-pentad) Various (pentad sequences)	Gamma		244
				220 (-*i*-pentad)	e		245
1.3. POLYACRYLATES							
Poly(acrylic acid)				Various gases	Vac/air		170
	3.6						2
	3.49				293–308 K		4
		0.0	0.44		Vac		185
				Various	77, 300 K		189
		0.47	0.62				190
				Various	Gamma, aq.		233
Poly(acrylic anhydride)			1.1*			*G(S)– S(X)	59
Poly(methyl acrylate)				H_2, CO, CO_2, CH_4 etc.	195–423		126

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TABLE 1. *cont'd*

Polymer	*G*(R)	*G*(X)	*G*(S)	*G*(products)	Radiation conditions	Comments	Refs.
Poly(methyl bromoacrylate)	6.98						139
Poly(methyl α-chloroacrylate)	5.1				77 K		133
		0.3–0.9	3.2–7.4			Dose dependent	24
		0.8	6.0				62
			6.7*			*G(S)– G(X)	17
Poly(methyl α-cyanoacrylate)	1.6				77 K		133
Poly(methyl α-fluoroacrylate)	1.0		0.05		77 K		65
1.4. POLY (METHACRYLATES)							
Poly(benzyl methacrylate)			0.29*		e	*G(S)– G(X)	22
		0	0		300 K	Syndiotactic	192
			0.14				238
Poly(*t*-butyl methacrylate)			1.28*		e	*G(S)– G(X)	22
Poly(cyclohexyl methacrylate)			0.44*		e	*G(S)– G(X)	22
			2.4*	Various		*G(S)– G(X)	120
Poly(glycidyl methacrylate)		9.2					246
Poly(hexafluoroisopropyl methacrylate)			2.6		7 K		65
Poly(hexyl methacrylate)			0.38*		e	*G(S)– G(X)	22
Poly(isobutyl methacrylate)			1.1*		e	*G(S)– G(X)	22
		0.1	0.8		300 K	Syndiotactic	192
Poly(2-methyl heptyl methacrylate)		0.5	0.3		300 K	Syndiotactic	192
Poly(methacrylic acid)			3.4		N_2	Aq. solution	91
				Various	Gamma/e		176
			0.6/2.9		77/273 K		123
			4.8		77 K		133
		0.2	6.0				185
				Various	77, 303 K		189
		0.04	6				195
Poly(methacrylic anhydride)				Various	Gamma/e		176
			1.8–2.9				59
Poly(methyl methacrylate)			1.9 (DMF)			Soln.	59
			1.3 (THF)				
	1.1–1.5(+)		1.5				73
	0.7–0.9(−)				77 K	Aromatic additives	57
	0.5, 1.5(+)				77 K	Aromatic additives	51
	2.8–4.1				303, 343 K	Absorbed on zeolite	53
			1.3		77 K		65
			1.31				50
			1.9		e		131
	0.58				77 K		132
			1.63, 1.09		Gamma/n, vac/air 206 K		135
	1.42		1.4				139
			1.5/0.33		Gamma/X	Si wafers	152
			1.2				161
				Various	e/gamma, 303–383 K		176
			0.71–1.63		Gamma/n, vac/air		86
	1.9/4.1				77/273 K	Various radicals	173
	1.04/1.11				Vac/air, 273 K		146
	1.9, 4.4				77 K	Bulk, alcohol	171
	1.5						162
			1.5*			*G(S)– G(X)	17
				Various		+ ethane diol	14
				15.8 (units)	Air	Isotactic	23
				0.34 (H_2)			33
			18.6		Vac, 363 K	Isotactic	187
			0.22,0.46,1.08	Various	Deep UV, e, X-ray		188

TABLE 1. *cont'd*

Polymer	G(R)	G(X)	G(S)	G(products)	Radiation conditions	Comments	Refs.
			1.5			Isotactic	190
			1.1		300 K	Syndiotactic	192
			1.7		N_2, RT		222
			1.7		Vac	Protons, gamma	223
			1.6		N_2	e, gamma	224
			0.99, 0.4		Vac	C_5+, O_5+ ions	225
			0.77				238
			5.1 (soln.)			*i*-PMMA	249
			0.89 (amorphous solid)				
			0.48 (crystalline solid)				
			1.21 (333 K)				
			0.89 (303 K)				
			0.46 (195 K)				
				G(damage) = 8.8		Morphology effects, racemization	258
		1.0			Air, RT		264
Poly(1-naphthyl methacrylate)			0.14			Benzene solution	1
			0.14				238
Poly(2-naphthyl methacrylate)			0.19				238
Poly(2,2,2-trichloroethyl methacrylate)		0.03	3.7		Gamma/e, 298–416 K		175
			3.7			Dioxane solution	11
Poly(ethyl methacrylate)		0	1.7		300 K	Syndiotactic	192
Poly(*n*-butyl methacrylate)		0.4	1.3		300 K	Syndiotactic	192
Poly(2-hydroxyethyl methacrylate)	1.2, 1.7				77, 300 K		193
Poly(phenyl methacrylate)			0.44				238
1.5. POLY(STYRENES)							
Poly(α-methyl styrene)			0.3		e		131
			0.33		Gamma/e, 77–373 K		38
			0.78		273–319 K	Benzene solution	25
		0	0.29		303, 353, 373, 383, 393 K	+ Depolymerization	194
			0.48,0.89, 0.97, 1.13				
	0.105, 0.05				77, 298 K		197
Poly(*p*-methyl styrene)		0.1			Gamma/e, 77–373 K		38
Poly(styrene)		0.45–7.9			303 K	Emulsion polymerization	48
		0.022	0.022		Air	Sheet	56
		0.17	1.09, 2.12			absorbed on silica gel	58
		0.035–0.042	0.010–0.051	0.032 (H_2)	303–373 K		60
		0.043	0.0009		303 K	Includes lit. review	61
		0.043–0.027	0.086–0.074		303–423 K		67
			0.2*		77 K	*G(S) − G(X)	73
		0.048, 0.021	0.27, 0.07		Air	Various doses	130
	0.05				77 K		132
		0.03/0.2	0.02/0.2		Gamma/n, vac/air, 206 K		135
		0.043	0.00086			Sheet	136
			3.9		$O_2 + CCl_4$ 373–623 K		147
		0.02	0.1		Air		157

TABLE 1. *cont'd*

Polymer	*G*(R)	*G*(X)	*G*(S)	*G*(products)	Radiation conditions	Comments	Refs.
		0.077	0.055				161
	0.0009				77 K	Radical pairs	74
		0.094	0.0027		313 K		81
		Various	Various		Gamma/n, vac/air		85
	1.8				77 K		98
		0.018, 0.15	0.06, 0.07		Gamma/n/alpha, air		112
	0.5				77 K	Warming	19
		0.0174	0.0012				6
		0.0425					7
				0.033 (H_2)			33
		0.014–0.05	0.105		Gamma/e, 77–373 K		38
		0.03–0.05			Abs of air	Various sources	195
		6.7–15.2	24.7–30.4 *G*(degradation)		Various dose rates	+ Crosslinking agents	196
		0.05	0.01	0.03 (H_2)			228
				H_2, CH_4, C_2H_2, C_3H_4, C_6H_6	Ion beam	Deuterium subs	234
				Various ($-O_2$)		Variable temp. dose rate	250
		Various	Various	Various hydrogen	Vac, various temp.	Tacticity, crystallinity effect	257
		0.03–0.05				Gamma, X-ray, Ne, Ar	255

1.6. POLY(VINYLS)

1.6.1. ACRYLAMIDES AND NITRILES

Poly(acrylamide)		2.5			Air/H_2O		149
			0.04		e, O_2	Aq. soln.	103
		5			Aq. soln, 304 K	Hydrogel	108
	0.88	1.33/0.62	0.45/0.52	Various	Vac/air, 77–393 K		167
Poly(methacrylamide)			1.2*			*G(S)–G(X)	141
Poly(acrylonitrile)	3.7–4.1				303 K	Absorbed on zeolite	53
	0.15–3.0						5
	2.8, 4.2	0.59	0.0		77, 300 K		198
Poly(methacrylonitrile)	2.2, 2.8				77, 300 K		200
			0.4–3.3		Absence of O_2	Various sources	195
			3.3 gamma				255
			3.6 X				
			0.5 Ne				
			0.4 Ar				
Poly(α-chloroacrylonitrile)	1.4				77 K		133
			2.7*			*G(S)– G(X)	59
			1.1–7.2		Vac/air	Solution + bulk	99
			3.2				145
			2.1–3.3*			*G(S)– G(X)	59
			3.1–3.3				62
			3.3*			*G(S)– G(X)	17

1.6.2. VINYL MONOMERS

Poly(*t*-butyl crotonate)		0.66	0.59				54
Poly(*t*-butyl vinyl ether)			3.6, 10.3		273, 348 K		122
Poly(ethyl vinyl ether)			0.36, 0.50		273, 348 K	Liquid	122
Poly(isobutyl vinyl ether)			0.39, 1.73		273, 348 K		122
Poly(isopropyl vinyl ether)			0.86, 1.50		273, 348 K		122

TABLE 1. *cont'd*

Polymer	G(R)	G(X)	G(S)	G(products)	Radiation conditions	Comments	Refs.
Poly(methyl vinyl ether)			0.31, 0.64		273, 348 K		122
Poly(tetrafluoroethylene)			0.5		$O_2 + CCl_4$ K	Also 373–623 K	147
Poly(vinyl acetate)	2.4–4.1				243–273 K		21
				0.9–2.4 gel dose	Absence of O_2		195
Poly(vinyl alcohol)			1.08		O_2		236
			1.02		Air		
			0.71		N_2		
Poly(vinyl bromide)				39–55(HBr)		Solution	9
Poly(vinyl butyral)		0.35	0.6		e, N_2		241
Poly(vinyl carbazole)	0.7 (holes)				e		168
Poly(vinyl chloride)	1.7				77 K		165
		2.36			Air	Under pressure	113
				Various	Vac/O_2		115
				7.7 (HCl)	Vac/O_2		119
		10–11	20–115	(d.b.)		THF soln. + additives	8,44
				17(HCl)	e, N_2/vac		154
				0.24 (H_2)	Vac/O_2		160
				8 (HCl)			
				2.8–3.5 (Py +)		G(cation)	247
				0–1.2 (Phenyl +)		273 K	
						G(X) Increases with crosslinker	263
				3.0 (–Cl)			269
Poly(vinyl imidazole)		10–54			Aq	+ Crosslinker	256
Poly(vinyl pyrrolidone)		0.41–0.75				Aq. soln.	12
	3.3				77 K	+ Warming	13
		0.01–1.32				Various solutions	205
1.7. MISCELLANEOUS POLYMERS							
1.7.1. CELLULOSE AND DERIVATIVES							
Cellulose				CO, CHO, COOH	Vac/air		111
			13–186		Vac/air	Post irrad.	26
Cellulose acetate			7.1		Air	H_2O incr. G(S)	156
1.7.2. POLY(SILOXANES)							
Poly(oxydimethyl diphenylsilylene)		Various				Liq.	94
Poly(oxydimethyl silylene)		2.48			N_2, 303 K	Also blends with PS	143
		18.5/120			Air	Effect of pressure	104
		2.7					76
		3.0					80
		2.8				Liquid	82
	Various	Various	Various	Various			186
						G(X) increases with crosslinker	265
Poly(methyl phenyl silane)		0.01–0.21				LET dependence	230
Poly(cyclohexyl methyl silane)	1		1.8–17.4			Dose dependence	232
Poly(dimethyl siloxane)		1.7					243
Silicon containing poly(acetylene)		0.3–2.3				Effect of various pendent groups	252
1.7.3. POLY (AMINO ACIDS)							
Poly(alanine)	2.9		3.8–7.0	Various			95
	3.6			Various			128
Poly(glycine)	2.2		3.0–3.3	Various			95
Poly(tyrosine)	< 0.4		0.12	Various			95
				0.04–0.12 (NH_3)	Air/N_2/N_2O	Aq. soln.	102
Poly(valine)				Various			95

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TABLE 1. *cont'd*

Polymer	G(R)	G(X)	G(S)	G(products)	Radiation conditions	Comments	Refs.
1.7.4. POLYESTERS							
Poly(hydroxybutyrate)			1.65		Air		191
Poly(L-lactic acid)	2.0, 1.5				77, 300 K		201
	2.37–1.23				77, 300 K		203
Poly(D, L lactic acid)	2.4, 1.2				77, 300 K		201
						Pressure and temp. effect on G(S) and G(X)	274
Poly(glycolic acid)	1.72, 1.47				77, 300 K		203
						Pressure and temp. effects on G(S) and G(X)	274
1.7.5. POLYSULFONES							
Bis-A-PSF	0.13	0.13–1.34	0.11–0.67	Various gases	Various temp		207
	0.13			0.14 (SO_2)			208
	0.57			0.145 (SO_2)			211
Hydroquinone PSF	0.19			0.136 (SO_2)			207
	0.14			0.14 (SO_2)			208
	0.56			0.14 (SO_2)			211
Biphenol PSF	0.084			0.063 (SO_2)			207
	0.084			0.06 (SO_2)			208
	0.51			0.6 (SO_2)			211
Bis-S-PSF	0.128			0.198 (SO_2)			207
PES (Polyethersulfone)	0.24			0.243 (SO_2)			207
1.7.6. POLYKETONES							
PEEK	0.11				Vac, 77 K	209	
	0.004				Vac, 300 K		
	0.001				Air, 300 K		
	1.0e20 spin/kG				77 K	211	
	0.11			0.00054 gases			212
PEEKK	0.12				Vac, 77 K		209
	0.004				Vac, 300 K		
	0.001				Air, 300 K		
	1.1e20 spin/kG				77 K		211
PEEK-Me	0.28				Vac, 77 K		209
	0.009				Vac, 300 K		
	0.001				Air, 300 K		
PEEKK-Me	0.37				Vac, 77 K		209
	0.012				Vac, 300 K		
	0.001				Air, 300 K		
PEK-Ar	0.42				Vac, 77 K		209
	0.039				Vac, 300 K		
	0.005				Air, 300 K		
1.7.7. FLUOROPOLYMERS							
Fluoro elastomers	Various	Various	Various	Various	Various	Review	186
Poly(perfluoroethers)				Various gases	e, argon 9 K		202
				G(decomposition) = 0.2–1.2	e	Structure, temp. effects	259
			G(S)	G(wt. loss), G(gas)			260
Poly(tetrafluoroethylene)			2.15			As polymerized sintered, low crystalline	237
			6.0			Dose rate effects on G(S)	267

TABLE 1. *cont'd*

Polymer	G(R)	G(X)	G(S)	G(products)	Radiation conditions	Comments	Refs.
			0.3 at 373 0.57 at 473 0.89 at 573 1.33 at 673 2.07 at 773			+ Dose effects	271
Poly(vinyl fluoride)	0.22			0.07 (Polyvinyl)			46
Poly(vinylidene fluoride)	0.37			0.11 (Polyvinyl)			46
		0.46–0.78	0.38–0.86	1–4 (HF)	293 K		49
		0.6–0.78	0.29			+ Crosslinker	254
1.7.8. OTHERS							
Aromatic polymers	Various			Various gases			204,211
Alkyl aromatic poly amides		Various	Various			G(S)/G(X) Reduces with increase in methylene	251
Aryloxyphosphazenes		0.22 (R = Me)		0.26			110
$-[(R\text{-}Ph\text{-}O)_2\text{-}PN]_n-$		2.12 (R = Et)		0.26			110
–biphenol	0.6, 0.19				77, 300 K		210
–bis phenol	0.6, 0.22				77, 300 K		210
–hydroquinone	0.6, 0.35				77, 300 K		210
Poly(bis(phenoxy)phosphazene)		0.9	0.7				273
Poly(bis(4-methyl-phenoxy)phosphazene)		3.5	2.0				273
Poly(bis(4-*t*-butyl-phenoxy)phosphazene)		0.1	0.1				273
Poly(bis(4-cumyl-phenoxy)phosphazene)		0.2	0.2				273
Poly(1-(*t*-butoxycarbonylthio)ethylene)	3.39				77 K	Warming	13
Poly(*t*-butyl isopropenyl ketone)			1.5				142
Poly(butylene), 1,4-disubstituted(urethane side chain)		0.33					93
Poly(epoxide)(Araldite)	0.59				77 K		36
Poly(ether imide) (Ultem)	0.01	0.139	0.00528		77 K		114
Hyaluronic acid				5.0–6.7 (O_2) 2.0 (H_2O_2) 0–0.1 (peroxide)		pH dependence	253
Poly(1-mercapto ethylene)	2.65				77 K	Warming	19
Poly(oxadiazole-2,5-diyl-1,4-phenylene-phthalidylidene-1,4-phenylene)			Various	Vac/air		39	
Poly(oxycarbonyl-1,1-dimethyl-2-isopropylidene-ethylene)			1.9				50
Poly(oxycarboxyethylene)		0.4–11	14.5, 40.5		N_2 air		35
Poly(oxyethylene)			2.6		e, O_2 air	Aq. soln.	103
		36			200 K		83
	5		57–144	Various		Dose rate dependence	55
Poly(oxyethyleneoxyterephthaloyl)		0.023				Also e	29
Poly(oxymethylene)			8	320 (HCHO)	423 K		37
Poly(oxy-1,4-phenylenesulfonyl-1,4-phenelene oxy-1,4-phenylene-isopropylidene-1,4-phenylene)		0.05	0.012	0.04 gas	300–423 K		153
Poly(oxy-1,4-phenylenesulfony-1,4-phenylene)				0.04 gas	300–423 K		153
Poly(oxysebacoyloxy-1,4-phenylene) isopropylidene-1,4-phenylene)			9		Air		68
Poly(phenylene oxide)	5.7e20 spin/kG				77 K		211
	0.6, 0.33			0.08 H_2 0.015 CH_4	77, 300 K		206
Poly(phenylene sulfide)	0.16, 0.04			0.03H_2	77, 300 K		206
Poly(thiophenylene)		0.015/0.067	0.030/0.15		Gamma/e, vac/air		109
Poly(thiopropylene)	0.0014				77 K	Radical pairs	74

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TABLE 2. COPOLYMERS

Copolymers	*G*(R)	*G*(X)	*G*(S)	*G*(products)	Radiation conditions	Comments	Refs.
2.1. COPOLYMERS WITH ETHYLENE							
Poly(ethylene-*co*-1-butene)				Various	303–423 K	+ Additives	10
				Various			125
Poly(ethylene-*co*-ethyl acrylate)		2.53–3.2			e, air		89
Poly(ethylene-*co*-hexene)				Various			125
				Various	303–423 K	+ Additives	10
Poly(ethylene-*co*-propylene)		0.43, 0.83	0.11, 0.35		303 K	23%, 36% Propylene	127
				Various	Air	+ Additives	70
				Various			125
				Various	303–423 K	+ Additives	10
				8.6–11.0 (O_2)	Air		96
		0.69	1.2	5(COOH)	Air		101
		1.1	0.33				116
		0.9/3.2	3.2		Air	2.0 GPa + variation	104
	2.92	0.26	0.16			In terpolymer	16
				Various gases, O_2	293–298		182
	Various	Various	Various	Various 0.07–0.62 gel dose	Various	Review various sources	186 195
Butyl rubber	2.3 (total) 0.19 (allyl)	0–0.6	3.9–6.09	Various chain ends	77–398 K		219
Halogenated butyl rubber	3.7–4.0	Dose dependent	Dose dependent	Various gases	77 K	Chloro and bromo	220
2.2. COPOLYMER WITH METHYL METHACRYLATE							
Poly(methyl methacrylate-*co*-bromomethyl methacrylate)	0.2–1.4	0.06–0.1	0.7–1			139	
Poly(methyl methacrylate-*co*-chlorotrifluoroethylene)			2.1		77 K		65
			2.1				137
Poly(methyl methacrylate-*co*-dichlorostyrene)		1.3				50	
Poly(methyl methacrylate-*co*-dimethyl itaconate)			3.2–3.5*			*G(S)– G(X)	17
			1.0*			*G(S)– G(X)	59
Poly(methyl methacrylate-*co*-hexafluoroisopropyl methacrylate)			2.0–3.1		77 K		65
		0.4	3.6				137
Poly(methyl methacrylate-*co*-hexyl methacrylate)		0.53–0.87				22	
Poly(methyl methacrylate-*co*-methacrylic acid)	1.8, 2.06				273 K		146
	2.9				77 K	20% MAA	133
Poly(methyl methacrylate-*co*-methacrylic acid-styrene)		1.2				238	
Poly(methyl methacrylate-*co*-methacrylic acid-*co*-cumyl phenyl methacrylate)		1.6				238	
Poly(methyl methacrylate-*co*-methacrylic acid-*co*-2-naphthyl methacrylate)			1.09				238
Poly(methyl methacrylate-*co*-methacrylic acid)			2.0				238
Poly(methyl methacrylate-*co*-2 naphthyl methacrylate)			1.06				238
Poly(methyl methacrylate-*co*-methacrylonitrile, vinylidene chloride, methyl-α-chloroacrylate, α-chloronitrile ter polymers)		0.06	1.9–3.1				145
Poly(methyl methacrylate-*co*-methyl bromoacrylate)	2.0	0.41	4.16			139	

TABLE 2. *cont'd*

Copolymer	G(R)	G(X)	G(S)	G(products)	Radiation conditions	Comments	Refs.
Poly(methyl methacrylate-*co*-methyl-α-chloroacrylate)	3.1				77 K	14% MCA	133
Poly(methyl methacrylate-*co*-methyl-α-chloroacrylate)		0.06	3.1				24
Poly(methyl methacrylate-*co*-methyl-2-chloroacrylate)			2.8*			*G(S)– G(X)	17
Poly(methyl methacrylate-*co*-methyl-α-chloroacrylonitrile)		6.6			77 K	14% CAN	133
Poly(methyl methacrylate-*co*-methyl-α-cyanoacrylate)	5.9				77 K	20% MCA	133
Poly(methyl methacrylate-*co*-methyl-α-fluoroacrylate)		0-0.44	1.0–2.2		77 K		65
Poly(methyl methacrylate-*co*-methyl fluoroacrylate)			2.4				137
Poly(methyl methacrylate-*co*-3-oximino-2-butanone methacrylate)			> 0.55	1.4–2.4	Various		69
Poly(methyl methacrylate-*co*-tribromophenyl methacrylate)		0.07–0.19	0.38–2.2		Air		72
Poly(methyl methacrylate-*co*-trichloroethyl-alpha-chloroacrylate)		3.8				Also TFEM	140
Poly(methyl methacrylate-*co*-trichlorophenyl methacrylate)		0.05–0.7	0.4–4.4				72
Poly(methyl methacrylate-*co*-trifluoroethylene methacrylate)			1.9		77 K		65
Poly(methyl methacrylate-*co*-vinylidene chloride)			2.8–3.4*			*G(S)– G(X)	17
Poly(methyl methacrylate-*co*-vinylidene fluoride)			1.6				137
			1.6		77 K		65
Poly(glycidyl methacrylate-*co*-ethyl methacrylate)		1.35–8.5	1.51–5.5			Various compositions	246
Poly(glycidyl methacrylate-*co*-ethyl acrylate)	6.5					246	

2.3. COPOLYMERS WITH STYRENE

Poly(styrene-*co*-acrylates)			Various				73
Poly(styrene-*co*-acrylonitrile)		0.077	0.055				34
	0.4–2.8 77 K 0.14–4.2 300 K	0.04–0.59	0.0–0.09		Vac	Various compositions	215,221
Poly(styrene-*co*-butadiene)		4.3/33	2.8/17		Air	Effect of pressure	104
		0.3–3.0			313 K		3
		Various	Various		77 K	Block copolymers	98
Poly(styrene-*co*-cyanoacrylates)		0.04–0.38	2.18–2.47				73
Poly(styrene-*co*-1-mercaptoethylene)	Various				77 K		19
Poly(styrene-*co*-methyl acrylate)				CO, CH_4, CO_2 etc.	Various temperatures	12–80% sty	126
	0.40–2.76 77 K 0.14–1.39 300 K				Vac	Various compositions	216
Poly(styrene-*co*-methyl methacrylate)	0.18			0.83 (gases)	77 K/(R), 300 K/(gas)	51% sty	132
Poly(styrene-*co*-methacrylonitrile)	0.31–2.16					Various compositions	199
Poly(styrene-*co*-butyl vinyl ketone)					e		239
Poly(styrene-*co*-methyl isopropyl ketone)					e		239

2.4. COPOYMERS WITH SULFUR DIOXIDE

Poly(1-butene-*co*-sulfur dioxide)				Various gases	273–423 K		31,124,150
			12		e		131
Poly(2-butene-*co*-sulfur dioxide)				Various gases	273–423 K		31,124
Poly(cyclohexene-*co*-sulfur dioxide)				Various gases	273–423 K		31,124
Poly(4,4-dimethylpentene-*co*-sulfur dioxide)				Various gases	273–423 K		31,124

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TABLE 2. *cont'd*

Copolymer	*G*(R)	*G*(X)	*G*(S)	*G*(products)	Radiation conditions	Comments	Refs.
Poly(ethylene-*co*-sulfur dioxide)				Various gases	273–423 K		124
Poly(hexene-1-*co*-sulfur dioxide)				Various gases	273–423 K		31,124
Poly(isobutene-*co*-sulfur dioxide)				Various gases	273–423 K		31,124
Poly(3-methyl-1-butene-*co*-sulfur dioxide)	1.8			Various gases	273–423 K		Poly(31,124, 150
Poly(propylene-*co*-sulfur dioxide)	2.2			Various gases	273–423 K		31, 124, 150
2.5. OTHER COPOLYMERS							
Poly(butyl methacrylate-*co*-1-naphthyl methacrylate)			0.14			Benzene soln.	1
Poly(glutamic acid-*co*-tyrosine)		0.03–0.5	0–0.5		300 K	Various compositions	214
Poly(glycolic acid-*co*-1-lactic acid)	2.23–2.36 1.49–1.53				77 K 300 K	Various compositions	203
Poly(glycidyl methacrylate-*co*-3-chlorostyrene)	1.0	0.42					144
Poly(hydroxy butyrate-*co*-valerate)	Various				77, 263, 273, 303 K	Different compositions	217
		3.0–0.5	2.7–3.4	Various gases 1,4-ester	e, gamma		218
Poly(methacrylonitrile-*co*-methyl-2-chloroacrylate)			3.2–43.*			*$G(S)-G(X)$	17
Poly(*N*-vinylpyrrolidone-*co*-*t*-butyl-*s*-vinyl thiocarbonate)	3.01				77 K	+ Warming	13
Poly(acrylonitrile-*co*-butadiene)		20/150			Air		104
Poly(acrylonitrile-*co*-chloroprene)				3.5 (Gas)			119
Poly(tetrafluoroethylene-*co*-hexafluoropropylene)		3.3					106
Poly(tetrafluoroethylene-*co*-propylene)		1.3	0.42			Emulsion polymer + H_2O	121
				0.6–5.2 (HF)	N_2		116
		1.16			240 C		266
Poly(vinyl chloride-*co*-ethylglycodimethacrylate)				30 (d.b.)			8
Poly(vinylidene chloride-*co*-dimethyl itaconate)			2.3–2.7			*$G(S)-G(X)$	17
Poly(vinylidene chloride-*co*-hexafluoropropylene)		1.2			Vac/air/H_2O	+ Additives	166
Tetrafluoroethylene, perfluoro methyl vinyl ether copolymer 2:1				0.93 (CF_4) 0.31 (COF_2) 0.055 (CO_2) 0.14 (CF_3 OCF_3) 1.43 (total gas) 0.34 (acid fluoride)	e		229
		0.9		New chain ends 1 ($-CF_2-CF_3$) 0.09 ($-CF_2-O-CF_3$) 0.5 (CF_2-COOH) 0.2($-CF=CF_2$)			268
Polysulphone–polydimethyl siloxane *block* copolymer	Various					Dose and molecular weight effects	272

TABLE 3. POLYMERS BLENDS

Polymer Blends	G(X)	G(S)	Comments	Refs.
Poly(methyl methacrylate)/ Poly(1-naphthyl(methacrylate)		0.14	Benzene	1
Poly(methyl methacrylate)/ Poly(styrene-*co*-acrylonitrile)	0.025	0.051	50% PMMA	161
Poly(methyl methacrylate)/styrene-acrylonitrile	0.041	0.027	SAN 100	242
	0.034	0.15	85	
	0.02	0.21	50	
	0.008	0.23	15	
Poly(methyl methacrylate)/Acrylonitrile	0.042	0.14	ACN 100	242
	0.036	0.25	85	
	0.009	0.34	50	
	0.01	0.88	15	

TABLE 4. COMPOSITES

Polymer Composites	G(products)	Radiation conditions	Refs.
Glass-DGEBA-DDM	H_2, CO, CO_2	77 K, RT	227
Color-DGEBA-DDM	H_2, CO, CO_2	77 K, RT	227

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SECTION III

PHYSICAL PROPERTIES OF MONOMERS AND SOLVENTS

Physical Properties of Monomers

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A. INTRODUCTION

This chapter contains some of the principal properties of the more common monomers. The monomers are arranged alphabetically, in groups, with derivatives listed alphabetically within the groups. Compounds are listed under their most commonly used names in polymer chemistry. Therefore, some names are not in agreement with the nomenclature rules of the International Union of Pure and Applied Chemistry.

Data are taken from a variety of published literature, including the 3rd edition of the "Polymer Handbook", "The Brandon Worldwide Monomer Reference Guide and Sourcebook", the "Aldrich Catalog Handbook of Fine Chemicals", and "Polysciences Monomers/Polymers, Scientific Polymer Products", "TCI America", "Lancaster and Janssen Chemica" catalogs. Where a range is reported in the literature, the average value is used here for melting points and boiling points. No attempt was made to verify the reported values experimentally.

Linear structures are given for most monomers. Molecular formulas are provided when linear structures cannot be unambiguously drawn.

Molecular weight is calculated based on the International Atomic Weight values.
Boiling point is given in degrees Celsius (°C), at 760 mmHg, unless indicated otherwise by the value in mmHg following a slash (/).
Melting point is given in degrees Celsius (°C), at 760 mmHg, unless indicated otherwise by the value in mmHg following a slash (/).
Refractive index is given at 20°C, unless indicated otherwise by the temperature in Celsius following a slash (/).
Density is relative to water at 4°C and measured at 20°C, unless otherwise indicated by the value following a slash (/).
Flash point was determined by the closed-cup method, using a Setaflash apparatus.

RTECS# is the reference to the Registry of Toxic Effects of Chemical Substances.

R&S is the reference found in the "Sigma–Aldrich Library of Regulatory & Safety Data", available from Aldrich Chemical Company.

FT-NMR is the reference to spectra in the "Aldrich Library of ^{13}C and ^{1}H FT-NMR Spectra", available from the Aldrich Chemical Company.

FT-IR is the reference to spectra in the "Aldrich Library of FT-IR Spectra", available from the Aldrich Chemical Company.

Merck Index is the reference to "The Merck Index", Merck & Co., Inc., Whitehouse Station, NJ.

Beilstein is the reference to "Beilsteins Handbuch der Organischen Chemie", Springer–Verlag, New York, NY.

Fieser is the reference to L. F. Fieser and M. Fieser, "Reagents for Organic Synthesis", John Wiley, New York, NY.

Abbreviations: (d) decomposes; (s) sublimes; (aq) aqueous.

B. TABLES OF PHYSICAL PROPERTIES

TABLE 1. ACETYLENES

Name	Formula RC≡CR′ R	R′	CAS Registry Number	Mol. wt.	Boiling point (°C)	Melting point (°C)
Acetylene	–H	–H	74-86-2	26.04	– 82	– 84(s)
–, Chloro	–Cl	–H		60.48	– 32	– 126
–, Dichloro-	–Cl	–Cl		94.93		– 66
–, Diphenyl-	$-C_6H_5$	$-C_6H_5$	501-65-5	178.23	60	170/19
–, Phenyl-	$-C_6H_5$	–H		102.14	143	

TABLE 2. ACID DICHLORIDES

Name	Formula ClC(O)RC(O)Cl R	CAS Registry Number	Mol. wt.	Boiling point (°C)	Melting point (°C)
Adipoyl	$-(CH_2)_4-$	111-50-2	183.03	106/2	
Azelaoyl	$-(CH_2)_7-$	123-98-8	255.12	166/18	
Diethylmanoyl	$-C(CH_2CH_3)_2-$	54505-72-5	197.06	198	
Dodecanedioyl	$-(CH_2)_{10}-$	4834-98-4	267.20	140/0.5	
Glutaryl	$-(CH_2)_3-$	2873-74-7	169.01	217	
Isophthaloyl	$-C_6H_4-$	99-63-8	203.02	276	43
Malonyl	$-CH_2-$	1663-67-8	140.95	54/19	
Methylpimeloyl	$-(CH_2)_2CH(CH_3)(CH_2)_2-$	44987-62-4	197.06	118/10	
Oxalyl	–CO–CO–	79-37-8	126.93	61	– 8
Phthaloyl	$-C_6H_4-$	88-95-9	203.02	270	12
Pimeloyl	$-(CH_2)_5-$	142-79-0	197.06	113/5	
Sebacoyl	$-(CH_2)_8-$	111-19-3	239.14	168/12	– 2.5
Suberoyl	$-(CH_2)_6-$	10027-07-3	211.09	162/15	
Succinyl	$-(CH_2)_2-$	543-20-4	154.98	190	16
Terephthaloyl	$-C_6H_4-$	100-20-9	203.02	266	80
Thionyl	ClC(S)Cl	7719-09-7	118.97	79	– 105

TABLE 3. ACROLEINS

Name	Formula HC(O)CR = CHR′ R	R′	CAS Registry Number	Mol. wt.	Boiling point (°C)	Melting point (°C)
Acrolein	–H	–H	107-02-8	56.06	53	– 87
–, 2-Chloro-	–Cl	–H		90.51	40/30	
–, 2-Methyl-	$-CH_3$	–H	78-85-3	70.09	68	– 81
–, 3-Methyl-, *trans*-(Crotonaldehyde)	–H	$-CH_3$	123-73-9	70.09		104
–, 2-Chloro-3-methyl-	–Cl	$-CH_3$		104.54	148	

TABLE 4. ACRYLAMIDES/METHACRYLAMIDES

Name	R	R′	CAS Registry Number	Mol. wt.	Boiling point (°C)	Melting point (°C)
4.1. ACRYLAMIDES $H_2C=CHC(O)NRR'$						
Acrylamide	–H	–H	79-06-1	71.08	125/25	
–, Acetyl-, *N*-	$-C(O)CH_3$	–H	1432-45-7	113.12		129
–, Adamantyl-, *N*-	$-C_{10}H_5$	–H	19026-83-6	205.30		155
–, Allyl-, *N*-	$-CH_2CH=CH_2$	–H	2555-13-7	111.14	120/19	
–, Benzyl-, *N*-	$-CH_2C_6H_5$	–H	13304-62-6	161.20		70
–, Butoxymethyl-, *N*-	$-CH_2O(CH_2)_3CH_3$	–H	1852-16-0	157.21	125/0.3	– 9
–, *tert*-Butyl-, *N*-	$-C(CH_3)_3$	–H	107-58-4	127.19		128
–, Cyclohexyl-, *N*-	$-C_6H_{11}$	–H	3066-72-6	153.23		113
–, Cystamine-bis-, *N,N′*-	$-CH_2CH_2SSCH_2CH_2-$	–H	60984-57-8	260.38		123
–, Diacetone-, *N*-	$-C(CH_3)_2CH_2C(O)CH_3$	–H	2873-97-4	169.23	93/0.1	55
–, Diallyl-, *N,N*-	$-CH_2CH=CH_2$	$-CH_2CH=CH_2$	3085-68-5	151.21	108/3	
–, Di-*n*-butyl-, *N,N*-	$-(CH_2)_3CH_3$	$-(CH_2)_3CH_3$	2274-13-7	183.29	97/1	

Density (at 20°C)	Refractive index (at 20°C)	Flash point (°C)	RTECS Number	R and S	FT-NMR	FT-IR	Merck	Beilstein	Fieser
1.000			AO9600000						1,11
0.990				1(2),2711I	1(3), 533A	1(2),946B	11,9428	5,656	1,335
0.929	1.548								

Density (at 20°C)	Refractive index (at 20°C)	Flash point (°C)	RTECS Number	R and S	FT-NMR	FT-IR	Merck	Beilstein	Fieser
1.259	1.4700	>110		1(1), 867J		1(1),741A		2,653	
1.143	1.4680	>110		1(1),869C				2,709	
1.145	1.4590	74		1(1),867G	1(1),1211B	1(1),740B		2,687	
1.069	1.4680	>110		1(1),869E	1(1)1212C			2(4),2127	
1.324	1.4720	107		1(1),867I	1(1),1212A	1(1),740D		2,634	
		180	NT2625000	1(2),1981H		1(2),352A		9,834	
1.449	1.4650	47		1(1),867F	1(1),1211A	1(1),740A		2(1),252	12,291
1.217	1.4720	>110		1(1),867K	1(1),1212B	1(1),741B			
1.455	1.4290	None	KI2950000	1(1),867D		1(1),739C	11,6867	2,542	17,241
1.409	1.5684	>110		1(2),1981G		1(2),351D	11,7439	9,805	14,263
1.205	1.4690	>110		1(1),869A		1(1),741C		2,671	
1.121	1.4680	>110		1(1),869D		1(1),742B		2,719	
1.172	1.4680	>110		1(1),869B		1(1),741D		2,694	
1.407	1.4680	77	WN4900000	1(1),867H	1(1),1211C	1(1),740C	11,8844	2,613	
		180	WZ1797000	1(2),1981I		1(2),352B		9,844	
1.631	1.5190	None	XM5150000	1(2),3197F		1(2),1227B	11,9278		13,297

Density (at 20°C)	Refractive index (at 20°C)	Flash point (°C)	RTECS Number	R and S	FT-NMR	FT-IR	Merck	Beilstein	Fieser
0.839	1.4025	−19	AS105000	1(1),515A	1(1),733B	1(1),470D	11,122	1,725	10,2
1.199	1.463								
0.847	1.4160	−16	OZ2625000	1(1),515B	1(1),733C	1(1),471A		1(3),2981	
0.846	1.4365	9	GP9625000	1(1),515G		1(1),472C	11,2599	1,728	
1.478									

Density (at 20°C)	Refractive index (at 20°C)	Flash point (°C)	RTECS Number	R and S	FT-NMR	FT-IR	Merck	Beilstein	Fieser
1.122			AS3325000	1(1),877K	1(1),1221A	1(1),749B	11,123	2,400	
0.9790	1.4620	>110	AS3450000						
			AS3460000					4(4),664	
		>110	AS3475000	1(1),887I	1(1),1236A	1(1),750C	11,2943		

TABLE 4. *cont'd*

Name	R	R′	CAS Registry Number	Mol. wt.	Boiling point (°C)	Melting point (°C)
–, Diethyl-, *N,N*-	$-CH_2CH_3$	$-CH_2CH_3$	2675-94-7	127.19	93/19	
–, 1,2-Dihydroxyethylene-bis-,*N,N′*	$-CH(OH)CH(OH)-$	–H	868-63-3	200.19		156(d)
–, Diisopropyl-, *N,N*-	$-CH(CH_3)_2$	$-CH(CH_3)_2$	44975-46-4	155.24	54/0.4	
–, 4,4-Dimethoxybutyl-, *N*-	$-(CH_2)_3CH(OCH_3)_2$	–H	38486-53-2	187.24	135/0.7	18
–, Dimethyl-, *N,N*-	$-CH_3$	$-CH_3$	2680-03-7	99.13	82/21	
–, 3-(Dimethylamino)-propyl-, *N*-	$-(CH_2)_3N(CH_3)_2$	–H	3845-76-9	156.23	117/2	
–, 1,1-Dimethyl-2-sulfoethyl-, *N*-(AMPS)	$-C(CH_3)_2CH_2SO_3H$	–H	15214-89-8	207.25		195(d)
–, Diphenylmethyl-,*N*-	$-CH(C_6H_5)_2$	–H	10254-08-7	237.30	178	
–, Ethylenebis-,*N,N′*-	$-CH_2CH_2-$	–H	2956-58-3	168.20		140
–, Ethylhexyl-,*N*-	$-CH_2CH(CH_2CH_3)(CH_2)_3CH_3$	–H	91625-16-0	183.30	123/0.5	
–, 2-Glycolic acid, *N*-	$-CH(OH)C(O)OH$	–H	6737-24-2	163.13	95	
–, 2-Glycolic acid methyl ester, *N*-	$-CH(OH)C(O)OCH_3$	–H	77402-03-0	173.17		74
–, Hexamethylenebis-, -*N,N′*	$-(CH_2)_6-$	–H	7150-41-6	224.28		135
–, *tert*-Hexyl-, *N*-	$-CH_2CH_2C(CH_3)_3$	–H	51330-07-5	155.24		100
–, Hydroxymethyl-, *N*- (solution)	$-CH_2OH$	–H	924-42-5	101.11		
–, Isobornyl-, *N*-	$-C_{10}H_{17}$	–H	17159-04-5	207.31		135
–, Isobutoxymethyl-, *N*-	$-CH_2OCH_2CH(CH_3)_2$	–H	16669-59-3	157.21	108	
–, Isopropyl-, *N*-	$-CH(CH_3)_2$	–H	2210-25-5	113.16	90/2	61
–, Isopropylidenebis-, *N,N′*-	$-C(CH_3)_2-$	–H		182.22		210
–, 3-Methoxypropyl-, *N*-	$-(CH_2)_3OCH_3$	–H	107374-86-7	143.19	99/0.3	
–, Methyl-, *N*-	$-CH_3$	–H	1187-59-3	85.11	106/4	
–, Methylenebis-, *N,N′*-	$-CH_2-$	–H	110-26-9	154.17		>300
–, (1-Methoxy)						
–, (Methoxy)-acetoxymethyl-, *N*-	$-C(OCH_3)C(O)OCH_3$	–H	77402-03-0	173.17		73
–, Morpholinoethyl-, *N*-	$-CH_2CH_2NC_4H_8O$	–H	5117-12-4	141.17	158/50	>110
–, 1-Naphthyl-, *N*-	$-C_{10}H_7$	–H	22302-62-1	197.24		138
–, Octadecyl-, *N*-	$-(CH_2)_{17}CH_3$	–H	1506-54-3	323.56		75
–, Octamethylenebis-, *N,N′*-	$-(CH_2)_8-$	–H	2945-02-0	252.35		138
–, *tert*-Octyl-, *N*-	$-(CH_2)_4C(CH_3)_3$	–H	4223-03-4	183.29		58
–, Phthalamidomethyl-, *N*-	$-CH_2NC_8H_4O_2$	–H	80500-94-3	230.22		190
–, 2,2,2-Trichloro-1-hydroxyethyl-, *N*-	$-CH(OH)CCl_3$	–H		218.47		170
–, Tri(hydroxymethyl)-methyl-, *N*	$-C(CH_2OH)_3$	–H	13880-05-2	175.18		139
–, 1,1,3-Trimethylbutyl-, *N*-	$-C(CH_3)_2CH_2CH(CH_3)_2$	–H	25269-93-6	169.27	125/25	55
–, Trimethylenebis-, *N,N′*-	$-(CH_2)_3-$	–H	4887-13-2	182.22		112
–, Triphenylmethyl-, *N*-	$-C(C_6H_5)_3$	–H	102548-89-0	313.40		204
4.2. METHACRYLAMIDES $H_2C=C(CH_3)C(O)NRR'$						
Methacrylamide	–H	–H	79-39-0	85.11	215	109
–, Acetyl-, *N*-	$-C(O)CH_3$	–H	44810-87-9	127.14	76/1.2	138
–, Acetylphenyl-, *N*-	$-C_6H_4C(O)CH_3$	–H	58813-69-7	203.24		138
–, Allyl-, *N*-	$-CH_2CH=CH_2$	–H	2186-33-6	125.17	90/2.2	
–, 3-Aminopropyl-, *N*-, hydrochloride	$-(CH_2)_3NH_2\cdot HCl$	–H	72607-53-5	178.66		124
–, Benzyl-, *N*-	$-CH_2C_6H_5$	–H	3219-55-4	175.23		82
–, Bis(diethylaminoethyl)-, *N,N*-	$-CH_2CH_2N(CH_2CH_3)_2$	$-CH_2CH_2N-(CH_2CH_3)_2$	76392-05-7	183.28	122/0.4	
–, Butoxymethyl-, *N*-	$-CH_2O(CH_2)_3CH_3$	–H	5153-77-5 28384-61-4	171.24	105/0.3	
–, *tert*-Butyl-, *N*-	$-C(CH_3)_3$	–H	6554-73-0	142.20	163	60
–, 2-Cyanoethyl-, *N*-	$-CH_2CH_2CN$	–H	24854-94-2	138.17		46
–, 2-Cyanoethyl-, *N*-, methyl-, *N*	$-CH_2CH_2CN$	$-CH_3$		152.20	113/1	46

Density (at 20°C)	Refractive index (at 20°C)	Flash point (°C)	RTECS Number	R and S	FT-NMR	FT-IR	Merck	Beilstein	Fieser
				1(1),885K	**1**(1),1233C				
0.962	1.4730	71	AU3230000	**1**(1),893I	**1**(1),1244C	**1**(3),784B		**4**(3),130	
0.949	1.4820	>110						**4**(4),1268	
		160		**1**(1),1065K	**1**(1),1438C				
				1(1),883K				**4**(3),526	
				1(1),915E	**1**(1),1276B	**1**(1),781A			
			AI8967330	**1**(1),913D	**1**(1),1272B				
1.074	1.4130	None	AS3600000	**1**(1),885J		**1**(1),750A		**2**(4),1472	
0.970	1.4610	79	AS3630000						
			AS3675000					**4**(4),517	
			AS3678000	**1**(1),883J	**1**(1),1230C	**1**(1),749D			
			AI8967330	**1**(1),913D	**1**(1),1272B				
1.122	1.5120	>110						**27**(4),278	
				1(1),883M	**1**(1),1231B				
1.10			UC6475000	**1**(1),877L	**1**(1),1221B	**1**(1),749C		**2**(2),399	
	1.4702								
0.96	1.46	122							
	1.4755								

TABLE 4. *cont'd*

Name	R	R′	CAS Registry Number	Mol. wt.	Boiling point (°C)	Melting point (°C)
–, Cyclohexyl-, *N*-	$-C_6H_{11}$	–H	2918-67-4	167.25		102
–, Diallyl-, *N,N*-	$-CH_2CH{=}CH_2$	$-CH_2CH{=}CH_2$	13169-99-8	197.32	50/1.1	
–, Dibenzyl-, *N,N*-	$-CH_2C_6H_5$	$-CH_2C_6H_5$	57625-30-6	265.36		41
–, Dibutyl-, *N,N*-	$-(CH_2)_3CH_3$	$-(CH_2)_3CH_3$	22240-86-4	197.32	81/0.8	
–, 3-Di(butyl)aminopropyl-, *N*-	$-(CH_2)_3N((CH_2)_3CH_3)_2$	–H	76392-03-5	253.41	125/0.13	
–, Diethyl-, *N,N*-	$-CH_2CH_3$	$-CH_2CH_3$	5441-99-6	141.21	82/7	
–, 3-(Diethylamino)propyl-, *N*-	$-(CH_2)_3N(CH_2CH_3)_2$	–H		197.30	134/10	
–, Diisopropyl-, *N,N*-	$-CH(CH_3)_2$	$-CH(CH_3)_2$	51745-62-1	169.27		47
–, 2,2-Dimethoxyethyl-, *N*-	$-CH_2CH(OCH_3)_2$	–H	95984-11-5	173.21		27
–, Dimethyl-, *N,N*-	$-CH_3$	$-CH_3$	6976-91-6	113.16	66/10	
–, 2-(Dimethylamino)ethyl-, *N*-	$-CH_2CH_2N(CH_3)_2$	–H	13081-44-2	156.34	87/1.8	
–, 3-(Dimethylamino)propyl-, *N*-	$-(CH_2)_3N(CH_3)_2$	–H	5205-93-6	170.26	134/2	
–, Dodecyl-, *N*-	$-(CH_2)_{11}CH_3$	–H	1191-39-5	253.43	145/0.08	
–, Ethylenebis-, *N,N′*-	$-CH_2CH_2-$	–H	6117-25-5	196.25		170
–, 2-Ethylhexyl-, *N*-	$-CH_2CH(CH_2CH_3)(CH_2)_3CH_3$	–H		197.32	110/0.3	
–, 2-Hydroxyethyl-, *N*-	$-CH_2CH_2OH$	–H	5238-56-2	129.16	147/1.2	
–, Hydroxymethyl-, *N*-	$-CH_2OH$	–H	923-02-4	115.13	*ca.* 100	–37
–, 4-Hydroxyphenyl-, *N*-	$-C_6H_4OH$	–H	19243-95-9	177.20		154
–, Isobutoxymethyl-, *N*-	$-CH_2OCH(CH_3)_2$	–H	4548-27-0	171.24	127/5	
–, Isopropyl-, *N*-	$-CH(CH_3)_2$	–H	13749-61-6	127.19	112/115	90
–, Methoxymethyl-, *N*-	$-CH_2OCH_3$	–H	3644-12-0	129.16	80.03	
–, Methyl-, *N*-	$-CH_3$	–H	3887-02-3	99.13	88/3.5	
–, Methylenebis-, *N,N′*-	$-CH_2-$	–H	2359-15-1	182.22		164
–, Methyl-, *N*-, Phenyl-, *N*-	$-CH_3$	$-C_6H_5$	2918-73-2	238.31	88/2	50
–, Methyl-, *N*-, 2,2-dimethoxyethyl-, *N*-	$-CH_3$	$-CH_2CH(OCH_3)_2$	95984-81-9	187.24	72/2	
–, 3-(*N*-morpholino)propyl-, *N*-	$-(CH_2)_3NC_4H_4O$	–H	55937-58-1	212.30	150/0.08	
–, 2-(2-Oxo-1-imidazolidinyl)-ethyl-, *N*-	$-CH_2CH_2C_3H_5N_2O$	–H	3089-19-8	197.24	100	
–, Phenyl-, *N*-	$-C_6H_5$	–H	1611-83-2	161.20		84
–, Phenyl-, *N*-, Phenylethyl-, *N*-	$-C_6H_5$	$-CH_2CH_2C_6H_5$	76392-02-4	266.37		63
–, 3-(Trifluoromethyl)phenyl-, *N*-	$-C_6H_4CF_3$	–H	783-05-1	229.20		95
–, 3-(Trimethylammonium)-propyl-, chloride, *N*- (eq. solution)	$-(CH_2)_3N(CH_3)_3 \cdot HCl$	–H	51410-72-1	220.74		–22.5

TABLE 5. ACRYLATES/METHACRYLATES

Name	R	CAS Registry Number	Mol. wt.	Boiling point (°C)	Melting point (°C)
5.1. ACRYLATE, ACIDS/ESTERS $H_2C{=}CHC(O)OR$					
Acid	–H	79-10-7	72.06	139	13
Allyl ester	$-CH_2CH{=}CH_2$	999-55-3	112.13	123	
Anhydride	$-C(O)CH{=}CH_2$	2051-76-5	126.11	97/35	
Benzyl ester	$-CH_2C_6H_5$	2495-35-4	162.19	110/8	
4-Biphenylyl ester	$-C_6H_4C_6H_5$	13026-23-8	226.27		224
Bisphenol A ethoxylate diester	$(-(CH_2CH_2OC_6H_4)_2C(CH_3)_2$	64401-02-1	424		
Bisphenol A diglycidyl ether diester	$(-CH_2CH(OH)CH_2OC_6H_4)_2C(CH_3)_2$	4687-94-9	484.55		
2-Bromo-	$H_2C{=}CBrC(O)OH$	10443-65-9	150.97		63
3-Bromo-, *cis*-	$BrCH{=}CHC(O)OH$	1609-92-3	150.96		63
2-Bromo-, ethyl ester	$H_2C{=}CBrC(O)OCH_2CH_3$	4519-46-4	164.99	72/78	
2-Bromoethyl ester	$-CH_2CH_2Br$	4823-47-6	179.03	52/5	
2-Bromomethyl-	$H_2C{=}C(CH_2Br)C(O)OH$	72707-66-5	164.99		70
2-Bromomethyl-, ethyl ester	$H_2C{=}C(CH_2Br)C(O)OCH_2CH_3$	17435-72-2	193.05	86/20	
2-Bromomethyl-, methyl ester	$H_2C{=}C(CH_2Br)C(O)OCH_3$	4224-69-5	179.02	36/1.3	
1,3-Butylene diester	$-CH_2CH_2CH(CH_3)-$	19485-03-1	198.22	73/0.1	
1,4-Butylene diester	$-(CH_2)_4-$	1070-70-8	198.22	83/0.3	
2-Butylene-1,4 diester	$-CH_2CH{=}CHCH_2-$		127.16	60/23	

Density (at 20°C)	Refractive index (at 20°C)	Flash point (°C)	RTECS Number	R and S	FT-NMR	FT-IR	Merck	Beilstein	Fieser
	1.4731								
	1.4600								
	1.4744								
0.940	1.4790	140							
	1.5002								
1.100	1.4300	>110	UC6380000						
0.97	1.46	107							
			SI1225000					**4**(3),276	
	1.4707								
0.97	1.4740								
1.110	1.4560	>110							
1.053	1.427								

Density (at 20°C)	Refractive index (at 20°C)	Flash point (°C)	RTECS Number	R and S	FT-NMR	FT-IR	Merck	Beilstein	Fieser
1.051	1.4202	54	AS4375000	**1**(1),547A	**1**(1),776A	**1**(1),498B	**11**,124	**2**,397	
0.880	1.4320	8					**2**,400		
	1.4487								
1.0573	1.5143	101							
1.146	1.5450	>110							
1.180	1.5570	>110							
				1(1),563H				**2**,402	
				1(1),563I				**2**(4),1486	
1.4774	1.4770								
				1(1),563K	**1**(1),806C	**1**(1),516C			
1.388	1.478								
1.489	1.490	78	AS4900000	**1**(1),745J	**1**(1),1031C	**1**(3),696D			
1.030	1.4500	93	AS5250000						
1.051	1.4560	>110	UD3130000					**2**(4),170	
0.9344	1.4422								

TABLE 5. *cont'd*

Name	R	CAS Registry Number	Mol. wt.	Boiling point (°C)	Melting point (°C)
2-(2-Butoxyethoxy)ethyl ester	$-CH_2CH_2OCH_2CH_2O(CH_2)_3CH_3$		232.28	103/23	
2-Butoxyethyl ester	$-CH_2CH_2O(CH_2)_3CH_3$	7251-90-3	172.22	63/2	
n-Butyl ester	$-(CH_2)_3CH_3$	141-32-2	128.17	145	−64
s-Butyl ester	$-CH(CH_3)CH_2CH_3$	2998-08-5	128.17	59/25	
t-Butyl ester	$-C(CH_3)_3$	1663-39-4	128.17	30/25	
2-Chloro-	$H_2C{=}CClC(O)OH$	26952-44-3	106.51	176(d)	60
2-Chloro-, butyl ester	$H_2C{=}CCl(O)O(CH_2)_3CH_3$	13401-85-9	162.62	100/42	
2-Chloro-, ethyl ester	$H_2C{=}CClC(O)OCH_2CH_3$	687-46-7	134.56	41/20	
2-Chloro-, methyl ester	$H_2C{=}CClC(O)OCH_3$	80-63-7	120.54	52/50	
3-Chloro-, *cis*-	$ClCH{=}CHC(O)OH$	1609-93-4	106.51		61
3-Chloro-, *trans*-	$ClCH{=}CHC(O)OH$	2345-61-1	106.51		84
2-Chloroethyl ester	$-CH_2CH_2Cl$	2206-89-5	134.57	64/20	
Cinnamyl ester	$-CH_2CH{=}CHC_6H_5$		188.23	105/2	
Crotyl ester	$-CH_2CH{=}CHCH_3$	23916-33-8	126.16	38/10	
2-Cyano-, butyl ester	$H_2C{=}C(CN)C(O)O(CH_2)_3CH_3$	6606-65-1	153.18	92/6	
2-Cyano-, ethyl ester	$H_2C{=}C(CN)C(O)OCH_2CH_3$	7085-85-0	125.13	90/5	−17
2-Cyano-, isobutyl ester	$H_2C{=}C(CN)C(O)OCH_2CH(CH_3)_2$	1069-55-2	153.18	81/4	
2-Cyanoethyl ester	$-CH_2CH_2CN$	106-71-8	125.13	103/8	−17
Cyclohexyl ester	$-C_6H_{11}$	3066-71-5	154.21	183	
Cyclopentyl ester	$-C_5H_9$	16868-13-6	282.38	145/0.08	
n-Decyl ester	$-(CH_2)_9CH_3$	2156-96-9	212.34	185/50	
2,3-Dibromopropyl ester	$-CH_2CHBrCH_2Br$	19660-16-3	271.94	105/6	
2,3-Dichloropropyl ester	$-CH_2CHClCH_2Cl$	24910-84-7	183.04	58/0.5	
Dicyclopentenyl ester	$-C_{10}H_{13}$	33791-58-1	202.25	105/4	
Dicyclopentenyloxyethyl ester	$-CH_2CH_2OC_{10}H_{13}$	65983-31-5	248.32	100/0.5	
2-(Diethylamino)ethyl ester	$-CH_2CH_2N(CH_2CH_3)_2$	2426-54-2	171.27	171.27	<−60
3-(Diethylamino)propyl ester	$-(CH_2)_3N(CH_2CH_3)_2$		185.27	44/0.1	
Di(ethylene glycol) diester	$-CH_2CH_2OCH_2CH_2-$	4074-88-8	214.22	162	
Dihydrodicyclopentadienyl ester	$-C_{10}H_{15}$	12542-30-2	204.27	119/5	−40
2,3-Dihydroxypropyl ester	$-CH_2CH(OH)CH_2OH$	10095-20-2	146.15	115/0.1	
2-(Dimethylamino) ethyl ester	$-CH_2CH_2N(CH_3)_2$	2439-35-2	143.19	64/12	<−60
3-(Dimethylamino) neopentyl ester	$-CH_2C(CH_3)_2CH_2N(CH_3)_2$	20166-73-8	181.24	53/1.4	
3-(Dimethylamino) propyl ester	$-(CH_2)_3N(CH_3)_2$	18526-07-3	157.22	167	
Dipentaerythritol pentaester	$(-CH_2)_3CCH_2OCH_2C(CH_2OH)(CH_2-)_2$	60506-81-2	524.53		
Di(propylene glycol) diester	$-CH_2CH(CH_3)OCH_2CH(CH_3)-$	85136-76-1	242.27	95/0.5	
Di(trimethylolpropane) tetraester	$((-CH_2)_2C(CH_2CH_3)CH_2)_2O$	94108-97-1	466.53		
Dodecyl ester	$-(CH_2)_{11}CH_3$	2156-97-0	240.39	120/1	
1H,1H,11H-Eicosafluoro-undecylester	$-CH_2(CF_2)_9CHF_2$	4998-38-3	586.17	115/1	49
2-(2-Ethoxyethoxy)ethyl ester	$-(CH_2CH_2O)_2CH_2CH_3$	7328-17-8	188.23	250	
2-Ethoxyethyl ester	$-CH_2CH_2OCH_2CH_3$	106-74-1	144.17	65/16	
Ethyl ester	$-CH_2CH_3$	140-88-5	100.12	99	−72
Ethylene diester	$-CH_2CH_2-$	2274-11-5	170.16	67/2	
2-Ethylhexyl ester	$-CH_2CH(CH_2CH_3)(CH_2)_3CH_3$	103-11-7	184.28	217	−90
Furfuryl ester	$-CH_2C_4H_3O$	10525-17-4	152.15	92/16	
Glycidyl ester	$-CH_2CH(-O-)CH_2$	106-90-1	128.13	115/78	
Glycerol propoxylate triester	$-CH(CH_3)CH_2OCH(CH_2OCH_2CH(CH_3)-)_2$	52408-84-1	428		
1H,1H,2H,2H-Heptadecafluoro-decyl ester	$-CH_2CH_2(CF_2)_7CF_3$	27905-45-9	518.10	100/4	
1H,1H-Heptafluorobutyl ester	$-CH_2CF_2CF_2CF_3$	424-64-6	254.11	121/743	
Heptyl ester	$-(CH_2)_6CH_3$	2499-58-3	170.25	56/1	
Hexadecyl ester	$-(CH_2)_{15}CH_3$	13402-02-3	296.50	170/15	
2,2,3,4,4,4-Hexafluorobutyl ester	$-CH_2CF_2CHFCF_3$	54052-90-3	236.11	48/12	
1H-Hexafluoroisoporpyl ester	$-CH(CF_3)_2$	2160-89-6	222.09	84	
Hexanediol diester	$-(CH_2)_6-$	13048-33-4	226.28	295	
n-Hexyl ester	$-(CH_2)_5CH_3$	2499-95-8	156.23	190	−45
4-Hydroxybutyl ester	$-(CH_2)_4OH$	2478-10-6	144.17	95/0.1	
2-Hydroxyethyl ester	$-CH_2CH_2OH$	818-61-1	116.11	90/12	−101
2-Hydroxy-3-phenoxypropyl ester	$-CH_2CH(OH)CH_2OC_6H_5$	16969-10-1	222.24		
2-Hydroxypropyl ester	$-CH_2CH(OH)CH_3$	999-61-1	130.15	77/15	−92
Isobornyl ester	$-C_{10}H_{18}$	5888-33-5	208.30	275	−15
Isobutyl ester	$-CH_2CH(CH_3)_2$	106-63-8	128.19	132	−61

Density (at 20°C)	Refractive index (at 20°C)	Flash point (°C)	RTECS Number	R and S	FT-NMR	FT-IR	Merck	Beilstein	Fieser
0.9821	1.4394								
0.9497	1.4323	90							
0.894	1.4180	39	UD3150000	**1**(1),719E	**1**(1),974A	**1**(1),642A	**11**,1539	**2**(2),388	
0.8114	1.4140								
0.8850	1.4108	17		**1**(1),719F	**1**(1),974B	**1**(3),674D		**2**(3),1228	
1.1404	1.4384								
1.189	1.4420	33							
				1(1),563F	**1**(1),805C	**1**(1),516A		**2**,400	
			AS5960000	**1**(1),563G	**1**(1),806A	**1**(1),516B		**2**,400	
1.1404	1.4384								
1.0495	1.5660								
0.986	1.4420	99							
1.069		108							
1.0690	1.4433	124	AT1500000					**3**(3),543	
0.975	1.4673	29	AS7350000						
0.8781	1.440	227							
1.7803	1.5520								
1.2603	1.4765								
1.085	1.5010	99							
0.9250	1.443	68	AS8225000						
0.9180	1.441								
1.118	1.4630	> 110	AS9450000						
1.08	1.509								
0.943	1.4380	58	AS8578000	**1**(1),771G	**1**(1),1073C	**1**(3),734A		**4**(3),649	
0.90	1.439	75							
0.928	1.4400	68							
1.1915		115							
	1.4488								
1.101	1.4790	> 110							
0.884	1.4450	> 110						**2**(3),1230	
1.016	1.4390	102						**2**(3),1232	
0.9819	1.4282	65	AS9800000					**2**(3),1232	
0.924	1.4060	15	AT0700000	**1**(1),719D	**1**(1),973C	**1**(1),638C	**11**,3715	**2**,399	**6**,251
1.090	1.4610	100	AT0350000	**1**(1),727M		**1**(3),675B		**2**(4),1496	
0.8859	1.4360	79	AT0855000	**1**(1),719G	**1**(1),974C	**1**(3),675A		**2**(3),1229	
1.1125	1.4800								
1.099	1.4490	76	AS9275000		**1**(1),1088C			**17**(3),1005	
1.064	1.4610								
	1.3380								
1.418	1.3301	31						**2**(4),1464	
0.8846	1.4311								
0.8620	1.4470								
1.398	1.352	59							
1.330	1.3190	10		**1**(1),745C	**1**(1),1029B				
1.010	1.4562	> 110	AT1430000	**1**(1),729E		**1**(1),639B			
0.8882	1.4280	68	AT1450000					**2**(3),1228	
1.039	1.4520	> 110		**1**(1),753L	**1**(1),1044C	**1**(3),720C		**2**(4),1470	
1.011	1.4502	98	AT1750000	**1**(1),753J	**1**(1),1044A	**1**(3),720B		**2**(4),1496	
1.160	1.5280	89							
1.05	1.4448	65							
0.986	1.4760	93		**1**(1),719H					
0.8896	1.4140	33	AT2100000					**2**(3),1227	

TABLE 5. *cont'd*

Name	R	CAS Registry Number	Mol. wt.	Boiling point (°C)	Melting point (°C)
Isodecyl ester	$-(CH_2)_7CH(CH_3)_2$	1330-61-6	212.34	121/10	−100
Isooctyl ester	$-(CH_2)_5CH(CH_3)_2$	29590-42-9	184.25	125/20	
Isopropoxyethyl ester	$-CH_2CH_2OCH(CH_3)_2$		159.21	82/19	
Isopropyl ester	$-CH(CH_3)_2$	689-12-3	114.14	51/103	
Methallyl ester	$-CH_2C(CH_3)=CH_2$	818-67-7	126.16	70/50	
2-(2-Methoxyethoxy) ethyl ester	$-CH_2CH_2OCH_2CH_2OCH_3$	7328-18-9	174.20	86/4.6	
2-Methoxyethyl ester	$-CH_2CH_2OCH_3$	3121-61-7	130.14	56/12	
Methyl ester	$-CH_3$	96-33-3	86.09	80	−75
2-Methylbutyl ester	$-CH_2CH(CH_3)CH_2CH_3$		142.20	63/27	
2-(*N*-Morpholino)ethyl ester	$-CH_2CH_2NC_4H_8O$	19727-38-9	185.2	67/0.2	
1-Naphthyl ester	$-C_{10}H_7$	20069-66-3	198.22	212/1	
2-Naphthyl ester	$-C_{10}H_7$	52684-34-1	198.22	138/0.4	
Neopentyl ester	$-CH_2C(CH_3)_3$	4513-36-4	142.24	31/3	
Neopentyl glycol diester	$-CH_2C(CH_3)_2CH_2-$	2223-82-7	212.25	105/5	
Nonyl ester	$-(CH_2)_8CH_3$		198.31	76/0.2	
Octadecyl ester	$-(CH_2)_{17}CH_3$	4813-57-4	324.55	160/3	32
1H,1H,5H-Octafluoropentyl ester	$-CH_2(CF_2)_3CF_2H$	376-84-1	286.12	88/41	
n-Octyl ester	$-(CH_2)_7CH_3$	2499-59-4	184.28	57/0.05	
1H,1H-Pentadecafluorooctyl ester	$-CH_2(CF_2)_6CF_3$	307-98-2	454.13	65/5	
Pentaerythritol tetraester	$(-CH_2)_4C$	4986-89-4	352.34		18
Penterythritol triester	$(-CH_2)_3CCH_2OH$	3524-68-3	298.30	>315	15
Pentaerythritol stearate diester	$(-CH_2)_2C(CH_2OH)CH_2OC(O)(CH_2)_{16}CH_3$	92092-01-8	510.72		30
2,2,3,3,3-Pentafluoropropyl ester	$-CH_2CF_2CF_3$	356-86-5	204.10	50/100	
1,5-Pentanediol diester	$-(CH_2)_5-$	36840-85-4	212.25	94/0.3	
n-Pentyl ester	$-(CH_2)_4CH_3$	2998-23-4	142.20	47/7	
2-Phenoxyethyl ester	$-CH_2CH_2OC_6H_5$	48145-04-6	192.21	103/0.6	
Phenyl ester	$-C_6H_5$	937-41-7	148.16	87/12	
1,4-Phenylene diester	$-C_6H_4-$	6729-79-9	218.21		88
1,4-Phenylene di(acrylic acid)	$C_6H_4(CH=CHC(O)OH)_2$	16323-43-6	218.21		>300
2-Phenylethyl ester	$-CH_2CH_2C_6H_5$	3530-36-7	176.22	104/5	
Trimethyl 2-phosphonoacrylate	$(CH_3O)_2P(O)C(C(O)OCH_3)=CH_2$	55168-74-6	194.13	91/0.1	
Propargyl ester	$-CH_2C\equiv CH$	10477-47-1	110.11		138
n-Propyl ester	$-CH_2CH_2CH_3$	925-60-0	114.14	43/40	
1,2-Propylene glycol diester	$-CH_2CH(CH_3)-$		184.19	63/0.3	
1,3-Propylene glycol diester	$-(CH_2)_3-$	25151-33-1	184.19	122/0.5	
Tetradecyl ester	$-(CH_2)_{13}CH_3$	21643-42-5	268.44	138/0.4	
Tetra(ethylene glycol) diester	$-(CH_2CH_2O)_3CH_2CH_2-$	17831-71-9	302.33	>120/0.3	
2,2,3,3-Tetrafluoropropyl ester	$-CH_2CF_2CF_2H$	7383-71-3	186.11	132	
Tetrahydrofurfuryl ester	$-C_5H_9O$	2399-48-6	156.18	87/9	<−60
S,S'-Thiodi-1,4-phenylene dithiol diester	$-SC_6H_4SSC_6H_4S-$	129283-82-5	386.56		64
2,3,3-Trichloro-	$ClCH_2=CClC(O)OH$	2257-35-4	175.40		72
Tridecyl ester	$-(CH_2)_{12}CH_3$	3076-04-8	254.41	150/10	
Tri(ethylene glycol) diester	$-(CH_2CH_2O)_2CH_2CH_2-$	1680-21-3	258.30	125/0.2	
2,2,2-Trifluoroethyl ester	$-CH_2CF_3$	407-47-6	154.09	92	
1,1,1-Tri(2-hydroxyethoxy-methyl)propane triester	$(-CH_2CH_2OCH_2)_3CCH_2CH_3$	28961-43-5	428.48	157	
Tri(2-hydroxyethyl) isocyanurate triester	$(-CH_2CH_2)_3C_3N_3O_3$	40220-08-4	423.38		97
3,5,5-Trimethylcyclohexyl ester	$-C_6H_8(CH_3)_3$	86178-38-3	196.29	40/0.1	
3,5,5-Trimethylhexyl ester	$-(CH_2)_2CH(CH_3)CH_2C(CH_3)_3$	2664-55-3	198.31	58/0.8	−34
Trimethylolpropane triester	$(-CH_2)_3CCH_2CH_3$	15625-89-5	296.32	316	
Trimethylolpropane ethoxylate triester	$((-CH_2CH_2O)_xCH_2)_3CCH_2CH_3$	28961-43-5	ca. 428	157	
Tri(propylene glycol) diester	$(-CH_2(CH_3)CH_2O)_2CH_2CH(CH_3)-$	42978-66-5	300	>120/1	<−20
Vinyl ester	$-CH=CH_2$	2177-18-6	98.10	91	

5.2. METHACRYLATE, ACIDS/ESTERS ($H_2C=C(CH_3)C(O)OR$)

Acid	$-H$	79-41-4	86.09	163	16
2-(Acetoacetoxy)ethyl ester	$-CH_2CH_2C(O)OCH_2C(O)CH_3$	21282-97-3	214.22	274	
Allyl ester	$-CH_2CH=CH_2$	96-05-9	126.16	60/43	
Anhydride	$-C(O)C(CH_3)=CH_2$	760-93-0	154.17	200	−20
2-(1-Aziridinyl)ethyl ester	$-CH_2CH(-NH-)CH_2$	6498-81-3	155.20	190	

Density (at 20°C)	Refractive index (at 20°C)	Flash point (°C)	RTECS Number	R and S	FT-NMR	FT-IR	Merck	Beilstein	Fieser
0.875	1.4420	106	AT2190000						
0.880	1.4370	80	UD3391000						
0.9549	1.4258								
0.8932	1.4060								
0.9285	1.4372								
1.0421	1.4392								
1.012	1.4272	60	KL6000000					**2**(3),1232	
0.956	1.4020	7	AT2800000	**1**(1),719C	**1**(1),973B	**1**(1),638B	**11**,5935	**3**,638B	**17**,183
0.8883	1.4800								
1.0711	1.4728								
0.859		> 37							
1.030	1.4530	123	AS8925000						
0.875	1.4375								
0.800		190						**2**(4),1468	
	1.3467	70							
0.8810	1.4350								
1.63	1.3279								
1.190	1.4870	170							
1.180	1.4840	> 110	UD3370000	**1**(1),753I		**1**(1),639C			
1.018									
1.32	1.3363								
	1.4551								
0.8920	1.4240								
1.104	1.5180	> 110	KM0700000					**6**(3),572	
				1(2),1775F	**1**(2),1050A	**1**(2),179B		**9**,914	
1.249	1.4540	105		**1**(1),1109B	**1**(1),1489B			**4**(4),3638	
0.9078	1.4130								
	1.4470								
	1.4529								
0.8700	1.4468								
1.110	1.4638	> 110	AS8100000	**1**(1),759E	**1**(1),1053B	**1**(1),639A			
1.317	1.3629	45		**1**(1),745A				**17**(3),1104	
1.063	1.4580	> 110						**17**(3),1104	
1.099	1.4609	63							
1.216	1.3506	12		**1**(1),743M	**1**(1),1028C	**1**(3),696C		**2**(4),1462	
1.110	1.4710	> 110	KM2890000		**1**(1),999C				
0.9292	1.455	88							
0.875	1.4370	89	UD3643625					**2**(3),1230	
1.100	1.4736	> 110	AT4810000	**1**(1),729F		**1**(1),640A			
1.110	1.4720	86	KM2890000		**1**(1),999C				
1.030	1.4500		AT4690000	**1**(1),729A		**1**(1),638D			
0.942	1.4320	2							
1.015	1.432	76	OZ2975000	**1**(1),547B	**1**(1),776B	**1**(1),499C	**11**,5849	**2**,421	
1.122	1.4560	106		**1**(1),791E	**1**(1),1107C				
0.934	1.4360	34	UD3483000	**1**(1),721E	**1**(1),977A	**1**(1),641B		**2**(3),1290	
1.035	1.454	83	OZ5700000	**1**(1),831C	**1**(1),1170C			**2**(3),1293	
								6(3),1481	

TABLE 5. *cont'd*

Name	R	CAS Registry Number	Mol. wt.	Boiling point (°C)	Melting point (°C)
Benzyl ester	$-CH_2C_6H_5$	2495-37-6	176.22	232	
Bisphenol A diester	$-C_6H_4C(CH_3)_2C_6H_4-$	3253-39-2	364.44		73
Bisphenol A tetraethoxylate diester	$((-CH_2CH_2O)_2C_6H_4)_2C(CH_3)_2$	41637-38-1	452.55	ca. 540	
2-Bromoethyl ester	$-CH_2CH_2Br$	4513-56-8	193.05	47/2.7	
1,3-Butylene diester	$-CH_2CH_2CH(CH_3)-$	1189-08-8	226.28	290	
1,4-Butylene diester	$-(CH_2)_4-$	2082-81-7	226.28	133/4	
2-Butoxyethyl ester	$-CH_2CH_2O(CH_2)_3CH_3$	13532-94-0	186.25	90/3	
n-Butyl ester	$-(CH_2)_3CH_3$	97-88-1	142.20	161	
s-Butyl ester	$-CH(CH_3)CH_2CH_3$	2998-18-7	142.20	146	
tert-Butyl ester	$-C(CH_3)_3$	585-07-9	142.20	132	
N-tert-Butyl-2-aminoethyl ester	$-CH_2CH_2NHC(CH_3)_3$	3775-90-4	185.27	100/12	
2-Chloro-2-hydroxypropyl ester	$-CH_2C(OH)ClCH_3$	13159-52-9	178.62	95/2	
2-Chloroethyl ester	$-CH_2CH_2Cl$	1888-94-4	148.60	59/7.5	
Chloromethyl ester	$-CH_2Cl$	27550-73-8	146.57	54/20	
Cinnamyl ester	$-CH_2CH{=}CHC_6H_5$	31736-34-2	202.25	141/3	
Chloride	$CH_2{=}C(CH_3)C(O)Cl$	920-46-7	104.54	95	
2-Cyanoethyl ester	$-CH_2CH_2CN$	4513-53-5	139.16	99/2	
1,4-Cyclohexanediol diester	$-C_6H_{10}-$	38479-34-4	252.31		50
Cyclohexyl ester	$-C_6H_{11}$	101-43-9	168.24	69/4	
Decanediol diester	$-(CH_2)_{10}-$	6701-13-9	310.44	170/2	
Decyl ester	$-(CH_2)_9CH_3$	3179-47-3	226.36	327	−44
2,3-Dibromopropyl ester	$-CH_2CHBrCH_2Br$	3066-70-4	285.96	72/0.03	
2-(Dibutylamino)ethyl ester	$-(CH_2)_2N(CH_2CH_2CH_2CH_3)_2$	2397-75-3	241.38	100/1	
Dicyclopentenyl ester	$-C_{10}H_{13}$	31621-69-9	218.30	137/13	
Dicyclopentenyloxyethyl ester	$-C_{12}H_{17}O$	68586-19-6	262.35	150/10	
2-(Diethylamino) ethyl ester	$-(CH_2)_2N(CH_2CH_3)_2$	105-16-8	185.28	80/10	<−60
3-(Dimethylamino) propyl ester	$-(CH_2)_3N(CH_3)_2$	17577-32-1	199.30	105/1.5	
Di(ethylene glycol) diester	$-CH_2CH_2OCH_2CH_2-$	2358-84-1	242.27	134/2	
3,4-Dihydroxybutyl ester	$-CH_2CH_2CH(OH)CH_2OH$	62180-57-8	174.20	110/0.25	
2,3-Dihydroxypropyl ester	$-CH_2CH(OH)CH_2OH$	5919-74-4	160.17	140/0.6	
2-(Dimethylamino) ethyl ester	$-CH_2CH_2N(CH_3)_2$	2867-47-2	157.22	187	−30
Diurethane diester (isomers)	$C_{23}H_{38}N_2O_8$	72869-86-4	470.57	200	
1H,1H,7H-Dodecafluoroheptyl ester	$-CH_2(CF_2)_5CF_2H$	2261-99-6	400.17	107/23	
Dodecanediol diester	$-(CH_2)_{12}-$	72829-09-5	338.49		0.95
Dodecyl ester	$-(CH_2)_{11}CH_3$	142-90-5	252.42	142/4	−7
2,3-Epithiopropyl ester	$-CH_2CH(-S-)CH_2$	3139-91-1	158.22	59/1.4	
2,3-Epoxybutyl ester	$-CH_2CH(-O-)CHCH_3$	68212-07-7	156.18	45/0.25	
3,4-Epoxybutyl ester	$-CH_2CH_2CH(-O-)CH_2$	55750-22-6	156.18	55/0.8	
2,3-Epoxyopropyl ester	$-CH_2CH(-O-)CH_2$	106-91-2	142.16	189	
4-Ethoxybutyl ester	$-(CH_2)_4OCH_2CH_3$	76392-24-0	186.25	85/23	
2-Ethoxyethyl ester	$-CH_2CH_2OCH_2CH_3$	2370-63-0	158.20	92/35	
Ethyl ester	$-CH_2CH_3$	97-63-2	114.15	118	<−75
Ethyl 2-bromomethyl- ester	$CH_2{=}C(CH_2Br)C(O)OCH_2CH_3$	17435-72-2	193.05	38/0.8	
2-Ethylbutyl ester	$-CH_2CH(CH_2CH_3)CH_2CH_3$	5138-86-3	170.25	74/16	
1,2-Ethylene diester	$-CH_2CH_2-$	97-90-5	198.22	240	−40
2-Ethylhexyl ester	$-CH_2CH(CH_2CH_3)(CH_2)_3CH_3$	688-84-6	198.31	218	
2-(Ethylthio)ethyl ester	$-CH_2CH_2SCH_2CH_3$	14216-25-2	174.26	102/15	
Ethyl 2-(trimethoxysilylmethyl-) ester	$CH_2{=}C(CH_2Si(OCH_3)_3)C(O)OCH_2CH_3$	74976-84-4	186.33	71/10	
Furfuryl ester	$-CH_2C_4H_3O$	3454-28-2	166.18	81/5	
Glycerol diester	$-CH_2CH(OH)CH_2-$	1830-78-0	228.25	120/1	<−18
Glycerol triester	$-CH(CH_2-)_2$	52408-84-1	296.3	150/0.1	
Glycidyl ester	$-CH(-O-)CH_2$	106-91-2	142.16	189	
1H,1H,2H,2H-Heptadecafluorodecyl ester	$-(CH_2)_2(CF_2)_7CF_3$	1996-88-9	532.20	120/4	
1H,1H-Heptafluorobutyl ester	$-CH_2(CF_2)_2CF_3$	13695-31-3	268.13	134	
Heptyl ester	$-(CH_2)_6CH_3$	5459-37-0	184.28	104/14	
1,6-Hexanediol diester	$-(CH_2)_6-$	6606-59-3	254.33	>315	
2,2,3,4,4,4-Hexafluorobutyl ester	$-CH_2CF_2CHFCF_3$	36405-47-7	250.14	158	
1H-Hexafluoroisopropyl ester	$-CH(CF_3)_2$	3063-94-3	236.11	99	
Hexyl ester	$-(CH_2)_5CH_3$	142-09-6	170.25	88/14	

Density (at 20°C)	Refractive index (at 20°C)	Flash point (°C)	RTECS Number	R and S	FT-NMR	FT-IR	Merck	Beilstein	Fieser
1.040	1.5120	107							
				1(2),1931F	**1**(2),1296C	**1**(2),316B			
1.120	1.5320	>110							
1.010	1.4520	130							
1.023	1.4565	113		**1**(1),729D	**1**(1),999A	**1**(1),639D		**2**(4),1534	
0.939	1.4335	93						**2**(3),1292	
0.894	1.4230	50	OZ3675000	**1**(1),721A	**1**(1),975C	**1**(1),641A		**2**(3),1286	
	1.4195								
0.875	1.4150	50	OZ3675500					**2**(4),1582	
0.914	1.4420	71	OZ3500000					**4**(4),1509	
1.190	1.4750	150						**2**(4),1533	
	1.4434								
1.070	1.4420	3	OZ5791000	**1**(1),857B		**1**(1),732C		**2**(3),1293	
	1.4459								
		82							
0.9626	1.459	82						**6**(3),25	
	1.4577								
0.875	1.443	101							
	1.4474								
1.050	1.4990	>110						**6**(3),1942	
1.064	1.4970	>110							
0.922	1.4442	85						**4**(3),676	
1.082	1.4580	66						**2**(3),1292	
0.933	1.4400	70	OZ4200000	**1**(1),771H	**1**(1),1074A	**1**(1),675C		**4**(3),649	
1.110	1.485	>150							
1.46									
0.868	1.4450	>110	OZ4300000	**1**(1),721D	**1**(1),976C	**1**(3),678B		**2**(3),1290	
	1.4422								
1.038	1.4472								
1.042	1.4490	76	OZ4375000	**1**(1),781F	**1**(1),1089A	**1**(1),668D			
	1.4223								
0.964	1.4290	71		**1**(1),759C	**1**(1),1052C	**1**(3),723C		**2**(3),1291	
0.917	1.4130	15	OZ4550000	**1**(1),719J	**1**(1),975B	**1**(1),640D		**2**,423	
1.398	1.4790	87							
1.051	1.4540	86	OZ4400000	**1**(1),729B	**1**(1),998B	**1**(1),642D		**2**(3),1292	
0.885	1.4380	92	OZ4630000	**1**(1),721C	**1**(1),976B			**2**(3),1289	
0.897	1.4380	59		**1**(2),2985A	**1**(3),686B				
1.078	1.4820	90						**17**(3),1248	
1.120	1.4720	>115							
1.042	1.4490	76	OZ4375000	**1**(1),781F	**1**(1),1089A	**1**(1),668D			
1.345	1.3410	37							
0.995	1.4580	150							
1.348	1.3610	57		**1**(1),745F	**1**(1),1030B				
1.302	1.3310	14		**1**(1),745E	**1**(1),1030A				
0.885	1.432	63							

TABLE 5. *cont'd*

Name	R	CAS Registry Number	Mol. wt.	Boiling point (°C)	Melting point (°C)
4-Hydroxybutyl ester	$-(CH_2)_4OH$	997-46-6	158.20	105/0.01	
2-Hydroxyethyl ester	$-CH_2CH_2OH$	868-77-9	130.14	250	−12
3-(5-Hydroxypentyloxy)-3-oxopropyl ester	$-CH_2CH_2C(O)O(CH_2)_5OH$	85099-10-1	244.29		−48
3-Hydroxypropyl ester	$-(CH_2)_3OH$	276-09-3	144.17	90/9	
Isobornyl ester	$-C_{10}H_8$	7534-94-3	222.33	245	−51
Isobutyl ester	$-CH_2CH(CH_3)_2$	97-86-9	142.20	155	
2-Isocyanatoethyl ester	$-CH_2CH_2NCO$	30674-80-7	155.17	211	−45
Isodecyl ester	$-(CH_2)_7CH(CH_3)_2$	29964-84-9	226.36	126/10	−41
Isopropyl ester	$-CH(CH_3)_2$	4655-34-9	128.17	125	
Methallyl ester	$-CH_2C(CH_3)=CH_2$	816-74-0	140.18	157	
2-(2-Methoxyethoxy) ethyl ester	$-(CH_2CH_2O)_2CH_3$	45103-58-0	188.22	67/1	
2-Methoxyethyl ester	$-CH_2CH_2OCH_3$	6976-93-8	144.17	66/16	
Methyl ester	$-CH_3$	80-62-6	100.12	100	−48
2-Methyl-2-nitropropyl ester	$-CH_2C(CH_3)(NO_2)CH_3$	2177-42-6	187.20	102/4	
2-(Methylthio) ethyl ester	$-CH_2CH_2SCH_3$	14216-23-0	160.24	38/0.06	
Methyl 2-bromomethyl ester	$CH_2=C(CH_2Br)C(O)OCH_3$	4224-69-5	179.02	36/1.3	
Methyl 2-(1-hydroxyethyl-)ester	$CH_2=C(CH(OH)CH_3)C(O)OCH_3$	18020-65-0	130.14	91/20	
2-*N*-Morpholinoethyl ester	$-CH_2CH_2NC_4H_8O$	2997-88-8	199.25	80/0.08	
Neopentylglycol diester	$-CH_2C(CH_3)_2CH_2-$	1985-51-9	240.30	112/1.2	
Nona(ethylene glycol) diester	$-(CH_2CH_2O)_8CH_2CH_2-$	25852-47-5	550		
Nona(propylene glycol) diester	$-(CH(CH_3)CH_2O)_8CH(CH_3)CH_2-$	25852-49-7	560	>200/1	
Nonyl ester	$-(CH_2)_8CH_3$	2696-43-7	212.33		
4-Nonylphenyl ester	$-C_6H_4(CH_2)_8CH_3$	76391-98-5	288.43	125/0.03	
Octadecyl ester	$-(CH_2)_{17}CH_3$	32360-05-7	338.58	195/6	19
n-Octyl ester	$-(CH_2)_7CH_3$	2157-01-9	198.31	105/4	
Pentabromophenyl ester	$-C_6Br_5$	18967-31-2	556.69		132
Pentachlorophenyl ester	$-C_6Cl_5$	16184-61-5	334.41		87
1H,1H-Pentafluorooctyl ester	$-CH_2(CF_2)_6CF_3$	3934-23-4	468.16	67/5	
Pentaerythritol tetraester	$C(CH_2-)_4$	3253-41-6	408.45		66
2,2,3,3,3-Pentafloropropyl ester	$-CH_2CF_2CF_3$	45115-53-5	218.12	55/110	
Pentyl ester	$-(CH_2)_4CH_3$	2849-98-1	156.23	73/17	
2-Phenoxyethyl ester	$-CH_2CH_2OC_6H_5$	10595-06-9	206.24	183	
Phenyl ester	$-C_6H_5$	2177-70-0	162.19	115/10	
2-Phenylethyl ester	$-CH_2CH_2C_6H_5$	3683-12-3	190.24	119/11	
n-Propyl ester	$-CH_2CH_2CH_3$	2210-28-8	128.17	140	
1,2-Propylene diester	$-CH_2CH(CH_3)-$	1188-09-6	212.25	68/1	
1,3-Propylene diester	$-(CH_2)_3-$		212.25	68/1	
2-Sulfoethyl ester	$-CH_2CH_2SO_3H$	10595-80-9	194.21	(d)	
3-Sulfopropyl ester, potassium salt	$-(CH_2)_3SO_3K$	31098-21-2	246.33		295(d)
Tetra(ethylene glycol) diester	$-CH_2CH_2(OCH_2CH_2)_3-$	109-17-1	300.37	220	
2,2,3,3-Tetrafluoropropyl ester	$-CH_2CF_2CF_2H$	45102-52-1	200.14	124	
Trimethylsilyl ester	$-Si(CH_3)_3$	13688-56-7	158.28	51/20	
2-(Trimethylsilyloxy)ethyl ester	$-CH_2CH_2OSi(CH_3)_3$	17407-09-9	202.33	65/0.9	
3-(Trimethylsilyloxy)propyl ester	$-(CH_2)_3OSi(CH_3)_3$	2530-85-0	248.35	190	
3-(Tris(trimethylsilyloxy)silyl) propyl ester	$-(CH_2)_3Si(OSi(CH_3)_3)_3$	17096-07-0	422.82	113/0.2	
Vinyl ester	$-CH=CH_2$	4245-37-8	112.13	111	

TABLE 6. ALCOHOLS

Name	Formula HOROH R	CAS Registry Number	Mol. wt.	Boiling point (°C)	Melting point (°C)
6.1. ALKANEDIOLS					
1,2-Butane	$-CH(C_2H_5)CH_2-$	584-03-2	90.12	191/747	
1,3-Butane	$-CH(CH_3)CH_2CH_2-$	107-88-0	90.12	203	
1,4-Butane	$-(CH_2)_4-$	110-63-4	90.12	230	16
1,10-Decane	$-(CH_2)_{10}-$	112-47-0	174.28	170/8	73
1,12-Dodecane	$-(CH_2)_{12}-$	5675-51-4	202.34	189/12	82
1,2-Ethylene	$-(CH_2)_2-$	107-21-1	62.07	197	−13

Density (at 20°C)	Refractive index (at 20°C)	Flash point (°C)	RTECS Number	R and S	FT-NMR	FT-IR	Merck	Beilstein	Fieser
1.073	1.4520	97	OZ4725000	**1**(1),753M	**1**(1),1045A	**1**(1),665B			
1.080	1.4360	>110							
1.066	1.4470	96							
0.9830	1.4770	107							
0.886	1.420	41	OZ4900000	**1**(1),721B	**1**(1),976A	**1**(3),677C		**2**(3),1287	
1.096		97							
0.878	1.4430	>110	OZ5000000						
0.8847	1.4122								
1.020	1.4397	>110							
0.993	1.4310	65							
0.936	1.4140	10	OZ5075000	**1**(1),719I	**1**(1),975A	**1**(1),640C	**11**,5849	**2**(2),398	
1.087	1.450	>110						**2**(3),1288	
1.040	1.4800	88							
1.489	1.4900	78	AS4900000	**1**(1),745J	**1**(1),1031C				
1.071	1.4520	43							
1.003	1.4530	117						**2**(4),1535	
1.099	1.4660	>110							
1.010	1.4520	>110							
1.099	1.4660	>110							
	1.5020	>110							
0.864	1.4510	196						**2**(3),1290	
	1.4373								
		96							
		>100							
1.5732	1.3482	6							
1.0687	1.5130	100							
	1.5184								
0.98	1.508	122							
0.9022	1.4450								
	1.4450								
1.3245	1.4772								
				1(1),1065F	**1**(1),1438B	**1**(1),890D			
1.080	1.4630	82	OZ4000000					**2**(4),1531	
1.250	1.3730	50		**1**(1),745B	**1**(1),1029A				
0.890	1.4147	32		**1**(2),2985B	**1**(3),686C				
0.928	1.4280	76		**1**(2),2985C	**1**(3),687A				
1.045	1.4310	92	UC0230000	**1**(2),2985D	**1**(3),687B	**1**(2),1116C			
0.918	1.4190	>110							
0.933	1.4360	13						**2**(3),1290	

Density (at 20°C)	Refractive index (at 20°C)	Flash point (°C)	RTECS Number	R and S	FT-NMR	FT-IR	Merck	Beilstein	Fieser
1.006	1.4380	93	EK0380000	**1**(1),141A	**1**(1),196C	**1**(1),130B		**1**,477	
1.005	1.4400	121	EK0440000	**1**(1),139L	**1**(1),195C	**1**(1),130D	**11**,1566	**1**,477	
1.017	1.4450	>110	EK0525000	**1**(1),139K	**1**(1),195B	**1**(1),130A		**1**,478	
			HD8433713	**1**(1),143N	**1**(1),205C	**1**(1),136D	**11**,2842	**1**(2),560	
				1(1),145A	**1**(1),206B	**1**(1),137A		**1**(2),562	
1.113	1.4310	>110	KW2975000	**1**(1),139A		**1**(1),127D	**11**,3755	**1**,465	**15**,156

TABLE 6. *cont'd*

Name	Formula HOROH R	CAS Registry Number	Mol. wt.	Boiling point (°C)	Melting point (°C)
1,7-Heptane	$-(CH_2)_7-$	629-30-1	132.20	259	18
1,16-Hexadiene	$-(CH_2)_{16}-$	23079-20-1	258.45	198/3	92
1,6-Hexane	$-(CH_2)_6-$	629-11-8	118.18	250	42
1,7-Heptane	$-(CH_2)_7-$	629-30-1	132.20	259	18
1,16-Hexadiene	$-(CH_2)_{16}-$	23079-20-1	258.45	198/3	92
1,9-Nonane	$-(CH_2)_9-$	3937-56-2	160.26	177/15	48
1,8-Octane	$-(CH_2)_8-$	629-41-4	146.23	172/20	60
1,5-Pentane	$-(CH_2)_5-$	111-29-5	104.15	242	
1,2-Propane	$-CH(CH_3)CH_2-$	57-55-6	76.10	187	−60
1,3-Propane	$-(CH_2)_3-$	504-63-2	76.10	214	−27
1,14-Tetradecane	$-(CH_2)_{14}-$	19812-64-7	230.39		88
6.2. ETHER DIOLS					
Di(ethylene glycol)	$-CH_2CH_2OCH_2CH_2-$	111-46-6	106.12	245	−10
Di(propylene glycol)	$-CH(CH_3)CH_2OCH(CH_3)CH_2-$	110-98-5	134.18		
Hexa(ethylene glycol)	$-CH_2CH_2(OCH_2CH_2)_5-$	2615-15-8	282.34	217/4	6
Penta(ethylene glycol)	$-CH_2CH_2(OCH_2CH_2)_4-$	4792-15-8	238.28	184/2	
Tetra(ethylene glycol)	$-CH_2CH_2(OCH_2CH_2)_3-$	112-60-7	194.23	314	−6
Tri(ethylene glycol)	$-CH_2CH_2(OCH_2CH_2)_2-$	112-27-6	150.17	285	−7
Tri(propylene glycol)	$-CH(CH_3)CH_2(OCH(CH_3)CH_2)_2-$	24800-44-0	192.26	273	

TABLE 7. ALLYL FUNCTIONAL

Name	Formula $CH_2=CHCH_2R$ R	CAS Registry Number	Mol. wt.	Boiling point (°C)	Melting point (°C)
Acetate	$-OC(O)CH_3$	591-87-7	100.12	104	
−Acetic acid	$-CH_2C(O)OH$	591-80-0	100.12	84/12	−22
Acetoacetate	$-OC(O)CH_2C(O)CH_3$	1118-84-9	142.16	194/737	
Alcohol	$-OH$	107-18-6	58.08	97	−129
−, 2-Bromo-	$H_2C=CBrCH_2OH$		136.98	152	
−, 2-Chloro-	$H_2C=CClCH_2OH$	5976-47-6	92.53	134	
−, 3-Methyl(crotyl alcohol)	$CH_3CH=CHCH_2OH$	6117-91-5	72.12	122	
−Amine	$-NH_2$	107-11-9	57.10	53	−88
−*N*-Aniline	$-NC_6H_5$	589-09-3	133.19	219	
−4-Anisole	$-C_6H_4OCH_3$	140-67-0	148.21	215	
−Benzene	$-C_6H_5$	300-57-2	118.18	156	
Benzyl ether	$-OCH_2C_6H_5$	14593-43-2	148.21	204	
Bromide	$-Br$	106-95-6	120.98	70	−119
Butyl ether	$-O(CH_2)_3CH_3$	3739-64-8	114.19		
Butyrate	$-OC(O)CH_2CH_2CH_3$	2051-78-7	128.17	44/15	
Chloride	$-Cl$	107-05-1	76.09	45	−134
Chloroacetate	$-OC(O)CH_2Cl$	2916-14-5	134.56	164/265	
Chloroformate	$-OC(O)Cl$	2937-50-0	120.54	109	
Cyanide	$-CN$	109-75-1	67.09	118	
Cyanoacetate	$-OC(O)CH_2CN$	13361-32-5	125.13	110/20	
Diallyl amine	$-NH-$	124-02-7	97.16	112	−88
2,3-Dibromide	$H_2=CBrCH_2Br$	513-31-5	199.88	141	
2,3-Dichloride	$H_2C=CClCH_2Cl$		110.97	94	
Ether	$-O-$	557-40-4	98.15	95	
Ethyl ether	$-OCH_2CH_3$	557-31-3	86.13	66	
Fluoride	$-F$	818-92-8	60.07	−10	
Formate	$-OC(O)H$		86.09	84	
Glycidyl ether	$-O-CH_2CH(-O-)CH_2$	106-92-3	114.14	154	
Iodide	$-I$	556-569	167.98	103	
Isocyanate	$-NCO$	1476-23-9	83.09	88	
Isopropyl ether	$-OCH(CH_3)_2$		100.16	84	
4-(2-Methoxyphenol)	$-C_6H_4(OCH_3)OH$	97-53-0	164.20	154	−11
Methyl ether	$-OCH_3$	627-40-7	72.11	46	
−2-Phenol	$-C_6H_4OH$	1745-81-9	134.18	220	

Density (at 20°C)	Refractive index (at 20°C)	Flash point (°C)	RTECS Number	R and S	FT-NMR	FT-IR	Merck	Beilstein	Fieser
0.951	1.4550	>110	MI9804000	**1**(1),143J	**1**(1),204B	**1**(1),135C		**1**,489	
				1(1),145E		**1**(1),137D			
		102	MO2100000	**1**(1),143D	**1**(1),202B	**1**(1),134B	**11**,4610	**1**,484	
0.951	1.4550	>110	MI9804000	**1**(1),143J	**1**(1),204B	**1**(1),135C		**1**,489	
				1(1),145E		**1**(1),137D		**1**,489	
		>110		**1**(1),143M	**1**(1),205B	**1**(1),136B		**1**,493	
				1(1),143K	**1**(1),204C	**1**(1),135D		**1**,490	
0.994	1.4500	129	SA0480000	**1**(1),141I	**1**(1),199A	**1**(1),132B	**11**,7073	**1**,481	
1.036	1.4320	107	TY2000000	**1**(1),139C	**1**(1),192C	**1**(1),128B	**11**,7868	**1**,472	
1.053	1.4400	79	TY2010000	**1**(1),139B	**1**(1),192B	**1**(1),128A	**11**,9629	**1**,475	
				1(1),145C	**1**(1),207A		**1**(2),564		
1.118	1.4460	143	ID5950000	**1**(1),225D	**1**(1),341B	**1**(1),223B	**11**,3109	**1**,468	
1.023	1.4410	138	UB8785000	**1**(1),225E	**1**(1),341C	**1**(1),226A		**1**(2),537	
1.127	1.4640	>110	MM3670000	**1**(1),229B	**1**(1),347A	**1**(1),227A		**1**,468	
1.126	1.4620	>110	RZ2670000	**1**(1),227K	**1**(1),346B	**1**(1),226D		**1**,468	
1.125	1.4590	177	XC2100000	**1**(1),227H	**1**(1),346A	**1**(1),226C		**1**,468	
1.125	1.4550	166	YE4550000	**1**(1),227D	**1**(1),345A	**1**(1),226B	**11**,9585	**1**,468	
1.021	1.4440	>110	YK6825000	**1**(1),227F	**1**(1),345B				

Density (at 20°C)	Refractive index (at 20°C)	Flash point (°C)	RTECS Number	R and S	FT-NMR	FT-IR	Merck	Beilstein	Fieser
0.928	1.4040	7	AF1760000	**1**(1),715C	**1**(1),963C	**1**(1),633B		**2**,136	
0.981	1.4283	89	SB2800000	**1**(1),547H	**1**(1),778A	**1**(1),499B		**2**,425	
1.037	1.4390	75		**1**(1),787A	**1**(1),687C	**1**(1),1098A	**1**(1),687C	**19**(3),1203	
0.854	1.4120	22	BA5075000	**1**(1),147A	**1**(1),207B	**1**(1),138B	**11**,284	**1**,436	
1.6	1.5								
1.162	1.4590	54	UD4725000	**1**(1),183D				**1**,439	
0.845	1.4270	37	EM9275000	**1**(1),147C	**1**(1),208A	**1**(1),138C	**11**,2604	**1**,442	
0.761	1.4205	−29	BA5425000	**1**(1),347A	**1**(1),518C	**1**(1),322B	**11**,285	**4**,205	
0.982	1.5630	89		**1**(1),1383K	**1**(2),454B	**1**(1),1191A		**12**,170	
0.965	1.5210	81	BZ8225000	**1**(1),1243C	**1**(2),208B	**1**(1),1053B	**11**,3657	**6**,751	
0.892	1.5100	33	CY2275000	**1**(1),1139E	**1**(2),24B	**1**(1),946B		**5**,484	
0.959	1.5070	76						**6**(3),1459	
1.398	1.4690	−2	UC7090000	**1**(1),95I	**1**(1),135A	**1**(1),93D	**11**,286	**1**,201	
0.783	1.4060	14		**1**(1),219G	**1**(1),333B			**1**(3),1882	
0.902	1.4140	41	ES5775000	**1**(1),717N	**1**(1),970B	**1**(1),637B		**2**,272	
0.939	1.4135	−29	UC7350000	**1**(1),95E	**1**(1),133C	**1**(1),93C	**11**,287	**1**,198	
1.159	1.4460	61						**2**,198	
1.136	1.4220	31	LQ5775000	**1**(1),863B	**1**(1),1206B	**1**(1),737A		**3**,12	**13**,2
0.834	1.4050	23	EM8050000	**1**(1),991F	**1**(1),1358C	**1**(1),843A	**11**,288	**2**,408	
1.065	1.4430	>110	AG3690000	**1**(1),1013F	**1**(1),1391B				
0.787	1.4405	16	UC6650000	**1**(1),347K	**1**(1),520A	**1**(1),322C	**11**,2951	**4**,208	
1.934	1.5470	81	UC8200000	**1**(1),101K		**1**(1),99C	**11**,3009	**1**,201	
1.211	1.4603								
0.803	1.4160	−7	KN7525000	**1**(1),219H	**1**(1),333C	**1**(1),212D	**11**,290	**1**,438	
0.760	1.3880	−21		**1**(1),219E	**1**(1),332C	**1**(1),212C	**11**,291	**1**,438	
0.9460									
0.962	1.4330	57	RR0875000	**1**(1),251C	**1**(1),374A	**1**(1),233D			
1.837	1.5540	18	VD0450000	**1**(1),95J		**1**(1),94A	**11**,292	**1**,202	
0.940	1.4170	43	NQ8175000	**1**(1),1023E	**1**(1),1404A	**1**(1),872A		**4**,214	
0.7764	1.3946								
1.066	1.5410	>110	SJ4375000	**1**(1),1283E	**1**(2),278A	**1**(1),1091A	**11**,3855	**6**,961	
0.978	1.5200	63							
1.028	1.5450	88	SJ3850000	**1**(1),1265H	**1**(2),245B	**1**(1),1070D		**6**,572	

TABLE 7. *cont'd*

Name	Formula $CH_2=CHCH_2R$ R	CAS Registry Number	Mol. wt.	Boiling point (°C)	Melting point (°C)
Phenyl ether	$-OC_6H_5$	1746-13-0	134.18	192	
4-Chloro-	$-OC_6H_4Cl$		168.63	107/12	
2,4,6-Tribromo-	$-OC_6H_2Br_3$	3278-89-5	370.88		75
Phenyl sulfone	$-S(O)(O)C_6H_5$	16212-05-8	182.24	111/0.5	
Propyl	$-CH_2CH_2CH_3$	1471-03-0	100.16	91	
–Succinic anhydride	$-C_4H_3O_3$	7539-12-0	140.1	260	6
Sulfide	–S–	592-88-1	114.21	138	
2-Tolyl ether	$-OC_6H_4CH_3$		148.21	81/2	
3-Tolyl ether	$-OC_6H_4CH_3$		148.21	213	
4-Tolyl ether	$-OC_6H_4CH_3$		148.21	91/10	
–Urea	$-NHC(O)NH_2$	557-11-9	100.12		85

TABLE 8. AMINES, DIFUNCTIONAL

Name	Formula H_2NRNH_2 R	CAS Registry Number	Mol. wt.	Boiling Point(°C)	Melting Point(°C)
Butane–	$-(CH_2)_4-$	110-60-1	88.15	159	27
Decane–	$-(CH_2)_{10}-$	646-25-3	172.32	140/12	62
Dodecane–	$-(CH_2)_{12}-$	2783-17-7	200.37		70
Ethylene–	$-(CH_2)_2-$	107-15-3	60.10	118	8.5
Heptane–	$-(CH_2)_7-$	646-19-5	130.24	224	28
Hexane–	$-(CH_2)_6-$	124-09-4	116.21	204	43
Nonane–	$-(CH_2)_9-$	646-24-2	158.29	258/756	37
Octane–	$-(CH_2)_8-$	373-44-4	144.26	225	51
Pentane–	$-(CH_2)_5-$	462-94-2	102.18	179	
1,2-Phenylene–	$-C_6H_4-$	95-54-5	108.14	257	104
1,3-Phenylene–	$-C_6H_4-$	108-45-2	108.14	283	65
1,4-Phenylene–	$-C_6H_4-$	106-50-3	108.14	267	144
Propane–	$-(CH_2)_3-$	109-76-2	74.13	140	– 12

TABLE 9. ANHYDRIDES

Name	Formula	CAS Registry Number	Mol. wt.	Boiling point (°C)	Melting point (°C)
9.1. MONOANHYDRIDES					
Acetoxysuccinic	$C_6H_6O_5$	79814-40-7	158.11		56
S-Acetylmercaptosuccinic	$C_6H_6O_4S$	6953-60-2	174.18		83
Aconitic, *cis*-	$C_6H_4O_5$	6318-55-4	156.10		75
Acrylic (see Acrylates)					
Allylsuccinic	$C_7H_8O_3$	7539-12-0	140.1	260	6
4-Amino-1,8-naphthalic	$C_{12}H_7NO_3$	6492-86-0	213.20		
1,2,4-Benzenetricarboxylic (trimellitic)	$C_9H_4O_5$	552-30-7	192.13		167
Bicyclo[2.2.2.]oct-5-ene-2,3-dicarboxylic, *endo*-	$C_{10}H_{10}O_3$	24327-08-0	178.19		145
Bromomaleic	C_4HBrO_3	5926-51-2	176.96	215	
4-Bromo,1,8-naphthalic	$C_{12}H_5BrO_3$	21563-29-1	277.08		218
3-(*tert*-Butyldimethylsilyloxy)-glutaric	$C_{11}H_{20}O_4Si$	91424-40-7	244.37		80
4-*tert*-Butylphthalic	$C_{12}H_{12}O_3$	32703-79-0	204.23		73
N-Carboxybenzyloxy-L-aspartic	$C_{12}H_{11}NO_5$	4515-23-5	249.23		123
Cantharidin	$C_{10}H_{12}O_4$	56-25-7	196.20		216
5-Chloroisotoic	$C_8H_4ClNO_3$	4743-17-3	197.58		300(d)
4-Chloro-1,8-naphthalic	$C_{12}H_5ClO_3$	4053-08-1	232.63		208
Citraconic	$C_5H_4O_3$	616-02-4	112.08	213	7
Cyclohexane-1,2-dicarboxylic, *cis*-	$C_8H_{10}O_3$	13149-00-3	154.17	158/17	33

Density (at 20°C)	Refractive index (at 20°C)	Flash point (°C)	RTECS Number	R and S	FT-NMR	FT-IR	Merck	Beilstein	Fieser
0.978	1.5200	63	DA8575000	**1**(1),1241M	**1**(2),207A	**1**(1),1052B	**6**,144	**11**,14	
	1.5348								
								6,205	
1.189	1.5480	>110	WR2400000	**1**(2),2185B	**1**(2),1580A			**6**,299	
0.767	1.3990	−5		**1**(1),219F	**1**(1),333A	**1**(3),2780		**1**,438	
0.887	1.4889	46	BC4900000	**1**(1),287J	**1**(1),432C	**1**(1),269C	**11**,295	**1**,440	
0.950	1.5179								
0.9564	1.5179								
0.970	1.5168								
			YR7875000	**1**(1),939M	**1**(1),1308B	**1**(1),800D	**11**,296	**4**,209	

Density (at 20°C)	Refractive Index(At 20°C)	Flash Point(°C)	RTECS Number	R and S	FT-NMR	FT-IR	Merck	Beilstein	Fieser
0.877	1.4569	52	EJ6800000	**1**(1),309G	**1**(1),465A	**1**(1),291D	**11**,7964	**4**,264	
			HD7175000	**1**(1),311I	**1**(1),469B	**1**(1),293D		**4**,273	
		155	JR2200000	**1**(1),311J	**1**(1),469C	**1**(1),294A		**4**,273	
0.899	1.4565	34	KH8575000	**1**(1),309A	**1**(1),463B	**1**(1),289C	**11**,3752	**4**,230	**4**,231
		88		**1**(1),311E	**1**(1),468A	**1**(1),293A		**4**,271	
		81	MO1180000	**1**(1),311B	**1**(1),467A	**1**(1),292C	**11**,4614	**4**,269	
		>110		**1**(1),311H	**1**(1),469A	**1**(1),293C		**4**,272	
		165	RG8841500	**1**(1),311F	**1**(1),468B	**1**(1),293B		**4**,271	
0.873	1.4582	63	SA0200000	**1**(1,309K		**1**(1,292B	**11**,1608	**4**,266	
			SS7875000	**1**(1),1429A	**1**(2),536B	**1**(1),1235C	**11**,7255	**13**,6	**8**,393
		>110	SS7700000	**1**(1),1431C	**1**(2),539A	**1**(1),1239A	**11**,7254	**3**,33	
			SS8050000	**1**(1),1433D	**1**(2),542C	**1**(1),1242B	**11**,7256	**13**,61	
0.888	1.4565	34	TX6825000	**1**(1),309D	**1**(1),464A	**1**(1),290A		**4**,261	

Density (at 20°C)	Refractive index (at 20°C)	Flash point (°C)	RTECS Number	R and S	FT-NMR	FT-IR	Merck	Beilstein	Fieser
								18(2),1128	
				1(1),837E	**1**(1),1179B	**1**(1),715C			
				1(1),837D				**18**,463	
1.163									
				1(2),1961B		**1**(2),336A		**18**(2),469	
			DC2050000	**1**(2),1959G	**1**(2),1329C	**1**,(2),334A	**11**,9617	**18**,468	
				1(1),835N	**1**(1),1178B	**1**(1),717D			
1.905		>110		**1**(1),839A	**1**(1),1182B	**1**(1),719C		**17**,435	
				1(2),1961A	**1**(2),1330B			**17**,523	
				1(2),2987F	**1**(3),692A				
			RN8575000					**19**,161	
				1(2),1957H		**1**(2),332C		**27**,265	
			QL6127295	**1**(2),1959N		**1**(2),335D		**17**,522	
1.247	1.4710	101	GE6825000	**1**(1),837J	**1**(1),1181A	**1**(1),718D		**17**,440	
		>110		**1**(1),835G	**1**(1),1175C	**1**(1),715D			

TABLE 9. *cont'd*

Name	Formula	CAS Registry Number	Mol. wt.	Boiling point (°C)	Melting point (°C)
Cyclohexane-1,2-dicarboxylic, *trans-*	$C_8H_{10}O_3$	14166-21-3	154.17		146
Diacetyl-L-tartaric	$C_8H_8O_7$	6283-74-5	216.15		131
3,5-Diacetyltetrahydropyran-2,4,6-trione	$C_9H_8O_6$	33524-89-9	212.16		154
Dichloromaleic	$C_4Cl_2O_3$	1122-17-4	166.95		
3,6-Dichlorophthalic	$C_8H_2Cl_2O_3$	4466-59-5	217.01		188
4,5-Dichlorophthalic	$C_8H_2Cl_2O_3$	942-06-3	217.01		186
3,6-Difluorophthalic	$C_8H_2F_2O_3$	652-40-4	184.10		219
Diglycolic	$C_4H_4O_4$	4480-83-5	116.07	240	92
2,2-Dimethylglutaric	$C_7H_{10}O_3$	2938-48-9	142.16	175/60	36
3,3-Dimethylglutaric	$C_7H_{10}O_3$	4160-82-1	142.16	181/25	124
2,3-Dimethylmaleic	$C_6H_6O_3$	766-39-2	126.11	223	94
2,2-Dimethylsuccinic	$C_6H_8O_3$	17347-61-4	128.13	219	30
Diphenic	$C_{14}H_8O_3$	6050-13-1	224.22		225
2,3-Diphenylmaleic	$C_{16}H_{10}O_3$	4808-48-4	250.26		160
2-Dodecen-1-ylsuccinic	$C_{16}H_{26}O_3$	19780-11-1	266.38	180/5	42
3,6-Epoxy-1,2,3,6-tetrahydrophthalic, *exo-*	$C_8H_6O_4$	6118-51-0	166.13		118(d)
3-Ethyl-3-methylglutaric	$C_8H_{12}O_3$	6970-57-6	156.18	185/20	
3-Fluorophthalic	$C_8H_3FO_3$	652-39-1	166.11		159
4-Fluorophthalic	$C_8H_3FO_3$	319-03-9	116.11		79
2-Formamidosuccinic	$C_5H_5NO_4$	33605-73-1	143.10		145
Glutaric	$C_5H_6C_3$	108-55-4	114.10		56
1,4,5,6,7,7-Hexachloro-5-norbornene-2,3-dicarboxylic	$C_9H_2Cl_6O_3$	115-27-5	370.83		237
Hexafluoroglutaric	$C_5F_6O_3$	376-68-1	222.04	72	
Hexahydro-4-methylphthalic	$C_9H_{12}O_3$	19438-60-9	168.19		
Homophthalic	$C_9H_6O_3$	703-59-3	162.14		141
3-Hydroxyphthalic	$C_8H_4O_4$	37418-88-5	164.12		200
Isatoic	$C_8H_5NO_3$	118-48-9	163.13		233(d)
Isobutenylsuccinic	$C_8H_{10}O_3$	18908-20-8	157.17	146/14	64
Itaconic	$C_5H_4O_3$	2170-03-8	112.09	114/12	71
Maleic	$C_4H_2O_3$	108-31-6	98.06	202	52
3-Methylglutaric	$C_6H_8O_3$	4166-53-4	128.13	181/25	45
N-Methylisatoic	$C_9H_7NO_3$	10328-92-4	117.16		
Methyl-5-norbornene-2,3-dicarboxylic	$C_{10}H_{10}O_3$	25134-21-8	178.19		
4-Methylphthalic	$C_9H_6O_3$	19438-61-0	162.14	295	91
Methylsuccinic	$C_5H_6O_3$	4100-80-5	114.10	239	34
1,8-Naphthalic	$C_{12}H_6O_3$	81-84-5	198.18		268
3-Nitro-1,8-naphthalic	$C_{12}H_5NO_5$	3027-38-1	243.17		248(d)
4-Nitro-1,8-naphthalic	$C_{12}H_5NO_5$	34087-02-0	343.17		228
3-Nitrophthalic	$C_8H_3NO_5$	641-70-3	193.11		164
4-Nitrophthalic	$C_8H_3NO_5$	5466-84-2	193.11		118
5-Norbornene-*endo*-2,3-dicarboxylic, *cis-*	$C_9H_8O_3$	129-64-6	164.16		166
Octadecylsuccinic	$C_{22}H_{38}O_3$		350.55	251/4	62
2-Octen-1-ylsuccinic	$C_{12}H_{18}O_3$	26680-54-6	210.27	168/10	10
3-Oxabicyclo[3.1.0] hexane-2,4-dione	$C_5H_4O_3$	5617-74-3	112.08	100/5	60
2,5-Oxazolidenedione	$C_3H_3NO_3$	2185-00-4	101.06		120(d)
2-Phenylglutaric	$C_{11}H_{10}O_3$	2959-96-8	190.20	218/13	97
Phenylmaleic	$C_{10}H_6O_3$	36122-35-7	176.16		121
1-Phenyl-2,3-naphthalene-dicarboxylic	$C_{18}H_{10}O_3$	1985-37-1	247.28		259
Phenylsuccinic	$C_{10}H_8O_3$	1131-15-3	176.17	191/12	54
Phthalic	$C_8H_4O_3$	85-44-9	148.12	284	132
N-Phthaloylglutamic	$C_{13}H_9NO_5$	3343-28-0	259.22		199
1-Propenyloxymethylmaleic	$C_7H_{10}O_4$	130221-78-2	158.16	251	
Pyrazinedicarboxylic	$C_6H_2N_2O_3$	4744-50-7	150.09		210(d)

Density (at 20°C)	Refractive index (at 20°C)	Flash point (°C)	RTECS Number	R and S	FT-NMR	FT-IR	Merck	Beilstein	Fieser
				1(1),835H	1(1),1176A	1(1),716A		17,452	
				1(1),837F	1(1),1179C			18,162	
				1(1),839L	1(1),1174A	1(1),457D		17(4),6841	
				1(1),839B		1(1),719D		17,434	5,195
				1(2),1959B	1(2),1328B			17,483	
				1(2),1959C	1(2),1328C			17,483	
				1(2),1959A	1(2),1328A			17(5),11,259	
				1(1),841C		1(1),722A		19,153	
				1(1),839G	1(1),1183C	1(1),720D		17,418	
				1(1),839H	1(1),1184A	1(1),721A		17,419	
			ON4025000	1(1),837K	1(1),1181B	1(1),719A		17,445	
1.135		108		1(1),835C	1(1),1175A			17,417	
				1(2),1959L		1(2),335B		17,526	
				1(2),1957C				17,532	
		177		1(1),835K	1(1),1177A	1(1),717A			
				1(1),837B	1(1),1179A			19(2),181	
				1(1),839I	1(1),1184B	1(1),721B		17(1),231	
								17(5),11,259	
								18(11),5,548	
		>110	MA3850000	1(1),839E	1(1),1183A	1(1),720B		17,411	
			RB9080000	1(1),839C	1(1),1182C	1(1),720A	11,2084		
1.654	1.3240	None		1(1),839K	1(1),1184C			17(4),5814	
1.162	1.4770	>110		1(1),835I	1(1),1176B	1(1),716B			
				1(2),1957E		1(2),331D		17,489	11,254
			TI3300000	1(2),1959F	1(2),1329B			18,94	
			DM3100000	1(2),1957F		1(2),332A		27,264	
				1(1),835E	1(1),1175B			17(4),5927	
				1(1),835J	1(1),1176C	1(1),716D		17,442	
		103	ON3675000	1(1),837I	1(1),1180C	1(1),718C	11,5586	17,432	5,422
		>110		1(1),839F	1(1),1183B	1(1),720C		17,415	
			DM3140000	1(2),1957G		1(2),332B		27,265	
1.232	1.5060	>110	RB9100000	1(1),835O	1(1),1178C	1(1),718C		17(2),461	
				1(2),1957M	1(2),1327B			17,492	
1.220		>110		1(1),835B	1(1),1174C	1(1),715B		17,414	
			QK5350000	1(2),1959M		1(2),335C		17,521	1,713
			QK5370000	1(2),1961C				17,523	
				1(2),1961D	1(2),1330C			17,524	
				1(2),1959H		1(2),334B		17,486	
			TI3328000	1(2),1959I	1(2),1330A	1(2),334C		17,486	
			DT5600000	1(1),835M	1(1),1177C	1(1),717C	11,1801	17(2),461	
1.055									
1.000	1.4694	>110							
				1(1),835F				17,442	
				1(1),907M				27,245	
				1(2),1957D		1(2),331C		17,494	
								17,510	
								17,492	
			TI3150000	1(2),1957J	1(2),1327A	1(2),332D	11,7346	17,469	1,882
			MA3900000	1(2),2017M	1(2)1391A			21(3),5370	
1.100	1.4610	>110							
								27,681	

TABLE 9. *cont'd*

Name	Formula	CAS Registry Number	Mol. wt.	Boiling point (°C)	Melting point (°C)
2,3-Pyridenedicarboxylic	$C_7H_3NO_3$	699-98-9	149.11		138
3,4-Pyridinedicarboxylic	$C_7H_3NO_3$	4664-08-8	149.11		76
Succinic	$C_4H_4O_3$	108-30-5	100.07	126	119
4-Sulfo-1,8-naphthalic	$C_{12}H_6O_6S$	71501-16-1	316.34		
Tetrabromophthalic	$C_8Br_4O_3$	632-79-1	463.72		275
Tetrachlorophthalic	$C_8Cl_4O_3$	117-08-8	285.90	371	256
Tetrafluorophthalic	$C_8F_4O_3$	652-12-0	220.08		95
1,2,3,6-Tetrahydrophthalic, *cis*-	$C_8H_8O_3$	935-79-5	152.15		98
3,4,5,6-Tetrahydrophthalic	$C_8H_8O_3$	2426-02-0	152.15		72
3,3-Tetramethyleneglutaric	$C_9H_{12}O_3$	5662-95-3	168.19	186/15	65
Tetrapropenylsuccinic (isomers)	$C_{16}H_{26}O_3$	26544-38-7	266.38	150/3	
Trimellitic	$C_9H_3ClO_4$	1204-28-0	210.57		67
2-(Triphenylphosphoranylidene)-succinic	$C_{22}H_{17}O_3P$	906-65-0	360.35		167(d)
9.2. DIANHYDRIDES					
Benzene-1,2,4,5-tetracarboxylic	$C_{10}H_2O_6$	89-32-7	218.12	397	283
Benzophenone-3,3′,4,4′-tetracarboxylic	$C_{17}H_6O_7$	2421-28-5	322.23		220
Bicyclo[2.2.2.]oct-7-ene-2,3,5,6-tetracarboxylic	$C_{12}H_8O_6$	1719-83-1	248.19		>300
Biphenylene-3,3′,4,4′-tetracarboxylic	$C_{16}H_6O_6$	2420-87-3	294.22		300
Cyclobutanetetracarboxylic	$C_8H_4O_6$	4415-87-6	196.11		>300
Cyclopentane-1,2,3,4-tetracarboxylic, *cis,cis*-	$C_9H_6O_6$	6053-68-5	210.14		225(d)
Diethylenetriaminepentaacetic	$C_{14}H_{19}N_3O_8$	23911-26-4	357.32		183
Ethylenediaminetetraacetic	$C_{10}H_{12}N_2O_6$	23911-25-3	256.22		190(d)
4,4′-(Hexafluoroisopropylidene) diphthalic	$C_{19}H_6F_6O_6$	1107-00-2	444.25		244
Naphthalene-1,4,5,8-tetra-carboxylic	$C_{14}H_4O_6$	81-30-1	268.18		>300
Perylene-3,4,9,10-tetracarboxylic	$C_{24}H_8O_6$	128-69-8	392.32		>300
Tetrahydrofuran-2,3,4,5-tetra-carboxylic	$C_8H_4O_7$	25774-69-0	212.11		223

TABLE 10. BUTADIENES

Name	Formula	CAS Registry Number	Mol. wt.	Boiling point (°C)	Melting point (°C)
10.1. 1,2-BUTADIENES					
1,2-Butadiene	$H_2C{=}C{=}CHCH_3$	590-19-2	54.09	11	−136
–, 4-Bromo-	$H_2C{=}C{=}CHCH_2Br$		133.00	110	
–, 4-Chloro-	$H_2C{=}C{=}CHCH_2Cl$		88.54	88	
–, 4-Hydroxy-	$H_2C{=}C{=}CHCH_2OH$		70.09	127	
–, 4-Iodo-	$H_2C{=}C{=}CHCH_2I$		179.99	130	
–, 3-Methyl-	$H_2C{=}C{=}C(CH_3)_2$	598-25-4	68.12	41	−148
10.2. 1,3-BUTADIENES					
1,3-Butadiene	$H_2C{=}CHCH{=}CH_2$	106-99-0	54.09	−4	−109
–, 2-Bromo-	$H_2C{=}CBrCH{=}CH_2$		133.00	42/165	
–, 1-Chloro-	$HCCl{=}CHCH{=}CH_2$		88.54	68	
–, 1-Chloro-2-methyl-	$HCCl{=}C(CH_3)CH{=}CH_2$		102.57	107	
–, 1-Chloro-3-Methyl-	$HCCl{=}CHC(CH_3){=}CH_2$		102.57	100	
–, 2-Chloro-	$H_2C{=}CClCH{=}CH_2$	126-99-8	88.54	59	
–, 2-Chloro-3-methyl-	$H_2C{=}CClC(CH_3){=}CH_2$		102.57	93	
–, 1,2-Dichloro-	$HCCl{=}CClCH{=}CH_2$		122.98	63/105	
–, 2,3-Dichloro-	$H_2C{=}CClCCl{=}CH_2$		122.98	98	

Density (at 20°C)	Refractive index (at 20°C)	Flash point (°C)	RTECS Number	R and S	FT-NMR	FT-IR	Merck	Beilstein	Fieser
				1(2),2547K	1(3),336A	1(2),795B		27,261	
				1(2),2547L	1(3),336B			27,261	
			WN0875000	1(1),835A	1(1),1174B	1(1),715A	11,8841	17,407	4,468
				1(2),2203F		1(2),501D			
			TI3350000	1(2),1959E		1(2),333D		17,485	
			TI3450000	1(2),1959D		1(2),333C		17,484	15,300
					1(2),1329A			17(5),11,260	
			GW5775000	1(1),835L	1(1),1177B	1(1),717B		17,462	
				1(1),837M	1(1),1182A	1(1),719B		17,461	
				1(1),839J		1(1),721C		17,237	
1.005	1.4790	>110	WN1300000					17(5),11,105	
				1(2),1981E	1(2),1353B	1(2),351B			
					1(2),1680C	1(2),550D			
			DB9300000	1(2),1959K		1(2),335A		19,196	
		162		1(21),1957L		1(2),333B			
				1(1),837H	1(1),1180B	1(1),716C			
				1(1),837G	1(1),1180A				
				1(1),841B					
				1(1),841A	1(1),1185A				
				1(2),1957N	1(2),1327C				
			QK3695000	1(2),1961F		1(2),336B		19,196	
				1(2),1961G		1(2),336C			

Density (at 20°C)	Refractive index (at 20°C)	Flash point (°C)	RTECS Number	R and S	FT-NMR	FT-IR	Merck	Beilstein	Fieser
0.652	1.4205/1.3							1(4),975	
1.4255	1.5248								
0.9891	1.4775								
0.9164	1.4759								
1.7129	1.5709								
0.694	1.4190	−23		1(1),27B	1(1),35C	1(1),30C		1,252	
0.650/−6	1.4292/ −25		EI9275000	1(1),27D	1(1),36B		11,1500	1,249	
1.397	1.4988								
0.961	1.4709								
0.9710	1.4792								
0.9543	1.4719								
0.9583	1.4583		EI9625000						
0.9593	1.4686								
1.1991	1.4960								
1.1829	1.4890								

TABLE 10. *cont'd*

Name	Formula	CAS Registry Number	Mol. wt.	Boiling point (°C)	Melting point (°C)
–, 2,3-Dimethyl-	$H_2C{=}C(CH_3)C(CH_3){=}CH_2$	513-81-5	82.15	68	– 76
–, 2-Fluoro-	$H_2C{=}CFCH{=}CH_2$		72.08	12	
–, Hexachloro-	$CCl_2{=}CClCCl{=}CCl_2$	87-68-3	260.76	215	– 20
–, Hexafluoro-	$CF_2{=}CFCF{=}CF_2$	685-63-2	162.03	7	– 132
–, 2-Iodo-	$H_2C{=}CICH{=}CH_2$		179.99	112	
–, 2-Methyl-	$H_2C{=}C(CH_3)CH{=}CH_2$	78-79-5	68.12	34	– 146

TABLE 11. BUTENES

Name	Formula	CAS Registry Number	Mol. wt.	Boiling point (°C)	Melting point (°C)
11.1. 1-BUTENES					
1-Butene	$H_2C{=}CHCH_2CH_3$	106-98-9	56.11	– 6	– 185
–, 4-Bromo-	$H_2C{=}CHCH_2CH_2Br$	5162-44-7	135.01	99	
–, 2,3-Dimethyl-	$H_2C{=}C(CH_3)CH(CH_3)_2$	563-78-0	84.16	56	– 158
–, 3,3-Dimethyl-	$H_2C{=}CHC(CH_3)_2CH_3$	558-37-2	84.16	41	– 115
–, 2-Methyl-	$H_2C{=}C(CH_3)CH_2CH_3$	563-46-2	70.14	31	– 137
–, 3-Methyl-	$H_2C{=}CHCH_2(CH_3)_2$	563-45-1	70.14	20	– 168
11.2. 2-BUTENES					
2-Butene, *cis-*	$CH_3CH{=}CHCH_3$	590-18-1	56.11	4	– 139
2-Butene, *trans-*	$CH_3CH{=}CHCH_3$	624-64-6	56.11	1	– 105
1,4-Dihydroxy-, *cis-*	$H_2C(OH)CH{=}CHCH_2(OH)$	6117-80-2	88.11	131/12	7
2,3-Dimethyl-	$(CH_3)_2C{=}C(CH_3)_2$	563-79-1	84.16	73	– 75
2-Methyl-	$(CH_3)_2C{=}CHCH_3$	513-35-9	70.14	36	– 134

TABLE 12. EPOXIDES

Name	Formula	CAS Registry Number	Mol. wt.	Boiling point (°C)	Melting point (°C)
12.1. MONOEPOXIDES $CH_2(-O-)CHR$					
Allylglycidyl ether	$-CH_2OCH_2CH{=}CH_2$	106-92-3	114.14	154	
2-Biphenylyl glycidyl ether	$-CH_2OC_6H_4C_6H_5$	7144-65-2	266.28	120/0.1	31
n-Butyl glycidyl ether	$-CH_2O(CH_2)_3CH_3$	2426-08-6	130.19	165	
t-Butyl glycidyl ether	$-CH_2OC(CH_3)_3$	7665-72-7	130.19	151	
4-*t*-Butylphenyl glycidyl ether	$-CH_2OC_6H_4C(CH_3)_3$	3101-60-8	206.29	166/4	
4-Chlorophenyl glycidyl ether	$-CH_2OC_6H_4Cl$	2212-05-7	184.62		32
Cyclohexene oxide	$C_6H_{10}O$	286-20-4	98.15	129	
Cyclooctene oxide	$C_8H_{14}O$	286-62-4	126.20	55/5	54
Cyclopentene oxide	C_5H_8O	285-67-6	84.12	102	
Epibromohydrin	$-CH_2Br$	3132-64-7	136.98	135	– 40
Epichlorohydrin	$-CH_2Cl$	106-89-8	92.53	116	– 57
Epifluorohydrin	$-CH_2F$	503-09-3	76.07	85	
1,2-Epoxybutane, *trans-*	$CH_3CH(-O-)CHCH_3$	21490-63-1	72.11	54	
1,2-Epoxydecane	$-(CH_2)_7CH_3$	2404-44-6	156.27	94/15	
1,2-Epoxydodecane	$-(CH_2)_9CH_3$	2855-19-8	184.32	124/15	
1,2-Epoxyhexadecane	$-(CH_2)_{13}CH_3$	7320-37-8	240.43	176/12	21
1,2-Epoxyhexane	$-(CH_2)_3CH_3$	1436-34-6	100.16	119	
2,3-Epoxynorbornane, *exo-*	$C_7H_{10}O$	3146-39-2	110.16		123
1,2-Epoxyoctadecane	$-(CH_2)_{15}CH_3$	7390-81-0	268.49	137/0.5	34
2,3-Epoxypropyl benzene	$-CH_2C_6H_5$	4436-24-2	134.18	99/17	
N-(2,3-Epoxypropyl)phthalimide	$-CH_2NC_8H_4O_2$	5455-98-1	203.20		99
1,2-Epoxytetradecane	$-(CH_2)_{11}CH_3$	3234-28-4	212.38	95/10.4	
Ethylene oxide	$-H$	75-21-8	44.05	10.7	– 111
2-Ethylhexyl glycidyl ether	$-CH_2OCH_2CH(CH_2CH_3)(CH_2)_3CH_3$	2461-15-6	186.30	61/0.3	
Furfuryl glycidyl ether	$-CH_2OCH_2C_4H_3O$	5380-87-0	154.17	103/11	
Glycidol	$-CH_2OH$	556-52-5	74.08	61/15	

Density (at 20°C)	Refractive index (at 20°C)	Flash point (°C)	RTECS Number	R and S	FT-NMR	FT-IR	Merck	Beilstein	Fieser
0.726	1.4390	−22		**1**(1),27F	**1**(1),37A	**1**(1),32A	**11**,3228	**1**(3),991	**1**,276
0.843	1.400								
1.665	1.5550	None	EJ0700000	**1**(1),105H	**1**(1),150A	**1**(1),102A		**1**,250	**10**,195
1.553/−20	1.378/−20								
	1.5616								
1.4220	1.4220	−54	NT4037000	**1**(1),27E	**1**(1),36C	**1**(1),30D	**11**,5087	**1**,252	

Density (at 20°C)	Refractive index (at 20°C)	Flash point (°C)	RTECS Number	R and S	FT-NMR	FT-IR	Merck	Beilstein	Fieser
	1.3962			**1**(1),15C			**11**,1513	**1**,203	
1.330	1.4625	9		**1**(1),97E	**1**(1),136C	**1**(1),94B		**1**(1),84	
0.684	1.3890	−18		**1**(1),23I	**1**(1),31B	**1**(1),22A		**1**(3),816	
0.653	1.3760	−29		**1**(1),23B	**1**(1),29B	**1**(1),25B		**1**,217	
0.650	1.3780	<−35		**1**(1),23G	**1**(1),30C	**1**(1),21B		**1**,211	
0.627/0	1.3640	−57		**1**(1),23A	**1**(1),29A	**1**(1),21C		**1**,213	
	1.3931/−25	37		**1**(1),19A				**11**,1514	**1**,205
	1.3848/−25			**1**(1),19B				**11**,1514	**1**,205
1.070	1.4780	126	EM4970000	**1**(1),153A	**1**(1),221A	**1**(1),146C		**1**(2),567	
0.708	1.4120	−17		**1**(1),25H	**1**(1),35B	**1**(1),25A	**11**,644	**1**,218	
0.662	1.3870	−46		**1**(1),25D	**1**(1),34A	**1**(1),21D	**11**,644	**1**,211	

Density (at 20°C)	Refractive index (at 20°C)	Flash point (°C)	RTECS Number	R and S	FT-NMR	FT-IR	Merck	Beilstein	Fieser
0.962	1.4330	57	RR0875000	**1**(1),251C	**1**(1),374A	**1**(1),233D			
				1(1),1253D	**1**(2),225A	**1**(1),1065C			
0.910	1.4190	56	TX4200000	**1**(1),249K	**1**(1),373A			**17**(3),988	
0.917	1.4170	43	RR0475000	**1**(1),251A	**1**(1),373B	**1**(1),232C		**17**(3),988	
1.038	1.5150	102	TX4250000	**1**(1),1253A	**1**(2),224A	**1**(1),1065B			
	1.5450	107	TX5600000	**1**(1),1253B	**1**(2),224B	**1**(1),1064D			
0.970	1.4520	27	RN7175000	**1**(1),251L	**1**(1),376C	**1**(1),235A		**17**,21	
		56		**1**(1),251M	**1**(1),377A	**1**(1),235B			
0.964	1.4340	10	RN8935000	**1**(1),251K	**1**(1),376B	**1**(1),234D		**17**,21	
1.601	1.4820	56	TX4115000	**1**(1),247L	**1**(1),370B	**1**(1),232A		**17**,21	
1.183	1.4380	34	TX4900000	**1**(1),247I	**1**(1),369B	**1**(1),231D	**11**,3563	**17**,6	**5**,290
1.067	1.3680	4	TZ3325000	**1**(1),247H	**1**(1),369A	**1**(1),231C			
0.804	1.3730	−27	EK3855000	**1**(1),245F	**1**(1),364C	**1**(1),229B		**17**(3),49	
0.840	1.4290	78		**1**(1),245J	**1**(1),365C	**1**(1),230A		**17**,18	
0.844	1.4360	105	JR2450000	**1**(1),245K	**1**(1),366A	**1**(1),230B		**17**(3),136	
0.846	1.4460	93	ML9450000	**1**(1),247A	**1**(1),366C	**1**(1),230D		**17**,20	
0.831	1.4060	16	MO3630000	**1**(1),245H		**1**(1),229A		**17**,86	
		10	RB7176000	**1**(1),253D	**1**(1),378B	**1**(1),235D			
		>110		**1**(1),247B	**1**(1),367A	**1**(1),231B		**17**(3),140	
1.020	1.5230	82	DA0178000	**1**(1),1251D	**1**(2),220C			**17**,51	
			TI4950000	**1**(2),2083B	**1**(2),1461C	**1**(2),408A			
0.845	1.4408	>110		**1**(1),245L	**1**(1),366B	**1**(2),230C		**17**(3),139	
0.891/4	1.3597/7		KX2450000	**1**(1),245A			**11**,3758	**17**,4	**8**,150
0.891	1.4340	97	TZ3300000	**1**(1), 251B	**1**(1),373C	**1**(1),232D			
1.122	1.4810	102	LU1423000	**1** (2),2319J	**1**(3),17C			**17**(5),347	
1.117	1.4330	81	UB4375000	**1**(1),249B	**1**(1),370C	**1**(1),232B	**11**,4385	**17**,104	

TABLE 12. *cont'd*

Name	Formula	CAS Registry Number	Mol. wt.	Boiling point (°C)	Melting point (°C)
3-Glycidoxypropyl trimethoxy-silane	$-CH_2O(CH_2)_3Si(OCH_3)_3$	2530-83-8	236.34	120/2	
(R)-(−)-Glycidyl Butyrate	$-CH_2OC(O)CH_2CH_2CH_3$	60456-26-0	144.17	90/19	
Glycidyl isopropyl ether	$-CH_2OCH(CH_3)_2$	4016-14-2	116.16	131	
Glycidyl methacrylate (see Methacrylates)					
Glycidyltrimethylammonium chloride, (70% aq. solution)	$-CH_2N(CH_3)_3Cl$	3033-77-0	151.54		
Hexafluoropropylene oxide	$F_2C(-O-)CFCF_3$	428-59-1	166.02	−42	
4-Methoxyphenyl glycidyl ether	$-CH_2OC_6H_4OCH_3$	2211-94-1	180.20		46
α-Pinene oxide	$C_{10}H_{16}O$	1686-14-2	152.24	102/50	
Propylene oxide	$-CH_3$	75-56-9	58.08	34	−112
Styrene oxide	$-C_6H_5$	96-09-3	120.15	194	−37
Tetracyanoethylene oxide	$(NC)_2C(-O-)C(CN)_2$	3189-43-3	144.09		
1,1,2,2-Tetrafluoroethyl glycidyl ether	$-CH_2OCF_2CHF_2$	85567-21-1	174.10	143	
Vinylethylene oxide	$-CH=CH_2$	930-22-3	70.09	65	
12.2. DIEPOXIDES $CH_2(-O-)CHRCH(-O-)CH_2$					
Bis(3,4-epoxycyclohexylmethyl) adipate	$C_6H_9(-O-)CH_2OC(O)(CH_2)_4C(O)OCH_2C_6H_9(-O-)$	3130-19-6	366.46		
1,3-Butadiene diepoxide	$CH_2(-O-)CHCH(-O-)CH_2$	1464-53-5	86.09	57/25	3
1,4-Butanediol diglycidol ether	$-CH_2O(CH_2)_4OCH_2-$	2425-79-8	202.25	158/11	
1,2,5,6-Diepoxycyclooctane	$C_8H_{12}O_2$	27035-39-8	140.18	70/0.4	
1,2,7,8-Diepoxyoctane	$-(CH_2)_4-$	2426-07-5	142.20	240	
3,4-Epoxycyclohexylmethyl 3,4-epoxycyclohexane-carboxylate	$C_6H_9(-O-)CH_2OC(O)C_6H_9(-O-)$	2386-87-0	252.31		−37
Ethylene glycol digycidyl ether	$-CH_2O(CH_2)_2OCH_2-$	2224-15-9	174.20	112/4.5	

TABLE 13. ETHYLENE HALIDES

Name	Formula	CAS Registry Number	Mol. wt.	Boiling point (°C)	Melting point (°C)
Ethylene	$H_2C=CH_2$	74-85-1	28.05	−104	−169
–, Bromo- (vinyl bromide)	$BrCH=CH_2$	593-60-2	106.96	16/750	−139
–, Chloro- (vinyl chloride)	$ClCH=CH_2$	75-01-4	62.50	−13.4	−154
–, 1-Chloro-1-fluoro-	$ClCF=CH_2$		84.48	−24	−169
–, Chlorotrifluoro-	$ClCF=CF_2$	79-38-9	116.47	−29	−157
–, 1,1-Dibromo- (vinylidene bromide)	$Br_2C=CH_2$		185.86	92	
–, 1,2-Dibromo-, *cis-*	$BrCH=CHBr$		185.86	112	−53
1,2-Dibromo-, *trans-*	$BrCH=CHBr$		185.86	108	−6
–, 1,1-Dichloro- (vinylidene chloride)	$Cl_2C=CH_2$	75-35-4	96.94	31	−122
–, 1,2-Dichloro-, *cis-*	$ClCH=CHCl$	156-59-2	96.94	60	−80
–, 1,2-Dichloro-, *trans-*	$ClCH=CHCl$	156-60-5	96.94	48	−50
–, Tetrabromo-	$Br_2C=CBr_2$		343.66	226	56
–, Tetrachloro-	$Cl_2C=CCl_2$	127-18-4	165.83	121	−22
–, Tetrafluoro-	$F_2C=CF_2$	116-14-3	100.02	−76	−142
–, Tetraiodo-	$I_2C=CI_2$	513-92-8	531.64		192
–, Tribromo-	$Br_2C=CHBr$		264.76	163	
–, Trichloro-	$Cl_2C=CHCl$	79-01-6	131.39	87	−85

Density (at 20°C)	Refractive index (at 20°C)	Flash point (°C)	RTECS Number	R and S	FT-NMR	FT-IR	Merck	Beilstein	Fieser
1.070	1.4290	>110	VV4025000	**1**(2),2973B	**1**(3),667C	**1**(2),1113D			
1.018	1.4280	85		**1**(1),781E	**1**(1),1088B			**17**(5),3,34	
0.924	1.4100	33	TZ3500000	**1**(1),249J	**1**(1),372C	**1**(3),306A		**17**(3),988	
1.129	1.4780	>110	BQ3480000		**1**(1),616B			**18**,583	
			TZ3400000	**1**(1),249A				**17**(3),20	
		>110	DA0176000	**1**(1),1253C	**1**(2),224C	**1**(1),1065A			
0.964	1.4690	66	TK4565000	**1**(1),253B	**1**(1),377C	**1**(1),237A		**5**,152	
0.830	1.3660	−35	TZ2975000	**1**(1),245B	**1**(1),363B	**1**(1),228B	**11**,7869	**17**,6	
1.054	1.5350	79	CZ9625000	**1**(1),1251A	**1**(2),219C	**1**(1),1063C		**17**,49	
				1(1),1003F	**1**(1),1376C		**18**(5),7,215		
1.380	1.3490	51							
0.870	1.4170	−50	EM7350000	**1**(1),247D	**1**(1),367C	**1**(1),233A		**17**(1),13	**4**,53
1.149	1.4930	>110	MO1880550						
1.113	1.4340	46	EJ8400000	**1**(1),251E	**1**(1),374B	**1**(1),234A	**11**,3621	**19**,14	
1.100	1.4610	>110	EJ5100000	**1**(1),251I	**1**(1),375C	**1**(1),234C			
1.138	1.4690	105	GX9627000	**1**(1),253E	**1**(1),378C	**1**(1),235C			
0.997	1.4450	98	RG9450000	**1**(1),251F	**1**(1),374C	**1**(1),234B			
1.170	1.4980	118	RN7750000						
1.118	1.4630	>110	KH5780000	**1**(1),251G	**1**(1),375A			**17**(3),997	

Density (at 20°C)	Refractive index (at 20°C)	Flash point (°C)	RTECS Number	R and S	FT-NMR	FT-IR	Merck	Beilstein	Fieser
			KU5340000	**1**(1),15A	**1**(3),17C		**11**,3748	**1**,180	
1.517	1.4350	None	KU8400000	**1**(1),95B	**1**(1),133A	**1**(1),93A		**1**,188	
0.911	1.3700	−61	KU9625000	**1**(1),95A			**11**,9898	**1**,186	**1**,1274
			KV0525000	**1**(1),103I				**1**(3),646	
2.178									
2.2464	1.5428								
2.2308	1.550								
1.213	1.4254	−9	KV9275000	**1**(1),101B	**1**(1),142B	**1**(1),98B	**11**,9900	**1**,186	
1.284	1.4481	6	KV9420000	**1**(1),101D	**1**(1),143A	**1**(1),98A	**11**,86	**1**,188	**14**,127
1.257	1.4456	6	KV9400000	**1**(1),101E	**1**(1),134B	**1**(1),79D	**11**,86	**1**,188	**12**,175
1.623	1.5060	None	KX3850000	**1**(1),103J		**1**(1),101C	**11**,9126	**1**,187	
1.1507/−40									
2.983			KX4125000	**1**(1),103K			**11**,9151	**1**,195	
2.708	1.6045/16								
1.463	1.4760	None	KX4550000	**1**(1),103G	**1**(1),147C	**1**(1),101B	**11**,9552	**1**,187	**11**,552

TABLE 14. FUMARATE ACIDS/ESTERS

Name	Formula ROC(O)CH=CHC(O)OR R	CAS Registry Number	Mol. wt.	Boiling point (°C)	Melting point (°C)
Acid	–H	110-17-8	116.07		299(s)
2-Bromo-	HOC(O)CBr=CHC(O)OH		194.98	200(d)	186
2-Chloro-	HOC(O)CCl=CHC(O)OH		150.52		193
2-Chloro-, diethyl ester	$CH_3CH_2OC(O)CCl=CHC(O)OCH_2CH_3$		206.63	136/19	
2-Chloro-, dimethyl ester	$CH_3OC(O)CCl=CHC(O)OCH_3$		178.57	224	
Di-*n*-amyl ester	$-(CH_2)_4CH_3$		256.33	162/7	
Diethyl ester	$-CH_2CH_3$	623-91-6	172.18	217	2
Diisoamyl ester	$-CH_2CH_2CH(CH_3)_2$		256.33	166/11	
Diisobutyl ester	$-CH_2CH(CH_3)_2$		228.29	170/160	
Diisopropyl ester	$-CH(CH_3)_2$		200.24	226	
2,3-Dimethyl-	$HOC(O)C(CH_3)=C(CH_3)C(O)OH$		144.13		241
Dimethyl ester	$-CH_3$	624-49-7	144.13	192	103
Dinitrile- (fumaronitrile)	NCCH=CHCN	764-42-1	78.07	186	96
Diphenyl ester	$-C_6H_5$		268.27	219/14	162
Di-*n*-propyl ester	$-CH_2CH_2CH_3$		200.24	110/5	
2-Methyl- (mesaconic acid)	$HOC(O)C(CH_3)=CHC(O)OH$	498-24-8	130.10	205(d)	204
2-Methyl-, diethyl ester	$CH_3CH_2OC(O)C(CH_3)=CHC(O)CH_2CH_3$			186.21	229
2-Methyl-, dimethyl ester	$CH_3OC(O)C(CH_3)=CHC(O)OCH_3$			158.16	204

TABLE 15. ISOCYANATES

Name	Formula OCNRNCO R	CAS Registry Number	Mol. wt.	Boiling point (°C)	Melting point (°C)
1,3-Benzene diisocyanate	$-C_6H_4-$	123-61-5	160.13	121/25	50
1,4-Benzene diisocyanate	$-C_6H_4-$	104-49-4	160.13	260	98
1,3-Bis(isopropyl)benzene α,α′-diisocyanate	$-C(CH_3)_2C_6H_4C(CH_3)_2-$	2778-42-9	244.30	157/10	–10
1,4-Bis(isopropyl)benzene α,α′-diisocyanate	$-C(CH_3)_2C_6H_4C(CH_3)_2-$	2778-41-8	244.30	150/3	72
1,4-Butene diisocyanate	$-(CH_2)_4-$	4538-37-8	140.14	102/14	
α-Chlorotoluene 2,4-diisocyanate	$-C_6H_3(CH_2Cl)-$	51979-57-8	208.60	153/11	
1,4-Cyclohexylene diisocyanate, *trans-*	$-C_6H_{10}-$	7517-76-2	166.18		60
1,12-Dodecane diisocyanate	$-(CH_2)_{12}-$	13879-35-1	252.36	168/3	
1,6-Hexane diisocyanate	$-(CH_2)_6-$	822-06-0	168.20	255	
Isopherone diisocyanate (isomers)	$-C_{10}H_{18}-$	4098-71-9	222.29	158/15	
4,4′-Methylenebis(cyclohexyl isocyanate) (isomers)	$-(C_6H_{10})CH_2(C_6H_{10})-$	5124-30-1	262.35		
4,4′-Methylenebis(2,6-diethylphenyl isocyanate)	$-C_6H_2(CH_2CH_3)_2CH_2C_6H_2(CH_2CH_3)_2-$	105442-35-1	362.48		56
4,4′-Methylenebis(phenylisocyanate)	$-C_6H_4CH_2C_6H_4-$	101-68-8	250.26	200/5	43
2-Methylpentane 1,5-diisocyanate	$-CH_2CH(CH_3)(CH_2)_3-$	34813-62-2	168.20		
1,8-Octane diisocyanate	$-(CH_2)_8-$	10124-86-4	196.25	156/15	
2,4-Toluene diisocyanate	$-C_6H_3(CH_3)-$	584-84-9	174.16	120/10	21

Density (at 20°C)	Refractive index (at 20°C)	Flash point (°C)	RTECS Number	R and S	FT-NMR	FT-IR	Merck	Beilstein	Fieser
			LS9625000	**1**(1),553A	**1**(1),787B	**1**(1),502D	**11**,4200	**2**,737	**5**,319
1.1880	1.4571								
1.290									
0.9681	1.4496								
1.052	1.4410	94	EM5950000	**1**(1),725M	**1**(1),993C	**1**(1),645A		**2**,742	
0.9655	1.4479								
0.9760	1.4432								
			EM6125000	**1**(1),725L	**1**(1),993B	**1**(1),644D		**2**,741	
0.9416	1.4349		LT2300000	**1**(1),993A	**1**(1),1360B	**1**(1),844A		**2**(1),302	
1.0129	1.4439								
1.466			OX5075000	**1**(1),553C	**1**(1),788A	**1**(1),503B	**11**,5806	**2**,763	
	1.0453	1.4488							
	1.0914	1.4512							

Density (at 20°C)	Refractive index (at 20°C)	Flash point (°C)	RTECS Number	R and S	FT-NMR	FT-IR	Merck	Beilstein	Fieser
		>110	NR0150000	**1**(2),2165G		**1**(3),1432D		**13**,50	
		>110	CZ6150000	**1**(2),2165H				**13**,105	
1.05		153	CY8480000						
		>93							
1.105		106		**1**(1),1023F	**1**(1),1404B			**4**(3),578	
1.362	1.5960	>110		**1**(2),2169H	**1**(2),1572A			**13**(4),245	
			GU9642500	**1**(1),1025A	**1**(1),1406A			**13**(3),12	
0.940	1.4590	>110		**1**(1),1023H	**1**(1),1405A			**4**(3),624	
1.040	1.4520	140	MO1740000	**1**(1),1023G	**1**(1),1404C	**1**(1),871A		**4**(2),711	
1.049	1.4840	>110	NQ9370000	**1**(1),1023J	**1**(1),1405C				
1.066	1.4970	>110	NQ9250000	**1**(1),1025B				**13**(4),33	
				1(2),2169K	**1**(2),1572C				
1.180		>110	NQ9350000	**1**(2),2163D				**13**(3),461	
1.049	1.4550	>110		**1**(1),1023I	**1**(1),1405B				
1.007	1.4550	>110						**4**(3),614	
1.214	1.5680	>110	CZ630000	**1**(2),2169F		**1**(2),478B	**11**,9456	**13**,138	**1**,117

TABLE 16. LACTAMS

Name	Formula	CAS Registry Number	Mol. wt.	Boiling point (°C)	Melting point (°C)
γ-Butyrolactam (2-pyrrolidinone)	$-C(O)(CH_2)_3NH-$	616-45-5	85.11	245	24
ε-Caprolactam	$-C(O)(CH_2)_5NH-$	105-60-2	113.16	137/10	69
12-Dodecanolactam	$-C(O)(CH_2)_{11}NH-$	947-04-6	197.32		151
7-Heptanolactam	$-C(O)(CH_2)_6NH-$	673-66-5	127.19	149/10	36
β-Propiolactam	$-C(O)CH_2CH_2NH-$	930-21-2	71.08	106/15	75
δ-Valerolactam	$-C(O)(CH_2)_4NH-$	675-20-7	99.13	256	39

TABLE 17. LACTONES

Name	Formula	CAS Registry Number	Mol. wt.	Boiling point (°C)	Melting point (°C)
γ-Butyrolactone	$-C(O)(CH_2)_3O-$	96-48-0	86.09	204	−45
ε-Caprolactone	$-C(O)(CH_2)_5O-$	502-44-3	114.14	97/15	
β-Propiolactone	$-C(O)(CH_2)_2O-$	57-57-8	72.06	162	−33
δ-Valerolactone	$-C(O)(CH_2)_4O-$	542-28-9	100.12	59/0.5	

TABLE 18. MALEATE ACIDS/ESTERS

Name	Formula ROC(O)CH=CHC(O)OR R	CAS Registry Number	Mol. wt.	Boiling point (°C)	Melting point (°C)
Acid	$-H$	110-16-7	116.07		141
2-Chloro-	$HOC(O)CCl=CHC(O)OH$		150.52		110
2-Chloro-, diethyl ester	$CH_3CH_2OC(O)CCl=CHC(O)OCH_2CH_3$		206.63	235	
2-Chloro-, dimethyl ester	$CH_3OC(O)CCl=CHC(O)OCH_3$		178.57	107	
Diallyl ester	$-CH_2CH=CH_2$	999-21-3	196.20	110/4	−47
Di-*n*-amyl ester	$-(CH_2)_4CH_3$		256.33	161/10	
Di-*n*-butyl ester	$-(CH_2)_3CH_3$	105-76-0	228.29	281	
2,3-Dichloro-	$HOC(O)CCl=CClC(O)OH$		184.97		120
Diethyl ester	$-CH_2CH_3$	141-05-9	172.18	225	−10
2,3-Dihydroxy-	$HOC(O)C(OH)=C(OH)C(O)OH$		148.07		155
Diisoamyl ester	$-CH_2CH_2CH(CH_3)_2$		156.33	157/13	
Dimethyl ester	$-CH_3$	624-48-6	144.13	204	
Diphenyl ester	$-C_6H_5$		268.27	226/15	93
Di-*n*-propyl ester	$-CH_2CH_2CH_3$		200.24	126/12	
2-Methyl-, *cis*- (citraconic acid)	$HOC(O)C(CH_3)=CHC(O)OH$	498-23-7	130.10		90
2-Methyl-, diethyl ester, *cis*-	$CH_3CH_2OC(O)C(CH_3)=CHC(O)OCH_2CH_3$		186.21	230	
2-Methyl-, dimethyl ester, *cis*-	$CH_3OC(O)C(CH_3)=CHC(O)OCH_3$			158.16	211

TABLE 19. PROPENES

Name	Formula	CAS Registry Number	Mol. wt.	Boiling point (°C)	Melting point (°C)
Propene	$H_2C=CHCH_3$	115-07-1	42.08	−48	−185
–, 1-Bromo-, *cis*-	$BrCH=CHCH_3$	590-13-6	120.98	58	
–, 1-Bromo-, *trans*-	$BrCH=CHCH_3$	590-15-8	120.98	64	
–, 2-Bromo-	$H_2C=CBrCH_3$	557-93-7	120.98	48	−125
–, 1-Chloro-, *cis*-	$ClCH=CHCH_3$		76.53	33	−135
–, 1-Chloro-, *trans*-	$ClCH=CHCH_3$		76.53	37	−99
–, 2-Chloro-	$H_2C=CClCH_3$	557-98-2	76.53	22.5	−139
–, 1-Chloro-2-methyl- (isocrotyl chloride)	$ClCH=C(CH_3)_2$	513-37-1	90.55	68	
–, 3-Chloro-2-methyl- (methallyl chloride)	$H_2C=C(CH_3)CH_2Cl$	563-47-3	90.55	71	−80
–, 1,1-Dichloro-	$Cl_2C=CHCH_3$	563-58-6	110.97	76	

Density (at 20°C)	Refractive index (at 20°C)	Flash point (°C)	RTECS Number	R and S	FT-NMR	FT-IR	Merck	Beilstein	Fieser
1.120	1.4870	>110	UY5715000	**1**(1),923B	**1**(1),1285B	**1**(1),788D	**11**,8027	**21**,236	
			CM3675000	**1**(1),927G	**1**(1),1293B	**1**(1),792B	**11**,1762	**21**(2),216	
			CL6940000	**1**(1),929A	**1**(1),1296A	**1**(1),794A			
		>110	CN4810000	**1**(1),927M	**1**(1),1295B	**1**(1),793C		**21**,242	
				1(1),923A	**1**(1),1285A			**21**(3),3141	
		>110	TO0110000	**1**(1),927E	**1**(1),1292C	**1**(1),791D		**21**,238	

Density (at 20°C)	Refractive index (at 20°C)	Flash point (°C)	RTECS Number	R and S	FT-NMR	FT-IR	Merck	Beilstein	Fieser
1.120	1.4360	98	LU3500000	**1**(1),803J	**1**(1),1127A	**1**(1),697D	**11**,1596	**17**,234	**1**,101
1.030	1.4630	109	MO8400000	**1**(1),819E	**1**(1),1161C	**1**(1),699B		**17**(2),290	
1.146	1.4120	70	RQ7350000	**1**(1),803A			**11**,7832	**17**(1),130	**1**,957
1.079	1.4580	100		**1**(1),815A	**1**(1),1152A	**1**(1),704D		**17**,235	

Density (at 20°C)	Refractive index (at 20°C)	Flash point (°C)	RTECS Number	R and S	FT-NMR	FT-IR	Merck	Beilstein	Fieser
1.590			OM9625000	**1**(1),5510	**1**(1),787A	**1**(1),503A	**11**,5585	**2**,748	
1.1741									
1.277									
1.073	1.4690	>110	ON0700000	**1**(1),725K	**1**(1),993A			**2**(3),1926	
0.9741	1.4475								
0.988	1.4452	>110	ON0875000	**1**(1),725J	**1**(1),992C			**2**(3),1925	
1.064	1.4410	93	ON1225000	**1**(1),725I	**1**(1),992B	**1**(1),644C	**11**,3113	**2**,751	
0.9714	1.4459								
1.152	1.4410	91	EM6300000	**1**(1),725H	**1**(1),992A	**1**(1),644B		**2**,751	
1.0245	1.4433								
			GE6650000	**1**(1),553B	**1**(1),787C	**1**(1),503C	**11**,2323	**2**,768	
1.0491	1.4468								
	1.9491	1.4473							

Density (at 20°C)	Refractive index (at 20°C)	Flash point (°C)	RTECS Number	R and S	FT-NMR	FT-IR	Merck	Beilstein	Fieser
			UC6740000	**1**(1),15B			**11**,7862	**1**,196	
1.423	1.4545	−34		**1**(1),95F	**1**(1),134A			**1**(3),710	
1.408	1.4530	−15		**1**(1),95C				**1**(4),754	**4**,236
1.362	1.436	4	UC7085000	**1**(1),95H	**1**(1),134C	**1**(1),96B		**1**,200	
0.9347	1.4055								
0.9351	1.4054								
0.899	1.3939	−34	UC7200000	**1**(1),95D	**1**(1),133B	**1**(1),96A		**1**,198	
0.920	1.4225	−1	UC8045000	**1**(1),97I	**1**(1),137C	**1**(1),97A	**11**,2147	**1**,209	
0.917	1.4278	−12	UC8050000	**1**(1),97J	**1**(1),138A	**1**(1),96D	**11**,2148	**1**,209	
1.169	1.4450	0	UC8290000	**1**(1),101G	**1**(1),144A	**1**(3),138D		**1**,199	

TABLE 19. *cont'd*

Name	Formula	CAS Registry Number	Mol. wt.	Boiling point (°C)	Melting point (°C)
–, 1,2-Dichloro-	$ClCH=CClCH_3$		110.97	77	
–, Hexafluoro-	$F_2C=CFCF_3$	116-15-4	150.02	–28	–153
–, 2-Methyl- (isobutylene)	$H_2C=C(CH_3)_2$	115-11-7	56.11	–7	–140
–, 1,1,2-Trichloro-	$Cl_2C=CClCH_3$		145.42	118	
–, 1,1,3-Trichloro-	$Cl_2C=CHCH_2Cl$		145.42	131	
–, 1,2,3-Trichloro-	$ClCH=CClCH_2Cl$		145.42	142	
–, 3,3,3-Trichloro-	$H_2C=CHCCl_3$		145.42	114	

TABLE 20. STYRENES

Name	Formula $CH_2=CHR$ R	CAS Registry Number	Mol. wt.	Boiling point (°C)	Melting point (°C)
Styrene	$-C_6H_5$	100-42-5	104.15	145	–30
–, 4-Acetoxy-	$-C_6H_4OC(O)CH_3$	2628-16-2	162.19	260	7
–, 2-Amino-	$-C_6H_4NH_2$	3867-18-3	119.18	104/8	
–, 4-Amino-	$-C_6H_4NH_2$	1520-21-4	119.18	249	23
–, 4-Benzyloxy-3-methoxy-	$-C_6H_3(OCH_3)OCH_2C_6H_5$	55708-65-1	240.30	51	
–, 3,5-Bis(trifluoromethyl)-	$-C_6H_4(CF_3)_2$	349-59-7	240.15	60/20	7
α-Bromo-	$H_2C=CBrC_6H_5$	98-81-7	183.05	69/4	–44
β-Bromo-	$HCBr=CHC_6H_5$	103-64-0	183.05	111/20	7
–, 2-Bromo-	$-C_6H_4Br$	2039-88-5	183.05	210	–53
–, 3-Bromo-	$-C_6H_4Br$	2039-86-3	183.05	74/3	
–, 4-Bromo-	$-C_6H_4Br$	2039-82-9	183.05	212	4.5
–, 4-*tert*-Butyl-	$-C_6H_4C(CH_3)_3$	1746-23-2	160.26	219	–37
–, 4-Carboxy-	$-C_6H_4CO_2H$	1075-49-6	148.16		143
α-Chloro-	$H_2C=CClC_6H_5$		138.60	199	–23
β-Chloro-	$HCCl=CHC_6H_5$		138.60	199	
–, 2-Chloro-	$-C_6H_4Cl$	2039-87-4	138.60	188	–63
–, 3-Chloro-	$-C_6H_4Cl$	2039-85-2	138.60	62/6	
–, 3-Chloromethyl (3-vinylbenzyl chloride)	$-C_6H_4CH_2Cl$	57458-41-0	152.62	229	
–, 4-Chloro-	$-C_6H_4Cl$	1073-67-2	138.60	192	–16
–, 4-Chloromethyl-	$-C_6H_4CH_2Cl$	1592-20-7	152.62	229	
–, 4-Chloro-α-Methyl-	$H_2C=C(CH_3)C_6H_4Cl$	1712-70-5	152.62		
–, 2-Cyano-	$-C_6H_4CN$		129.16	53/0.15	
–, 3-Cyano-	$-C_6H_4CN$	5338-96-5	129.16	83/2.6	
–, 4-Cyano-	$-C_6H_4CN$	3435-51-6	129.16	92/3	–15
–, 2,5-Dichloro-	$-C_6H_3Cl_2$	1123-84-8	173.04	74/3	
–, 2,6-Dichloro-	$-C_6H_3Cl_2$	28469-92-3	173.04	88/8	
–, 3,4-Dichloro-	$-C_6H_3Cl_2$	2039-83-0	173.04	76/3	
–, α,β-Difluoro-	$HCF=CFC_6H_5$		140.03	88/60	
–, 1,2-Difluoro-	$-C_6H_3F_2$	366-37-0	140.03	90/45	
–, 2,6-Difluoro-	$-C_6H_3F_2$		140.03	59/51	
–, 1,3-Diisopropenyl benzene	$C_6H_4(C(CH_3)=CH_2)_2$	3748-13-8	158.25	231	
–, 3,4-Dimethoxy-	$-C_6H_3(OCH_3)_2$	6380-23-0	164.20	120/10	
–, α,2-dimethyl-	$H_2C=C(CH_3)C_6H_4CH_3$	26444-18-8	132.21	54/11	
–, 2,4-Dimethyl-	$-C_6H_3(CH_3)_2$	2234-20-0	132.21	70/11	–64
–, 2,5-Dimethyl-	$-C_6H_3(CH_3)_2$	2039-89-6	132.21	71/10	–35
–, Divinyl-, (isomers)	$C_6H_4(CH=CH_2)_2$	1321-74-0	130.19		
–, 4-Ethoxy-	$-C_6H_4OCH_2CH_3$	5459-40-5	148.21	59/1	
–, 2-Ethyl-	$-C_6H_4CH_2CH_3$	7564-63-8	132.21	191	–127
–, 4-Ethyl-	$-C_6H_4CH_2CH_3$	3454-07-7	132.21	193	–50
–, 3-Iodo-	$-C_6H_4I$		233.05		73
–, 2-Fluoro-	$-C_6H_4F$	394-46-7	122.14	67/15	
–, 3-Fluoro-	$-C_6H_4F$	350-51-6	122.14	30/4	
–, 4-Fluoro-	$-C_6H_4F$	405-99-2	122.14	30/14	
–, 2-Hydroxy-	$-C_6H_4OH$		120.15	108/15	29
–, 3-Hydroxy-	$-C_6H_4OH$		120.15	115	
–, 4-Hydroxy-	$-C_6H_4OH$		120.15		73.5
–, 4-Isopropyl-	$-C_6H_4CH(CH_3)_2$	2055-40-5	146.22	204	–45

Density (at 20°C)	Refractive index (at 20°C)	Flash point (°C)	RTECS Number	R and S	FT-NMR	FT-IR	Merck	Beilstein	Fieser
1.1818	1.4471								
			UD0350000	**1**(1),105A		**1**(3),143C		**1**(3),697	
			UD0890000	**1**(1),23F		**1**(3),28B	**11**,5024	**1**,207	
1.382	1.4827								
1.403	1.4950	48	UD1928500	**1**(1),103H	**1**(1),148A	**1**(3),142A		**1**(3),707	
1.414	1.5020								
1.369	1.4827								

Density (at 20°C)	Refractive index (at 20°C)	Flash point (°C)	RTECS Number	R and S	FT-NMR	FT-IR	Merck	Beilstein	Fieser
0.9059	1.5470	31	WL3675000	**1**(1),1139A	**1**(2),23A	**1**(1),945B	**11**,8830	**5**,474	
1.060	1.5380	87	SL3784000	**1**(2),1927F	**1**(2),1287C			**6**(3),2387	
1.608									
1.014	1.6267							**12**,1187	
		>110		**1**(1),1237M	**1**(2),197C	**1**(1),1053A			
1.334	1.4250	122		**1**(1),1213A	**1**(2),155A			**5**(4),1386	
1.410	1.5880	87	WL3840000	**1**(1),1203F				**5**,477	
1.427	1.6070	102	WL3850000	**1**(1),1203H	**1**(2),136C	**1**(1),1017B		**5**,477	
1.460	1.5927	85		**1**(1),1203L	**1**(2),138A	**1**(1),1018A		**5**(3),1176	
1.406	1.5891	67		**1**(1),1205D	**1**(2),139C	**1**(3),195B		**5**(3),1176	
1.400	1.5940	75		**1**(1),1205H	**1**(2),141A	**1**(1),1019C		**5**(2),367	
0.875	1.5260	80						**5**(3),1254	
				1(2),1789D	**1**(2),1076A	**1**(2),194D		**9**(3),2755	
1.1016/18	1.5612								
1.1095/15	1.5648								
1.080	1.5648	58	WL4160000	**1**(1),1203K	**1**(2),137C	**1**(1),1017D			
1.090	1.5613	62		**1**(1),1205C	**1**(2),139B	**1**(1),1018C			
1.074		105							
1.155	1.5662	60		**1**(1),1205F	**1**(2),140B	**1**(1),1019B		**5**(2),367	
1.083	1.5740	104							
1.065	1.5550	74		**1**(1),1205G	**1**(2),140C	**1**(1),1018D			
	1.5756								
1.083	1.5630	104							
	1.575								
1.267	1.5740	71		**1**(1),1205J	**1**(2),141C	**1**(1),1019D			
	1.5061								
1.130	1.4990	30		**1**(1),1205I	**1**(2),141B				
0.925	1.5570	91	CY8535000	**1**(1),1139L	**1**(2),26B	**1**(1),947C			
1.109	1.5710	>110		**1**(1),1243D	**1**(2),208C	**1**(1),1053D		**6**,954	
0.894	1.5150	43							
0.906	1.5390	60	WL4450000	**1**(1),1141D	**1**(2),27C			**5**,491	
0.904	1.5391	63	WL4460000	**1**(1),1141E	**1**(2),28A			**5**,491	
0.914	1.5470	64	CZ9370000	**1**(1),1141B					
0.990	1.5498	87		**1**(1),1243A		**1**(3),984B		**6**,561	
0.8955	1.5351								
0.8925	1.5376								
	1.6390								
1.025	1.5200	35		**1**(1),1203J	**1**(2),137B			**5**(3),1171	
1.025	1.5175	29		**1**(1),1205B	**1**(2),139A	**1**(1),1081B		**5**(3),1171	
1.024	1.5156	26		**1**(1),1205E	**1**(2),140A	**1**(1),1019A			
1.0609/18	1.5783/27								
1.0468/35	1.5804/31								
0.885	1.5289								

TABLE 20. *cont'd*

Name	Formula CH_2=CHR R	CAS Registry Number	Mol. wt.	Boiling point (°C)	Melting point (°C)
–, 2-Methoxy-	$-C_6H_4OCH_3$	612-15-7	134.18	61.3	29
–, 3-Methoxy-	$-C_6H_4OCH_3$	626-20-0	134.18	144/2	
–, 4-Methoxy-	$-C_6H_4OCH_3$	637-69-4	134.18	204	
–, 2-Methoxy-4-hydroxy-	$-C_6H_3OCH_3(OH)$	7786-61-0	150.18	224	
α-Methyl-	$H_2C=C(CH_3)C_6H_5$	98-83-9	118.18	167	– 24
–, 2-Methyl-	$-C_6H_4CH_3$	611-15-4	118.18	171	– 69
–, 3-Methyl-	$-C_6H_4CH_3$	100-80-1	118.18	170	– 82
–, 4-Methyl-	$-C_6H_4CH_3$	622-97-9	118.18	172	– 34
–, β-Nitro-	$HC(NO_2)=CHC_6H_5$		149.15	250	58
–, 2-Nitro-	$-C_6H_4NO_2$		149.15		13
–, 3-Nitro-	$-C_6H_4NO_2$	586-39-0	149.15	90/3.5	– 5
–, 4-Nitro-	$-C_6H_4NO_2$	100-13-0	149.15	120/10	25
–, Pentabromo-	$-C_6Br_5$	53097-59-9	498.66		188
–, Pentafluoro-	$-C_6F_5$	653-34-9	194.10	139	
–, 4-Phenoxy-	$-C_6H_4OC_6H_5$	4973-29-9	196.25		71
–, 4-Phenyl-	$-C_6H_4C_6H_5$	2350-89-2	180.25		120
–, 4-Sulfonic acid, sodium salt	$-C_6H_4SO_3Na$	2695-37-6	206.20		225
–, 2-Trifluoromethyl-	$-C_6H_4CF_3$	395-45-9	172.15	61/40	
–, 3-Trifluoromethyl-	$-C_6H_4CF_3$	402-24-4	172.15	55/12	
–, 4-Trifluoromethyl-	$-C_6H_4CF_3$	402-50-6	172.15	65/40	
–, 2,4,6-Trimethyl-	$-C_6H_2(CH_3)_3$	769-25-5	146.24	209	

TABLE 21. VINYL FUNCTIONAL

Name	Formula	CAS Registry Number	Mol. wt.	Boiling point (°C)	Melting point (°C)
21.1. ARYL H_2C=CHR					
9-Anthracene	$-C_{14}H_9$	2444-68-0	204.27	62/10	65
Benzene (see Styrene)					
2-Naphthalene	$-C_{10}H_7$	827-54-3	154.21		61
2-Pyridine	$-C_5H_4N$	100-69-6	105.14	80/29	
3-Pyridine	$-C_5H_4N$	1121-55-7	105.14	68/15	
4-Pyridine	$-C_5H_4N$	100-43-6	105.14	63/15	
2-Quinoline	$-C_9H_6N$	772-03-2	155.20	71/0.5	
21.2. ESTERS H_2C=CHOC(O)R					
Acetate	$-CH_3$	108-05-4	86.09	72	– 93
Acrylate (see Acrylates)					
Allyl adipate	$-(CH_2)_4C(O)OCH_2CH=CH_2$	56860-96-9	212.25	135/9	
Benzoate	$-C_6H_5$	769-78-8	148.16	203	
Bromoacetate	$-CH_2Br$	5309-70-6	165.0	50/10	
4-*tert*-Butyl benzoate	$-C_6H_4C(CH_3)_3$	15484-80-7	204.27	111/2	
Butyrate	$-(CH_2)_2CH_3$	123-20-6	114.14	116	
Carbonate	$-OCH=CH_2$	872-36-6	86.05	162	22
Chloroacetate	$-CH_2Cl$	2549-51-1	120.54	134	
2-Chlorobenzoate	$-C_6H_4Cl$	15721-27-4	182.61		
Chloroformate	$-Cl$	5130-24-5	106.51	68/735	
Cinnamate	$-CH=CHC_6H_5$	3098-92-8	174.20	125/7	
Crotonate	$-CH_2CH=CHCH_3$	14861-06-4	112.13	133	
Decanoate	$-(CH_2)_8CH_3$	4704-31-8	198.31	146/50	
Dodecanoate	$-(CH_2)_{10}CH_3$	2146-71-6	226.36	140/10	
2-Ethylhexanoate	$-CH(CH_2CH_3)(CH_2)_3CH_3$	94-04-2	170.25	128/20	– 90
Formate	$-H$	692-45-5	72.06	46	
2-Furoate	$-C_4H_3O$	1917-10-8	138.12	182/10	14
Hexadecanoate (palmitate)	$-(CH_2)_{14}CH_3$	693-38-9	282.47	165/2	24
Hexanoate (caproate)	$-(CH_2)_4CH_3$	3050-69-9	142.20	160/10	
Maleate	$-CH=CHC(O)OCH=CH_2$		168.15	94/10	

Density (at 20°C)	Refractive index (at 20°C)	Flash point (°C)	RTECS Number	R and S	FT-NMR	FT-IR	Merck	Beilstein	Fieser
1.0049	1.5388								
0.9999	1.5540								
0.994	1.5620	72		**1**(1),1241O	**1**(2),207C	**1**(1),1052C		**6**,561	
1.110	1.5820	>110	SL8205000					**6**(3),4981	
0.909	1.5380	45	WL5075300	**1**(1),1139B	**1**(2),2437C	**1**(1),945C		**5**,484	
0.917	1.544	58	WL5075900	**1**(1),1139K		**1**(1),947A		**5**(1),233	
0.890	1.5408	52	WL5075800	**1**(1),1139M	**1**(2),26C	**1**(3),869B		**5**,485	
0.897	1.5412	45	WL5076000	**1**(1),1139N	**1**(2),27A	**1**(1),947B		**5**,485	
1.070	1.5840	107		**1**(1),1555D	**1**(2),687C	**1**(1),1334D		**5**,478	
	1.6016		WL5470000						
				1(1),1205N		**1**(1),1020B			
1.406	1.4455	34		**1**(1),1205K	**1**(2),142A	**1**(1),1020A			
				1(1),1145G	**1**(2),35B	**1**(1),951D			
				1(2),2207I	**1**(2),1598C				
1.175	1.4700	42		**1**(1),1207C	**1**(2),143A			**5**(4),1367	
1.161	1.4655			**1**(1),1207K	**1**(2),138C			**5**(3),1197	
1.165	1.4660			**1**(1),1209F	**1**(2),148A			**5**(4),1369	
0.906	1.5320	75		**1**(1),1141G		**1**(3),871A		**5**,500	

Density (at 20°C)	Refractive index (at 20°C)	Flash point (°C)	RTECS Number	R and S	FT-NMR	FT-IR	Merck	Beilstein	Fieser
				1(1),1153I	**1**(2),51A	**1**(1),963B			
				1(1),1151G	**1**(2),46A	**1**(1),959C			
0.975	1.5490	47	UU1040000	**1**(2),2495G	**1**(3),242C	**1**(2),734A		**20**,256	
	1.5530								
0.975	1.5500	52	UU1045000	**1**(2),2499B	**1**(3),248B	**1**(2),738D		**20**(2),170	
1.340		128				**1**(2),853D		**20**,425	
0.934	1.3950	−6	AK0875000	**1**(1),715A	**1**(1),963A	**1**(1),632D	**11**,9896	**2**(1),63	**12**,565
1.070	1.5290	82	DI1050000					**9**(1),65	
0.999	1.5180	>110		**1**(2),1903L	**1**(2),1248C			**9**(4),1885	
0.9022	1.411	20						**2**(4),792	
1.355	1.4210	72	FG3325000	**1**(1),697E	**1**(1),933A	**1**(1),644A			**13**,342
1.19	1.4440								
1.22									
1.253	1.4100	−4		**1**(1),863A	**1**(1),1206A	**1**(1),736D		**3**(3),28	**8**,530
1.07									
0.940	1.4480	27	GQ5850000	**1**(1),721H	**1**(1),978C	**1**(1),642B		**2**(3),1263	
0.886	1.4350	104						**2**(3),843	
0.8639	1.4387	136							
0.875	1.4256	65	MO7875000	**1**(1),719A	**1**(1),793A	**1**(1),637C		**2**(4),1005	
0.9651	1.4757		LR0525000		**1**(1),1206A	**1**(1),736C		**3**(3),28	**8**,530
0.8602	1.4444								
0.8837	1.4159								

TABLE 21. *cont'd*

Name	Formula	CAS Registry Number	Mol. wt.	Boiling point (°C)	Melting point (°C)
Maleate, monoester	$-CH=CHC(O)OH$	19896-47-0	142.11	80/1	
Methacrylate (see Methacrylates)					
Neodecanoate	$-C_9H_{19}$	51000-52-3	198.31	216	
Nonate	$-(CH_2)_7CH_3$	6280-03-1	184.28	133/50	
Octadecanoate (stearate)	$-(CH_2)_{16}CH_3$	111-63-7	310.51	181/2	32
9-Octadecenoate (oleate)	$-(CH_2)_7CH=CH(CH_2)_7CH_3$	3896-58-0	308.49	145	36
Octanoate	$-(CH_2)_6CH_3$	818-44-0	170.25	79/7	
Pentafluoropropionate	$-CF_2CF_3$		190.08	58/560	
Pentanoate	$-(CH_2)_3CH_3$	5873-43-8	128.17	132	
Pivalate	$-C(CH_3)_3$	3377-92-2	128.17	112	
Propionate	$-CH_2CH_3$	105-38-4	100.12	95	−81
Sebacate	$-(CH_2)_8C(O)OCH=CH_2$	10355-50-7	254.33	142/3	
Succinate	$-CH_2CH_2C(O)OCH=CH_2$	13416-90-5	170.16	50/3	
Tetradecanoate (myristate)	$-(CH_2)_{12}CH_3$	5809-91-6	254.41	152/3	15
Thioacetate	$H_2C=CHSC(O)CH_3$	10340-63-3	102.15	115	
Trichloroacetate	$-CCl_3$	7062-87-5	189.43	38/5	
Trifluoroacetate	$-CF_3$	433-28-3	140.06	42	
1-Trifluoromethyl acetate	$H_2C=C(CF_3)OC(O)CH_3$	2247-91-8	154.09	86	
Trithiocarbonate	$H_2C=CHSC(S)SCH=CH_2$	930-35-8	134.24		48
Undecanoate	$-(CH_2)_9CH_3$		212.33	125/8	
Versatate	$-C(CH_3)_2(CH_2)_5CH_3$	49863-74-3	198.31	60/1	
21.3. ETHERS $H_2C=CHOR$					
Allyl	$-CH_2CH=CH_2$	3917-15-5	84.12	67	
Butoxyethyl	$-CH_2CH_2O(CH_2)_3CH_3$	4223-11-4	144.21	70/20	
n-Butyl	$-(CH_2)_3CH_3$	111-34-2	100.16	94	−92
2-Butyl	$-CH(CH_2CH_3)CH_3$	4181-12-8	100.16	87	
tert-Butyl	$-C(CH_3)_3$	926-02-3	100.16	75	
1-Chloroethyl	$-CHClCH_3$	110-75-8	106.55	109	
2-Chloroethyl	$-CH_2CH_2Cl$	110-75-8	106.55	109	−70
Cyclohexyl	$-C_6H_{11}$	2182-55-0	126.20	147	−109
1,2-Dichloroethyl	$-CHClCH_2Cl$		141.00	128	
Di(ethylene glycol)	$-CH_2CH_2OCH_2CH_2OH$	929-37-3	132.16	196	
Divinyl	$-CH=CH_2$	109-93-3	70.09	28	−101
Dodecyl	$-(CH_2)_{11}CH_3$	765-14-0	212.38	118	−12
Ethyl	$-CH_2CH_3$	109-92-2	72.11	33	−116
2-Ethylhexyl	$-CH_2CH(CH_2CH_3)(CH_2)_3CH_3$	103-44-6	156.27	177	−85
Glycidyl	$-CH_2CH(-O-)CH_2$	3678-15-7	100.12	139	
Hexachlorodivinyl	$(Cl_2C=CCl)_2O$		276.76	210	
Hexadecyl	$-(CH_2)_{15}CH_3$	822-28-6	268.47	173/5	16
4-Hydroxybutyl	$-(CH_2)_4OH$	17832-28-9	116.16	189	−33
2-Hydroxyethyl	$-CH_2CH_2OH$	764-48-7	88.11	143	
Isoamyl	$-CH_2CH_2CH(CH_3)_2$		114.19	112	
Isobutyl	$-CH_2CH(CH_3)_2$	109-53-5	100.16	82	−112
Isooctyl	$-(CH_2)_5CH(CH_3)_2$	37769-62-3	156.27	175	
Isopropyl	$-CH(CH_3)_2$	926-65-8	86.13	83	−140
2-(2-Methoxyethoxy)ethyl	$-(CH_2CH_2O)_2CH_3$	26256-87-1	190.24	242	
2-Methoxyethyl	$-CH_2CH_2OCH_3$	1663-35-0	102.13	108	−83
Methyl	$-CH_3$	107-25-5	58.08	5	−123
Octadecyl	$-(CH_2)_{17}CH_3$	930-02-9	296.54	178/5	27
Perfluoropropyl	$F_2C=CFOCF_2CF_2CF_3$	1623-05-8	266.04	36	
Phenyl	$-C_6H_5$	766-94-9	120.15	154	
1-Phenylethyl	$-CH(C_6H_5)CH_3$	6230-62-2	148.21	211	
Propyl	$-CH_2CH_2CH_3$	764-47-6	86.13	65	−50
21.4. *N*-SUBSTITUTED $H_2C=CHR$					
–Caprolactam	$-NC_6H_{10}O$	2235-00-9	139.20	128/21	36
–Carbazole	$-NC_{12}H_8$	1484-13-5	193.25	154/3	65
–Formamide	$-NHC(O)H$	13162-05-5	71.08	210	−16
–Phthalimide	$-NC_8H_4O_2$	3485-84-5	173.17		85
–Pyrolidone	$-NC_4H_6O$	88-12-0	111.14		
–*N*-Methylacetamide	$-N(CH_3)C(O)CH_3$	3195-78-6	99.10	166	−36

Density (at 20°C)	Refractive index (at 20°C)	Flash point (°C)	RTECS Number	R and S	FT-NMR	FT-IR	Merck	Beilstein	Fieser
								2(3),1290	
0.882	1.4360	83		**1**(1),719B				**2**(4),1045	
0.8689	1.4291								
0.904		>110							
		>110							
0.8719	1.4256								
0.866	1.4050	10							
0.9173	1.4030	6	UF8575000					**2**(3),532	
0.87									
1.203	1.3170	−31		**1**(1),745G	**1**(1),1030C	**1**(3),704B		**2**(4),466	
1.212	1.3410	2							
		>110		**1**(1),697F	**1**(1),933B			**19**(3),1598	
0.8	1.4109	<20							
0.866	1.4220	46	KH7175000					**1**(4),2387	
0.774	1.410	−9	KN5950000	**1**(1),219C	**1**(1),332B	**1**(1),213D			
	1.4558								
0.762	1.3980	−17						**1**(3),1863	
1.048	1.4380	16	KN6300000	**1**(1),221C	**1**(1),336A	**1**(1),213B	**11**,2139	**1**(2),473	
1.048	1.4380	16	KN6300000	**1**(1),221C	**1**(1),336A	**1**(1),213B	**11**,2139	**1**(2),473	
0.891	1.4540	35						**6**(3),18	
1.197	1.4558/17							**1**(4),2398	
0.986	1.4480	83	KM5495500					**1**(4),2398	
0.773	1.3989	−30							
0.817	1.4382	>110							
0.754	1.3770	−45	KO0710000	**1**(1),219B	**1**(1),332A	**1**(1),212B		**1**,433	**11**,235
0.816	1.4280	52	KO0175000					**1**(3),1864	
1.006	1.4326	35						**17**(5),8,12	
1.654									
0.939	1.4440	85						**1**(4),2518	
0.982	1.4360	48	KM5495000					**1**(2),520	
0.7826	1.4072								
0.7645	1.3950	−13	KO1300000	**1**(1),219D		**1**(3),278A		**1**(3),1862	
0.7534	1.3840	−32							
0.990	1.4390								
0.8967	1.4072	17							
0.7511/0	1.3730/0	−56	KO2300000	**1**(1),219A		**1**(3),277C		**1**(3),1857	**1**,697
0.821	1.440	177	RG0300000					**1**(4),2057	
1.53									
	1.5226								
	1.3908	−26						**1**(3),1859	
1.029		101						**2**(3),3207	
			FE6350000	**1**(2),2425E	**1**(3),161C			**20**(2),282	
1.014	1.4940	102							
								21(1),363	
1.040	1.5120	94	UY6107000	**1**(1),923K	**1**(1),1288A	**1**(1),790B			
0.9600	1.4835	60	AC6475000	**1**(1),891K	**1**(1),1242C	**1**(1),759C		**4**(3),442	

TABLE 21. *cont'd*

Name	Formula	CAS Registry Number	Mol. wt.	Boiling point (°C)	Melting point (°C)
21.5. SULFONATES $H_2C{=}CHSO_3R$					
Ethylene sulfonic acid	$-H$		108.10	100/0.5	
n-Amyl ester	$-(CH_2)_4CH_3$		178.23	131/17	
n-Butyl ester	$-(CH_2)_3CH_3$		164.21	117/15	
Ethyl ester	$-CH_2CH_3$		136.16	76/5	
n-Hexyl ester	$-(CH_2)_5CH_3$		192.26	146/15	
Isoamyl ester	$-(CH_2)_2CH(CH_3)_2$		178.23	124/15	
Isobutyl ester	$-CH_2CH(CH_3)_2$		164.21	78/5	
Isopropyl ester	$-CH(CH_3)_2$		152.20	70/4	
Methyl ester	$-CH_3$		122.13	91/15	
Phenyl ester	$-C_6H_5$	1562-34-1	184.21	45/2	
n-Propyl ester	$-CH_2CH_2CH_3$		152.20	110/18	

Density (at 20°C)	Refractive index (at 20°C)	Flash point (°C)	RTECS Number	R and S	FT-NMR	FT-IR	Merck	Beilstein	Fieser
1.4003	1.4493								
1.087	1.4412								
1.122	1.4416								
1.183	1.431								
1.050	1.4430								
1.082	1.4415								
1.190	1.426								
1.132	1.4321								
1.248	1.4316								
1.165	1.426	>110		**1**(2),2219A	**1**(2),1605A	**1**(3),1437A		**6**(3),651	**13**,241
1.156	1.4368								

Isorefractive and Isopycnic Solvent Pairs

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A. INTRODUCTION

Isorefractive solvents are solvents having the same refractive index, and isopycnic solvents are those that have the same density.

The determination of molar masses by non-colligative methods such as light scattering and ultracentrifugation will lead only to *apparent* molar masses if solvent mixtures are used whose components are not isorefractive. The observed increases or decreases of these apparent molar masses depend in sign and magnitude on both the preferential solvation and the refractive index increment of solvent 2 in solvent 1 at a fixed polymer concentration. The effect disappears if isorefractive solvent pairs are used.

A similar effect may be observed in ultracentrifugal experiments with non-isopycnic solvent pairs. To suppress these effects, isopycnic-isorefractive solvent pairs should be used. A table of isorefractive and isopycnic solvent pairs was prepared (for 25°C), starting with 392 commonly used solvents. A solvent pair was classified as isorefractive and isopycnic if the components had differences no greater than ± 0.002 in refractive index and ± 0.015 g/ml in density. The miscibility of the components was not checked.

B. TABLE OF ISOREFRACTIVE AND ISOPYCNIC SOLVENT PAIRS

		Refractive index		Density (g/ml)	
Solvent 1	**Solvent 2**	**1**	**2**	**1**	**2**
Acetone	Ethanol	1.357	1.359	0.788	0.786
Ethyl formate	Methyl acetate	1.358	1.360	0.916	0.935
	Propionitrile	1.359	1.363	0.786	0.777
2,2-Dimethylbutane	2-Methylpentane	1.366	1.369	0.644	0.649
2-Methylpentane	*n*-Hexane	1.369	1.372	0.649	0.655
	2,3-Dimethylbutane	1.369	1.372	0.649	0.657
	3-Methylpentane	1.369	1.374	0.649	0.660
2,3-Dimethylbutane	*n*-Hexane	1.372	1.372	0.657	0.655
	3-Methylpentane	1.372	1.374	0.657	0.660
n-Hexane	3-Methylpentane	1.372	1.374	0.655	0.660
Isopropyl acetate	2-Chloropropane	1.375	1.376	0.868	0.865
2-Butanone	Butyraldehyde	1.377	1.378	0.801	0.799
Butyraldehyde	Butyronitrile	1.378	1.382	0.799	0.786
n-Propyl ether	*n*-Butyl ethyl ether	1.379	1.380	0.753	0.746
2,4-Dimethylpentane	2-Methylhexane	1.379	1.382	0.799	0.786
Acetaldehyde diethyl acetal	*n*-Butyl ethyl ether	1.379	1.380	0.753	0.746
n-Propyl acetate	Ethyl propionate	1.382	1.382	0.883	0.888
	Isobutyl formate	1.382	1.383	0.883	0.881
	1-Chloropropane	1.382	1.386	0.883	0.890
Butyronitrile	*t*-Butanol	1.382	1.385	0.786	0.781
Ethyl propionate	Isobutyl formate	1.382	1.383	0.888	0.881
	1-Chloropropane	1.382	1.386	0.888	0.890
2-Methylhexane	*n*-Heptane	1.382	1.385	0.674	0.680
	3-Methylhexane	1.382	1.386	0.674	0.683

Solvent 1	Solvent 2	Refractive index 1	Refractive index 2	Density (g/ml) 1	Density (g/ml) 2
n-Propanol	3-Methyl-2-butanone	1.383	1.386	0.806	0.807
	2-Pentanone	1.383	1.387	0.806	0.804
Isobutyl formate	1-Chloropropane	1.383	1.386	0.881	0.890
	s-Butyl acetate	1.383	1.387	0.881	0.868
	n-Butylformate	1.383	1.387	0.881	0.888
Diethylamine	*n*-Propylamine	1.384	1.386	0.702	0.713
n-Heptane	3-Methylhexane	1.385	1.386	0.680	0.683
	2,3,3-Trimethylbutane	1.385	1.387	0.680	0.686
	2,2,4-Trimethylpentane	1.385	1.389	0.680	0.687
	2,3-Dimethylpentane	1.385	1.389	0.680	0.691
3-Methylhexane	2,3,3-Trimethylbutane	1.386	1.387	0.683	0.686
	2,4-Trimethylpentane	1.386	1.389	0.683	0.687
	2,3-Dimethylpentane	1.386	1.389	0.683	0.691
1-Chloropropane	Butyl formate	1.386	1.387	0.890	0.888
3-Methyl-2-butanone	2-Pentanone	1.386	1.390	0.807	0.802
	3-Pentanone	1.386	1.390	0.807	0.810
n-Propylamine	Diisopropylamine	1.386	1.390	0.713	0.712
	s-Butylamine	1.386	1.390	0.713	0.720
2,3,3-Trimethylbutane	2,2,4-Trimethylpentane	1.387	1.389	0.686	0.683
	2,3-Dimethylpentane	1.387	1.389	0.686	0.691
s-Butyl acetate	Methyl butyrate	1.387	1.391	0.868	0.875
n-Butyl formate	*n*-Dodecane	1.387	1.391	0.888	0.775
Isobutyl acetate	Methyl butyrate	1.388	1.391	0.871	0.875
	n-Butyl acetate	1.388	1.392	0.871	0.877
2,2,4-Trimethylpentane	2,3-Dimethylpentane	1.389	1.389	0.687	0.691
Diisopropylamine	*s*-Butylamine	1.390	1.390	0.712	0.720
2-Pentanone	3-Pentanone	1.390	1.390	0.802	0.810
	4-Methyl-2-pentanone	1.390	1.394	0.802	0.797
	2-Methyl-1-propanol	1.390	1.394	0.802	0.798
3-Pentanone	4-Methyl-2-pentanone	1.390	1.394	0.810	0.797
	2-Methyl-1-propanol	1.390	1.394	0.810	0.798
Methyl butyrate	*n*-Butyl acetate	1.391	1.392	0.875	0.877
	2-Chlorobutane	1.391	1.395	0.875	0.868
2-Chloro-2-methyl-propane	2-Chlorobutane	1.392	1.395	0.872	0.868
n-Butyl acetate	2-Chlorobutane	1.392	1.395	0.877	0.868
4-Methyl-2-pentanone	2-Methyl-1-propanol	1.394	1.394	0.797	0.798
	Valeronitrile	1.394	1.395	0.797	0.795
	2-Butanol	1.394	1.395	0.797	0.803
	2-Hexanone	1.394	1.395	0.797	0.810
	1-Butanol	1.394	1.397	0.797	0.812
	Methacrylonitrile	1.394	1.398	0.797	0.795
	3-Methyl-2-pentanone	1.394	1.398	0.797	0.808
2-Methyl-1-propanol	Valeronitrile	1.394	1.395	0.798	0.795
	2-Butanol	1.394	1.395	0.798	0.803
	2-Hexanone	1.394	1.395	0.798	0.810
	Butanol	1.394	1.397	0.798	0.812
	Methacrylonitrile	1.394	1.398	0.798	0.795
	3-Methyl-2-pentanone	1.394	1.398	0.798	0.808
Octane	2,2,5-Trimethylhexane	1.395	1.397	0.698	0.703
2-Butanol	Butanol	1.395	1.397	0.803	0.812
	Methacrylonitrile	1.395	1.398	0.803	0.795
	3-Methyl-2-pentanone	1.395	1.398	0.803	0.808
	2,4-Dimethyl-3-pentanone	1.395	1.399	0.803	0.805
2-Hexanone	Butanol	1.395	1.397	0.810	0.812

Solvent 1	Solvent 2	Refractive index 1	Refractive index 2	Density (g/ml) 1	Density (g/ml) 2
	Methacrylonitrile	1.395	1.398	0.810	0.795
	3-Methyl-2-pentanone	1.395	1.398	0.810	0.808
	2,4-Dimethyl-3-pentanone	1.395	1.399	0.810	0.805
Valeronitrile	Methacrylonitrile	1.395	1.398	0.795	0.795
	3-Methyl-2-pentanone	1.395	1.398	0.795	0.808
	2,4-Dimethyl-3-pentanone	1.395	1.399	0.795	0.805
2-Hexanone	3-Methyl-2-pentanone	1.395	1.398	0.810	0.808
Isobutylamine	Triethylamine	1.395	1.399	0.729	0.723
	n-Butylamine	1.395	1.399	0.729	0.736
2-Chlorobutane	Isobutyl *n*-butyrate	1.395	1.399	0.868	0.860
Butyric acid	2-Methoxyethanol	1.396	1.400	0.955	0.960
n-Butanol	3-Methyl-2-pentanone	1.397	1.398	0.812	0.808
	2,4-Dimethyl-3-pentanone	1.397	1.399	0.812	0.805
1-Chloro-2-methyl-propane	Isobutyl *n*-Butyrate	1.397	1.399	0.872	0.860
	Amyl acetate	1.397	1.400	0.872	0.871
	1-Chlorobutane	1.397	1.400	0.872	0.881
2,5,5-Trimethylhexane	2,2,3-Trimethylpentane	1.397	1.401	0.703	0.712
Methyl methacrylate	3-Methyl-2-pentanone	1.398	1.398	0.795	0.808
Methacrylonitrile	2,4-Dimethyl-3-pentanone	1.398	1.399	0.795	0.805
	2-Methyl-2-butanol	1.398	1.404	0.795	0.805
3-Methyl-2-pentanone	2,4-Dimethyl-4-pentanone	1.398	1.399	0.808	0.805
Triethylamine	*n*-Butylamine	1.399	1.399	0.723	0.736
	2,2,3-Trimethylpentane	1.399	1.401	0.723	0.712
	n-Nonane	1.399	1.401	0.723	0.714
	Dipropylamine	1.399	1.401	0.723	0.736
n-Butylamine	*n*-Dodecane	1.399	1.400	0.736	0.746
Isobutyl *n*-butyrate	*n*-Amyl acetate	1.399	1.400	0.860	0.871
	Isoamyl acetate	1.399	1.403	0.860	0.868
	1-Chlorobutane	1.399	1.401	8.860	0.875
1-Nitropropane	Propionic anhydride	1.399	1.400	0.995	1.007
Amyl acetate	1-Chlorobutane	1.400	1.400	0.871	0.881
	Tetrahydrofuran	1.400	1.404	0.871	0.885
n-Dodecane	Dipropylamine	1.400	1.403	0.746	0.736
	Cyclopentane	1.400	1.404	0.746	0.740
1-Chlorobutane	Tetrahydrofuran	1.400	1.404	0.871	0.885
2,2,3-Trimethylpentane	*n*-Nonane	1.401	1.403	0.712	0.714
Isovaleric acid	2-Ethoxyethanol	1.402	1.405	0.923	0.926
	Valeric acid	1.402	1.406	0.923	0.936
Dipropylamine	Cyclopentane	1.403	1.404	0.736	0.740
	Methylcyclopentane	1.403	1.407	0.736	0.744
n-Nonane	2,2,4-Trimethyl-1-pentene	1.403	1.407	0.714	0.712
Isoamylacetate	Tributyl borate	1.403	1.407	0.868	0.854
2-Pentanol	2-Methyl-1-butanol	1.404	1.404	0.804	0.805
	3-Methyl-1-butanol	1.404	1.404	0.804	0.805
	4-Heptanone	1.404	1.405	0.804	0.813
	2-Heptanone	1.404	1.406	0.804	0.811
2-Methoxybutanol	3-Methyl-1-butanol	1.404	1.404	0.805	0.805
	Capronitrile	1.404	1.405	0.805	0.801
	4-Heptanone	1.404	1.405	0.805	0.813
	2-Heptanone	1.404	1.406	0.805	0.811
	Pentanol	1.404	1.408	0.805	0.810
	3-Methyl-2-butanol	1.404	1.408	0.805	0.815
3-Methyl-1-butanol	Capronitrile	1.404	1.405	0.805	0.801
	4-Heptanone	1.404	1.405	0.805	0.813

Solvent 1	Solvent 2	Refractive index 1	Refractive index 2	Density (g/ml) 1	Density (g/ml) 2
	2-Heptanone	1.404	1.406	0.805	0.811
	Pentanol	1.404	1.408	0.805	0.810
	3-Methyl-2-butanol	1.404	1.408	0.805	0.815
Cyclopentane	Methylcyclopentane	1.404	1.407	0.740	0.744
Capronitrile	4-Heptanone	1.405	1.405	0.801	0.813
	2-Heptanone	1.405	1.406	0.801	0.811
	2-Pentanol	1.405	1.407	0.801	0.804
	1-Pentanol	1.405	1.408	0.801	0.810
	3-Methyl-2-butanol	1.405	1.408	0.801	0.815
	4-Methyl-2-pentanol	1.405	1.409	0.801	0.802
	3-Isopropyl-2-pentanone	1.405	1.409	0.801	0.808
	2-Methyl-1-butanol	1.405	1.409	0.801	0.815
4-Heptanone	2-Heptanone	1.405	1.406	0.813	0.811
	1-Pentanol	1.405	1.408	0.813	0.810
	3-Methyl-2-butanol	1.405	1.408	0.813	0.815
	4-Methyl-2-pentanol	1.405	1.409	0.813	0.802
	3-Isopropyl-2-pentanone	1.405	1.409	0.813	0.808
	2-Methyl-1-butanol	1.405	1.409	0.813	0.815
2-Ethoxyethanol	Valeric acid	1.405	1.406	0.926	0.936
2-Heptanone	1-Pentanol	1.406	1.408	0.811	0.810
	3-Methyl-2-butanol	1.406	1.408	0.811	0.802
	4-Methyl-2-pentanol	1.406	1.409	0.811	0.802
	3-Isopropyl-2-pentanone	1.406	1.409	0.811	0.808
	2-Ethoxyethanol	1.406	1.409	0.811	0.815
	2-Methyl-1-butanol	1.406	1.409	0.811	0.815
	Amyl ether	1.406	1.410	0.811	0.799
2-Pentanol	1-Pentanol	1.407	1.408	0.804	0.810
	3-Methyl-2-butanol	1.407	1.408	0.804	0.815
	4-Methyl-2-pentanol	1.407	1.409	0.804	0.802
	3-Isopropyl-2-pentanone	1.407	1.409	0.804	0.808
	2-Methyl-1-butanol	1.407	1.409	0.804	0.815
	Amyl ether	1.407	1.410	0.804	0.799
2,2,4-Trimethyl-1-pentene	*n*-Decane	1.407	1.409	0.712	0.726
Tributyl borate	Isoamyl isovalerate	1.407	1.410	0.854	0.853
	Allyl alcohol	1.407	1.411	0.854	0.847
1-Pentanol	3-Methyl-2-butanol	1.408	1.408	0.810	0.815
	4-Methyl-2-pentanol	1.408	1.409	0.810	0.802
	3-Isopropyl-2-pentanone	1.408	1.409	0.810	0.808
	2-Methyl-1-butanol	1.408	1.409	0.810	0.815
	Amyl ether	1.408	1.410	0.810	0.799
3-Methyl-2-butanol	4-Methyl-2-pentanol	1.408	1.409	0.815	0.802
	3-Isopropyl-2-pentanone	1.408	1.409	0.815	0.808
	2-Methyl-1-butanol	1.408	1.409	0.815	0.815
	Amyl ether	1.408	1.410	0.815	0.799
4-Methyl-2-pentanol	3-Isopropyl-2-pentanone	1.409	1.409	0.802	0.808
	2-Methyl-1-butanol	1.409	1.409	0.802	0.815
	Amyl ether	1.409	1.410	0.802	0.799
3-Isopropyl-2-pentanone	2-Methyl-1-butanol	1.409	1.409	0.808	0.815
	Amyl ether	1.409	1.410	0.808	0.799
2-Methyl-1-butanol	Amyl ether	1.409	1.410	0.815	0.799
Isoamyl isovalerate	Allyl alcohol	1.410	1.411	0.853	0.847
Amyl ether	2-Octanone	1.410	1.414	0.799	0.814
2,4-Dimethyldioxane	Allyl chloride	1.412	1.413	0.935	0.932
	Caproic acid	1.412	1.415	0.935	0.923

Solvent 1	Solvent 2	Refractive index 1	Refractive index 2	Density (g/ml) 1	Density (g/ml) 2
Diethyl malonate	Ethyl cyanoacetate	1.412	1.415	1.051	1.056
Allyl chloride	Capric acid	1.413	1.415	0.932	0.923
2-Octanone	3-Methyl-2-heptanone	1.414	1.415	0.814	0.818
	1-Hexanol	1.414	1.416	0.814	0.814
	2-Pentanol	1.414	1.416	0.814	0.826
	Caprylnitrile	1.414	1.418	0.814	0.810
	2-Heptanol	1.414	1.418	0.814	0.818
3-Octanone	3-Methyl-2-heptanone	1.414	1.415	0.830	0.818
	2-Pentanol	1.414	1.416	0.830	0.826
3-Methyl-2-heptanone	1-Hexanol	1.415	1.416	0.818	0.814
	2-Pentanol	1.415	1.416	0.818	0.826
	Caprylonitrile	1.415	1.418	0.818	0.810
	2-Heptanol	1.415	1.418	0.818	0.818
1-Hexanol	2-Pentanol	1.416	1.416	0.814	0.826
	Caprylonitrile	1.416	1.418	0.814	0.810
	2-Heptanol	1.416	1.418	0.814	0.818
	3-Methyl-2-pentanol	1.416	1.420	0.814	0.823
	2-Ethyl-1-butanol	1.416	1.420	0.814	0.829
2-Pentanol	2-Heptanol	1.416	1.418	0.826	0.818
	3-Methyl-2-pentanol	1.416	1.418	0.816	0.818
	2-Ethyl-1-butanol	1.416	1.420	0.826	0.829
Dibutylamine	Allylamine	1.416	1.419	0.756	0.758
Caprylonitrile	2-Heptanol	1.418	1.418	0.810	0.818
	3-Methyl-2-pentanol	1.418	1.420	0.810	0.823
	1-Heptanol	1.418	1.422	0.810	0.818
2-Heptanol	2-Methyl-2-pentanol	1.418	1.420	0.818	0.823
	2-Ethyl-1-butanol	1.418	1.420	0.818	0.829
	1-Heptanol	1.418	1.422	0.818	0.818
	3-Isopropyl-2-heptanone	1.418	1.423	0.818	0.815
Allylamine	Methylcyclohexane	1.419	1.421	0.758	0.765
3-Methyl-2-pentanol	2-Ethyl-1-butanol	1.420	1.420	0.823	0.829
	1-Heptanol	1.420	1.422	0.823	0.818
	3-Isopropyl-2-heptanone	1.420	1.423	0.815	0.815
2-Ethyl-1-butanol	1-Heptanol	1.420	1.420	0.829	0.818
	3-Isopropyl-2-heptanone	1.420	1.423	0.829	0.815
Methylcyclohexane	Cyclohexane	1.421	1.424	0.765	0.774
1-Heptanol	3-Isopropyl-2-heptanone	1.422	1.423	0.818	0.815
3-Isopropyl-2-heptanone	1-Octanol	1.423	1.427	0.815	0.821
	3-Methyl-2-pentanone	1.423	1.427	0.815	0.824
3-Chloro-2-methyl-1-propene	Caprylic acid	1.425	1.426	0.917	0.905
Caprylic acid	*N*-Methylalaninenitrile	1.426	1.429	0.905	0.895
1-Octanol	3-Methyl-2-pentanol	1.427	1.427	0.821	0.824
1-Chlorooctane	1-Chloro-2-ethylhexane	1.428	1.430	0.867	0.872
2-Methyl-7-ethylnonane	2-Methyl-7-ethyl-4-undecanone	1.433	1.435	0.830	0.832
Butyrolactone	Chloro-*t*-butanol	1.434	1.436	1.051	1.059
	1,3-Propanediol	1.434	1.438	1.051	1.049
	Diethyl maleate	1.434	1.438	1.051	1.064
4-*n*-Propyl-5-ethyldioxane	*N*-methylmorpholine	1.435	1.436	0.927	0.924
2-Methyl-7-ethyl-4-undecanone	2-Methyl-7-ethyl-4-nonanol	1.435	1.438	0.832	0.829
	6-Ethyl-2-nonanol	1.435	1.438	0.832	0.836
6-Ethyl-3-octanol	5-Ethyl-2-nonanol	1.435	1.438	0.832	0.830
Chloro-*t*-butanol	1,3-Propanediol	1.436	1.438	1.059	1.049
	Diethyl maleate	1.436	1.438	1.059	1.064
N-Methylmorpholine	Dibutyl sebacate	1.436	1.440	0.924	0.932

Solvent 1	Solvent 2	Refractive index 1	Refractive index 2	Density (g/ml) 1	Density (g/ml) 2
2-Methyl-7-ethyl-4-nonanol	5-Ethyl-2-nonanol	1.438	1.438	0.829	0.830
	6-Ethyl-3-octanol	1.438	1.438	0.829	0.836
	Butanethiol	1.438	1.440	0.829	0.837
	7-Methyl-7-ethyl-4-undecanol	1.438	1.442	0.829	0.829
	Ethyl sulfide	1.438	1.442	0.829	0.831
	6-Ethyl-3-decanol	1.438	1.441	0.829	0.838
5-Ethyl-2-nonanol	6-Ethyl-3-octanol	1.438	1.438	0.830	0.836
	Butanethiol	1.438	1.440	0.830	0.837
	2-Methyl-7-ethyl-4-undecanol	1.438	1.442	0.830	0.829
	Ethyl sulfide	1.438	1.442	0.830	0.831
	6-Ethyl-3-decanol	1.438	1.441	0.830	0.838
1,3-Propanediol	Diethyl maleate	1.438	1.438	1.049	1.064
Methyl salicylate	2-Methyl-7-ethyl-1-undecanol	1.438	1.442	0.836	0.829
	Ethyl sulfide	1.438	1.442	0.836	0.831
	Butanethiol	1.438	1.442	0.836	0.837
6-Ethyl-3-octanol	6-Ethyl-3-decanol	1.438	1.441	0.836	0.838
Butanethiol	6-Ethyl-3-decanol	1.440	1.441	0.837	0.838
	2-Methyl-7-ethyl-4-undecanol	1.440	1.442	0.837	0.829
	Ethyl sulfide	1.440	1.442	0.837	0.831
	Mesityl oxide	1.440	1.442	0.837	0.850
6-Ethyl-3-decanol	2-Methyl-7-ethyl-4-undecanol	1.441	1.442	0.838	0.829
	Ethyl sulfide	1.441	1.442	0.838	0.831
	Mesityl oxide	1.441	1.442	0.838	0.850
1-Chlorododecane (technical)	Mesityl oxide	1.441	1.442	0.862	0.850
	Butyl stearate	1.441	1.442	0.862	0.854
	1-Chlorotetradecane	1.441	1.445	0.862	0.858
2-Methyl-7-ethyl-4-undecanol	Ethyl sulfide	1.442	1.442	0.829	0.831
	2-Butyloctyl-3-aminopropyl ether	1.442	1.446	0.829	0.842
Mesityl oxide	Butyl stearate	1.442	1.442	0.850	0.854
	1-Chlorotetradecane	1.442	1.445	0.850	0.858
	2-Butyloctyl-3-aminopropyl ether	1.442	1.446	0.850	0.842
Butyl stearate	1-Chlorotetradecane	1.442	1.445	0.850	0.858
	2-Butyloctyl-3-aminopropyl ether	1.442	1.446	0.854	0.842
Ethyl sulfide	2-Butyloctyl-3-aminopropyl ether	1.442	1.446	0.831	0.842
1,3-Butanediol sulfite	1,2-Dichloroethane	1.444	1.444	1.231	1.245
	trans-1,2-Dichloroethylene	1.444	1.444	1.231	1.257
1,2-Dichloroethane	*trans*-1,2-Dichloroethylene	1.444	1.444	1.231	1.257
1-Chlorotetradecane	2-Butyloctyl-3-aminopropyl ether	1.445	1.446	0.857	0.842
	1-Chlorohexadecane	1.445	1.448	0.857	0.859
Diethylene glycol	Formamide	1.445	1.446	1.128	1.129
	Ethylene glycol diglycidyl ether	1.445	1.447	1.128	1.134
2-Butyloctyl-3-aminopropyl ether	3-Lauroxy-1-propylamine	1.446	1.447	0.842	0.840
Formamide	Ethylene glycol diglycidyl ether	1.446	1.447	1.129	1.134
2-Methylmorpholine	Cyclohexanone	1.446	1.448	0.951	0.943
	1-Amino-2-propanol	1.446	1.448	0.951	0.961
Dipropylene glycol monoethyl ether	Tetrahydrofurfuryl alcohol	1.446	1.450	1.043	1.050
1-Amino-2-methyl-2-pentanol	2-Butylcyclohexanone	1.449	1.453	1.050	1.047
3-Methyl-5-ethyl-2,4-heptanediol	2-Propylcyclohexanone	1.452	1.452	0.922	0.923
	4-Methylcyclohexanone	1.452	1.454	0.922	0.908
	2,2′-Dimethyl-2,2′-dipropyldiethanolamine	1.452	1.456	0.922	0.922
2-Propylcyclohexanone	4-Methylcyclohexanol	1.452	1.454	0.923	0.908
	3-Methylcyclohexanol	1.452	1.455	0.923	0.913
	2,2′-Dimethyl-2,2′-dipropyldiethanolamine	1.452	1.456	0.923	0.922
	1,8-Cineole	1.452	1.456	0.923	0.921

Solvent 1	Solvent 2	Refractive index 1	Refractive index 2	Density (g/ml) 1	Density (g/ml) 2
4-Methylcyclohexanol	2,2′-Dimethyl-2,2′-dipropyldiethanolamine	1.454	1.456	0.908	0.922
3-Methylcyclohexanol	2,2′-Dimethyl-2,2′-dipropyldiethanolamine	1.455	1.456	0.913	0.922
Cyclohexylamine	1-Chloroeicosane	1.456	1.459	0.862	0.872
1-Chloroeicosane (technical)	Oleic acid	1.459	1.459	0.872	0.887
Oleic acid	2-(β-Ethyl)butylcyclohexanone	1.459	1.461	0.887	0.892
	2-Butylcyclohexanol	1.459	1.462	0.887	0.898
	2-(β-Ethyl)hexylcyclohexanone	1.459	1.463	0.887	0.892
1,1′,2,2′-Tetramethyldiethanolamine	1-Aminopropanol	1.459	1.459	0.973	0.965
	N-(*n*-Butyl)diethanolamine	1.459	1.461	0.973	0.965
Carbon tetrachloride	4,5-Dichloro-1,3-dioxolane-2-one	1.459	1.461	1.584	1.591
2-(β-Ethyl)butylcyclohexanone	2,4-(bis)α-Phenylethyl)phenylmethyl ether	1.461	1.462	0.892	0.898
	2-(β-Ethyl)hexylcyclohexanone	1.461	1.463	0.892	0.892
N-(*n*-Butyl)diethanolamine	Cyclohexanol	1.461	1.465	0.965	0.968
2-Butylcyclohexanol	2-(β-Ethyl)hexylcyclohexanone	1.462	1.463	0.898	0.892
	2-Ethylcyclohexanol	1.462	1.463	0.898	0.908
N-β-Oxypropylmorpholine	Fluorobenzene	1.462	1.463	1.013	1.020
Fluorobenzene	*N*-(2-Hydroxyethyl)-2-hydroxybutyl amine	1.463	1.467	1.020	1.027
D-α-Pinene	1-α-Pinene	1.464	1.465	0.855	0.855
	trans-Decahydronaphthalene	1.464	1.468	0.855	0.867
m-Fluorotoluene	*p*-Fluorotoluene	1.465	1.467	0.994	0.995
1-α-Pinene	*trans*-Decahydronaphthalene	1.465	1.468	0.855	0.867
p-Fluorotoluene	*o*-Fluorotoluene	1.467	1.468	0.994	0.995
N-(2-Hydroxyethyl)-2-hydrobutylamine	*N*-(2-Hydroxyethyl)-2-hydropropylamine	1.467	1.468	1.027	1.042
	2-Allyloxy-2-hydroxypropylamine	1.467	1.469	1.027	1.017
	Di(2-Hydroxybutyl)ethanolamine	1.467	1.469	1.027	1.018
	Di(2-Hydroxypropyl)ethanolamine	1.467	1.469	1.027	1.042
2-Allyloxy-2-hydroxypropylamine	Di(2-Hydroxybutyl)ethanolamine	1.469	1.469	1.017	1.018
cis-Decahydronaphthalene	1-Methoxy-1-butene-3-yn	1.479	1.480	0.893	0.902
	n-Dodecyl-4-*t*-butylphenyl ether	1.479	1.482	0.893	0.881
	n-Dodecylphenyl ether	1.479	1.482	0.893	0.891
	n-Dodecyl-4-methylphenyl ether	1.479	1.483	0.893	0.889
1-Methoxy-1-butene-3-yn	*n*-Dodecylphenyl ether	1.480	1.482	0.902	0.891
	n-Dodecyl-4-methylphenyl ether	1.480	1.483	0.902	0.889
n-Dodecyl-4-*t*-butylphenyl ether	*n*-Dodecylphenyl ether	1.482	1.482	0.881	0.891
Butylbenzene	Dioctylbenzene (90% *p*; 10% *m*)	1.487	1.487	0.856	0.856
	p-Cymene	1.487	1.488	0.856	0.853
	Isopropylbenzene	1.487	1.489	0.856	0.857
	t-Butylbenzene (80% *p*, 15% *m*, 5% *o*)	1.487	1.490	0.856	0.856
	n-Propylbenzene	1.487	1.490	0.856	0.856
	s-Butylbenzene	1.487	1.490	0.856	0.856
	Hexyl-*m*-xylene	1.487	1.490	0.856	0.860
	t-Butylbenzene	1.487	1.490	0.856	0.862
	Isopropylethylbenzene (35% *p*, 60% *m*, 5% *o*)	1.487	1.491	0.856	0.856
p-Cymene	Isopropylbenzene	1.488	1.489	0.853	0.857
	t-Butylcumene (80% *p*, 15% *m*, 5% *o*)	1.488	1.490	0.853	0.856
	n-Propylbenzene	1.488	1.490	0.853	0.858
	s-Butylbenzene	1.488	1.490	0.853	0.858
	Hexyl-*m*-xylene (mainly 1,3,5)	1.488	1.490	0.853	0.860
	t-Butylbenzene	1.488	1.490	0.853	0.862
	Isopropylethylbenzene (35% *p*, 60% *m*, 5% *o*)	1.488	1.491	0.853	0.856
	t-Butyltoluene	1.488	1.491	0.853	0.858
	Hexylcumene (90% *p*, 5% *m*, 5% *o*)	1.488	1.492	0.853	0.863
	Octyltoluene (96% *p*, 2% *m*, 2% *o*)	1.488	1.492	0.853	0.866
Isopropylbenzene	*t*-Butylcumene (80% *p*, 15% *m*, 5% *o*)	1.489	1.490	0.857	0.856

Solvent 1	Solvent 2	Refractive index 1	Refractive index 2	Density (g/ml) 1	Density (g/ml) 2
	n-Propylbenzene	1.489	1.490	0.857	0.858
	s-Butylbenzene	1.489	1.490	0.857	0.858
	Hexyl-*m*-xylene (mainly 1,3,5)	1.489	1.490	0.857	0.860
	t-Butylbenzene	1.489	1.490	0.857	0.862
	Isopropylethylbenzene (35% *p*, 60% *m*, 5% *o*)	1.489	1.491	0.857	0.856
	t-Butylbenzene (80% *p*, 15% *m*, 5% *o*)	1.489	1.491	0.857	0.858
t-Butylcumene (80% *p*, 15% *m*, 5% *o*)	*n*-Propylbenzene	1.490	1.490	0.856	0.858
	s-Butylbenzene	1.490	1.490	0.856	0.858
	Hexyl-*m*-xylene (mainly 1,3,5)	1.490	1.490	0.856	0.860
	t-Butylbenzene	1.490	1.490	0.856	0.862
	Isopropylethylbenzene (35% *p*, 60% *m*, 5% *o*)	1.490	1.491	0.856	0.856
	t-Butyltoluene (80% *p*, 15% *m*, 5% *o*)	1.490	1.491	0.856	0.858
	Hexylcumene (90% *p*, 5% *m*, 5% *o*)	1.490	1.492	0.856	0.863
	Octyltoluene (96% *p*, 2% *m*, 2% *o*)	1.490	1.492	0.856	0.866
	Octylcumene (90% *p*, 4% *m*, 6% *o*)	1.490	1.492	0.856	0.869
	Dihexylbenzene	1.490	1.492	0.856	0.870
	p-Xylene	1.490	1.493	0.856	0.857
	1,3-Diethylbenzene	1.490	1.493	0.856	0.860
	t-Butyl-*m*-xylene (mainly 1,3,5)	1.490	1.493	0.856	0.862
	Ethylbenzene	1.490	1.493	0.856	0.863
	Octylethylbenzene (80–90% *p*, 10% *m*)	1.490	1.493	0.856	0.866
	Isopropyl-*m*-xylene (mainly 1,3,5)	1.490	1.494	0.856	0.860
	Toluene	1.490	1.494	0.856	0.862
n-Propylbenzene	*s*-Butylbenzene	1.490	1.490	0.858	0.858
	Hexyl-*m*-xylene (mainly 1,3,5)	1.490	1.490	0.858	0.860
	t-Butylbenzene	1.490	1.490	0.858	0.862
	Isopropylethylbenzene (35% *p*, 60% *m*, 5% *o*)	1.490	1.491	0.858	0.856
	t-Butyltoluene (80% *p*, 15% *m*, 5% *p*)	1.490	1.491	0.858	0.858
	Hexylcumene (90% *p*, 5% *m*, 5% *o*)	1.490	1.492	0.858	0.863
	Octyltoluene (96% *p*, 2% *m* 2% *o*)	1.490	1.492	0.858	0.866
	Octylcumene (90% *p*, 4% *m* 6% *o*)	1.490	1.492	0.858	0.869
	Dihexylbenzene	1.490	1.492	0.858	0.870
	p-Xylene	1.490	1.493	0.858	0.857
	1,3-Diethylbenzene	1.490	1.493	0.858	0.860
	t-Butyl-*m*-xylene (mainly 1,3,5)	1.490	1.493	0.858	0.862
	Ethylbenzene	1.490	1.493	0.858	0.863
	Octylethylbenzene (80–90% *p*, 10% *m*)	1.490	1.493	0.858	0.866
	Isopropyl-*m*-xylene (mainly 1,3,5)	1.490	1.494	0.858	0.860
	Toluene	1.490	1.494	0.858	0.862
s-Butylbenzene	Hexyl-*m*-xylene (mainly 1,3,5)	1.490	1.490	0.858	0.860
	t-Butylbenzene	1.490	1.490	0.858	0.862
	Isopropylethylbenzene (35% *p*, 60% *m*, 5% *o*)	1.490	1.491	0.858	0.856
	t-Butyltoluene (80% *p*, 15% *m*, 5% *o*)	1.490	1.491	0.858	0.858
	Hexylcumene (90% *p*, 5% *m*, 5% *o*)	1.490	1.492	0.858	0.863
	Octyltoluene (96% *p*, 2% *m*, 2% *o*)	1.490	1.492	0.858	0.866
	Octylcumene (90% *p*, 4% *m*, 6% *o*)	1.490	1.492	0.858	0.869
	Dihexylbenzene	1.490	1.492	0.858	0.870
	p-Xylene	1.490	1.493	0.858	0.857
	1,3-Diethylbenzene	1.490	1.493	0.858	0.860
	t-Butyl-*m*-xylene (mainly 1,3,5)	1.490	1.493	0.858	0.862
	Ethylbenzene	1.490	1.493	0.858	0.863
	Octylethylbenzene (80–90% *p*, 10% *m*)	1.490	1.493	0.858	0.866

Solvent 1	Solvent 2	Refractive index 1	Refractive index 2	Density (g/ml) 1	Density (g/ml) 2
	Isopropyl-*m*-xylene (mainly 1,3,5)	1.490	1.494	0.858	0.860
	Toluene	1.490	1.494	0.858	0.862
Hexyl-*m*-xylene (mainly 1,3,5)	*t*-Butylbenzene	1.490	1.490	0.860	0.862
	Isopropylethylbenzene (35% *p*, 60% *m*, 5% *o*)	1.490	1.491	0.860	0.856
	t-Butyltoluene (80% *p*, 15% *m*, 5% *o*)	1.490	1.491	0.860	0.858
	Hexylcumene (90% *p*, 5% *m*, 5% *o*)	1.490	1.492	0.860	0.863
	Octyltoluene (96% *p*, 2% *m*, 2% *o*)	1.490	1.492	0.860	0.866
	Octylcumene (90% *p*, 4% *m*, 6% *o*)	1.490	1.492	0.860	0.869
	Dihexylbenzene	1.490	1.492	0.860	0.870
	p-Xylene	1.490	1.493	0.860	0.857
	1,3-Diethylbenzene	1.490	1.493	0.860	0.860
	t-Butyl-*m*-xylene (mainly 1,3,5)	1.490	1.493	0.860	0.862
	Ethylbenzene	1.490	1.493	0.860	0.863
	Octylethylbenzene (80–90% *p*, 10% *m*)	1.490	1.493	0.860	0.866
	Isopropyl-*m*-xylene (mainly 1,3,5)	1.490	1.494	0.860	0.860
	Toluene	1.490	1.494	0.860	0.862
t-Butylbenzene	Isopropylethylbenzene (35% *p*, 60% *m*, 5% *o*)	1.490	1.491	0.862	0.856
	t-Butyltoluene (80% *p*, 15% *m*, 5% *o*)	1.490	1.491	0.862	0.858
	Hexylcumene (90% *p*, 5% *m*, 5% *o*)	1.490	1.492	0.862	0.863
	Octyltoluene (96% *p*, 2% *m*, 2% *o*)	1.490	1.492	0.862	0.866
	Octylcumene (90% *p*, 4% *m*, 6% *o*)	1.490	1.492	0.862	0.869
	Dihexylbenzene	1.490	1.492	0.862	0.870
	p-Xylene	1.490	1.493	0.862	0.857
	1,3-Diethylbenzene	1.490	1.493	0.862	0.860
	t-Butyl-*m*-xylene (mainly 1,3,5)	1.490	1.493	0.862	0.862
	Ethylbenzene	1.490	1.493	0.862	0.863
	Octylethylbenzene (80–90% *p*, 10% *m*)	1.490	1.493	0.862	0.866
	Isopropyl-*m*-xylene (mainly 1,3,5)	1.490	1.494	0.862	0.860
	Toluene	1.490	1.494	0.862	0.862
Isopropylethylbenzene (35% *p*, 60% *m*)	Hexylcumene (90% *p*, 5% *m*, 5% *o*)	1.491	1.492	0.858	0.863
	Octyltoluene (96% *p*, 2% *m*, 2% *o*)	1.491	1.492	0.858	0.866
	Octylcumene (90% *p*, 4% *m*, 6% *o*)	1.491	1.492	0.858	0.869
	Dihexylbenzene	1.491	1.492	0.858	0.870
	p-Xylene	1.491	1.493	0.858	0.857
	1,3-Diethylbenzene	1.491	1.493	0.858	0.860
	t-Butyl-*m*-xylene (mainly 1,3,5)	1.491	1.493	0.858	0.862
	Ethylbenzene	1.491	1.493	0.858	0.863
	Octylethylbenzene (80–90% *p*, 10% *m*)	1.491	1.493	0.858	0.866
	Isopropyl-*m*-xylene (mainly 1,3,5)	1.491	1.494	0.858	0.860
	Toluene	1.491	1.494	0.858	0.862
	t-Butylethylbenzene (70% *p*, 25% *m*, 5% *o*)	1.491	1.495	0.858	0.854
	m-Xylene	1.491	1.495	0.858	0.860
	Hexylethylbenzene	1.491	1.495	0.858	0.868
t-Butyltoluene (85% *p*, 10% *m*)	Hexylcumene (90% *p*, 5% *m*, 5% *o*)	1.491	1.492	0.858	0.863
	Octyltoluene (96% *p*, 2% *m*, 2% *o*)	1.491	1.492	0.856	0.866
	Octylcumene (90% *p*, 4% *m*, 6% *o*)	1.491	1.492	0.856	0.869
	Dihexylbenzene	1.491	1.492	0.856	0.870
	p-Xylene	1.491	1.493	0.856	0.857
	1,3-Diethylbenzene	1.491	1.493	0.856	0.860
	t-Butyl-*m*-xylene (mainly 1,3,5)	1.491	1.493	0.856	0.862
	Ethylbenzene	1.491	1.493	0.856	0.863
	Octylethylbenzene (80–90% *p*, 10% *m*)	1.491	1.493	0.856	0.866
	Isopropyl-*m*-xylene (mainly 1,3,5)	1.491	1.494	0.856	0.860
	Toluene	1.491	1.494	0.856	0.862

Solvent 1	Solvent 2	Refractive index 1	Refractive index 2	Density (g/ml) 1	Density (g/ml) 2
	t-Butylethylbenzene (70% *p*, 25% *m*, 5% *o*)	1.491	1.495	0.856	0.854
	m-Xylene	1.491	1.495	0.856	0.860
	Hexylethylbenzene(70% *p*, 25% *m*, 5% *o*)	1.491	1.495	0.856	0.868
1-Phenyl-1-hydroxyphenyl ether	1,3-Dimorpholyl-2-propanol	1.491	1.493	1.081	1.094
Hexylcumene (90% *p*, 5% *m*)	Octyltoluene (96% *p*, 2% *m*, 2% *o*)	1.492	1.492	0.863	0.866
	Octylcumene (90% *p*, 4% *m*, 6% *o*)	1.492	1.492	0.863	0.869
	Dihexylbenzene	1.492	1.492	0.863	0.870
	p-Xylene	1.492	1.493	0.863	0.857
	1,3-Diethylbenzene	1.492	1.493	0.863	0.860
	t-Butyl-*m*-xylene (mainly 1,3,5)	1.492	1.493	0.863	0.862
	Ethylbenzene	1.492	1.493	0.863	0.863
	Octylethylbenzene (80–90% *p*, 10% *m*)	1.492	1.493	0.863	0.866
	Isopropyl-*m*-xylene (mainly 1,3,5)	1.492	1.494	0.863	0.860
	Toluene	1.492	1.494	0.863	0.862
	t-Butylethylbenzene (70% *p*, 25% *m*, 5% *o*)	1.492	1.495	0.863	0.854
	m-Xylene	1.492	1.495	0.863	0.860
	Hexylethylbenzene (70% *p*, 25% *m*, 5% *o*)	1.492	1.495	0.863	0.868
	1,4-Diethylbenzene	1.492	1.496	0.863	0.858
	Isopropylbenzene	1.492	1.498	0.863	0.857
Dihexylbenzene (85% *p*, 10% *m*)	Octylcumene (90% *p*, 4% *m*, 6% *0*)	1.492	1.492	0.870	0.869
	p-Xylene	1.492	1.493	0.870	0.857
	1,3-Diethylbenzene	1.492	1.493	0.870	0.860
	t-Butyl-*m*-xylene (mainly 1,3,5)	1.492	1.493	0.870	0.862
	Ethylbenzene	1.492	1.493	0.870	0.863
	Octylethylbenzene (80–90% *p*, 10% *m*)	1.492	1.493	0.870	0.866
	Isopropyl-*m*-xylene (mainly 1,3,5)	1.492	1.494	0.870	0.860
	Toluene	1.492	1.494	0.870	0.862
	m-Xylene	1.492	1.495	0.870	0.860
	Hexylethylbenzene (70% *p*, 25% *m*, 5% *o*)	1.492	1.495	0.870	0.868
	1,4-Diethylbenzene	1.492	1.496	0.870	0.858
	Isopropylbenzene	1.492	1.498	0.870	0.857
Octyltoluene (96% *p*, 2% *m*)	Octylcumene (90% *p*, 4% *m*, 6% *o*)	1.492	1.492	0.866	0.869
	Dihexylbenzene (85% *p*, 10% *m*, 5% *o*)	1.492	1.492	0.866	0.870
	p-Xylene	1.492	1.493	0.866	0.857
	t-Butyl-*m*-xylene (mainly 1,3,5)	1.492	1.493	0.866	0.862
	Ethylbenzene	1.492	1.493	0.866	0.863
	Octylethylbenzene (80–90% *p*, 10% *m*)	1.492	1.493	0.866	0.866
	Isopropyl-*m*-xylene (mainly 1,3,5)	1.492	1.494	0.866	0.860
	Toluene	1.492	1.494	0.866	0.862
	t-Butylethylbenzene (70% *p*, 25% *m*, 5% *o*)	1.492	1.495	0.866	0.854
	m-Xylene	1.492	1.495	0.866	0.860
	Hexylethylbenzene (70% *p*, 25% *m*, 5% *o*)	1.492	1.495	0.866	0.868
	1,4-Diethylbenzene	1.492	1.496	0.866	0.858
	Isopropylbenzene	1.492	1.498	0.866	0.857
Octylcumene (90% *p*, 4% *m*, 6% *o*)	*p*-Xylene	1.492	1.493	0.866	0.857
	1,3-Diethylbenzene	1.492	1.493	0.866	0.860
	t-Butyl-*m*-xylene (mainly 1,3,5)	1.492	1.493	0.866	0.862
	Ethylbenzene	1.492	1.493	0.866	0.863
	Octylethylbenzene (80–90% *p*, 10% *m*)	1.492	1.493	0.866	0.866
	Isopropyl-*m*-xylene (mainly 1,3,5)	1.492	1.494	0.866	0.860
	Toluene	1.492	1.494	0.866	0.862
	t-Butylethylbenzene (70% *p*, 25% *m*, 5% *o*)	1.492	1.495	0.866	0.854
	m-Xylene	1.492	1.495	0.866	0.860
	Hexylethylbenzene (70% *p*, 25% *m*, 5% *o*)	1.492	1.495	0.866	0.868

Solvent 1	Solvent 2	Refractive index 1	Refractive index 2	Density (g/ml) 1	Density (g/ml) 2
	1,4-Diethylbenzene	1.492	1.496	0.866	0.858
	Isopropylbenzene	1.492	1.498	0.866	0.857
p-Xylene	1,3-Diethylbenzene	1.493	1.493	0.857	0.860
	t-Butyl-*m*-xylene (mainly 1,3,5)	1.493	1.493	0.857	0.862
	Ethylbenzene	1.493	1.493	0.857	0.863
	Octylethylbenzene (80–90% *p*, 10% *m*)	1.493	1.493	0.857	0.866
	Isopropyl-*m*-xylene (mainly 1,3,5)	1.493	1.494	0.857	0.860
	Toluene	1.493	1.494	0.857	0.862
	t-Butylethylbenzene (70% *p*, 25% *m*, 5% *o*)	1.493	1.495	0.857	0.854
	m-Xylene	1.493	1.495	0.857	0.860
	Hexylethylbenzene (70% *p*, 25% *m*, 5% *o*)	1.493	1.495	0.857	0.868
	1,4-Diethylbenzene	1.493	1.496	0.857	0.858
	Mesitylene	1.493	1.497	0.857	0.861
	Isopropylbenzene	1.493	1.498	0.857	0.857
1,3-Diethylbenzene	*t*-Butyl-*m*-xylene (mainly 1,3,5)	1.493	1.493	0.860	0.862
	Ethylbenzene	1.493	1.493	0.860	0.863
	Octyltoluene (96% *p*, 2% *m*, 2% *o*)	1.493	1.493	0.860	0.866
	Octylethylbenzene (80–90% *p*, 10% *m*)	1.493	1.493	0.860	0.866
	Isopropyl-*m*-xylene (mainly 1,3,5)	1.493	1.494	0.860	0.860
	Toluene	1.493	1.494	0.860	0.862
	t-Butylethylbenzene (70% *p*, 25% *m*, 5% *o*)	1.493	1.495	0.860	0.854
	m-Xylene	1.493	1.495	0.860	0.860
	1,4-Diethylbenzene	1.493	1.496	0.860	0.858
	Mesitylene	1.493	1.497	0.860	0.861
	Hexyltoluene (70% *p*, 25% *m*, 5% *o*)	1.493	1.497	0.860	0.870
	Isopropylbenzene	1.493	1.498	0.860	0.860
t-Butyl-*m*-xylene (mainly 1,3,5)	Ethylbenzene	1.493	1.493	0.862	0.863
	Octylethylbenzene (80–90% *p*, 10% *m*)	1.493	1.493	0.862	0.866
	Isopropyl-*m*-xylene (mainly 1,3,5)	1.493	1.494	0.862	0.860
	Toluene	1.493	1.494	0.862	0.862
	t-Butylethylbenzene (70% *p*, 25% *m*, 5% *o*)	1.493	1.495	0.862	0.854
	m-Xylene	1.493	1.495	0.862	0.860
	Hexylethylbenzene (70% *p*, 25% *m*, 5% *o*)	1.493	1.495	0.862	0.868
	1,4-Diethylbenzene	1.493	1.496	0.862	0.858
	Mesitylene	1.493	1.497	0.862	0.861
	Hexyltoluene (70% *p*, 25% *m*, 5% *o*)	1.493	1.497	0.862	0.870
	Isopropylbenzene	1.493	1.498	0.862	0.857
Ethylbenzene	Octylethylbenzene (80–90% *p*, 10% *m*)	1.493	1.493	0.863	0.866
	Isopropyl-*m*-xylene (mainly 1,3,5)	1.493	1.494	0.863	0.860
	Toluene	1.493	1.494	0.863	0.862
	t-Butylethylbenzene (70% *p*, 25% *m*, 5% *o*)	1.493	1.495	0.863	0.854
	m-Xylene	1.493	1.495	0.863	0.860
	Hexylethylbenzene (70% *p*, 25% *m*, 5% *o*)	1.493	1.495	0.863	0.868
	1,4-Diethylbenzene	1.493	1.496	0.863	0.858
	Mesitylene	1.493	1.497	0.863	0.861
	Hexyltoluene (70% *p*, 25% *m*, 5% *o*)	1.493	1.497	0.863	0.870
	Isopropylbenzene	1.493	1.498	0.863	0.857
Octylethylbenzene (80–90% *p*, 10% *m*)	Isopropyl-*m*-xylene (mainly 1,3,5)	1.493	1.494	0.866	0.860
	Toluene	1.493	1.494	0.866	0.862
	t-Butylethylbenzene (70% *p*, 25% *m*, 5% *o*)	1.493	1.495	0.866	0.854
	m-Xylene	1.493	1.495	0.866	0.860
	Hexylethylbenzene (70% *p*, 25% *m*, 5% *o*)	1.493	1.495	0.866	0.868
	1,4-Diethylbenzene	1.493	1.496	0.866	0.858
	Mesitylene	1.493	1.497	0.866	0.861

Solvent 1	Solvent 2	Refractive index 1	Refractive index 2	Density (g/ml) 1	Density (g/ml) 2
	Hexyltoluene (70% *p*, 25% *m*, 5% *o*)	1.493	1.497	0.866	0.870
	Isopropylbenzene	1.493	1.498	0.866	0.857
Isopropyl-*m*-xylene (mainly 1,3,5)	Toluene	1.494	1.494	0.860	0.862
	t-Butylethylbenzene (70% *p*, 25% *m*, 5% *o*)	1.494	1.495	0.860	0.854
	m-Xylene	1.494	1.495	0.860	0.860
	Hexylethylbenzene (70% *p*, 25% *m*, 5% *o*)	1.494	1.495	0.860	0.868
	1,4-Diethylbenzene	1.494	1.496	0.860	0.858
	Mesitylene	1.494	1.497	0.860	0.861
	Hexyltoluene (70% *p*, 25% *m*, 5% *o*)	1.494	1.497	0.860	0.870
	Benzene	1.494	1.498	0.860	0.874
Toluene	*t*-Butylethylbenzene (70% *p*, 25% *m*, 5% *o*)	1.494	1.495	0.862	0.854
	m-Xylene	1.494	1.495	0.862	0.860
	Hexylethylbenzene (70% *p*, 25% *m*, 5% *o*)	1.494	1.495	0.862	0.868
	1,4-Diethylbenzene	1.494	1.496	0.862	0.858
	Mesitylene	1.494	1.497	0.862	0.861
	Hexyltoluene (70% *p*, 25% *m*, 5% *o*)	1.494	1.497	0.862	0.870
	Benzene	1.494	1.498	0.862	0.874
t-Butylethylbenzene (70% *p*, 25% *m*)	*m*-Xylene	1.495	1.495	0.854	0.860
	1,4-Diethylbenzene	1.495	1.496	0.854	0.858
	Mesitylene	1.495	1.497	0.854	0.861
m-Xylene	Hexylethylbenzene (70% *p*, 25% *m*, 5% *o*)	1.495	1.495	0.860	0.868
	1,4-Diethylbenzene	1.495	1.496	0.860	0.858
	Mesitylene	1.495	1.497	0.860	0.861
	Benzene	1.495	1.498	0.860	0.874
Hexylethylbenzene (70% *p*, 25% *m*)	1,4-Diethylbenzene	1.495	1.496	0.868	0.858
	Mesitylene	1.495	1.497	0.868	0.861
	Hexyltoluene (70% *p*, 25% *m*, 5% *o*)	1.495	1.497	0.868	0.870
	Benzene	1.495	1.498	0.868	0.874
1,4-Diethylbenzene	Mesitylene	1.496	1.497	0.858	0.861
	Hexyltoluene (70% *p*, 25% *m*, 5% *o*)	1.496	1.498	0.858	0.870
Mesitylene	Ethylbenzene	1.497	1.497	0.861	0.870
Hexyltoluene (70% *p*, 25% *m*)	Benzene	1.497	1.498	0.870	0.874
	1,2-Diethylbenzene	1.497	1.501	0.870	0.876
Benzene	Mesitylene	1.498	1.498	0.874	0.874
	1,2-Diethylbenzene	1.498	1.501	0.874	0.876
Mesitylene	1,2-Diethylbenzene	1.498	1.501	0.874	0.876
1,2-Diethylbenzene	*o*-Xylene	1.501	1.503	0.867	0.876
β-Picoline	Phenetole	1.504	1.505	0.953	0.961
Phenetole	Pyridine	1.505	1.507	0.961	0.978
Cyclohexylcumene (50% *p*, 20% *m*)	Cyclohexylethylbenzene (60% *p*, 20% *m*, 20% *o*)	1.516	1.520	0.917	0.923
Benzyl acetate	Chloro-*t*-butylbenzene	1.518	1.521	1.051	1.039
Cyclohexylethylbenzene (60% *p*, 20% *m*)	Cyclohexyltoluene	1.520	1.523	0.923	0.923
2-Furfurol	Thiophene	1.524	1.526	1.057	1.059
Benzyl alcohol	*m*-Cresol	1.538	1.542	1.041	1.037
m-Cresol	Benzaldehyde	1.542	1.544	1.037	1.041
m-Toluidine	*o*-Toluidine	1.566	1.570	0.985	0.994

Refractive Indices of Common Solvents

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A. INTRODUCTION

Measurements which depend on the difference in refractive index between the polymer and the solvent will, in general, give greater accuracy as the refractive index increment between polymer and solvent is increased. The magnitude of the increment may be either positive or negative. Systems involving refractive index increments are those of light scattering and ultracentrifugation when either schlieren or interference optics is used. A table of commonly used solvents, arranged according to increasing refractive index, will be useful in practical work with many different polymers. Data at 25°C, D-line.

B. TABLE OF REFRACTIVE INDICES OF COMMON SOLVENTS

Solvents	Refractive index
Trifluoroacetic acid	1.283
Trifluoroethanol	1.290
Octafluoro-1-pentanol	1.316
Dodecafluoro-1-heptanol	1.316
Methanol	1.326
Acetonitrile	1.342
Ethyl ether	1.352
Acetone	1.357
Ethyl formate	1.358
Ethanol	1.359
Methyl acetate	1.360
Propionitrile	1.363
2,2-Dimethylbutane	1.366
Isopropyl ether	1.367
2-Methylpentane	1.369
Formic acid	1.369
Ethyl acetate	1.370
Acetic acid	1.370
Propionaldehyde	1.371
n-Hexane	1.372
2,3-Dimethylbutane	1.372
3-Methylpentane	1.374
2-Propanol	1.375
Isopropyl acetate	1.375
Propyl formate	1.375
2-Chloropropane	1.376
2-Butanone	1.377
Butyraldehyde	1.378
2,4-Dimethylpentane	1.379
Propyl ether	1.379
Acetaldehyde diethyl acetal	1.379
Butyl ethyl ether	1.380
Nitromethane	1.380
Trifluoropropanol	1.381
2-Methylhexane	1.382
Butyronitrile	1.382
Propyl acetate	1.382
Ethyl propionate	1.382
2-Methyl-2-propanol	1.383
Propanol	1.383
Isobutyl formate	1.383
Diethyl carbonate	1.383
Heptane	1.385
t-Butanol	1.385
Propionic acid	1.385
3-Methylhexane	1.386
Propylamine	1.386
3-Methyl-2-butanone	1.386
1-Chloropropane	1.386
2,2,3-Trimethylbutane	1.387
s-Butyl acetate	1.387
Butyl formate	1.387
Isobutyl acetate	1.388
2,2,4-Trimethylpentane	1.389
2,3-Dimethylpentane	1.389
Acetic anhydride	1.389
Diisopropylamine	1.390
2-Butylamine	1.390
2-Pentanone	1.390
3-Pentanone	1.390
Nitroethane	1.390
Methyl *n*-butyrate	1.391
Butyl acetate	1.392
2-Nitropropane	1.392
4-Methyl-2-propanone	1.394
2-Methyl-1-propanol	1.394
Octane	1.395

Solvents	Refractive index
Isobutylamine	1.395
Valeronitrile	1.395
2-Butanol	1.395
2-Hexanone	1.395
2-Chlorobutane	1.395
Butyric acid	1.396
2,2,5-Trimethylhexane	1.397
Dibutyl ether	1.397
Butanol	1.397
Acrolein	1.397
1-Chloro-2-methylpropane	1.397
Methacrylonitrile	1.398
3-Methyl-2-pentanone	1.398
Triethylamine	1.399
Butylamine	1.399
2,4-Dimethyl-3-pentanone	1.399
Isobutyl *n*-butyrate	1.399
1-Nitropropane	1.399
Dodecane	1.400
Amyl acetate	1.400
1-Chlorobutane	1.400
2-Methoxyethanol	1.400
Propionic anhydride	1.400
2,2,3-Trimethylpentane	1.401
1-Chlorobutane	1.401
β-Methoxypropionitrile	1.401
Isovaleric acid	1.402
Nonane	1.403
Dipropylamine	1.403
Isoamyl acetate	1.403
Cyclopentane	1.404
2-Methyl-2-butanol	1.404
3-Methyl-1-butanol	1.404
Tetrahydrofuran	1.404
Capronitrile	1.405
4-Heptanone	1.405
2-Ethoxyethanol	1.405
2-Heptanone	1.406
Valeric acid	1.406
Diisobutylene	1.407
Methylcyclopentane	1.407
Isoamyl ether	1.405
2-Pentanol	1.407
Tributyl borate	1.407
Pentanol	1.408
3-Methyl-2-butanol	1.408
Diethyl oxalate	1.408
Decane	1.409
4-Methyl-2-pentanol	1.409
3-Isopropyl-2-pentanone	1.409
2-Methyl-1-butanol	1.409
Butyric anhydride	1.409
Amyl ether	1.410
Isoamyl isovalerate	1.410
1-Chloropentane	1.410
Allyl alcohol	1.411

Solvents	Refractive index
2,4-Dimethyldioxane	1.412
Ethyl lactate	1.412
Diethyl malonate	1.412
3-Chloropropene	1.413
Ethylene glycol diacetate	1.413
2-Octanone	1.414
3-Octanone	1.414
3-Methyl-2-heptanone	1.415
Caproic acid	1.415
4-Methyldioxane	1.415
1,2-Propylene glycol monobutyl ether	1.415
Ethyl cyanoacetate	1.415
Dibutylamine	1.416
Hexanol	1.416
2-Pentanol	1.416
1,1-Dichloroethane	1.416
Heptachlorodiethyl ether	1.416
3-Methoxypropylamine	1.417
Caprylonitrile	1.418
2-Heptanol	1.418
Allylamine	1.419
1,2-Propylene glycol carbonate	1.419
2-Heptanol	1.420
3-Methyl-2-pentanol	1.420
2-Ethyl-1-butanol	1.420
1-Chloro-2-methyl-1-propene	1.420
1,4-Dioxane	1.420
Methylcyclopropane	1.421
4-Hydroxy-4-methyl-2-pentanone	1.421
Heptanol	1.422
3-Isopropyl-2-heptanone	1.423
Cyclohexane	1.424
2-Bromopropane	1.424
3-Chloro-2-methyl-1-propene	1.425
Caprylic acid	1.426
Ethylene carbonate	1.426
Octanol	1.427
3-Methyl-2-heptanol	1.427
N,N-Dimethylformamide	1.427
Sulfuric acid	1.427
1-Chlorooctane	1.428
Triisobutylene	1.429
N-Methylalaninenitrile	1.429
1,2-Ethanediol	1.429
1-Chloro-2-ethylhexane	1.430
Ethylcyclohexane	1.431
1,2-Propanediol	1.431
1-Bromopropane	1.431
2-Methyl-7-ethyl-4-nonanone	1.433
Ethylene glycol monoallyl ether	1.434
Butyrolactone	1.434
2-Methyl-7-ethyl-undecanone	1.435
1,2-Dichloroisobutane	1.435
1,2-Propylene glycol sulfite	1.435
N-Methylmorpholine	1.436
Chloro-*t*-butanol	1.436

Solvents	Refractive index
Epichlorohydrin	1.436
Triethylene glycol monobutyl ether	1.437
2-Methyl-7-ethyl-4-nonanol	1.438
5-Ethyl-2-nonanol	1.438
6-Ethyl-3-octanol	1.438
1,3-Propanediol	1.438
Diethyl maleate	1.438
Butanethiol	1.440
Dibutyl sebacate	1.440
2-Chloroethanol	1.440
6-Ethyl-3-decanol	1.441
1-Chlorododecane	1.441
3-Methyl-2,4-pentanediol	1.441
Dimethyl maleate	1.441
2-Methyl-7-ethyl-4-undecanol	1.442
Ethyl sulfide	1.442
Mesityl oxide	1.442
Butyl stearate	1.442
Cyclohexene	1.443
Lauryl glycidyl ether	1.443
Dibutyl maleate	1.444
1,3-Butylene glycol sulfite	1.444
1,2-Dichloroethane	1.444
Glycol sulfite	1.444
Chloroform	1.444
1-Chlorotetradecane	1.445
Diethylene glycol	1.445
cis-1,2-Dichloroethylene	1.445
2-Butyloctyl-3-aminopropyl ether	1.446
2-Methylmorpholine	1.446
Formamide	1.446
3-Lauryl-1-hydroxypropylamine	1.447
Ethylene glycol diglycidyl ether	1.447
1-Chlorohexanedecane	1.448
Cyclohexanone	1.448
1-Amino-2-propanol	1.448
Diethylene glycol mono-β-hydroxyisopropyl ether	1.448
1-Amino-2-methyl-2-pentanol	1.449
Tetrahydrofurfuryl alcohol	1.450
2-Propylcyclohexanone	1.452
2-Aminoethanol	1.452
1,4-Butanediol glycidyl ether	1.452
4-Chloro-1,3-dioxolane-2-one	1.452
1-Chlorooctadecane	1.453
2-Butylcyclohexanone	1.453
Ethylenediamine	1.454
2-(β-Methyl)propylcyclohexanone	1.454
4-Methylcyclohexanol	1.454
3-Methylcyclohexanol	1.455
Bis(2-chloroethyl) ether	1.455
Cyclohexyl methacrylate	1.456
1,8-Cineole	1.456
2,2′-Dimethyl-2,2′-dipropyl diethanolamine	1.456
1,3-Butanediol glycidyl ether	1.456

Solvents	Refractive index
1-Chloroeicosane	1.459
Oleic acid	1.459
(1,1′,2,2′-Tetramethyl) diethanolamine	1.459
3-Aminopropanol	1.459
Carbon tetrachloride	1.459
3-Methyl-5-ethyl-2,4-heptanediol	1.459
2-(β-Ethyl)butylcyclohexanone	1.461
2-Methylcyclohexanol	1.461
N-(*n*-Butyl)diethanolamine	1.461
4,5-Dichloro-1,3-dioxolane-2-one	1.462
2-Butylcyclohexanol	1.462
N-β-Hydroxypropylmorpholine	1.462
2-(β-Ethyl)hexylcyclohexanone	1.463
2-Ethylcyclohexanol	1.463
Fluorobenzene	1.463
D-α-Pinene	1.464
L-α-Pinene	1.465
Cyclohexanol	1.465
m-Fluorotoluene	1.465
p-Fluorotoluene	1.467
N-(2-Hydroxyethyl)-2-hydroxybutylamine	1.467
4-Chloromethyl-1,3-dioxolane-2-one	1.467
trans-Decahydronaphthalene	1.468
o-Fluorotoluene	1.468
N-(2-Hydroxyethyl)-2-hydroxypropylamine	1.468
3-Allyloxy-2-hydroxypropylamine	1.469
Di(2-hydroxybutyl)ethanolamine	1.469
Di(2-hydroxypropyl)ethanolamine	1.469
D-Limonene	1.471
2-(α-Hydroxybutyl)cyclohexanol	1.473
1,2,3-Trichloroisobutane	1.473
Decahydronaphthalene	1.474
1,2,3-Propanetriol	1.475
Trichloroethylene	1.474
N-(β-Hydroxyethyl)morpholine	1.476
Dimethyl sulfoxide	1.476
cis-Decahydronaphthalene	1.479
2-(α-Hydroxyethyl)cyclohexanol	1.479
1-Methoxy-1-butene-3-yn	1.480
2-Butylidenecyclohexanone	1.481
N-(β-Chloroallyl)morpholine	1.481
n-Dodecyl-4-*t*-butyl phenyl ether	1.482
n-Dodecyl phenyl ether	1.482
n-Dodecyl 4-methylphenyl ether	1.483
N-Hydroxyethyl-1,3-propanediamine	1.483
Morpholyl *N*-(ethylhydroxy)ethylamine	1.485
2-Ethylidenecyclohexanone	1.486
Butylbenzene	1.487
Dioctylbenzene (90% *p*, 10% *m*)	1.487
p-Cymene	1.488
Isopropylbenzene	1.489
Furfuryl alcohol	1.489
t-Butylcumene (80% *p*, 15% *m*, 5% *o*)	1.490
n-Propylbenzene	1.490

Solvents	Refractive index
s-Butylbenzene	1.490
Hexyl-*m*-xylene (mainly 1,3,5)	1.490
t-Butylbenzene	1.490
Dibutyl phthalate	1.490
Isopropylethylbenzene (35% *p*, 60% *m*, 5% *o*)	1.491
t-Butyltoluene (85% *p*, 10% *m*, 5% *o*)	1.491
1-Phenyl-1-hydroxyphenyl ethane	1.491
Hexylcumene (90% *p*, 5% *m*, 5% *o*)	1.492
Octyltoluene (96% *p*, 2% *m*, 2% *o*)	1.492
Octylcumene (90% *p*, 4% *m*, 6% *o*)	1.493
Dihexylbenzene (85% *p*, 10% *m*, 5% *o*)	1.492
p-Xylene	1.493
1,3-Diethylbenzene	1.493
t-Butyl-*m*-xylene (mainly 1,3,5)	1.493
Ethylbenzene	1.493
Octylethylbenzene (80–90% *p*, 10% *m*)	1.493
1,3-Dimorpholyl-2-propanol	1.493
1,1,2,2-Tetrachloroethane	1.493
Isopropyl-*m*-xylene (mainly 1,3,5)	1.494
Toluene	1.494
Benzyl ethyl ether	1.494
t-Butylethylbenzene (70% *p*, 25% *m*, 5% *o*)	1.495
m-Xylene	1.495
Hexylethylbenzene (70% *p*, 25% *m*, 5% *o*)	1.495
1,4-Diethylbenzene	1.496
2,3-Dichlorodioxane	1.496
Mesitylene	1.497
Hexyltoluene (90% *p*, 5% *m*, 5% *o*)	1.497
2-Iodopropane	1.497
Benzene	1.498
Propyl benzoate	1.498
α-Picoline	1.499
1,2-Diethylbenzene	1.501
Pentachloroethane	1.501
1-Iodopropane	1.502
o-Xylene	1.503
Ethyl benzoate	1.503
β-Picoline	1.504
Tetrachloroethylene	1.504
Phenetole	1.505
Pyridine	1.507
Iodoethane	1.512
Phenyl methallyl ether	1.514
Anisole	1.515
Methyl benzoate	1.515
Cyclohexylcumene (60% *p*, 25% *m*, 15% *o*)	1.516
Diallyl phthalate	1.517
Benzyl acetate	1.518
Cyclohexylethylbenzene (70% *p*, 20% *m*, 20% *o*)	1.520
2-Methyl-4-*t*-butylphenol	1.521
Phenyl acetonitrile	1.521
(Chloro-*t*-butyl)benzene	1.521
Methyl salicylate	1.522
Cyclohexyltoluene (50% *p*, 20% *m*, 30% *o*)	1.523
Chlorobenzene	1.523
Furfural	1.524
Octachlorodiethyl ether	1.525
Benzonitrile	1.526
Thiophene	1.526
Nonachlorodiethyl ether	1.529
Iodomethane	1.530
4-Phenyldioxane	1.530
3-Phenyl-1-propanol	1.532
Acetophenone	1.532
Benzyl alcohol	1.538
1,2-Dibromoethane	1.538
1,2,3,4-Tetrahydronaphthalene	1.539
m-Cresol	1.542
β,β-Di(butylxanthogenic acid) diethylester	1.543
m-Dichlorobenzene	1.544
Benzaldehyde	1.544
Styrene	1.545
Nitrobenzene	1.550
o-Dichlorobenzene	1.551
Bromobenzene	1.557
o-Nitroanisole	1.560
m-Toluidine	1.566
Benzyl benzoate	1.568
o-Toluidine	1.570
1-Methoxyphenyl-1-phenylethane	1.571
Aniline	1.583
o-Chloroaniline	1.586
Bromoform	1.587
Thiophenol	1.588
2,4-Bis(α-phenylethyl)phenylmethyl ether	1.590
Carbon disulfide	1.628
1,1,2,2-Tetrabromoethane	1.633
Methylene iodide	1.749

Physical Constants of the Most Common Solvents for Polymers

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Values given here have been taken a variety of reference books. Where a range was given, the melting and boiling points given here are average values. Flash point was determined by the closed cup method, using a Setaflash apparatus. The refractive index is reported relative to the sodium D line. Boiling points are given at 760 mmHg unless indicated otherwise by the pressure in mmHg following a slash (/). Viscosity is reported at 20°C unless indicated at another temperature in Celsius following a slash (/).

Compound	CAS Number	Formula wt.	Melting pt. (°C)	Boiling pt. (°C)	Density (at 20°C)	Viscosity at 20°C (cps)	Refractive index (at 20°C)	Flash pt. (°C)
Acetic acid	64-19-7	60.05	17	118	1.049	1.21	1.3716	40
Acetic anhydride	108-24-7	102.09	−73	140	1.082		1.3900	54
Acetone	67-64-1	58.08	−94	56	0.790	0.324	1.3588	−17
Acetonitrile	75-05-8	41.05	−48	82	0.786		1.3440	5
n-Amyl acetate	628-63-7	130.19	−71	148	0.876		1.4026	36
Aniline	62-53-3	93.13	−6	184	1.022		1.5860	70
Anisole	100-66-3	108.14	−37	154	0.995		1.5160	51
Benzene	71-43-2	78.11	6	80	0.874	0.52	1.5010	−11
Benzonitrile	100-47-0	103.12	−13	191	1.010		1.5280	71
Benzyl acetate	140-11-4	150.18	−51	206	1.040		1.5020	102
Benzyl alcohol	100-51-6	108.14	−15	205	1.045	5.8	1.5400	93
Biphenyl	92-52-4	154.21	71	255	0.992			
Bromoform	75-25-2	252.75	8.3	151	2.894		1.5960	
n-Butanol	71-36-3	74.12	−90	118	0.810	2.948	1.3990	35
n-Butyl acetate	123-86-4	116.16	−78	125	0.882	5.8	1.3940	
γ-Butyrolactone	96-48-0	86.09	−45	205	1.120		1.4360	98
Carbon disulfide	75-15-0	76.14	−111	46	1.266		1.6270	−33
Carbon tetrachloride	56-23-5	153.82	−23	77	1.594	0.969	1.4600	
Chlorobenzene	108-90-7	112.56	−45	132	1.107		1.5240	23
2-Chloroethanol	107-07-3	80.51	−89	129	1.201		1.4410	60
Chloroform	67-66-3	119.38	−63	61	1.492	0.568	1.4460	
2-Chlorophenol	95-57-8	128.56	8	176	1.241		1.5580	63
m-Cresol	108-39-4	108.14	9	203	1.034	20.8	1.5400	86
Cyclohexane	110-82-7	84.16	7	81	0.779	0.979	1.4260	−18
Cyclohexanol	108-93-0	100.16	22	161	0.948		1.4650	67
Cyclohexanone	108-94-1	98.15	−47	155	0.947	2.543/15	1.4500	46
Cyclohexyl acetate	622-45-7	142.2		173	0.966		1.4390	57
Cyclopentanol	96-41-3	86.13	−19	140	0.949		1.4530	51
cis-Decahydronaphthalene	493-01-6	138.25	−43	193	0.896		1.4750	57
Diacetone alcohol	123-42-2	116.16		166	0.931	1.4230		61
Di-*n*-amyl ether	693-65-2	158.29	−69	188	0.785		1.4119	57
1,2-Dichlorobenzene	95-50-1	147	−17	180	1.306		1.5510	65
Di-2-chlorodiethylether	111-44-4	143.01	−47	66/15	1.220		1.4560	55
1,2-Dichloroethylene, *cis* & *trans*	540-59-0	96.94	−57	48–60	1.265		1.4470	6
Dichloromethane/methylene chloride	75-09-2	84.93	−97	40	1.325		1.4240	
1,3,-Dichloro-2,4,6-trifluorobenzene	2368-53-8	200.98		162	1.599	1.4870		76
Diethyl ether	60-29-7	74.12	−116	34.6	0.708	1.26	1.3530	−40

Compound	CAS Number	Formula wt.	Melting pt. (°C)	Boiling pt. (°C)	Density (at 20°C)	Viscosity at 20°C (cps)	Refractive index (at 20°C)	Flash pt. (°C)
Di(ethylene glycol)	111-46-6	106.12	−10	245	1.118		1.4460	143
Di(ethylene glycol mono-*n*-butyl ether	112-34-5	162.23	−68	231	0.967		1.4320	100
Di(ethylene glycol) monoethyl ether	111-90-0	134.18		202	0.999		1.4270	96
Diisobutyl ketone	108-83-8	142.24	−46	169	0.806		1.4113	49
Diisopropyl ketone	565-80-0	114.19	−80	124	0.806		1.4000	15
1,2-Dimethoxyethane/ethylene glycol dimethyl ether	110-71-4	90.12	−58	85	0.867		1.3790	0
N,N-Dimethylacetamide	127-19-5	87.12	−20	166	0.937		1.4380	70
N,N-Dimethylformamide	68-12-2	73.1	−61	153	0.944		1.4310	57
Dimethylsulfoxide	67-68-5	78.13	18	189	1.101		1.4790	95
1,4-Dioxane	123-91-1	88.11	12	102	1.034	1.26	1.4220	12
Diphenyl ether	101-84-8	170.21	28	259	1.073		1.5790	>110
Di(propylene glycol)	110-98-5	134.18		230	1.023		1.4410	137
Di(propylene glycol) monomethyl ether	34590-94-8	148.2		90/12	0.938		1.4220	74
Ethanol	64-17-5	46.07	−130	78	0.785	1.2	1.3600	8
Ethyl acetate	141-78-6	88.11	−84	77	0.902	0.455	1.3720	−3
Ethylene glycol diacetate	111-55-7	146.14	−41	187	1.128		1.4150	82
Ethylene carbonate	96-49-1	88.06	39	244/740	1.321			160
Ethylene dichloride	107-06-2	98.96	−35	83	1.256		1.4450	15
Ethylene gylcol	107-21-1	62.07	−13	197	1.113		1.4310	>110
Ethylene glycol mono-*n*-butyl ether	111-76-2	118.18	−75	171/743	0.903		1.4190	60
Ethylene glycol diacetate	111-55-7	146.14	−41	187	1.128		1.4150	82
Ethylene glycol diethyl ether	629-14-1	118.18	−74	121	0.842		1.3923	20
Ethylene glycol dimethyl ether	110-71-4	90.12	−58	85	0.867		1.3790	0
Ethylene glycol monoethyl ether	110-80-5	90.12	−90	135	0.930		1.4070	44
Ethylhexyl acetate	103-09-3	172.27		200	0.870			77
(*S*)-(−)-Ethyl lactate	687-47-8	118.13	−26	154	1.042		1.4130	28
Formaldehyde, 37% solution	50-00-0	30.03	−15	97	1.083		1.3765	56
Formamide	75-12-7	45.04	3	210	1.134		1.4470	154
Formic acid, 96%	64-18-6	46.03	8	101	1.220		1.3704	68
Furfurol	98-00-0	98.1	−29	170	1.135		1.4860	65
Glycerine	56-81-5	92.09	20	182/20	1.261		1.4740	160
n-Heptane	142-82-5	100.21	−91	98	0.684		1.3870	−1
Hexachloroethane	67-72-1	236.74	193		2.091			
Hexafluorobenzene	392-56-3	186.05	4	80	1.612		1.3770	10
Hexamethylphosphoric triamide	680-31-9	179.2	7	232/740	1.030		1.4580	105
Hexane	110-54-3	86.18	−95	69	0.659	0.326	1.3750	−23
Isobutanol	78-83-1	74.12	−108	108	0.803		1.3960	27
Isobutyl isobutyrate	97-85-8	144.21	−81	148	0.855		1.3980	37
Isobutyric acid	79-31-2	88.11	−47	154	0.950		1.3930	55
Isophorone	78-59-1	138.21	−8	214	0.923		1.4760	84
Isopropanol	67-63-0	60.1	−89	82	0.785		1.3770	11
Isopropyl acetate	108-21-4	102.13	−73	89	0.872		1.3770	16
Isopropylamine	75-31-0	59.11	−101	34	0.694		1.3746	−32
Mesitylene	108-67-8	120.2	−45	163	0.864		1.4990	44
Mesityl oxide	141-79-7	98.15	−53	129	0.858		1.4450	30
Methanol	67-56-1	32.04	−98	65	0.791		1.3290	11
2-Methoxyethanol	109-86-4	76.1	−85	125	0.965		1.4020	46
Methyl acetate	79-20-9	74.08	−98	58	0.932		1.3610	−9
Methyl ethyl ketone	78-93-3	72.11	−87	80	0.805	0.423/15	1.3970	3
Methyl isoamyl ketone	110-12-3	114.19		145	0.888		1.4070	41
Methyl isobutyl ketone	108-10-1	100.16	−80	118	0.801		1.3960	13
Methyl propyl ketone	107-87-9	86.13	−78	110	0.802		1.3900	7
N-Methylpyrrolidone	872-50-4	99.13	−24	82/10	1.033		1.4700	86
Morpholine	110-91-8	87.12	−7	129	0.999		1.4540	35
Nitrobenzene	98-95-3	123.11	6	211	1.196		1.5510	87
Nitromethane	75-52-5	61.04	−29	101	1.127		1.3820	35
n-Octane	111-65-9	114.23	−57	127	0.703	2.256	1.3980	15
n-Pentanol	71-41-0	88.15	−78	138	0.811		1.4090	48
Perfluoroacetone	684-16-2	166.02	−129	−26				
Perfluorotributylamine	311-89-7	671.1		178	1.883			None
Phenol	108-95-2	94.11	41	182	1.071		1.5425	79
1,4-Phenylenediamine	106-50-3	108.14	144	267				

Compound	CAS Number	Formula wt.	Melting pt. (°C)	Boiling pt. (°C)	Density (at 20°C)	Viscosity at 20°C (cps)	Refractive index (at 20°C)	Flash pt. (°C)
Piperazine	110-85-0	86.14	109	146				109
n-Propanol	71-23-8	60.1	−127	97	0.804	2.256	1.3840	15
Propyl acetate	109-60-4	102.13	−95	102	0.888		1.3840	12
Propylene carbonate	108-32-7	102.09	−55	240	1.189		1.4210	132
Propylene glycol	57-55-6	76.1	−60	187	1.036		1.4320	107
Propylene glycol mono-*n*-butyl ether		132.2		72/20	0.885		1.4160	58
Propylene glycol monomethyl ether	107-98-2	90.12	−97	119	0.922		1.4030	33
Propylene glycol mono-*n*-propyl ether	1569-01-3	118.18		140–160	0.885		1.4110	48
Propylene glycol mono-*t*-butyl ether	57018-52-7	132.20		144	0.874		1.4130	44
Pyridine	110-86-1	79.1	−42	115	0.978		1.5100	20
1,1,2,2-Tetrachloroethane	79-34-5	167.85	−45	147	1.586		1.4935	None
Tetrachloroethylene	127-18-4	165.83	−22	121	1.623		1.5060	None
Tetrahydrofuran	109-99-9	72.11	−108	66	0.889	0.486	1.4070	−17
Tetrahydrofurfuryl alcohol	97-99-4	102.13	−80	178	1.054		1.4520	83
Tetrahydronaphthalene/tetralin	119-64-2	132.21	−35	207	0.973		1.5410	77
Tetramethylene sulfone	126-33-0	120.17	27	285	1.261		1.4840	165
Tetramethylurea	632-22-4	116.16	−1	177	0.971		1.4506	65
Toluene	108-88-3	92.14	−93	111	0.865	0.59	1.4960	4
1,1,1-Trichloroethane	71-55-6	133.41	−35	75	1.338		1.4366	None
Trichloroethylene	79-01-6	131.39	−85	87	1.463		1.4760	None
Tricresyl phosphate	1330-78-5	368.37		265/10	1.143		1.5550	>110
Trifluoroacetic acid	76-05-1	114.02	−15	72	1.480			None
Water	7732-18-5	18.02	0	100	0.998	1.005	1.3329	None
o-Xylene	95-47-6	106.17	−24	144	0.870		1.5050	32
p-Xylene	106-42-3	106.17	13	138	0.866	0.648	1.4950	27

SECTION IV

PHYSICAL DATA OF OLIGOMERS

Physical Data of Oligomers

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A. INTRODUCTION

Oligomers are defined as the low members of the polymeric–homologous series with molecular weights up to about 1000–2000. They are easily obtained by stepwise synthesis from suitably protected monomer derivatives or by separation from the polymers. As monodisperse oligomers are low molecular compounds of defined molecular weights, they represent ideal model substances for the polymers. By physical studies of a complete series of oligomers, substantial knowledge is gained of the relation between chain length and physical properties. In this way certain physical data of the polymers could be explained for the first time. In chemical aspects, oligomers must, on principle, have the same properties as the related polymers; they are, however, much more accessible to all studies, owing to their strictly defined and comparatively simpler structure.

Homologous oligomers differ sufficiently in their physical properties – due to their low molecular weight – so that they can be separated into individual chemicals. They can therefore be used for elucidating the structure of polymers and, in close relation, for the investigation of the mechanisms of polymerization. Oligomers are intermediates in polycondensation and polyaddition reactions and are present in more or less significant amounts in the polymers, due to equilibria between different chains, and between chains and rings. Therefore important conclusions on the structure of the related high polymers can be drawn from isolation and structure determination of oligomers, along with a comparison of the chemical properties of polymers and oligomers. In this way clear evidence can be obtained as regards the type of linkage between the monomer units in the polymer as well as the structure of unknown endgroups. Finally, unequivocal evidence on the mechanism of polymer formation is to be expected from the behavior of oligomers under the conditions of the polyreaction.

The following tables give the physical properties of the most important, linear, cyclic, and branched monodisperse oligomers which are significant for polymer chemistry. Derivatives and co-oligomers (such as co-oligo-peptides, -saccharides, and -nucleotides) as well as organosilicon and inorganic oligomers are not included, nor are any low polymers which have not been proved to be strictly monodisperse. Only those literature references are cited that indicate the best methods of synthesis and the most important physical properties of the oligomers concerned (including spectroscopic and conformational data which could not be mentioned in detail in the tables).

In the last few decades several reviews on linear and cyclic oligomers have appeared. A small list is giving below.

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B. OLIGOMERS CONTAINING MAIN CHAIN ACYCLIC CARBON ONLY

TABLE 1. OLIGO(OLEFINS)

1.1. OLIGO(METHYLENES) AND OLIGO(ETHYLENES)

1.1.1. *n*-ALKANES $H[CH_2]_nH$

n	Mol. wt.	m.p. (°C)	b.p. (°C/mbar)	d_4 (g/cm^3)/°C	Refs.
1	16.0	−182.6	−161.6/1013	0.4240/−164	21,22,75,84,88,93
2	30.1	−183.3	−88.5/1013	0.5462/89	21,75,84,88,93
3	44.1	−187.1	−42.2/1013	0.5824/−45	21,22,75,84,88,93
4	58.1	−138.4	−0.5/1013	0.6011/0	21,22,75,84,88,112,178,192
5	72.2	−129.7	36.1/1013	0.6263/20	3,7,13,21,22,30,75,84,88,93,112,178,192,195
6	86.2	−94.0	68.7/1013	0.6594/20	3,5,7,21,22,30,75,78,84,88,93,112,178,192,195
7	100.2	−90.5	98.4/1013	0.6838/20	3,5,7,13,21,22,30,75,84,88,93,112,178,192
8	114.2	−56.8	125.5/1013	0.7026/20	3,5,7,13,21,22,30,78,84,87,88,93,112,178,192,195
9	128.3	−53.5	150.8/1013	0.7177/20	1,5,7,13,21,22,30,84,87,88,93,111,112,178,192
10	142.3	−29.7	174.1/1013	0.7301/20	1,3,5,7,18,21,22,30,84,87,88,93,111,112,178,192,195
11	156.3	−25.6	195.9/1013	0.7402/20	1,3,7,13,21,22,30,77,83,84,87,88,93,111,112
12	170.3	−9.7	216.3/1013	0.7487/20	1,7,17,21,22,30,79,84,87,88,93,111,112,178,185,192
13	184.4	−6.0	235.5/1013	0.7563/20	1,7,13,21,30,77,83,84,87,88,93,112,205,206
14	198.4	5.5	253.6/1013	0.7627/20	1,7,17,21,30,84,87,88,93,111,112
15	212.4	10.1	270.7/1013	0.7684/20	1,3,7,21,30,77,83,84,87,88,93,112
16	226.4	18.1	287.1/1013	0.7733/20	1,7,11,15,16,19,21,30,78,84,87,88,93,111,112,192
17	240.5	22.1	302.6/1013	0.7767/22	1,3,7,13,14,21,30,75,77,83,84,88,93,111,112,193
18	254.5	28.2	317.4/1013	0.7768/28	1–3,7,11,14,15,17,19,21,30,75,84,88,93,111
19	268.5	32.0	331.6/1013	0.7776/32	1,3,4,7,14,15,19,21,77,83,84,88,93,97,111,121, 198,221,235
20	282.6	36.7	345.1/1013	0.7550/70	1,3–7,11,14,15,17–19,21,22,79,82,88,91,93,107, 110,111,198
21	296.6	40.4	215/20	0.7583/70	1,3,4,10,14,15,19,21,77,83,86,88,93,111,118, 194,198,232
22	310.6	44.4	222–225/20	0.7631/70	1,3,4,7,11,14,21,78,83,88,91,93,97,111,115,121,198
23	324.6	47.4	234/20	0.7641/70	1,3,4,10,14,21,77,83,86,88,93,121,198
24	338.7	51.1	243/20	0.7657/70	1,3,4,11,14,17,21,83,86,88,91,93,99,182,198,202,204
25	352.7	54	259/20	0.7693/70	1,3–5,14,21,77,83,88,93,118,193,198,232
26	366.7	57.0	262/20	0.7704/70	1–4,7,11,14,21,83,85,88,93,198
27	380.7	60.0	270/20	0.7732/70	1–4,8,14,21,77,83,85,88,93,118,198
28	394.8	61.6	279–281/20	0.7750/70	1,4,11,13–15,17,19,21,83,85,86,88,90,93,99,100, 111,198
29	408.8	64.0	286/20	0.7755/70	1,3,4,11,14,21,77,83,85,88,91,93,118,198
30	422.8	66.0	304/20	0.7795/70	1–4,6,7,11,14,18,21,82,83,85,86,88,93,110,198
31	436.9	67.9	302/20	0.7678/100	1–4,8,77,83,85,86
32	450.9	70.4	310/20	0.7645/100	1,2,4,11,15,16,19,20,83,85,91,95,97,99,109,111, 115,185,198
33	464.9	71.3			1,4,5,77,83,91,109,116,119,198,207
34	478.9	72.9			1–4,7,11,77,83,85,86,198
35	493.0	74.7	331/20	0.7436/135	1,4,7,8,10,15,19,77,79,83,85,86,88,91,95,118
36	507.0	76.1	298.4/4	0.7783/90	1,2,4,7,10,13–15,19,77,78,83,85,86,88,90,91 107,109,111,185,191,193,194,198,207,211,221, 223,232,233
37	531.0	77.2			75,109,198
38	535.0	79.2			75,77,83,198
39	549.1	80.5			12,75,77,83
40	563.1	81.5	150/10^{-4}		6,7,10,17,18,21,75,77,82,83,86,93,99,110,198
41	577.1	81.7			75
42	591.2	82.9			76
43	605.2	85.5	332/4	0.7812/90	10,22,77,83,86
44	619.2	86.4		0.7514/135	3,11,15,19,77,79,80,83,89,91,95,107,110,111,115, 116,118,205
45	633.2	87.2			109
46	647.2	88.0			77,80,83,91,100,198
48	675.3	88.5–89			100,109,202,204
50	703.4	92.1	420–422/20		6,7,11,15,18,21,77,80,82,83,90,93,110,116, 188,193,198
52	731.4	94.0			77,80,83,90

1.1.1. *cont'd*

n	Mol. wt.	m.p. (°C)	b.p. (°C/mbar)	d_4 (g/cm^3)/°C	Refs.
54	759.5	95.0			2,7,77,80,83,90
56	787.6	95.5–96			106,204
60	843.6	99.1	250/10^{-4}		6,7,18,21,77,80,82,83,90,93,104,109,110,187,188, 190,193,198
61	857.6	100.3			109
62	871.7	100.5			2,7,77,80,83,90,116
64	899.7	102.1		0.7654/135	2,7,13,22,77,79,80,83,90
65	913.7	102.1			109
66	927.8	103.6			9,77,80,83,90
67	941.8	104.1			9,77,80,83,90
69	969.9	104.7			109
70	983.9	105.3	300/10^{-4}		6,7,18,21,77,80,82,83,90,93,100,110,116
72	1012.0	103–105			100,202
80	1124.2	108.0			18,82,104,109
82	1152.2	110.1			20,77,80,81,83,89,110,188
94	1320.6	113.8		0.783/115	15,19,20,77,79,80,83,100,103,107,110, 116–118,188,204
96	1348.6	110–112			100,202
98		113–114			229
100	1404.7	115.2			18,22,77,80–83,93,104,110,185
102	1432.8	115.5–116.5			105,108,183,203
104	1460.8	115–115.5			106,203,204
120	1685.3	119.2			82,98,104,200,202
122		116–117			229
140	1965.8	121.0			82
144	2021.9	121			98,200,202
150	2106.1	123–123.5			105,108,183,203,227,248
160	2246.4	122.2			104,108
162		121–121.5			229
168	2358.5	121.9			98,114,177,189,199,200,202,221
192	2695.2	127.5			98,186,189,200–202,225
194		126.9			224,229
198	2779.4	127.0			105,108,183,184,197,203,224–227,229,248
210	2947.7	127.4			224,229
216	3029.8	128.4			98,200,202,225
240	3368.5				189,199
242	3396.6	120–121			229
246	3450.6	128–130			105,108,181,183,184,203,224–227,229,249
258	3621.0	128.8			224,229
288	4039.8	128.8			98,200,202
294	4126.0	130.4			108,183,203,224,225,229,248
384	5386.4	131.3			98,200
390	5470.5	132			105,108,183,203,229,248

Conformation, chain folding: Refs. 108,178 (n = 2–10,12), 179 (n = 9–44), 181,183,184,193,194,202,205–208,211,226,227,248.
Crystallization: Refs. 168,177–179,181,183,184,188–190,194,197,199–202,211,224–227,248.
Thermal behavior, phase transitions, DSC: Refs. 88,98,107,107,109,119,181,184,186–191,193,197–204,217,221,224–226,246.
NMR: Refs. 95,97 (n = 19,22,32), 99 (n = 6,8,10,14,18,24,28), 100,179,187,191,205,206,221,229,246.
IR, Raman: Refs. 98,108,116,119,178,182,192–194,200,202,232,248.
X-ray: Refs. 100,107,109,112,119,183,184,187,190,191,198,206,223,224,226,233.
Electron diffraction: Refs. 187,188.
MS: Ref. 195.
GPC: Ref. 185.

1.1.2. CYCLOALKANES $\underline{[[CH_2]_n]}$

n	Mol. wt.	m.p. (°C)	b.p. (°C/mbar)	d_4 (g/cm^3)/°C	Refs.
3	42.1	−127.5	−32.8/1013	0.688/−40	23,24,93,94,178
4	56.1	−90	12.5/1013	0.7038/0	25,93,94,178,232
5	70.1	−93.9	49.3/1013	0.7457/20	26,93,94,178,183,195
6	84.2	6.6	80.7/1013	0.7784/20	27–29,93,94,99,111,178,183,195
7	98.2	−8.0	118.5/1013	0.8098/20	29,31,93,94,178,195
8	112.2	13.5	149/1000	0.8349/20	32–34,93,94,99,178,195,208

1.1.2. *cont'd*

n	Mol. wt.	m.p. (°C)	b.p. (°C/mbar)	d_4 (g/cm^3)/°C	Refs.
9	126.2	9.7	69/19	0.8534/20	29,34,93,94,178,208
10	140.3	9.5	69/16	0.8575/20	29,35,36,93,94,99,178,180,208
11	154.3	−7.3	91/16	0.8591/20	29,37,93,94,99,208
12	168.3	60.6		0.861/20	29,38,39,40,93,94,99,101,111,114,178,180,196, 208,214,215,217,232
13	182.4	24.4	128/27	0.861/20	29,34,38,40,93,94,99,196,208,217
14	196.4	56.2	131/15	0.8259/79	17,29,38,40,41,93,94,99,180,196,208–210,214, 217,218,220
15	210.4	63.4	147/16	0.8240/78	29,38,40,44,93,94,99,196,208,217
16	224.4	60.5	170–171/27	0.819/79	16,38,40–42,93,94,99,111,169,180,196,208,209, 212,214,217,220
17	238.5	65		0.8200/77	40,43,44,93,94
18	252.5	72–73		0.8201/76	17,40–42,45,93,94,99
19	266.5	80			40,93,94,99
20	280.5	61–62			18,40,41,93,94,99,111
21	294.6	64–65			41,94,99,102
22	308.6	46.8	177/0.5	0.8174/75	38,40,43,48,94,96,99,220
23	322.6	53–54	177/0.1	0.8259/64	46,48,94,99
24	336.6	48.8	222–228/0.8		38,40,41,45,48,94–99,100,101,111,114,169,196, 202,210,211,213–217,219,228,235,246
25	350.7	53–54			47,94
26	364.7	44–46	218–219/0.7	0.8120/78	38,40,43,48,94,99,210
27	378.7	47–48			41,94,102
28	392.8	47–48	213–214/0.3	0.8243/58	38,41,48,94,97,99,102,111,219,222
29	406.8	54.5–55.5	215/1.5	0.8232/64	38,94,99
30	420.8	57–58	230/0.3	0.8233/69	18,41,42,45,48,90,93,94,99,102
32	448.9	65.5–66.5		0.8261/70	41,48,94,97,99,102,111,169,222
34	476.9	66–67	230–240/0.4	0.8229/76	48,92,94,113
36	505.0	70.0			41,45,94,97,99,100,101,102,111,114,115,120,196, 211,214,215,217,228,248,256
37	519.0	65–66			99
40	561.1	76–77			18,41,93,97,99,102,111,115,216,219,222,248,256
42	589.2	75–76			42,102
44	617.2	82–82.5			99,100
45	631.2	80–81			41,102
46	645.2	83.5–85			222
48	673.3	89.2			97,98,100,101,111,114,115,120,196,198,200, 202,207,211,213,217,230,235,248,256
50	701.4	87–88			18
54	757.5	90–91			41,102
60	841.6	96.5			101,120,211,247
64	897.7		^{13}C-NMR		97,111,115,234,248,256
72	1009.9	107.0	103.5–104.5		98,100,101,120,196,198,200,202,207,211,213, 216,217,228,230,231,235
80	1122.2		^{13}C-NMR		97,111,115,248,256
84	1178.3	108.8			101
96	1346.6	116.0			96,98,100,120,196,198,202,216,217,230,231,235
100	1402.7				228
104					248,256
120	1683.2				211,228
128	1795.5				219,248,256
144	2019.9	120.8			98,100,198,200,202,230
160	2294.3				219,248,256
168	2356.5				177
192	2693.2	124.3			98
200	2805.4				228,248,256
288	4039.8	129.8			98,100,202,230

Conformation, chain folding: Refs: 94,97,113,178 (n = 3–10,12), 179 (n = 3–96), 180,187,202,207–209,211–213,215–217,219,220,228,230,231,234,235,246,248.
Crystallization: Refs. 178,179,217,230,234,248.
Thermal behavior, phase transition, DSC: Refs. 96,101,179,196,209,216–221,230,246.
NMR: Refs. 95,97,99 (n = 6,8,10–16,18–24,26,28–30,32,36,37,40,44), 100 (n = 24,26,44,48,72,96), 111,114,115,179 (n = 3–96), 180,189,214–219,234,246,248,256.
IR, Raman: Refs. 92,96,178,179,200,202,209,220,235.
X-ray: Refs. 113,120,179,202,210,211,215,216,218,223,230,256.
Electron diffraction: Refs. 230,231.
GPC: Ref. 211.

1.2. OLIGO(PERFLUOROMETHYLENES) AND OLIGO (PERFLUOROETHYLENES)

1.2.1. PERFLUORO-*n*-ALKANES $F[CF_2]_nF$

n	Mol. wt.	m.p. (°C)	b.p. (°C/mbar)	d_4 (g/cm³)/°C	Refs.
1	88.0	−183.6	−128/1005	1.619/−129	22,49,63,64,125,130,179
2	138.0	−96.6	−78.3/1013	1.590/−78	49,50,63,64,125,130,154,179
3	188.0	−147.7	−36.7/1013		22,51,52,64,125,130,131,179
4	238.0	−129.2	−2.2/1013		22,52–54,64,125,126,129,132,139,144,179,241
5	288.1	−125.4	29.2/1013	1.620/20	22,52,54–56,124,129
6	338.1	90.7	57.2/1013	1.6995/20	22,52,57,58,124–126,134,144,175,179
7	388.1	93.3	82.2/1013	1.7333/20	22,52,56,59,125,128,134,144,175,179
8	438.1	−19.0	103.3/1013	1.776/25	22,52,59,125,134,144,175,179
9	488.1	−16	125.3/1013	1.799/25	22,52,59,127
10	538.1	36	144.2/1013	1.770/45	22,52,59,127
11	588.1	57	161/1013	1.745/70	22,52,59
12	638.1	75.3	178/1013	1.670/113.5	22,52,59,127,175,179,250,251
14	738.1		IR, Raman spectr.		124,127,133,179,240,249
16	838.2	129.0	232/1013		54,59,127,175
18	938.2		IR, Raman spectr.		124,127,133
20	1038.2	164.7	IR, Raman spectr.		124,127,133,175,179,243–245,249,252
24	1238.2	192.0	IR, Raman spectr.		175,242,243,245

1.2.2. PERFLUORO-CYCLOALKANES $\underline{[CH_2]_n}$

n	Mol. wt.	m.p. (°C)	b.p. (°C/mbar)	Refs.
3	150.0	−80	−31.5/1013	60,61
4	200.0	−38.7	−2/1013	61,63,144
5	250.0	10.3	22.5/1013	51,54–56,61,64
6	300.0	58.2	51 (subl.)	51,56,59,64,65,144
7	350.0	−37	76.2/1013	51,59
8	400.0	−55	101.5/1013	59
9	450.0	−56	124.6/1013	59
10	500.0	−44	146.5/1013	59

1.2.3. α,ω-DISUBSTITUTED PERFLUORO-*n*-ALKANES $X-[CF_2]_n-X$

X	*n*	Mol. wt.	m.p. (°C)	b.p. (°C/mbar)	Refs.
H	1	52.0		−51.6/1013	
	2	102.0		−20°/1013	144,145
	3	152.0		10–11/1013	146
	4	202.0		43.5/1013	135–137,144
	5	252.1		66.5/1013	136
	6	302.1		88.5–89.5/1013	135–137,144
	7	352.1		104.2/1013	136,137
	8	402.1		130.6/1013	136,137
	10	502.1	42–43	153–154/1013	135–137
CH_3S	2	194.2		67–70/53	135
	4	294.2		80–83/27	135
	6	394.3		81–84/5	135
	8	494.3		102–106/5	135
	10	594.3		90–94/1	135
	12	694.3		118–122/1	135
CH_3SO_2	2	258.4	125		135
	4	358.4	151		135
	6	458.5	168		135
	8	558.5	171		135
	10	658.5	187		135
CH_3COO	4	318.1		115–116/133	135
	6	418.1		121–123/67	135
	8	518.1		126–127/33	135
	10	618.2		144–146/33	135
$HOCH_2$	2	164.1	81–82		135
	4	264.1	69	135–136/36	135

1.2.3. *cont'd*

X	*n*	Mol. wt.	m.p. (°C)	b.p. (°C/mbar)	Refs.
I	2	353.8		113/1013	236
	4	453.8		149/1013	236
	6	553.8		186/1013	236
	8	653.8		222/1013	236
	10	753.8		258/1013	236

1.2.4. α,ω-DISUBSTITUTED PERFLUORO-*n*-ALKANES WITH DIFFERENT ENDGROUPS $X-[CF_2]_n-Y$

X	Y	*n*	Mol. wt.	m.p.	b.p. (°C/mbar)	d_4^{20} (g/cm^3)	Refs.
H	Cl	2	136.5		−10/1013		61
		3	186.5		21/1013	1.556	61
		4	236.5		50/1013	1.607	61
		5	286.5		77/1013	1.661	61
		6	336.5		100/1013	1.719	61
		7	386.5		122.5/1013	1.738	61
		8	436.5		144.5/1013	1.778	61
		9	486.5		162.5/1013		61
		10	536.5	46	162.5/1013		61
		11	586.5	52	177/1013		61
		12	636.5	78	202/1013		61
		13	686.5	87	213/1013		61
		14	736.5	95	227–228/1013		61
H	F	2	120.0		−48.5/1013		240,252
		3	170.0		−16/986		240
		4	220.0		14/986		240
		5	270.0		46/986		240
		7	370.0		94/986		240
		12	620.0	72			250,251
$(CF_3)_2CF$	I	4	495.9		139/1026		237
		6	596.0		189/1008		237

1.2.5. SEMIFLUORINATED *n*-ALKANES $F-[CF_2]_m-[CH_2]_n-H$

m	*n*	Mol. wt.	m.p. (°C)	b.p. (°C/mbar)	Refs.
1	1	84.0		−46.7/1013	155,176
6	12	488.3	−13.0		138,176
7	7	468.3			255
8	8	532.3	27.0		138,176
10		540.3	35		251
10	8	632.4	53.0		138,176
10	10	660.4	64		138,176,251,255
10	12	688.4	65		138,176,251
12	2	648.2	71.0		138,176,250,251,255
12	4	676.2	76.0		138,176,250,251,255
12	6	704.3	84		138,176,250,251,255
12	8	732.4	88		138,176,251
12	10	760.4	92		138,176,251
12	12	788.4	91		138,176,250,251,255
12	14	816.5	93		138,176,251
12	16	844.5	94		138,176,251
12	18	872.6	97		138,176,251
12	20	800.6	100		138,176,250,251,255

1.2.6. ANIONIC OLIGOMERS OF PERFLUORO-*n*-ALKENES (MAJOR OLIGOMERS, *cis/trans* MIXTURES)

n	Compound	Mol. wt.	b.p. (°C/mbar)
$CF_2=CF_2$ (Refs. 238,239,243):			
4	$CF_3CF_2-C(CF_3)=C(CF_3)-CF_2CF_3$	400.1	95–96/1013
5	$(CF_3CF_2)_2(CF_3)C-C(CF_3)=CF(CF_3)$	500.1	135–138/1012

1.2.6. *cont'd*

n	Compound	Mol. wt.	b.p. (°C/mbar)
6	$(CF_3CF_2)_2(CF_3)C-\underset{\underset{CF_2}{\|}}{C}-CF(CF_2CF_3)_2$	600.1	160–165/1013
$CF_3-CF=CF_2$ (Refs. 253,254,257):			
2	$(CF_3)_2CF-CF=CF-CF_3$	300.1	46–48.5/1013
	$(CF_3)_2C=CF-CF_2-CF_3$		46–48.5/1013
3	$(CF_3)_2C=C(CF_2-CF_3-CF(CF_3)_2$	450.1	114.8/1013
	$[(CF_3)_2CF]_2C=CF-CF_3$		110–115/1013
	$(CF_3)_2CF-CF=C(CF_3)-CF_2-CF_2-CF_3$		110–115/1013

1.2.7. PERFLUORO-1-ALKENES $F-[CF_2]_n-CF=CR_2$

n	Mol. wt.	b.p. at ~983 mbar (°C)	n_D^{20}	Refs.
1	150.0	−29		240
2	200.0	1		240
3	250.0	28–29	1.2571	240
5	350.0	81	1.2782	240
7	450.1	123	1.2868	240

Conformation; Crystallization: Refs. 126,179,242,243–245,251.
Phase transition, DSC: Refs. 55,125,138,175,176,179,242,244,245,249,251.
NMR: Refs. 134,179,250,251.
X-ray: Refs. 65,138,175,176,179,244,245.
IR, Raman: Refs. 125–127,133,138,175,176,241,242,245,249,250,255.
MS: Ref. 56.

1.3. OLIGO(ISOBUTENES)

Compound	m.p. (°C)	b.p. (°C/1013 mbar)	d_4^{20} (g/cm³)
MONOMER (mol. wt. 56.1)			
Isobutene $CH_2=C(CH_3)_2$		−6	
DIMERS (mol. wt. 112.2; Refs. 66–70,72,74,122,141,143,147,148,150–152,153)			
2,4,4-Trimethyl-1-pentene $CH_2=\underset{\underset{CH_3}{\|}}{C}-CH_2C(CH_3)_3$	−93.6	101.4	0.7150
2,4,4-Trimethyl-2-pentene $CH_3-\underset{\underset{CH_3}{\|}}{C}=CH-C(CH_3)_3$	−106.5	104.9	0.7212
3,4,4-Trimethyl-2-pentene $CH_3-CH=\underset{\underset{CH_3}{\|}}{C}-C(CH_3)_3$		112.3	0.7392
2,3,4-Trimethyl-2-pentene $(CH_3)_2C=\underset{\underset{CH_3}{\|}}{C}-CH(CH_3)_2$	−113.4	116.3	0.7434
2,3,4-Trimethyl-1-pentene $CH_2=\underset{\underset{CH_3}{\|}}{C}-\underset{\underset{CH_3}{\|}}{CH}(CH_3)_2$		108	0.729
2,3,3-Trimethyl-1-pentene $CH_2=\underset{\underset{CH_3}{\|}}{C}-C(CH_3)_2-CH_2-CH_3$	−69	108.4	0.7352
1,1,3-Trimethyl-cyclopentane		105.0	0.7481

1.3. *cont'd*

Compound	m.p. (°C)	b.p. (°C/1013 mbar)	d_4^{20} (g/cm^3)
TRIMERS (mol. wt. 168.3, Refs. 71,73,74,123,140,142,143,147–149,151,152)			
1,1-Dineopentylethylene			
$CH_2{=}C[CH_2C(CH_3)_2]_2$		178.0/1013	0.7599
2,2,4,6,6-Pentamethyl-3-heptene			
$(CH_3)_3C{-}CH{=}C(CH_3){-}CH_2{-}C(CH_3)_3$		^{13}C-NMR	
TETRAMERS (mol. wt. 224.4; Refs. 74,141–143,147,151,152)			
2,2,6,6,8,8-Hexamethyl-4-methylene-nonane		106–107/11	
$(CH_3)_3C{-}CH_2{-}C({=}CH_2){-}CH_2{-}C(CH_3)_2{-}CH_2{-}C(CH_3)_3$		^{13}C-NMR	
2,2,4,6,6,8,8-Heptamethyl-4-nonene			
$(CH_3)_3C{-}CH_2{-}C(CH_3){=}CH{-}C(CH_3)_2{-}CH_2{-}C(CH_3)_3$		^{13}C-NMR	

1.4. OLIGO(1-ALKENYLENES)

x	n	Configuration	Mol. wt.	m.p. (°C)	b.p. (°C/mbar)	n_D^{25}	Refs.
2	2	*cis/trans*	108.2	−70	150.8/1002		163,170–172
	3	*cis/trans*	162.3		104/15		164,173,174
	4	*cis/trans*	216.3		88–91/0.07		161,164
	5	*cis/trans*	270.4		105–110/0.07		161,164
	6	*cis/trans*	324.5		162/0.1		161
	n = 4–13 *cis/trans* GC Refs. 161,166						
	n = 4–7,10,11 *cis/trans* ^{1}H-, ^{13}C-NMR Ref. 161						
3	2	*cis*	136.2	21–23		1.4972	162
4	2	*cis*	164.3	0	51/0.5 (*cis/trans*)	1.4971	40,157,162
	3	*cis/trans*	246.4		112/0.5		157
	4	*cis*	328.6	25–27			40
5	2	*cis*	192.3	46	48/0.001 (*cis/trans*)		40,157
	3	*cis/trans*	288.5		116/0.001		157
6	2	*cis*	220.4	18.5	89/0.07 (*cis/trans*)		40,157,158
	3	*cis/trans*	330.6		130/0.07		157,158
n = 2–8 (*cis/trans*): GPC, b.p., n_D^{20}, IR, UV, MS Refs. 158–160							
7	2	*cis*	248.4	38.5	122/0.4 (*cis/trans*)		40,157
8	2	*cis*	276.5	38–39	123–124/0.2 (*cis/trans*)		40,157
10	1	*cis/trans*	166.3		100/0.11		156
	2	*cis/trans*	332.6	54–55	150/0.09		156–158,160
		trans/trans		IR: 970 cm^{-1}			156
		trans/cis		970, 725 cm^{-1}			156
		cis/cis		725 cm^{-1}			156
	3	*cis/trans*	498.3		220/0.12		156
	4	*cis/trans*	665.2		255/0.12		156
	n = 2–14: MS Refs. 167,168						
	n = 2–9: GPC Ref. 160						
13	n = 2–7: MS Ref. 166						

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TABLE 2. OLIGO(DIENES)

2.1. OLIGOMERS OF 1,3-BUTADIENE

Oligomers	*n*	Mol. wt.	m.p. (°C)	b.p. (°C/mbar)	n_D/°C	Refs.
LINEAR DIMERS	2	108.2				
3-Methyl-1-*trans*-4,6-heptatriene				117/1013	1.4657/20	13,14,33,35,36,38
$CH_2{=}CH{-}CH(CH_3){-}CH{=}CH{-}CH{=}CH_2$						
1,3,6-Octatriene				129/1013	1.4743/20	33,36
$CH_2{=}CH{-}CH{=}CH{-}CH_2{-}CH{=}CH{-}CH_3$						
1,3,7-Octatriene						31,32,35,36,39
$CH_2{=}CH{-}CH{=}CH{-}CH_2{-}CH_2{-}CH{=}CH_2$						
trans				124–125/1013	1.4686/20	39
cis				115–117/1013	1.4594/20	39
2,4,6-Octatriene (*cis/trans*)				65–66/53		34,40,41
$CH_3{-}CH{=}CH{-}CH{=}CH{-}CH{=}CH{-}CH_3$						
all-*trans*			52.5	147–148/1019	1.5131/27	34,40,41
$\Delta^{3,3'}$-Octahydro-diphenyl	3	162.3		230–232/1013		42,43
Vinylcyclopolyenes $\lceil[(CH_2CH{=}CHCH_2)_xCH(CH{=}CH_2)CH_2]\rceil$						
4-Vinyl-1-cyclohexene ($x = 1$)	2	108.2		129–130/1013	1.4642/20	1–7,34–37,44,48,49
17-Vinyl-all-*trans*-1,5,9,13-cyclo-octadecatetraene ($x = 4$)	5	270.4		~136/1.3	1.5093/20	37
21-Vinyl-all-*trans*-1,5,9,13,17-cyclodocosapentaene ($x = 5$)	6	324.5		~170/1.3	1.5098/20	37
1,2-Divinyl-cyclobutane	2	108.2				
cis				38/51	1.4563	1,8,48,49
trans				112–113/1013	1.4451/20	8,44,48,49
CYCLOPOLYENES $\lceil[CH_2{-}CH{=}CH{-}CH_2]_n\rceil$						
1,5-Cyclooctadiene	2	108.2				1,3–10,35–37
cis,cis			−70.1	150.8/1002	1.4936/20	1,4,8,9
trans,trans			−62		1.4933/20	4
1,5,9-Cyclododecatriene	3	162.3				5–7,10–12,35–37
trans,trans,trans			34	237.5/1013	1.5005/20	5–7,12,45,46
cis,trans,trans			−16.8	241.5/1013	1.5078/20	5,6,12,45–47
cis,cis,trans			−9 to −8	244/1013	1.5129/20	6,12,46
All-*trans*-1,5,9,13-cyclohexadecatetraene	4	216.4	19–20	~97/1	1.507/20	37
All-*trans*-1,5,9,13,17-cycloeicosapentaene	5	270.4		~142/1	1.5133/20	37
All-*trans*-1,5,9,13,17,21-cyclotetracosahexaene	6	324.5		~176/1	1.5133/20	37

2.2. OLIGOMERS OF ISOPRENE

Oligomers	*n*	Mol. wt.	b.p. (°C/mbar)	n_D/°C	Refs.
LINEAR OLIGOMERS					
2,7-Dimethyl-1-*trans*-3,7-octatriene $CH_2=C(CH_3)-CH=CH-CH_2-CH_2-C(CH_3)=CH_2$	2	136.3	176/1013	1.4721/25	50,51
2,6-Dimethyl-1,3,6-Octatriene $CH_2=C(CH_3)-CH=CH-CH_2-C(CH_3)=CH-CH_3$	2	136.3	57–58/16	1.4794	6,30,52,27
2,7-Dimethyl-1-*trans*-3,6-octatriene $CH_2=C(CH_3)-CH=CH-CH_2-CH=C(CH_3)-CH_3$	2	136.3	54/13	1.4786/20	11,29,30
2,6-Dimethyl-1-*trans*-3,7-octatriene $CH_2=C(CH_3)-CH=CH-CH_2-CH(CH_3)-CH=CH_2$	2	136.3	167/1013	1.4704/25	50
3-Methyl-6-methylene-1,7-octadiene $CH_2=CH-C(CH_3)-(CH_2)_2-C(=CH_2)-CH=CH_2$	2	136.3	161/1013	1.4570/25	50
2,6,10-Trimethyl-1-*trans*-3,5,10-dodecatetraene $CH_2=C(CH_3)-CH=CH-CH=C(CH_3)-(CH_2)_3-C(CH_3)=CH-CH_3$	3	204.3	78/1.3	1.4963/20	53
7,11-Dimethyl-3-methylene-1-*trans*-6,11-dodecatriene (β-farnesene) $CH_2=C(CH_3)-(CH_2)_3-C(CH_3)=CH-(CH_2)_2-C(=CH_2)-CH=CH_2$	3	204.3	70/1.3	1.4786/20	53
2,6,10,14-Tetramethyl-1-*trans*-3,6,10,14-hexadecapentaene $CH_2=C(CH_3)CH=CH-[CH_2C(CH_3)=CHCH_2]_3=H$	4	272.5	160/1.3	1.5013/20	53
CYCLIC OLIGOMERS					
trans-1,2-Dimethyl-1,2-divinylcyclobutane	2	136.3	134.5–135/992	1.4541/27	49
trans-1-Isopropenyl-2-methyl-2-vinylcyclobutane	2	136.3	152.5–153/992	1.4591/27	49
trans-1,2-Diisopropenylcyclobutane	2	136.3	155.1–155.4/987	1.4585/29	49
4-Isopropenyl-1-methyl-1-cyclohexene (dipentene) (D,L)	2	136.3	178/1013	1.4727/18	15–17, 55,62,71
6-Isopropenyl-3-methyl-1-cyclohexene (diprene) (D,L)	2	136.3	173–175/1000	1.4735/20	15,16, 59,71
2,4-Dimethyl-4-vinyl-1-cyclohexene	2	136.3	162/1000	1.4654/20	11,29,30, 49,55, 58–60,71
1,4-Dimethyl-4-vinyl-1-cyclohexene	2	136.3	160.5–161.5/988	1.4658/28	11,17,30, 49,53,55, 57–59,71
cis,cis 1,5-Dimethyl-1,5-cyclooctadiene	2	136.3	182.4/988	1.4863/28	49,54, 56–59,71
cis,cis 2,5-Dimethyl-1,5-cyclooctadiene	2	136.3	182.5–184/992	1.4870/27	49,54, 56–59,71

2.2. *cont'd*

Oligomers	*n*	Mol. wt.	b.p. (°C/mbar)	n_D/°C	Refs.
1,5,10-Trimethyl-*cis,trans,trans*-1,5,9-cyclododecatriene	3	204.3	138/17	1.5120	61

2.3. OLIGOMERS OF 1,3-BUTADIENE DERIVATIVES

Monomer	Oligomers	*n*	Mol. wt.	m.p. (°C)	b.p. (°C/mbar)	n_D/°C	Refs.
2-Chloro-1,3-butadiene	1-Chloro-4-(α-chloro-vinyl)-1-cyclohexene	2	177.1		53/1.2	1.5135/25	63–66
	1,6-Dichloro-1,5-cyclooctadiene	2	177.1	13.8	64/0.33	1.5339/25	9,63–66
2,3-Dichloro-1,3-butadiene	3,4,7,8-Tetrachloro-1,5-cyclooctadiene	2	246.0	98–99	140–146/4.8		63
Hexafluoro-1,3-butadiene	Cyclic dimer	2	324.1	40	80/1013		20,21
2-Cyano-1,3-butadiene	4-Vinyl-1,4-dicyano-1-cyclohexene	2	158.2	55–56	110–112/1.3		69
1-Phenyl-1,3-butadiene	3-Phenyl-4-*trans*-styryl-1-cyclohexene	2	260.4		189–191/3		67
2-Phenyl-1,3-butadiene	1,4-Diphenyl-4-vinyl-1-cyclohexene	2	260.4	60	220–222/17		68
1,3-Diphenyl-1,3-butadiene	1,3,4-Triphenyl-4-*trans*-styryl-1-cyclohexene	2	412.3	137–138		18,19	

2.4. 1,4-OLIGO(ALKADIENES) $CH_3CH_2-[CH_2-CX=CH-CH_2]_n-CH_2CH_3$

X	*n*	Configuration	Mol. wt.	b.p. (°C/mbar)	n_D/°C	Refs.
H	1	*cis*	112.2	121.7/985	1.4136/20	87
		trans		121.4/985	1.4116/20	87
	2	All-*cis*	166.3	90–91/23	1.4455/23	85
		All-*trans*		87–88/23	1.4415/24	85
	3	All-*cis*	220.4	120–125/2	1.4638/19	86
CH_3	1		126.2	138–140/1013	1.4224/20	75
	2		194.3	92/7	1.4540/20	75
	3		262.5	98/0.3	1.4729/20	75
	4		330.6	140/0.2	1.4878/16	75

2.5. OLIGOMERS OF CYCLOPENTADIENE AND 1,3-CYCLOHEXADIENE

Oligomers	*n*	Mol. wt.	m.p. (°C)	b.p. (°C/mbar)	n_D/°C	Refs.
Dicyclopentadiene	2	132.2				84
endo			32	163/1021		22,23,49,70,74
exo				170/1017	1.5070/25	49,70,72
Tricyclopentadiene	3	198.3	68	251/1021		22,23,74,84
Tetracyclopentadiene	4	264.4	207	344/1021		22,23,74,84
trans-Tricyclo[5,3,0,0^{2,6}]-3,9-decadiene	2	132.2		170–172/1013	1.5080/25	49,70
Dicyclohexadiene	2	160.3		229/1013		22,73,74

2.6. OLIGOMERS OF ALLENE

Oligomers	*n*	Mol. wt.	m.p. (°C)	b.p. (°C/mbar)	n_D/°C	Refs.
DIMERS	2	80.1				
1,2-Dimethylene-cyclobutane				74/1013	1.4690/20	24–27,77,81,82
1,3-Dimethylene-cyclobutane				69/1013	1.4485/20	77–80
TRIMERS	3	120.2				
1,2,4-Trimethylene-cyclohexane				68–69/80	1.4919/25	76,77
1,3,5-Trimethylene-cyclohexane			33.5–35	68–69/80	1.4919/25	76
3-Methylenebicyclo-[4,2,0]-octa-1(6)-ene			UV, ^{1}H-NMR, MS			77
1.5-(or 1,6-)-Dimethylenespiro-[3,3]heptane			IR, UV, ^{1}H-NMR, MS			77
TETRAMERS	4	160.3				
2,6- + 2,7-Dimethylenebicyclo-[4,4,0]-dec-9,10-ene (β-tetramer)				107–108/17	1.5248/25	24,25,28,60,83

2.6. *cont'd*

Oligomers	*n*	Mol. wt.	m.p. (°C)	b.p. (°C/mbar)	n_D/°C	Refs.
1,3,5,7-Tetramethylene cyclooctane				60/4.7	1.5102/25	76
PENTAMERS	5	200.4				
6′-Methylene-3′,4′,7′,8′-tetrahydrospiro[2- and 3-methylene]-cyclobutane-1,2′(1′H,5′H)-naphthalene + 7′-methylene-3′,4′,5′,6′-tetrahydrospiro[2- and 3-methylene]cyclobutane-1,2′-(1′H,8′H)-naphthalene				73/0.03	1.5307/20	24,88

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TABLE 3. OLIGO(ACETYLENES)

3.1. LINEAR OLIGOMERS OF ACETYLENE

	n	Mol. wt.	b.p. (°C/mbar)	*d* (g/cm³)/°C	n_D^{20}	Refs.
Vinylacetylene $CH_2{=}CH{-}C{\equiv}CH$	2	52.1	5/1009	0.705/0		1,2
Divinylacetylene $CH_2{=}CH{-}C{\equiv}C{-}CH{=}CH_2$	3	78.1	84.5–85/1013	0.772/20	1.5055	1–3
1,3-Hexadiene-5-yne *cis/trans* $CH_2{=}CH{-}CH{=}CH{-}C{\equiv}CH$	3	78.1	81–82/1013	0.780/28	1.4900	1,2,4–6,25
1,3,7-Octatriene-5-yne $CH_2{=}CH{-}CH{=}CH{-}C{\equiv}C{-}CH{=}CH_2$ (E)-: GC; ^{1}H-, ^{13}C-NMR; Ref. 7 (Z)-: GC; ^{1}H-, ^{13}C-NMR; Ref. 7	4	105.1	10/27	0.830/20	1.5834	1,2,7

3.2. POLYENYNE OLIGOMERS $(CH_3)_3C-[C\equiv C-CH=CH]_n-C\equiv C-C(CH_3)_3$

n	Mol. wt.	m.p. (°C)	Refs.
1	188.3	69–72	26
2	238.4	118–120	26
3	288.4	155–156	26
5	388.5	220 d	26
7	488.6	204 d	26

3.3. OLIGOMERIC α,ω-DIYNES $H[C\equiv C-(CH_2)_x-C\equiv C]_nH$

x	*n*	Mol. wt.	m.p. (°C)	b.p. (°C/mbar)	n_D/°C	Refs.
1	1	64.1	−20 to −19	63–64/1013		8
	2	126.1	65–66			8,9
	3	188.2	103–104			8
2	1	78.1		87.5–88.5/1011	1.4381/23	10
	2	154.2	99–100			11–14
	4	30.4	167–168 d			11,12
3	1	92.1	−84.8	111.5/1013	1.4423/20	15
	2	182.3	~−5	110–111/0.9		11,12
	4	362.5	60–61			11,12
4	1	106.2		93–95/253	1.4521/18	16
	2	210.3	21–22	119–120/0.1	1.5205/23	11,17
	4	418.6	93–94			11,17
5	1	120.2	−27.3	162/1013	1.4490/20	15
	2	238.4	21–22		1.5119/26	11,12
6	1	134.2		68–71/18		18
	2	266.4	30–31			11,12
	4	530.8	59–61			11,12

3.4. OLIGO(ALKYNES) $H[C\equiv C-(CH_2)_x]_n-C\equiv CH$

x	*n*	Mol. wt.	m.p. (°C)	b.p. (°C/mbar)	n_D/°C	Refs.
1	1	64.1	−21 to −19	63–64/1013		8
	2	102.1	21–21.5		1.4833/22	8
	3	140.2	44–45			8
	4	178.2	73–74			8
	6	254.3	112–113.5			8
2	1	78.1		87.5–88.5/1011	1.4381/23	10
	2	130.2	46	61–63/3		19
4	1	106.2		93–95/253	1.4521/18	16
	2	186.2	−3	111/1.3	1.4775/25	9
	3	266.4	19	167/0.4	1.4918/25	9
	7	586.9	36			9
	8	667.0	55			9
5	1	120.2	−27.3	162/1013	1.4490/20	15
	2	214.3	8	113/1.1	1.4791/26	9
	3	308.5	33	170/0.1		9
6	1	134.2		68–71/18		18
	2	242.4	24	131/0.3	1.4806/25	9

3.5. CYCLIC OLIGO(ALKYNES) $\ulcorner[(C\equiv C)_x-(CH_2)_y]_n\urcorner$

x	*y*	*n*	Mol. wt.	m.p. (°C)	b.p. (°C/mbar)	Refs.
1	4	2	160.2	39	87/0.3	9,20,21
		4	320.5	71	215/0.3	9,20
	5	2	188.3	100	100–110/0.001	9,20
	6	2	216.4	−3.5	110–120/0.001	20
	7	2	244.4	97	160–180/4	20
	8	2	272.5	38–39	145–147/0.01	20
	9	2	300.5	106.5	198–202/0.001	20

3.5. *cont'd*

x	y	n	Mol. wt.	m.p. (°C)	b.p. (°C/mbar)	Refs.
2	2	3	228.3	175–180 d		14
		4	304.4	170–180 d		14
		5	380.5	165 d		14
		6	456.6	~180 d		14
		7	532.6	~180 d		14
	3	2	180.2	115–120 (expl.)		11,12
		3	270.4	174–175		13
		4	360.5	213–214		13,22
	4	2	208.3	163		12,13,17,20,22
		3	312.4	173–174		13,22
		4	416.6	154–155		13,22
		5	520.7	155–157		13,22
	5	2	236.3	212		11–13,20,22
		3	354.5	125–126		13,22
		4	472.7	135–136		13,22
		5	590.9	144–145		13,22
		6	709.0	144–145		13,22
	6	2	264.4	82		12,20,22
		3	396.6	135–136		22
		4	528.8	152–154		22
	7	2	292.4	171		20
	8	2	320.5	85		20,22
	9	2	348.5	142		20
	10	1	188.3	18		23
		2	376.6	101–102		23
3	5	2	284.4	>200		20

3.6. **PERICYCLYNES** $\ulcorner[C{\equiv}C{-}C(CH_3)_2]_n\urcorner$

n	Mol. wt.	m.p. (°C)	Refs.
5	330.5	201–202	24
6	396.6	249–250	24
7	462.7	173–174	24
8	528.8	189–190	24

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TABLE 4. OLIGOMERS WITH ALIPHATIC SIDE CHAINS WHICH IN ADDITION CONTAIN HETEROATOMS

4.1. OLIGOMERIC ACRYLIC DERIVATIVES

4.1.1. OLIGO(ACRYLIC ACIDS)

4.1.1.1. $H[CH_2CH(COOH)]_nCH_3$

n	Mol. wt.	Configuration	m.p. (°C)	b.p. (°C/mbar)	Refs.
1	88.1		−46	153/1012	
2	160.2	Isotactic (meso)	128		1–3,11
		Syndiotactic (racemic)	141		1–3,11
3	232.2	Isotactic (meso)	167.5–170.0		3,78
		Heterotactic (racemic)	160.0–163.0		3,78
		Syndiotactic (meso)	153.5–154.5		3,78

4.1.1.2. $(CH_3)_2C(COOH)-[CH_2CH(COOH)]_n-C(COOH)(CH_3)_2$

n	Mol. wt.	m.p. (°C)	Refs.
1	246.3	30–35	4
2	318.3	70–80[a]	4
3	390.4	181–183	4
4	462.5	80–82	5

[a] *p*-Nitrobenzyl ester.

4.1.2. OLIGO (ACRYLATES)

4.1.2.1. $H[CH_2CH(COOH)]_nCH_3$

n	Mol. wt.	Configuration	b.p. (°C/mbar)	n_D/°C	Refs.
1	102.1		91.5/990	1.3838/20	6
2	188.2	Isotactic (meso)	64/0.9	1.4258	3,6,101
		Syndiotactic (racemic)	NMR		3
3	274.3	Isotactic (meso)	163/15	1.4440	3,6,78
		Heterotactic (racemic)	160/15	1.4420	3,6,78
		Syndiotactic (meso)	156/15	1.4407	3,6,78

4.1.2.2. Anionic Oligomers $RO[CH_2CH(COOR)]_nH$

R	*n*	Mol. wt.	b.p. (°C/mbar)	n_D^{25}	Refs.
CH_3	1	118.1	55–56/27		7
CH_3	2	204.2	90/1	1.433	7
C_2H_5	1	146.2	75–77/27		7,42,56
C_2H_5	2	246.3	82/0.15	1.446	7,42,56,62

4.1.2.3. Unsaturated Oligomers

Oligomers	R	*n*	Mol. wt.	b.p. (°C/mbar)	n_D^{25}	Refs.
Dialkyl-Δ^2-dihydromuconate (*trans*)	CH_3	2	172.2	86–88/1.3	1.4497	42,44,58,60,61,63
$ROOC-CH=CH-CH_2CH_2COOR$	C_2H_5	2	200.2	80–84/1.3		58
Dialkyl-Δ^3-dihydromuconate	CH_3	2	172.2	74–75/1.3		42,58,60,63
$ROOC-CH_2-CH=CH-CH_2COOR$	C_2H_5	2	200.2	107–108/1.3		58,63
Dialkyl-α-methyleneglutarate oligomers	CH_3	1	172.2	59/0.3		7,8,42,44,62

4.1.2.3. cont'd

Oligomers	R	*n*	Mol. wt.	b.p. (°C/mbar)	n_D^{25}	Refs.
CH_2=C(COOR)–[CH_2CH(COOR)]$_n$H		2	258.2	120/0.9		8
		3	344.3	166–168/0.4		8
		4	430.4	180/0.03		8
	C_2H_5	1	200.2	52–53/0.2	1.0392	42,52,56,62

4.1.3. ANIONIC OLIGOMERS OF ACRYLAMIDE CH_2=CHCO–[$NHCH_2CH_2CO$]$_n$$NH_2$

n	Mol. wt.	m.p. (°C)	Refs.
1	142.2	149–150	110–112
2	213.2	179–181	112

4.1.4. OLIGO(ACRYLONITRILES)

4.1.4.1. H[CH_2CH(CN)]$_n$H

n	Mol. wt.	b.p. (°C/mbar)	n_D/°C	Refs.
1	55.1	97.1/1013	1.3689/15	
2	108.1	116–118/6.5	1.4320/25	9,45
3	161.2	195–196/3.5	1.4609/20	9,10,45

4.1.4.2. H[CH_2CH(CN)]$_n$$CH_3$

n[a]	Mol. wt.	m.p. (°C)	b.p. (°C/mbar)	d_4^{64}/°C (g/cm^3)	n_D/°C	Refs.
1	69.1	−71.5	107–108/1013	0.773	1.3720/20	37
2	122.2	8.8[b]	106/3	0.9051	1.4191/60	10,11,38,54,80
		55[c]	94/3	0.8940	1.4155/60	10,11,38,54,80
3	175.2	37–39[b]				10,38,53
		53–54[d]				10,53
		80–81[e]				10,53
4	228.3	130–132[f]				10
		158				10

[a] $n = 2–5$ (diastereomers): ^{13}C-NMR, Ref. 35.
[b] Isotactic (meso).
[c] Syndiotactic (racemic).
[d] Heterotactic (racemic).
[e] Syndiotactic (meso).
[f] Two stereoisomers.

4.1.4.3. H[CH(CN)CH_2]$_n$$CH_2$CN

n	Mol. wt.	b.p. (°C/mbar)	n_D/°C	Refs.
1	94.1	287.4/1013	1.4347/20	
2	147.2	85/0.01	1.4644/25	9,12
3	200.2	95/0.01		9,12

4.1.4.4. 1,2-Dicyanocyclobutanes

n	Configuration	Mol. wt.	m.p. (°C)	b.p. (°C/mbar)	n_D^{25}	Refs.
1	*cis/trans*	106.1				13,42,43,66,81
	cis		67–67.5	190/20	1.4628	13,14,79
	trans		30.5/31.5	160/20		13,14,79

4.1.4.5. Unsaturated Oligomers

Oligomers[a]	*n*	Mol. wt.	m.p. (°C)	b.p. (°C/mbar)	n_D^{25}	Refs.
2,3-Dihydromuconitrile $NCCH_2CH{=}CHCH_2CN$	2	106.1	76			14,15,82
1,4-Dicyano-1-butene $CN{-}CH{=}CH{-}CH_2CH_2CN$	2	106.1				42,46,49,67
cis			−19 to −17	99.5–102.5/0.5	1.4677	49,50,83
trans			−13 to −12	84.5–86.5/0.5	1.4646	49,50
2-Methyleneglutaronitrile $CH_2{=}C(CN){-}CH_2CH_2CN$ (*cis/trans*)	2	106.1	−9.6	65/0.13	1.4550	42,44–48,52
2,4,6-Tricyano-1-hexene $CH_2{=}C(CN){-}CH_2CH(CN){-}CH_2CH_2CN$	3	159.2		152–164/2.5	1.4762	42,45
1,1,4,4-Tetracyanoethyl-1,4-dicyano-2-butene $(NCCH_2CH_2)_2C(CN){-}CH{=}CH{-}C(CN)(CH_2CH_2CN)_2$	6	318.4	240			14,45,46
1,4-Dicyano-1,3-butadiene $NC{-}CH{=}CH{-}CH{=}CH{-}CH$	2	104.1				42,51
cis,cis			128–129			83
trans,trans			159–161			97

4.2. OLIGOMERIC METHACRYLIC DERIVATIVES

4.2.1. OLIGO(METHACRYLIC ACIDS)

4.2.1.1. $H[CH_2C(CH_3)(COOH)]_n{-}C(COOH)(CH_3)_2$

n	Mol. wt.	m.p. (°C)	Refs.
2	260.3	Oil	19
3	346.4	45–48	18,19
4	432.5	56–59	19

4.2.1.2. Anionic Oligo(methacrylic acids)

n	Mol. wt.	m.p. (°C)	Refs.
$CH_3O{-}[CH_2C(CH_3)(COOH)]_nH$			
2	204.2	82	17
3	290.3	160	17

4.2.2. OLIGO(METHACRYLATES)

4.2.2.1. Anionic Oligo(methacrylates) $RO{-}[CH_2C(CH_3)(COOR)]_nH$

R	R′	*n*	Mol. wt.	b.p. (°C/mbar)	d^{20}/(g/cm³) °C	n_D^{20}	Refs.
CH_3O	CH_3O	1	132.2	147/1013	0.7949	1.4053	17,36,41,73
		2	232.3	241/1013	1.0540	1.4378	17,36,41
		3	332.4	116/0.1	1.1045	1.4567	17,36,41
		4	432.5	190/0.1	1.12	1.4681	17
		6	632.8		1.565		17
			n = 2–10: GPC Ref. 36				
$n{-}C_4H_9O$	$n{-}C_4H_9O$	1	216.3	59–61/0.13	0.8970	1.4213	74
		2	358.5	128–130/0.13	0.9436	1.4400	74
		3	500.7	186–90/0.13	0.9736	1.4508	74
		4	642.9	246–250/0.4	0.9909	1.4574	74

Isotactic and syndiotactic oligomers, $(CH_3)_3C{-}[CH_2C(CH_3)COOCH_3]_n{-}H$, n = 2–100 (mol. wt. 158.2–10070.0): HPLC, GPC, SFC; DSC (T_g, T_m), X-ray (n = 2–5), NMR, MS; Refs. 114–124.
Reviews: Refs. 114,115.
Properties of specific oligomers: n (isotactic and syndiotactic, resp.) = 2–8,13,14,16,19,21,22–25,27–29,31,36,41,44,45,50,58,80,100.
m.p. (°C), (isotactic oligomers): n = 28: 98.5, n = 31: 104.5, n = 36: 109.6, n = 41: 117.3, n = 44: 124.3; Ref. 116.

4.2.2.2. Unsaturated Oligomers[a] $CH_2{=}C(COOCH_3)-[CH_2-X-(COOCH_3)]_n-CH_3$

X	*n*	Mol. wt.	b.p. (°C/mbar)	n_D^{25}	Refs.
CH_2CH	1	188.2	107/4	1.4445	16,20,42,59,65,77
	2	276.3	173/4	1.4588	16,20,42,59,65,77
$C(CH_3)$	1	188.2		IR, MS, ^{1}H-NMR	Ref. 65,77
					Ref. 75

[a] $n = 2-4$: 2D-COSY-NMR

4.2.2.3. Cyclic Oligomers

Oligomers	R	*n*	Configuration	Mol. wt.	m.p. (°C)	b.p. (°C/mbar)	Refs.
1,2-Dimethylcyclobutane-1,2-dicarboxylates	CH_3	2	*cis*	200.2	IR, MS, ^{1}H-NMR		65
			trans		IR, MS, ^{1}H-NMR		65
2,4,6-Trimethyl-6-methoxy-methyl-cyclohexanone-2,4-dicarboxylate							
	CH_3	3		268.3		122/0.13	17,36
1,3,3,5-Tetramethylcyclohexane-2-one-1,5-dicarboxylate	CH_3	3	*cis*	270.1		128–138/3	64,72
			trans		52–54	128–138/3	64,72
4,6,7-Trimethyl-3-oxo-7-propyl-2-oxabicyclo-[2,2,2]octane-6-carboxylate							
	CH_3	3	6-endo	268.3	117–119		64
			6-exo		Oil		64
1-Ethyl-4,6,7-trimethyl-3-oxo-7-propyl-2-oxa-bicyclo[2,2,2]octane-6-carboxylate							
	CH_3	4	6-exo	296.4	IR, MS, ^{1}H-NMR		64

4.2.3. OLIGO(METHACRYLOYL CHLORIDES)

Oligomers	*n*	Mol. wt.	b.p. (°C/mbar)	Refs.
2-Chloro-2,5-dimethylcyclopentanone-5-carboxylic chloride				
	2	209.1	111–117/23	40
2,5-Dimethyl-Δ^2-cyclopentenone-5-carboxylic acid chloride				
	2	209.1	111–117/23	40

4.2.4. ANIONIC OLIGOMERS OF METHACRYLAMIDE $CH_2=C(CH_3)CO-[NHCH_2CH(CH_3)CO]_nNH_2$

n	Mol. wt.	m.p. (°C)	Refs.
1	170.2	118–120	84
2	255.3	155–158	84
3	340.4	195	84
$n = 4–9$: GPC, MS, Ref. 84			

4.2.5. OLIGO(METHACRYLONITRILES)

4.2.5.1. Anionic Oligo(methacrylonitriles) $CH_3O[CH_2C(CH_3)CN]_nH$

n	Mol. wt.	b.p. (°C/mbar)	n_D/°C	Refs.
1	99.1	160.6/1013	1.4038/20	113
2	166.2	92/0.7	1.438	21,34
3	233.3	165/0.7	1.464	21,34
4	300.4	235/0.7	1.478	21,34
5	367.5	300–305/0.7	1.488	21,34

4.2.5.2. 1,2-Dicyano-1,2-dimethyl-cyclobutanes $\overline{[CH_2C(CH_3)(CN)-C(CH_3)(CN)CH_2]_n}$

n	Configuration	Mol. wt.	m.p. (°C)	b.p. (°C/mbar)	Refs.
2	*cis*	134.2	107–108	170/33	16,66,89
2	*trans*	134.2	90.3	120/33	16,66,89

4.2.5.3. Unsaturated Oligomers

Oligomers	*n*	Mol. wt.	m.p. (°C)	b.p. (°C/mbar)	n_D^{25}	Refs.
α-Methylene-δ-methyladiponitrile $CH_3CH(CN)-CH_2CH_2C(CN)=CH_2$	2	134.2		148/33	1.4502	16,42,89
5-Cyano-8-methyl-2-methylene-nonanedinitrile $CH_2=C(CN)-[CH_2CH_2CH(CN)]_2=CH_3$	3	201.3	47–49	194/1.3	1.4720	16

4.3. OLIGOMERS OF β-ALKYL-SUBSTITUTED VINYL DERIVATIVES

4.3.1. OLIGO(ESTERS)

Monomer	R	Oligomers	*n*	Mol. wt.	b.p. (°C/mbar)	n_D^{25}	Refs.
$CH_3CH=CHCOOR$		2-methyl-3-pentene-1,3-dicarboxylate (*cis/trans*) $CH_3CH=C(COOR)-CH(CH_3)CH_2COOR$					
	CH_3		2	200.2	70–80/96		42,55,68,70,71
	C_2H_5		2	228.3	84/0.75	1.4512	42,55,56,69
	CH_3	2-Methyl-4-pentene-1,3-dicarboxylate (*cis/trans*) $CH_2=CH-CH(COOR)-CH(CH_3)CH_2COOR$	2	200.2	90–110/13		42,70,71
n-$C_3H_7CH=CHCOOR$	CH_3	2-*n*-Propyl-3-heptene-1,3-dicarboxylate $C_3H_7-CH=C(COOR)-CH(CH_2COOR)-C_3H_7$	2	252.3	100–102/4		55
i-$C_3H_7CH=CHCOOR$	CH_3	2-Isopropyl-5-methyl-4-hexene-1,3-dicarboxylate $(CH_3)_2C=CH-CH(COOR)-CH(CH_2COOR)-CH(CH_3)_2$	2	252.3	90–93/3		55

4.3.2. OLIGO(CROTONONITRILES)

Oligomers	n	Mol. wt.	b.p. (°C/mbar)	n_D^{25}	Refs.
1,3-Dicyano-2-methyl-3-pentene (*cis/trans*) $CH_3CH{=}C(CN){-}CH(CH_3)CH_2CN$	2	134.2	81–83/0.3	1.4730	42,52,55–57
1,3,5-Tricyano-2,4,6-trimethylcyclohexane $\lceil[CH(CN){-}CH(CH_3)]_3\rceil$	3	201.3	152–155/0.3	1.4950	42,57
1,3,5-Tricyano-2,4-dimethyl-5-heptene $CH_3CH{=}C(CN){-}CH(CH_3)CH(CN){-}CH(CH_3)CH_2CN$	3		150–160/0.13		42,52

4.4. OLIGO(VINYL) DERIVATIVES

4.4.1. OLIGO(VINYL ALCOHOLS) AND OLIGO(VINYL ACETATES) $H[CH_2CHOR]_nCH_3$

R	n	Configuration	Mol. wt.	m.p. (°C)	b.p. (°C/mbar)	n_D^{20}	Refs.
H	2	Isotactic (meso)	104.1		73/4	1.4327	80,86,87
		Syndiotactic (racemic)		48–49	74/4	1.4378	80,86,87
	3	Isotactic (meso)	148.2	67	120/1.3		84,85
		Heterotactic (racemic)			120/1.3		84,85
		Syndiotactic (meso)		87.5–88			84,85
$COCH_3$	2	Isotactic (meso)	188.2		20/1013	1.4172	86,88,97
		Syndiotactic (racemic)			201/1013	1.4142	86,88,97
		Mixture			103–107/27	1.4170	96
	3	Isotactic	274.3		116–117.5/0.7	1.4342	84,88
		Heterotactic		21–22	115–116/0.7	1.4319	84
		Syndiotactic		32.5–33.5	112–114/0.5	1.4297	84,88
		Mixture			120–122/0.7	1.4320	84,96

4.4.2. OLIGO(VINYL CHLORIDES) $H[CH_2CHCL]_nCH_3$ [a]

n	Configuration	Mol. wt.	b.p. (°C/mbar)	n_D^{20}	Refs.
2 [b]	Isotactic (meso)	141.0	40/16	1.4409	80,90–95,97
	Syndiotactic (racemic)		36/16	1.4390	80,90–95,97
	Mixture		140–141/1013	1.4409	95
3 [b]	Isotactic	203.5	102.5/20	1.4722	89,94,95
	Heterotactic		103.5/20	1.4704	89,94,95
	Syndiotactic		104.5/20	1.4686	89,94,95
	Mixture		102.5–104.5	1.4699	89

[a] Oligomers $(CH_3)_3C{-}[CH_2CHCl]_n{-}H$, n = 1,2,3 (threo-; erythro-), 4 (ribo-; xylo-; arabino-; lyxo-): HPLC, ^{13}C-NMR, Ref. 39.
[b] 2,4-Dibromopentanes and 2,4,6-tribromoheptanes: Kerr Effekt, Ref. 98.

4.4.3. OLIGO(VINYL ALDEHYDES) AND OLIGO(VINYL KETONES)

Monomer	Oligomers	n	Mol. wt.	m.p. (°C)	b.p. (C/mbar)	Refs.
Acrolein $CH_2{=}CHCHO$	2-Formyl-2,3-dihydropyran 	2	112.1		145–148/1013	22–25
	3-Formyl-5,6-dihydropyran 	2	112.1		77–78/16	26,27
α-Methylacrolein $CH_2{=}C(CH_3)CHO$	2-Formyl-2,5-dimethyl-2,3-dihydropyran 	2	140.2	−75	166/1000	24,28
α-Ethylacrolein $CH_2{=}C(CH_2H_5)CHO$	2-Formyl-2,5-diethyl-2,3-dihydropyran 	2	168.2		195/1013	24

4.4.3. *cont'd*

Monomer	Oligomers	*n*	Mol. wt.	m.p. (°C)	b.p. (C/mbar)	Refs.
Methyl vinyl ketone $CH_2{=}CH{-}CO{-}CH_3$	2-Methyl-6-acetyl-5,6-dihydropyran	2	128.2		68/17	29
	3-Methylene-2,6-heptanedione $CH_3COC(=CH_2)CH_2CH_2COCH_3$	2	140.2	5–7	91–92/7	46
2-Methyl-1-butene-(3)-one $CH_2{=}C(CH_3)COCH_3$	2,6-Dimethyl-3,7-dioxo-1-octene $CH_3COCH(CH_3)CH_2CH_2COC(CH_3){=}CH_2$	2	168.2		83–85/23	30,99,100
Phenyl vinyl ketone $CH_2{=}CH{-}CO{-}C_6H_5$	2,4-Dibenzoylpentane $CH_3CH(COC_6H_5)CH_2CH(COC_6H_5)CH_3$	2	280.4	^{1}H-NMR		99,100
	Isotactic (meso)			64–65	100/1.3	99,100
	Syndiotactic (racemic)			62–63	155/1.3	99,100

4.4.4. OLIGOMERIC *N*-VINYL DERIVATIVES

Monomer	Oligomers	*n*	Mol. wt.	m.p. (°C)	Ref.
N-Vinyl-pyrrolidone	1,3-Bis-[*N*-pyrrolidone-(2)-yl]-1-butene	2	212.3	75	31

4.4.5. OLIGO(VINYL PYRIDINES)

Monomer	Oligomers	*n*	Configuration	Mol. wt.	b.p. (°C/mbar)	Refs.
2-Vinylpyridine		2	Isotactic (meso)	226.3	106–108/0.33	102,105–107,109
		3	Isotactic (meso)	331.4	LC, GC, ^{1}H-, ^{13}C-NMR	103,105,107,109
		4	Isotactic (meso)	436.6	LC, GC, ^{1}H-, ^{13}C-NMR	104,103,107,109
	$n = 2$–7: LC, ^{1}H-, ^{13}C-NMR Refs. 108,109					
4-Vinylpyridine	sym-Tri(4-pyridyl)-cyclohexane	3		315.4	m.p. (°C): 228.5	32,33

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TABLE 5. OLIGO(STYRENES)

No.	Monomer	Oligomers	*n*	Mol. wt.	m.p. (°C)	b.p. (°C/mbar)	n_D^{20}	Refs.
Styrene		3-Methyl-1-phenylindane (2 stereoisomers)	2	208.3	9.5 25.5	168–169/21 157/16	1.5810 1.5809	1–5

5.1. *cont'd*

No.	Monomer	Oligomers	n	Mol. wt.	m.p. (°C)	b.p. (°C/mbar)	n_D^{20}	Refs.
		1,3-Diphenyl-1-butene $CH_3-CH-CH=CH$	2	208.3		181–182/27 134–135/1	1.5930	1–3,6,23
		1,4-Diphenyl-1-butene $CH=CH-CH_2-CH_2$	2	208.3		124/1013		6,23
		1,2-Diphenylcyclobutane C_6H_5, C_6H_5	2	208.3			1.5913	7
α-Methylstyrene		1,3,3-Trimethyl-1-phenylindane CH_3, CH_3, CH_3	2	236.4	53	158–160/13		8–10
		4-Methyl-2,4-diphenyl-2-pentene $CH_3-C=CH-C(CH_3)_2$	2	236.4	52	166–167/20	1.5728	8,11,12
α-Methyl-*p*-methoxystyrene		$CH_3O-C_6H_4-C(CH_3)_2CH=C(CH_3)-C_6H_4-OCH_3$	2	296.4		237–240/24	1.5703	9,13
α-Methyl-*p*-aminostyrene		1,3,3-Trimethyl-4′,6-diamino-phenylindane H_2N, CH_3, CH_3, CH_3, NH_2	2	266.4	93–94			9
		$H_2N-C_6H_4-C(CH_3)_2CH=C(CH_3)-C_6H_4-NH_2$	2	266.4	173			9,14
α-Methyl-*p*-carboxystyrene		1,3,3-Trimethyl-1-phenylindane-4′,6-dicarboxylic acid HOOC, CH_3, CH_3, CH_3, COOH	2	348.4	297			9,14
α-*p*-Dimethylstyrene		1,3,3,4′,6-Pentamethyl-1-phenylindane CH_3, CH_3, CH_3, CH_3, CH_3	2	264.4	40	142–144/1.1		9,15,16

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5.1. *cont'd*

No.	Monomer	Oligomers	n	Mol. wt.	m.p. (°C)	b.p. (°C/mbar)	n_D^{20}	Refs.
	α-Ethylstyrene	1,3-Diethyl-3-methyl-1-phenylindane	2	264.4		104–106/0.4	1.5642	17
		3,5-Diphenyl-5-methyl-2-heptene $CH_3-C(C_2H_5)CH_2C{=}CHCH_3$	2	264.4		133–135/1.6	1.54345/25	17
	α-*m*-Dimethylstyrene	1,3,3,3′,7-Pentamethyl-1-phenylindane	2	264.4	57			9
	p-Bromostyrene	*cis*-1,3-Di(*p*-bromophenyl)-1-butene	2	366.1	67–68			18,19
	Stilbene	1,2,3,4-Tetraphenylcyclobutane	2	360.5	164–165			20–22
		1,2-Diphenyl-1-*p*-tolyethane $C_6H_5CHCH_2C_6H_5$	2	272.4	42–43			20

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TABLE 8. OLIGOMERS CONTAINING N IN THE MAIN CHAIN

8.1. OLIGO(AMIDES)

8.1.1. OLIGO(AMIDES) OF β-AMINO ACIDS (NYLON 3)

8.1.1.1. Linear Oligo(amides) of β-Alanine $H[NH(CH_2)_2CO]_nOH$

n	Mol. wt.	m.p. (d) (°C)	Refs.
1	89.1	206	1
2	160.2	212	2,4,96
3	231.2	>255	3,4,96
4	302.3	>260	4,96
5	373.4	>310	5
6	444.5	>320	5

8.1.1.2. Cyclic Oligo(amides) of β-Alanine $\overline{[NH(CH_2)_2CO]_n}$

n	Mol. wt.	m.p (°C)	Refs.
1	71.1	74–74.5	6,104,113
2	142.2	298–299	4,8,9,72,84,114,116
3	213.2	>360	4,10,84,88,93,101,114,116
4	284.3	353	4,10,84,114,116
5	355.4	327	84,114,116
6	426.5	360	114,116
7	497.6	341	114,116
8	568.8	>360	114,116
9	639.7	349	114,116
10	710.8	>350	116
11	781.8	>350	116

8.1.1.3. Linear Oligo(amides) of C-Methyl-β-Alanines $H[NHCHR_1CHR_2CO]_nOH$

R_1	R_2	*n*	Mol. wt.	m.p. (°C)	Refs.
CH_3	H	1	103.1	188–189	102
		3	273.3	240–241	92

8.1.1.4. Cyclic Oligo(amides) of C-Methyl-β-Alanines $\overline{[NHCHR_1CHR_2CO]_n}$

R_1	R_2	*n*	Mol. wt.	m.p. (°C)	b.p. (°C/mbar)	Refs.
CH_3	H	1	85.1		100/13	104,105
		3	255.3	300		91
H	CH_3	1	85.1		98–99/20	104
		2	170.2	255		84
		3	255.3	>350		84,85,87
		4	340.4	>350		84
		5	425.5	>350		84
		6	510.6	>350		84
		7	595.7	330–335		84
		8	680.8	338–340		84
		9	765.9	327–330		84
		10	851.0	330		84
		11	936.0	325		84

8.1.1.5. Linear Oligo(amides) of C-Dimethyl-β-Alanines $H[NHC(R_1)_2C(R_2)_2CO]_nOH$

R_1	R_2	*n*	Mol. wt.	m.p. (°C)	Refs.
H	CH_3	1	117.1	239	106
		3	315.4	209–212	94
		6	612.8	207.5–210.5	94
CH_3	H	1	117.1	217	103
		3	315.4	182–184	95

8.1.1.6. Cyclic Oligo(amides) of C-Dimethyl-β-Alanines $\overline{[NHC(R_1)_2C(R_2)_2CO]_n}$

R_1	R_2	*n*	Mol. wt.	m.p. (°C)	b.p. (°C/mbar)	Refs.
H	CH_3	1	99.1		70–73/1.1	107
		3	297.4	255–259.5		84,91
		4	396.5	270		84
		5	495.7	257		84
		6	594.8	310		84,91
		7	693.9	290		84
		8	793.1	256		84
		9	892.3	315		84
		10	991.3	252		84
		11	1090.5	315		84
		12	1189.6	245		84
CH_3	H	1	99.1	16–17	112/20	104,105
		3	297.4	257–258		91

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8.1.2. OLIGO(AMIDES) OF γ-AMINOBUTYRIC ACID (NYLON 4)

8.1.2.1. Linear Oligo(amides) $H[NH(CH_2)_3CO]_nOH$

n	Mol. wt.	m.p. (°C)	Refs.
1	103.1	204–205	11
2	188.2	186	4,7,12
3	273.4	198–199	4
4	358.4	202–203	4
6	528.6	196–198	133
8	698.8	206–208	133
10	869.0	199–203	133
12	1039.3	208	133
16	1379.6	207–209	133
20	1719.4	206–208	133

8.1.2.2. Cyclic Oligo(amides) $\overline{[NH(CH_2)_3CO]_n}$

n	Mol. wt.	m.p. (°C)	Refs.
1	85.1	24	13,14
2	170.2	283	4,10,70,71,73
3	255.3	242–243	4,10
4	340.4	255	4,10,70
6	510.6	303	10,135
8	680.9	298	135
10	851.1	312	135
12	1021.3	301	135
14	1191.5	>355	135

8.1.2.3. Anionic Oligo(amides)

n	Mol. wt.	m.p. (°C)	Refs.
0	189.2	92.5	15
1	274.3	121	16

8.1.2.4. Cationic Oligo(amides)

R	*n*	Mol. wt.	m.p. (°C)	Refs.
H_2	1	206.5	181	71,89,118
	0	188.7	156	89,119
	1	273.5	162	89

8.1.2.5. Amidino-Oligo(aminobutyric Acids)

n	Mol. wt.	m.p. (°C)	Refs.
1	170.2	175–177	89,118,121
2	255.3	175	89
3	340.4	162–163	89

8.1.3. OLIGO(AMIDES) OF-δ-AMINOVALERIC ACID (NYLON 5)

8.1.3.1. Linear Oligo(amides) $H[NH(CH_2)_4CO]_nOH$

n	Mol. wt.	m.p. (°C)	Refs.
1	117.2	160–162	17
2	216.3	178	18
3	315.4	184–185.5	18
4	414.5	196.5–198.5	18

8.1.3.2. Cyclic Oligo(amides) $\overline{[NH(CH_2)_4CO]_n}$

n	Mol. wt.	m.p. (°C)	Refs.
1	98.1	39–40	14,17,19
2	198.3	295–296	8,18
3	297.4	329–331	18
4	396.5	266–267	18

8.1.3.3. Cationic Oligo(amides)

R	*n*	Mol. wt.	m.p. (°C)	Refs.
H_2	1	234.5	114	89
	0	216.5	93–94	89
	1	315.5	138	89

8.1.3.4. Amidino-Oligo(aminovaleric Acids)

n	Mol. wt.	m.p. (°C)	Refs.
1	198.3	166–168	89,118
2	297.4	92–94	89
3	396.5	112	89

8.1.4. OLIGO(AMIDES) OF ε-AMINOCAPROIC ACID (NYLON 6)

8.1.4.1. Linear Oligo(amides) $H[NH(CH_2)_5CO]_nOH$

n	Mol. wt.	m.p. (°C)	Refs.
1	131.2	206–208	20,21
2	244.3	204–205	22–24,136
3	357.3	208–209	23–25,69,136
4	470.6	220–221	23,24,36
5	583.8	214–215	23,69,136
6	697.0	212–214	23,24,136
7	810.1	210–211	23,69,136
8	923.3	210–211	23
9	1036.5	208–211	26,69
10	1149.6	212–213	26
11	1262.8	209–212	26,69
12	1375.9	211–213	26
13	1489.1	210–211	69
14	1602.3	207–208	136
15	1715.3	207–208	69
17	1941.5	209–211	69

8.1.4.1. cont'd

n	Mol. wt.	m.p. (°C)	Refs.
18	2054.9	206–209	136
21	2394.5	212–213	69
22	2507.5	209–211	136
25	2847.0	212–213.5	69
26	2960.2	209–211	136
30	3412.8	210–213	136
34	3865.5	211–214	136
38	4318.1	214–217	136

8.1.4.2. Oligo(aminocaproic Amides)
$H_2^+[NH(CH_2)_5CO]_n$–NHR CL^-

R	*n*	Mol. wt.	m.p. (°C)	Refs.
n-C_4H_9	1	222.8	143	122
	2	335.9	176	122
	3	449.1	189	122
$CH_2C_6H_5$	1	256.8	164.5	122
	2	369.9	179	122
	3	483.1	194–195	122

8.1.4.3. Amidino-Oligo(aminocaproic Acids)

n	Mol. wt.	m.p. (°C)	Refs.
1	226.3	168	120,128
2	339.5	120	120
3	452.6	154	120

8.1.4.4. Amidino-Oligo(aminocaproic Amides)

R	*n*	Mol. wt.	m.p. (°C)	Refs.
n-C_4H_9	0	168.3	53	122
	1	281.4	129	122
	2	394.6	148–150	122
$CH_2C_6H_5$	0	202.3	76–78	122
	1	315.5	135	122
	2	428.6	157	122

8.1.4.5. Anionic Oligo(amides)

n	Mol. wt.	b.p. (°C/mbar)	n_D^{20}	R_F^a	Refs.
0	155.2	123/21	1.4898		32
1	268.5		1.4992	0.76	33
2	381.5			0.67	33
3	494.7			0.58	33

[a] PC: solvent, tetrahydrofuran/cyclohexane/water (186 : 14 : 10).

8.1.4.6. Cationic Oligo(amides)

R	*n*	Mol. wt.	m.p. (°C)	Refs.
H_2	1	262.8	112	120
	2	375.9	Oil	120
	3	489.1	Oil	120
	0	244.8	137	89,120
	1	357.9	106–108	120

8.1.4.7. End-group Protected Oligo(amides)
C_2H_5CO–$[NH(CH_2)_5CO]_n$–NHC_3H_7

n	Mol. wt.	m.p. (°C)	Refs.
1	228.3	106	31,112
2	341.5	149	31,112
3	454.7	172	31,112
4	567.8	181	31
5	681.0	187	31,112
6	794.2	191	31,112
7	907.3	197	31,112
8	1020.5	200	31,112
9	1133.6	201	31,112
10	1246.8	201	31,112
11	1360.0	204	31
12	1473.1	202	31,112
13	1586.3	200	31
14	1699.3	205	31
15	1812.6	206	31
16	1925.8	206	31

8.1.4.8. Cyclic Oligo(amides) $\sqsubset[NH(CH_2)_5CO]_n\sqsupset$

			R_F		
n^a	Mol. wt.	m.p. (°C)	TCW[b]	EAW[c]	Refs.
1	113.2	69.5	0.56	0.88	14,17,27,78
2	226.3	348	0.48	0.81	4,24,28,29,45,78,98,110,111,112,148
3	339.5	244	0.34	0.77	4,24,28,29,45,78,98,111,112,147
4	452.6	256–257	0.25	0.69	4,24,28,29,45,78,98,111,112
5	565.8	254	0.16	0.59	4,24,29,78,98,111,112
6	678.9	260	0.10	0.49	4,24,29,60,98,111,112
7	792.1	243	0.08	0.40	29,30,60,98,111
8	905.3	254	0.04		29,30,60,98,111
9	1018.4	245	0.02		29,30,68,138

8.1.4.8. cont'd

n^a	Mol. wt.	m.p. (°C)	R_F TCW[b]	R_F EAW[c]	Refs.
10	1131.8	257			117,137
11	1244.8	249			138
12	1357.9	262			117,137
13	1471.1	249			138
14	1584.3	263			117,137
15	1697.4	256			138
16	1810.6	261			117,137
18	2036.9	263			117,137
20	2263.2	259			117,137
21	2376.4	248			138
22	2489.5	250			117,137
24	2715.9	252			117,137
25	2829.0	249			138
26	2942.2	246			137
27	3055.3	244			138
28	3168.5	247			137
30	3394.8	255			117,137
32	3621.2	248			137
33	3734.3	231			138
34	3847.5	231			137
36	4073.8	228			137
38	4300.1	230			137
40	4526.4	235			137
48	5431.7	234			138
50	5658.1	229			138
55	6223.9	226			138
56	6337.0	229			138
60	6789.7	227			138
64	7242.3	226			138
70	7921.3	225			138
72	8147.6	225			138
80	9052.9	224			138
90	10184.5	222			138
100	11316.1	221			138

[a] n = 2–40: HPLC (trifluoroethanol/water mixtures), Ref. 117; n = 2–18: FD-MS, Ref. 117; n = 2–100: HPLC (trifluoroethanol/water, gradient elution, Ref. 138.
[b] PC, TLC: solvent, tetrahydrofuran/cyclohexane/water (186 : 14 : 10).
[c] PC, TLC: solvent, ethyl acetate/acetone/water (10 : 10 : 2), Refs. 29,134.

8.1.5. OLIGO(AMIDES) OF HIGHER ω-AMINO ACIDS (NYLON 7–12)

8.1.5.1. Linear Oligo(amides) $H[NH(CH_2)_xCO]_nOH$

x	n	Mol. wt.	m.p. (°C)	Refs.
6	1	145.2	195	34,35
	2	272.4	205–208	36
7	1	159.2	188	4,37
	2	300.4	191–192	4,38
8	1	173.3	184	4,34
	2	328.5	184–186	4
10	1	201.3	186–187	34,38,39
	2	384.6	189–190	4,40,140
	3	567.9	183–184	5,40,115,140
	4	751.2	177–179	40,63,115
	5	934.5	177–178	63
	10	1850.8	181–182	63,67
11	1	215.3	186–187	41
	2	412.6	192–193	31

8.1.5.2. Cyclic Oligo(amides) $\overline{[NH(CH_2)_xCO]_n}$

x	n	Mol. wt.	m.p. (°C)	Refs.
6	1	127.2	29–30	14,17,42
	2	254.4	236–237	4,10
	3	381.6	259–261	89
6	4	508.8	215–216	89
	5	636.0	236	89
	6	763.2	244–245	89
	8	1017.5	258–259	89
	10	1271.9	262–263	89
7	1	141.2	72–73	13,14,34,42
	2	282.4	277	4,10,76,77
	3	423.6	217	89
	4	564.8	219	82,89
	5	706.0	215	89
	6	847.2	215	89
8	1	155.3	138–139	14,42
	2	310.5	201	4,10
9	1	169.3	162	14,42
	2	338.4	238	10,144

8.1.5.2. cont'd

x	*n*	Mol. wt.	m.p. (°C)	Refs.
10	1	183.3	155	42,43,75
	2	366.6	188–189	4,10,44,75,98
10	4	741.2	203	140
	5	926.6	204	140
	6	1111.9	217	140
	7	1297.2	205	140
	8	1482.5	221	140
	9	1667.8	201	140
	3	549.9	184	44,60,75,98
11	1	197.3	155	13,14,42,75
	2	394.6	212	60,61,75,98,115
	3	531.9	175	31,75
14	2	478.8	182	139

8.1.6. OLIGO(AMIDES) OF AROMATIC AMINO ACIDS

8.1.6.1. Linear Oligo(amides) of o-Aminobenzoic Acid

n	Mol. wt.	m.p. (°C)	Refs.
1	137.1	146	46–48
2	256.3	203–204	46,123,124,131
3	375.4	256	46,131
4	494.5	d	46

8.1.6.2. Cyclic Oligo(amides) of o-Aminobenzoic Acids

R_1	R_2	*n*	Mol. wt.	m.p. (°C)	Refs.
H	H	2	238.2	335–337	47,125–128,131
CH_3	H	2	266.3	207	47
		3	399.2	>320	131
		4	532.2	>300	130
$C_6H_5CH_2$	H	2	418.2	158–159	131
		3	627.3	260–263	131
	CH_3	3	669.3	260–263	129
CH_3	CH_3	3	441.2	>300	129

8.1.6.3. Cyclic Oligo(amides) of m-Aminobenzoic Acids

R	*n*	Mol. wt.	m.p. (°C)	Ref.
CH_3	3	399.2	>320	132

8.1.6.4. Linear Oligo(amides) of p-Aminobenzoic Acid

R	*n*	Mol. wt.	m.p. (°C)	Refs.
H	2	256.1	276	86
	3	375.4	>310	86
C_2H_5	2	284.1	176	86
	3	403.2	>266	86
	4	522.2	>330	86

8.1.6.5. Cyclic Oligo(amides) of 4-Amino-2,3-dihydroquinoline-3-Carboxylic Acid

R	*n*	Mol. wt.	m.p. (°C)	Ref.
n-C_3H_7	4	857.0	198	97
$CH_2C_6H_5$	4	1049.2	206	97

8.1.7. CYCLIC DIAMIDES OF ALIPHATIC DICARBOXYLIC ACIDS AND DIAMINES $\overline{[NH(CH_2)_xNH-CO(CH_2)_xCO]_n}$

x	*n*	Mol. wt.	m.p. (°C)	Refs.
2	1	142.2	201	142
3	1	170.2	238	49,50,74,139
4	1	198.3	304	49,51,139
5	1	226.3	337	49,139
	2	452.6	234	143
	3	679.0	246	143
	4	905.3	244	143
6	1	254.3	238	49,51,139
7	1	282.4	267	49,139
8	1	310.5	209	8,49,139,146
9	1	338.5	228	49,139,147
10	1	366.6	195	8,49,139
11	1	394.6	206	139
12	1	422.7	186	139

8.1.8. OLIGO(AMIDES) OF ADIPIC ACID AND HEXAMETHYLENE DIAMINE (NYLON 6.6)

8.1.8.1. Linear Oligo(amides) $H[NH(CH_2)_6NH-CO(CH_2)_4CO]_nOH$

n	Mol. wt.	m.p. (°C)	Refs.
1	244.3	193	52,53
2	470.7	221–222	52,53,63
3	696.9	246–248	52,53,63
4	923.3	247–249	31,63,65
5	1149.5	247–250	31,63,65
10	2281.1	250–255	63

8.1.8.2. End-Group Protected Oligo(amides)

8.1.8.2.1. Oligomeric Dicarboxylic Acid Dipropylamides
$C_3H_7NH-CO(CH_2)_4CO-[NH(CH_2)_6NH-CO(CH_2)_4CO]_n-NHC_3H_7$

n	Mol. wt.	m.p. (°C)	Refs.
1	454.7	229–230	64
2	681.0	239–242	64
3	907.3	248–250	64
4	1133.6	257–260	64
5	1359.9	258–261	64

8.1.8.2.2. Oligomeric Dipropionyl Diamines
$C_2H_5CO-[NH(CH_2)_6NH-CO(CH_2)_4CO]_n-NH(CH_2)_6NH-COC_2H_5$

n	Mol. wt.	m.p. (°C)	Refs.
1	454.7	202–203	64
2	681.0	226–228	64
3	907.3	229–231	64

8.1.8.3. Oligomeric Diamines
$H_2^+[NH(CH_2)_6NH-CO(CH_2)_4CO]_n-NH(CH_2)_6NH_3^+\ 2Cl^-$

n	Mol. wt.	m.p. (°C)	Refs.
1	415.4	248–250	65
2	641.7	249–251	65
3	868.0	252–254	65
4	1094.4	251–254	65
5	1320.7	252–255	65

8.1.8.4. Oligomeric Dicarboxylic Acids
$HOOC(CH_2)_4CO-[NH(CH_2)_6NH-CO(CH_2)_4CO]_nOH$

n	Mol. wt.	m.p. (°C)	Refs.
1	372.4	188–189	56
2	598.7	200–205	56,57
3	825.0	210–211	56
4	1051.3	214–219	31

8.1.8.5. Cyclic Oligo(amides) $\overline{[NH(CH_2)_6NH-CO(CH_2)_4CO]_n}$

n[a]	Mol. wt.	m.p. (°C)	TCW[b]	EAW[c]	Refs.
1	226.3	254	0.47	0.51	51,53–55,62,80,81,90,98,108
2	452.6	243–244	0.28	0.38	53–55,62,80,81,90,98,109
3	678.9	235	0.13	0.23	53,55,62,98
4	905.3	273	0.06	0.16	53,60,62,98
5	1131.6	279			149
6	1357.9	279			149
7	1584.3	291			149
8	1810.6	282			149
9	2036.9	280			149
10	2263.2	280			149
12	2715.9	280			149
14	3168.5	292			149
16	3621.2	284			149
18	4073.8	275			149
20	4526.4	270			149

[a] $n = 1–20$: HPLC (trifluoroethanol/water, gradient elution), Ref. 149.
[b] PC, TLC: solvent: tetrahydrofuran/cyclohexane/water (186 : 14 : 10).
[c] PC, TLC: solvent: ethyl acetate/acetone/water .(10 : 10 : 2).

8.1.9. OLIGO(AMIDES) OF SEBACIC ACID AND HEXAMETHYLENEDIAMINE (NYLON 6.10)

8.1.9.1. Linear Oligo(amides) $H[NH(CH_2)_6NH-CO(CH_2)_8CO]_nOH$

n	Mol. wt.	m.p. (°C)	Refs.
1	300.4	187–188	58
2	582.8	196–199	63,67
3	865.3	208–210	63,67

8.1.9.2. Cyclic Oligo(amides) $\overline{[NH(CH_2)_6NH-CO(CH_2)_8CO]_n}$

n	Mol. wt.	m.p. (°C)	Refs.
1	282.4	232	51,98,145
2	564.8	222	58,60,98,145
3	847.3	221	145

8.1.9.3. Oligomeric Diamines
$H[NH(CH_2)_6NH-CO(CH_2)_8CO]_n-NH(CH_2)_6NH_2$

n	Mol. wt.	m.p. (°C)	Refs.
1	398.6	129–131	57,58
2	681.1	177–179	58
3	963.5	203–210	58

8.1.9.4. Oligomeric Dicarboxylic Acids
$HOOC(CH_2)_8CO-[NH(CH_2)_6NH-CO(CH_2)_8CO]_nOH$

n	Mol. wt.	m.p. (°C)	Refs.
1	494.6	156–159	57,58
2	767.1	182–184	57,58
3	1049.5	181–185	58

8.1.10. OLIGO(AMIDES) OF DECANE DICARBOXYLIC ACID AND *p,p'*-DIAMINO-DICYCLOHEXYLMETHANE (QIANA TYPE)

n	Mol. wt.	Config.	m.p. (°C)	Refs.
1	404.6	*trans-trans*	310–314	83
		cis-trans	269–272	83
		cis-cis	254–257	83

8.1.11. OLIGO(AMIDES) OF OXALIC ACID AND HEXAMETHYLENEDIAMINE $\left[NH(CH_2)_6NH-COCO\right]_n$

n	Mol. wt.	m.p. (°C)	Refs.
1	170.2	232	66
2	340.4	303	66
3	510.6	345	66

8.1.12. OLIGO(AMIDES) OF TEREPHTHALIC ACID AND PENTAMETHYLENEDIAMINE

n	Mol. wt.	m.p. (°C)	Refs.
2	464.3	407	59

8.1.13. OLIGO(AMIDES) OF *N,N'*-DIALKYLETHYLENEDIAMINE AND DICARBOXYLIC ACIDS

8.1.13.1. Aliphatic Dicarboxylic Acids

$\left[NRCH_2CH_2NR-CO(CH_2)_xCO\right]_n$

R	*x*	*n*	Mol. wt.	m.p. (°C)	Refs.
$C_6H_5CH_2$	3	2	672.8	231–234	79
	5	2	729.0	199–201	79
	7	2	785.1	199–204	79

8.1.13.2. Terephthalic Acid

R	*n*	Mol. wt.	m.p. (°C)	Refs.
CH_3	3	654.8	114–123	99
$C_6H_5CH_2$	3	1111.4	255–257	100
	4	1481.8	143–145	100
	6	2222.8	140–144	100

8.1.13.3. Pyridine-2.5-Dicarboxylic Acid

R	*n*	Mol. wt.	m.p. (°C)	Refs.
CH_3	3	663.8	123–129	99
	4	885.0	132–136	99

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8.2. OLIGO(PEPTIDES)

8.2.1. OLIGO(PEPTIDES) OF GLYCINE

8.2.1.1. Linear Oligo(peptides) $H[NHCH_2CO]_nOH$

n	Mol. wt.	m.p. (°C)	Refs.
1	75.1	233–236	1
2	132.1	210–215	2,7,75
3	189.2	235	3,4,75
4	246.2	240	4,5,75
5	303.3	270	4,5,75,78
6	360.3	>256 d	6

8.2.1.2. Cyclic Oligo(peptides) $\ulcorner[NHCH_2CO]_n\urcorner$

n	Mol. wt.	m.p. (°C)	Refs.
2	114.1	309	2,7,79,131,174,177,184
4	228.2	340	8,9,77,79,80,191,205,206
5	285.3	>330	9,77–80,136
6	342.3	>360	4,8,10,11,77,79,80,131
7	399.4	>280	77,79,131
8	456.4	>350	77,79,131,205
9	513.5	290	77,79,131
10	570.5	290	77,79,131
11	627.6	300	77,79,131

8.2.2. OLIGO(PEPTIDES) OF SARCOSINE

8.2.2.1. Linear Oligo(peptides) $H[N(CH_3)CH_2CO]_nOH$

n	Mol. wt.	m.p. (°C)	Refs.
1	89.1	211–213	1
2	160.2	190–191	13,17,21

8.2.2.2. Cyclic Oligo(peptides) $\ulcorner[N(CH_3)CH_2CO]_n\urcorner$

n	Mol. wt.	m.p. (°C)	Refs.
2	142.2	147	13,27,51,61,177,187,191,204
3	213.3	221	51,191,192,197
4	284.4	>350	51,166,191–195,198
5	355.5	255	51,191–193,199
6	426.5	315	17,51,163,166,191,193,200
7	497.7	296	51,191,193,201
8	568.7	338	51,191,193,196,202
9	639.8	>320	17,163
10	711.0		193,203
12	853.0	>320	17,163

8.2.3. OLIGO(PEPTIDES) OF L-ALANINE

8.2.3.1. Linear Oligo(peptides) $H[NHCH(CH_3)CO]_nOH$

n	Mol. wt.	m.p. (°C)	Specific rotation $[\alpha]_D$	(°C)	*c* (%)	Solvent	Refs.
1	89.1		+14.5	25	10	6.0 N HCl	1
2	160.2	298	−38.5	27	0.9	0.2 N HCl	6,12,15,73,85,138,139
3	231.3	257–263	−85.7	27	0.6	0.2 N HCl	14,15,73,85,138,139
4	302.3	269–272	−131.0	27	0.6	0.2 N HCl	15,16,73,85,138,139
5	373.4	>320	−150.0	27	0.5	0.2 N HCl	15,16,85,138
6	444.5	>320	−167.0	27	0.3	0.2 N HCl	15,16,85,138
7	515.6	>320					15

8.2.3.2. Endgroup Protected Oligo(peptides) $R-[NHCH(CH_3)CO]_n-R'$

R	R′	*n*	Mol. wt.	m.p. (°C)	Specific rotation $[\alpha]_D^{25}$	*c* (%)	Solvent	Refs.
BOC	OMe	2	274.3	110–111	−71.8[a]		HFIP	86,95,102,103
		3	345.4	193–194	−84.8[a]		HFIP	86,87,95,102,103
		4	416.5	>240 d	−84.0[a]		HFIP	86,87,95,102,103
		5	487.6	>240 d	−83.1[a]		HFIP	86,87,95,102,103
		6	558.6	>240 d	−82.0[a]		HFIP	86,87,102,103
		7	629.7	>240 d	−79.5[a]		HFIP	86,87,102,103
Z[b]	OEt	2	322.4	116	−51.1	0.5	TFE	81–83
		3	393.4	192	−73.0	0.5	TFE	14,81–83
		4	464.5	251–253	−95.1	0.5	TFE	81
		5	535.6	250	−107.1	0.5	TFE	81–83
		6	606.7	>275 d	−119.3	0.25	TFE	81
		7	677.8	>275 d	−125.4	0.25	TFE	81
		10	891.0	>250 d	−136.9	0.2	TFE	82,83
	Mo	2	363.4	135–136	−35.4	0.47	TFE	81
		3	434.5	198–200	−62.5	0.48	TFE	81
		4	505.6	270–271	−78.0	0.46	TFE	81
		5	576.7	>275 d	−92.0	0.45	TFE	81
		6	647.7	>275 d	−102.5	0.45	TFE	81
		7	718.8	>275 d	−108.1	0.45	TFE	81
		8	789.9	>275 d	−1171.1	0.44	TFE	81
		9	861.0	>275 d	−121.6	0.20	TFE	81
MEEA	OEt	3	419.5	138–140	−70.7	0.55	TFE	81
		4	490.6	240–241	−89.2	0.49	TFE	81
		5	561.6	>250 d	−98.5	0.20	TFE	81
		6	632.7	>250 d	−108.2	0.45	TFE	81
		7	703.8	>250 d	−119.0	0.50	TFE	81
	Mo	3	460.5	110–111	−49.9	0.44	TFE	81,84
		5	602.7	250 d	−87.5	0.40	TFE	81,84
		6	673.8	>275 d	−94.5	0.21	TFE	81,84
		7	744.9	>275 d	−102.3	0.23	TFE	81,84
		8	816.0	>275 d	−104.4	0.25	TFE	81,84
		9	887.1	>275 d	−110.2	0.22	TFE	81,84

[a] $t = 22°C$.
[b] Z-, $C_6H_5CH_2-OCO-$; BOC-, $(CH_3)_3C-OCO-$; MEEA-, $CH_3OCH_2CH_2OCH_2CH_2OCH_2CO-$; -OMe, $-CH_3$; -OEt, $-OC_2H_5$; —Mo, O⌒N—; TFE, trifluorethanol; HFIP, Hexafluoroisopropanol.

8.2.3.3. Cyclic Oligo(peptides) $\overline{[NHCH(CH_3)CO]_n}$

n	Mol. wt.	m.p. (°C)	Specific rotation $[\alpha]_D$	(°C)	*c* (%)	Solvent	Refs.
2	142.2	297	−29.6	20	1.9	H_2O	6,79,174,183–185
4	284.3	250	−68	22	0.5	DMF	134,135,195,206
6	426.5	>310	−210.4	20	0.02	H_2O	136,137

8.2.3.3. cont'd

			Specific rotation				
n	Mol. wt.	m.p. (°C)	$[\alpha]_D$	(°C)	*c* (%)	Solvent	Refs.
7	497.6	302	−60.5	20	2.1	H_2O	79
8	568.6	331	−62.1	20	1.4	H_2O	79
9	639.7	321	−97.1	20	1	H_2O	79
10	710.8	368	−102.7	20	0.1	H_2O	79
11	781.8	289	−133.0	20	0.002	H_2O	79

8.2.4. OLIGO(PEPTIDES) OF α-AMINOISOBUTYRIC ACID $C_6H_5CH_2OCO-[NHC(CH_3)_2CO]_n-OX$

X	*n*	Mol. wt.	m.p. (°C)	Refs.
$C(CH_3)_3$	1	293.4	60–1	88,90,91,94
	2	378.5	134	90,91,94
	3	463.6	166.5–167.5	88,91–94
	4	558.7	178	88,89,91–94
	5	633.8	236	88,89,91–94
	6	718.9	215–218	88,91
	7	804.0	229–230	91
	8	889.1	247–248	91
	9	974.2	262–263	91
$C(CH_3)_3$	10	1059.3	257–258	91
	11	1144.4	271–272	91
	12	1229.5	>300	91
	1	237.2	88–89	90,151,152
	2	322.4	161–162.5	151
	3	407.5	205–206	88,92
	4	482.5	243–244	88,92
	5	577.7	254–256	88,92
	6	662.8	243–245	88

8.2.5. OLIGO(PEPTIDES) OF HYDROPHOBIC AMINO ACIDS (α-AMINOBUTYRIC ACIDS, NORVALINE, VALINE, NORELEUCINE, LEUCINE, ISOLEUCINE, CYCLOHEXYLALANINE, PHENYLALANINE, TRIYPTOPHAN)

8.2.5.1. Linear Oligo(peptides) $H[NHCHRCO]_nOH$

			Specific rotation				
R	*n*	Mol. wt.	$[\alpha]_D$	(°C)	*c* (%)	Solvent	Refs.
L-Val	1	117.2	+28.8	20	3.4	6 N HCl	1
$-CH(CH_3)_2$	2	216.3	+10.8	25	2.0	H_2O	18,19
	3	315.4	−41.8	21	2.7	1 N Cl	19
L-Leu	1	131.2	+13.9	25	9.1	4.5 N HCl	1
$-CH_2CH(CH_3)_2$	2	244.3	−13.7	23	1.0	1 N NaOH	18,22–24,74
	3	357.5	−51.4	20	3.1	1 N NaOH	26
	4	470.7	−90.0	20	7.6	1 N NaOH	26
L-Ile	1	131.2	+40.6	20	1	6 N HCl	1
$-CH(CH_3)CH_2CH_3$	2	244.3	+17.1	25	1	H_2O +	20
					1 eq. HCl		

8.2.5.2. Endgroup Protected Oligo(peptides) $(CH_3)_3COCO-[NHCHRCO]_n-OCH_3$

			Specific rotation			
R	*n*	Mol. wt.	m.p. (°C)	$[\alpha]^T$	Solvent	Refs.
L-Abu	2	302.3	108–109	−5.95	HFIP[a]	95
$-CH_2CH_3$	3	387.5	126–127	−10.84	HFIP[a]	95
	4	472.6	228–229	−16.72	HFIP[a]	95
	5	557.7	>250	−20.44	HFIP[a]	95

8.2.5.2. cont'd

R	n	Mol. wt.	m.p. (°C)	Specific rotation $[\alpha]^T$	Solvent	Refs.
	6	642.8	>250	−23.12	HFIP[a]	95
	7	727.8	>250	−27.21	HFIP[a]	95
L-Nva	2	330.4	95–96			98,102,103,105,113,153
$-CH_2CH_2CH_3$						
	3	429.5	119–120			95,97,98,102,103,105,113,153
	4	528.7	207–208			95,97,98,102,103,105,113,153
	5	627.8	220			95,97,98,102,103,153
	6	726.9	220			97–99,102,103,153
	7	826.1	220			97,98,102,103,153
L-Val	2	330.4	166–167	−48.3	TFE[b]	96,102,103,112,113,115
$-CH(CH_3)_2$				−40.8	HFA[b]	
	3	429.5	170–171	−76.7	TFE[b]	96,102,103,112,113,115
				−77.4	HFA[b]	153
	4	528.7	247–248	−91.0	TFE[b]	96,102,103,112,113,115
				−107.5	HFA[b]	153
	5	627.8	>260	−103.6	TFE[b]	96,102,103,112,115,153
				−126.2	HFA[b]	
	6	726.9	>260	−94.3	TFE[b]	96,102,103,153
				193.0	HFA[b]	
	7	826.1	>260	+37.8	TFE[b]	96,102,103,112,153
				−144.5	HFA[b]	
L-Nle	2	358.5	63–64	−3.88	HFIP[c]	95,106
$-CH_2CH_2CH_2CH_3$	3	471.6	146–147	−6.51	HFIP[c]	95,106
	4	584.8	214–215	−6.42	HFIP[c]	95,106
	5	698.0	>240	−7.74	HFIP[c]	95,106
	6	811.1	>240	−7.26	HFIP[c]	106
	7	924.3	>240	−7.51	HFIP[c]	106
L-Leu	2	358.5	141–142	−46.9	HFA[d]	100,102,104,111
$-CH_2CH(CH_3)_2$	3	471.6	158–159	−75.1	HFA[d]	100,102,104,111,153
	4	584.8	208–209	−92.6	HFA[d]	100,102,104,111,153
	5	698.0	>250	−101.0	HFA[d]	100,102,104,111,153
	6	811.1	>250	−111.1	HFA[d]	100,102,104,111,153
	7	924.3	>250	−120.0	HFA[d]	100,102,104,111,153
L-Ile	2	358.5	158–159	−44.0	TFE[e]	56–58,101,102,112,115,116
$-CH(CH_3)CH_2CH_3$	3	471.6	193–194	−67.6	TFE[e]	56–58,101,102,112,115,116
	4	584.8	245	−83.4	TFE[e]	56,57,101,102,112,115,116
	5	698.0	>250 d	−87.8	TFE[e]	56,57,101,102,112,115,116
	6	811.1	>250 d	−93.9	TFE[e]	56,57,101,102,112,115,116
	7	924.3	>240 d	+13.9	TFE[e]	56,101,102
	8	1037.5	>240 d	+24.6	TFE[e]	56,101
D-aIle	2	358.5	133–134	+30.1	TFE[f]	115,116
$-CH(CH_3)CH_2CH_3$				+39.9	HFIP[g]	
	3	471.6	175–176	+48.1	TFE[f]	115,116
				+58.3	HFIP[g]	
	4	584.8	245	+58.3	TFE[f]	115,116
				+73.5	HFIP[g]	
	5	698.0	>250 d	+55.0	TFE[f]	115,116
				+94.8	HFIP[g]	
	6	811.1	>250 d	+55.3	TFE[f]	115,116
				+101.8	HFIP[g]	
	7	924.3	>250 d	+109.4	HFIP[g]	115
L-Cha	2	438.6	117–118	−43.3	HFIP[h]	110,111,115
$-CH_2-$	3	591.8	171–172	−54.1	HFIP[h]	110,111
	4	745.1	203–204	−57.7	HFIP[h]	110,111
	5	898.3	>240	−61.2	HFIP[h]	110,111,114
	6	1051.5	>240	−65.6	HFIP[h]	110,111
	7	1204.7	>240	−66.9	HFIP[h]	110,111
L-Phe	2	426.5	121–122	0.00	TFE[i]	102,107–109,111,112
				−8.7	DMF[i]	
$-CH_2-$	3	573.7	173–174	−15.3	TFE[i]	102,107–109,111,112
				−14.9	DMF[i]	

8.2.5.2. cont'd

R	n	Mol. wt.	m.p. (°C)	Specific rotation $[\alpha]^T$	Solvent	Refs.
	4	720.8	196–197	−22.2	TFE[i]	102,107–109,111,112
				−16.1	DMF[i]	
	5	868.0	213–214	−28.3	TFE[i]	102,107–109,111,112
				−19.2	DMF[i]	
	6	1015.2	223–226	−25.0	TFE[i]	102,108,109,111
				−21.1	DMF[i]	
	7	1162.3	>235	−22.1	DMF[i]	102,108,109,111
	8	1309.5	>235			108,109
	9	1456.7	>235			108,109

[a] $\lambda = 546$ nm; $T = 20$°C; $c = 5 \times 10^{-4}$ M; $\alpha[(\pi/180)$ rad $\times$ cm^2/g]; HFIP = hexafluoroisopropanol.
[b] $\lambda = 589$ nm; $T = 25$°C; $c = 3 \times 10^{-3}$ M ($n = 2$–6), 3×10^{-4} M ($n = 7$); TFE = trifluoroethanol; HFA = hexafluoroacetone sesquihydrate.
[c] $\lambda = 589$ nm; $T = 22$°C; $c = 10^{-3}$ M; HFIP = hexafluoroisopropanol.
[d] $\lambda = 589$ nm; $T = 25$°C; $c = 3 \times 10^{-3}$ M; HFA = hexafluoroacetone sesquihydrate.
[e] $\lambda = 589$ nm; $T = 25$°C; $c = 0.025$–0.2%; TFE = trifluoroethanol.
[f] $\lambda = 589$ nm; $T = 25$°C; $c = 0.6$%; TFE = trifluoroethanol.
[g] $\lambda = 589$ nm; $T = 21$°C; $c = 0.1$%; hexafluoroacetone sesquihydrate.
[h] $\lambda = 589$ nm; $T = 20$°C; $c = 0.1$–0.2%; HFIP = hexafluoroisopropanol.
[i] $\lambda = 589$ nm; T in TFE = 23°C, in DMF = 18°C; $c = 0.2$%; TFE = trifluoroethanol.

8.2.5.3. Endgroup Protected Oligo(peptides) of Tryptophan X–[NHCHRCO]$_n$–OCH$_3$

R	X	n	Mol. wt.	m.p. (°C)	Specific rotation $[\alpha]_D^{25}$	c (%)	Solvent	Refs.
	Z[a]	2	538.5	196	−13	1	MeOH	208,225
		3	721.8	85–95				208
	$(CH_3)_2PS$	1	276.3	108–109	−2.4	1.0	MeOH	140
		2	428.4	153–154	−47.6	0.5	MeOH	140
		3	580.6		−66.8	0.5	MeOH	140
		4	732.7		−65.6	0.5	MeOH	140
		5	884.9	151–154	−65.0	0.5	MeOH	140

[a] Z- = Benzyloxycarbonyl-.

8.2.5.4. Cyclic Oligo(peptides) [–[NHCHRCO]$_n$–]

R	n	Mol. wt.	m.p. (°C)	Specific rotation $[\alpha]_D$	(°C)	c (%)	Solvent	Refs.
L-Val	2	198.3	269–271	−77.5	18–22	1.0	CH_3COOH	207
$-CH(CH_3)_2$								
L-Leu	2	226.3	277	−46.0	20	0.8	CH_3COOH	22,25,177,184,185, 188,207
$-CH_2CH(CH_3)_2$								
	5	565.8	>300	−71	15	1.0	EtOH	132
L-Ile	2	226.3	308	−60.0	18–22	1.0	CH_3COOH	131,207
$-CH(CH_3)CH_2CH_3$	5	565.8	357					131
L-Phe	2	294.4	315–316	−100	25–28	0.2	CH_3COOH	177,184,185,188
	5	735.9	250–254	−124.3	25	1.0	DMF	78
	10	1471.8	251.5	−142	20	0.4	MeOH	131
L-Trp	2	372.4		−14.7	20		CH_3COOH	230,232

8.2.5.5. Endgroup Protected Oligo(Dipeptides) $R'[NHCHR_1CO-NHCHR_2CO]_n-R''$[a]

R′	R″	R_1	R_2	n	Mol. wt.	m.p. (°C)	Specific rotation $[\alpha]_D^{25}$	c (%)	Solvent	Refs.
Boc[a]	OMe	D-Val	L-Val	1	300.4	110.7	−23.7	1.02	$CHCl_3$	118
		L-$CH(CH_3)_2$	D-$CH(CH_3)_2$	2	528.7	209.6	−17.8	1.00	$CHCl_3$	118
				3	727.0	232.7	−21.0	1.02	$CHCl_3$	118
				4	925.2	261.1	−8.9	1.00	$CHCl_3$	117,118
				6	1321.8	d	−6.2	1.12	$CHCl_3$	118
				8	1718.3	d	−11.4	1.05	$CHCl_3$	118
Nps[a]	OEt	L-Leu	L-Ala	2	567.6	110–111	−66.5	2.0	HFIP/TFE[a] (1:2)	119
		$-CH_2CH(CH_3)_2$	$-CH_3$	3	751.8	203–205	−96.9	2.0	HFIP/TFE (1:2)	119
				4	936.0	257–260 d	−101.3	2.0	HFIP/TFE (1:2)	119
				5	1120.2	>270 d	−84.6	2.0	HFIP/TFE (1:2)	119
				6	1304.4	>270 d	−50.0	2.0	HFIP/TFE (1:2)	119
				8	1672.8	>270 d	−52.6	2.0	HFIP/TFE (1:2)	119

[a] Boc- = *tert.* butyloxycarbonyl-; Nps. = *o*-nitrophenylsulfenyl-; HFIP = hexafluoroisopropanol; TFE = trifluoroethanol.

8.2.6. OLIGO(PEPTIDES) OF L-AND D-PROLINE

8.2.6.1. Linear Oligo(all-L-peptides) $H[\overset{\frown}{N-CHCO}]_nOH$

n	Mol. wt.	m.p. (°C)	E_F-Values[a]				$[\alpha]_D^{20}$[b]	Refs.
1	115.2	220–222	1.00				−87	1
2	212.3	144–145	0.84				−175	52,62,69,70,150,171–173
3	309.4	122	0.72				−220	53,62,69,70,150,171–173
4	406.5	170	0.60				−293	62,69,70,150,171–173
5	503.6	189	0.52	1.00			−338	62,69,70,150,172,173
6	600.7	209		0.91			−376	62,69,70,150,172,173
7	697.8	228		0.77			−394	62,69,70,150
8	794.9	>280		0.72			−412	62,69,70,150
9	892.0	>280		0.66			−435	62,69,150
10	989.1	>300		0.60	1.00		−456	62,69,70,150
11	1086.2	>300			0.92		−466	62,69,70,150
12	1183.3	>300			0.83		−472	62,69,70,150
13	1280.4	>300			0.75	1.00	−480	69,70
14	1377.5	>300			0.70	0.94	−491	69
15	1474.6	>300			0.64	0.90	−496	62,69,70
16	1571.7	>300				0.86	−499	69,70
17	1668.8	>300		1.00		0.81	−505	69
18	1765.9	>300		0.95			−509	69,70
19	1863.0	>300		0.90			−513	69
20	1960.1	>300		0.84			−520	69,70
21	2057.3	>300					−521	70
22	2154.5	>300	100				−523	70
25	2445.7	>300	0.93	1.00			−526	70
28	2737.0	>300		0.92	1.00		−528	70
30	2931.3	>300			0.95		−530	70
31	3028.5	>300			0.93	1.00	−532	70
34	3320.1	>300	1.00			0.93–530	70	
37	3611.4	>300	0.93	1.00			−528	70
40	3902.7	>300		0.94			−532	70

[a] Paper electrophoresis; buffer; $HCOOH/CH_3COOH/H_2O$ (1:1:3), 1000–5000 V, 40–115 mA, 40–240 min.
[b] c (%) = 1, H_2O.

8.2.6.2. Endgroup Protected Oligo(peptides)

8.2.6.2.1. *tert*-BUTYLOXYCARBONYL OLIGO(ALL-L-PROLINES) $(CH_3)_3COCO-[\overset{\frown}{N-CHCO}]_n-OH$

n	Mol. wt.	m.p. (°C)	R_F^a	$[\alpha]_D^{20}$[b]	Refs.
1	215.3	137–138	0.84	−105	62,72,169,179
2	312.4	191–193	0.68	−153.5	62,150,167,179,181
3	409.5	219–220	0.60	−173	62,150,167,179
4	506.6	178	0.53	−194	62,150,167

8.2.6.2.1. *cont'd*

n	Mol. wt.	m.p. (°C)	R_F^a	$[\alpha]_D^{20\,b}$	Refs.
5	603.7	225	0.47	−220	62,150,167
6	700.8	247	0.41	−239	62,150,167
7	797.9	267	0.37	−247	62,150
8	894.0	>280	0.33	−256	62,150
9	991.1	>280	0.29	−265	62,150
10	1088.2	>280	0.25	−272	62,150
11	1185.3	>300	0.23	−269	62,150
12	1282.4	>300	0.22	−277	62,150
15	1573.7	>300	0.22	−291	62,150

[a] TLC: solvent, *n*-butanol/acetone/acetic acid/ammonia, 1:4/water (9:3:2:2:4).
[b] *c* (%) = 1, $CHCl_3$.

8.2.6.2.2. *tert*-AMYLOXYCARBONYL OLIGO(ALL-L-PROLINES) $C_5H_{11}OCO-[N-CHCO]_n-OH$

n	Mol. wt.	m.p. (°C)	Specific rotation $[\alpha]_D$	(°C)	*c* (%)	Solvent	Refs.
1	229.3	94–95.5	−47.2	21	1.7	EtOH	63–68,170,179
2	326.4	157–159	−113	25	2.0	EtOH	64–68,179
3	423.5	200–201.5	−170	25	2.2	EtOH	64–68,179,182
4	520.6	207.5–208.5	−227	24	2.1	EtOH	64–68
5	617.7	224.5–226	−248	24	2.3	EtOH	64–68
6	714.8	240–242	−291	24	2.1	EtOH	64–68
8	908.0	280	−318	22	0.9	EtOH	64–68

8.2.6.2.3. *tert*-BUTYLOXYCARBONYL D,L-OLIGO(DIPROLINES)

$(CH_3)COCO-[N-CHCO-N-CHCO]_n-OH$

n	Mol. wt.	m.p. (°C)	$[\alpha]_D^{22\,a}$	Refs.
1	312.4	204	−70.1	158,165
2	506.6	188–189	−38.8	158
3	700.8	220–221	−32.4	158,159

[a] *c* (%) = 1, DMF.

8.2.6.2.4. *tert*-BUTYLOXYCARBONYL OLIGO(D,L-DIPROLINE) BENZYL ESTERS

$(CH_3)_3COCO-[N-CHCO-N-CHCO]_n-OCH_2C_6H_5$

n	Mol. wt.	m.p. (°C)	$[\alpha]_D^{22\,a}$	Refs.
2	612.7	64–66	−24.0	164
3	806.9	157–160	−23.2	164
4	1001.2	146–148	−20.4	164

[a] *c* (%) = 1, DMF.

8.2.6.3. Cyclic Oligo(peptides)

8.2.6.3.1. CYCLIC OLIGO(ALL-L-PROLINES) $\lceil[N-CHCO]_n\rfloor$

n	Mol. wt.	m.p. (°C)	$[\alpha]_D$	(°C)	*c* (%)	Solvent	Refs.
2	194.2	146	−151.6	19	0.5	H_2O	54,55,180,185
3	291.3	358	+48.5	25	0.48	CH_3OH	53,154–157,162,163,168,176,189,190

8.2.6.3.2. CYCLIC OLIGO(L,D-DIPROLINES) $\lceil[N-CHCO-N-CHCO]_n\rfloor$ (L, D)

n	Mol. wt.	m.p. (°C)	Refs.
1	194.2	194–199	158,180,185,186
2	388.4	>300 d	158
3	582.6	>310 d	158, 159
4	776.8	>250 d	158
6	1165.2	>280 d	158
9	1747.8	>250 d	158
12	2330.4	>250 d	158

8.2.6.3.3. CYCLIC OLIGO(D,L,L-TRIPROLINES)

n	Mol. wt.	m.p. (°C)	Specific rotation $[\alpha]_D^{22}$	c (%)	Solvent	Refs.
1	291.2	181–184	+70.7	1	H_2O	159–163
2	582.3	304	−60.9	1	H_2O	159–163
3	873.5	230 d	−114.5	1	H_2O	159–163
4	1164.6	250 d	−72.0	1	H_2O	159–163
5	1455.8	250 d	−101.8	0.5	H_2O	159–163

8.2.7. OLIGO(PEPTIDES) OF L-AZETIDINE-2-CARBOXYLIC ACID

8.2.7.1. Cyclic Oligo(peptides)

n	Mol. wt.	m.p. (°C)	$[\alpha]_D^{578}$ [a]	Refs.
2	166.2	207–212	+8.2	175
3	249.3	334–340	+20.8	175
6	498.5	339–350	−352.0	175

[a] c (%) = 0.5, H_2O.

8.2.8. OLIGO(PEPTIDES) OF L-HYDROXY AND L-MERCAPTO AMINO ACIDS

8.2.8.1. Linear Oligo(peptides) H[NHCHRCO]$_n$OH

	n	Mol. wt.	m.p. (°C)	Specific rotation $[\alpha]_D$	(°C)	c (%)	Solvent [a]	Refs.
L-Ser	1	105.1		+14.5	25	9.3	N HCl	1
$-CH_2OH$	2	192.2		+14.2	25	7	N HCl	28,35,139
L-Tyr	1	181.2		−7.3	25	4	6.1 N HCl	1
$-CH_2C_6H_4OH$	2	344.4	285–288	+30.1	19	4	H_2O + 1 eq. HCl	29–31
	3	507.6	181–182					31
L-Cys	1	121.1		+7.6	26	12	N HCl	1
$-CH_2SH$1.5 HCl	2	224.2		+35	22	1	0.2 N HCl	37
L-Met	1	149.2		+23.4	20	5	3 N HCl	1
$-CH_2CH_2SCH_3$	2	280.4	229–231	+27.0	24	2	H_2O	32–34
	3	411.6	219–220	−70.0	16	1	H_2O	33

8.2.8.2. Endgroup Protected Oligo(peptides) $(CH_3)_3COCO-[NHCHRCO]_n-OCH_3$

R	n	Mol. wt.	m.p. (°C)	Specific rotation $[\alpha]_D$	c (%)	Solvent [a]	Refs.
L-Cys(Me)	2	366.5	94–95				102,121,122,133
$-CH_2SCH_3$	3	483.7	104–105				102,121,122,133
	4	600.8	191–192				102,121,122,133
	5	718.0	211–212				102,121,122,133
	6	835.2	>220				102,121,122,133
	7	952.3	>220				102,121,122,133
L-Met	2	394.5	66–67	−29.6	0.003 M	HFIP [a]	102,123,124,127–129
$-CH_2CH_2SCH_3$	3	525.8	92–96	−37.6	0.003 M	HFIP	102,123,124,127–129
	4	656.9	191–194	−41.4	0.03 M	HFIP	102,123,124,127–129
	5	788.1	236 d	−48.1	0.003 M	HFIP	102,123,124,127–129
	6	919.3	245 d	−50.3	0.03 M	HFIP	102,123,124,126 –129
	7	1050.5	>275	−54.8	0.03 M	HFIP	102,123–129

[a] HFIP = hexafluoroisopropanol.

8.2.8.3. Formyl-Oligo(L-Methionines) HCO–[NHCHRCO]$_n$–OH

R	n	Mol. wt.	m.p. (°C)	Specific rotation [α]$_D$	c (%)	Solvent[a]	Refs.
L-Met	2	308.4	125–126	−44.8	0.5	HFIP	130
$-CH_2CH_2SCH_3$	3	439.6	176–177	−56.7	0.5	HFIP	130
	4	570.8	195–196	−67.2	0.5	HFIP	130
	5	702.0	216–217	−63.3	0.5	HFIP	130
	6	833.2	230–231 d	−81.8	0.5	HFIP	130

8.2.8.4. Cyclic Oligo(peptides) ⌐[NHCHRCO]$_n$⌐

R	n	Mol. wt.	m.p. (°C)	Specific rotation [α]$_D$	(°C)	c (%)	Solvent[a]	Refs.
$-CH_2OH$	2	174.2	247	67.5	25	2.2	H_2O	35,174,183
$-CH_2C_6H_4OH$	2	326.4	277–280	−223.8	20	2.4	NaOH	36,174

8.2.8.5. Oligo(peptides) of Cystine CyS = [—NHCHCO— / CH_2S—]

R	n	m.p. (°C)	Specific rotation [α]$_D$	(°C)	Solvent[a]	Refs.
H—CyS—CyS—OH	222.3	−29	25	1	N HCl	38
H—CyS—CyS—OH H—CyS—CyS—OH	444.6	−58.7	26	1	N HCl	37,38

[a] HFIP = hexafluoroisopropanol.

8.2.9. OLIGO(PEPTIDES) OF ACIDIC AMINO ACIDS

8.2.9.1. α- and ω-Oligo(peptides) of L-Aspartic Acid and L-Glutamic Acid H[NH–X–CO]$_n$OH

X	n	Mol. wt.	Specific rotation [α]$_D$	(°C)	c (%)	Solvent	Refs.
Asp	2	248.2	+18.5	20	2	0.5 N HCl	76
—CH(CH_2)—	3	363.3	+6.0	20	2	0.5 N HCl	76
COOH	4	478.3	+16.1	20	1	0.5 N HCl	76
	5	593.4	+6.1	20	1	0.5 N HCl	76
	6	708.5	+8.7	20	2	0.5 N HCl	76
Glu	1	147.1	+31.2	22.4	1	6 N HCl	1
—CH—	2	276.3	+18.2	24	1–2	0.5 N HCl	42–44
CH_2CH_2COOH	3	405.4	−7.2	19	1.4	H_2O	45
Glu	2	276.3	+4.2	24	1–2	0.5 N HCl	43,44,46,47,59,178
—CH(CH_2CH_2)—	3	405.4	−7.2	20	2	0.5 N HCl	48,59,178
COOH	4	534.5	−16.0	24	1–2	0.5 N HCl	59,178
	5	663.6	−14.8	20	1–5	0.5 N HCl	59
	6	792.7	−17.2	20	1–5	0.5 N HCl	59
	7	921.8	−19.1	20	1–5	0.5 N HCl	59,71

8.2.9.2. γ-Oligo(peptides) of D-*Glutamic Acid Esters* $H[NH-X-CO]_n-OC(CH_3)_3$

X	n	Mol. wt.	Specific rotation m.p. (°C)	$[\alpha]_D^{25}$	c (%)	Solvent	Refs.
D-Glu	3	629.8	81–84	+17.9	3	MeOH	59
$-CH(COOC(CH_3)_3)CH_2CH_2-$	4	815.0	125–127.5	+22.3	3	MeOH	59
	5	1000.2	126–131	+27.6	3	MeOH	59
	6	1185.4	>58	+29.4	3	MeOH	59

8.2.9.3. α-Oligo(peptides) of γ-Unsubstituted L-*Glutamic Acid Derivatives* $CH_3CO-[NHCH(CH_2CH_2COOH)CO]_n-NHC_2H_5$

n^a	Mol. wt.	Specific rotation $[\alpha]_D^{25}$	c (%)	Solvent	Ref.
1	216.2	−23	1	H_2O	226
2	345.4	−36	1	H_2O	226
3	474.3	−49.5	1	H_2O	226

[a] $n = 2–12$: ion-exchange chromatography, IR, CD, MS, pK values, Refs. 227,228.

8.2.9.4. α-Oligo(peptides) of Benzyloxycarbonyl L-*Aspartic Acid and* L-*Glutamic Acid Ethyl Esters* $C_6H_5CH_2OCO-[NHCHRCO]_{n-1}-NHCHR'COOC_2H_5$

R	R′	n	Mol. wt.	m.p. (°C)	Specific rotation $[\alpha]_D^{25}$	c (%)	Solvent[a]	Refs.
Asp		2	452.5	80–81	+17.9	3.1	DCA	49,146
$-CH_2COOCH_3$	$-CH_2COOC_2H_5$	3	581.6	127–128	−1.01	3.1	DCA	49,146
		4	710.7	143–144	−13.1	1.1	DCA	49,146
		5	839.8	161–163	−19.1	0.1	DCA	49,146
		6	968.9	175–178	−26.6	0.7	DCA	49
		8	1227.2	207 d	−35.1	0.5	DCA	49,141,146
		11	1614.5	224 d	−42.9	0.45	DCA	49,146
		14	2001.9	233 d	−46.0	0.3	DCA	49,146
Glu		2	480.5	86	−12.4	2	DCA	50,141,146
$-CH_2CH_2COOCH_3$	$-CH_2CH_2COOC_2H_5$	3	623.6	124	−18.0	2	DCA	50,146
		4	766.8	139	−21.3	2	DCA	50,141,146
		5	910.0	200	−22.7	2	DCA	50,141,146
		6	1053.1	250	−26.7	2	DCA	50,146
		7	1196.3	259	−28.7	2	DCA	50,141,146
		9	1482.5	d	−32.6	2	DCA	50,146
		11	1768.8	d	−35.6	2	DCA	50,146
Glu		2	494.5	104–105	−17.9		TFE	43,120,142–145
$-CH_2CH_2COOC_2H_5$	$-CH_2CH_2COOC_2H_5$	3	651.7	127–128	−27.1	2	TFE	43,120,142–145
		4	808.9	137–139	−30.9		TFE	142–145
		5	966.0	177–178.5	−26.5		TFE	142–145
		7	1280.4	>235	−20.9	1	TFE	142–144
		8	1437.5	>235	−16.5		TFE	142,143,145
		9	1594.7	>235	−7.6	1	TFE	142,143,145

[a] DCA, dichloroacetic acid; TFE, trifluoroethanol.

8.2.9.5. ω-Oligo(peptides) of Benzyloxycarbonyl L-*Aspartic Acid and* L- *and* D-*Glutamic Acid ω-Alkyl Esters* $C_6H_5CH_2OCO-[NH-X-CO]_n-OR$

X	R	n	Mol. wt.	m.p. (°C)	Specific rotation $[\alpha]_D$	(°C)	c (%)	Solvent[a]	Refs.
L-Asp	$C(CH_3)_3$	2	550.7	70–72	−23.0	25	1	DMF	76
$-CH(COOC(CH_3)_3)CH_2-$		3	721.9	93–95	−22.1	25	1	DMF	76
		4	893.1	97–99	−19.3	25	1	DMF	76
		5	1064.3	121–123	−18.7	25	1	DMF	76
		6	1235.4	157–162	−20.0	25	1	DMF	76

8.2.9.5. cont'd

X	R	n	Mol. wt.	m.p. (°C)	Specific rotation $[\alpha]_D$	(°C)	c (%)	Solvent[a]	Refs.
L-Glu	CH_3	2	452.5	97–98	−25.2	20	5	DMF	59
$-CH(COOCH_3)CH_2CH_2-$		3	595.5	135–137	−26.1	20	5	DMF	59
		4	738.6	135–139	−28.2	20	5	DMF	59
		5	881.7	175–179	−30.1	20	5	DMF	59
		6	1024.8	195–198	−31.5	20	5	DMF	59
		7	1153.9	206–213	−32.8	20	5	DMF	59
D-Glu	$C(CH_3)_3$	2	578.7	88.5–91	+27.4	25	3	MeOH	59
$-CH(COOC(CH_3)_3)CH_2CH_2-$		3	763.9	77.5–81.5	+30.6	25	3	MeOH	59
		4	949.1	95–97	+34.5	25	3	MeOH	59
		5	1134.3	99–102	+36.1	25	3	MeOH	59
		6	1319.6	73–77	+42.4	25	3	MeOH	59
		7	1504.8	74–78	+42.9	25	3	MeOH	59
L-Glu	$C(CH_3)_3$	2	578.7	83–84	−25.4	22	1	MeOH	71
$-CH(COOC(CH_3)_3)CH_2CH_2-$		3	763.9	79	−30.2	21	1	MeOH	71
		4	949.1	87–89	−33.2	22	1	MeOH	71
		5	1134.3	102–103.5	−36.8	23	1	MeOH	71
		6	1319.6	123–125	−39.9	22.5	1	MeOH	71
		7	1504.8	130–132	−43.7	21	1	MeOH	71

8.2.9.6. α-Oligo(peptides) of Acetyl L-Glutamic Acid Esters $CH_3CO-[NHCH(CH_2CH_2COOC_2H_5)CO]_nOC_2H_5$

n	Mol. wt.	m.p. (°C)	Specific rotation $[\alpha]_D^{25}$	c (%)	Solvent[a]	Ref.
2	402.4	94–95	−29.1	0.5–1.5	TFE	142
3	559.6	150–151	−31.2	0.5–1.5	TFE	142
4	716.8	171	−39.3	0.5–1.5	TFE	142
5	873.9	>230	−34.9	0.5–1.5	TFE	142
8	1345.5	>230	−17.3	0.5–1.5	TFE	142

[a] TFE, Trifluoroethanol

8.2.9.7. α-Oligo(peptides) of o-Nitrophenylsulfenyl L-Glutamic Acid Amides and Esters $Nps^a-[NHCH(CH_2CH_2COOCH_2C_6H_5)CO]_n-R$

R	n	Mol. wt.	m.p. (°C)	Specific rotation $[\alpha]_D$	(°C)	c(%)	Solvent	Ref.
NHC_2H_5	1	417.5	92–93					147
	2	636.7	147–148					147
	4	1075.2	180–182					147
	6	1513.6	233–234					148
$OCH_2C_6H_5$	2	699.7	65–67	−40.0	20	1.0	$CHCl_3$	149
	4	1138.1	114–115	−26.2	22	1.0	$CHCl_3$	149
	8	2014.9	198–205	−8.2	25	0.9	$CHCl_3$	149
	12	2891.7	236–238	+7.1	26	0.5	$CHCl_3$	149

[a] Nps = o-Nitrophenylsulfenyl.

8.2.9.8. Cyclo-γ-Oligo(peptides) of Glutamic Acid $\ulcorner[NHCH(COOR)CH_2CH_2CO]_n\urcorner$

R	n	Mol. wt.	m.p. (°C)	Specific rotation $[\alpha]_D$	(°C)	c (%)	Solvent	Ref.
H	2	258.2	189–192	+14.0	22	0.5	0.1 N HCl	60
	3	387.3	235–238	+90.0	22	0.5	0.1 N HCl	60
	4	516.5	232–236	+38.5	22	0.45	0.1 N HCl	60
$C(CH_3)_3$	2	370.4	220–222	+23.0	23	1	DMF	60
	3	555.7	203–206	−52.5	23	1	DMF	60
	4	740.9	230–232	−38.0	23	0.5	DMF	60

8.2.10. OLIGO(PEPTIDES) OF BASIC L-AMINO ACIDS (LYSINE, ORNITHINE, ARGININE, HISTIDINE)

8.2.10.1. Linear Oligo(peptides) H[NHCHRCO]$_n$OH

R	n	Mol. wt.	R_F [a]	Specific rotation [α]$_D$	(°C)	c (%)	Solvent	Refs.
Lys	1	146.2	0.24	+25.7	25	1.6	6 N HCl	1
$-(CH_2)_4NH_2$	2	274.4	0.17	+5.6	25	2	6 N HCl	39,40
	3	402.6	0.12	−2.2	24	2	0.5 N HCl	40,41
	4	530.7	0.09					40
	5	658.9	0.06					40
	n = 2–20: Ion-exchange chromatography, Refs. 209–212; n = 2–22; ORD, pK values, Ref. 209; n = 2–5: CD, Ref. 217.							
Lys(Boc) [b]	1	246.3	237–255	+4.7	26	0.88	2 N NH_3	219
$-(CH_2)_4NH-Boc$	2	474.6	188	+16.4	20	1	MeOH	213,214
	3	702.9	185–187	+7.4	20	1	MeOH	214
Arg	2	330.4	224–226 [a]	+1780 [c,d]		1.4	N HCl	216
$-(CH_2)_3-NHC(=NH)NH_2$	3	486.6	227–232 [b]	+1540 [c,d]		3.9	N HCl	126
	4	642.7	238–241 [b]	+1030 [c,d]		1.8	N HCl	216

[a] TLC in n-butanol/acetic acid/water/pyridine (30 : 6 : 24 : 20).
[b] Boc = *tert* butyloxycarbonyl-.
[c] As flavianates.
[d] λ = 224 nm

8.2.10.2. Endgroup Protected Oligo(peptides) X–[NHCHRCO]$_n$–Y

R	X	Y	n	Mol. wt.	m.p. (°C)	Specific rotation [α]$_\lambda$	λ (nm)	(°C)	c (%)	Solvent	Refs.
Lys(Boc) [b]	Z	OCH_3	1	394.5	Oil	−10.6	589	26	1.9	Acetone	219
$-(CH_2)_4NH-Boc$			2	622.8	97–98	−5.5	589	20	2.1	Acetone	218–220
			4	1079.4	121	−15.3	589	22	2.1	CH_3COOH	220
			8	2192.6	>260	−16.4	589	22	2.1	CH_3COOH	220
	Z	$OC(CH_3)_3$	2	664.8	82–84	−10.4	578	22	1	DMF	213
			4	1121.4	143–145	−15.5	578	20	1	DMF	213
	Z	$NHCH_3$	2	721.8	129	−14.4	589	22		CH_3COOH	220
			4	1078.3	174	−16.6	589	22		CH_3COOH	220
			8	1991.5	>260	−18.0	589	22		CH_3COOH	220
			16	3817.7	>260	−14.6	589	22		CH_3COOH	220
	Z	OH	1	380.4	Oil	−2.4	589	26	2.0	Acetone	219
			2	790.0	112	−3.1	578	22	1	CH_3COOH	213
			3	837.0	107	−12.2	589	20	1	MeOH	214
	Boc	$OC(CH_3)_3$	7	1773.2	268	−19.0	578	22	1	DMF	213
	Boc	OH	3	802.0	114	−5.5	578	22	1	DMF	213
			4	1031.0	92–95	−15.4	589	20	1	MeOH	214
	H	Suco [a]	n = 1,5–8,10,20: TLC, IR, CD								
Lys(Z) [b]	Boc	$OCH_2C_6H_5$	2	732.8	80	−14.0	578		1	DMF	213
$-(CH_2)_4NH-Z$			3	995.1	140	−16.2	578		1	DMF	213
			4	1257.4	156–158	−15.7	578		1	DMF	213
			5	1519.7	170	−16.7	578		1	DMF	213
			7	2044.3	245–248	−13.9	578		1	DMF	213
Lys(Z)	Boc	OH	2	642.7	97–105						215
$-(CH_2)_4NH-Z$			4	1167.3	124–127						215
			8	2216.5	1235–140						215
Orn(Boc)	Z	OCH_3	1	380.4	71	−14.4	589	27	1.08	90% AcOH [b]	221
$-(CH_2)_3NH-Boc$			2	594.7	125	−15.1	589	20	1.34	90% AcOH	221,222
			3	809.0	147	−13.7	589	20	1.1	90% AcOH	222
Orn(Boc)			4	1023.2	152	−17.8	589	20	1	MeOH	221,222
			5	1237.5	165–171	−5.1	589	25	1.05	DMF	222
$Arg(NO_2)$	Z	OCH_3	1	367.4	153–153.5						216
$-(CH_2)_3-NHC(=N-NO_2)NH_2$			3	769.7	133–136						216
			4	970.9	139–140						216

8.2.10.2. cont'd

R	X	Y	*n*	Mol. wt.	m.p. (°C)	Specific rotation $[\alpha]_\lambda$	λ (nm)	(°C)	*c* (%)	Solvent	Refs.
His(π-Bom)[b]	BOc	OCH_3	3	904.1	67–69	−15.5	589	20	0.49	MeOH	223
			4	1161.4	78–81	−21.2	589	20	0.49	MeOH	223
			5	1418.7	93–97	−22.3	589	20	0.48	MeOH	223
			6	1676.0	117–122	−23.3	589	20	0.52	MeOH	223
			7	1933.3	155–163	−23.2	589	20	0.52	MeOH	223

[a] Suco = *p*-oxymethylbenzylcholestan-3-β-yl succinate.
[b] Z- = Benzyloxycarbonyl-; Boc- = *tert* butyloxycarbonyl-; π-Bom- = *N*(π)-benzyloxymethyl-; AcOH = acetic acid.

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8.3. OLIGO(IMINES)

8.3.1. LINEAR OLIGO(IMINES)

8.3.1.1. Linear Oligo(ethylene imines) $H[NHCH_2CH_2]_nNH_2$

n	Mol. wt.	m.p. (°C)	b.p. (°C/mbar)	d_{20}^{20} (g/cm³)	n_D^{25}	Refs.
1	60.1	11.0	116.5/1013	0.8994	1.4536	1,2
2	103.1		207.1/1013	0.9586	1.4810	1–3
3	146.2	12.0	277.9/1013	0.9839	1.4951	1–4
4	189.2		333/1013	0.9994	1.5015	1–3
7	318.5		109–110/11		1.5132	2,5
9	404.7		199–200/1		1.5161	2,5

8.3.1.2. Linear Oligo(alkylene imines) $R-[NH(CH_2)_6NH(CH_2)_{10}]_n-R'$

R	R′	*n*	Mol. wt.	m.p. (°C)	Ref.
H	OH	1	272.5	64–67	6
		2	526.9	70–72	6
		3	781.4	85–86	6
$(CH_2)_{10}OH$	OH	1	428.8	99–100	6
		2	683.2	90–93	6
		3	937.7	80–84	6
H	$NH(CH_2)_6NH_2$	1	370.7	70–72	6
		2	625.1	86–88	6
		3	879.6	81–85	6

8.3.2. CYCLIC OLIGO(IMINES) $\overline{[NH(CH_2)_x]_n}$

x	*n*	Mol. wt.	m.p. (°C)	b.p. (°C/mbar)	d_4 (g/cm³)/°C	Refs.
2	1	43.1		55–56/1013	0.8321/24	2,7,8
	2	86.1	104	145–146/1013		8,9
	4	172.3	35	$110/10^{-4}$		10
3	1	57.1		63/1013	0.8436/20	11
	2	114.2	14–15	186–188/1013		8,11–13
4	1	71.1		88/1013	0.8520/22.5	14
	2	142.2		95/16	0.9020/18	8,13
5	1	85.2	−9	106/1013	0.8606/20	14
	2	170.3		108–110/16	0.9195/13	8
6	1	99.2		138/1013	0.8864/21	8,15,16
	2	198.2	72			13,17,18
	3	297.5	42			17
	4	396.7	59–60			17
	5	495.9	45			17
	6	595.1	67–68			17

8.3.2. *cont'd*

x	*n*	Mol. wt.	m.p. (°C)	b.p. (°C/mbar)	d_4 (g/cm^3)/°C	Refs.
7	1	113.1	−33	162/1013	0.8895/20	16,19
	2	226.2	26		0.9012/30	19
8	1	127.2		90/32	0.9021/21	16
	2	254.5	55			20
9	1	141.3			0.8982/21	16
	2	282.5	38			19
13	1	197.4	50–51			16
	2	394.7	52			21

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8.4. OLIGO(UREAS)

8.4.1. OLIGO(METHYLENE UREAS) $H[NHCONHCH_2]_nNHCONH_2$

n	Mol. wt.	m.p. (°C)	Refs.
1	132.1	218 d	1,2
2	204.2	227	1
3	276.3	231–233	1,2
5	420.5	236 d	2

8.4.2. OLIGO(METHYLENE THIOUREAS) $H[NHCSNHCH_2]_nNHCSNH_2$

zn	Mol. wt.	m.p. (°C)	Refs.
1	164.3	198 d	3,4
2	252.4	210 d	3
3	340.5	215 d	3

3.4.3. OLIGO(METHYLOL THIOUREAS) $R[NHCSNHCH_2]_nOH$

R	*n*	Mol. wt.	m.p. (°C)	Refs.
H	1	106.2	104–105	3,4
	2	194.3	190–192 d	3
CH_2OH	1	136.2	92	3
	2	224.3	132	3,4

8.4.4. CYCLIC OLIGO(UREAS)

n	Mol. wt.	m.p. (°C)	Refs.
2	504.6	300–301	5

1	422.6	157–158	5
2	845.1	180–181	5

8.4.5. OLIGO(CARBONYLPIPERAZINES)

n	Mol. wt.	m.p. (°C)	Refs.
0	196.3	42–43	6,7
1	308.4	177	7,8
2	420.5	267	7
3	532.7	337	7

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TABLE 9. OLIGO(CYCLOPENTYLENES) H[—⬠—]$_n$H

n	Mol. wt.	m.p. (°C)	b.p. (°C/mbar)	d_4^{20} (g/cm^3)	Refs.
1	70.1	−93.9	42.3/1013	0.7510	
2	138.3		190/1013	0.8646	1,2
3	206.3		293–294/1013	0.9177	1,2
4	274.5		369–370/1013	0.9564	1,2
6	410.7	143–146	235/0.13		1

TABLE 10. OLIGO(SPIRANES) R[—⬠—⬠—]$_n$R

R	n	Mol. wt.	m.p. (°C)	b.p. (°C/mbar)	Refs.
CH_2	5	216.3		78/0.4	3
$(CH_2)_2$	3	244.4		84/0.07	3
	5	324.5	61		3
	7	406.6	107–108		3
$(CH_2)_3$	3	272.5	52.5	120–122/0.07	3
	5	352.6	79.5		3
	7	432.7	103–104		3
	9	512.8	138–140		3

TABLE 11. OLIGO(XYLYLENES)

11.1. LINEAR OLIGO(XYLYLENES)

H[—H_2C—⬡—CH_2—]$_n$H

n		Mol. wt.	m.p. (°C)	b.p. (°C/mbar)	Refs.
o-	1	106.2	−25	144/1013	
	2	210.3	66.5	177–178/127	5–7
m-	1	106.2	−47.4	139/1013	
	2	210.3		296/1013	7,8
p-	1	106.2	13–14	138/1013	
	2	210.3	82	178/24	7,9–12,30
	3	314.5	141–142		10,13

11.2. CYCLIC OLIGO(XYLYLENES)

[—H_2C—⬡—CH_2—]$_n$

n		Mol. wt.	m.p. (°C)	b.p. (°C/mbar)	Refs.
o-	2	208.3	112–112.5		5,6,14
	3	312.5	184.5		5,6
	4	416.6	205		15
m-	2	208.3	132–133	290/1013	10
p-	2	208.3	285–287		8,11–13,19,30
	3	312.5	170–171		10,,13,30
	4	416.6	179–182		13

TABLE 12. OLIGO(STILBENES)

n	Mol. wt.	m.p. (°C)	Refs.
1	180.2	124	17
2	282.4	265	16–18
3	384.5	350–352	17
4	486.5	360–374	16,17
5	588.7	395–400	16,17
6	690.9	415–420	16,17
7	793.0	425	16,17

TABLE 13. OLIGO(BENZYLS)

n	Mol. wt.	m.p. (°C)	Refs.
1	168.2	25.1	
2	258.3	82	20,23
3	348.4	90	21,23
4	438.6	120	23
5	528.7	153–156	22,23

TABLE 14. OLIGO-(2,5-DIMETHYL-BENZYLS)

n	Mol. wt.	m.p. (°C)	Refs.
1	224.3	60–61	22,24
2	342.5	153–154	22
4	578.8	234–236	22
6	815.1	262–266	22

TABLE 15. OLIGO(2,3,5,6-TETRAMETHYL-BENZYLS)

n	Mol. wt.	m.p. (°C)	Refs.
1	280.5	155–156	22,25
2	426.7	263–264	22,26
3	572.9	305–307	22
4	719.1	335–337	22

TABLE 16. OLIGO(*p*-PHENYLENE OXIDES)

n	Mol. wt.	m.p. (°C)	Refs.
1	170.2	28	
2	262.3	73	23,27
3	354.4	105	23,27
4	446.5	142	23,27

TABLE 17. OLIGO(*p*-PHENYLENE SULFIDES)

n	Mol. wt.	m.p. (°C)	Refs.
1	186.4	−21.5	
2	294.5	80	23,28
3	402.6	110	23
4	510.7	150	23

TABLE 18. OLIGO(*p*-PHENOXYPHENYLMETHANES)

n	Mol. wt.	m.p. (°C)	Refs.
1	350.4	59	23
2	532.7	101	23

TABLE 19. OLIGO(DIPHENYLMETHANES)

n	Mol. wt.	m.p. (°C)	Refs.
1	168.2	25.1	
2	334.5	115	4,29
3	500.7	180	4
4	666.9	240	4

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TABLE 20. PHENOL–FORMALDEHYDE AND RELATED OLIGOMERS

20.1. LINEAR PHENOL–FORMALDEHYDE OLIGOMERS

20.1.1. PHENOL–FORMALDEHYDE OLIGOMERS

n	Mol. wt.	m.p. (°C)	Refs.
1	200.2	119–120	1–4
2	306.4	158–159	2–6
3	412.5	161–162	3,4
4	518.6	148–150	4,7
5	624.7	203–204	4
6	730.8	213–214	4

20.1.2. *p*-CRESOL–FORMALDEHYDE OLIGOMERS

20.1.2.1.

n	Mol. wt.	m.p. (°C)	Refs.
	228.3	126	8–10,56–58
2	348.4	214–215	8–11,56–58
3	468.6	173	8,9,56,57
4	588.7	130	12,56,57
5	708.9	215–217	12
6	829.1	225–230	12
7	949.2	167–170	12
8	1069.4	205–210	12
9	1189.5	175–180	12
11	1429.8	245	12

20.1.2.2.

n	Mol. wt.	m.p. (°C)	Refs.
1	136.1	70–72	61
2	256.3	148	11,13–16
3	376.5	183–184	11
4	496.7	204–205	11
5	616.9	152–154	61

20.1.3. p-tert BUTYLPHENOL–FORMALDEHYDE OLIGOMERS

20.1.3.1.

n	Mol. wt.	m.p. (°C)	Refs.
1	312.5	156	17,18,62
2	474.7	218–220	17,18,62
3	636.9	211	17,18,62
4	799.2	216–217	17,18,62
5	961.4	250	17,18,62
6	1123.6	249–250	17,18
7	1285.9	253–256	18
8	1448.1	224–226	17
10	1772.6	140	17

20.1.3.2.

n	Mol. wt.	m.p. (°C)	Refs.
0	220.4	70–71	61
1	340.5	125–130	61
2	460.7	82–84	61
4	701.0	188–190	61

20.1.4. 2,4,6-MESITOL–FORMALDEHYDE OLIGOMERS

n	Mol. wt.	m.p. (°C)	Refs.
1	284.4	188	19
2	432.6	257	19

20.1.5. 4-CARBOXY-PHENOL–FORMALDEHYDE OLIGOMERS

n	Mol. wt.	m.p. (°C)	Refs.
1	288.3	305–307	59
2	438.4	310	59

20.1.6. 4-BROMO-PHENOL–FORMALDEHYDE OLIGOMERS

n	Mol. wt.	m.p. (°C)	Refs.
1	358.1	183–184	1,60
2	543.1	237–238	60

20.1.7. *p*-CRESOL–ACETALDEHYDE OLIGOMERS

R	*n*	Mol. wt.	m.p. (°C)	Refs.
H	1	241.3	141	20,21
H	2	373.5	214–215	21
CH_3	1	270.4	135–135.5	22
CH_3	2	404.6	154–155	63
CH_3	3	538.7	204–205	63

20.1.8. OLIGOMERS WITH CARBONYL AND SULFONYL BRIDGES

20.1.8.1.

n	Mol. wt.	m.p. (°C)	Refs.
1	242.3	106–107	23,24,56–58
2	376.4	122–123	24,56,57

20.1.8.2.

n	Mol. wt.	m.p. (°C)	Refs.
1	347.2	179	25
2	517.4	238–240	25
3	687.6	246–252	25

20.2. OLIGOMERIC PHENOL ALCOHOLS

20.2.1. OLIGOMERIC PHENOL ALCOHOLS

n	Mol. wt.	m.p. (°C)	Refs.
1	124.1	86–87	3,26
2	230.3	121.5–123	3,27,28

20.2.2. PHENOL DIALCOHOLS

n	Mol. wt.	m.p. (°C)	Refs.
1	154.2	101	29–32
2	260.3	126–127	28

20.2.3. *p*-CRESOL MONOALCOHOLS

n	Mol. wt.	m.p. (°C)	Refs.
1	138.2	107	8,33,34
2	258.3	148	8,9,35
4	498.6		36

20.2.4. *p*-CRESOL DIALCOHOLS

n	Mol. wt.	m.p. (°C)	Refs.
1	168.2	133–134	13,37
2	288.3	151.5	9,35,38,39
3	408.5	203	9,39,40

20.2.5. *p-tert* BUTYLPHENOL DIALCOHOLS

n	Mol. wt.	m.p. (°C)	Refs.
1	210.3	74–75	41
2	372.5	117–118	18

20.2.6. *o*-HYDROXYDIBENZYL ETHERS

n	Mol. wt.	m.p. (°C)	Refs.
2	318.4	85	42

20.3. CYCLIC PHENOL–FORMALDEHYDE OLIGOMERS

20.3.1.

X	R	*n*	Mol. wt.	m.p. (°C)	Refs.
$-CH_2-$	$-CH_3$	4	480.6	300	36,43
	$-C(CH_3)_3$	4	648.9	344–346	18,44, 65,66
		5	811.1	310	68
		6	973.5	380–381	65,66,68
		8	1298.0	411–412	65,66,68
	$-C_6H_5$	4	728.9	407–409	18,66,67
		6	1093.4	408–410	66,67
		8	1457.8	421–423	66,67
	$-C_6H_{11}$	4	753.1	330	18
	$-CH_2C_6H_5$	4	785.0	330	18
	$-C(CH_3)_2CH_2CH_3$	4	705.0	280	18
	$-C(CH_3)_2CH_2C(CH_3)_2$	4	813.2	333	18
$-CH_2OCH_2-$	$-CH_3$	4	600.7	264–266	42
	$-C(CH_3)_3$	3	576–8	245	45

20.3.2.

n	Mol. wt.	m.p. (°C)	Ref.
2	540.7	325–330	46

20.3.3.

R	*n*	Mol. wt.	Refs.
H	2	916.2	47
	1	1201.5	43,47

20.4. BRANCHED PHENOL–FORMALDEHYDE OLIGOMERS

20.4.1.

Mol. wt.	m.p. (°C)	Ref.
376.5	158	48

20.4.2.

R_1	R_2	Mol. wt.	m.p. (°C)	Refs.
H	H	411.5		49
H	CH_3	453.6	184–187	30,50
CH_3	CH_3	495.6	185–186	51

20.4.3.

R_1	R_2	*n*	Mol. w.t	m.p. (°C)	Refs.
H	H	1	624.7	185–187	52,53
CH_3	CH_3	1	737.0	207–208	6,53,54
CH_3	CH_3	2	1217.5	190–191	54

20.5. HYDROQUINONE OLIGOMERS

20.5.1.

n	Mol. wt.	m.p. (°C)	Refs.
1	300.4	97–98	64
2	462.5	146–147	64

20.5.2.

R	*n*	Mol. wt.	m.p. (°C)	Refs.
H	0	300.4	97–98	64
	1	462.5	192–193	64
CH_3	0	328.4	162–163	64
	1	490.6	242–243	64
	2	652.8	283–284	64
	3	815.0	306–307	64
	4	977.2	326–328	64

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TABLE 21. OLIGO(PHENYLENES)

21.1. *o*-OLIGO(PHENYLENES)

21.1.1. LINEAR *o*-OLIGO(PHENYLENES)

n	Mol. wt.	m.p. (°C)	b.p. (°C)	Refs.
3	230.3	59	332	1,2
4	306.4	119	420	1,3–6
6	458.6	217		3,5
8	610.8	320		5

21.1.2. CYCLIC *o*-OLIGO(PHENYLENES)

n	Mol. wt.	m.p. (°C)	Refs.
2	152.2	111	4,5,7–9
3	228.3	196.5	10,11
4	304.4	233	4,5
6	456.6	432	5
8	608.8	425	5

21.2. *m*-OLIGO(PHENYLENES)

21.2.1. LINEAR *m*-OLIGO(PHENYLENES)

n	Mol. wt.	m.p. (°C)	b.p. (°C)	Refs.
3	230.3	89	365	12–14
4	306.4	86.5–87.5	419	3,6,15–17
5	382.5	117–117.5		12,15,16
6	458.6	148		3,15,17,18
8	610.8	129–131		15,17
9	689.9	195–200		18

21.2.2. CYCLIC *m*-OLIGO(PHENYLENES)

n	Mol. wt.	m.p. (°C)	Refs.
6	456.6	509.5–511	19
8	608.8	449–451	19

21.2.3. OLIGO(3-METHYL-*m*-PHENYLENES)

n	Mol. wt.	m.p. (°C)	b.p. (°C)	Refs.
2	182.3	9–9.5	280	20–23
3	272.4	65		12

21.3. *p*-OLIGO(PHENYLENES)

21.3.1. *p*-OLIGO(PHENYLENES) H[—⟨⟩—]$_n$H

n	Mol. wt.	m.p. (°C)	b.p. (°C/mm)	Solubility (g/L toluene)	Refs.
1	78.1	5.5	80.1	∞	
2	154.2	71	156	430	24
3	230.3	215	376	7.4	3,12,14,25,26
4	306.4	322	428/10	0.12	3,12,16,21,25,26
5	382.5	395		<0.005	12,16,21,25,27,28
6	458.6	465			3,29–31

21.3.2. OLIGO(3-METHYL-*p*-PHENYLENES) H[—⟨CH_3⟩—]$_n$H

n	Mol. wt.	m.p. (°C)	b.p. (°C)	Refs.
1	92.1	−95	110.6	
2	182.3		273–274	22,23,32
3	272.4	43		33

21.3.3. OLIGO(2,5-DIMETHYL-*p*-PHENYLENES) H[—⟨CH_3, CH_3⟩—]$_n$H

n	Mol. wt.	m.p. (°C)	b.p. (°C)	Solubility (g/L toluene)	Refs.
1	106.2	13.3	138.4	∞	
2	210.3	53–54		700	20,34
3	314.5	182–183		28	34
4	418.6	264–266		1.1	34
5	522.8	307–309		0.24	34

21.3.4. OLIGO(2,3,5,6-TETRAMETHYL-*p*-PHENYLENES)

H[—⟨H_3C, CH_3, H_3C, CH_3⟩—]$_n$H

n	Mol. wt.	m.p. (°C)	b.p. (°C)	Solubility (g/L toluene)	Refs.
1	134.2	79.2	196–198	∞	
2	266.4	136–137		365	34,35
3	398.6	270–272		24	34
4	530.8	270–272		3.4	34

21.3.5. OLIGO(2,2′-DIMETHYL-BIPHENYLENES)

H[—⟨CH_3⟩—⟨CH_3⟩—]$_n$H

n	Mol. wt.	m.p. (°C)	Solubility (g/L toluene)	Refs.
1	182.3	24		20,23,36
2	362.5	96	490	37

21.3.6. OLIGO(3,3′-DIMETHYL-BIPHENYLENES)

H[—⟨CH_3⟩—⟨CH_3⟩—]$_n$H

n	Mol. wt.	m.p. (°C)	b.p. (°C)	Solubility (g/L toluene)	Refs.
1	182.3	9–9.5	280	∞	20–23,38
2	362.5	76.5		512	27,37
3	542.8	142		87	39
4	723.0	273		<6.5	39,40
5	903.3	285		~2	39,40
6	1083.5	298		<0.8	39,40

21.3.7. OLIGO(3,3″-DIMETHYL-*p*-TERPHENYLENES)

H[—⟨CH_3⟩—⟨⟩—⟨CH_3⟩—]$_n$H

n	Mol. wt.	m.p. (°C)	Solubility (g/L toluene)	Refs.
1	258.4	140–141	4.9	27,37
2	514.7	258	0.4	37

21.3.8. OLIGO(2,5-DIMETHOXY-*p*-PHENYLENES)

n	Mol. wt.	m.p. (°C)	b.p. (°C)	Refs.
1	138.2	56	212.6	
2	274.3	105		20,41
3	410.5	189		41
4	546.6	246		41

21.3.9. OLIGO(3,3′-DIMETHOXY-BIPHENYLENES)

n	Mol. wt.	m.p. (°C)	b.p. (°C)	Solubility (g/L toluene)	Refs.
1	214.3	36	328		42
2	426.5	158		22	38,43

21.3.10. OLIGO(2′,3″-DIMETHOXY-*p*-QUATERPHENYLENES)

n	Mol. wt.	m.p. (°C)	Solubility (g/L toluene)	Refs.
1	366.5	183–184	13	43
2	730.9	276–277	0.2	43

21.4. OLIGO(*p*-QUINONES)

n	Mol. wt.	m.p. (°C)	Refs.
1	108.1	116.5	
2	214.2	194	41
3	320.3	>230	41
4	426.3	230–270	41

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E. OLIGOMERS CONTAINING HETEROCYCLIC RINGS IN THE MAIN CHAIN

TABLE 22. HETEROCYCLIC OLIGOMERS

22.1. OLIGO(FURAN)DERIVATIVES

22.1.1. OLIGO(FURFURYL) ALCOHOLS

n	Mol. wt.	m.p. (°C)	b.p. (°C/mbar)	n_D^{20}	Refs.
1	98.1		171/1000	1.4868	10,11
2	178.2	−2.5	141–143/12	1.5290	10–12,14
3	258.3	62–62.5	192.5–295/8		10–12,14

22.1.2. OLIGO(FURFURYL) FURANS

R_1	R_2	*n*	Mol. wt.	m.p. (°C)	b.p. (°C/mbar)	d_4^{20} (g/cm³)	n_D^{20}	Refs.
H	H	1	148.2		78/16	1.102	1.5048	10,12,14–15,39
		2	228.2		141–146/11		1.5324	10,12
		3	308.3	74–75				10,12,14
		4	388.4	99–101				10,14
H	CH_3	1	162.2		91/28	1.073	1.4993	16,17
		2	256.3		114–116/0.13			17
		3	350.4		165–168/0.04			16,17
CH_3	CH_3	1	176.2	−12	73–76/7–8	1.043	1.4966	17,18
		2	284.3	47.0/47.5	120–123/1.3			17,18
		3	392.5		163–167/1.3	1.030	1.5172	17,18
		4	500.6	Oil				17
		5	608.7	83–85				17
CH_3	C_2H_5	1	190.2		68–70/3	1.033	1.4970	18
		2	312.4		143–145/1.3	1.045	1.5094	19
		3	434.6		205–210/1.3	1.046	1.5173	19
C_2H_5	C_2H_5	1	204.3	−9 to −8	76–77/3	1.023	1.4978	20
		2	340.4		162–163/2	1.028	1.5089	20
		3	476.6		212–215/2	1.034	1.5199	20
		1	216.3	13–17	94–95/2			21
		2	364.5	86.8–87.6	200–205/2	1.018	1.5221	21

22.1.3. 2,5-OLIGO(FURYLENES)

n	Mol. wt.	m.p. (°C)	b.p. (°C/mbar)	d_4^{20} (g/cm³)	n_D^{20}	Refs.
1	68.1	−85.7	31.4/1013	0.9514/20	1.4214/20	
2	134.1		63–64/15		1.5601/22	39–41,42
3	200.2	62–63				32

22.1.4. FURANOPHANES

R′	R″	n	Mol. wt.	m.p. (°C)	Refs.
H	CH_3	4	376.4	140–142	16,17,22
	r-2,c-7,c-12,c-17-			191.0–192.0	22
H	C_2H_5	4	432.5	83–88	22
	r-2,c-7,c-12,c-17-			152.0–153.0	22
CH_3	CH_3	4	432.5	243	18,23,24
CH_3	CH_3	5	540.7	Oil	17
		6	648.8	182	17,18,24
CH_3	C_2H_5	4	488.5	174	18,19,22,24
C_2H_5	C_2H_5	4	544.7	249–250	18,20,24
H		4	592.8	268–269	21,24

22.1.5. TETRAHYDROFURANOPHANES

n	Mol. wt.	m.p. (°C)	Refs.
4	448.7	204–209	17,18,20,21,23
	r-(1S, 3S, 6R, 8S, 11R, 13R, 16S, 18R)-	218	25
	r-(1S, 3R, 6S, 8R, 11S, 13R, 16S, 18R)-	221	25
5	560.8	Oil	17
6	673.0	75–80	17

22.2. OLIGO(THIOPHENE) DERIVATIVES

22.2.1. OLIGO(2.5-THIENYLENES)

n	Mol. wt.	m.p. (°C)	b.p. (°C/mbar)	n_D^{20}	Refs.
1	84.1	−38.4	84.2/1013	1.5289	
2	166.3	33–34	125/16		1,27,28,34,41,42,44,49
3	248.4	96–97			1,3,26,28,30–33,42,44,47,49
4	330.5	215–216			1,3,27–29,41,42,44,46,49
5	412.5	257–258			1,3,28,29,42,48
6	494.8	304–305			3,27,28,42,44,46
7	576.9	327–328			3,29,48
8	659.0	364			42,46

22.3. OLIGO(PYRROLE) DERIVATIVES

22.3.1. OLIGO(PYRROLE) DERIVATIVES

No.	Oligomers	R	n	Mol. wt.	m.p. (°C)	b.p. (°C/mbar)	Refs.
1			2	214.3	105–106		21,43
2		CH_3	2	174.2	59	125–126/4	35
3			4 4	428.6 588.8	291 272.0–272.5		36,37 21

22.3.2. OLIGO[2,5-(*N*-METHYL)PYRROLENES]

n	Mol. wt.	m.p. (°C)	b.p. (°C/mbar)	Refs.
1	81.1		114–115/99.6	
2	160.2	14–15	77–78/0.5	13,42
4	318.4	134		42
5	397.5	145		42
6	476.6	160		42
8	634.8	178–182		42
16	1267.6	240–256		42

22.4. OLIGO(PYRIDINE) DERIVATIVES

22.4.1. OLIGO(2,6-PYRIDYLENES)

n	Mol. wt.	m.p. (°C)	b.p. (°C/mbar)	n_D^{20}	Refs.
1	79.1	−42	115.5/1013	1.5095	
2	156.2	70.1	273–275/1013		4,5
3	233.3	89–90	370/1013		2,4–6
4	310.4	219–220			5
5	387.5	265			5
6	464.5	350			5

22.4.2. OLIGO(3,5-PYRIDYLENES) H[ ]H

n	Mol. wt.	m.p. (°C)	b.p. (°C/mbar)	n_D^{20}	Refs.
1	79.1	−42	115.5	1.5095	
2	156.2	68	291–292/981		4,9
3	233.3	249–251			9

22.4.3. OLIGO(2,6-QUINOLYLENES) H[ ]H

n	Mol. wt.	m.p. (°C)	b.p. (°C/mbar)	n_D^{20}	Refs.
1	129.2	−15.6	238.1/1013	1.6268	
2	256.3	144			7,8
3	383.5	267–269			8
4	510.6	348–350			8

22.5. CYCLIC OLIGO(HETEROCYCLICS)

No.		Mol. wt.	m.p. (°C)	Refs.
1		188.2	189–190	38
2		220.3	194.5–196	38
3		264.2	233	42,45
4		328.5	255–256	42,45
5		492.7	420	42,45
6		328.5	300–301	42,45
7		528.7	410	45
8		312.3	355–360	45

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TABLE 23. OLIGO(SACCHARIDES)

23.1. OLIGOMERIC PENTOSES

23.1.1. OLIGO(β-XYLOPYRANOSES)[a]

n	Mol. wt.	m.p. (°C)	$[\alpha]_D^{25}$ in H_2O
1	150.1	153	19.2
2	282.2	186–187	−25.6
3	414.4	215–216	−48.1
4	546.5	224–226	−61.9
5	678.6	240–242	−72.9
6	810.7	237–242	−78.5
7	942.8	240–242	−74.0

[a] Refs. 1–3.

23.1.2. OLIGO(β-XYLOPYRANOSE ACETATES)[a]

n	Mol. wt.	m.p. (°C)	$[\alpha]_D^{25}$	*c* in $CHCl_3$
2	534.5	155.5–156	−74.5	0.9
3	750.7	109–110	−84.3	0.6
4	966.9	201–202	−93.7	0.8
5	1183.1	249–250	−97.5	1.1
6	1399.3	260–261	−102.0	1.5

[a] Refs. 1–3.

23.2. OLIGOMERIC HEXOSES

23.2.1. MALTO-OLIGO[a]

n	Mol. wt.	m.p. (°C)	$[\alpha]_D^{15}$ in H_2O
1	180.2	146	52.6
2	342.3	160–165	136.0
3	504.4		160.0
4	666.6		177.0
5	828.7		180.3
6	990.9		184.7
7	1153.0		186.4

[a] Refs. 4–6.

23.2.2. CYCLODEXTRINS[a]

n	Mol. wt.	$[\alpha]_D$ ($c = 1$, H_2O)
6	972.8	149.0
7	1135.0	158.8
8	1297.1	170.0

[a] Refs. 4–6.

23.2.3. CELLO-OLIGOSES[a]

n	Mol. wt.	m.p. (°C)	Specific rotation $[\alpha]_D$	(°C)	c in H_2O
1	180.2	150	52.5	20	4
2	342.3	225 d	34.6	20	8
3	504.4	238 d	21.6	26	4
4	666.6	253 d	16.5	23	3.4
5	828.7	267 d	11.0	30	4.1
6	990.9	278 d	10.0	30	1.2
7	1153.0	286 d	7.3	30	0.1

[a] Refs. 7–14.

23.2.4. CELLO-OLIGOSE ACETATES[a]

n	Mol. wt.	m.p. (°C)	$[\alpha]_D^{20-25}$ ($c = 5$, in $CHCl_3$)
1	390.4	113	101.6
2	678.6	229.5	41.0
3	966.9	223–224	22.6
4	1255.1	230–234	13.4
5	1543.4	240–241	4.2
6	1831.6	252–255	−0.2
7	2119.8	263–266	−4.4

[a] Refs. 7–14.

23.2.5. ISOMALTO-OLIGOSES[a]

n	Mol. wt.	m.p. (°C)	$[\alpha]_D$ in H_2O
1	180.2	146	52.6
2	342.3	225 d	
3	504.4		
4	666.6		153
5	828.7		160
6	990.9		163

[a] Ref. 15.

23.2.6. GENTIO-OLIGOSES[a]

n	Mol. wt.	m.p. (°C)	$[\alpha]_D$ in H_2O
1	180.2	150	52.5
2	342.3	190–195	9.6
3	504.4		−10.5
4	666.6		−19.5

[a] Ref. 15.

23.2.7. GALACTO-OLIGOSES[a]

n	Mol. wt.	m.p. (°C)	$[\alpha]_D$ in H_2O
1	180.2	167	−52.5
2	342.3	210–211	173
3	504.4	115–120	58
4	666.6		53

[a] Ref. 15.

23.2.8. MANNO-OLIGOSES[a]

n	Mol. wt.	m.p. (°C)	Specific rotation $[\alpha]_D$	(°C)	c, H_2O
1	180.2	132			
2	342.3	193–194	−7.7	25	0.9
3	504.4	137–137.5	−23.3		1.3
4	666.6	232–234	−31		1.6

[a] Refs. 16,17.

23.3. OLIGOMERIC AMINO SUGARS

23.3.1. *N*-ACETYL CHITO-OLIGOSES[a]

n	Mol. wt.	m.p. (°C)	Specific rotation $[\alpha]_D$	c in H_2O
1	221.2			
2	424.4	260–262 d	17.2	0.5
3	627.6	290–311 d	2.2	0.9
4	830.8	290–300 d	−4.1	1.0
5	1034.0	285–295 d	−9.1	1.0
6	1237.2		−11.4	0.8
7	1440.4		−12.6	0.3

[a] Refs. 18,19.

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SECTION V

PHYSICAL CONSTANTS OF SOME IMPORTANT POLYMERS

Physical Constants of Rubbery Polymers

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A. INTRODUCTION

Where a range is given, there are available several observations which differ. In most cases the differences are thought to be real, arising from differences in the rubber rather than from errors of observation. Where a single value is given, it is either because no other observations are available or because there seems to be no significant disagreement among values within the errors of observation. Where values are not given, data have not been found. Where dashes are shown, either the physical measurement is impossible or the constant in question is not adequately defined under the given conditions. The values shown refer to specific vulcanizates cited in the corresponding references. Other vulcanizates may yield a broader range of values.

The values are expressed in the International System of Units (SI), the modern metric system, described in National Bureau of Standards Special Publication 330, 1981 edition, and in American Society for Testing and Materials Metric Practice Guide E380–85.

Values are given for constants at a temperature of 25°C (273.15 K) and a pressure of 1 normal atmosphere = 101.325 kPa.

B. TABLES

TABLE 1. 1,4-*cis*(96–98%)POLY(BUTADIENE)

Property	Units	Unvulcanized	Refs.	Pure-gum vulcanizate	Refs.
Density	kg/m^3			1.01	1
Coefficient of expansion	K^{-1} ($\times 10^6$)	669	2		
Glass transition temperature	°C			−110 to −95	3
Specific heat	J/kg/K ($\times 10^3$)	1.96	4	1.960–1.970	1
Thermal conductivity	W/m/K ($\times 10^{-3}$)			200	5
Thermal diffusivity	m^2/s ($\times 10^{-9}$)				
Solubility parameter	$MPa^{1/2}$	17.0	6		
Polymer–solvent interaction parameter (25–30°C)	**Solvent**				
	n-Heptane	0.51	7		
	n-Hexane	0.53	7		
	Cyclohexane	0.45	8		
	Benzene	0.44	7		
	Toluene	0.36	7		

TABLE 1. *cont'd*

Property	Units	Unvulcanized	Refs.	Pure-gum vulcanizate	Refs.
Equilibrium melting temperature	K (°C)	1.0	10		
		0	11		
Temperature of most rapid crystallization	K (°C)	− 52 to − 57	3		
Heat of fusion of crystal	J/kg ($\times 10^3$)	47	11		
		169	10		
Refractive index	N_D	1.526	12		
Molar polarizability	cm^3 ($\times 10^{-25}$)	71.4	12		
Dielectric constant (50 Hz)		2.3	3		
Dielectric loss factor (50 Hz)		0.8	3		
Compressibility	Pa^{-1} ($\times 10^{-12}$)	500	2		
Young's modulus	Pa ($\times 10^6$)			1.3	9
Shear modulus	Pa ($\times 10^6$)			0.96	9
Storage modulus (1 Hz)	log Pa			5.98	9
Loss modulus	log Pa			4.79	9
Loss tangent				0.065	9

TABLE 2. POLY(BUTADIENE-*co*-ACRYLONITRILE)

Property	Units	Unvulcanized	Refs.	Pure-gum vulcanizate	Refs.
Density	kg/m^3			0.95[a] (20%)	3
				1.02 (45%)	3
Glass transition temperature	°C			− 85 + A(20–40%) (A = AN%)	3
Specific heat	J/kg/K ($\times 10^3$)			1.970(40%)	3
Thermal conductivity	W/m/K ($\times 10^{-3}$)			250 (18–35%)	3
Thermal diffusivity	m^2s ($\times 10^{-9}$)				
Solubility parameter	$MPa^{1/2}$	18.5–21.0 (18–39%)	6		
Polymer–solvent interaction parameter (25–30°C)					

Solvent	AN% 18	30	39	Refs.
n-Heptane	0.96	1.88	3.6	9
n-Hexane	0.99		2.8	9
Dichloromethane	0.39	0.31	0.32	9
Cyclohexane	0.70	1.42	2.6	9
Benzene	0.39	0.31	0.32	9
Toluene	0.43	0.8	0.6	8

Property	Units	Unvulcanized	Refs.	Pure-gum vulcanizate	Refs.
Refractive index	N_D			1.519 (20%)	3
				1.521 (45%)	3
Dielectric constant (10^6 Hz)				5.5 (27%)	3
				4.8 (40%)	3
Dielectric loss factor (10^6 Hz)				35 (27%)	3
				42 (40%)	3

[a] Bound acrylonitrile content (= AN%)).

TABLE 3. POLY(BUTADIENE-*co*-STYRENE) (23.5–25% BOUND STYRENE CONTENT)

Property	Units	Unvulcanized	Refs.	Pure-gum vulcanizate	Refs.
Density	kg/m^3	933	43	980	17
		(932.5–933.5)	43	940–1000	17
Coefficient of expansion	K^{-1} ($\times 10^6$)	660	43	660	17,18,44
Glass transition temperature	°C	−64 to −59	43	−52	21
Specific heat	J/kg/K ($\times 10^3$)	1.89	45	1.83	24
Thermal conductivity	W/m/K ($\times 10^{-3}$)			190–250	46,47
Thermal diffusivity	m^2/s ($\times 10^{-9}$)			90	48
Solubility parameter	$MPa^{1/2}$	17.0	6		
Polymer–solvent interaction parameter (25–30°C)	**Solvent**				
	n-Heptane	0.59	9		
	n-Hexane	0.66	9		
	Dichloromethane	0.47	9		
	Cyclohexane	0.48	9		
	Benzene	0.40	9		
	Toluene	0.31	13		
Heat of combustion	J/kg ($\times 10^6$)	56.5	43		
Refractive index	N_D	1.5345	43		
		(1.534–1.535)	43		
Molar polarizability	cm^3 ($\times 10^{-25}$)				
Dielectric constant (1 kHz)		2.5	33	2.66	33
Dielectric loss factor		0.0009	33	0.0009	33
Electric conductivity	Sm^{-1} ($\times 10^{-15}$)				
Compressibility	Pa^{-1} ($\times 10^{-12}$)	530	49	510	50
Bulk modulus (isothermal)	Pa ($\times 10^6$)	1890	49	1960	49
Young's modulus	Pa ($\times 10^6$)			1.6	21,35
				1.0–2.0	35
Shear modulus	Pa ($\times 10^6$)			0.53	21
				0.3–0.7	35
Shear compliance	Pa^{-1} ($\times 10^{-6}$)			7	21,35
				3–10	21,35
Storage modulus	log Pa	5.82	40	5.88	64
		(5.82–5.85)	40	5.64–6.20	64
Loss modulus	log Pa	4.94	40	4.92	64
		(4.56–4.94)	40	4.73–5.04	64
Loss tangent		0.13	40	0.11	64
		(0.05–0.13)	40		
Tensile strength	MPa			1.4-3.0	19,42
Ultimate elongation	%			400–600	19,42

TABLE 4. POLY(CHLOROPRENE) (CR NEOPRENE)

Property	Units	Unvulcanized	Refs.	Pure-gum vulcanizate	Refs.
Density	kg/m^3	1230	43,51,58	1320	17
Coefficient of expansion	K^{-1} ($\times 10^6$)	600	46,58	610–720	17,58,59
Glass transition temperature	°C	−45	60	−45	21,59,60,61
Specific heat	J/kg/K ($\times 10^3$)	2.2–2.2	46	2.1–2.2	46
Thermal conductivity	W/m/K ($\times 10^{-3}$)	192	58	192	58
Thermal diffusivity	m^2/s	10^{-9}			
Solubility parameter	$MPa^{1/2}$	18.5	6		

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TABLE 4. *cont'd*

Property	Units	Unvulcanized	Refs.	Pure-gum vulcanizate	Refs.
Polymer–solvent interaction parameter (25–30°C)					
	Solvent				
	n-Heptane	0.85	9		
	n-Hexane	0.89	9		
	Dicyclomethane	0.53	9		
	Cyclohexane	0.69	9		
	Benzene	0.26	9		
	Toluene	0.70	13		
Equilibrium melting temperature	K (°C)	328–351 (55–78)	62,63		
Temperature of most rapid crystallization	K (°C)	268 (−5)	65	261 (−12)	65,66
Heat of fusion of crystal	J/kg ($\times 10^3$)	95	63		
Refractive index	N_D	1.558	20		
Dielectric constant				6.5–8.1	33
Dielectric loss factor				0.03/0.86	33
Electric conductivity	Sm^{-1} ($\times 10^{-15}$)			3–1400	33
Compressibility	Pa^{-1} ($\times 10^{-12}$)	480	49,50	440	49,50
Bulk modulus (isothermal)	Pa ($\times 10^6$)	2080	50	2270	50
Young's modulus	Pa ($\times 10^6$)			1.6	21,35
Shear modulus	Pa ($\times 10^6$)			0.52	21
Shear compliance	Pa^{-1} ($\times 10^{-6}$)			2.0	19,21,35
Poisson's ratio				0.49974	38
Storage modulus	log Pa			5.81	57,59
Loss modulus	log Pa			5.04	57,59
Loss tangent				0.17	57,59
Tensile strength	MPa			25–38	19,42
Ultimate elongation	%			800–1000	19,42

TABLE 5. POLY(ISOBUTENE-*co*-ISOPRENE) BUTYL RUBBER (IIR)

Property	Units	Unvulcanized	Refs.	Pure-gum vulcanizate	Refs.
Density	kg/m^{-3}	917	51	933	52
				930–970	17
Coefficient of expansion	K^{-1} ($\times 10^6$)	750	53	560	52,54
Glass transition temperature	°C	−71	53	−63	21
Specific heat	J/kg/K ($\times 10^3$)	1.95	23,24,29	1.85	24
Thermal conductivity	W/m/K ($\times 10^{-3}$)			130	47
Thermal diffusivity	m^2/s ($\times 10^{-9}$)			70	55
Solubility parameter	$MPa^{1/2}$	16.0	6		
Polymer–solvent interaction parameter					
	Solvent				
	n-Heptane	0.48	14		
	n-Hexane	0.52	14		
	Dicyclomethane	0.58	14		
	Cyclohexane	0.44	14		
	Benzene	0.66	14		
	Toluene	0.56	14		
Equilibrium melting temperature	K (°C)	275 (1.5)	53		
Temperature of most rapid crystallization	K (°C)	239 (−34)	53		
Refractive index	N_D	1.5081	43		
Dielectric constant (1 kHz)		2.38	33	2.42	33
Dielectric loss factor		0.003	33	0.0054	33

TABLE 5. *cont'd*

Property	Units	Unvulcanized	Refs.	Pure-gum vulcanizate	Refs.
Compressibility	Pa^{-1} ($\times 10^{12}$)			508	54
Bulk modulus (isothermal)	Pa ($\times 10^6$)			1970	54
Young's modulus	Pa ($\times 10^6$)			1.0	21,35
Shear modulus	Pa ($\times 10^6$)			0.33	21,35
				0.2–0.5	19,21,35
Shear compliance	Pa^{-1} ($\times 10^{-6}$)			3.1	21
Strage modulus	log Pa	6.50	56	5.64	57
Loss modulus	log Pa	5.98	56	5.48	57
Loss tangent		0.3	56	0.7	57
Tensile strength	MPa			18–21	19,42
Ultimate elongation	%			750–950	19,42

TABLE 6. POLYISOPRENE, NATURAL RUBBER

Property	Units	Unvulcanized	Refs.	Pure-gum vulcanizate	Refs.
Density	kg/m^3	913	16	970	17,18
		906–916	16	(920–1000)	19
Coefficient of expansion	K^{-1} ($\times 10^6$)	670	16	660	16
Glass transition temperature	°C	−72	20	−63	21
		(−74 to −69)	20	(−72 to −61)	21
Specific heat	J/kg/K ($\times 10^3$)	1.905	22,23	1.828	24
Thermal conductivity	W/m/K ($\times 10^{-3}$)	134	16	153	25,26
Thermal diffusivity	m^2/s ($\times 10$)			70	27
Solubility parameter	$MPa^{1/2}$	1.7	6		
Polymer–Solvent interaction parameter (25–30°C)	**Solvent**				
	n-Heptane	0.43	9		
	n-Hexane	0.47	9		
	Dichloromethane	0.40	9		
	Cyclohexane	0.53	9		
	Benzene	0.44	9		
	Toluene	0.39	9		
Equilibrium melting temperature	K (°C)	308.6 (35.5)	28	313(40)	29
Temperature of most rapid crystallization	K (°C)	248 (−25)	30		
Heat of fusion of crystal	J/kg ($\times 10^3$)	67.3	31		
Heat of combustion	J/kg ($\times 10^6$)	45.2	16	44.4	16
Refractive index	$N_D K^{-1}$	1.5191(25°C)	32	1.5264	16
Molar polarizability	cm^3 ($\times 10^{-25}$)				
Dielectric constant (1 kHz)		2.37–2.45	16,33	2.68	33
Dielectric loss factor (1 kHz)		0.001–0.003	33	0.002–0.04	33
Electric conductivity	Sm^{-1} ($\times 10^{-15}$)	2.57	16,33	2–100	16,33
Compressibility	Pa^{-1} ($\times 10^{-12}$)	515	34	514	34
Bulk modulus (isothermal)	Pa ($\times 10^6$)	1940	34	1950	34
Young's modulus	Pa ($\times 10^6$)			1.3	35,36
				(1.0–2.0)	19,35
Shear modulus	Pa ($\times 10^6$)			0.43	21,36
				0.3–0.7	21,37
Shear compliance	Pa^{-1} ($\times 10^{-6}$)			2.3	21,36
				(1.5–3.5)	21,37
Poisson's ratio				0.49989	34,38,39
Storage modulus	log Pa	5.61	40	5.61	41
		5.53–5.75		5.49–5.78	
Loss modulus	log Pa	4.46	40	3.80	41
		(4.43–4.65)		3.72–4.48	

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TABLE 6. *cont'd*

Property	Units	Unvulcanized	Refs.	Pure-gum vulcanizate	Refs.
Loss tangent		0.09	40	0.016	41
		0.07–0.13		0.01–0.05	
Tensile strength	MPa			17–25	19,42
Ultimate elongation	%			750–850	19,42

TABLE 7. ETHYLENE–PROPYLENE–DIENE–TERPOLYMER (EPDM)

Property	Units	Unvulcanized	Refs.	Pure-gum vulcanizate	Refs.
Density	kg/m^3			0.85	3
Glass transition temperature	°C			−60 to −69	1
Specific heat	J/kg/K ($\times 10^3$)			2340	3
Thermal conductivity	W/m/K ($\times 10^{-3}$)				
Thermal diffusivity	m^2/s ($\times 10^{-9}$)				
Solubility parameter	$MPa^{1/2}$	16.0–16.5	6		
Polymer–Solvent interaction parameter (25–30°C)					
	Solvent				
	n-Heptane	0.44	15		
	n-Hexane	0.49	16		
	Dichloromethane	0.32	16		
	Cyclohexane	0.35	15		
	Benzene	0.58	15		
	Toluene	0.49	15		
Refractive index	N_D			1.48	3
Young's modulus	Pa ($\times 10^6$)			2.0	13
Shear modulus	Pa ($\times 10^6$)			1.59	13
Storage modulus (1 Hz)	MPa			1.59	13
Loss modulus (1 Hz)	MPa			0.12	13
Loss tangent (1 Hz)				0.077	13

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SECTION VI

SOLID STATE PROPERTIES

Crystallographic Data and Melting Points for Various Polymers

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A. INTRODUCTION

These tables contain data for approximately 2700 polymers. In general, the format and organization of the tables follows that used in the 2nd edition of the "Polymer Handbook" (Section B: Crystallographic Data; Section C: Melting Points; Section D: Formula Index and Section E: References). The Formula Index is included as an aid to the searcher: it permits one to determine the polymer name used in these tables from the structural line formula for the polymer of interest.

To avoid the duplication of data for polymers appearing in both the Crystallographic Data and Melting Point tables, the entry in the Melting Point table has been flagged with an asterisk (*).

1. Nomenclature

Contrary to the rest of the *Polymer Handbook,* the ACS-IUPAC nomenclature proposals (1,2) for naming regular single-strand organic polymers have not been adopted for these tables. Basically, the nomenclature used in this portion of the *Polymer Handbook* is that of the 1st and 2nd editions and of the 1967 recommendations of the IUPAC Nomenclature Committee (3). The majority of polymers were named as the bivalent radical(s) comprising the constitutional repeating unit (CRU), with priority in naming given to (a) incorporation of important structural features (amide, ester, oxide, etc.) and (b) emphasis on symmetry of the CRU (when present). As in the past, many common polymers (poly(styrene), poly(vinyl chloride), etc.) were named according to source names.

In the majority of cases, the polymer was named according to its structure, particularly when the CRU was composed of two or more subunits following each other in a regular fashion. An example is poly(ethylene terephthalate). With more complicated structures, the CRU was divided into its possible subunits, each of which was treated as a bivalent radical and so named. One of the subunits was treated as the parent compound, for example, the "terephthalic acid" of the above example. For poly(amides) and poly(esters), the acid was chosen as the parent compound; for poly(urethanes) it was the isocyanate.

Whenever the CRU (or a portion thereof) exhibited a center of symmetry, naming began with the central subunit using Chemical Abstracts/IUPAC names for the constituent bivalent radicals (see under examples). Conjunctive names were used as needed in constructing names. For symmetrical units, this process of naming could be continued indefinitely.

Unsymmetrical bivalent units were named with replacement nomenclature, or from end to end, depending upon the complexity of the bivalent radical and the ease of naming by the alternative choices. Replacement nomenclature was used, for example, to name poly(hexamethylene 6-oxaheptadecanediamide). The polymer from the symmetrical oxyacid would be named poly(hexamethylene oxydicaprylamide).

More complicated structures without symmetry were named end to end. This method was particularly appropriate for the poly(oxides) of the form $-(R-O-R'-O)_n$ (and for the analogous sulfides, sulfones, ureas, and anhydrides) and for the poly(ω-amino acids) and for the poly (ω-hydroxy acids). The constitutional hydrocarbon subunits were ordered alphabetically in naming the polymer as, for example, in poly(methyleneoxy pentamethylene oxide).

For silicon-containing polymers, bivalent radical names replaced the source-based silane/siloxane names. For example, the source-named polymer, poly[(tetramethylsilphenylene) siloxane], appears in these tables as poly(*p*-phenylene tetramethyldisiloxanylene).

For the regular polymers of multipeptides, a cyclic permutation of the individual peptide residues in the constitutional base unit was performed to permit alphabetical ordering without loss of directional or sequential sense. Thus, poly(alanylglycyl-proline) is the name given to polymers prepared form (ala-gly-pro), (gly-pro-ala), and (pro-ala-gly), but not from (ala-pro-gly) or from either of its cyclic permutations.

2. Examples of Polymer Names

2.1. Polymer Names Based on Source

Olefin, Vinyl, and Acyclic Polymers

$[-CH_2-CH_2-]_n$	Poly(ethylene)
$[-CH(CH_2-CH_3)-CH_2-]_n$	Poly(1-butene)
$[-CH(CN)-CH_2-]_n$	Poly(acrylonitrile)
$[-CH(Cl)-CH_2-]_n$	Poly(vinyl chloride)
$[-CH(COOCH_3)-CH_2-]_n$	Poly(methyl acrylate)

Poly(amides)[1]

$[-NH-CH_2-COO-]_n$	Poly(glycine)
$[-NH-(CH_2)_2-COO-]_n$	Poly(3-aminopropionic acid) (poly(β-alanine))
$[-NH-(CH_2)_3-COO-]_n$	Poly(4-aminobuyric acid)
$[-NH-(CH_2)_4-COO-]_n$	Poly(5-aminovaleric acid)
$[-NH-(CH_2)_5-COO-]_n$	Poly(6-aminocaproic acid)
$[-NH-(CH_2)_6-COO-]_n$	Poly(7-aminoenanthic acid)
$[-NH-(CH_2)_7-COO-]_n$	Poly(8-aminocaprylic acid)
$[-NH-(CH_2)_8-COO-]_n$	Poly(9-aminopelargonic acid)
$[-NH-(CH_2)_9-COO-]_n$	Poly(10-aminocapric acid)
$[-NH-(CH_2)_{10}-COO-]_n$	Poly(11-aminoundecanoic acid)
$[-NH-(CH_2)_{11}-COO-]_n$	Poly(12-aminolauric acid)

Poly(oxides)

$[-CH_2-O-]_n$	Poly(oxymethylene)
$[-CHO-]_n$ (CH_3)	Poly(acetaldehyde)

[1] Poly(esters) are treated similarly.

$[-CH_2-CH_2-O-]_n$	Poly(ethylene oxide)
$[-CH(CH_3)-CH_2-O-]_n$	Poly(propylene oxide)
$[-CH_2-CH_2-CH_2-O-]_n$	Poly(trimethylene oxide)

2.2. Polymer Names Based on Structure

(a) Linking Radicals

$-CH_2-CH_2-$	Ethylene
$-CH_2-CH_2-CH_2-$	Trimethylene
$-CH_2-CH_2-O-CH_2-CH_2-$	Oxydiethylene
$-CH_2-CH_2-O-CH_2-CH_2-O-CH_2-CH_2-$	Ethylenedioxy-diethylene
$-CH_2-CH_2-S(=O)_2-CH_2-CH_2-$	Sulfonyldiethylene
$-CH_2-CH_2-CH_2-P(CH_3)-CH_2-CH_2-CH_2-$	methylphosphinidene-ditrimethylene
$-CH_2-CH_2-C_6H_4-CH_2-CH_2-$	*p*-Phenylenediethylene
$-CH_2-CH_2-C_6H_4-C_6H_4-CH_2-CH_2-$	4,4′-Biphenylenediethylene
$-C_6H_4-CH_2-C_6H_4-$	4,4′-Methylenediphenylene
$-C_6H_4-CH(CH_3)-C_6H_4-$	4,4′-Ethylidenediphenylene
$-C_6H_4-C(CH_3)_2-C_6H_4-$	4,4′-Isopropylidenediphenylene
$-C_6H_4-CH((CH_2)_2-CH_3)-C_6H_4-$	4,4′-Butylidenediphenylene
$-C_6H_4-C(CH_3)(CH_2-CH_3)-C_6H_4-$	4,4′-(2,2-Butylidene)diphenylene
$-C_6H_4-O-C_6H_4-$	4,4′-Oxydiphenylene
$-C_6H_4-S(=O)_2-C_6H_4-$	4,4′-Sulfonyldiphenylene

(b) Parent Compounds

$-OOC-COO-(-NHOC-CONH-)$	Oxalate (oxamide)
$-OOC-CH_2-COO-$	Malonate (malonamide)
$-OOC-(CH_2)_2-COO-$	Succinate (succinamide)
$-OOC-(CH_3)_3-COO-$	Glutarate (glutaramide)

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$-OOC-(CH_2)_4-COO-$	Adipate (adipamide)
$-OOC-(CH_2)_5-COO-$	Pimelate (pimelamide)
$-OOC-(CH_2)_6-COO-$	Suberate (suberamide)
$-OOC-(CH_2)_7-COO-$	Azelaate (azelaamide)
$-OOC-(CH_2)_8-COO-$	Sebacate (sebacamide)
$-OOC-(CH_2)_9-COO-$	Nonanedioate (nonanediamide)
$-OOC-CH_2-CH_2-O-CH_2-CH_2-COO-$	Oxydipropionate
	p-Phenylene diacetate
	p-Phenylenedipropionate
	4,4′-Dibenzoate
	4,4′-Methylenedibenzoate
	4,4′-Oxydibenzoate
	4,4′-Sulfonyldibenzoate
	4,4′-Oxydiphenylenediacetate
	4,4′-(Ethylenedioxy)dibenzoate
	p-(Phenylenedioxy)diacetate
	(*p*-Carboxyphenoxy)acetate
	1,4-Piperazinediacetate

(c) Polymer Names

Poly(esters)[2]

	Poly(ethylene terephthalate)
	Poly(ethylene 4,4′-dibenzoate)
	Poly(ethylene *p*-phenylenediacetate)
	Poly(ethylene 4,4′-isopropylidenedibenzoate)
	Poly(ethylene 4,4′-sulfonyldibenzoate)

Poly(urethanes)

	Poly(trimethylene ethylene-urethane)

[2] Poly(amides) are treated similarly.

Poly(oxides), Poly(sulfides), Poly(amines)

$[-(CH_2)_2-O-(CH_2)_3-]_n$	Poly(ethylene trimethylene oxide)
$[-(CH_2)_2-S-(CH_2)_3-]_n$	Poly(ethylene trimethylene sulfide)
$[-(CH_2)_2-NH-(CH_2)_3-]_n$	Poly(ethylene trimethylene amine)

REFERENCES FOR INTRODUCTION

1. ACS Structure-based Nomenclature for Linear Polymers, Macromolecules, **1**, 193 (1968).
2. IUPAC Appendices on Tentative Nomenclature, Symbols, Units, and Standards – Number 29, Nomenclature of Regular Single-strand Organic Polymers, November 1972 – Macromolecules, **6**, 149 (1973).
3. 1967 IUPAC Report on Nomenclature, J. Polym. Sci. B, **6**, 257 (1968).

B. CRYSTALLOGRAPHIC DATA FOR VARIOUS POLYMERS

The following table presents crystallographic data for about 750 polymers (and for their many polymorphs) grouped, according to the generic structure of the constitutional base unit, into poly(olefins), poly(vinyls) and poly(vinylidenes), poly(aromatics) and poly(imides), poly(dienes) and poly(diynes), poly(peptides), poly(amides), poly(esters), poly(urethanes) and poly(ureas), poly(ethers), poly(oxides), poly(sulfides) and poly(sulfones), poly(saccharides), and other polymers. Where a polymer might be included in more than one group the following group definitions were used:

1. *Poly(olefins):* those olefin polymers not containing aromatic rings; all substituted derivatives of these, excluding the vinyl and vinylidene polymers. For example, poly(ethylene), poly(tetrafluoroethylene), and poly(cyclopentene), but not poly(styrene) or poly(vinyl chloride).
2. *Poly(vinyls) and Poly(vinylidenes):* those vinyl and vinylidene polymers containing atoms other than carbon and hydrogen, excepting the poly(ethers). Thus, poly(vinyl chloride) but not poly(methylvinyl ether).
3. *Poly(aromatics) and Poly(imides):* those hydrocarbon polymers containing aromatic rings, including heterocyclic ones. Thus, poly(styrene), poly(*p*-xylylene), and poly(*p*-phenylene pyromellitimide).
4. *Poly(peptides):* those polymers whose basic structure, ignoring substituents, is poly(2-aminoacetic acid), that is, poly(glycine). This group contains mainly the synthetic poly(α-amino acids).
5. *Poly(amides):* all amide polymers except the poly(α-amino acids), which are separately grouped under poly(peptides).
6. The remaining categories contain polymers according to functional groups as, for example, the poly(esters). Poly(ethers) and poly(oxides) are differentiated according to whether the ether linkage is in the side-group or in the chain backbone, respectively. For example, poly(1-butoxy-2-chloroethylene) is a poly(ether) and poly(oxymethylene) is a poly(oxide).
7. Those polymers not otherwise categorized, such as the poly(phosphazenes) and the poly(siloxanes), are grouped in the "other" category.

Within each group, polymers are listed alphabetically according to the basic structure, ignoring substituents (excepting the polypeptides, all of which have the same base structure). Substituted polymers are listed alphabetically according to the substituent under the entry for the unsubstituted polymer. Thus, poly(tetrafluoroethylene) and poly(4-methyl-1-pentene) appear, respectively, under poly(ethylene) and poly(1-pentene).

Included as part of the polymer name column is the molecular weight of the chemical repeat unit of the chain, that is, of the constitutional base unit. This is given in parentheses just below the polymer name. The values reported are in grams per mole.

Unless otherwise indicated, the reference cited in the last column applies to all of the data in that line of the tables. Where an entry in a line has been taken from a source different from that listed in the reference column, a *solidus* (/) separates the value of the entry from the reference citation. For example, one value of the melting point of poly(1-butene) is given as "126/12" which is to be read as "126°C according to Ref. 12".

The crystal system, where known, is given in column 2 of the table, using the abbreviations given later. The next column contains the space group symbol (the Schoenflies notation is used because of the limitations of common printers at mainframe installations) with the subscript portion of the symbol preceding the superscript portion. Thus, according to Ref. 14, the poly(ethylene) unit cell is orthorhombic (Ortho) with space group D_{2h}^{16} (D2h-16). For a fuller discussion of space group symbols, see "International Tables for X-Ray Crystallography", Vol. I, Kynoch Press, Birmingham, England, 1952.

The dimensions of the unit cell (a, b, c) are given next, in Angstroms (1 Å = 0.1 nm). c is the fiber axis. Unless otherwise indicated, the unit cell angles are all 90°. Where only one angle differs from 90°, its value is given. When all three angles differ from 90°, their values are listed in the order α, β, γ. The next column contains the number of constitutional base units in the unit cell described.

Columns 9 and 10 contain the densities of the completely crystalline and of the completely amorphous polymer, respectively. The values given, normally appro-

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priate to room temperature, are in grams per cubic centimeter ($1\ g/cm^3 = 10^3\ kg/m^3$). For uniformity crystallographic densities (column 9) have been recalculated on the basis of the 1969 IUPAC atomic weight values. Melting points in degrees Celsius and heats of fusion in kilojoules per mole are listed in the next two columns. The heats of fusion correspond to the amount of substance represented by the molecular weight associated with each polymer name.

Column 13 of the tables indicate briefly the conformation of the polymer chain in the crystal (in a helical notation) either as reported in the reference cited or as inferred from the value of the fiber axis. The designation $n*p/q$ specifies the number (n) of skeletal atoms in the asymmetric unit of the chain and the number of such asymmetric units (p) per q turns of the helix in the crystallographic repeat. Thus, poly(ethylene), as listed, has two carbon atoms in the backbone with one such unit per turn in the repeat – it is designated as a $2*1/1$ helix. Alternatively, poly(ethylene) considered a poly(methylene) would be designated as a $1*2/1$ helix – an entirely equivalent description of the conformation. Note that n may differ from the number of chain atoms in the constitutional base unit. On the one hand, isotactic poly(propene) has two skeletal atoms in the asymmetric unit and three units per turn ($2*3/1$). On the other hand, syndiotactic poly(propene) with the same constitutional base unit as isotactic poly(propene) has four skeletal atoms in the asymmetric unit and two units per turn ($4*2/1$). In this case, n signifies the number of skeletal atoms in the stereobase unit. A fuller discussion of this helical notation is given in Hughes and Lauer, J. Chem. Phys., **30**, 1165 (1959) and in Nagai and Kobayashi, J. Chem. Phys., **36**, 1268 (1961).

This list of polymers and data is not considered to be exhaustive. The compiler expands it as new information is unearthed and he is quite receptive to notification of omissions and/or corrections and to submission of unpublished data. All of the data in this table cannot be considered to have the same validity – the number of polymers for which detailed, accurate, and reliable crystal structure analyses have been conducted is still quite limited. The reader may find it desirable to refer to the original literature cited so as to gain a fuller appreciation of the reasons for apparent discrepancies within the tables.

The following abbrevaitions have been used in the tables.

Tri	Triclinic
Mono	Monoclinic
Ortho	Orthorhombic
Tet	Tetragonal
Rho	Rhombohedral (trigonal)
Hex	Hexagonal
P	Pseudo
Phex	Pseudohexagonal

TABLE 1. POLY(OLEFINS) (–HCH–CHR–)

Polymer	Cryst syst.	Space group	Unit cell parameters				z	Density (g/cm³)		Melting point (°C)[a]	Heat of fusion kJ/mol[a]	Chain conform. ($n*p/q$)	Refs.
			a	b	c	Angles		Crystal.	Amorph.[a]				
Poly(acetylene)													
trans-													
I.	Phex		4.2	4.2	2.43		1	1.16				2*1/1	69
(26.04)	Mono		4.26	7.33	2.46	$\beta = 91.4$	2	1.126				2*1/1	982
	Ortho	D2h-16	7.32	4.24	2.46		2	1.33				2*1/1	981
	Ortho		7.37	4.065	2.45		2	1.178				2*1/1	979
	Ortho		5.62	4.92	2.592		2	1.207				2*1/1	980
	Mono	C2h-5	4.24	7.32	2.46	$\beta = 91.5$	2	1.133				2*1/1	1213
	Port	C2h-5	7.41	4.08	2.48		2	1.153				2*1/1	1228
	Ortho		3.99	7.29	2.51		2	1.184				2*1/1	1229
	Ortho		7.20	4.15	2.44		2	1.186				2*1/1	1281
	Ortho		7.31	4.06	2.45		2	1.189				2*1/1	1282
	Ortho		7.26	4.24	2.47		2	1.137				2*1/1	1283
			7.46	4.08	2.46		2	1.155				2*1/1	1323
			7.38	4.09	2.457		2	1.166				2*1/1	1324
	Ortho	D2h-16	7.330	4.090	2.457		2	1.174				2*1/1	1369
II.	Mono		3.73	3.73	2.44	$\gamma = 98$	1	1.286				2*1/1	980
cis-transoid													
	Ortho	D2h-16	7.61	4.39	4.47[b]		4	1.158				2*2/1	945
	Ortho		7.74	4.32	4.47		4	1.157				2*2/1	976
	Ortho	D2h-16	7.68	4.46	4.38		4	1.153				2*2/1	978
	Ortho		7.45	4.30	4.40[b]		4	1.227				2*2/1	1229
	Ortho		7.62	4.46	4.38		4	1.162				2*2/1	1282
			7.61	4.39	4.36[b]		4	1.187				2*2/1	1323
			7.66	4.42	4.384		4	1.165				2*2/1	1324
	Orhto	D2h-16	7.62	4.44	4.384		4	1.166				2*2/1	1369
cis-cisoid													
	Hex		5.12	5.12	4.84		3	1.180				2*3/1	977

TABLE 1. *cont'd*

Polymer	Cryst syst.	Space group	Unit cell parameters a	b	c	Angles	z	Density (g/cm³) Crystal.	Amorph.[a]	Melting point (°C)[a]	Heat of fusion kJ/mol[a]	Chain conform. (n*p/q)	Refs.
–, difluoro-													
trans-													
(62.02)	Ortho		7.58	4.29	2.48		2	2.554				2*1/1	1385
cis-													
	Ortho		8.03	4.47	4.64		4	2.473				2*2/1	1385
–, complex with:													
alkali metals													
Cs													
I.	Tet		9.09	9.09									1230
K													
I.	Tet		8.46	8.46									1230
II.	Ortho		5.94	16.37									1231
Na													
I.	Tet		8.5	8.5									1230
Rb													
I.	Tet		8.75	8.75									1230
II.	Ortho		6.16	16.68									1231
SbF_6													
	Mono		8.66	7.36	2.4	$\gamma = 101$							1261
and	Hex		9.8	9.8	5.4								1261
Poly(allene)													
I. (40.06)	Ortho	D2h-6	8.20	7.81	3.88		4	1.071		122/536		2*2/1	497
II.	Mono	C2-2 or C2h-2	6.37	5.12	3.88[b]	$\gamma = 96.6$	2	1.058				2*2/1	497
III.					3.88							2*2/1	497
–, tetrafluoro-													
(112.03)	Tet	C4-2 or D4-3	6.88	6.88	15.4		8	2.042		126		2*8/1	38
Poly(allylbenzene), see Poly(propene) 3-phenyl-													
Poly(1-butene)													
isotactic													
I.	Rho	D3d-6	17.7	17.7	6.50		18	0.951		126/12	13.9/82	2*3/1	35
(56.11)	Hex		17.3	17.3	6.7		18	0.96	0.87	132/250	6.07/277	2*3/1	45
	Rho		17.70	17.70	6.51		18	0.950		133	7.57	2*3/1	1284
								0.950	0.868	136/277	8.0/1285		252
								0.95		139	7.01		983
								0.95/12	0.860	135/320	6.92/320		391
											138/380		
											142/984		
											142/313		
II.	Tet	S4-1	15.42	15.42	21.05		44	0.819		130/380	4.06/320	2*11/3	866
	Tet	S4-1	14.89	14.89	20.87		44	0.886		124/277	6.28/277	2*11/3	207
	Tet		14.85	18.85	20.6		44	0.902		126/313	6.9/1285	2*11/3	350
	Tet		14.91	14.91	20.76		44	0.888		120	8.16	2*11/3	1284
	Tet	D2d-7	14.5	14.5	21.1		44			122/320		*40//11	914
									0.868				1195
III.	Ortho		12.49	8.96	(7.6)		8	(0.876)		106/277	6.49/277	2*4/1	207
	Ortho	D2-4	12.38	8.88	7.56		8	0.897		110/984		2*4/1	876
			12.38	8.92	7.45		8	0.906				2*4/1	531
					7.6								461
syndiotactic													
I.	Ortho	D2-5	16.9	6.05	7.78		8	0.937		45		4*2/1	1435
	Ortho	D2-5	16.81	6.06	7.73		8	0.946				4*2/1	1449
II.	Mono	C2-2	9.94	13.9	20.4		22	0.964?				4*5/3	1435
					20.0								1449
–, 3-methyl-													
(70.14)	Mono		9.55	8.54	6.84	$\gamma = 116.5$	4	0.933		300/48	17.3/82	2*4/1	9
	Mono	C2h-5	9.55	17.08	6.84	$\gamma = 116.5$	8	0.933		306/632		2*4/1	549
	Mono		19.1	17.8	6.85	$\gamma = 116$	16	0.890		310/90		2*4/1	231
	Port		19.25	17.20	6.85	$\gamma = 116.5$	16	0.918		300/282		2*4/1	355
	Tet	C4v-12	34.3	34.3	6.85		64	0.925				2*4/1	431
	Mono		19.25	17.20	6.63	$\gamma = 116.5$	16	0.948				2*4/1	280

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TABLE 1. *cont'd*

Polymer	Cryst syst.	Space group	Unit cell parameters *a*	*b*	*c*	Angles	*z*	Density (g/cm³) Crystal.	Amorph.[a]	Melting point (°C)[a]	Heat of fusion kJ/mol[a]	Chain conform. (*n*∗*p*/*q*)	Refs.
–, 3-methyl- [1,3-via hydride shift]													
(70.14)			5.4		7.8					55			332
										68/319			
–, 4-phenyl-													
(132.21)	Port	CS-2	10.4	18.0	6.61		6	1.064	0.962	158	4.6	2∗3/1	483
					6.55					160/90		2∗3/1	67
									1.041	159/282	4.36		1195
										168/187			
–, 4-trimethylsilyl-													
(128.29)	Ortho		10.97	20.02	6.46		6	0.901		206		2∗3/1	772
Poly(2-butene-*alt*-ethylene)													
(84.16)	Mono	C2h-5	10.92	7.73	9.10	$\alpha = 130$	4	0.950	0.87	135		4∗2/1	324
Poly(chlorotrifluoroethylene-*alt*-ethylene)													
(144.52)	Hex		9.86	9.86	5.02		3	1.703		262	18.8	4∗1/1	635
					5					264	13.30		637
Poly(1,3-cyclobutylene)													
–, 1-cyano-													
(79.10)					25.3					370		3∗8/	847
Poly(1,2-cycloheptylene-*alt*-ethylene)													
(124.23)					9.0					74		9∗1/1	259
Poly(1,2-cyclopentylene-*alt*-ethylene)													
(96.17)	Ortho		8.76	7.83	9.02		4	1.032				4∗2/1	247
	Ortho	D2h-17 or D2h-14	8.76	8.05	9.00		4	1.006		185		4∗2/1	412
Poly(1,3-cyclopentylene-*alt*-methylene)													
(82.15)	Ortho		7.69	6.21	4.80		2	1.190		146		4∗1/1	267
	Ortho		13.30	15.52	4.80		8	1.101		128		4∗1/1	340
Poly(decenamer)													
trans-													
III.	Tri	Ci-1	4.40	5.39	12.30	66,104,118	1	0.985				10∗1/1	477
(138.25)													
IV.	Mono	C2h-5	7.42	5.00	12.40	$\beta = 94.2$	2	1.001		80/562	32.9/562	10∗1/1	530
Poly(1-decene)													
I. (140.27)					13.2					34/250		2∗	150
										40/537			
Poly(1-docosene)													
I. (308.59)	Ortho		7.5	88	6.7		8	0.93		90		2∗4/1	949
										91/872			
II.	Mono		5.3	108	7.7	$\beta = 94$	8	0.93		83		2∗4/1	949
III.										75/949		2∗	
Poly(dodecenamer)													
trans-													
III.	Tri	Ci-1	4.40	5.39	14.78	66,104,118	1	0.986				12∗1/1	477
(166.31)													
IV.	Mono	C2h-5	7.43	5.00	14.85	$\beta = 93.5$	2	1.003		80/439	41.2/562	12∗1/1	530
										84/562			
Poly(1-dodecene)													
I. (168.32)					13.2					45/48		2∗	150
										49/872			
										49/250			
Poly(ethylene)													
I. (28.05)	Ortho	D2h-16	7.40	4.93	2.534		2	1.008		137/85	8.03/85	2∗1/1	14
	Ortho		7.428	4.934	2.532		2	1.004		142/315	8.12/262	2∗1/1	892
	Ortho		7.36	4.94	2.534		2	1.011		141/206	7.70/86	2∗1/1	15
	Ortho		7.418	4.946	2.546		2	0.997		145/351	8.67/700	2∗1/1	535
	Ortho		7.406	4.939	2.547		2	1.000		141/286	7.79/156	2∗1/1	311
	Ortho	D2h-16	7.407	4.949	2.551		2	0.9961				2∗1/1	1421
									0.855	146/362	7.62/343		138
								0.999	0.887		8.37/260		363
								0.991	0.811				406
								1.003	0.852	141	8.2		939
single crystal	Tri		7.84	5.56	120	63,71,82	96	1.004				2∗1/1	72
II.	Pmono		4.05	4.85	2.54	$\gamma = 105$	1	0.966				2∗1/1	58

TABLE 1. *cont'd*

Polymer	Cryst syst.	Space group	Unit cell parameters *a*	*b*	*c*	Angles	*z*	Density (g/cm³) Crystal.	Amorph.[a]	Melting point (°C)[a]	Heat of fusion kJ/mol[a]	Chain conform. ($n*p/q$)	Refs.
	Pmono		7.11	5.46	2.534	$\gamma = 96.5$	2	0.953				2*1/1	557
	Mono	C2h-3	8.09	4.79	2.53[b]	$\gamma = 107.9$	2	0.998				2*1/1	253
	Tri		4.285	4.820	2.54	90,110,108	1	1.002				2*1/1	254
III.	Ortho		8.46	4.88	2.45		2	0.920				2*1/1	792
(hi press.)	Tet		4.26	4.26	8.52		4	1.20				2*4/1	946
–, chlorotrifluoro-													
(116.47)	Hex		6.34	6.34	35		14	2.222	2.08/49	220/49	5.02/88	2*14/1	208
	Hex		6.5	6.5	35		14	2.11		210/46		2*14/1	21
	Hex		6.438	6.438	41.5	Approx.	17	2.18		222/341			777
	Hex		6.385	6.385	42		17	2.217				2*17/	296
	Hex		6.4	6.4	42.5		17	2.18				2*17/1	629
					43		16					2*16/1	205
								2.19/49	1.925				139
								2.192	2.032	215			116
–, ethylsilyl-													
isotactic	Hex	C3I-2	21.60	21.60	6.50		18	0.981				2*3/1	489
(86.21)													
–, tetrafluoro-													
II. (50.01)	Phex		5.54	5.54	16.8	$\gamma = 119.5$	13	2.406	2.0/1195	327/46	3.4/1195	1*13/1	11
	Tri		4.882	4.875	5.105	90,87,87	4	2.744				1*4/	266
	Tri		5.59	5.59	16.88	$\gamma' = 119.3$	13	2.347				1*13/6	209
	Mono	C2-2	5.59	9.76	16.88	$\beta = 90$	26	2.344				1*13/	602
			9.649	5.648	1.3**	γ	2	2.344				Irreg	987
	Phex		5.61	5.61		$\gamma = 119.3$						1*13/6	1286
	Tri		9.52	5.59	17.06	88,90,92	26	2.381				1*13/1	1321
I and IV.	Hex		5.61	5.61	16.8		13	2.358		330	2.87/91	1*13/1	11
(>20°C)	Hex		5.66	5.66	19.50		15	2.302		330/101	4.10/989	1*15/7	209
	Hex		5.65	5.65	19.54		15	2.306	2.060	346	4.64	1*15/	988
	Hex		5.67	5.67						332/89		1*15/7	1286
								2.304		334/1357			66
III.	Mono	C2h-3	9.50	5.05	2.62	$\gamma = 105.5$	4	2.742				1*2/1	681
(hi press.)	Ortho	D2h-16	8.73	5.69	2.62		4	2.552				1*2/1	857
	Ortho	D2h-16	8.53	5.72	2.62		4	2.598				1*2/1	986
–, trifluoro-													
(82.02)	Hex		5.59	5.59	2.50		1	2.013		222/726	5.4/726	2*1/1	389
	Hex		5.63	5.63	6.75		3	2.205		213/985	5.44/985	2*3/1	854
	Hex		5.61	5.61									1192
Poly(ethylene), complexes with:													
–, perhydrotriphenylene													
	Hex	C6-6 or C6h-2	14.34	14.34	4.78		2	1.071		181		4*1/1	1124
–, urea													
	Hex		8.22	8.22	11.02								992
(at 83 K)	Ortho		8.30	13.81	11.00								993
Poly(ethylidene)													
(28.05)	Ortho		12.38	6.28	2.5		4	0.958		100/617		1*2/1	178
										195/619			
										200/618			
Poly(heptenamer)													
trans-													
I.	Ortho	D2h-16 or C2v-9	7.40	5.00	17.10		4	1.010		51/439		7*2/1	97
(96.17)													
Poly(1-heptene)													
I. (98.19)					6.45					17/250		2*3/1	150
												2*3/1	359
–, 5-methyl-													
(112.22)					6.40					52/129		2*3/1	67
(S)	Mono	C2-2	18.40	10.62	6.36	$\beta = 90$	6	0.900				2*3/1	685
(S), (R)	Tet	S4-1	20.00	20.00	38.76		76	0.913				2*19/6	685
Poly(1-hexadecene)													
II. (224.43)	Ortho		7.5	63.2	6.6		8	0.95		68/250		2*4/1	150
Poly(hexafluoroisobutylene-*alt*-vinylidene fluoride)													
(228.08)	Ortho	C2v-21	10.64	18.37	7.83		8	1.980		327		4*2/1	947

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TABLE 1. *cont'd*

Polymer	Cryst syst.	Space group	Unit cell parameters *a*	*b*	*c*	Angles	*z*	Density (g/cm³) Crystal.	Amorph.[a]	Melting point (°C)[a]	Heat of fusion kJ/mol[a]	Chain conform. ($n*p/q$)	Refs.
Poly(1-hexene)													
(84.16)	Mono		22.2	8.89	13.7	$\gamma = 94.5$	14	0.726		−55/48		2*7/2	150
	Ortho		11.7	26.9	13.7		28	0.908				2*7/2	150
–, 4-methyl-													
(98.19)	Tet		19.64	19.64	14.00		28	0.845		200/9		2*7/2	67
	Tet	C1-1	19.85	19.85	13.50		28	0.858		190/632		2*7/1	569
–, 5-methyl-													
(98.19)	Hex		10.2	10.2	6.50		3	0.835		130		2*3/1	9
	Mono	C2-2	17.62	10.17	6.33	$\beta = 90$	6	0.862		110/282		2*3/1	685
Poly(isobutene)													
(56.11)	Ortho	D2-4	6.94	11.96	18.63		16	0.964	0.915	44/66	12.0/82	2*8/5	34
	Ortho	D2-4	6.88	11.91	18.60		16	0.978	0.912/53			2*8/3	801
									0.842				139
Poly(norbornene), see Poly(1-vinylene-3-methylene)													
Poly(1-octadecene)													
II. (252.49)	Ortho		7.5	70.4	6.6		8	0.96		80/6		2*4/1	150
										100/90			
III.	Hex		4.24	4.24								2*	493
Poly(octamethylene)													
–, 1-methyl-													
(126.24)										−5	10.9	8*	639
Poly(octenamer)													
trans-													
III.					9.78					67/439	20.1/284		126
(110.20)	Tri	Ci-1	4.34	5.41	9.78	64,105,119	1	1.008		73/284		8*1/1	476
									0.867	76	25.3		1377
IV.	Mono	C2h-5	7.43	5.00	9.90	$\beta = 95.2$	2	0.999		77/562	23.8/562	8*1/1	530
										62/439			
cis-	Mono	C2h-6	4.58	9.50	17.11	$\beta = 98$	4	0.993				8*2/1	905
										38	21.0		1376
Poly(1-octene)													
(at 90 K)	Mono		5.6	38	7.6	$\beta = 97$	8	0.93		5		2*4/1	1209
(112.22)										10–38/48			
										10/872			
Poly(pentenamer)													
trans-													
I.	Ortho	C2v-9	7.28	4.97	11.90		4	1.051		23	12.0/682	5*2/1	147
(68.12)		or D2h-16								34/682			
Poly(1-pentene)													
isotactic													
Ia.	Mono		11.35	20.85	6.49	$\beta = 99.6$	12	0.923		130/276	6.28/501	2*3/1	355
(70.13)			21.15	11.20	6.49	$\beta = 99.6$	12	0.922		130/380		2*3/1	355
	Mono		22.4	21.2	6.49[b]	$\gamma = 91$	24	0.907		111/501		2*3/1	931
								0.96	0.85				408
Ib.					6.5							2*3/1	355
	Mono		24.3	19.3	6.50[b]	$\gamma = 96$	24	0.922				2*3/1	931
IIa.					6.60					75/48	4.00/501		152
	Mono		35.65	20.2	7.13[b]	$\gamma = 91$	40	0.907		78/282		2*4/1	818
	Port		19.30	16.90	7.08	$\gamma = 116$	16	0.898		80/9		2*4/1	355
										79/501			
IIb.	Port		19.60	16.75	7.08	$\gamma = 115.3$	16	0.887				2*4/1	355
III.	Ortho	D2-4	21.20	11.48	14.39		28	0.931				2*7/2	834
syndiotactic													
										42	2.94		1452
–, 5-amino-													
–, –, *N,N*-diisobutyl-													
(197.37)					6.85					112		2*	191
–, –, *N,N*-diisopropyl-													
(169.31)					7.32					130		2*	191
–, 4,4-dimethyl-													
(98.19)	Tet	S4-1	20.3	20.3	13.8		28	0.803		231/282		2*7/2	431
	Tet		20.35	20.35	7.01		16	0.899		350/90		2*4/1	442
										380/441			

TABLE 1. *cont'd*

Polymer	Cryst syst.	Space group	Unit cell parameters *a*	*b*	*c*	Angles	*z*	Density (g/cm³) Crystal.	Amorph.[a]	Melting point (°C)[a]	Heat of fusion kJ/mol[a]	Chain conform. ($n*p/q$)	Refs.
–, 5-hydroxy-													
(86.13)					6.5							2*	191
–, 3-methyl-													
(84.16)	Tet	C4-6	13.35	13.35	6.80		8	0.922		362/632		2*4/1	622
										273/129			
										200/441			
–, 4-methyl-													
isotactic													
I.	Tet	S4-1	18.66	18.66	13.80		28	0.814		235/48	19.7/82	2*7/2	55
(84.16)	Tet		18.70	18.70	13.54		28	0.826	>0.835	228/282	11.9/370	2*7/2	936
	Tet		18.53	18.53	13.76		28	0.828		238/632	9.9/1195	2*7/2	894
	Tet		18.54	18.54	13.84		28	0.822		250/94	5.2/1288	2*7/2	452
	Tet		18.50	18.50	13.76		28	0.831			5.5/1331	Irreg.	333
	Tet		18.60	18.60	13.85		28	0.817				2*7/2	67
	Tet	S4-1	18.63	18.63	13.85		28	0.814				2*7/2	689
	Tet	D2d-7	18.70	18.70	13.68		28	0.818				2*7/2	1177
	Tet		18.66	18.66	13.65		28	0.823				2*7/2	1198
								0.828	0.838				94
II.			19.16	19.16	7.12		16	0.855		125		2*4/1	8
III.			19.36	19.36	7.05		16	0.846		75		2*4/1	8
	Tet		19.38	19.38	6.98		16	0.853				2*4/1	1197
	Tet	C4-6	19.46	19.46	7.022		16	0.8408				2*4/1	1453
IV.					6.5							2*	845
(hi press)	Hex		16.88	16.88	6.31		18	0.808				2*3/1	1454
V.	Hex		22.17	22.17	6.69		18	0.883?				2*3/1?	990
syndiotactic													
	Tet	S4-1	18.03	18.03	46.91		48	0.880		210		4*12/7	1455
–, 5-trimethylsilyl-													
(142.32)					6.55					133/71		2*3/1	67
Poly(propene)													
isotactic													
I.	Mono	C2h-6	6.65	20.96	6.50	$\beta = 99.3$	12	0.938	0.85/45	176/10	9.92/82	2*3/1	127
(42.08)	Mono		6.66	20.78	6.495	$\beta = 99.62$	12	0.946		189/392	7.96/478	2*3/1	308
	Tri	Ci-1	13.36	11.00	6.502[b]	93,81,108	12	0.935		186/394	8.8/394	2*3/1	170
	Mono	C2h-5	6.65	20.73	6.50	$\beta = 99.7$	12	0.947		208/676	5.80/676	2*3/1	519
	Mono		6.63	20.78	6.504	$\beta = 99.5$	12	0.949		165/282	10.5/474	2*3/1	626
	Mono		6.64	20.88	6.51	$\beta = 98.7$	12	0.940		178/349	10.0/358	2*3/1	131
	Mono	C2h-5	6.69	20.98	6.504	$\beta = 99.5$	12	0.931	0.854	183/380	6.16/182	2*3/1	136
	Mono	C2h-3								180/250	7.91/251	2*3/1	330
	Mono	C2h-5	6.65	20.80	6.50	$\beta = 99.33$	12	0.945		220/974	10.9/83	2*3/1	991
										220/975	6.9/1195		
										186/1003	9.3/1212		
II.	Hex		12.74	12.74	6.35		12	0.939	0.907/112	147/789	4.22/789	2*3/1	166
	Rho		19.08	19.08	6.49		27	0.922		200/975	8.2/1212	2*3/1	485
	Rho	D3-4	6.38	6.38	6.33		3	0.939		170/974	4.0/1404	2*3/1	196
	Ortho		19.08	11.01	6.490		18	0.922		192/1212		2*3/1	308
	Hex		22.03	22.03	6.490		36	0.922		183/1404		2*3/1	308
	Rho	C3-2	19.08	19.08	(6.49)		27	0.922				2*3/1	1456
	Ortho		11.03	19.08	6.49		18	0.921				2*3/1	1457
	Rho		11	11	6.5		9	0.92				3*3/1	1642
III.	Tri		6.47	10.71		$\gamma' = 99.07$	6					2*3/1	308
	Tri		6.54	21.40	6.50	89,100,99	12	0.946				2*3/1	592
	Ortho	D2h-24	8.54	9.93	42.41		48	0.935				cf ref	1408
quenched	Tet		5.97	5.97	6			0.88/167				2*3/1	943
syndiotactic													
I.	Ortho	D2-2	14.5	5.8	7.4		8	0.898	0.858/393	161/415	1.88/545	4*2/1	169
	Ortho	D2-5	14.50	5.60	7.40		8	0.930		138/545	2.1/1195	4*2/1	430
	Ortho	D2h-27	14.50	11.20	7.40		16	0.930			8.3/1458	4*2/1	1330
								0.898	0.858	160/1459	8.0/1459		409
II.	Phex				5.05							4*1/1	306
	Ortho	C2v-9	5.22	11.17	5.06		4	0.947				4*/1	1430
III.					11.8							4*	845

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TABLE 1. *cont'd*

Polymer	Cryst syst.	Space group	Unit cell parameters *a*	*b*	*c*	Angles	*z*	Density (g/cm³) Crystal.	Amorph.[a]	Melting point (°C)[a]	Heat of fusion kJ/mol[a]	Chain conform. ($n*p/q$)	Refs.
(hi press.)													
IV. (252.48)	Tri	C1-1	5.72	7.64	11.60	73,89,112	1	0.942				12*1/1	1460
–, 3-cyclohexyl-													
I. (124.23)	Tet	C4-5 or S4-2	21.06	21.06	20.09		40	0.926		230/90 215/282 214/328		2*10/3	431
II.	Rho	C4-3 or C3i-2	19.12	19.12	6.33		9	0.926				2*3/1	431
–, 3-cyclopentyl-													
(110.20)	Tet	C4-5 or S4-2	20.34	20.34	47.49		96	0.894		210/328 225/90		2*24/7	431
	Tet		20.30	20.30	47.40		96	0.899				2*24/7	625
–, hexafluoro-													
(150.02)										160		2*4/1	268
–, 3-phenyl- [allylbenzene]													
(118.18)					6.40					230/90 208/187 185/282		2*3/1	67
–, 3-silyl-													
(72.18)					6.45					128/71		2*3/1	67
–, trimethylsilyl-													
(114.26)					6.50					360/71		2*3/1	67
Poly(propene-alt-ethylene) syndiotactic													
(70.14)	Mono		11.19	11.62	9.00	$\gamma = 67.03$				55			1450
Poly(1-tetradecene)													
II. (196.38)	Ortho		7.5	56.0	6.6		8	0.94		57/250 57/872		2*4/1	150
Poly(tetrafluoroethylene-*alt*-ethylene)													
(128.07)	Mono		9.6	9.25	5.0	$\gamma = 96$	4	1.93				4*1/1	722
	Ortho		8.57	11.20	5.04		4	1.758	1.684	267		4*1/1	1287
			9.46	5.81									1321
Poly(vinylcyclobutane)													
(82.15)	Tet		34.12	34.12	6.6		64	1.14		228/437		2*4/1	431
Poly(vinylcycloheptane)													
(124.23)	Tet	C4h-6	23.4	23.4	6.5		16	0.927		>300/437		2*4/1	431
Poly(vinylcyclohexane)													
I. (110.20)	Tet	C4h-6	21.99	21.99	6.43		16	0.942		305/90		2*4/1	431
	Tet		21.76	21.76	6.50		16	0.951		300/282 372/441 383/328		2*4/1	67
II.	Tet	C4-5 or S4-2	20.48	20.48	44.58		96	0.940				2*24/7	431
Poly(vinylcyclopentane)													
I. (96.17)	Tet	C4h-6	20.14	20.14	6.50		16	0.969		270/441 292/328		2*4/7	431
II.	Tet	C4-5 or S4-2	20.14	20.14	19.5		48	0.969				2*12/3	431
III.	Tet	D4h-1 or D4h-7	37.3	37.3	19.8			0.927				2*10/3	431
Poly(vinylcyclopropane)													
I. (68.12)					6.5					230			175
	Rho	C3-2 or C3-3	13.6	13.6	6.48		9	0.981				2*3/1	526
II.	Tet	S4-2	15.21	15.21	20.85		40	0.938				2*10/3	526
Poly(1-vinylene-3-cyclopentylene) [norbornene]													
trans- (94.16)					11.8					202		5*2/	620
	Mono		5.13	4.78	11.56	$\gamma = 73.5$	2	1.150				5*2/1	1451
cis-	Mono		4.64	4.22	9.84	$\gamma = 68.1$	2	1.749				5*2/1	1451

[a] The numbers after the solidus (/) are reference citations.
[b] The unit cell parameter assignment has been changed from that published so as to make *c* the fiber axis.

TABLE 2. POLY(VINYLS) AND POLY(VINYLIDENES) (–HCH–CHR– and –HCH–RCR–)

Polymer	Cryst syst.	Space group	Unit cell parameters a	b	c	Angles	z	Density (g/cm³) Crystal.	Amorph.[a]	Melting point (°C)[a]	Heat of fusion kJ/mol[a]	Chain conform. (n*p/q)	Refs.
Poly(acrylamide)													
–, *N,N*-dibutyl-													
(183.30)	Hex		26.3	26.3	6.3		12	0.97 (1.06)				2*3/1	93
–, *N*-isopropyl-													
(113.16)								1.118	1.070	200		2*	102
Poly(acrylic acid)													
–, allyl ester													
(112.13)					6.5					90		2*3/1	278
–, biphenyloxyhexamethylene ester													
(324.42)	Phex		23.5	23.5	6.48		6	1.043				2*3/1	1122
–, *sec*-butyl ester													
(128.17)	Ortho		17.92	10.34	6.49		6	1.062		130		2*3/1	401
–, *tert*-butyl ester													
(128.17)					6.45					193/16		2*3/1	67
	Ortho		17.92	10.50	6.48		6	1.047		200		2*3/1	401
–, *p*-carboxyphenyl ester													
(192.17)	Mono		21.50	7.42	6.68[b]	$\beta = 124$	4	1.445				2*	865
–, isobutyl ester													
(128.17)	Ortho		17.92	17.92	6.42		12	1.239		81		2*3/1	401
–, isopropyl ester													
isotactic													
(114.14)					6.5					162/120	5.9/541	2*3/1	67
					6.32			1.08		162 178/541			149
syndiotactic													
					5.18			1.18		115		4*1/1	113
Poly(acrylonitrile)													
syndiotactic													
(53.06)	Hex		5.99	5.99						317/77	4.86/77–		76
	Ortho		21.18	11.60	(5.1)		16	1.125		341/499	5.23/77	4*1/1	486
	Ortho		10.6	11.6	5.04		8	1.137				4*1/1	575
	Ortho	C2v-16	10.20	6.10	5.10		4	1.111				4*1/1	133
	Ortho		18.1	6.12	5.00		8	1.273				4*1/1	162
	Ortho		10.55	5.80	5.08		4	1.134				4*1/1	210
	Phex		6.1	6.11	(5.1)	$\gamma = 120$	2	1.07				4*1/1	322
	Ortho		21.0	11.9	5.04		16	1.119				4*1/1	1001
	Ortho	C2v-9	10.7	12.1	(5.1)		8	1.07				4*1/1	1332
			9.03	5.24									1631
II?	Ortho		21.48	11.55	7.096		24	1.201				2*4/	804
			21.18	11.71									1631
isotactic													
	Tet		4.74	4.74	2.55		1	1.538				2*1/1	133
(gel)	Tet		11.4	11.4	8.2		16	1.32				2*4/1	1461
Poly(isopropenylmethyl ketone)													
(84.12)	Tet		15.08	15.08	8.54		16	1.151		240 240/255 200/379		2*4/1	347
Poly(methacrylic acid)													
–, methyl ester													
isotactic													
(100.12)	Port		21.08	12.17	10.55		20	1.228	1.22/31	160/31	5.02/871	2*5/2	30
	Ortho		21.08	12.17	10.50		20	1.234		220/855		2*5/1	520
	Ortho		20.98	12.06	10.40		20	1.264				vi ref	868
	Tri		20.57	12.49	10.56	93,88,91	20	1.228				*10/1	1002
	Ortho	D2h-24	41.96	24.34	10.50		80	1.240				*10/1	1462
syndiotactic									1.19/31	200/31		4*5/2	30
it-st stereocomplex (1 : 2)													
	Mono		21.5	16.5	18.4	$\gamma = 112$						*9/1	1397
					73.6					260/1006		*30/4	1005
–, –, chloroacetone complex													
syndiotactic													
	Mono		43.5	43.5	35.4	$\gamma = 107$						4*37/4	1004

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TABLE 2. *cont'd*

Polymer	Cryst syst.	Space group	Unit cell parameters *a*	*b*	*c*	Angles	*z*	Density (g/cm³) Crystal.	Amorph.[a]	Melting point (°C)[a]	Heat of fusion kJ/mol[a]	Chain conform. ($n*p/q$)	Refs.
–, octadecyl ester													
syndiotactic													
(338.58)	Hex		4.73	4.73	30.2		1	0.961		36			500
Poly(methacrylontirile)													
I. (67.09)	Phex		9.03	9.03	6.87		4	0.918		250/436		2*	427
			7.87	8.97	6.87		4	0.918					729
II.	Mono		13.5	7.71	7.62	$\beta = 97.7$	8	1.134				2*4/1	427
Poly(thiolacrylic acid)													
–, *sec*-butyl ester													
(144.23)	Rho	C3-2			6.35							2*3/1	401
–, isobutyl ester													
(144.23)	Mono	Cs-2			6.42							2*	401
–, isopropyl ester													
(130.20)	Rho	C3-2			6.42							2*	401
–, propyl ester													
(130.20)	Mono	Cs-2			6.4							2*3/1	401
Poly(vinyl acetate)													
–, trifluoro-													
(140.06)	Ortho		9.54	12.44	4.8		4	1.633		175/821		2*	638
Poly(vinyl alcohol)													
(44.05)	Mono	C2h-2	7.81	5.51	2.52[b]	$\gamma = 91.7$	2	1.350	1.291/1	232/310	6.87/433	2*1/1	29
	Mono		7.81	5.43		$\gamma = 91.5$	2	1.34/410	1.27/410	243/480	6.99/480	2*1/1	316
	Mono		7.805	5.485	2.533[b]	$\gamma = 92.2$	2	1.350	1.26/53	265/323	7.1/1195	2*1/1	132
								1.345	1.269	228/433			184
	Mono	C2h-2	7.81	5.50	2.52[b]	$\gamma = 92$	2	1.352		267/450		2*1/1	261
	Mono		7.84	5.52	2.52[b]	$\gamma = 93$	2	1.343				2*1/1	1441
quenched	Ortho	C2v-20	7.42	5.25	2.52[b]		2	1.490				2*1/1	261
single crystal	Hex		5.45	5.45	2.51		1	1.133				2*1/1	151
I2 complex	Mono		7.87	5.53	2.525[b]	$\gamma = 93.3$	2					2*1/1	1424
Poly(vinyl bromide)													
(106.95)	Ortho	D2h-11	11.0	5.6	5.1		4	2.26		117		4*1/1	772
Poly(vinyl chloride)													
(62.50)	Ortho	D2h-11	10.6	5.4	5.1		4	1.42	1.41/413	273/372	11/372	4*1/1	7
	Ortho	D2h-11	10.40	5.30	5.10		4	1.477		310/423	4.9/835	4*1/1	235
	Ortho		10.11	5.27	5.12		4	1.522		212/143	2.8/145	4*1/1	64
	Mono		10.65	5.20	5.15[b]	$\gamma = 90$	4	1.456			3.3/423	4*1/1	140
single crystal	Ortho	D2h-11	10.24	5.24	5.08		4	1.523				4*1/1	718
Poly(vinyl fluoride)													
(46.04)	Hex		4.93	4.93	2.53		1	1.436		200/79	7.54/79	2*1/1	62
	Ortho	C2v-14	8.57	4.95	2.52		2	1.430		230/434		2*1/1	236
	Mono		4.938	4.938	2.518	$\gamma = 120$	1	1.4377				2*1/1	1463
Poly(vinyl formate)													
isotactic													
(72.06)	Rho	C3v-6-D3d-6	15.9	15.9	6.55		18	1.502				2*3/1	232
syndiotactic													
					5.0							4*1/1	232
Poly(vinylidene bromide)													
(185.85)	Mono		25.88	13.87	4.77[b]	$\gamma = 109.8$	16	3.065					33
Poly(vinylidene chloride)													
(96.94)	Mono	C2h-2	6.71	12.51	4.68[b]	$\gamma = 123$	4	1.954	1.66/43	200/721		4*1/1	915
	Mono		13.69	6.296	4.67[b]	$\gamma = 124.8$	4	1.948		190/46		4*1/1	32
	Mono		22.54	12.53	4.68[b]	$\gamma = 95.8$	16	1.958					33
	Mono	C2-2	6.73	12.54	4.68[b]	$\gamma = 123.6$	4	1.957		195	5.68		245
												2*2/1	231
									1.7754				462
Poly(vinylidene fluoride)													
α (II)	Mono		5.02	25.4	4.62	$\beta = 107$	10	1.888	1.68/776	185/434	6.7/823		171
(64.04)	Ortho	C2v-4	4.96	9.64	4.62		4	1.925	1.67/770	170/995	6.2/886	4*1/1	994
	Mono	C2-2	17.72	11.68	4.57[b]	$\gamma = 92.7$	16	1.801		220/443	5.96/726	4*1/1	417
	Ortho	C2v-9	9.66	4.96	4.64		4	1.913		171/373		2*2/1	418
	Mono	C2h-5	4.96	9.64	4.62	$\beta = 90$	4	1.925		178		4*1/1	604
	Mono	C2-2,1	9.64	5.02	4.64[b]	$\gamma = 91.1$	4	1.895		178/726		4*1/1	168

TABLE 2. *cont'd*

Polymer	Cryst syst.	Space group	Unit cell parameters a	b	c	Angles	z	Density (g/cm³) Crystal.	Amorph.[a]	Melting point (°C)[a]	Heat of fusion kJ/mol[a]	Chain conform. (n*p/q)	Refs.
	Port	C2-2	5.02	9.63	4.62		4	1.904		188/846		2*2/1	563
	Ortho		9.60	5.00	4.655		4	1.904		213/1464			597
			9.80	5.05			4						750
β (I)	Ortho	C2v-14	8.45	4.88	2.55		2	2.022		212/443		2*1/1	417
	Ortho	C2v-14	8.58	4.91	2.56		2	1.972		191		2*1/1	604
	Ortho	C2v-14	8.47	4.90	2.56		2	2.002		207/942		2*1/1	418
	Ortho		8.60	4.97	2.57		2	1.936					597
γ (III)	Mono	Cs-4	4.96	9.58	9.23	$\beta = 92.9$	8	1.942		218/846		8*1/1	996
	Mono	C2-3	8.66	4.93	2.58	$\beta = 97$	2	1.945		197		2*1/1	604
	Ortho	C2v-16	4.97	9.66	9.18		8	1.930		184/995		8*1/1	997
	Mono		4.96	9.67	9.20	$\beta = 93$	8	1.930		231/1464		8*1/1	998
δ (IV)			4.96	9.64								4*1/1	999
(polar alpha)	Ortho	C2v-9	4.96	9.64	4.62		4	1.925				4*1/1	1000
Poly(vinylmethyl ketone)													
(70.09)	Tet	S4-1	14.52	14.52	14.40		28	1.073				2*7/2	164
	Tet		14.56	14.56	14.10		28	1.090		170		2*7/2	379

[a] The numbers after the solidus (/) are reference citations.
[b] The unit cell parameter assignment has been changed from that published so as to make *c* the fiber axis.

TABLE 3. POLY(AROMATICS) AND POLY(IMIDES)

Polymer	Cryst syst.	Space group	Unit cell parameters a	b	c	Angles	z	Density (g/cm³) Crystal.	Amorph.[a]	Melting point (°C)[a]	Heat of fusion kJ/mol[a]	Chain conform. (n*p/q)	Refs.
Poly(4,4′-benzobisthiazole-diphenylene pyromellitimide)													
(556.57)	Ortho	D2-3	5.70	8.11	24.8		2	1.612				22*1/1	1433
Poly(2,6-benzothiazole)													
(133.17)	Port		6.044	3.417	12.19		2	1.756				5*2/1	1235
Poly(2,5(6)-benzoxazole)													
(117.11)	Port		6.061	3.384	11.58		2	1.638				5*2/1	1235
Poly(4,4′-biphenylene 3,3′,4,4′-biphenylenetetracarboximide)													
(442.43)								1.480					1335
–, 2,2′-bis(trifluoromethyl)-													
(578.43)	Mono		15.40	9.90	20.25	$\gamma = 56$	4	1.501				18*1/1	1494
	Mono		15.40	9.918	20.21	$\gamma = 56.2$	4	1.4977				18*1/1	1495
–, 2,2′-dimethyl-													
(470.48)	Tri		20.49	15.30	40.0	62,52,80	16	1.443	1.341			18*2/1	1584
–, 3,3′-dimethyl-													
(470.48)	Ortho		16.7	13.0	20.5		8	1.404				18*1/1	1289
Poly(4,4′-biphenylene 4,4′-carbonyl(3,3′-dicarboxy)-dibenzamide)													
(506.47)					21.2							21*1/1	1178
Poly(4,4′-biphenylene 3,3′,4,4′-carbonyldiphenylenetetracarboximide)													
(470.44)					21.6							19*1/1	1178
Poly(4,4′-biphenylenedioxy-3,3′-biphenylene pyromellitimide)													
(550.53)	Ortho		7.89	6.29	25.11		2	1.467				23*1/1	1475
	Ortho		7.85	6.37	25.31		2	1.444		388		34*1/1	1498
Poly[2,2′-(4,4′-biphenylene) 6,6′-diquinoline]													
–, di-*p*-phenyl-													
(558.63)	Ortho		16.2	5.31	21.4		2	1.008				20*1/1	1500
Poly(4,4′-biphenylene 4,4′-oxy(3,3′-dicarboxy)-dibenzamide)													
(494.46)					21.0							21*1/1	1178
Poly(4,4′-biphenylene 3,3′,4,4′-oxydiphenylenetetracarboximide)													
(458.43)					21.3					900/1018		19*1/1	1178
Poly(4,4′-biphenylene 1,4-pyromellitamide)													
(402.36)					16.1							16*1/1	1178
Poly(4,4′-biphenylene pyromellitimide)													
(366.33)					16.6								908
			8.58	5.48	16.6		2	1.559		827/1018		15*1/1	928
	Ortho	D2h-9	8.57	5.51	16.78		2	1.535				15*1/1	1476

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TABLE 3. *cont'd*

Polymer	Cryst syst.	Space group	Unit cell parameters *a*	*b*	*c*	Angles	*z*	Density (g/cm³) Crystal.	Amorph.[a]	Melting point (°C)[a]	Heat of fusion kJ/mol[a]	Chain conform. (*n*∗*p*/*q*)	Refs.
Poly(2,2′-bithiophene)													
–, 3,3′didecyl-													
(444.78)	Ortho		17.6	4.5	15.6		2	1.20				6∗2/1	1485
–, 3,3′-dihexyl-													
(332.56)	Ortho		11.8	4.5	15.6[b]		2	1.33				6∗2/1	1485
–, 3,3′-dioctyl-													
(388.67)	Mono	C2h-4	14.6	4.42	14.73	$\beta = 90$	2	1.36				6∗2/1	1484
	Ortho		14.5	4.5	15.6[b]		2	1.27				6∗2/1	1485
	Ortho		14.6	4.42	15.70		2	1.27				6∗2/1	1486
Poly(4,4′-carbonyldiphenylene pyromellitimide)													
(394.34)					31.0[b]								908
	Ortho		7.9	6.65	32.8		4	1.520				16∗2/1	1013
Poly(decamethylene 3,3′,4,4′-oxydiphenylenetetracarboximide)													
(446.50)					23.5							21∗1/1	896
Poly(decamethylene pyromellitimide)													
(354.40)	Mono		19.8	4.61	19.2	$\gamma = 96$	4	1.350		318		17∗1/1	1395
										323/1267			
Poly(dodecamethylene 1,4,5,8-naphthalenetetracarboximide)													
(432.52)	Tri		6.23	4.68	19.1	90,111,100	1	1.409		308		20∗1/1	1015
Poly(dodecamethylene pyromellitimide)													
α	Mono		5.58	4.89	18.9	$\gamma = 108.4$	1	1.289				19∗1/1	1395
(382.46)					18.96								1371
β	Mono		18.95	4.54	21.5	$\gamma = 101.3$	4	1.401		297		19∗1/1	1015
					21.43					305/1267			1371
γ					22.05								1371
δ					20.95								1371
Poly(3,4′-ethylenedioxydiethylenedioxydiphenylene 3,3′,4,4′-oxydiphenylenetetracarboximide)													
(606.59)										268	88.0		1493
Poly(3,4′-ethylenedioxydiphenylene 3,3′,4,4′-oxydiphenylenetetracarboximide)													
(518.48)										340	72.5		1493
Poly(2,7-fluorenylene 1,4-pyromellitamide)													
(414.37)					15.9							15∗1/1	1178
Poly(2,7-fluoenylene pyromellitimide)													
(378.34)					16.3							14∗1/1	1178
Poly(hexamethylene 3,3′,4,4′-oxydiphenylenetetracarboximide)													
(390.40)					19.5								896
	Tri		8.34	9.18	19.6	90,134,117	2	(1.462)		238		17∗1/1	1015
Poly(hexamethylene pyromellitimide)													
(298.30)					24.88					430			1395
Poly[4,4′-(isophthaloyldiamino)-diphenylene 3,3′,4,4′-oxydiphenylenetetracarboximide]													
(620.58)	Ortho		9.84	4.95	28.5		2	1.485		320		26∗1/1	1190
Poly[4,4′-(isophthaloyldiamino)-diphenylene *p*-phenyleneditrimellitatediimide]													
(768.69)	Ortho		6.03	7.58	73.6		4	1.518				33∗2/1	1191
Poly[4,4′-(isophthaloyldiamino)-diphenylene pyromellitimide]													
(528.48)					24.2							22∗1/1	1191
										1.382			1335
Poly[isophthaloyl-4,4′-diphenylenedioxy-4,4′-diphenylene 3,3′,4,4′-carbonyldiphenylenetetracarboximide]													
(786.75)	Ortho		8.07	6.135	37.50		2	1.07		350		34∗1/1	1498
Poly(4,4′-methylenediphenylene pyromellitimide)													
(380.36)					29.1								908
	Ortho		8.20	6.55	32.4		4	1.452				16∗2/1	1013
					14.1								1014
Poly(methylene-*p*-phenylene)													
(90.12)	Ortho		8.16	6.32	9.90		4	1.172		170		5∗2/1	745
										142/744			
–, α-methyl-													
(104.15)	Ortho		10.42	5.97	9.62		4	1.156		219/1007		5∗2/1	848
Poly(methylene-3,5-toluene)													
–, 2,6-diamino-													
(134.18)	Ortho		12.82	13.83	9.69		8	1.037				4∗2/1	1351
Poly(2,6-naphthalene 2,4-cyclobutylenedicarboxylic acid)													
–, bis(2,4-dichlorophenyl) ester													
(558.24)	Tri	Ci-1	6.00	8.93	13.48	70,94,101	1	1.396				9∗1/1	950

TABLE 3. *cont'd*

Polymer	Cryst syst.	Space group	Unit cell parameters a	b	c	Angles	z	Density (g/cm³) Crystal.	Amorph.[a]	Melting point (°C)[a]	Heat of fusion kJ/mol[a]	Chain conform. (n*p/q)	Refs.
Poly(4,4′-neopentylenedioxydiphenylene 3,3′,4,4′-carbonyldiphenylenetetracarboximide)													
(572.57)	Mono		9.60	5.82	24.6	$\gamma = 81.1$	2	1.400				24*1/1	1499
Poly(nonamethylene 3,3′,4,4′-oxydiphenylenetetracarboximide)													
(432.48)					21.3							20*1/1	1015
Poly(nonamethylene pyromellitimide)													
(340.38)					32.0					303			1395
										>350			1267
Poly(octamethylene 3,3′,4,4′-oxydiphenylenetetracarboximide)												19*1/1	
(418.45)	Tri		8.37	4.95	21.5	90,38,104	1	1.372	1.30				896
	Tri		8.37	4.95	21.5	90,38,104	1	1.396		202		19*1/1	1015
Poly(octamethylene pyromellitimide)													
(326.35)	Mono		20.8	4.76	16.9	$\gamma = 95.5$	4	1.301		362		15*1/1	1395
										383/1267			
Poly(3,4′-oxydiethylenedioxdiphenylene 3,3′,4,4′-oxydiphenylenetetracarboximide)													
(562.34)										304	80.2		1493
Poly(3,4′-oxydiphenylene 3,3′,4,4′-biphenylenetetracarboximide)													
(458.43)	Mono		14.8	8.20	20.6	$\gamma = 56$	4	1.469				18*1/1	1289
Poly[4,4‴-((4′,4″-oxydiphenylene)-dioxy)-diphenylene *p*-phenyleneditrimellitatediimide]													
(806.74)			5.68	8.09	78.6		4	1.484				37*2/1	963
Poly[4,4‴-((4′,4″-oxydiphenylene)-dioxy)-diphenylene pyromellitimide]													
(566.53)			8.44	5.66	53.4		4	1.475		547/1018		26*2/1	963
					53.4								908
Poly(4,4′-oxydiphenylene 3,3′,4,4′-oxydiphenylenetetracarboximide)													
(474.43)	Mono		5.17	10.85	38.2	$\gamma = 103.7$	4	1.514		427/1018		20*2/1	684
Poly[4,4′-oxydiphenylene 3,3′-(*p*-phenylene)-ditrimellitatediamide]													
(658.58)					26.3							26*2/1	1178
Poly(4,4′-oxydiphenylene *p*-phenyleneditrimellitatediimide)													
A. (622.54)	Mono		5.56	7.94	58.0	$\gamma = 86$	4	1.619				27*2/1	658
			5.56	7.94	59.0	$\beta = 86$	4	1.591				27*2/1	963
					28.7								1178
									1.366				1335
B.			13.12	7.84	57.0		8	1.410				27*2/1	963
Poly(4,4′-oxydiphenylene 1,4-pyromellitamide)													
(418.36)					15.2							17*1/1	1178
									1.410				1335
Poly(3,4′-oxydiphenylene pyromellitimide)													
(382.33)	Ortho		8.48	5.62	33.65		4	1.583				15*2/1	1477
	Ortho	D2-9	5.75	8.48	33.2		4	1.569				15*2/1	1478
Poly(4,4′-oxydiphenylene pyromellitimide)													
I. (382.33)	Ortho		6.35	4.05	32.6		2	1.514		597/1018		16*2/1	642
	Ortho		6.31	3.97	32		2	1.58				16*2/1	684
	Ortho	C2-2	4.66	5.96	32.9[b]	$\gamma = 100$	2	1.411					877
	Ortho		8.36	5.63	33.03		4	1.633				16*2/1	1477
	Mono	C2-2	6.45	4.01	32.58	$\gamma = 90$	2	1.507				16*2/1	1478
					15.9								1178
II.	Ortho		5.93	4.70	33.00		2	1.380				16*2/1	1477
Poly(*m*-phenylene)													
(76.10)										790/964	6.90/964	3*	
Poly(*p*-phenylene)													
(76.10)	Ortho		7.81	5.53	4.20		2	1.393		<550/735	15.0/964	4*1/1	475
	Ortho		7.80	5.56	4.20		2	1.388		1400/964		4*1/1	1290
	Mono		8.06	5.55	4.30	$\beta = 100$	2	1.334				4*1/1	1334
	Ortho		7.82	5.60	4.20		2	1.374				4*1/1	1448
	Ortho	pgg	7.79	5.51	(4.20)		2	1.402				4*1/1	1466
												4*2/1	508
–, complex with:													
K	Ortho	D2h-9	6.04	15.6	4.35		4					4*1/1	1231
(1/2 K/unit)													
$SbCl_5$	Ortho		15.6	6.2	4.2		2					4*1/1	1393
(1/2 Sb/unit)													
SbF_5	Hex		12.0	12.0	4.2		3					4*1/1	1393
(1/3 Sb/unit)													

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TABLE 3. *cont'd*

Polymer	Cryst syst.	Space group	Unit cell parameters a	b	c	Angles	z	Density (g/cm³) Crystal.	Amorph.[a]	Melting point (°C)[a]	Heat of fusion kJ/mol[a]	Chain conform. (n*p/q)	Refs.
Poly(*p*-phenylene benzobisoxazole) [PBO]													
(234.21)	Mono		5.64	3.58	12.07	$\gamma = 100.4$	1	1.622				11*1/1	1263
	Mono		11.20	3.540	12.050	$\gamma = 101.3$	2	1.660				11*1/1	1488
	Mono	Cs-2	11.20	3.54	12.05	$\gamma = 101.3$	2	1.660				11*1/1	1489
	Port		11.8	3.54	12.1		2	1.55				11*1/1	1490
–, complex with poly(phosphoric acid)													
I.	Mono		12.6	11.6	12.2	$\gamma = 98$							1492
II.	Mono		7.0	5.8	12.0	$\gamma = 99$							1492
Poly(*p*-phenylene benzobisthiazole) [PBT]													
(266.34)	Mono		5.83	3.54	12.35	$\gamma = 96$	1	1.745				11*1/1	1016
	Mono		11.96	3.555	12.35	$\gamma = 100.9$	2	1.716				11*1/1	1017
	Mono		11.79	3.539	12.514	$\gamma = 94.0$	2	1.698				11*1/1	1488
–, complex with poly(phosphoric acid)													
	Ortho		15.9	20.6	36.9					250		11*3/1	1316
	Mono		8.15	24.49	37.2	$\gamma = 94.5$		2.15					1491
Poly(*p*-phenylenecyclobutylene)													
–, 2,4-dipyridyl-													
(284.36)	Ortho	D2h-15	19.16	10.69	7.45		4	1.238				7*1/1	202
	Ortho	D2h-15	18.9	10.5	7.53		4	1.26		340		7*1/1	723
Poly(*p*-phenylene 2,4-cyclobutylenedicarboxylic acid)													
–, diethyl ester													
(274.32)	Mono	C2h-5	8.62	9.98	8.16[b]	$\beta = 102$	2	1.327		347/723		7*1/1	893
–, dimethyl ester													
(246.26)	Tri	Ci-1	6.04	7.42	7.82[b]	101,106,72	1	1.284		415/723		7*1/1	893
–, diphenyl ester													
(370.40)	Mono	C2h-5	7.50	17.3	7.50[b]	$\beta = 102$	2	1.292		420/723		7*1/1	893
–, dipropyl ester													
–, –, 2,4-dicyano-													
(352.39)	Mono	C2h-2	6.19	20.1	7.58	$\beta = 96$	2	1.248		335/723		7*1/1	893
Poly[4,4‴-((4′,4″-(*p*-phenylenedioxy)-diphenylene)-dioxy)-diphenylene *p*-phenyleneditrimellitatediimide]													
(898.84)			5.66	8.14	43.5		2	1.489				42*1/1	963
Poly[4,4‴-((4′,4″-(*p*-phenylenedioxy)-diphenylene)-dioxy)-diphenylene pyromellitimide]													
(658.62)			8.44	5.66	31.3		2	1.463				31*1/1	963
					31.3								908
Poly[4,4′-(*p*-phenylenedioxy)-diphenylene 4,4′-oxy(3,3′-dicarboxy)-dibenzamide]													
(602.56)					24.6							27*1/1	1178
Poly[4,4′-(*p*-phenylenedioxy)-diphenylene 3,3′,4,4′-oxydiphenylenetetracarboximide]													
(566.52)	Tri		10.52	9.45	26.1	90,95,98	4	1.472				25*1/1	684
					26.0								1178
									1.341				1335
Poly[4,4′-(*p*-phenylenedioxy)-diphenylene *p*-phenyleneditrimellitatediimide]													
(714.64)	Ortho		5.64	8.05	34.5		2	1.515				32*1/1	658
Poly[4,4′-(*m*-phenylenedioxy)-diphenylene 1,4-pyromellitamide]													
(510.46)					19.8							21*1/1	1178
Poly[4,4′-(*p*-phenylenedioxy)-diphenylene 1,4-pyromellitamide]													
(510.46)					19.6							22*1/1	1178
Poly[4,4′-(*m*-phenylenedioxy)-diphenylene pyromellitimide]													
(474.43)			8.76	5.47	43.4		4	1.515				20*2/1	963
					43.4								908
					21.7								1178
Poly[4,4′-(*p*-phenylenedioxy)-diphenylene pyromellitimide]													
(474.43)	Mono		5.64	8.30	21.8	$\beta = 98.7$	2	1.562				21*1/1	684
	Ortho		8.23	5.58	22.09		2	1.553				21*1/1	1477
					21.0								1178
Poly(*p*-phenylene-1,3,4-oxadizaole)													
α	Ortho	D2-4	12.35	6.55	14.0		8	1.69				7*2/1	1496
(144.13)													
Poly[*p*-phenylene 4,4′-oxy(3,3′-dicarboxy)-dibenzamide]													
(418.36)					16.6							17*1/1	1178
Poly(*p*-phenylene 3,3′, 4,4′-oxydiphenylenetetracarboximide)													
(382.33)					16.9							15*1/1	1178
Poly(*p*-phenylene 1,4-pyromellitamide)													
(326.26)					12.2							12*1/1	1178

TABLE 3. *cont'd*

Polymer	Cryst syst.	Space group	Unit cell parameters a	b	c	Angles	z	Density (g/cm³) Crystal.	Amorph.[a]	Melting point (°C)[a]	Heat of fusion kJ/mol[a]	Chain conform. (n*p/q)	Refs.
Poly(*m*-phenylene pyromellitimide)													
(290.23)	Ortho		7.72	7.18	21.5		4	1.618				10*2/1	1013
Poly(*p*-phenylene pyromellitimide)													
(290.23)					12.3								908
			8.58	5.48	12.3		2	1.667				11*1/1	928
Poly(*p*-phenylenevinylene)													
(102.14)	Mono		7.90	6.05	6.58	$\alpha = 123$	2	1.286				6*1/1	1236
			8.1	6.1	6.6	$\alpha = 123$	2	1.24				6*1/1	1465
–, complex with:													
AsF_5	Ortho		10.10	6.60	6.58		2					6*1/1	1399
ClO_4^-	Ortho		9.40	6.60	6.58		2					6*1/1	1399
$FeCl_3$	Ortho		10.80	6.70	6.6		2					6*1/1	1465
H_2SO_4	Ortho		10.45	6.60	6.58		2					6*1/1	1399
SbF_5	Ortho		10.32	6.60	6.58		2					6*1/1	1399
Poly(2,5-pyrazinecyclobutylene)													
–, 2,4-diphenyl-													
(284.36)	Ortho		10.8	18.4	7.4		4	1.28		321		7*2/1	558
	Ortho	D2h-15	18.36	10.88	7.52		4	1.257		343/723		7*2/1	564
	Ortho	C2v-5	18.36	10.88	7.52		4	1.257				7*2/1	950
	Ortho		18.40	10.89	73.45		4	1.265				7*2/1	1238
Poly(styrene)													
isotactic													
(104.15)	Rho	D3d-6	22.08	22.08	6.626		18	1.113	1.04–	240/10	9.00/89	2*3/1	6
	Rho	D3d-6	21.9	21.9	6.65		18	1.127	1.065/17	250/90	8.37/174	2*3/1	128
	Rho	D3d-6	22.08	22.08	6.594		18	1.118		242/1415	8.5/1415	2*3/1	1388
									1.024				139
								1.114	1.052	235/282	10/1121		411
gel					30.6							4*6/1	1008
	Ortho		21.0	16.4	30.6		48					4*6/1	1009
syndiotactic													
α	Mono	C2h-5	19.84	12.90	5.06	$\gamma = 95$	8	1.072		266/1372	8.6/1407	4*1/1	1418
	Hex	D3h-4	26.26	26.26	5.045		18	1.033		269/1407		4*1/1	1388
	Hex		26.3	26.3	5.1		18	1.02				4*1/1	1470
					5.06					270		4*1/1	1291
					5.08					286/1417		4*1/1	1370
β	Ortho	D2h-16	8.81	28.82	5.06		8	1.077				4*1/1	1418
γ					7.5							4*2/1	1401
					7.7							4*2/1	1419
–, complex with:													
CH_2Cl_2	Ortho	D2h-10	21.4	17.1	7.5		16	1.01				4*2/1	1370
					7.7							4*2/1	1419
C_7H_8	Mono	C2h-5	17.48	13.27	7.71	$\gamma = 122$	8	1.114				4*2/1	1436
	Mono	C2h-5	17.58	13.26	7.71	$\gamma = 121.2$	8	1.100				4*2/1	1474
I_2	Mono	C2h-5	17.29	12.85	7.79	$\gamma = 120.3$	8	2.054				4*2/1	1473
–, *p-tert*-butyl-													
–, –, isotactic													
(160.26)									0.950	300			198
										308/1372			
–, *o*-fluoro-													
–, –, isotactic													
(122.14)	Rho	C3v-6	22.15	22.15	6.63		18	1.296		270/75		2*3/1	123
–, *p*-fluoro-													
–, –, isotactic													
(122.14)					8.30					265/75		2*4/1	67
	Port	D2-4	17.6	12.1	8.25		8	0.924				2*4/1	791
–, α-methyl-													
–, –, isotactic													
(118.18)	Rho				6.6							2*3/1	357
–, –, (*p*-methyl-													
–, –, –, isotactic													
(132.21)										224/888	10.0/888		

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TABLE 3. *cont'd*

Polymer	Cryst syst.	Space group	Unit cell parameters *a*	*b*	*c*	Angles	*z*	Density (g/cm³) Crystal.	Amorph.[a]	Melting point (°C)[a]	Heat of fusion kJ/mol[a]	Chain conform. (*n*∗*p*/*q*)	Refs.
–, *m*-methyl-													
–, –, isotactic													
(118.18)	Tet	S4-1	19.81	19.81	21.74		44	1.012		215		2∗11/3	80
					57.1					215/74		2∗29/8	163
	Tet	C4-5	19.9	19.9	78.9			1.005				2∗40/	431
		or S4-2			57.0							11	103
–, *o*-methyl-													
–, –, isotactic													
(118.18)	Tet	C4v-12	19.01	19.01	8.10		16	1.073		360/74		2∗4/1	125
–, –, *p*-fluoro-													
–, –, –, isotactic													
(136.17)					8.05					360/75		2∗4/1	67
–, *p*-methyl-													
–, –, isotactic													
(118.18)					12.9				1.04/67	205/1402		2∗	103
–, –, syndiotactic													
I.					~7.8					180/1472			1471
										173/1372			
II.					~7.8					200/1472			1471
III.	Ortho	D2h-16	13.36	23.21	5.12		8	0.977				4∗1/1	1471
IV.					~5.1								1471
(mesomorphic)													
V.					~5.1								1471
–, trimethylsilyl-													
–, –, isotactic													
(176.34)					60.4					284			103
Poly[4,4′-(terephthaloyldiamino)-diphenylene pyromellitimide]													
(528.48)	Mono	C2h-5	8.64	5.18	25.38	$\beta = 90$	2	1.545				23∗2/1	1191
Poly[4,4′-(terephthaloyldiamino)-diphenylene *p*-phenyleneditrimellitatediimide]													
(768.69)					37.63							34∗2/1	1191
Poly(*p*-terphenylene pyromellitimide)													
(442.43)					20.9								908
			8.58	5.48	20.9		2	1.495				19∗1/1	928
Poly(2,2′:5′,2″-terthiophene)													
–, 3,3″-dioctyl-													
(470.79)	Ortho		14.7	4.33	23.55		2	1.04				9∗2/1	1486
Poly(4,4′-thiodiphenylene *p*-phenyleneditrimellitatediimide)													
(638.61)	Ortho		6.61	8.02	53.6		4	1.493				27∗2/1	808
Poly(4,4′-thiodiphenylene pyromellitimide)													
(398.39)					29.4								908
	Ortho		8.57	6.37	61.5		8	1.576				16∗4/1	1013
Poly(2,5-thiophene)													
(82.12)	Ortho		7.80	5.55	8.03		4	1.569				3∗2/1	1276
	Mono		7.83	5.55	8.20	$\beta = 96$	4	1.539				3∗2/1	1276
			7.79	5.53	7.7		4	1.64				3∗2/1	1336
	Ortho		7.80	5.55	8.03		4	1.569				3∗2/1	1448
–, 3-decyl-													
α	Mono		22.32	16.76	7.77	$\gamma = 95.5$	8	1.021				3∗2/1	1630
(222.39)													
(at 120°C)	Mono		22.08	16.72	7.76	$\gamma = 95.6$	8	1.036				3∗2/1	1630
β	Mono	C2-2	22.36	17.40	7.77	$\gamma = 90.5$	8	0.977				3∗2/1	1447
	Ortho		23.9	3.8	15.6		4	1.042				3∗4/1	1482
	Mono		51.9	7.74	7.8[b]	$\gamma = 86$	9	0.94				3∗2/1	1487
(at 173 K)	Mono	C2-2	22.54	17.17	7.749	$\gamma = 90.3$	8	0.985				3∗2/1	1447
(at 120°C)	Mono		21.54	17.17	7.750	$\gamma = 90.3$	8	1.0310				3∗2/1	1630
–, 3-dodecyl-													
I. (250.44)	Ortho		25.83	7.75	7.77		4	1.069				3∗2/1	1479
	Ortho		51.9	7.74	8.0		8	1.04				3∗2/1	1481
	Ortho		21.71	3.97	7.8		2	1.24				3∗2/1	1483
II.	Mono		19.8	9.37	8.07	$\gamma = 77$	4	1/140				3∗2/1	1623
–, 3-hexadecyl-													
(306.55)	Ortho		24.74	4.21	7.8		2	1.25				3∗2/1	1483

TABLE 3. *cont'd*

Polymer	Cryst syst.	Space group	Unit cell parameters *a*	*b*	*c*	Angles	*z*	Density (g/cm³) Crystal.	Amorph.[a]	Melting point (°C)[a]	Heat of fusion kJ/mol[a]	Chain conform. ($n*p/q$)	Refs.
–, 3-hexyl-													
(166.28)	Ortho		16.63	7.75	7.77		4	1.069				3*2/1	1479
	Ortho		33.6	7.66	7.7		8	1.11				3*2/1	1481
–, –, iodine doped													
	Ortho		37.25	23.15	7.77		24	1.932				3*2/1	1480
–, 3-methyl- (with 50% CF3S03-)													
(96.15)	Hex		19	19	12.2		22	1.63				6*11/1	1259
–, 3-octyl-													
I. (194.34)	Ortho		41.3	7.63	7.7		8	1.06				3*2/1	1481
	Ortho		17.40	3.61	7.8		2	1.32				3*2/1	1483
	Ortho		20.3	3.81	7.85		2	1.063				3*2/1	1486
	Mono		42.0	7.67	7.8	$\gamma = 87$	8	1.03				3*2/1	1487
II.	Mono		15.3	9.43	8.07	$\gamma = 72$	4	1.166				3*2/1	1623
–, 3-phenyl-													
–, –, 4′-octyl-													
(270.43)	Ortho		28.4	5.06	7.44		2	0.840				3*2/1	1637
–, 3-tetradecyl-													
(278.50)	Ortho		24.73	3.82	7.8		2	1.26				3*2/1	1483
Poly(tridecamethylene pyromellitimide)													
(396.49)					39.2					263			1395
Poly(undecamethylene pyromellitimide)													
(368.43)					32.0					292			1395
Poly(*N*-vinyl carbazole)													
(193.25)	Hex		12.30	12.30	7.44		3	0.988		>320/228		2*3/1	126
	Hex		12.00	12.00	6.47		3	1.193				2*3/1	825
	Ortho		21.6	12.5	7.44		6	0.958				2*3/1	1010
	Phex		12.3	12.3			3					2*3/1	607
	Rho		12.00	12.00	6.39		3	1.208				2*3/1	813
Poly(1-vinyl naphthalene)													
(154.21)	Tet	C4v-12	21.20	21.20	8.10		16	1.125		360/75		2*4/1	122
Poly(2-vinylpyridine)													
(105.14)					6.7					212			185
	Rho	C3-2	15.49	15.49	6.56		9	1.153				2*3/1	861
Poly(*p*-xylylene)													
α	Mono		11.68	6.10	9.16	$\beta = 102.5$	4	1.086		425/142	30.2/82	6*2/1	223
(104.15)	Ortho		21.3	33.6	6.58		31	1.138	1.05	420/219		6*1/1	426
	Mono		5.92	10.64	6.55	$\beta = 134.7$	2	1.179		375/82		6*1/1	595
	Mono		5.9	10.64	6.55	$\beta = 135$	2	1.19		435/1187 400/395 440/546		6*1/1	1181
β	Mono		8.10	5.25	6.53	$\beta = 95$	2	1.250				6*1/1	223
	Rho	C3-1	20.52	20.52	6.55		16	1.158				6*1/1	1011
	Hex		20.52	20.52	6.58		16	1.153		420		6*1/1	426
					6.55					412			224
–, chloro-													
(138.60)	Tri		5.92	12.8	6.55	90,90,135	2	1.312		290/395		6*1/1	1012
	Mono		5.9	12.8	6.55	$\beta = 135$	2	1.32				6*1/1	1181
–, ethyl-													
(132.21)	Mono		5.9	13.4	6.55	$\beta = 135$	2	1.20		170/395		6*1/1	1181
–, isopropyl-													
(146.23)	Mono		5.9	14.1	6.55	$\beta = 135$	2	1.26				6*1/1	1181

[a] The number after the solidus (/) are reference citations.
[b] The unit cell parameter assignment has been changed from that published so as to make *c* the fiber axis.

TABLE 4. POLY(DIENES) AND POLY(DIYNES)

Polymer	Cryst syst.	Space group	Unit cell parameters *a*	*b*	*c*	Angles	*z*	Density (g/cm³) Crystal.	Amorph.[a]	Melting point (°C)[a]	Heat of fusion kJ/mol[a]	Chain conform. (*n*∗*p*/*q*)	Refs.
1,4-Poly(2,3-azabutadiene)													
–, 1,4-diethyl-													
trans-													
(112.18)					4.72							4∗1/1	1504
1,2-Poly(1,3-butadiene)													
syndiotactic													
(54.09)	Ortho	D2h-11	10.98	6.60	5.14		4	0.964		154		4∗1/1	7
isotactic													
	Rho	D3d-6	17.3	17.3	6.5		18	0.96		120		2∗3/1	12
1,4-Poly(1,3-butadiene)													
trans-													
I.	Phex		4.54	4.54	4.9		1	1.03		100/352	10.0/352	4∗1/1	37
(54.09)	Mono	C2h-5	8.63	9.11	4.83	$\beta = 114$	4	1.036		96/451	13.8/451	4∗1/1	496
									0.891	55/624	6.31/624		1195
II. (>65°C)	Phex		4.88	4.88	4.68		1	0.930		141/352	4.61/352	4∗1/1	154
	Hex		4.95	4.95	4.66		1	0.908		148/44	5.99/342	4∗1/1	550
										145/451	4.61/451		
										142/624	3.62/624		
cis-													
	Mono	C2h-5	8.53	8.16	12.66	$\beta = 83.33$	8	0.821		6.3/335	9.2/353		60
	Mono	Cs-4	4.60	9.50	8.60	$\beta = 109$	4	1.011		1		8∗1/1	124
	or	C2h-6							0.902	12/1121			1195
–, 2-*tert*-butyl-													
cis-													
(110.20)	Tri		13.95	20.78	15.3		22	0.908		106		4∗11/3	367
–, chlorinated													
cis-threo-disyndiotactic													
(125.00)	Mono	C2h-4	7.37	5.30	10.10	$\beta = 134$	2	1.463				4∗2/1	768
trans-erythro-diisotactic													
	Mono	C2h-5	7.05	8.05	5.10	$\beta = 100$	2	1.456				4∗1/1	768
–, 2-chloro- [chloroprene]													
trans-													
(88.54)	Ortho	D2-4	8.84	10.24	4.79		4	1.356		115/229	8.37/81	4∗1/1	40
	Ortho		9.0	8.23	4.79		4	1.658		80/81		4∗1/1	109
cis-													
										70/1157			
–, 1-cyano													
trans-													
(79.10)					4.8							4∗1/1	275
–, 2,3-dichloro-													
trans-													
I.					4.86								221
(122.98)	Mono	C2h-5	5.34	9.95	4.80	$\beta = 93.5$	2	1.604				4∗1/1	565
II.	Ortho	C2v-9	8.81	12.34	4.80		4	1.565				4∗1/1	699
–, –, thiourea complex													
	Mono	C2Hh5	9.87	15.83	12.53	$\beta = 114.1$		1.44					565
	Mono	C2h-5	9.91	15.85	12.5	$\beta = 114.1$		1.44					803
–, 2,3-dimethyl-													
trans-													
(82.15)					4.35					260			104
	Ortho	C2v-9	9.13	13.00	4.70		4	0.978		272/221		4∗1/1	699
cis-													
					7.0					198			220
–, –, thiourea complex													
	Mono	C2h-5	10.40	15.47	12.5	$\beta = 114.4$		1.22					803
–, 2-methyl- [isoprene]													
trans-													
α					8.70					80/1121	13/1121	4∗2/1	288
(68.12)					8.76						10/1128		502
	Mono	C2h-5	7.98	6.29	8.77	$\beta = 102$	4	1.051					715
									0.905				1127
β (LM)	Ortho	D2-4	7.78	11.78	4.72		4	1.046		65/46	8.0/1128	4∗1/1	40
	Ortho		7.85	11.9	4.8[b]		4	1.009		64/81	10.6/287	4∗1/1	288

TABLE 4. *cont'd*

Polymer	Cryst syst.	Space group	Unit cell parameters a	b	c	Angles	z	Density (g/cm³) Crystal.	Amorph.[a]	Melting point (°C)[a]	Heat of fusion kJ/mol[a]	Chain conform. (n*p/q)	Refs.
	Ortho		7.83	11.87	4.75		4	1.025		82/287		4*1/1	502
									0.906	78/630			1195
										78/568			
										80/1170			
δ (HM)	Mono		5.9	7.9	9.2	$\gamma = 94$	4	1.06		74/81	12.7/81	4*2/1	502
			7.84	5.99			4			80/287			492
										87/568			
										89/1170			
ε			7.80	6.29									492
cis-													
	Mono	C2h-5	12.46	8.89	8.10	$\beta = 92$	8	1.009	0.906/53	28/81	4.40/81	8*1/1	40
			25.2	8.97	8.20[b]		16	0.976	0.910/47	36/50	4.6/1195	8*1/1	288
	Ortho	D2h-15								14/287		8*1/1	124
	Mono		26.3	8.9	8.15[b]	$\gamma = 109.5$	16	1.01		36/1169			1019
	Ortho		12.4	8.9	8.15[b]		8	1.101					1019
–, –, 3-chloro-													
trans-													
(102.56)					4.9							4*1/1	165
–, –, hydrochlorinated													
(104.58)	Port	C2h-5	5.83	10.38	8.95	$\beta = 90$	4	1.282		115		4*2/1	229
	Ortho		11.9	10.4	9.1[b]		8	1.23		110		4*2/1	70
–, 2-methylacetoxy-													
trans-													
(126.15)	Ortho		16.2	9.3	4.75		4	1.17		135		4*1/1	165
–, perhydrotriphenylene complex													
trans-													
2 phtp/monomer	Hex	C6h-2	14.26	14.26	4.78		1	1.079		183/1124			798
cis-													
–, 2-propyl-													
trans-													
(96.17)			10.95	6.65	9.2		4	0.95		42		8*1/1	368
										42/368			
–, urea complex													
	Hex	D6-2	8.22	8.22	11.01								827
1,4-Poly(1,3-butadiyne)													
–, 1,4-(4,4′-diphenyleneglutarate)-													
(330.34)	Mono	C2h-6	23.12	7.87	9.69	$\beta = 111.29$	4	1.336				4*2/1	948
	Mono	C2h-6	20.8	8.0	9.7	$\beta = 106$	4	1.41				4*2/1	913
Poly(chloroprene), see Poly(butadiene), 2-chloro-													
1,12-Poly(1,11-dodecadiyne)													
macromonomer	Mono	C2h-5	13.25	7.63	14.15[b]	$\gamma = 118.5$	4	0.847				12*1/1	1022
(160.26)													
cross-polymer	Mono	C2h-5	9.17	9.92	12.2	$\gamma = 123.5$	4	1.146					1022
5,8-Poly(5,7-dodecadiynediol)													
–, 1,12-bis(*N*-butoxycarbonyl)methylurethane-													
(508.61)			5.33	54.36	4.88		2	1.195				4*1/1	1319
	Ortho	D2-3	53.86	10.98	4.880		4	1.170				4*1/1	1329
–, 1,12-bis(ethylurethane)-													
(336.43)	Mono	C2h-5	18.30	10.78	4.89[b]	$\gamma = 95$	2	1.163				4*1/1	1318
	Mono		18.13	10.81	4.89[b]	$\gamma = 94$	2	1.169				4*1/1	1320
(hi temp)	Mono	C2h-5	19.93	9.58	4.83[b]	$\gamma = 91$	2	1.212				4*1/1	1318
	Mono		18.9	10.89	4.83[b]	$\gamma = 91$	2	1.124				4*1/1	1320
–, 1,12-bis(phenylurethane)-													
(432.52)	Mono	C2h-5	6.229	39.03	4.909	$\beta = 106.85$	2	1.258				4*1/1	95
	Mono	C2h-5	6.205	39.16	4.90[b]	$\beta = 106.42$	2	1.259				4*1/1	1353
–, 1,12-bis(*p*-toluylsulfonyl)-													
(502.64)	Tri	Ci-1	20.13	6.11	4.91	95,94,89	1	1.391				4*1/1	381
(110 K)	Tri	Ci-1	20.01	6.02	4.91	95,94,89	1	1.420				4*1/1	381
10,13-Poly(10,12-heptacosadiynoic acid)													
(as Li salt)			65										1268
(400.65)													

TABLE 4. *cont'd*

Polymer	Cryst syst.	Space group	Unit cell parameters *a*	*b*	*c*	Angles	*z*	Density (g/cm³) Crystal.	Amorph.[a]	Melting point (°C)[a]	Heat of fusion kJ/mol[a]	Chain conform. (*n*∗*p*/*q*)	Refs.
1,4-Poly(1,3-heptadiene)													
trans-													
isotactic													
(96.17)	Mono	C2-2	8.62	7.95	4.85	$\beta = 99$	2	0.973		85/371		4∗1/1	375
–, 6-methyl-													
trans-													
isotactic													
(110.20)					4.85					119		4∗1/1	371
1,4-Poly(1,3-hexadiene)													
trans-													
isotactic													
(82.15)	Ortho	D2-4	14.02	8.02	4.85		4	1.000		82/371		4∗1/1	274
–, 5-methyl-													
trans-													
isotactic													
(96.17)					4.85					88		4∗1/1	371
2,5-Poly(2,4-hexadiene)													
trans-erythro-diisotactic													
(82.15)					2.3					84		2∗1/1	525
–, 2,5-dimethyl-													
trans-													
(110.20)					4.8					265		4∗1/1	183
										265/376			
2,5-Poly(2,4-hexadienedioic acid)													
trans-erythro-diisotactic													
–, diisopropyl ester													
(226.27)	Ortho		14.16	10.28	9.70		4	1.064		230/420		8∗1/1	420
2,5-Poly(2,4-hexadienoic acid)													
trans-erythro-diisotactic													
–, 6-amino-													
0.5 $CdCl_4$/unit	Tri	Ci-1	9.67∗	10.70	17.79	93,90,90	8	1.838		347		4∗2/1	1123
(254.25)	Tri	Ci-1	7.214	7.245	18.59	104,97,96	4	1.823				8∗1/1	1188
–, –, hydrochloride													
(163.60)										334			1123
–, butyl ester													
(168.24)	Ortho		11.36	9.70	4.80		2	1.056				4∗1/1	384
–, ethyl ester													
(140.18)					4.80							4∗1/1	384
–, isoamyl ester													
(182.26)					4.80							4∗1/1	384
–, isobutyl ester													
(168.24)					4.80							4∗1/1	384
–, isopropyl ester													
(154.21)					4.80							4∗1/1	384
–, methyl ester													
(126.16)					4.80							4∗1/1	384
					4.8							4∗1/1	1208
trans-threo-diisotactic													
–methyl ester													
(126.16)					9.4							4∗2/1	1208
2,5-Poly(2,4-hexadiyne)													
–, 1,6-di(*N*-carbazoyl)-													
(408.50)	Mono	C2h-5	13.03	17.55	4.92[b]	$\gamma = 108.7$	2	1.273				4∗1/1	951
	Mono	C2h-5	12.82	17.33	4.886[b]	$\gamma = 108.3$	2	1.316				4∗1/1	611
	Mono	C2h-5	12.87	17.40	4.907[b]	$\gamma = 108.3$	2	1.300				4∗1/1	830
–, –, hexabromo-													
	Mono		14.21	20.67	4.75[b]	$\gamma = 106.8$						4∗1/1	1503
2,5-Poly(2,4-hexadiynediol)													
(50 mrad)	Mono	C2h-5	4.176	15.78	4.703	$\beta = 110.34$	2	1.258				4∗1/1	903
(″ annld)	Mono	C2h-5	4.115	16.05	4.819	$\beta = 106.08$	2	1.196				4∗1/1	903
(110.11)	Mono		4.109	16.09	4.793	$\beta = 106.4$	2	1.203				4∗1/1	904
–, 1,6-bis(ethylurethane)-													
(252.27)	Mono	C2h-5	15.14	17.96	4.88	$\gamma = 98.42$	4	1.277				4∗1/1	1240

TABLE 4. *cont'd*

Polymer	Cryst syst.	Space group	Unit cell parameters a	b	c	Angles	z	Density (g/cm³) Crystal.	Amorph.[a]	Melting point (°C)[a]	Heat of fusion kJ/mol[a]	Chain conform. (n*p/q)	Refs.
–, 1,6-bis(phenylsulfonyl)-													
–, –, di-*p*-fluoro-													
(426.41)	Mono	C2h-5	13.93	14.06	4.90[b]	$\gamma = 113.3$	2	1.606				4*1/1	1378
	Mono	C2h-5	13.89	14.10	4.91[b]	$\gamma = 113.2$	2	1.602				4*1/1	1379
	Mono	C2h-5	13.96	14.10	4.914[b]	$\gamma = 113.56$	2	1.597				4*1/1	1380
–, –, di-*p*-methoxy-													
(450.48)	Tri	Ci-1	12.72	8.543	4.902[b]	110,103,79	1	1.542				4*1/1	1021
–, 1,6-bis(phenylurethane)-													
I. (348.36)	Tri	Ci-1	16.78	12.53	4.89[b]	84,83,69	2	1.340				4*1/1	716
(5 dioxane/unit)					4.9								749
II.					4.9							4*1/1	749
III.					4.9							4*1/1	749
–, 1,6-bis-(*p*-toluylsulfonyl)-													
I. (418.48)	Mono	C2h-5	14.49	14.94	4.910[b]	$\gamma = 118.14$	2	1.482		102/1020	35/1020	4*1/1	898
	Mono	C2h-5	14.53	14.96	4.912[b]	$\gamma = 118.21$	2	1.477				4*1/1	1277
	Mono	C2h-5	14.91	14.48	4.93	$\gamma = 118.0$	2	1.479				4*1/1	1381
II. (120 K)	Mono	C2h-5	14.93	25.56	4.910[b]	$\gamma = 92$	4	1.484				4*1/1	899
–, 1-(*p*-toluylsulfonyl)-6-(*p*-fluorophenylsulfonyl)-													
I. (422.44)	Mono		14.22	14.52	4.909[b]	$\gamma = 116.1$	2	1.541				4*1/1	1337
II. (143 K)	Mono		14.10	14.43	4.906[b]	$\gamma = 116.3$	2	1.566				4*1/1	1337
Poly(isoprene), see Poly(butadiene), 2-methyl-													
10, 13-Poly(10,12-nonacosadiynoic acid)													
(as Li salt)	Ortho		70	8.11	4.89		4	1.04				4*1/1	1268
(428.70)													
1,9-Poly(1,8-nonadiyne)													
macromonomer	Mono	C2-2	7.88	5.67	21.00[b]	$\gamma = 90.8$	4	0.837				9*2/1	1023
(118.18)													
cross-polymer	Mono	C2h-5	9.30	17.5	4.85	$\beta = 101.71$	4	1.016				9*2/1	1023
1,4-Poly(1,3-octadiene)													
trans-													
isotactic													
(110.20)					4.85					87		4*1/1	371
2,5-Poly(2,4,6-octatriynediol)													
(134.14)	Mono	C2h-5	4.11	19.59	4.80	$\beta = 109$	2	1.219				4*1/1	780
–, 1,8-bis(phenylurethane)-													
(372.38)	Mono	C2h-5	24.65	30.74	4.89	$\beta = 92.2$	8	1.336				4*1/1	780
10,13-Poly(10,12-pentacosadiynoic acid)													
(as Li salt)			60										1268
(372.59)													
1,2-Poly(1,3-pentadiene)													
trans-													
syndiotactic													
(68.12)					5.1					10		4*1/1	230
–, 4-methyl-													
isotactic													
II.	Tet	D2d-10	17.80	17.80	36.50		72	0.849		167/707		2*18/5	488
(82.15)													
syndiotactic													
I.					11.73							12*1/1	1502
II.					5.05							4*1/1	1502
1,4-Poly(1,3-pentadiene)													
trans-													
isotactic													
(68.12)	Ortho		19.73	4.85	4.8		4	0.98		95		4*1/1	189
	Ortho	D2-4	19.80	4.86	4.85		4	0.969		104/1126		4*1/1	200
cis-													
isotactic													
	Ortho	D2-4	9.47	5.97	8.15		4	0.982				4*2/1	844
					8.15					44		4*2/1	263
syndiotactic													
	Mono	C2h-5	6.34	9.12	8.50	$\beta = 105.9$	4	0.957				8*1/1	1431
					8.50					53		8*1/1	234

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TABLE 4. *cont'd*

Polymer	Cryst syst.	Space group	Unit cell parameters *a*	*b*	*c*	Angles	*z*	Density (g/cm³) Crystal.	Amorph.[a]	Melting point (°C)[a]	Heat of fusion kJ/mol[a]	Chain conform. (*n*∗*p*/*q*)	Refs.
–, 2-methyl-													
trans-													
isotactic													
(RT)	Mono	C2h-5	12.89	9.186	4.820[b]	$\beta=93.5$	4	0.958		195/1365		4∗1/1	1317
(82.15)													
(153 K)	Mono	C2h-5	12.78	9.084	4.824[b]	$\beta=93.6$	4	0.977				4∗1/1	1317
cis-													
isotactic													
α (– 130)	Ortho	D2h-15	10.74	13.04	7.87		8	0.990		175		4∗2/1	1364
β (RT)	Ortho	D2-4	9.30	7.73	7.90		4	0.961		165		4∗2/1	1364
										165/1365			
–, 3-methyl-													
cis-													
isotactic													
(82.15) I.					8.02							∗2/1	1497
II.					6.97							∗3/1	1497
syndiotactic													
II.					8.6							8∗1/1	1501
1,4-Poly(1,3-pentadiynol)													
–, 1-*N*-carbazoly-													
(245.28)	Mono	C2h-5	16.49	19.51	4.873[b]	$\gamma=124.27$	4	1.257				4∗1/1	1354
2,5-Poly(5-phenyl-2,4-pentadienoic acid)													
trans-erythro-diisotactic													
–, butyl ester													
(230.31)					4.80							4∗1/1	384
–methyl ester													
(188.23)					4.80							4∗1/1	384
1,24-Poly(1,11,13,23-tetracostetrayne)													
cross-polymer	Mono	C2h-4	26.8∗	8.254	4.91∗	$\gamma=119.6$	2	1.136					1264
(322.54)													

[a] The number after the solidus (/) are reference citations.
[b] The unit cell parameter assignment has been changed from that published so as to make *c* the fiber axis.

TABLE 5. POLY(PEPTIDES) -(NH–CHR–CO)-

Polymer	Cryst syst.	Space group	Unit cell parameters *a*	*b*	*c*	Angles	*z*	Density (g/cm³) Crystal.	Amorph.[a]	Melting point (°C)[a]	Heat of fusion kJ/mol[a]	Chain conform. (*n*∗*p*/*q*)	Refs.
Poly(L-alanine)													
α helix	hex		8.55	8.55	70.3		47	1.246				3∗47/13	507
(71.08)													
β	Ortho		4.79	10.7	6.88		4	1.339				3∗2/1	507
	Ortho		4.734	10.54	6.89		4	1.373				3∗2/1	509
–, phenyl-													
α helix	Hex		11.55	11.55								3∗18/5	1025
(147.18)													
ω helix	Tet		11.28	11.28	5.91		4	1.300				3∗4/1	1024
	Tet		12.86	12.86	5.59		4	1.057				3∗4/1	1025
Poly(β-alanine), see Poly(3-aminopropionic acid)													
Poly(L-alanyl-D-alanyl-L-alanyl-D-valine)													
(312.37)	Ortho		9.5	31.0	11.0		8	1.281				12∗1/1	1046
Poly(L-alanyl-L-alanylglycine)													
(200.22)	Ortho		9.44	9.96	20.94[b]		8	1.351				9∗2/1	753
–phenyl- [2nd alanyl]													
(275.31)					15							9∗	774
Poly(L-alanyl-L-alanylglycyl-L-prolyl-L-prolylglycine)													
(450.49)	Ortho		10.5		29.5							18∗	755
Poly(L-alanyl-D-alanyl-L-valyl-D-valine)													
(340.42)	Ortho		9.5	34.1	11.0		8	1.269				12∗1/1	1046

TABLE 5. *cont'd*

Polymer	Cryst syst.	Space group	Unit cell parameters *a*	*b*	*c*	Angles	*z*	Density (g/cm³) Crystal.	Amorph.[a]	Melting point (°C)[a]	Heat of fusion kJ/mol[a]	Chain conform. ($n*p/q$)	Refs.
Poly(L-alanyl-4-aminobutyric acid)													
(156.18)	Ortho		9.4	9.9	9.2		4	1.21				8*1/1	969
Poly(L-alanyl-6-aminocaproic acid)													
(184.24)	Ortho		9.4	9.8	11.5[b]		4	1.16				10*1/1	969
Poly(L-alanyl-3-aminopropionic acid)													
(142.16)	Ortho		9.4	9.8	16.1[b]		8	1.27				7*2/1	969
Poly(L-alanyl-11-aminoundecanoic acid)													
(254.37)	Ortho	D2-5	4.79	10.35	29.8		4	1.144				15*2/1	1619
Poly(L-alanyl-5-aminovaleric acid)													
(170.21)	Ortho		9.4	10.7	20.7[b]		8	1.09				9*2/1	969
Poly(L-alanyl-L-glutamylglycine)													
–, γ-ethyl-													
(285.30)	Mono		9.54	8.54	21.36[b]	$\gamma=106$	4	1.133				9*2/1	756
Poly(L-alanylglycine)													
I. (128.13)	Ortho		9.42	8.87	6.95[b]		4	1.466				6*1/1	591
	Ortho		9.44	8.96	6.94[b]		4	1.450				6*1/1	754
II.	Ortho		4.72	14.4	9.6		4	1.30				6*2/1	741
Poly(L-alanylglycyl-L-alanylglycyl-L-alanylglycyl-L-alanylglycyl-L-alanylglycyl-L-glutamylglycine)													
(990.98)	Ortho		9.64	9.62	48.65		4	1.459				42*1/1	1648
Poly(L-alanylglycyl-L-alanylglyclyl-L-alanylglycyl-L-alanylglycyl-L-alanylglycyl-L-glutamylglycine)													
(850.84)	Ortho		9.57	9.70	41.70		4	1.460				36*1/1	1648
Poly(L-alanylglycyl-L-alanylglycyl-L-alanylglycyl-L-alanylglycyl-L-glutamylglycine)													
(710.70)	Ortho		9.48	10.28	34.75		4	1.394				30*1/1	1648
Poly(L-alanylglycyl-L-alanylglycyl-L-alanylglycyl-L-glutamylglycine)													
I. (570.56)	Ortho		9.48	17.34	18.8		4	1.226				24*1/1	1633
II.	Ortho		9.48	10.60	27.80		4	1.356				24*1/1	1648
Poly(L-alanylglycyl-L-alanylglycyl-L-serylglycine)													
(400.39)	Ortho		9.39	9.05	20.55[b]		4	1.522				18*	754
Poly(L-alanylglycyl-L-alanyl-L-prolyglycyl-L-proline)													
(450.49)	Ortho		10.5		29.5							18*	755
Poly(L-alanylglycylglycine)													
II. (185.18)	Mono		8.86	22.0	9.42	$\beta=90$	9	1.507				9*1/1	596
(monohydrate)	Mono	C2-2	11.0	4.8	9.45	$\beta=90$	2	1.35				9*1/1	740
Poly(L-alanylglycylglycylglycine)													
II. (242.24)	Hex		4.89	4.89	36.60		3	1.592				12*3/1	740
Poly(L-alanylglycyl-L-proline)													
dry	Hex		11.9	11.9	28.8		10	1.06				9*10/3	614
wet	Hex		11.4	11.4	9.3		3	1.07				9*3/1	614
(225.25)													
Poly(L-alanylglycyl-L-prolyl-L-prolyglycyl-L-proline)													
(476.53)	Ortho		10.6		28.7							18*	755
Poly(L-alanyl-L-prolyglycine)													
with H_2O	Mono	C2-2	8.6	7.2	9.4	$\beta=90$	2	1.4				9*1/1	616
(225.25)													
Poly(L-alanyl-L-prolylglycyl-L-prolyl-L-prolylglycine)													
(476.53)	Hex		11.9	11.9	29.5		5	1.093				18*	755
Poly(L-alanyl-D-valine)													
(170.21)	Port		9.7	14.7	6.2		4	1.28				6*1/1	1176
	Ortho		9.5	29.4	11.1		16	1.459?				6*2/1	1046
Poly(2-aminoisobutyric acid)													
(85.11)	Hex		8.7	8.7	5.96		3	1.08				3*3/1	967
–, dichloroacetic acid complex													
(106.60)	Hex	C3v-6	21.8	21.8	5.95		18	1.301				3*3/1	1053
(1 DCA/6 residues)													
Poly(L-arginine)													
–, hydrochloride													
α helix	Hex		14.7	14.7	27.0		18	1.406				3*18/	641
(2.5 H_2O/residue)													
(192.65)													
β	Mono		9.26	22.05	6.76	$\gamma=108.9$	4	1.438				3*2/1	641
(>5 H_2O/residue)													

TABLE 5. *cont'd*

Polymer	Cryst syst.	Space group	Unit cell parameters *a*	*b*	*c*	Angles	*z*	Density (g/cm³) Crystal.	Amorph.[a]	Melting point (°C)[a]	Heat of fusion kJ/mol[a]	Chain conform. ($n*p/q$)	Refs.
Poly(L-aspartic acid)													
–, β-benzyl-													
ω helix	Tet		13.85	13.85	5.30		4	1.341				3*4/1	582
(205.21)	Tet		13.80	13.80	5.42		4	1.320				3*4/1	703
	Tet		13.88	13.88	5.3		4	1.34				3*4/1	837
racemic	Ortho		21.4	4.28	5.68		2	1.310				3*2/1	1026
–, –, *p*-chloro-													
α helix	Hex	D6-3	14.9	14.9	27.0		18	1.380				3*18/5	606
(239.66)	Hex		14.8	14.8	27		4	1.40				3*18/5	1505
ω helix	Tet	D4-4	23.3	23.3	5.20		8	1.128				3*4/1	606
	Mono		16.4	13.4	5.2	γ=99	18	1.41				3*4/1	1505
–, –, *p*-methyl-													
α helix (219.24)	Hex		14.9	14.9	27		4	1.26				3*18/5	1505
ω helix	Mono		16.6	13.4	5.28	γ=108	4	1.304				3*4/1	1505
–, α-*n*-butyl-													
I. (171.20)	Hex		13.5	13.5	19.9		13	1.177				4*13/4	1507
	Phex	C2-2	13.45	13.45	20.6	γ=120	13	1.145				4*13/4	1508
II.	Tet	C4-2	14.15	14.15	4.90		4	1.338				4*4/1	1508
–, α-ethyl-													
–, –, 2-methoxy-													
(173.17)	Phex	C2-2	12.40	12.40	20.74	γ=120	13	1.354				4*13/4	1508
–, β-ethyl-													
–, –, 2-phenyl-													
α helix (219.24)	Tet		13.2	13.2	27.0		18	1.393				3*18/5	1027
β	Ortho		17.7	4.76	6.83		2	1.265				3*2/1	1027
π helix	Ortho		20.3	11.7	19.89		17	1.310				3*17/4	1028
>200°C	Hex		17.1	17.1	19.89		17	1.229				3*17/4	1028
?	Hex		23.4	23.4									1027
–, α-isobutyl-													
I. (171.20)	Ortho		13.5	23.4	19.9		26	1.176		286/1310		4*13/4	1312
	Hex		13.5	13.5	19.9		13	1.177				4*13/4	1506
II.	Tet		14.0	14.0	4.95		4	1.172				4*4/1	1312
	Tet		13.98	13.98	4.94		4	1.178				4*4/1	1506
–, β-*n*-propyl													
β (157.17)	Mono	C2-2	9.57	25.08	6.79[b]	γ=96	8	1.288				3*2/1	579
–, –, 3-phenyl-													
(232.26)	Hex		15.6	15.6	10.5		7	1.220				3*7/2	1628
(at 140°C)	Ortho		28.0	16.1	10.5		14	1.141				3*7/2	1628
Poly(L-cysteine)													
–, s-benzyloxycarbonyl-													
β													
I. (237.27)	Ortho		4.76	32.4	6.95[b]		4	1.470				3*2/1	578
II.	Ortho		4.89	32.8	6.89[b]		4	1.426				3*2/1	578
–, *s*-benzylthio-													
ω helix (225.32)	Tet	C4-2	14.28	14.28	5.55		4	1.322				3*4/1	1029
Poly(2,4-diaminobutyric acid)													
–, *N*-benzyloxycarbonyl-													
(234.26)	Rho		27.5	27.5	27.0		56	1.232				3*18/5	720
Poly(D-glutamic acid)													
–, γ-benzyl-													
–, –, chloro-													
meta (253.68)	Phex		15.30	15.30	26.99	γ=60.23	18	1.382				3*18/5	932
ortho	Phex		15.07	15.07	27.15	γ=60.03	18	1.420				3*18/5	932
para	Ortho		15.24	26.40	10.68		14	1.372				3*7/2	932
	Hex		15.24	15.24	10.67		7	1.374				3*7/2	1033

TABLE 5. *cont'd*

Polymer	Cryst syst.	Space group	Unit cell parameters a	b	c	Angles	z	Density (g/cm³) Crystal.	Amorph.[a]	Melting point (°C)[a]	Heat of fusion kJ/mol[a]	Chain conform. (n*p/q)	Refs.
–, γ-*n*-hexyl-													
α helix	Hex		15.89	15.89	27		18	1.08				3*18/5	859
(213.27)													
–, γ-methyl-													
α helix	Hex		12.0	12.0								3*18/5	1162
(143.14)													
β	Ortho		9.49	19.09	7.07		8	1.484				3*2/1	954
			9.44	23.37	6.81	γ=90	8	1.266					812
Poly(L-glutamic acid)													
β													
I.	Mono		9.66	9.10	6.98[b]	γ=105	4	1.447				3*2/1	585
(129.12)	Mono		9.79	9.35	6.82[b]	γ=105	4	1.422				3*2/1	966
II.	Mono		9.75	8.06	6.84[b]	γ=104	4	1.644				3*2/1	966
	Ortho		4.95	15.6	6.90		4	1.610				3*2/1	836
–, γ-*n*-amyl-													
(199.25)	Hex		15.1	15.1	(27)		18	1.12				3*18/5	1040
	Hex		15	15	27		18	1.13				3*18/5	1279
–, γ-benzyl-													
α helix													
A.	Mono		15.3	14.6		γ=121.7						3*18/5	1030
(219.24)	Hex		30	30			72					3*18/5	952
B.	Tri		15.25	15.25	27.0	84,84,122	18	1.257				3*18/5	587
	Mono		25.2	15.0	26.8	γ=122.5	30	1.278				3*18/5	702
	Mono		15.88	13.00	27.1	γ=113.7	18	1.279				3*18/5	952
(dry)	Ortho		14.76	25.40	64.11		86	1.303				*43/12	757
	Mono		29.06	13.20	27.27	β=96	36	1.260				3*18/5	1030
C.	Hex		14.95	14.95	27.1	γ=56	18	1.305				3*18/5	584
(racemic)	Hex		14.95	14.95	106		71	1.260				*71/20	584
	Mono		15.05	14.78	27	γ=119.4	18	1.252				3*18/5	1030
	Hex		14.8	14.8	10.50		7	1.279				3*7/2	1030
D.	Hex		39.05	39.05	10.58		49	1.277				3*7/	953
E.	Hex		64.36	64.36	10.5			1.285				3*7/2	1030
single crystal	Mono		5.52	5.11	22.25	β=97.8	2	1.171					926
racemic mixture													
I.	Ortho		24.4	15.4									1031
II.	Mono		25.6	15.6		γ=107.7							1031
–, –, chloro-													
meta	Hex		15.50	15.50	27.10		18	1.345				3*18/5	1032
(racemic)	Hex		15.49	15.49	26.84		18	1.360				3*18/5	1035
(253.68)													
ortho	Ortho		26.50	30.60	27.02		72	1.384				3*18/5	1032
(racemic)	Hex		15.24	15.24	27.23		18	1.384				3*18/5	1034
para	Ortho		15.24	26.40	10.67		14	1.374				3*7/2	1032
(racemic)	Ortho		15.12	26.09	10.72		14	1.394				3*7/2	932
–, γ-*n*-butyl-													
(185.22)	Phex		14.1	14.1	(27)	γ=114	18	1.13				3*18/5	1040
(at 100°C)	Ortho		25.4	14.66	27		36	1.101				3*18/5	1040
–, γ-calcium													
β (wet)	Mono	C2-2	9.40	12.82	6.83[b]	γ=100.3							585
–, γ-*n*-dodecyl-													
(297.44)	Hex		27.6	27.6									1292
–, γ-ethyl-													
α helix													
I.	Phex		12.5	12.5	27.0	γ=110	18	1.18				3*18/5	826
(157.17)	Phex		12.16	12.16	108.9	γ=109.5	73	1.255				*73/20	955
					16.4							3*11/3	1036
T.	Tet		11.72	11.72	108.9		73	1.274				3*73/20	955
III.	Phex		12.9	12.9	108.9	γ=123	73	1.25				3*73/20	955
H.	Ortho		22.95	13.25	108.9			1.151				3*73/20	955
–, –, 2-chloro-													
(191.61)	Phex		11.7	11.7	16.56	γ=118.7	11	1.760				3*11/3	1036
–, –, 2-phenyl-													
(233.27)	Hex		15.60	15.60	(27)			1.225				3*18/5	1038
	Ortho		15.38	26.65	54.4		72	1.251				3*18/5	1039

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TABLE 5. *cont'd*

Polymer	Cryst syst.	Space group	Unit cell parameters *a*	*b*	*c*	Angles	*z*	Density (g/cm³) Crystal.	Amorph.[a]	Melting point (°C)[a]	Heat of fusion kJ/mol[a]	Chain conform. (*n*∗*p*/*q*)	Refs.
–, γ-*n*-hexyl-													
(213.28)	Hex		15.8	15.8	27		18	1.09				3∗18/5	1040
	Hex		15.5	15.5	27		18	1.14				3∗18/5	1279
–, γ-methyl-													
α helix	Hex		11.96	11.96	27.5		18	1.256				3∗18/5	588
(143.14)	Hex	11.95	11.95	27.0			18	1.281				3∗18/5	576
	Hex		11.79	11.79	26.9		18	1.321				3∗18/5	858
					97.26		65	(1.284)				∗65/18	583
	Ortho		11.95	20.70	43.2		58	1.290				3∗29/8	589
	Hex		11.82	11.82	103.0		69	1.316				∗69/19	1204
	Hex		11.58	11.58	26.33		18	1.399				3∗18/5	1650
precursor to α (3 chloroform/18 mers)													
	Hex		12.75	12.75	27.0		18	1.282				3∗18/5	1293
	Hex		12.75	12.75	26.9		18	1.287				3∗18/5	1338
(at 170°C)	Rho		21.27	21.27	176.0			1.210				117/32	1204
β			4.725		6.83							3∗2/1	702
	Ortho		4.70	21	6.83		4	1.410				3∗2/1	1037
–, –, dimethyl phthalate complex													
25%	Hex		27.6	27.6			72					3∗18/5	1041
extracted	Phex		23.9	24.9	27	γ = 121.4	72	1.248				3∗18/5	1041
–, γ-*n*-octyl-													
(241.33)	Hex		17.1	17.1	27		18	1.06				3∗18/5	1279
–, γ-*n*-propyl-													
(171.20)	Phex		14.4	14.4	(27)	γ = 130	18	1.19				3∗18/5	1040
(at 150°C)	Ortho		24.6	14.2	60.0		80	1.085				∗40/11	1040
	Rho		24.3	24.3	60.0		120	1.112				∗40/11	1533
–, –, 3-phenyl-													
(247.29)	Hex		16.30	16.30	(27)		18	1.190				3∗18/5	1038
–, γ-sodium													
α helix	Hex		15.9	15.9									794
(hydrated)													
β (wet)	Port		14.4	7.0∗	4.7								794
Poly(L-glutamine)													
–, *N*5-(4-hydroxybutyl)-													
(200.24)	Ortho		14.8	12.4	60.4		40	1.200				3∗40/11	935
–, *N*5-(2-hydroxyethyl)-													
(172.18)	Ptet		12.1	12.1	27		18	1.30				3∗18/5	968
–, *N*5-(3-hydroxypropyl)-													
(186.21)	Ortho		14.6	12.3	43.2		29	1.156				3∗29/8	924
Poly(D-glutamyl-L-glutamic acid)													
–, γ-benzyl-													
α helix	Hex		15.2	15.2	28		19	1.235				3∗19/5	885
(219.24)	Hex		14.9	14.9	26.6		18	1.281				6∗9/5	1042
	Hex		26.0	26.0	32.4		66	1.267				6∗11/6	1272
β	Hex		22.9	22.9	9.46		16	1.356				6∗1/1	1042
	Ortho		9.52	22.5									1215
ω helix			27	15.8									885
	Ortho		26.92	15.54	5.40		8	1.289				6∗2/1	1042
	Ortho		27.1	15.5	5.40		8	1.284				6∗2/1	1272
π helix	Hex		17.0	17.0	25.6		22	1.250				6∗11/5	885
	Hex		17.0	17.0	25.6		22	1.250				6∗11/5	1272
π–π 5.6	Hex		18.2	18.2	56.3		56	1.262				6∗14/5	1214
π–π 7.2	Hex		22.6	22.6	53.1		72	1.116				6∗18/5	1214
π–π 9.0	Mono		25.3	24.4	20.2	γ = 117	36	1.180				6∗9/2	1214
π–π 10.8	Mono		26.4	25.6	50.0	γ = 118		1.318				6∗27/5	1214
–, γ-ethyl-													
–, –, 2-phenyl-													
α helix	Hex		15.9	15.9	26.5		18	1.204				6∗9/5	1042
(233.27)	Hex		27.5	27.5	32.4		66	1.205				6∗11/6	1272
β	Hex		24.2	24.2	4.75		8	1.286				6∗1/1	1042
π helix	Hex		17.6	17.6	25.7		22	1.236				6∗11/5	1272
Poly(glycine)													
I. (57.05)			4.77	4.77	7.0	γ = 66	2	1.30		365/795		3∗2/1	581
	Mono	C2h-5	9.54	3.67	7.044[b]	γ = 113	4	1.669				3∗2/1	1239

TABLE 5. *cont'd*

Polymer	Cryst syst.	Space group	Unit cell parameters *a*	*b*	*c*	Angles	*z*	Density (g/cm³) Crystal.	Amorph.[a]	Melting point (°C)[a]	Heat of fusion kJ/mol[a]	Chain conform. ($n*p/q$)	Refs.
II.	Hex	C3-2	4.8	4.8	9.3		3	1.53				3*3/1	273
Poly(glycyl-6-aminocaproic acid)													
I. (170.21)	Hex		4.79	4.79	35.1		3	1.216		276/1524		10*3/1	1311
II.	Mono		4.76		3.96	$\beta=113$							1311
Poly(glycyl-12-aminododecanoic acid)													
II. (254.37)	Hex		4.79	4.79	112.8		6	1.131		230/1524		6*16/1	1512
Poly(glycyl-3-aminopropionic acid)													
I. (128.13)	Ortho		9.51	15.20	16.95[b]		16	1.389				7*2/1	1294
II.	Hex		4.79	4.79	22.2		3	1.447				7*3/1	1294
Poly(glycyl-3-aminopropionic acid-3-aminopropionic acid)													
(199.21)	Hex		4.79	4.79	35.2		3	1.419				11*3/4	1313
Poly(glycyl-11-aminoundecanoic acid)													
I. (240.35)	Ortho		9.60		37.5[b]							15*2/1	1391
II.	Hex		4.79	4.79								15*	1391
Poly(glycylglycyl-L-proline)													
with H_2O	Mono	C2-2	12.2	4.9	9.3	$\beta=90$	2	1.4				9*1/1	615
w/formic acid	Mono	C2-2	13.5	4.9	9.3	$\beta=94$	2					9*1/1	615
(211.22)													
Poly(glycylprolylhydroxyproline)													
(267.28)	Hex		13.7	13.7	28.2		10	0.97				9*10/	612
Poly(glycyl-L-prolyl-L-proline)													
dry	Hex		12.5	12.5	28.7		10	1.07				9*10/	613
(251.29)													
–, α-phenyl-(glycyl)													
(327.38)	Ortho	D2-4	14.3	13.5	9.4		4	1.198				9*1/1	965
Poly(L-histidine)													
–, 1-benzyl-													
(227.27)	Phex		17.4	17.4	27.0	$\gamma=130$	18	1.085				3*18/5	719
–, hydrochloride													
(1 H_2O/residue)	Mono		14.95	14.95	45.0	$\gamma=116.5$	45	1.582				3*15/4	1295
(190.61)													
Poly(L-isoleucine)													
β	Ortho		4.80	22.36	6.88		4	1.018				3*2/1	806
(113.16)	Ortho		4.8	23	6.6		4	1.032				3*2/1	1025
Poly(L-leucine)													
α helix	Hex		13.22	13.22								3*	806
(113.16)													
β	Ortho		4.80	23.56	6.88		4	0.966				3*2/1	806
Poly(L-lysine)													
α helix	Hex		19.55	19.55								3*	586
(128.18)													
β	Ortho		9.44	17.16	6.8[b]		6	1.16				3*2/1	586
–, *E*-benzyloxycarbonyl-													
α helix	Hex		16.69	16.69	26.90		18	1.208				3*18/5	577
(262.31)													
–, hydrobromide													
(1.4 H_2O/residue)	Ortho	D2-3	9.52	16.44	6.80		4	1.46				3*2/1	923
(234.31)													
–, hydrochloride													
α helix	Hex		16.80	16.80									666
>84% RH													
(164.64)													
β dry	Ortho		4.62	15.20	6.66		4	2.338					666
65% RH	Ortho		4.71	16.67	6.66		4						666
Poly(L-lysyl-L-lysyl-L-valine)													
α helix	Hex		15.87	15.87								9*	1047
(355.48)													
β	Ortho		9.35	15.04	20.88		4	0.969				9*2/1	1047
(with 2HCl)													
–, di-benzyloxycarbonyl-													
β	Ortho		9.38	28.24	20.22		8	1.547				9*2/1	1048
(623.75)													

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TABLE 5. *cont'd*

Polymer	Cryst syst.	Space group	Unit cell parameters *a*	*b*	*c*	Angles	*z*	Density (g/cm³) Crystal.	Amorph.[a]	Melting point (°C)[a]	Heat of fusion kJ/mol[a]	Chain conform. ($n*p/q$)	Refs.
Poly(L-methionine)													
α helix	Hex		11.49	11.49	70.5		47	1.270				3*47/13	867
(131.19)													
Poly(D-methionyl-L-methionine)													
β	Mono		18.05	4.71	14.66[b]	$\beta = 110.4$	8	1.492				6*2/1	850
(131.19)													
Poly(L-ornithine)													
–, *N*-benzoyl-													
α helix	Hex		15.0	15.0	26.5		18	1.263				3*18/5	1373
(218.26)													
–, –, *p*-bromo-													
ω helix	Ortho		D2-4	24.6	18.4	5.68	8	1.535				3*4/1	1373
8297.15*													
–, –, *p*-chloro-													
ω helix	Ortho	D2-4	24.1	18.5	5.68		8	1.326				3*4/1	1373
(252.70)													
–, –, *p*-fluoro-													
ω helix	Ortho	D2-4	23.8	18.7	5.68		8	1.241				3*4/1	1373
(236.25)													
–, *N*-benzyloxycarbonyl-													
I. (248.28)	Mono		23.3	22.7	16.2	$\gamma = 119.2$	22	1.213				3*11/3	720
	Phex		23.0	22.6	(16)	$\gamma = 119.5$	22	1.238				3*11/3	1043
	Hex		22.8	22.8	16.4		22	1.228				3*11/3	1296
II.	Ortho		29.40	14.70	27.0		36	1.272				3*18/5	1043
	Tet		20.8	20.8	60.00		80	1.270				3*40/1	1296
III.	Ortho		22.09	19.95	60.00		80	1.247				3*40/1	1296
–, hydrobromide													
α helix	Hex		15.0										784
(>86% RH)													
β (wet)	Ortho		4.60	30.2	6.64		8					3*2/1	784
(to 85% RH)													
Poly(L-proline)													
I. (97.12)	Hex	C2-2	9.05	9.05	19.0		10	1.197				3*10/3	590
II.	Rho	C3-3	6.62	6.62	9.36		3	1.362				3*3/1	510
	Rho	C3-3	6.62	6.62	9.31		3	1.369				3*3/1	512
	Rho	C3-3	6.68	6.68	9.36		3	1.338				3*3/1	511
–, acid complexes													
–, acetic	Tet		9.13	9.13	19.0		10					3*10/3	701
–, formic	Tet		8.92	8.92	19.0		10					3*10/3	701
–, propionic	Tet		9.13	9.13	19.0		10					3*10/3	701
highly solvated	Ortho		9.00	25.1	19.0								701
–, hydroxy-													
A. (113.12)	Hex	C3-3	12.3	12.3	9.15		9	1.410				3*	580
B. >66% RH	Phex		15.75	15.75	22.88	$\gamma = 120.47$						3*8/3	1044
–, –, *O*-acetyl-													
II. (155.15)	Hex		11.4	11.4	9.3		6	1.48				3*3/1	737
Poly(L-serine)													
–, *O*-acetyl-													
β	Ortho		9.71	6.48	9.6[b]		3	1.065				3*3/1	706
(129.12)													
Poly(L-tyrosine)													
–, *O*-benzyloxycarbonyl-													
(297.31)	Mono		18.0	18.0	16.5	$\gamma = 122$	11	1.20				3*11/3	849
Poly(L-valine)													
α helix	Hex		11.43	11.43	(27)		18	0.970				3*18/5	1025
(99.13)													
β	Ortho		4.79	19.00	6.88		4	1.052				3*2/1	806
	Ortho	D2-4	4.80	19.14	6.59		4	1.088				3*2/1	1045

[a] The number after the solidus (/) are reference citations.
[b] The unit cell parameter assignment has been changed from that published so as to make *c* the fiber axis.

TABLE 6. POLY(AMIDES) (–NH–X–NH–CO–Y–CO– or –NH–X–CO–) see also POLY(PEPTIDES)

Polymer	Cryst syst.	Space group	Unit cell parameters a	b	c	Angles	z	Density (g/cm³) Crystal.	Amorph.[a]	Melting point (°C)[a]	Heat of fusion kJ/mol[a]	Chain conform. (n*p/q)	Refs.
Poly(2-aminoacetic acid), see Polyglycine													
Poly(*p*-aminobenzoic acid)													
(119.12)	Ortho	D2-4	7.71	5.14	12.9		4	1.548		550/735		6*2/1	811
	Ortho	D2-4	7.71	5.14	12.8		4	1.560				6*2/1	902
	Ortho	D2-4	7.75	5.30	12.87		4	1.497				6*2/1	1434
Poly(3-amino-2-butenoic acid)													
irrad. in vacuum													
(83.09)	Mono		19.11	8.54	10.665	$\beta=97.6$						4*	1530
irrad. in air													
	Mono		21.90	10.13	12.461	$\beta=96.8$						4*	1530
Poly(3-aminobutyric acid)													
(85.11)	Ortho		10.9	9.6	4.6		4	1.17		330		4*1/1	503
Poly(4-aminobutyric acid)													
α	Mono		9.44	8.22	12.1[b]	$\gamma=116$	8	1.340		260/337		5*2/1	272
(85.11)	Mono	C2-2	9.29	7.97	12.24[b]	$\gamma=114.5$	8	1.375		260/244		5*2/1	457
	Mono		9.79	8.31	12.25	$\gamma=117$	8	1.273				5*2/1	1509
β	Mono				12.24[b]							5*2/1	458
δ	Hex		4.65	4.65									458
–, 4-benzyloxycarbonyl-(L)													
I. (219.24)	Mono		9.62	19.30	12.30	$\beta=71.1$	8	1.35				5*2/1	1359
II.	Hex		13.14	13.14	10.0		5	1.22				5*5/2	1359
–, 4-methyloxycarbonyl-(L)													
(143.14)	Hex		10.90	10.90	10.0		5	1.16				5*5/2	1359
Poly(10-aminocapric acid)													
α	Tri		9.80	5.12	27.54	54,90,110	4	1.110				11*2/1	1237
(169.27)													
γ	Phex	C2h-5	4.78	9.56	26.9	$\gamma=120$	4	1.056		188/337		11*2/1	971
	Hex		4.9	4.9	26.5		2	1.02		177/146		11*2/1	61
Poly(6-aminocaproic acid) [caprolactam]													
α	Mono	C2-2	9.56	8.01	17.24[b]	$\gamma=67.5$	8	1.232	1.09/839	215	20.8/155	7*2/1	3
(113.16)	Mono	C2-2	4.81	7.61	17.10[b]	$\gamma=79.5$	4	1.221		223/153	18.1/216	7*2/1	26
	Mono		9.65	8.11	17.2[b]	$\gamma=66.3$	8	1.220		223/244	23.0/405	7*2/1	135
	Mono	C2-2	9.45	8.02	17.08	$\gamma=68$	8	1.252		226/293	21.6/343	7*2/1	212
	Mono		9.66	8.32	17.0	$\gamma=65$	8	1.214		214/304	26/1121	7*2/1	334
	Mono		4.77	4.06	17.25	$\gamma=66.5$	2	1.224		272/839	19.4/839	7*2/1	891
	Mono	C2-2	9.71	8.19	17.40	$\gamma=115$	8	1.199		260/1051	27/1050	7*2/1	1049
									0.917	228/346	27.3		1050
								1.250	1.114	250/532	24.1/697		449
								1.23	1.10		18.5/534		213
β	Hex		4.8	4.8	8.6		1	1.10				7*1/1	222
	Hex		4.85	4.85	8.4		1	1.10				7*1/1	1052
γ	Mono	C2h-5	9.35	4.81	16.60[b]	$\gamma=120$	4	1.162	1.09/839	272/839	15.6/839	7*2/1	336
	Mono	C2h-5	9.33	4.78	16.88[b]	$\gamma=121$	4	1.165			27/1050	7*2/1	246
	Hex		4.79	4.79	16.7		2	1.132				7*2/1	272
	Ortho		4.82	7.82	16.70		4	1.194				7*2/1	279
	Mono		9.14	4.84	16.68	$\gamma=121$	4	1.188				7*2/1	697
	Ortho		4.83	7.83	16.68		4	1.191				7*2/1	697
>150°C	Rho		4.90	16.28	8.22		4	1.146				7*1/1	26
	Mono		4.86	4.65	16.87	$\gamma=60$	2	1.138				7*2/1	891
–, complex with I2													
	Mono	C2h-5	9.13	17.9	16.2[b]	$\gamma=59.7$							1510
	or	C2-2											
–, D-(-)-3-methyl-													
(127.19)	Mono	C2-2	9.15	4.84	16.96[b]	$\gamma=90$	4	1.125		225/19		7*2/1	440
										226/36			
Poly(6-aminocaproic acid-*alt*-11-aminoundecanoic acid)													
(296.46)					22.5					184		19*1/1	714
Poly(6-aminocaproyl-5-aminovaleryl-3-aminopropionic acid)													
(297.40)	Tri		4.9	10.7	21.6	51,77,62	2	1.28				18*1/1	1437
Poly(8-aminocaprylic acid)													
α	Mono	C2-2	9.8	8.3	22.4[b]	$\gamma=115$	8	1.14		185/146	30/1195	9*2/1	272
(141.21)								1.18		202			153
										200/244			
										218/838			

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TABLE 6. *cont'd*

Polymer	Cryst syst.	Space group	Unit cell parameters *a*	*b*	*c*	Angles	*z*	Density (g/cm³) Crystal.	Amorph.[a]	Melting point (°C)[a]	Heat of fusion kJ/mol[a]	Chain conform. (*n*∗*p*/*q*)	Refs.
β	Mono												121
γ	Hex		4.79	4.79	21.7		2	1.088	1.04/495		18/1121	9∗2/1	272
	Hex		4.9	4.9	21.7		2	1.04				9∗2/1	61
	Phex	C2h-5	4.77	9.54	21.9	γ=120	4	1.087				9∗2/1	971
Poly(2-aminocyclopentylenecarboxy acid)													
(111.14)			8.25	4.54	7.8		2	1.26				4∗2/1	1059
Poly(7-aminoenanthic acid)													
(127.19)	Tri	C1-1	9.8	10.0	9.8	56,90,69	4	1.18		233/215		8∗1/1	918
	Tri	Ci-1	4.9	5.4	9.85	49,77,63	1	1.21		225/146		8∗1/1	61
										217			153
								1.20			223/291		
–, (R)-3-methyl-													
(141.21)					9.24					179			479
–, (S)-4-methyl-													
(141.21)					9.43					176			479
–, (R)-5-methyl-													
(141.21)					9.11					182			479
–, (R)-6-methyl-													
(141.21)					9.57					188			479
Poly(aminoformic acid)													
–, *N*-butyl-													
(99.13)	Phex		13.3	13.3	15.4		16	1.12		175/528		2∗8/3	522
Poly(2-aminoisobutyric acid), see Poly(peptide) Section													
Poly(12-aminolauric acid)													
γ	Hex		4.80	4.80	32.1		2	1.023	0.972	208/1172		13∗2/1	895
(197.32)	Hex		4.70	4.70	31		2	1.10		179/177		13∗2/1	660
	Phex	C2h-5	4.79	9.58	31.9[b]	γ=120	4	1.034				13∗2/1	680
	Mono		4.87	9.38	32.2[b]	γ=121.5	4	1.045				13∗2/1	759
	Mono		4.90	4.67	32.1	γ=121.7	2	1.048	0.99			13∗2/1	1054
	Mono		9.28	4.85	31.35	γ=124.4	4	1.126				13∗2/1	1511
formed during planar extrusion													
	Tri		9.28	5.29	31.35	59,90,60	4	1.223				13∗2/1	1511
Poly(9-aminopelargonic acid)													
(155.24)	Tri	Ci-1	4.9	5.4	12.5	49,77,64	1	1.15		210		10∗1/1	421
	Tri	C1-1	9.7	9.7	12.6	64,90,67	4	1.07		194/146		10∗1/1	918
										198/292			
										209/177			
Poly(2-aminopropionic acid), see Poly(alanine)													
Poly(3-aminopropionic acid) [β alanine]													
α	Mono	C2-2	9.33	8.73	4.78[b]	γ=120	4	1.400		340		4∗1/1	491
(71.08)	Mono		9.60	8.96	4.78[b]	γ=122.5	4	1.361		330/337		4∗1/1	1265
										357/1403			
β	Ortho		9.56	7.56	4.78[a]		4	1.366				4∗1/1	1265
–, 2-butyl-2-methyl-													
(141.21)					8.3					72		4∗2/1	1093
–, 2,2-dimethyl-													
I. (99.13)										189/73		4∗	
II.					8.4					273	13		73
	Ortho		11.57	10.95	8.39		8	1.239		268		4∗2/1	1093
										270/402			
–, 2-ethyl-2-methyl-													
(113.16)					8.5					76		4∗2/1	1093
–, 3-methyl-, see Poly(3-aminobutyric acid)													
–, 2-methyl-2-propyl-													
(127.19)					8.4					74		4∗2/1	1093
Poly(3-aminopropyl-5-aminovaleryl-6-aminocaproic acid)													
(297.40)	Tri		4.9	10.7	21.6	51,77,62	2	1.28				18∗1/1	1437
Poly(18-aminostearic acid)													
γ	Mono		4.76	9.52	46.9	γ=120	4	1.016				19∗2/1	1055
(281.48)													
Poly(2-aminotetrahydropyran-6-carboxcylic acid)													
(127.14)	Mono	C2-1	11.79	14.40	19.43	γ=98	20	1.292	Double	305		5∗10/3	1333

TABLE 6. *cont'd*

Polymer	Cryst syst.	Space group	Unit cell parameters *a*	*b*	*c*	Angles	*z*	Density (g/cm³) Crystal.	Amorph.[a]	Melting point (°C)[a]	Heat of fusion kJ/mol[a]	Chain conform. ($n*p/q$)	Refs.
Poly(11-aminoundecanoic acid)													
α	Tri	C1-1	9.5	10.0	15.0	60,90,67	4	1.10		183/292	27/1161	12*1/1	918
(183.30)	Tri		4.78	4.13	13.1	90,75,66	1	1.343	1.01	220	41/343	12*1/1	365
	Tri	Ci-1	4.9	5.4	14.9	49,77,63	1	1.15		182/146		12*1/1	61
	Tri		9.6	4.2	15.0	72,90,64	2	1.19		194/101		12*1/1	59
	Tri		4.78	4.13	14.9	82,75,66	1	1.174		186		12*1/1	263
			4.78		14.1	$\alpha = 63.5$				188/444 226/1161		12*1/1	1057
II.	Mono		9.75	8.02	15.0[b]	$\gamma = 115$	4	1.145				12*1/1	529
γ	Mono		9.48	4.5	29.4[b]	$\gamma = 118.5$	4	1.10				12*1/1	529
				7.68	14.78								1056
Poly(5-aminovaleric acid)													
α	Tri	C1-1	9.5	5.6	7.5	48,90,67	2	1.30		258/402		6*1/1	918
(99.13)													
Poly(4,4′-benzanilidylene terephthalamide)													
(357.37)					18.63							18*1/1	1425
Poly(1,3-cyclohexylenedimethylene adipamide)													
cis-													
(252.36)	Tri		4.8	12.6	29.6	26,85,75	2	1.19		253/1201		13*2/1	1058
Poly(1,3-cyclohexylenedimethylene dodecanediamide)													
cis-													
(336.52)	Tri		4.8	19.0	44.6	16,90,83	2	1.12				19*2/1	1058
Poly(1,3-cyclohexylenedimethylene suberamide)													
cis-													
(280.41)	Tri		4.8	14.5	34.8	22,85,76	2	1.15				15*2/1	1058
Poly(decamethylene adipamide) [10.6]													
(282.43)					20.0					230 236/244 240/544		18*1/1	110
Poly(decamethylene azelamide) [10.9]													
(324.51)										214/137	68.2/405 36.7/159	21*	
γ	Phex					2							65
Poly(4,4′-decamethylenedipiperazine sebacamide)													
(476.75)										130/159 129/402	69.1/159	28*	
Poly(decamethylene 4-octenediamide)													
trans-													
(308.47)				24.1						243		20*1/1	657
Poly(decamethylene phosphinylidenedipropionamide)													
–, methyl-(diacid)													
(344.44)				20						173		19*1/1	831
Poly(decamethylene sebacamide) [10.10]													
(338.54)	Tri		4.9	5.4	27.8	49,76,63	1	1.14		203/244	51.1/118	22*1/1	1412
					25.6					197 198/454 216/137	34.7/159 72.0/405 32.7/160	*1/1	110
Poly(decamethylene succinamide) [10.4]													
(254.37)	Tri		4.9	5.5	19.8	49,77,63	1	1.18		242		16*1/1	1626
Poly(dodecamethylene oxamide) [12.2]													
(254.37)					19.5					230		16*1/1	743
Poly(dodecamethylene phosphinylidenedipropionamide)													
–, methyl-(diacid)													
(372.49)					21.55					180			831
Poly(dodecamethylene malonamide) [12.3]													
(268.40)	Mono		8.48	4.71	41.30	$\beta = 101$	4	1.101				17*2/1	1523
Poly(dodecamethylene sebacamide) [12.10]													
α	Tri		5.0	5.25	29.2	51,75,63	1	1.15		173/339		24*1/1	1513
(366.59)													
β	Tri		5.0	8.16	29.2	90,75,68	1	1.15				24*1/1	1513
Poly(dodecamethylene succinamide) [12.4]													
(282.43)	Tri		4.9	5.5	22.3	49,77,63	1	1.17		237		18*1/1	1626

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TABLE 6. *cont'd*

Polymer	Cryst syst.	Space group	Unit cell parameters *a*	*b*	*c*	Angles	*z*	Density (g/cm³) Crystal.	Amorph.[a]	Melting point (°C)[a]	Heat of fusion kJ/mol[a]	Chain conform. ($n*p/q$)	Refs.
Poly[4,4′-(ethylenedioxydiphenylene)-ditrimethylene adipamide]													
(438.57)					26.3							25*1/1	516
Poly(ethylene-L-tartaramide)													
–, di-*O*-methyl-													
(202.21)	Tri		4.95	6.87	9.10	59,90,106	1	1.337		312		8*1/1	1629
Poly(heptamethylene adipamide) [7.6]													
γ	Phex	C2-2					2			209/291			65
(240.35)										226/339			
										250/244			
Poly(heptamethylene azelamide) [7.9]													
γ	Phex						1			201/244			65
(282.43)													
Poly(heptamethylene pimelamide) [7.7]													
(254.37)	Phex	Cs-1	4.82	18.95[b]		$\gamma=120$	1	1.105		214/244		16*1/1	63
										205/2			
										196/339			
										228/1625			
γ	Phex				18.95		1					16*1/1	65
Poly(heptamethylene sebacamide) [7.10]													
γ	Phex	C2-2					2			187/339			65
(296.46)										208/244			
Poly(heptamethylene suberamide) [7.8]													
γ	Phex	C2-2					2			230/244			65
(268.40)													
Poly(hexamethylene adipamide) [6.6]													
α													
I.	Tri	Ci-1	4.9	5.4	17.2	48,77,63	1	1.24	1.09/52	265/2	46.5/82	14*1/1	25
(226.32)	Mono		15.7	10.5	17.3	$\beta=73$	9	1.240	1.12/495	270/289	40/155	14*1/1	402
	Tri		5.00	4.17	17.3	81,76,63	1	1.204		301/1166	36.8/216	14*1/1	407
	Tri		4.87	5.26	17.15	50,76,64	1	1.241		280/1121	68/1121	14*1/1	891
	Tri		4.97	5.47	17.29	48,77,62	1	1.214			58/1166	14*1/1	1180
	Tri		4.96	5.52	17.41	48,76,62	1	1.208			46.9/405	14*1/1	1409
								1.225	1.095		53.2		1179
								1.220	1.069				54
II.	Tri		4.95	5.45	17.12	52,80,63	1	1.152		269.5	43.4	14*1/1	1180
								1.165	1.095		41.9		1179
β	Tri	Ci-1	4.9	8.0	17.2	90,77,67	2	1.25	1.09/495			14*1/1	25
high temp.	Tri		5	5.9	16.23	57,80,60	1	1.10				14*1/1	1060
(170°C)	Tri		4.91	5.87	16.50	56,81,60	1	1.119				14*1/1	1409
Poly(hexamethylene azelamide) [6.9]													
(268.40)	Mono		7.8	5.3	40.15[b]	$\gamma=87$	4	1.08		226/244		17*2/1	402
										185/339			
Poly(hexamethylene glutaramide) [6.5]													
(212.29)	Mono	C2h-6	4.60	8.62	30.95[b]	$\beta=114$	4	1.258		241/402		13*2/1	1514
(at 190°C)	Mono		5.23	8.50	30.55	$\beta=110$	4	1.105				13*2/1	1514
Poly(hexamethylene malonamide) [6.3]													
(184.24)	Mono		8.60	4.62	25.70	$\beta=100.4$	4	1.218		241/1524		11*2/1	1523
Poly(hexamethylene 4-octenediamide)													
trans-													
(252.36)					19.1					259		16*1/1	657
Poly[hexamethylene oxamide) [6.2]													
(170.21)	Tri	Ci-1	5.15	7.54	12.39	32,74,62	1	1.280		320/402		10*1/1	956
Poly(hexamethylene *m*-phenylenedisulfonamide)													
(318.41)	Mono	C2h-3	7.70	7.76	14.1	$\beta=117$	2	1.409		170		13*1/1	1384
Poly(hexamethylene sebacamide) [6.10]													
α	Tri	Ci-1	4.95	5.4	22.4	49,76,63	1	1.16		228/51	30.6/160	18*1/1	25
(282.43)	Tri		4.86	5.05	22.35	55,76,62	1	1.189		215/291	56.5/137	18*1/1	891
								1.152	1.041	233/244	58.6/405		54
								1.189		225/454			52
								1.17		216			153
β	Tri	Ci-1	4.9	8.0	22.4	90,77,67	2	1.20				18*1/1	25

TABLE 6. *cont'd*

Polymer	Cryst syst.	Space group	Unit cell parameters a	b	c	Angles	z	Density (g/cm³) Crystal.	Amorph.[a]	Melting point (°C)[a]	Heat of fusion kJ/mol[a]	Chain conform. (n*p/q)	Refs.
Poly(hexamethylene suberamide) [6.8]													
(254.37)	Tri						1			232/244			65
	Mono		9.60	8.26	19.7	$\gamma=115$	4	1.193		235/291 241/1202		16*1/1	1515
quenched	Phex		9.7	9.7		$\gamma=120$							1515
Poly(hexamethylene succinamide) [6.4]													
(198.26)	Tri		4.9	5.3	14.8	51,77,62	1	1.25	212/402	275		12*1/1	1626
Poly(hexamethylene-L-tartaramide) –, di-*O*-methyl-													
(252.32)	Tri		5.00	6.84	13.20	62,90,112	1	1.191		230		12*1/1	1629
Poly(hexamethylene terephthalamide) [6.T]													
(246.31)					15.6					371 371/829 D350/291		14*1/1	828
Poly(methylene adipamide) [1.6]													
(156.18)	Mono	C2h-6	8.04	4.79	20.2[b]	$\gamma=90$	4	1.333		285/1524 306/402		9*2/1	1522
Poly(4,4′-methylenedicyclohexylene azelamide) *trans-, trans-*													
(362.56)	Ortho		9.4	6.1	39.5		4	1.06				20*2/1	1315
Poly(4,4′-methylenedicyclohexylene dodecanediamide) *trans-, trans-*													
I.	Ortho	C2v-5	9.30	6.06	45.0		4	1.060				23*2/1	1315
(404.64)	Ortho		9.4	6.1	45.5		4	1.03				23*2/1	1315
II.	Mono		9.50	5.22	52.6	$\gamma=96.6$	4	1.037				23*2/1	1315
Poly(4,4′-methylenedicyclohexylene pimelamide) *trans-, trans-*													
I.	Ortho		9.4	6.1	35.8		4	1.08				18*2/1	1315
(334.50)													
II.	Mono		9.57	5.32	40.5	$\gamma=99.6$	4	1.093				18*2/1	1315
Poly(4,4′-methylenedicyclohexylene sebacamide) *trans-, trans-*													
(376.58)	Ortho		9.4	6.1	41.4		4	1.05				21*2/1	1315
Poly(4,4′-methylenedicyclohexylene suberamide) *trans-, trans-*													
(348.53)	Ortho		9.4	6.1	37.6		4	1.07				19*2/1	1315
Poly(4,4′-methylenedicyclohexylene tetradecanediamide) *trans-, trans-*													
(432.60)	Ortho		9.4	6.1	49.4		4	1.02				25*2/1	1315
Poly(4,4′-methylenedicyclohexylene tridecanediamide) *trans-, trans-*													
(418.66)	Ortho		9.4	6.1	47.4		4	1.02				24*2/1	1315
Poly(4,4′-methylenedicyclohexylene undecandediamide) *trans-, trans-*													
(390.61)	Ortho		9.4	6.1	43.5		4	1.04				22*2/1	1315
Poly(4,4′-methylenediphenylene dodecanediamide)													
I. (392.54)	Ortho		11.10	4.96	44.7		4	1.059		290 256/1443		23*2/1	1440
II.	Ortho		10.52	4.96	44.7		4	1.118				23*2/1	1440
III.	Ortho		9.64	4.96	44.7		4	1.220				23*2/1	1440
Poly(methylene dodecanediamide) [1.12]													
(240.35)	Mono	C2h-6	8.12	4.79	35.2[b]	$\gamma=90$	3	1.166		259/1524		15*2/1	1522
Poly(methylene glutaramide) [1.5]													
(142.16)	Rho	D3-5	4.79	4.79	26.1		3	1.366				8*3/1	1522
Poly(methylene malonamide) [1.3]													
(114.10)	Hex		4.79	4.79	18.0		3	1.589				6*3/2	1313
Poly(methylene pimelamide) [1.7]													
(170.21)	Rho	D3-5	4.79	4.79	34.5		3	1.237				10*3/1	1522
Poly(methylene sebacamide) [1.10]													
(212.29)	Mono	C2h-6	8.10	4.79	30.0[b]	$\gamma=90$	4	1.211		260/4024 266/1524 268/1537		13*2/1	1522

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TABLE 6. *cont'd*

Polymer	Cryst syst.	Space group	Unit cell parameters *a*	*b*	*c*	Angles	*z*	Density (g/cm³) Crystal.	Amorph.[a]	Melting point (°C)[a]	Heat of fusion kJ/mol[a]	Chain conform. ($n*p/q$)	Refs.
Poly(methylene suberamide) [1.8]													
(184.24)	Mono	C2h-6	8.08	4.79	25.2[b]	$\gamma=90$	4	1.255		276/1524		11*2/1	1522
Poly(nonamethylene azelamide) [9.9]													
(310.48)					24.0					177 189/2 165/339		20*1/1	110
γ	Phex						1						65
Poly(nonamethylene malonamide) [9.3]													
(226.32)	Ortho		8.32	4.71	32.70		4	1.173				14*2/1	1523
Poly(octamethylene azelamide) [8.9]													
γ (296.46)	Phex						2			206/244			65
Poly(octamethylene malonamide) [8.3]													
(212.29)	Mono		8.50	4.71	30.70	$\beta=101.7$	4	1.172		233/1524		13*2/1	1523
Poly(octamethylene suberamide) [8.8]													
(282.43)	Tri						1			216/291 225/244			65
Poly(octamethylene succinamide) [8.4]													
(226.32)	Tri		4.9	5.4	17.3	51,77,62	1	1.20		254		14*1/1	1626
Poly(octamethylene-L-tartaramide)													
–, di-*O*-methyl-													
(286.37)	Tri		5.00	6.82	15.7	57,90,111	1	1.175		208		14*1/1	1629
Poly(octamethylene terephthalamide) [8.T]													
(274.36)					17.9					335		16*1/1	828
Poly(pentamethylene azelamide) [5.9]													
(254.37)					19.5					179/291		16*1/1	2
Poly(pentamethylene glutaramide) [5.5]													
(198.26)	Mono	C2-3	8.30	4.79	13.8	$\gamma=90$	2	1.200		198/291 247/1625		12*1/1	1624
Poly(pentamethylene malonamide) [5.3]													
(170.21)	Ortho		8.47	4.62	22.40		4	1.290		195/402 248/1524		10*2/1	1523
Poly(pentamethylene pimelamide) [5.7]													
γ (226.32)	Mono	Cs-2	4.83	9.35	16.62	$\gamma=58.9$	2	1.169		228 183/291		14*1/1	1210
Poly(pentamethylene terephthalamide) [5.T]													
(232.28)					14.1					354 353/829		13*1/1	828
–, 2-methyl-(diamine)													
(246.31)	Ortho		4.61	36.7	26.5		16	1.460				13*2/1	1529
Poly(3,8-phenanthridinonediyl terephthalamide)													
(355.35)	Mono		8.1	6.5	17.2	$\gamma=60$	2	1.50				16*1/1	1063
Poly(*m*-phenylene adipamide)													
(218.26)					11.8					344 296/402		11*1/1	828
Poly(*p*-phenylene dodecanediamide)													
(302.42)					21.2							19*1/1	828
Poly(*m*-phenylene isophthalamide)													
(238.25)	Ortho		6.7	4.71	11.0		1	1.14		375/735		10*1/1	735
	Tri	C1-1	5.27	5.25	11.3	112,111,88	1	1.470		390/748		10*1/1	856
	Tri	C1-1	5.36	5.36	11.3	113,113,88	1	1.443		1.33		10*1/1	878
	Ortho		5.1	5	23.2		2	1.34				10*2/1	1062
–, hexamethylphosphorictriamide complex													
(596.66) (2 HMPT/monomer)	Mono		9.43	16.94	11.3	$\beta=123.4$	2	1.315					957
Poly(*p*-phenylene phthalamide)													
(238.25)	Ortho	D2h-14	22.8	5.5	8.1		4	1.56				10*1/1	396
Poly(*p*-phenylene pimelamide)													
(232.28)					14.7					372		14*1/1	828
Poly(*m*-phenylene sebacamide)													
(274.36)					14.9					258		17*1/1	828
Poly(*p*-phenylene sebacamide)													
(274.36)					18.5					334		18*1/1	828

TABLE 6. *cont'd*

Polymer	Cryst syst.	Space group	Unit cell parameters a	b	c	Angles	z	Density (g/cm³) Crystal.	Amorph.[a]	Melting point (°C)[a]	Heat of fusion kJ/mol[a]	Chain conform. (n*p/q)	Refs.
Poly(*m*-phenylene suberamide)													
(246.31)					13.0					302		15*1/1	828
Poly(*p*-phenylene suberamide)													
(246.31)					16.3					374		16*1/1	828
Poly(*m*-phenylene terephthalamide)													
(238.25)										500/748			
–, 4-methyl-(diamine)													
(252.27)	Mono		8.57	7.54	22.11	$\beta=116.3$	4	1.308				11*2/1	1398
Poly(*p*-phenylene terephthalamide)													
I. (238.25)	Port	Cs-1	7.87	5.18	12.9	$\gamma=90$	2	1.504		500/748		12*1/1	761
	Mono		7.728	5.184	12.81	$\gamma=90.04$	2	1.542		600/735		12*1/1	1061
	Mono	C2h-5	7.80	5.19	12.9	$\gamma=90$	2	1.515				12*1/1	902
	Ortho		7.78	5.28	12.9		2	1.493				12*1/1	1525
	Mono		7.79	5.18	12.89	$\gamma=92.2$	2	1.522				12*1/1	1527
	Port	Cs-2	7.88	5.22	12.9		2	1.491				12*1/1	1620
	Ortho		7.60	5.04	12.78		2	1.616				12*1/1	1638
				4.8	12.7	$\alpha=88$							1526
II.			8.0	5.1	12.9		2	1.50				12*1/1	958
				4.8	12.7	$\alpha=88$							1526
single crystals & spherulites													
					11.5								1297
–, 2,2′-difluoro-													
(274.23)	Port		8.6	5.0	13.0		2	1.63				12*1/1	1528
Poly(*p*-phenylene 2,5-thiophenediamide)													
(272.46)	Mono		4.29	5.09	25.2	$\gamma=98$	2	1.489				11*2/1	1532
Poly(piperazine adipamide)													
(196.25)					9.2					355		10*1/1	386
Poly(1,4-piperazine 1,3-cyclobutylenedicarboximide)													
–, 2,4-diphenyl-(diacid)													
trans-													
(346.43)	Ortho		8.74	5.93	9.22		1	1.204				9*1/1	934
Poly(1,4-piperazine 4-octenediamide)													
trans-													
(222.29)	Mono	C2h-5	4.54	10.00	13.50	$\beta=110.2$	2	1.283		252/657		12*1/1	873
Poly(piperazine sebacamide)													
(252.36)										180/81	26.0/81	16*	
Poly(2,5-pyrimidine terephthalamide)													
(240.22)	Ortho		7.3	5.1	12.8		2	1.67				12*1/1	1531
Poly(4,4′-sulfonyldiphenylene terephthalamide)													
(378.40)					15.45								1203
Poly(terephthaloyldihydrazo-di(*p*-aminobenzoyl) terephthalamide)													
(562.54)	Port		8.5	4.9	29.69		2	1.51				28*1/1	760
Poly(tetramethylene adipamide) [4.6]													
(198.26)	Tri	C1-1	4.95	5.47	14.66	48,78,64	1	1.245		295/291		12*1/1	1516
	Mono		9.6	8.26	14.7	$\gamma=115$	4	1.246		308/51		12*1/1	1517
	Tri		4.9	5.5	14.8	46,78,64	1	1.29		350	41.6	12*1/1	1655
										319/1518			
Poly(tetramethylene azelamide) [4.9]													
γ	Phex						2			223/339			65
(240.35)										253/402			
Poly(tetramethylene malonamide) [4.3]													
156.18*	Mono		8.65	4.62	20.40	$\beta=102.5$	4	1.303		277/1524		9*2/1	1523
Poly(tetramethylene 4-octenediamide)													
trans-													
(224.30)					17.0					294		14*1/1	657
Poly(tetramethylene succinamide) [4.4]													
(170.21)	Tri		4.9	5.5	12.3	49,77,62	1	1.29		d		10*1/1	1626
										287/402			
Poly(tetramethylene-L-tartaramide)													
–, di-*O*-methyl-													
(230.26)	Tri		5.00	7.06	10.80	59,90,110	1	1.270		266		10*1/1	1629

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TABLE 6. *cont'd*

Polymer	Cryst syst.	Space group	Unit cell parameters *a*	*b*	*c*	Angles	*z*	Density (g/cm³) Crystal.	Amorph.[a]	Melting point (°C)[a]	Heat of fusion kJ/mol[a]	Chain conform. (*n*∗*p*/*q*)	Refs.
Poly(tridecamethylene tridecanediamide) [13.13]													
γ	Mono		9.22	4.94	34.47	$\beta=121.1$	2	1.044	1.01	>183	97.2	28∗1/1	1519
(422.70)	Mono		4.88	4.73	34.0	$\gamma=121$	1	1.043		172/1521		28∗1/1	1520
Poly(*m*-xylylene adipamide)													
(246.31)	Mono		5.10	4.70	15.2	$\gamma'=69.6$	1	1.198		246/326		13∗1/1	84
	Tri	Ci-1	12.01	4.83	29.8	75,26,65	2	1.250		244/544		13∗2/1	459
Poly(*p*-xylylene sebacamide)													
(302.42)	Tri		5.74	4.87	20.6	76,55,65	1	1.168		300/290 281/385 291/454 268/291		18∗1/1	204

[a] The number after the solidus (/) are reference citations.
[b] The unit cell parameter assignment has been changed from that published so as to make *c* the fiber axis.

TABLE 7. POLY(ESTERS) (–O–X–O–CO–Y–CO– or –O–X–CO–)

Polymer	Cryst syst.	Space group	Unit cell parameters *a*	*b*	*c*	Angles	*z*	Density (g/cm³) Crystal.	Amorph.[a]	Melting point (°C)[a]	Heat of fusion kJ/mol[a]	Chain conform. (*n*∗*p*/*q*)	Refs.
Poly(4,4′-bicyclohexylene sebacate)													
–, *trans-*, *trans-*													
(364.53)	Mono		11.16	5.27	19.48	$\beta=49.0$	2	1.400				20∗1/1	1636
smectic	Mono		11.98	5.48	19.76	$\beta=52.5$	2	1.176				20∗1/1	1636
Poly(4,4′-bicyclohexylene undecanedioate)													
–, *trans-*, *trans-*													
(378.55)	Mono		12.4	5.21	23.0	$\beta=43.5$	2	1.229				21∗1/1	1636
smectic	Mono		12.3	5.55	20.6	$\beta=51.4$	2	1.144				21∗1/1	1636
Poly(4,4′-biphenylene 4,4′-biphenylenedicarboxylate)													
(392.11)	Ortho		7.83	5.50	20.66		2	1.464				20∗1/1	1622
Poly(4,4′-biphenylene terephthalate)													
(316.31)	Ortho		7.20	5.23								16∗	1622
Poly(3,4′-carbonyldiphenylene terephthalate)													
(344.32)	Ortho	C2v-17	12.51	7.561	67.66		16	1.4292				16∗4/1	1562
Poly(1,3-cyclobutylene carbonate)													
–, 2,2,4,4-tetramethyl-													
trans-													
(170.21)	Tri		9.25	8.28	(6.9)	$\gamma=96.5$		1.08		360		6∗1/1	364
cis-													
	Ortho		9.16	8.22	12.9		4	1.164		253		6∗2/1	364
Poly(1,4-cyclohexylene adipate)													
trans-													
(226.27)					13.5					225/762		12∗1/1	763
Poly(1,4-cyclohexylenedimethylene adipate)													
trans-													
I.	Mono	C2h-5	6.938	9.761	15.97	$\beta=41.4$	2	1.181		124/547		14∗1/1	1262
(254.33)													
cis-													
										55/547			
Poly(1,4-cyclohexylenedimethylene succinate)													
trans-													
(226.27)	Mono	C2h-5	6.486	9.482	13.51	$\beta=45.9$	2	1.259		147/547		12∗1/1	1193
cis-													
										62/547			
Poly(1,4-cyclohexylenedimethylene terephthalate)													
trans-													
(274.32)	Tri		6.37	6.63	14.2	89,47,114	1	1.266		318/547		14∗1/1	199
	Tri	Ci-1	6.46	6.65	14.2	89,47,115	1	1.260				14∗1/1	1077
cis-													
	Tri		6.02	6.01	13.7	89,53,112	1	1.319		256/547		14∗1/1	199

SECTION VII

SOLUTION PROPERTIES

Viscosity – Molecular Weight Relationships and Unperturbed Dimensions of Linear Chain Molecules

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A. INTRODUCTION

1. The Viscosity – Molecular Weight Relationship

The limiting viscosity number $[\eta]$ of a solution – which has long been called the intrinsic viscosity – is defined as

$$[\eta] = \lim_{c \to 0} \frac{\eta - \eta_0}{\eta_0 c} \tag{A1}$$

in terms of the solvent viscosity, η_0, the solution viscosity, η, and the solute concentration, c. The concentration, c, is expressed in grams of solute per milliliter of solution or, more frequently, in grams of solute per 100 milliliters of solution, the limiting viscosity number being given in the reciprocal of these units, *i.e.*, in milliliters per gram or in deciliters per gram. Here, following the IUPAC 1952-recommendations (1), we adopt the former unit. The quantity $[\eta]$ of a polymer solution is a measure of the capacity of a polymer molecule to enhance the viscosity, which depends on the size and the shape of the polymer molecule. Within a given series of polymer homologs, $[\eta]$ increases with the molecular weight M; hence it is a measure of M.

Section C gives the limiting viscosity number – molecular weight relationships for polymers, in various solvents and at various temperatures. The table contains the constants of the equation

$$[\eta] = KM^a \tag{A2}$$

which is known as the Mark–Houwink–Sakurada equation. It is now well established that for linear, flexible polymers, under special conditions of temperature or solvent, (usually known as the Flory "theta" temperature or solvent, (2)), the above equation becomes

$$[\eta]_\theta = K_\theta M^{0.50} \tag{A3}$$

In the tables, the θ sign in parenthesis (next to the temperature data) indicates that the viscosity constants were obtained under the theta condition. Since Eq. (A3) is approximately valid over the whole molecular weight range, K_θ and $a = 0.50$ may be used without modification, outside of the molecular weight range in which they were determined. However, it must be noted that $[\eta]$ is rather sensitive to temperature in the vicinity of θ, especially when M is higher than 5×10^5.

In ordinary good solvents, the constants K and a obtained are valid only within a rather limited range of M (3,4). It is therefore, quite probable that the tabulated relationships are in error outside the indicated range of M (see eighth column in the table). As for the effect of temperature, however, both K and a mostly become insensitive to the temperature when a exceeds about 0.70, and they may be used in a 10-degree range on either side of temperature at which the constants were determined.

The method of determination of the molecular weight and the number of fractionated samples (Fr.) or whole polymer samples (WP) used to determine the $[\eta]$–M relationship are also given in the ninth and the sixth or seventh columns, respectively. The abbreviations used are as follows:

(A) Methods Yielding the Number-Average Molecular Weight (M_n)

CR	cryoscopy
EG	end-group titration
VOS	vapor pressure osmometry
EB	ebullioscopy
OS	osmotic pressure

(B) Methods Yielding the Weight-Average Molecular Weight (M_w)

LS	light scattering
LLS	low-angle laser light scattering
SE	sedimentation equilibrium
SEC, GPC	size exclusion chromatography gel permeation chromatography
SA	approach to the sedimentation equilibrium (Archibald's method)

(C) Empirical or Semi-Empirical Methods

EM	electron microscopy
GPC	gel permeation chromatography
LV	limiting viscosity number – molecular weight relationship
PR	analysis of polymerization rate (yielding M_n)
DV	diffusion and viscosity
MV	melt viscosity – molecular weight relationship
SD	sedimentation and diffusion
SV	sedimentation and viscosity

Thus, for example, the constants tabulated are for the $[\eta]$–M relationships, expressed in terms of M_n or M_w, if the method is specified as OS or LS, respectively; *i.e.*,

$$[\eta] = K_n M_n^a \tag{A4}$$

or

$$[\eta] = K_w M_w^a \tag{A5}$$

The values of K_n and K_w, especially the former, are greatly influenced by the molecular weight distribution (MWD) of the polymer samples, and caution must be taken in using these relationships.

To illustrate this effect, let us assume that

(i) Equation (A2) is applicable to the molecule i with molecular weight M_i over the whole range of M; *i.e.*,

$$[\eta]_i = KM_i^a \tag{A6}$$

(ii) The weight fraction w_i of the molecules i in a given sample can be represented by a continuous exponential function,

$$w_i(M_i) = [y^{h+1}/\Gamma(h+1)]\, M_i^h \exp(-yM_i) \tag{A7}$$

$$y = h/M_n = (h+1)/M_w \tag{A8}$$

or by the log-normal function,

$$w_i(M_i) = AM_i \exp[-p^2(\ln M_i/M_0)^2] \tag{A9}$$

where h, A, p, and M_0 are constants, and Γ represents the gamma function.
Then, since $[\eta] = \sum_i w_i[\eta]_i$, we obtain

$$K_n = K\Gamma(a+h+1)/h^a\,\Gamma(h+1) \tag{A10}$$

$$K_w = K\Gamma(a+h+1)/(h+1)^a\,\Gamma(h+1) \tag{A11}$$

for the exponential MWD, and

$$K_n = K(M_w/M_n)^{0.5a(a+1)} \tag{A12}$$

$$K_w = K(M_w/M_n)^{0.5a(a-1)} \tag{A13}$$

for the log-normal MWD (5). The values of K_n/K and K_w/K calculated by these equations are shown in Section B. This table may be used for estimating an error due to MWD in the determination of M.

As an example, let us assume that a given polymer sample has the exponential MWD with $M_w/M_n = 2.0$, while an available $[\eta]$–M_n equation has been obtained for samples with a narrow MWD, *e.g.*, $M_w/M_n = 1.1$. Further, let a be 0.70. Then, to find the correct value of M_n of the given sample from $[\eta]$, we must use Eq. (A4) with $K_n = 1.54K$, instead of the available equation with $K_n = 1.06K$. Use of the latter would lead to an overestimate M'_n which is related to the correct M_n by

$$[\eta] = 1.54KM_n^{0.70} = 1.06KM_n'^{0.70} \tag{A14}$$

The error amounts to about 70%, *i.e.*, $M'_n = 1.7M_n$. Thus, application of the viscosity equation written in M_n is to be restricted to within a narrow class of samples, unless an appropriate correction is made. On the other hand, if an $[\eta]$–M_w equation is available for the same pair of working and reference samples as above, we have

$$[\eta] = 0.951KM_w^{0.70} = 0.991KM_w'^{0.70} \tag{A15}$$

instead of Eq. (A14). Hence, the error M_w amounts to only 6% ($M'_w = 0.94M_w$), which will be negligible for more practical purposes.

Based on the above consideration, we classify the heterogeneity of polymers into four classes, A–D, as shown in the last column of the table in Section B, and indicate it in the tenth column of the tables in Section C, as a measure of the heterogeneity of the reference samples used.

It is desirable that readers select their own relationship by inspecting these data on heterogeneity as well as those on the number of samples and the molecular weight range. Generally speaking, a "good" $[\eta]$–M relationship is one that has been obtained on the basis of M_w for at least four samples of classes A and B (exceptionally C) or on the basis of M_n for those of class A (exceptionally B), whose molecular weights range over at least one half orders of magnitude.

In the "Remarks" column of Section C, we have occasionally indicated by the letter R, a "recommended" relationship for the convenience of readers. In the range of low molecular weight (mostly less than 10^4), the constant a becomes 0.50 irrespective of the solvent. This type of relationship cannot be used, even approximately, at higher molecular weights. This case is noted by the letter L. High conversion polymers are also marked by the letter H, where the $[\eta]$–M relationships are less reproducible due to chain branching than are ordinary ones. The abbreviations used are as follows:

A	Narrow MWD polymers, or well-fractionated polymers, $M_w/M_n \leq 1.25$
B	Ordinary fractionated polymers, $1.30 \leq M_w/M_n \leq 1.75$
C	Poorly fractionated polymers or most probable MWD polymers, $1.8 \leq M_w/M_n \leq 2.4$
D	Wide MWD polymers, $M_w/M_n \geq 2.5$
H	High conversion polymers, including branches
L	Limited to low-molecular-weight polymers
R	Recommended relationship

In Section C, polymers are arranged according to their structure in subgroups. Within each subgroup, the polymers are, in principle, given in alphabetical order. Within each polymer, the solvents are also arranged in alphabetical order, followed by the mixed solvents.

Chain configurational data are occasionally given in the first column. The data given in parentheses refer to only one set of viscosity constants listed in the same row, while the data given without parentheses refer to a series of sets listed in the same and succeeding rows. Thus, for example, the data "N content, 13.9 wt.%" are effective only for the sixth row of cellulose trinitrate, and the data "95%-*cis*, 1%-*trans*, 4%-1,2" are effective for the fourth to eighth rows of polybutadiene.

The tables in Section C are essentially based on the table published by Kurata and Stockmeyer (3). Data were also taken from tables published by Peterlin (7), Meyerhoff (8), Elias (9), and Krause (10), the last one including a number of unpublished data on acrylic and methacrylic polymers. We are also grateful to these authors. Thanks are also due to J. Brandrup and K. Kamide for their help with this compilation.

2. Unperturbed Dimensions of Linear Chain Molecules

The mean-square end-to-end distance $\langle r^2 \rangle$ of a linear chain molecule in solution is usually expressed in terms of two basic quantities, the unperturbed mean-square end-to-end distance $\langle r^2 \rangle_0$ and the expansion factor α; *i.e.*,

$$\langle r^2 \rangle = \langle r^2 \rangle_0 \alpha^2 \tag{A16}$$

The latter quantity α represents the effect of "long-range interactions" which can be described as an osmotic swelling of the chain by the solvent–polymer interactions, while the unperturbed dimension $\langle r^2 \rangle_0$ represents the effect of "short-range interactions" such as bond angle restrictions and steric hindrances to internal rotation. The steric hindrances are also influenced by the torques exerted on the chain by solvent molecules, but the effect is rather small in many cases (11).

For sufficiently long chain, $\langle r^2 \rangle_0$ becomes proportional to $\sum_i n_i l_i^2$ where n_i is the number of the ith-kind bond of length l_i. The quantity C_∞, defined by

$$C_\infty = \lim_{n \to \infty} \langle r^2 \rangle_0 \Big/ \sum_i n_i l_i^2 \tag{A17}$$

is often called the characteristic ratio and it serves as a measure of the effect of short-range interactions.

The freely rotating state is a hypothetical state of the chain in which the bond angle restrictions are retained, but the steric hindrances to internal rotation are released. The mean-square end-to-end distance of the freely rotating chain $\langle r^2 \rangle_{0f}$ can be readily calculated from the given basic structure of the chain. For instance, if the chain consists of only one kind of bond of length l, we obtain

$$\langle r^2 \rangle_{0f} = nl^2[(1 + \cos\theta)/(1 - \cos\theta)] \tag{A18}$$

where n is the number of bonds and θ is the supplement of the valence bond angle. For vinyl polymer chains, $l = 0.154$ [nm], $\cos\theta = 1/3$, and $n = M/m = 2M/M_u$; and hence

$$(\langle r^2 \rangle_{0f}/M)^{1/2} = 0.308/M_u^{1/2} = 0.218/m^{1/2}\ [\text{nm}] \tag{A19}$$

where M_u is the molecular weight of the repeating unit and m is the average molecular weight per skeletal link. Similar expressions for r_{0f} $(= \langle r^2 \rangle_{0f}^{1/2})$ can be also obtained for more complicated chains. The results are summarized in Section D.

The ratio of $\langle r^2 \rangle_0$ to $\langle r^2 \rangle_{0f}$, then, represents the effect of steric hindrance on the average chain dimensions:

$$\sigma = r_0/r_{0f} = (\langle r^2 \rangle_0 / \langle r^2 \rangle_{0f})^{1/2} \tag{A20}$$

The quantity σ is independent of n. Section E gives a list of the unperturbed dimensions of linear chain molecules which were obtained under various conditions of solvent and temperature. The values of $r_0/M^{1/2}$, $r_{0f}/M^{1/2}$, σ and C_∞ are given, together with the experimental values of $S_{0z}/M_w^{1/2}$, a_p, or K_0 from which r_0 was computed. S_{0z} which is the abbreviation of $\langle S^2 \rangle_{0z}^{1/2}$ is the z-average value of the unperturbed radius of gyration, a_p is the persistence length, and K_0 is the viscosity constant corresponding to K_θ in Eq. (A3). The methods used to determine these quantities are also indicated in the tenth column of the tables by using the following abbreviations:

(A) Light scattering
- LT Zimm's plot in a theta solvent yielding $S_{0z}/M_w^{1/2}$. After a heterogeneity correction is made, the tabulated value of $r_0/M^{1/2}$ $(= 6^{1/2} S_{0w}/M_w^{1/2})$ is obtained.
- LD dissymmetry method in a theta solvent. Less reliable for heterogeneous samples than the former method.
- LG Zimm's plot in good solvents yielding $S_z/M_w^{1/2}$. After corrections for the excluded volume effect and heterogeneity are made, the tabulated value of $r_0/M^{1/2}$ is obtained (3,12).

(B) X-ray small-angle scattering
- XS the persistence length a_p is obtained irrespective of the solvent nature. The tabulated values of $r_0/M^{1/2}$ are the asymptotic values for infinitely high molecular weight (13,14).

(C) Limiting viscosity number
- VT viscosity – molecular weight relationship in a theta solvent. Equation (A3) $r_0/M^{1/2}$ is calculated by the Flory and Fox relation, $K_0 = \Phi_0 (r_0/M^{1/2})^3$. The following values of Φ_0 were used:
  - 2.7×10^{23} for well-fractionated polymers (class A in Section C)
  - 2.5×10^{23} for ordinary fractionated polymers (class B)
  - 2.1×10^{23} for poorly fractionated or unfractionated polymers (class C or D)
- VG viscosity – molecular weight relationship in good solvents. K_0 was estimated by using the Kurata–Stockmeyer–Fixman plot (3,4) or other analogous plots (12).
- VWC viscosity analyzed by the wormlike cylinder model.
- VA viscosity in good solvents. The correction of excluded volume effect is made by using the Flory–Krigbaum–Orofino theory of the second virial coefficient A_2 or other analogous theories (12).

(D) Method yielding the temperature dependence of r_0.
ST stress – temperature coefficient of undiluted or swollen samples.
VTe viscosity – temperature coefficient of the intrinsic viscosity

The polymers are arranged in Section E in the same order as in Section C. For each polymer, smoothed values of $r_0/M^{1/2}$, σ, and C_∞, which were mostly obtained by VT or VG, are given in the first line, followed by some typical values obtained by more direct methods such as LT or XS. The listed values of $r_0/M^{1/2}$ sometimes scatter appreciably, reflecting the difficulty involved, both experimental and theoretical, in the determination of this quantity. Especially in the case of cellulose chains, the right magnitude of r_0 is yet in controversy (542, 549,3,691,696,688,678,686,12). In recent papers, emphasis has often been put on the effect of temperature or solvent on the unperturbed dimensions. These data are put together at the end of the tabulation for each polymer. Section E is also based on the tables published by Kurata and Stockmeyer (3).

B. EFFECT OF MOLECULAR WEIGHT DISTRIBUTION ON THE VISCOSITY CONSTANT K

	$a=0.5$		$a=0.6$		$a=0.7$		$a=0.8$		$a=0.9$		$a=1.0$		
M_w/M_n	K_n/K	K_w/K	K_n/K	K_w/K	K_n/K	K_w/K	K_n/K	K_w/K	K_n/K	K_w/K	K_n/K	K_w/K	Class
MOLECULAR WEIGHT DISTRIBUTION: EXPONENTIAL TYPE (Eq. (A7))													
30	4.87	0.890	6.91	0.897	9.85	0.911	14.18	0.933	20.56	0.963	30	1	D
15	3.46	0.893	4.57	0.900	6.08	0.914	8.16	0.935	11.02	0.964	15	1	D
10	2.83	0.896	3.59	0.903	4.59	0.917	5.91	0.937	7.67	0.965	10	1	D
5	2.03	0.907	2.40	0.913	2.85	0.925	3.42	0.943	4.12	0.968	5	1	D
3	1.60	0.921	1.79	0.926	2.02	0.936	2.29	0.952	2.62	0.973	3	1	D
2	1.33	0.940	1.43	0.943	1.54	0.951	1.68	0.963	1.83	0.979	2	1	C
1.75	1.25	0.948	1.33	0.951	1.42	0.958	1.51	0.968	1.63	0.982	1.75	1	B
1.50	1.18	0.959	1.23	0.961	1.28	0.967	1.35	0.975	1.42	0.986	1.50	1	B
1.25	1.09	0.975	1.12	0.977	1.15	0.980	1.18	0.985	1.21	0.991	1.25	1	A
1.10	1.04	0.989	1.05	0.989	1.06	0.991	1.07	0.993	1.09	0.996	1.10	1	A
MOLECULAR WEIGHT DISTRIBUTION: NORMAL TYPE (Eq. (A9))													
30	3.58	0.654	5.12	0.665	7.57	0.700	11.58	0.762	18.32	0.858	30	1	D
15	2.76	0.713	3.67	0.723	5.01	0.753	7.03	0.805	10.13	0.885	15	1	D
10	2.37	0.750	3.02	0.759	3.94	0.785	5.25	0.832	7.16	0.902	10	1	D
5	1.83	0.818	2.17	0.824	2.61	0.845	3.19	0.879	3.96	0.930	5	1	D
3	1.51	0.872	1.69	0.877	1.92	0.891	2.21	0.916	2.56	0.952	3	1	D
2	1.30	0.917	1.39	0.920	1.51	0.930	1.65	0.946	1.81	0.969	2	1	C
1.75	1.23	0.932	1.31	0.935	1.40	0.943	1.50	0.956	1.61	0.975	1.75	1	B
1.50	1.16	0.951	1.21	0.953	1.27	0.958	1.34	0.968	1.41	0.982	1.50	1	B
1.25	1.09	0.973	1.11	0.974	1.14	0.977	1.17	0.982	1.21	0.990	1.25	1	A
1.10	1.04	0.988	1.05	0.989	1.06	0.990	1.07	0.992	1.08	0.996	1.10	1	A

C. TABLES OF VISCOSITY – MOLECULAR WEIGHT RELATIONSHIPS, $[\eta] = KM^a$

TABLE 1. MAIN-CHAIN ACYCLIC CARBON POLYMERS

Polymer	Solvent	Temp. (°C)	K ($\times 10^3$) (ml/g)	a	No. of samples Fr.	No. of samples W.P.	Mol. wt. range ($\times 10^{-4}$)	Method(s)	Remarks	Refs.
1.1. POLY(DIENES)										
Poly(butadiene)										
linear	Dioxane	12.1	139	0.52	4	–	2.1–23.2	LG	B–C	889
	Toluene	35	16.9	0.765	6	–	2.1–23.2	LG	B–C	889
ring	Toluene	35	11.8–10.6	0.765	3	–	3.8–6.1	LG	B–C	889
98%-*cis*, 2%-1,2	Benzene	30 (θ)	33.7	0.715	9	–	5–50	OS	A,R	15
	Isobutyl acetate	20.5	185	0.50	6	–	5–50	OS	A	15
	Toluene	30	30.5	0.725	9	–	5–50	OS	A	15
95%-*cis*, 1%-*trans*, 4%-1,2	Benzene	30	8.5	0.78	4	–	15–50	LS	A	16
	Cyclohexane	30	11.2	0.75	4	–	15–50	LS	A	16
	5-Methyl-2-hexanone	12.6 (θ)	150	0.50	4	–	15–35	LS	B	17

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TABLE 1. *cont'd*

Polymer	Solvent	Temp. (°C)	K ($\times 10^3$) (ml/g)	a	No. of samples Fr.	No. of samples W.P.	Mol. wt. range ($\times 10^{-4}$)	Method(s)	Remarks	Refs.
	3-Pentanone	10.3 (θ)	152	0.50	4	–	10–25	LS	B	17
	Toluene	30	33.9	0.688	8	–	10–65	OS	A	18
94%-*cis*, 4%-*trans*, 2%-1,2	Benzene	25	41.4	0.70	8	–	9–120	OS	A	19
	Dioxane	20.2 (θ)	205	0.50	8	–	9–120	OS	A	19
92%-*cis*, 3%-*trans*, 5%-1,2	Benzene	32	10	0.77	13	–	10–160	LS	B,R	20
51%-*trans*, 43%-*cis*, 6%-1,2	Toluene	30	39	0.713	6	–	11–25	OS	A	21
57%-*trans*, 36%-*cis*, 7%-1,2	Tetrahydrofuran	30	25.6	0.74	2	–	1–57	LS	A	733
71%-*trans*, 4%-*cis*, 25%-1,2	Cyclohexane	25	12	0.77	8	–	230–880	LS	C	22
79%-*trans*, 21%-*cis*	Cyclohexane	20	36	0.70	12	–	23–130	LS	B,R	23
97%-*trans*, 3%-1,2	Cyclohexane	40	28.2	0.70	7	–	4–17	LS	B	24
	Toluene	30	29.4	0.753	6	–	5–16	OS	A	25
ca. 100%-*cis*	Benzene	32	14.5	0.76	8	–	18–50	LS	A	26
	Heptane/hexane (1/1, v/v)	20	138	0.53	5	–	?	SD	A	27
65%-1,2, 25%-*trans*, 10%-*cis*	Toluene	25	110	0.62	8	–	7–70	OS	B	28
5°C-emulsion, randomly branched	3-Pentanone	24 (θ)	$M^{2/3}[\eta] = 7.15 + 3.47M$		10	–	10–100	OS	C	29
50°C-emulsion, randomly branched	Benzene	5 (θ)	$M^{2/3}[\eta]^{4/3} = 4.61 + 0.3287M$		16		5–124	OS	C	29
Poly(butadiene-*co*-acrylonitrile), Buna-N rubber										
	Acetone	25	50	0.64	5	–	2.5–10	OS	B	28
	Benzene	25	13	0.55	5	–	2.5–10	OS	B	28
	Chloroform	25	54	0.68	5	–	2.5–10	OS	B	28
	Toluene	25	49	0.64	7	–	2.5–40	OS	B	28
Poly(butadiene-*co*-styrene), Buna-S, GR-S, or SBR rubber										
	Benzene	25	52.5	0.66	24	–	1–160	OS		45
		25	54	0.66	8	–	1–165	OS	B	46
	Cyclohexane	30	31.6	0.70	6	–	5–25	OS	A	47
	2-Pentanone	21 (θ)	185	0.50	6	–	5–25	OS	A	47
	Toluene	25	52.5	0.667	25	–	2.5–50	OS	B	28
		30	16.5	0.78	–	9	3–35	OS		48
		30	37.9	0.71	6	–	5–25	OS	A	47
linear fraction	Toluene	30	21.4	0.74	15	–	3–20	OS	A,R	41
branched fraction	Toluene	30	535	0.48	20	–	20–100	OS	B	41
Poly(1-butenylene-*co*-vinylethylene)										
43%-1,2	1,4-Dioxane	15.7 (θ)	173	0.50	6	–	0.88–22	LLS, SEC, OS	A	890
	Tetrahydrofuran	30	32.3	0.72	6	–	0.88–22	LLS, SEC, OS	A	890
Poly(2-*tert*-butylbutadiene)	Benzene	21	4.2	0.80	–	8	6–90	SD	A	30
	Octane	21	4.2	0.80	–	7	6–35	SD	A	30
Poly(chloroprene)										
Neoprene CG	Benzene	25	2.02	0.89	10	–	6–150	OS	B	31
Neoprene GN	Benzene	25	14.6	0.73	16	–	2–96	OS	B	32
Neoprene W	Benzene	25	15.5	0.71	8	–	5–100	OS	B	33
		25	15.5	0.72	9	–	5–80	LS	B,R	34
	Butanone	25 (θ)	113	0.50	7	–	15–300	LS	A	35
	Butyl acetate	25	37.8	0.62	7	–	15–300	LS	A	35
	Carbon tetrachloride	25	22.1	0.69	7	–	15–300	LS	A	35
	Cyclohexane	45.5 (θ)	107	0.50	7	–	15–70	LS	B	34
type, unspecified	Toluene	25	50	0.615	13	–	4–120	OS	B	28
Poly(isoprene)										
natural rubber	Benzene	30	18.5	0.74	–	4	8–28	OS	C	37
	Cyclohexane	27	30	0.70	–	1	ca. 185	LS, SD	C	38
	4-Methyl-2-pentanone	35	60.7	0.57			5–100	LS	B	698
	2-Pentanone	14.5 (θ)	119	0.50	–	4	8–28	OS	C	37
	Toluene	25	50.2	0.667	20	–	7–100	OS	B,R	39
		35	17.4	0.74			5–100	LS	B	698
synthetic *cis*	Hexane	20	68.4	0.58	5	–	5–80	SD	A	40
	Toluene	30	8.51	0.77	5	–	20–100	LS	A	41
85–91%-*cis*	Toluene	30	20.0	0.728	–	12	14–580	LS	A,R	42
		30	15	0.74	–	16	2–15	PR	A	43
	2,2,4-Trimethylpentane	30	22.2	0.683	–	8	23–580	LS	A	42
	Heptane/propanol (78/22, v/v)	30	37	0.63	–	6	43–580	LS	A	42

TABLE 1. *cont'd*

Polymer	Solvent	Temp. (°C)	K ($\times 10^3$) (ml/g)	a	No. of samples Fr.	No. of samples W.P.	Mol. wt. range ($\times 10^{-4}$)	Method(s)	Remarks	Refs.
84%-*cis*, 14%-*trans*, 2%-1,2	Benzene	25	13.3	0.78	20	–	2–80	OS	B	44
		25	11.2	0.78	25	–	2–60	OS	B	44
	Dioxane	34 (θ)	145	0.50	30	–	2–50	OS	B	44
71%-*cis*, 22%-*trans*, 7%-3,4	Cyclohexane	35	20.2	0.73	5	–	2–32	OS	A	786
	Dioxane	35	94	0.53	5	–	2–32	OS	A	786
	4-Methyl-2-pentanone	35	76	0.56	5	–	2–32	OS	A	786
	Toluene	35	17.5	0.74	5	–	2–32	OS	A	786
gutta percha	Benzene	25	35.5	0.71	9	–	0.2–5	OS	A,R	19
	Dioxane	47.7 (θ)	191	0.50	9	–	0.2–5	OS	A	19
	Propyl acetate	60 (θ)	232	0.50	–	3	10–20	OS	C	37
synthetic *trans*	Benzene	32	43.7	0.65	24	–	8–140	LS	C	26
synthetic *trans* (98%)	Benzene	30	18.1	0.722			14–77	LS	B	699
	Cyclohexane	30	16.2	0.736	8	–	14–77	LS	B	699
	Hexane	30	13.8	0.711	7	–	14–77	LS	B	699
	Toluene	30	17.6	0.729			14–77	LS	B	699
98% 1,4-*trans*	Benzene	30	18.1	0.722	6	–	14–69	LS	B	887
	Cyclohexane	30	16.2	0.736	8	–	16–130	LS	B	887
	n-Hexane	30	13.8	0.711	7	–	16–105	LS	B	887
	Toluene	30	17.6	0.729	5	–	14–77	LS	B	887
70% *cis*-1,4, 23% *trans*-1,4 7% 3,4	Cyclohexane	25	20.5	0.730	11	–	1.5–342	LS	A	891
76% *cis*-1,4, 19% *trans*-1,4 5% 3,4	Cyclohexane	25	18.0	0.74	5	–	33–724	LS	A	892
star type 70% *cis*-1,4, 23% *trans*-1,4 7% 3,4 (mol. wt. of arm = various)										
3 arm	Cyclohexane	25	12.5	0.757	–	–	–	LS	–	893
4 arm	Cyclohexane	25	11.6	0.753	–	–	–	LS	–	893
8 arm	1,4-Dioxane	34	75.5	0.493	–	–	–	LS	–	893
	Toluene	34	9.47	0.726	–	–	–	LS	–	893
12 arm	1,4-Dioxane	34	53.9	0.501	–	–	–	LS	–	893
	Toluene	34	5.70	0.741	–	–	–	LS	–	893
16 arm	1,4-Dioxane	34	37.4	0.502	–	–	–	LS	–	893
	Toluene	34	3.04	0.764	–	–	–	LS	–	893
trans 1,4	Benzene	30	18.1	0.722	6	–	14–70	LS	B	894
	Cyclohexane	30	16.2	0.736	6	–	14–70	LS	B	894
	Hexane	30	13.8	0.711	6	–	14–70	LS	B	894
	Toluene	30	17.6	0.729	4	–	14–70	LS	B	894
Poly(isoprene)-*block*-poly(styrene), A_k-B_n										
k/*n*, (50/50, w/w)	Cyclohexane	35	21.8	0.68	5	–	3–54	OS	A	786
	Dioxane	35	32.6	0.63	5	–	3–54	OS	A	786
	4-Methyl-2-pentanone	35	53.1	0.57	5	–	3–54	OS	A	786
	Toluene	35	14.6	0.73	5	–	3–54	OS	A	786
k/*n*, (25/75, w/w)	Cyclohexane	35	39.3	0.60	6	–	3–48	OS	A	786
	Dioxane	35	24.8	0.65	6	–	3–48	OS	A	786
	4-Methyl-2-pentanone	35	62.8	0.55	6	–	3–48	OS	A	786
	Toluene	35	14.3	0.72	6	–	3–48	OS	A	786
Poly(isopropenylethylene-*co*-1-methyl-1-vinylethylene) 20–25%-1,2,70–75%-3,4										
	2-Octanol	30.5 (θ)	102	0.50	7	–	1.3–27	LLS, SEC, OS	A	890
	Tetrahydrofuran	30	11.6	0.77	7	–	1.3–27	LLS, SEC, OS	A	890
Poly(1-methyl-1-butylene-*co*-isopropenylethylene) 51%-1,4,49%-3,4										
	2-Octanol	41.3	78	0.52	8	–	1.1–14	LLS, SEC, OS	A	890
	Tetrahydrofuran	30	14.6	0.75	8	–	1.1–14	LLS, SEC, OS	A	890
Poly(1,1,2-trichlorobutadiene)	Benzene	25	31.6	0.66	11	–	25–130	LS		36
1.2. POLY(ALKENES), POLY(ACETYLENES)										
Poly(alkene) C_{10}–C_{18}	Toluene	25	12.7	1.04	12	–	2–18	LS	B	86
Poly(alkene) C_{12}–C_{18}	Cetane	38	21	0.61	10	–	4–700	LS	B	87
Poly(1-butene)	2-Octanol	23.6	60.5	0.52	6	–	2.7–55	LLS, SEC	A	896
	Tetrahydrofuran	25	8.24	0.76	6	–	2.7–55	LLS, SEC	A	896
atactic	Anisole	86.2 (θ)	123	0.50	3	–	10–130	LS	C	81
	Benzene	30	22.4	0.72	11	–	0.03–0.5	EG	B,L	82

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TABLE 1. *cont'd*

Polymer	Solvent	Temp. (°C)	K ($\times 10^3$) (ml/g)	a	No. of samples Fr.	No. of samples W.P.	Mol. wt. range ($\times 10^{-4}$)	Method(s)	Remarks	Refs.
	Ethylcyclohexane	70	7.34	0.80	5	–	4–130	LS	C	81
	Phenyl ether	141 (θ)	104	0.50	5	–	2–66	OS	A	700
isotactic	Anisole	89 (θ)	111	0.50	5	–	4–57	OS	B	700
	Decalin	115	9.49	0.73	6	–	4.5–90	LS		83
	Ethylcyclohexane	70	7.34	0.80	4	–	8–94	LS	A	81
	Heptane	35	4.73	0.80	6	–	4.5–90	LS		83
		60	15.0	0.69	6	–	4.5–90	LS		83
	Nonane	80	5.85	0.80	4	–	11–94	LS	A	81
	Phenetole	64.5 (θ)	113	0.50	5	–	4–57	OS	B	700
	Phenyl ether	148 (θ)	103	0.50	5	–	4–57	OS	B	700
	1,2,4,-Trichlorobenzene	135	11.8	0.729				GPC		701
	Cyclohexane/propanol									
	(80/20, v/v)	35	102	0.59	6	–	3–73	LS	B–C	702
	(70/30, v/v)	35	253	0.51	6	–	3–73	LS	B–C	702
	(65/35, v/v)	35	497	0.44	6	–	3–73	LS	B–C	702
Poly(ethylene)										
low pressure	Biphenyl	127.5 (θ)	323	0.50	4	–	2–30	LV	B	58
		130 (θ)	302	0.50	5	–	5.7–27	LS, GPC		703
	1-Chloronaphthalene	125	138	0.58	?	?	?	LS	?	59
		125	18.4	0.78	10	–	5–100	LS		60
		125	43	0.67	10	–	5–100	LS	C,D	61
		129	27.1	0.71	26	–	5–100	LS	D	62
	Decalin	135	67.7	0.67	–	>10	3–100	LS	D	63
		135	46	0.73	23	–	3–64	LS		64
		135	62	0.70	7	–	2–105	LS	B,R	65,66
		135	58.5	0.725	9	–	0.4–50	OS	B	67,68
		135	62	0.70	7	–	3–120	GPC, LS	B	704
	Decanol	153.3 (θ)	302	0.50	?	–	2–105	LV	B	58
	Diphenyl ether	161.4 (θ)	295	0.50	6	–	2–105	LS	B	65
	Diphenylmethane	142.2 (θ)	315	0.50	?	–	2–105	LV	B	58
	Dodecanol	137.3 (θ)	307	0.50	5	–	2–105	LV	B	58
		138 (θ)	316	0.50	–	8	8–32	LS	F	69
		144.5		0.61	6	–	0.8–59	LS		705
	Octanol	180.1 (θ)	286	0.50	?	–	2–105	LV	B	58
	Tetralin	105	16.2	0.83	4	–	13–57	LS	C	70
		120	23.6	0.78	36	–	5–100	LS		60
		120	32.6	0.77	20	–	0.3–50	LS	B	71
		130	43.5	0.76	6	–	2–30	OS	B	71
		130	51	0.725	9	–	0.4–50	OS	B,R	72
		130	37.8	0.72	–	10	8–17	LS	D	73
	1,2,4-Trichlorobenzene	135	95.4	0.64	4	–	3–45	LS	A	706
		135	51	0.706	19	–	0.8–123	GPC, LS	B	704
		135	51.6	0.691	4	–		GPC		701
	3,5,5-Trimethylhexyl acetate	121		0.55	6	–	1–59	LS		705
	p-Xylene	105	16.5	0.83	4	–	13–50	LS	C	70
		105	17.6	0.83	8	–	1–18	OS	C	74
		105	51	0.725	?	–	0.4–50	LV	B,R	75
	Paraffin wax ($M_n = 390 \pm 10$)									
		150	(42)	(0.65)	9	–	0.04–11	LS	D	76
high pressure	Decalin	70	38.73	0.738	8	–	0.2–3.5	OS	B	77
	p-Xylene	75	135	0.63	–	22	0.2–7.6	OS	D	78
		81	105	0.63	7	–	1–10	OS	D	79
(normal paraffin)	Carbon tetrachloride	20 $[\eta] = -1.14 + 0.104\,M$			–	7	0.024–0.048	CR	A	80
Poly(ethylene-*alt*-tetrafluoroethylene)										
	Diisobutyl adipate	240	2.3	0.71	–	3	54–116	LS	B	898
Poly(ethylene-*co*-isopropylethylene)										
	n-Hexyl acetate	65	171	0.51	6	–	0.92–23	LLS, SEC, OS	A	890
	Tetrahydrofuran	30	71.3	0.64	6	–	0.92–23	LLS, SEC, OS	A	890
Poly(ethylene-*co*-propylene)	Benzene	19.0	201	0.502	6	–	2.8–39	LS	A	897
		21.4	136	0.543	6	–	2.8–39	LS	A	897
	n-Decyl acetate	5.0	162	0.523	6	–	2.8–39	LS	A	897
	n-Heptyl acetate	38.0	156	0.522	6	–	2.8–39	LS	A	897

TABLE 1. *cont'd*

Polymer	Solvent	Temp. (°C)	K ($\times 10^3$) (ml/g)	a	No. of samples Fr.	No. of samples W.P.	Mol. wt. range ($\times 10^{-4}$)	Method(s)	Remarks	Refs.
Poly(ethylene-*co*-propylene-*co*-diene), EPDM rubber										
	Cyclohexane	40	53.1	0.75	20	–	3–30	OS	A	41
Poly(isobutene)	Anisole	105 (θ)	91	0.50	–	–	18–188	LV	B	49
	Benzene	24 (θ)	107	0.50	15	–	18–188	LV	B	49
		25	83	0.53	9	–	0.05–126	OS, CR	B,R	50
		30	61	0.56	9	–	0.05–126	OS, CR	B	50
		40	43	0.60	9	–	0.05–126	OS, CR	B	50
		60	26	0.66	9	–	0.05–126	OS, CR	B	50
	Benzene	25	100	0.504	–	9	1.35–148	SEC, LLS	A–B	1010
	Carbon tetrachloride	30	29	0.68	12	–	0.05–126	OS, CR	B	50
	Chloroform	25	71	0.55	12	–	5.7–490	LS	A(?)	899
	Cyclohexane	10	25.6	0.639	–	6	2.6–110	LV	A–B	901
		20	24.2	0.697	–	6	2.6–110	LV	A–B	901
		30	23.3	0.699	–	6	2.6–110	LV	A–B	901
		40	22.9	0.701	–	6	2.6–110	LV	A–B	901
		50	22.4	0.702	–	6	2.6–110	LV	A–B	901
	Cyclohexane	25	40	0.72	6	–	14–34	OS	B	51
		30	27.6	0.69	7	–	4–71	OS	A,R	52
		30	26.5	0.69	12	–	0.05–126	OS, CR	B	50
	Cyclohexane	25	13.5	0.740	–	18	6.4–161	SEC, LLS	A–B	1010
	Decalin	25	22	0.70	6	–	530–1680	LS	A–B	53,54
	Diisobutylene	20	36	0.64	23	–	1–130	OS	A,R	55,52
		25	130	0.50	5	–	0.4–2.5	OS	A,L	56
	n-Heptane	25	15.8	0.697	–	7	0.84–148	SEC, LLS	A–B	1010
	Isooctane	10	38.1	0.624	–	6	2.6–110	LV	A–B	901
		20	36.8	0.626	–	6	2.6–110	LV	A–B	901
		30	36.2	0.627	–	6	2.6–110	LV	A–B	901
		40	34.6	0.631	–	6	2.6–110	LV	A–B	901
		50	33.6	0.633	–	6	2.6–110	LV	A–B	901
	Phenetole	86 (θ)	91	0.50	4	–	5–188	LV	B	49
	Toluene	0	40	0.60	8	–	1–146	LV	B	50
		15	24	0.65	6	–	1–146	LV	B	50
		25	87	0.56	6	–	14–34	OS	B	51
		30	20	0.67	5	–	1–146	LV	B,R	50
		50	20	0.68	6	–	1–146	LV	B	50
		60	13.5	0.71	4	–	11–146	LV	B	50
		90	12.6	0.72	3	–	46–146	LV	B	50
oligomer–polymer	Benzene	25 (θ)	($M_w > 10^5$) ($M_w < 10^5$)	0.50 Not const.	19	–	0.011–179	LS	A	904
	Isoamyl isovalerate	25 (θ)	($M_w > 10^5$) ($M_w < 10^5$)	0.50 Not const.	19	–	0.011–179	LS	A	904
Poly(isobutene-*co*-isoprene), butyl rubber	Benzene	22.8 (θ)	115	0.50	5	–	15–72	LS	A	787
	Carbon tetrachloride	25	10.7	0.78	6	–	10–30	OS	A	57
	5-Methyl-3-heptanone	55.5 (θ)	109	0.50	5	–	15–72	LS	A	787
	Toluene	25	66	0.60	5	–	15–30	OS	A	57
		30	21.4	0.678	8	–	10–30	OS	A	57
Poly(methylbutylene)	*n*-Hexyl acetate	60.9	169	0.51	8	–	0.84–60	LLS, SEC, OS	A	890
	Tetrahydrofuran	30	42.2	0.68	8	–	0.84–60	LLS, SEC, OS	A	890
Poly(isopropylethylene-*co*-1-methyl-1-ethylethylene)										
	2-Octanol	26.2	92	0.49	7	–	1.5–28	LLS, SEC, OS	A	890
	Tetrahydrofuran	30	10.3	0.75	7	–	1.5–28	LLS, SEC, OS	A	890
Poly(3-methyl-1-butene)	Diisobutylene	20	42	0.63	6	–	1–20	LS	A	85
Poly(1-methylbutylene-*co*-isopropylethylene)										
	2-Octanol	53.3	74	0.52	8	–	1.1–43	LLS, SEC, OS	A	890
	Tetrahydrofuran	30	29.8	0.68	8	–	1.1–43	LLS, SEC, OS	A	890
Poly(4-methyl-1-pentene)	Biphenyl	194.6 (θ)	152	0.50	7	–	6–30	OS	B	707
	Decalin	130	19.5	0.75	5	–	6–30	OS	B	707
	Diphenyl ether	210.0 (θ)	158	0.50	6	–	6–30	OS	B	707
	Diphenylmethane	176.6 (θ)	160	0.50	6	–	6–30	OS	B	707
Poly(1-octene)	Bromobenzene	25	2.90	0.78	5	–	25–400	LS	A	84
	Cyclohexane	30	5.75	0.78	6	–	25–400	LS	A	84
	Phenetole	50.4 (θ)	65.5	0.50	4	–	60–400	LS	A	84

TABLE 1. *cont'd*

Polymer	Solvent	Temp. (°C)	K ($\times 10^3$) (ml/g)	a	No. of samples Fr.	No. of samples W.P.	Mol. wt. range ($\times 10^{-4}$)	Method(s)	Remarks	Refs.
Poly(pentenamer)										
80–85%-*trans*,	Cyclohexane	30	56.9	0.68	5	–	3.6–63	LS	B	788
19–12%-*cis*	Isopentyl acetate	38 (θ)	234	0.50	8	–	3.6–63	LS	B	788
	Toluene	30	52.1	0.69	10	–	3.6–63	LS	B	788
Poly(1-phenyl-1-propyne)	Cyclohexane	36 (θ)	–	0.5–0.8	12	–	1.6–145	LS, SE	A	902
		(wormlike behavior)								
	Toluene	25	–	Not const.	12	–	1.6–145	LS, SE	A	902
		(wormlike behavior)								
Poly(propylene)										
	n-Octyl acetate	27.0	175	0.512	6	–	2.8–39	LS	A	897
	3-Nonanol	5.0	113	0.536	7	–	2.3–42	LS, SEC	A	897
	1-Octanol	77.0	110	0.504	7	–	2.3–42	LS, SEC	A	897
atactic	Benzene	25	27.0	0.71	6	–	6–31	OS	A	88
		30	33.8	0.67	6	–	2–34	OS	A	89
	Biphenyl	129 (θ)	128.3	0.50	3		4–71	LV	B	708
	1-Chloronaphthalene	74 (θ)	182	0.50	3	–	4–33	OS	A	90
	Cyclohexane	25	16.0	0.80	6	–	6–31	OS	A	88
		30	20.9	0.76	6	–	2–34	OS	A	89
	Cyclohexanone	92 (θ)	172	0.50	4	–	1.5–33	OS	A	90
	Decalin	135	15.8	0.77	6	–	2–39	OS	A	91
		135	11.0	0.80	6	–	2–62	LS	A,R	88
		135	54.3	0.65	–	10	2–72	LS	D	92
	Isobutyl acetate	58 (θ)	158.5	0.50	3	–	4–71	LV	B	708
	Isopentyl acetate	34 (θ)	168.5	0.50	6	–	2–34	OS	A	89
	Phenyl ether	145	192	0.47	3	–	3.7–21	OS	A	90
		153 (θ)	120	0.50	3	–	3.7–21	OS	A	90
	Tetralin	130	1.24	0.96	–	–	?	?		93
	Toluene	30	21.8	0.725	7	–	2–34	OS	A	89
isotactic	Biphenyl	125.1 (θ)	152	0.50	4	–	5–42	LV	A	94
		125 (θ)	141.0	0.50	5	–	5–50	OS	B	708
	1-Chloronaphthalene	139	21.5	0.67	11	–	10–170	LS		95
		145	4.9	0.80	9	–	5–63	LS	A,R	96
	Decalin	135	11.0	0.80	6	–	2–62	LS	A,R	88
		135	10.0	0.80	4	–	10–100	LS	A,R	97
	Dibenzyl ether	183.2 (θ)	106	0.50	4	–	5–42	LV	A	94
	Diphenyl ether	142.8 (θ)	137	0.50	4	–	5–42	LV	A	94
		145 (θ)	132	0.50	4	–	3–48	OS	A	90
		153	112	0.54	4	–	3–48	OS	A	90
	Tetralin	135	2.5	1.0	5	–	2–11	OS		98
		135	9.17	0.80	9	–	4–54	OS	A,R	96
		135	19.3	0.74	5	–	5–50	OS	B	708
	p-Xylene	85	96	0.63	12	–	?	OS		99
syndiotactic	Heptane	30	31.2	0.71	5	–	9–45	LS	A	100
head-to-head										
94%-*trans*, 6%-1,2	Cyclohexane	30	493	0.39	5	–	0.2–1.1	VOS, OS	L	709
		30	4.16	0.86	5	–	2.1–4.2	VOS, OS		709
89%-*trans*, 11%-1,2	Cyclohexane	30	295	0.43	5	–	0.3–0.8	VOS, OS	L	709
		30	3.82	0.90	3	–	1.7–3.2	VOS, OS		709
1.3. POLY(ACRYLIC ACID) AND DERIVATIVES										
Poly(acrylamide)	Water	30	6.31	0.80	7	–	2–50	SD	B	101
		30	68	0.66	–	21	1–20	PR	C	102
		30	6.5	0.82	7	–	4–127	OS	B	710
	Aq. NaCl (1 N)	25	19.1	0.71	–	5	49–320	LS	D	905
	Aq. NaCl (0.12 M)	30	5.31	0.79	7	–	15–153	LS	B	972
Poly(*N*-acryloyl-*m*-aminobenzoic acid)										
	N,N-Dimethylacetamide	30	9.1	0.84	8	–	1.3–5.5	VOS, GPC	A–B	908
	N,N-Dimethylformamide	30	8.9	0.83	8	–	1.3–5.5	VOS, GPC	A–B	908
	Dimethyl sulfoxide	30	10.6	0.80	8	–	1.3–5.5	VOS, GPC	A–B	908
Poly(*N*-acryloyl-*o*-aminobenzoic acid)										
	N,N-Dimethylformamide	25	3.74	0.93	7	–	0.7–2.9	VOS, GPC	A–B	909
	Dimethyl sulfoxide	25	3.83	0.92	7	–	0.7–2.9	COS, GPC	A–B	909
	Tetrahydrofuran	25	3.39	0.89	7	–	0.7–2.9	COS, GPC	A–B	909

TABLE 1. *cont'd*

Polymer	Solvent	Temp. (°C)	K ($\times 10^3$) (ml/g)	a	No. of samples Fr.	No. of samples W.P.	Mol. wt. range ($\times 10^{-4}$)	Method(s)	Remarks	Refs.
Poly(acrylamide-*co*-*N*,*N*,*N*-trimethyl aminoethyl chloride acrylate)										
70% acrylamide	Aq. NaCl (1 N)	25	10.5	0.73	–	6	45–270	LS	D	905
Poly(acrylic acid)	1,4-Dioxane	30 (θ)	76	0.50	–	4	13–82	OS	B	104
–, sodium salt	Aq. NaOH (2 M)	25	42.2	0.64	12	–	4–50	OS	C	105
	Aq. NaCl									
	(0.012 M)	20	–	0.93	7	–	7–180	LV	B	106
	(1 M)	25	15.47	0.90	12	–	4–50	OS	C	105
Poly(acrylic acid)										
–, sodium salt	Aq. NaCl									
	(0.05 M)	25	7.35	0.88	4	–	9.4–60	LLS, GPC	B–C	906
	(0.1 M)	25	14.6	0.80	4	–	9.4–60	LLS, GPC	B–C	906
	(0.3 M)	25	16.9	0.75	4	–	9.4–60	LLS, GPC	B–C	906
	(0.5 M)	25	18.6	0.72	4	–	9.4–60	LLS, GPC	B–C	906
	(1.0 M)	25	41.5	0.63	4	–	9.4–60	LLS, GPC	B–C	906
	Aq. NaBr									
	(1.5 M)	15	145	0.50	4	–	9.4–60	LLS, GPC	B–C	906
	(1.5 M)	15 (θ)	165	0.50	5	–	6–64	LV	C	107
		15 (θ)	124	0.50	4	–	12–83	LS	C	108
	(0.5 M)	15	52.7	0.628	7	–	1–50	LV	C	109
		25	50.6	0.656	7	–	2–80	LV	C,R	110
	(0.1 M)	15	25.4	0.755	7	–	1–50	LV	C	109
		25	31.2	0.755	7	–	2–80	LV	C	110
	(0.05 M)	15	28.1	0.77	7	–	1–50	LV	C	109
	(0.025 M)	15	16.3	0.84	7	–	1–50	LV	C	109
		25	17.6	0.85	7	–	2–80	LV	C	110
	(0.01 M)	15	13.6	0.89	7	–	1–50	LV	C	109
		25	13.2	0.91	7	–	2–80	LV	C	110
	(0.005 M)	15	(44.2)	0.83	7	–	1–50	LV	C	109
	(0.0025 M)	15	(24.9)	0.89	7	–	1–50	LV	C	109
	Aq. NaSCN	30 (θ)	154	0.50	5	–	6–64	LV	C	107
	(1.12 M)	30 (θ)	121	0.50	4	–	12–83	LS	C	111
Poly(acrylonitrile)	γ-Butyrolactone	20	34.3	0.730	5	–	4–40	LV (LS)	A,R	134
(polymerized at –30°C)		30	57.2	0.67	6	–	4–30	SA	B	135
(polymerized at 60°C)		30	34.2	0.70	5	–	6–30	SA	B	135
		30	40.0	0.69	–	5	15–53	LS	D	136
		50	28.7	0.740	5	–	4–40	LS	A	134
	Dimethylformamide	20	17.7	0.78	5	–	7–30	LS	B	137
		25	16.6	0.81	5	–	5–27	SD	B	138
		25	24.3	0.75	–	4	3–25	LS	C	139
		25	39.2	0.75	–	16	3–100	OS	C	140
		25	52.0	0.690	7	–	5–52	LS	B,R	711
	(Deionized DMF)	25	15.5	0.80	3	5	3–10	LS, SD	B–C	141
		25	57.4	0.73	–	8	0.3–1.5	EG	L	142
		25	39.6	0.75	–	7	4–30	OS	C	143
		25	44.3	0.70	–	7	2–20	LS	C	143
		25	69.8	0.65	–	21	8–140	LS	C	144
(polymerized at –30°C)		30	29.6	0.74	7	–	4–30	SA	B	135
(polymerized at 60°C)		30	20.9	0.75	7	–	6–30	SA	B	135
		30	33.5	0.72	–	6	16–48	LS	D	136
		35	27.8	0.76	9	–	3–58	DV	B	145
		35	31.7	0.746	12	–	9–76	LS	A,R	134
		50	30.0	0.752	22	–	4–102	LV	A	134
	Dimethylacetamide	20	30.7	0.761	6	–	2–40	LV	A	134
		35	27.5	0.767	6	–	2–40	LV	A	134
		50	27.4	0.764	6	–	2–40	LV	A	134
	Dimethyl sulfoxide	20	32.1	0.750	9	–	9–40	LV	A	134
		50	28.3	0.758	9	–	9–40	LV	A	134
		140	20.9	0.75	–	6	4–40	LS		146
	Ethylene carbonate	50	29.5	0.718	13	–	7–40	LV	A	134
	Ethylene carbonate/water (85/15, w/w)	25	263	0.49	7	–	5.2–52	LS, OS	A–B	951

TABLE 1. *cont'd*

Polymer	Solvent	Temp. (°C)	K ($\times 10^3$) (ml/g)	a	No. of samples Fr.	No. of samples W.P.	Mol. wt. range ($\times 10^{-4}$)	Method(s)	Remarks	Refs.
	Hydroxyacetonitrile	20	40.9	0.697	8	–	4–34	LV	A	134
		50	35.4	0.707	8	–	4–34	LV	A	134
	Aq. HNO_3 (60%)	0	33.9	0.740	6	–	2–40	LV	A	134
		20	30.7	0.747	5	–	4–40	LV	A	134
Poly(benzyl acrylate)	Butanone	35	0.587	0.883	?		?	OS		337
Poly(butyl acrylate)	Acetone	25	6.85	0.75	–	6	5–27	LS	C	112
Poly(*tert*-butyl acrylate)	Acetone	25	4.7	0.75	5	–	7–31	LS	B	712
	Butanone	25	3.2	0.80	5	–	7–31	LS	B	712
	Hexane	24.2 (θ)	49.0	0.50	5	–	7–31	LS	B	712
	Methanol	25	16.0	0.61	5	–	7–31	LS	B	712
	Pentane	25	22.0	0.57	5	–	7–31	LS	B	712
Poly(1,1-dihydroperfluorobutyl acrylate)										
	Benzofluoride	26.6	13	0.56	7	3	20–200	LS	B	113
	Methyl perfluorobutyrate	26.6	12	0.60	7	3	20–200	LS	B	113
Poly(*N*,*N*-dimethylacrylamide)	Methanol	25	17.5	0.68	–	8	5–122	LS	C	103
	Water	25	23.2	0.81	–	6	5–122	LS	C	103
		40	20.0	0.65	–	4	11–122	LS	C	103
Poly(ethyl acrylate)	Acetone	25	51	0.59	7	–	35–450	LS	B,R	114
		30	20.0	0.66	5	–	16–50	OS	B,R	115
	Benzene	30	27.7	0.67	–	7	5–67	OS	C	116
	Butanone	30	2.68	0.80	5	–	48–700	LS	B–C	117
	Chloroform	30	31.4	0.68	–	5	9–54	OS	C	116
	Ethyl acetate	30	26.0	0.66	–	5	9–54	OS	C	116
Poly(2-ferrocenylethyl acrylate)	Benzene	25	4.68	0.70	–	3	1.4–2.7	VOS, GPC	D	713
Poly(ferrocenylmethyl acrylate)	Benzene	25	6.84	0.75	–	8	0.7–2	VOS, GPC	C–D	714
Poly(hexadecyl acrylate)	Methanol	30	48.7	0.55	–	6	6–70	OS	C	116
	Heptane	20	1.74	0.82	6	–	1–10	LS	B	118
Poly(*N*-isopropylacrylamide)	Tetrahydrofuran	27	9.59	0.65	8	–	10–100	OS	A	975
	Water	20 (θ)	145	0.50	8	–	10–100	OS	A	975
Poly(isopropyl acrylate)	Acetone	30	13.0	0.69	6	–	6–30	LS	B	119
	Benzene	25	14.9	0.70	9	–	7–70	OS	B	120
		25	12.4	0.701	20	–	4–100	LS	B,R	121
		30	11.8	0.71	4	–	7–20	LS	B	119
	Bromobenzene	25	11.3	0.704	20	–	4–100	LS	B	121
		60	11.6	0.698	20	–	4–100	LS	B	121
	Chloroform	30	14.1	0.72	5	–	7–30	LS	B	122
isotactic	2,2,3,3-tetrafluoro-propanol	25	19.7	0.697	7	–	10–65	LS	B	121
atactic		25	17.3	0.703	6	–	8–110	LS	B	121
syndiotactic		25	15.9	0.708	6	–	20–110	LS	B	121
isotactic		60	17.9	0.693	4	–	10–65	LS	B	121
atactic and syndiotactic		60	14.7	0.704	6	–	20–110	LS	B	121
Poly(methyl acrylate)	Acetone	20	(7.40)	(0.76)	–	4	7–32	OS		123
		25	5.5	0.77	8	–	28–160	LS	B,R	124
		25	19.8	0.66	9	–	30–250	LS	B	125
		25	5.20	0.77	11	–	4–183	LS	B	715
		30	28.2	0.52	7	–	4–45	OS	B	126
	Benzene	25	2.58	0.85	4	–	20–130	OS		127
		30	4.5	0.78	7	7	7–160	LS		128
		30	3.56	0.798	6	–	25–190	LS	B,R	129
		30	4.59	0.795	6	–	15–140	OS	B	129
		35	12.8	0.71	–	5	5–30	OS	C	130
	Butanone	20	3.5	0.81	13	–	6–240	LS	A–B,R	128
		25	14.1	0.67	4	–	17–68	LS	B	131
		30	3.97	0.772	6	–	25–190	LS	B	129
		35	(34)	(0.61)	–	3	5–47	LV	C	132
	Dimethyl malonate	30	3.51	0.793	4	–	50–190	LS	B	129
	Ethyl acetate	35	11	0.69	–	8	24–148	LS	A	133
	Isopentyl acetate	62.5 (θ)	68	0.50	6	–	20–160	LS	B	129
	2-methylcyclohexanol	56.0 (θ)	68	0.50	4	–	40–105	LS	B	129
	Toluene	30	7.79	0.697	6	–	25–190	LS	B	129
		35	21	0.60	–	7	12–69	LS	A	133

TABLE 1. *cont'd*

Polymer	Solvent	Temp. (°C)	K ($\times 10^3$) (ml/g)	a	No. of samples Fr.	No. of samples W.P.	Mol. wt. range ($\times 10^{-4}$)	Method(s)	Remarks	Refs.
	Butanone–2-propanol									
	(42/58, v/v)	20 (θ)	81	0.50	5	–	29–140	LS	B	124
	(1/1, v/v)	27.5 (θ)	54.4	0.50	4	–	14–83	LS	C	108
		30 (θ)	72	0.50	4	–	50–190	LS	B	129
branched	(42/58 v/v)	20 (θ)	290	0.40	6	–	37–250	LS	B	125
Poly(1-methylphenyl acrylate)	Butyl acetate	25	14.7	0.63	8	–	2–110	SD	A	346
Poly(morpholinocarbonylethylene)										
	Dimethylformamide	25	18	0.65	?		?	LS	C	338
	Aqueous NaCl (0.1 M)	20	64	0.68	?		?	LS	C	338
Poly(piperidinocarbonylethylene)	Dimethylformamide	25	32	0.56	?		?	LS	C	338
Poly(propyl acrylate)	Butanone	30	15.0	0.687	4	–	71–181	LS	A	117
1.4. POLY(α-SUBSTITUTED ACRYLIC ACID) AND DERIVATIVES										
Poly(benzyl methacrylate)	Benzene	30	1.03	0.82	–	9	17–120	LS		339
Poly(butyl methacrylate)	Acetone	25	18.4	0.62	5	–	100–600	LS	A	150
	Benzene	30	(4.0)	(0.77)	–	3	8–300	LS		151
	Benzene	25	3.82	0.774	6	–	1270–2070	–	–	912
	Butanone	23	1.56	0.81	10	–	25–260	LS	B	152
		25	9.7	0.68	5	–	11–670	LS	A	150
		30	(1.15)	(0.89)	3	–	67–132	OS	C	153
	Chloroform	20	2.9	0.78	8	–	4–800	LS	B,R	154
		25	4.37	0.80	6	–	8–80	OS		155
	Cyclohexane	25	21.0	0.648	6	–	1230–2450	–	–	912
	Dioxane	25	23.7	0.630	6	–	1330–2070	–	–	912
	Methyl ethyl ketone	25	6.13	0.726	10	–	959–2160	–	–	912
	2-Propanol	21.5 (θ)	29.5	0.50	8	–	30–260	LS	B	152
		21.5 (θ)	38	0.50	9	–	4–800	LS	B,R	154
		23.7 (θ)	36.6	0.50	5	–	40–170	LS	B	156
Poly(*tert*-butyl methacrylate)	Butyl acetate	25	22.0	0.63	6	–	46–870	LS	A	157
anionic	Butanone	25	12.0	0.675	6	–	2.8–107	LLS, SEC	A	917
	Cyclohexane	10.0	62.0	0.499	6	–	2.8–107	LLS, SEC	A	917
	Tetrahydrofuran	30	15.2	0.66	6	–	2.8–107	LLS, SEC	A	917
free radical	Butanone	25	5.91	0.73	4	–	14–155	LLS, SEC	A	917
	Cyclohexane	10.0	46.0	0.505	5	–	6.8–155	LLS, SEC	A	917
	n-Heptane	64.0	62.1	0.476	7	–	3.4–155	LLS, SEC	A	917
	Tetrahydrofuran	30	5.84	0.76	6	–	3.4–155	LLS, SEC	A	917
Poly(2-*tert*-butylphenyl methacrylate)										
	Benzene	25	7.8	0.68	8	–	4–113	LS	B	771
	Butanone	25	9.0	0.64	8	–	4–113	LS	B	771
	Cyclohexane	18.4 (θ)	35.5	0.50	8	–	4–113	LS	B	771
Poly(4-*tert*-butylphenyl methacrylate)										
	Acetone	20	5.75	0.68	15	–	6–350	LS		340
		25	16	0.60	6	–	11–204	LS	B	716
	Bromobenzene	20	4.1	0.71	7	–	15–2500	LS		341
	Carbon tetrachloride	20	4.1	0.71	7	–	20–2500	LS		341
	Chloroform	20	2.4	0.78	15	–	6–300	LS	A–B	342
	Cyclohexane	25	47	0.49	6	–	11–204	LS	B	716
	Tetrahydrofuran	25	9.4	0.68	6	–	7–88	L	B	716
Poly[1-(*N*-carbethoxyphenyl)-methacrylamide]										
	Acetone	Unc.	0.00115	1.35	4	–	26–74	LS		369
	Dimethylformamide	Unc.	This relation not followed		5	–	48–140	LS		369
	Ethyl acetate	Unc.	0.00446	1.25	5	–	26–11	LS		369
Poly(2-chloroethyl methacrylate)	*o*-Dichlorobenzene	35.7 (θ)	47.4	0.50	6	–	3.2–54	LLS, SEC	A–B	914
	Tetrahydrofuran	30	6.83	0.72	6	–	3.2–54	LLS, SEC	A–B	914
Poly(4-chlorophenyl methacrylate)										
	Benzene		9.2	0.66	8	–	10–610	LS	A	343
	Carbon tetrachloride		20.0	0.58	8	–	10–610	LS	A	343
	Dioxane		6.1	0.70	8	–	10–610	LS	A	343
Poly(cyclobutyl methacrylate)	1-Butanol	37.5	49.2	0.494	6	–	4.8–31		A–B	915
Poly(cyclododecyl methacrylate)	Cyclohexane	30	8.84	0.651	7	–	5.1–475		B–C	915
	n-Hexyl acetate	35	35.4	0.494	6	–	5.1–475		B–C	915
	Toluene	30	6.03	0.687	7	–	5.1–475		B–C	915

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TABLE 1. *cont'd*

Polymer	Solvent	Temp. (°C)	K ($\times 10^3$) (ml/g)	a	No. of samples Fr.	No. of samples W.P.	Mol. wt. range ($\times 10^{-4}$)	Method(s)	Remarks	Refs.
Poly(cyclohexyl methacrylate)	Benzene	30	8.4	0.69	5	–	80–200	LS		344
		25	3.54	0.77	9	–	10–419	LS	A	717
	Butanol	23 (θ)	33.7	0.50	5	–	57–445	LS	B	345
		22.5 (θ)	45.2	0.50			10–125	LS	A	718
		25	31.8	0.533			10–125	LS	A	718
	Butanone	25	5.79	0.68	6	–	57–560	LS	B	345
		30	7.0	0.66	5	–	80–200	LS		344
	Cyclohexane	25	8.8	0.67	9	–	10–419	LS	A	717
Poly(cyclohexylthiolmethacrylate)										
	Cyclohexane	25	8.65	0.63	8	–	4–60	LS	B	719
	Tetrahydrofuran	35	4.07	0.74	8	–	4–60	LS	B	719
Poly(cyclooctyl methacrylate)	2-Butanol	45	43.2	0.488	7	–	6.6–418		A–C	915
	1,4-Dioxane	30	26.0	0.549	8	–	3.1–418		A–C	915
	Toluene	30	8.70	0.677	8	–	3.1–418		A–C	915
Poly(cyclopentyl methacrylate)	Cyclohexane	36	54.8	0.487	8	–	4.6–358		A–B	915
	1,4-Dioxane	30	10.9	0.659	8	–	2.9–358		A–B	915
	Ethyl acetate	30	19.4	0.588	9	–	2.9–358		A–B	915
	Methyl ethyl ketone	30	13.6	0.631	9	–	2.9–358		A–B	915
	Toluene	30	8.38	0.696	9	–	2.9–358		A–B	915
Poly(2,6-dimethylphenyl methacrylate)										
	Chlorobenzene	25	18.4	0.65	4	–	3.4–33	OS, SEC	A	923
	Tetrahydrofuran	25	33.1	0.59	8	–	3.4–82	OS, SEC	A	923
	Tetrahydrofuran/water	25 (θ)	75.0	0.50	4	–	5.7–33	OS, SEC	A	923
	Toluene	25 (θ)	78.0	0.50	9	–	3.4–82	OS, SEC	A	923
Poly(diphenylmethyl methacrylate)										
	3-Heptanone	45	38.6	0.485	9	–	8.7–575	LLS, SEC	A–B	911
	Toluene	25	3.61	0.712	7	–	42–575	LLS, SEC	A–B	911
Poly(decyl methacrylate)	Ethyl acetate	11 (θ)	34.7	0.50	10	–	2.9–92	LS, OS, SEC	B	913
	Tetrahydrofuran	30	4.56	0.73	10	–	2.9–92	LS, OS, SEC	B	913
Poly(dodecyl methacrylate)	Amyl acetate	31	36.6	0.53	10	–	10–135	LS, OS, SEC	B	913
	Tetrahydrofuran	30	1.05	0.64	10	–	10–135	LS, OS, SEC	B	913
Poly(dodecyl methacrylate)	Butyl acetate	23	8.64	0.64	8	–	26–360	LS	A	158
	Isopropyl acetate	13 (θ)	32.2	0.50	7	–	26–360	LS	A	158
	Pentanol	29.5 (θ)	34.8	0.50	7	–	27–240	LS	A	159
Poly(2-ethylbutyl methacrylate)	Butanone	25	2.21	0.77	8	–	48–332	LS	A	160
	2-Propanol	27.4 (θ)	33.7	0.50	8	–	48–332	LS	A	160
Poly(ethyl methacrylate)	Butanone	23	2.83	0.79	10	–	20–263	LS	A	161
	Ethyl acetate	35	8.6	0.71	–	11	65–1200	LS	C	162
	2-Propanol	36.9 (θ)	47.5	0.50	4	–	22–130	LS	B	156
	Butanone-2-propanol (1/7, v/v)	23 (θ)	47.3	0.50	10	–	20–263	LS	A	161
	Ethyl acetate/ethanol (2/9, v/v)	35	47.6	0.53	6	–	78–500	LS	A	162
	(1/6, v/v)	35 (θ)	56.4	0.50	6	–	60–420	LS	A	162
Poly(2-ferrocenylethyl methacrylate)										
	Benzene		3.12	0.76	–	6	2–9	VOS, GPC	C,D	713
Poly(ferrocenylmethyl methacrylate)										
	Benzene	25	27.8	0.58	–	6	0.6–3.6		C,D	714
Poly(hexadecyl methacrylate)	Benzene	21	5.9	0.71	3	–	130–440	SD	B	163
	Carbon tetrachloride	21	2.37	0.78	5	–	130–440	SD	B	163
	Heptane	21	3.92	0.75	5	–	130–440	SD	B	163
		25	35.1	0.56	9	–	20–110	LS		164
Poly[4-(4-hexadecyloxybenzoyloxy)-phenyl methacrylate]										
	Carbon tetrachloride		33.1	0.5	20	–	10–2000	SD		730
Poly(hexyl methacrylate)	Butanone	23	2.12	0.78	8	–	6–41	LS	A	165
	2-Propanol	32.6 (θ)	43.0	0.50	8	–	6–41	LS	A	165
Poly(2-hydroxyethyl methacrylate)										
	Dimethylformamide	30	10.6	0.70	6	–	4–52	LS	A,B	720
	Dimethyl sulfoxide	30	12.9	0.69	5	–	4–52	LS	A,B	720
	Methanol	30	52.4	0.51	7	–	4–52	LS	A,B	720
Poly[1-(2-hydroxyethyl) pyridiniumbenzene sulfonate methacrylate]										
	Aq. KCL (0.5 M)	25	2.62	0.71	–	14	19–950	LS		721

TABLE 1. *cont'd*

Polymer	Solvent	Temp. (°C)	K ($\times 10^3$) (ml/g)	a	No. of samples Fr.	No. of samples W.P.	Mol. wt. range ($\times 10^{-4}$)	Method(s)	Remarks	Refs.
Poly[1(2-hydroxyethyl) trimethylammoniumbenzene sulfonate methacrylate]										
	Aq. KCl (0.5 M)	25	4.04	0.70	–	8	15–400	LS		721
Poly[*N*-(2-hydroxypropyl) methacrylamide]										
	Aqueous KCl (0.1 M)	25	11.0	0.67	12	–	2–500	LS		722
Poly(D,L-isobornyl methacrylate)	1-Octanol	39.6 (θ)	31.7	0.50	6	–	9–120	GPC		723
	Tetrahydrofuran	30	3.68	0.73	6	–	9–120	GPC		723
Poly(isobutyl methacrylate)	Acetone	25	0.199	0.94	6	–	300–1100	LS	C	166
		25	23.4	0.66	6	–	50–116	OS		724
		60	18.2	0.68	6	–	50–116	OS		724
	Acetone	25	8.41	0.66	6	–	1020–3460	–	–	919
	Benzene	25	3.88	0.74	5	–	1020–3460	–	–	919
	Benzene	25	7.03	0.77	6	–	50–116	OS		724
	Butanone	20	5.56	0.73	6	–	300–1100	LS	C	166
		25	8.61	0.70	7	–	300–1100	LS	C	166
		30	7.47	0.71	6	–	300–1100	LS	C	166
		44	2.18	0.79	6	–	300–1100	LS	C	166
	Carbon tetrachloride	25	4.88	0.72	6	–	1020–3460	–	–	919
	1,4-Dioxane	25	6.89	0.68	6	–	1020–3460	–	–	919
	2-Hydroxymethyl-tetrahydrofuran	25	85.8	0.56	6	–	50–116	OS		724
Poly(5-*p*-methyl methacrylate)	Benzene	25	9.6	0.67	6	–	12–230	LS	B	771
	Cyclohexane	25	11.5	0.65	6	–	12–230	LS	B	771
	2-Pentanone	25 (θ)	43.6	0.50	6	–	12–230	LS	B	771
	Tetrahydrofuran	25	11.5	0.65	6	–	12–230	LS	B	771
Poly(methacrolein)	Dimethylformamide	20	2.8	0.97	–	?	0.5–2	OS, CR	?	204
Poly(methacrylic acid)	*N,N*-Dimethylformamide/ 1,4-dioxane (5/7, v/v)	26.9 (θ)	103	0.50	7	–	27.5–101	LS	–	907
	Methanol	26	242	0.51	6	–	4–20	OS	B	147
	Aq. HCl (0.002 M)	30	66	0.50	7	–	10–90	LV	C	148
	Aq. $NaNO_3$ (2 M)	25	44.9	0.65	6	–	8–70	OS	B	149
Poly(methacrylonitrile)	Acetone	20	95.5	0.56	–	4	35–100	OS	C	202
	Dimethylformamide	29.2	306	0.503	–	15	0.6–8	LV	C,H	203
Poly(2-methoxyethyl methacrylate)										
	Butanone	25	7.34	0.71	12	–	4–220	LS	A–B	725
	Tetrahydrofuran	25	7.57	0.71	12	–	4–220	LS	A–B	725
Poly(methyl butacrylate)	Butanol	13 (θ)	57.0	0.50	4	–	6–60	LS	A	168
	Butanone	30	5.43	0.73	10	–	7–430	LS	A	168
Poly(methyl α-chloroacrylate)	Chloroform	30	3.08	0.78	8	–	20–780	LS	D	726
Poly(methyl ethacrylate)	Benzene	30	2.35	0.82	6	–	16–110	LS	A	168
	Butanone	30	4.29	0.75	10	–	4–200	LS	A	168
	2,6-Dimethyl-4-heptanone	11.4 (θ)	67.6	0.50	10	–	4–200	LS	A	168
Poly(methyl methacrylate) atactic	Acetone	20	5.5	0.73	7	–	7–700	SD	A–B,R	169
		20	3.90	0.76	7	–	7–700	SD	A–B	169
		25	7.5	0.70	9	–	8–137	LS	B	170
		25	6.76	0.71	10	–	3–700	SD	A–B	171
		25	7.5	0.70	14	–	2–740	LS, SD	A–B	172
		25	5.3	0.73	7	–	2–780	LS	A–B,R	173
		25	9.6	0.69	4	–	180–350	LS	A–B	174
		25	7.5	0.70	4	6	3–98	LS	B–C	175
		25	2.45	0.80	9	–	6–210	OS	B–C	176
		25	6.59	0.71	6	–	5–41	OS	B	177
		30	7.7	0.70	6	–	6–263	LS	A–B	178
		39	6.40	0.72	6	–	5–41	OS	B	177
		46	6.18	0.72	6	–	5–41	OS	B	177
	Acetonitrile	30	39.3	0.50	6	–	10–86	LV	A–B	178
		45 (θ)	48	0.50	6	–	10–260	LV	A–B,R	179
		50	29	0.54	6	–	10–260	LV	A–B	180
		65	9.8	0.64	5	–	10–260	LV	A–B	180
	Benzene	20	8.35	0.73	7	–	7–700	SD	A–B	169
		20	15.1	0.70	7	–	8–90	SD		181
		25	7.24	0.76	10	–	6–100	OS	B	182
		25	5.5	0.76	11	–	2–740	LS	A–B,R	173

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TABLE 1. *cont'd*

Polymer	Solvent	Temp. (°C)	K ($\times 10^3$) (ml/g)	a	No. of samples Fr.	No. of samples W.P.	Mol. wt. range ($\times 10^{-4}$)	Method(s)	Remarks	Refs.
		25	3.80	0.79	5	–	24–450	LS		183
		25	83	0.52	7	–	0.03–1	EB	A,L	184
		30	5.2	0.76	9	–	6–250	LS	A–B,R	178
		30	6.27	0.76	5	–	4–73	OS	A	185
		30	104	0.50	9	–	0.02–2	OS	A,L	185
		30	195	0.41	5	–	0.3–2	LS	A–B,L	178
		39	6.74	0.75	6	–	5–41	OS	B	177
		53	6.52	0.76	6	–	5–41	OS	B	177
	Butanone	25	6.8	0.72	9	–	8–137	LS	B,R	170
		25	7.1	0.72	7	–	41–330	LS	A–B	174
		25	6.8	0.72	4	6	3–98	LS	B–C	175
		25	9.39	0.68	15	–	16–910	LS	A–B	186
plasma initiated		25	11 ± 2	0.69			1610–3000	LS		727
	Butyl chloride	35.4 (θ)	50.5	0.50	4	–	13–68	SA	A–B	187
	Chloroform	20	9.6	0.78	18	–	1.4–60	OS		188
		20	4.88	0.82	8	–	6–100	OS	B	182
		20	4.85	0.80	9	–	8–200	SD	A–B,R	169
		20	6.0	0.79	12	–	3–780	LS	A–B	173,189
		25	4.8	0.80	9	–	8–137	LS	B	170
		25	3.4	0.83	6	–	40–330	LS	A–B	174
		25	5.81	0.79	6	–	5–41	OS	B	177
living type		30	4.3	0.80	–	8	13–263	LS	A–B	178
		39	5.02	0.80	6	–	5–41	OS	B	177
		53	3.90	0.79	6	–	5–41	OS	B	177
		Unc.	5.1	0.79	13	–	7–400	LS	B	190
	p-Cymene	159.7 (θ)	57.5	0.50	4	–	6.6–171	LV	A–B	191
	1,2-Dichloroethane	25	17.0	0.68	4	6	3–98	LS	B–C	175
		30	5.3	0.77	–	7	6–263	LS	A–B,R	178
	Ethyl acetate	20	21.1	0.64	8	34	6–110	SD		192
	3-Heptanone	33.7 (θ)	63.1	0.50	4	–	6.6–171	LV	A–B	191
	4-Heptanone	33.8 (θ)	48	0.50	5	–	1–172	LS	A–B,R	179
	Methyl isobutyrate	30	9.9	0.67	6	–	19–260	LV	A–B	178
	Methyl methacrylate	20	16.2	0.65	9	–	1.8–160	LS	A	918
		40	11.3	0.68	9	–	1.8–160	LS	A	918
		60	21.2	0.64	9	–	1.8–160	LS	A	918
	Methyl methacrylate	30	6.75	0.72	3	–	13–170	LV	A–B	178
	Nitroethane	25	5.70	0.74	2	6	10–200	LS	C	193
	3-Octane	72 (θ)	50	0.50	3	–	13–260	LV	A–B	179
	Propanol	84.4 (θ)	67.9	0.50	4	–	6.6–171	LV	A–B	191
	Tetrachloroethane	25	12.8	0.73	6	–	5–41	OS	B	177
		53	12.2	0.73	6	–	5–41	OS	B	177
	2,2,3,3-Tetrafluoro-propanol	25	7.2	0.79	7	–	7–95	LV	A	194
	Tetrahydrofuran	25	7.5	0.72				LS	A	732
	Toluene	25	7.1	0.73	7	–	4–330	LS	A–B	174
		25	8.12	0.71	6	–	5–41	OS	B	177
		25	78	0.50	10	–	0.2–7	OS	A,L	195
		30	7.0	0.71	6	–	19–263	LV	A–B	178
		39	7.24	0.72	6	–	5–41	OS	B	177
		53	6.63	0.73	6	–	5–41	OS	B	177
	Butanone/2-propanol									
	(55/45, v/v)	23	47.0	0.55	6	–	40–300	LS	A–B	174
	(50/50, v/v)	25 (θ)	59.2	0.50	7	–	30–280	LS	A–B	196
		25 (θ)	42.8	0.50	5	–	77–490	LS	A–B	186
	Methanol/toluene (9/5, v/v)	26.2 (θ)	55.9	0.50	3	–	60–300	LS	A–B	156
oligomer-polymer										
atactic, $f_{racem} = 0.79$	Acetonitrile	44.0	–	Not const.	22	–	0.032–283	LS	A	916
	Benzene	30.0	–	Not const.	15	–	0.032–75.8	LS	A	916
	n-Butyl chloride	40.8	–	Not const.	21	–	0.032–283	LS	A	916
isotactic	Acetone	30	23.0	0.63	7	–	5–128	LS	A–B	199
	Acetonitrile	20	130	0.448	5	–	3–19	LV	A	198
		27.6 (θ)	75.5	0.500	5	–	3–19	LV	A	198

TABLE 1. *cont'd*

Polymer	Solvent	Temp. (°C)	K ($\times 10^3$) (ml/g)	a	No. of samples Fr.	No. of samples W.P.	Mol. wt. range ($\times 10^{-4}$)	Method(s)	Remarks	Refs.
		35	46	0.546	5	–	3–19	LV	A	198
		50	26.2	0.602	5	–	3–19	LV	A	198
		27.5 (θ)	76.2	0.50	6	–	13–68	LS	B	728
	Benzene	30	5.2	0.76	5	–	5–128	LS	A–B	199
	p-Cymene	152.1 (θ)	56.6	0.50	4	–	7–131	LV	A–B	191
	3-Heptanone	40.0 (θ)	87.0	0.50	4	–	7–131	LV	A–B	191
	Propanol	75.9 (θ)	76.1	0.50	4	–	7–131	LV	A–B	191
	2,2,3,3-Tetrafluoro-propanol	25	7.05	0.78	11	–	2–100	LV	B	194
	Butanone/2-propanol (1/1, v/v)	30.3 (θ)	90.0	0.50	4	–	7–131	LV	A–B	191
5%-iso, 51%-hetero, 43%-syndiotactic	Acetonitrile/chlorobenzene									
	(4.4/95.6, v/v)	25 (θ)	68.3	0.50	4	–	73–232	LS	A	785
	(91.2/8.8, v/v)	25 (θ)	63.5	0.50	4	–	73–232	LS	A	785
Poly(α-methyleneglutaronitrile)	Dimethylformamide	25	31.6	0.65	–	8		LS	H	731
Poly(methyl phenylacrylate), see 1.9 Other Compounds poly(1-methoxycarbonyl-1-phenylethylene)										
Poly(β-naphthyl methacrylate)	Benzene	20	27.2	0.55	6	–	17–262	LS	B	729
	Tetralin	20 (θ)	47.5	0.50	4	–	57–262	LS	B	729
Poly[4-(4-nonyloxy-phenyl methacrylate], Poly(phenylmethacrylic ester of nonyloxybenzoic acid)										
	Carbon tetrachloride		24.3	0.5	20	–	20–220	SD		730
Poly(octadecyl methacrylate)	Tetrahydrofuran	30	2.5	0.75	–	4	20–170	LS	C,H	200
Poly(octyl methacrylate)	Butanol	16.8 (θ)	26.8	0.50	10	–	33–1250	LS	B	201
	Butanone	23	4.47	0.69	10	–	33–1250	LS	B	201
	Butyl acetone	10.5 (θ)	–	0.45	4	–	62–320	LS	C	920
		20	–	0.53	4	–	62–320	LS	C	920
		30	–	0.54	4	–	62–320	LS	C	920
Poly(*N*-phenyl methacrylamide)	Acetone	20	28.2	0.75	8	–	10–320	LS		370
	n-Propyl acetate	36 (θ)	37.1	0.50	11	–	1.5–93	LS, OS, SEC	B	913
	Tetrahydrofuran	30	8.95	0.67	11	–	1.5–93	LS, OS, SEC	B	913
Poly(2-selenolylmethyl methacrylate)										
	Chlorobenzene	25	36.3	0.56	5	–	3.6–21	VOS, SEC	A–B	922
	Tetrahydrofuran	25	18.1	0.65	5	–	3.6–21	VOS, SEC	A–B	922
Poly(stearyl methacrylate)	Tetrahydrofuran	30	9.0	0.67	12	–	1.5–94	LS	B	733,751
Poly(tetrahydrofurfuryl methacrylate)										
	Acetone	30	24.0	0.66	7	–	16–62	OS	B	734
Poly(tetrahydro-4H-pyranyl 2-methacrylate)										
	Isobutanol	30.4 (θ)	31.9	0.50	6	–	4–85	GPC		735
Poly(2-thiophenmethyl methacrylate)										
	Chlorobenzene	25 (θ)	4.35	0.50	6	–	48–59	SEC	A–B	921
	Tetrahydrofuran	25	6.95	0.72	6	–	48–59	SEC	A–B	921
	Thiophen	25	9.00	0.66	6	–	48–59	SEC	A–B	921
Poly(*N,N,N*-trimethyl aminoethyl chloride acrylate)										
	Aq. NaCl (1 N)	25	2.3	0.82	–	4	85–510	LS	D	905
Poly(tridecyl methacrylate)	Ethyl acetate	27 (θ)	32.2	0.50	10	–	8.2–138	LS, OS, SEC	B	913
	Tetrahydrofuran	30	4.74	0.71	10	–	8.2–138	LS, OS, SEC	B	913
	Tetrahydrofuran	30	2.93	0.76	6	–	4–85	GPC		735
Poly[2-(triphenylmethoxy)ethyl methacrylate]										
	Mesitylene	47 (θ)	30	0.50				LV		736
1.5. POLY(VINYL ETHERS)										
Poly[(hexadecyloxy)ethylene]	Heptane	21	70.8	0.50	6	–	0.5–3	SD	B,L	205
Poly(methoxyethylene)	Benzene	30	76	0.60	13	–	1–45	LS	B	206
	Butanone	30	137	0.56	13	–	1–45	LS	B	206
Poly[(octadecyloxy)ethylene]	Benzene	25	170	0.47	–	7	0.1–1.5	LS	D,H	200
	Tetrahydrofuran	30	224	0.35	–	7	9.4–11	LS	D,H	200
Poly(vinyl methyl ether), see Poly(methoxyethylene)										
1.6. POLY(VINYL ALCOHOL), POLY(VINYL HALIDES)										
Poly(chlorotrifluoroethylene)	2,5-Dichlorobenzo-trifluoride	130	6.15	0.74	7	–	7–51	OS	B	234

TABLE 1. *cont'd*

Polymer	Solvent	Temp. (°C)	K ($\times 10^3$) (ml/g)	a	No. of samples Fr.	No. of samples W.P.	Mol. wt. range ($\times 10^{-4}$)	Method(s)	Remarks	Refs.
Poly(tetrafluoroethylene-*alt*-ethylene), see also Poly(ethylene-*alt*-tetra-fluoroethylene) in group 1.2										
Poly(vinyl alcohol)	Water	25	20	0.76	6	–	0.6–2.1	OS	B	208
		25	300	0.50	4	–	0.9–17	SD		209
		25	140	0.60	3	–	1–7	SD	B	210
		30	66.6	0.64	8	–	0.6–16	OS	B	212
		30	42.8	0.64	–	14	1–80	LS	C	213
		30	45.3	0.64	–	–	1–80	LS	A,R	213
		30	73.4	0.63	7	–	3–12	LV	B	737
		80	94	0.56	–	5	10–46	LS	B	214
	Phenol/water (85/15, v/v)	30	24.6	0.80	–	21	3–12	LV	B	215
	Water/dimethylsulfoxide									
	(100/0, v/v)	30	74.3	0.63	7	–	DP = 815–2830	VG	C	924
	(90/10, v/v)	30	–	Not clear	5	–	DP = 815–3400	VG	C	924
Poly(vinyl bromide)	Cyclohexanone	25	32.8	0.55	7	–	2–10	LS	B	217
	Tetrahydrofuran	25	15.9	0.64	7	–	2–10	LS	B	217
	Methanol/tetrahydrofuran									
	(17/83, v/v)	20	38.8	0.50	7	–	2–10	LS	B	218
Poly(vinyl chloride)	Benzyl alcohol	155.4 (θ)	156	0.50	9	–	4–35	LS	B	219
	Chlorobenzene	30	71.2	0.59	7	–	3–19	SA	B	220
	Cyclohexanone	20	11.6	0.85	–	6	2–10	OS	C	221
		20	13.7	1.0	7	5	7–13	OS	C,D	222
		20	112.5	0.63	5	3	9–15	OS	D,H	222
		25	12.3	0.83	11	–	2–14	OS		223
		25	24	0.77	13	–	3–14	OS		224
		25	204	0.56	?	–	2–15	OS	C	225
		25	174	0.55	6	–	6–22	LS	C	226
		25	8.5	0.75	5	–	4–20	LS	B	227
		25	13.8	0.78	28	–	1–12	LS	A,B,R	228
		30	16.3	0.77	6	–	3–19	SA	B	220
	Tetrahydrofuran	20	3.63	0.92	20	–	2–17	OS	B	229
		25	15.0	0.77	22	–	1–12	LS	A,B	228
		25	16.3	0.766	23	–	2–30	LS	A,B,R	230
		25	49.8	0.69	5	–	4–40	LS	A–B	231
		30	63.8	0.65	9	–	3–32	LS		232
		30	83.3	0.83	7	–	3–19	SA	B	220
		30	219	0.54	16	–	5–30	LS		233
Poly(vinyl fluoride)	Dimethylformamide	90	6.42	0.80	–	9	14–66	SV	D	235
Poly(vinylidene chloride)	Hexamethylphos-phoramide	25	25.8	0.65	–	7	0.8–12	LS	C	738
	1-Methyl-2-pyrrolidone	25	13.1	0.69	–	7	0.8–12	LS	C	738
	Tetramethylene sulfoxide	25	13.9	0.69	–	7	0.8–12	LS	C	738
Poly(vinylidene fluoride)	*N,N*-Dimethylacetamide, *N,N*-dimethylformamide, *N*-methylpyrrolidone, *N,N*-dimethyl-*N,N*-tri-methylene urea	25	45	0.70	–	7	–	LS	–	925
1.7. POLY(VINYL ESTERS)										
Poly(allyl acetate)	Benzene	27	66	0.53	8	–	0.1–0.3	CR		216
Poly(vinyl acetate)	Acetone	6	$[\eta] = 0.104\,M^{0.50} + 0.00725\,M^{0.90}$		21	–	0.3–150	LS	A	236
		18	24.5	0.67	6	–	4–34	OS	B	237
		20	15.8	0.69	6	–	19–72	LS		238
		25	21.4	0.68	6	–	4–34	OS	B	237
		25	18.8	0.69	?	?	?	LS		239
		25	14.6	0.72	–	6	0.7–1.3	EG	C,L	240
		25	10.8	0.72	10	–	0.9–2.5	EG	B,L	240
		30	17.6	0.68	16	–	2–163	OS	A–B	241
		30	8.6	0.74	8	–	8–66	LS	A–B	242
		30	17.4	0.70	?	–	7–68	OS		243
		30	10.2	0.72	–	8	3–126	LS	C	244
		30	10.1	0.73	11	–	6–150	LS	A	236

TABLE 1. *cont'd*

Polymer	Solvent	Temp. (°C)	K ($\times 10^3$) (ml/g)	a	No. of samples Fr.	No. of samples W.P.	Mol. wt. range ($\times 10^{-4}$)	Method(s)	Remarks	Refs.
		30	$[\eta] = 0.097 M^{0.50} + 0.00723 M^{0.90}$		22	–	0.3–150	LS	A	236
		46	13.8	0.71	6	–	4–34	OS	A	236
	Acetonitrile	25	16.2	0.71	–	–	24–215	LS	B	246
		30	41.5	0.62	4	–	97–153	LS	A–B	247
	Benzene	30	22	0.65	5	–	34–102	LS	A–B	248
		30	56.3	0.62	24	–	3–86	OS	B	249
		30	56.3	0.62	12	–	7–54	LS	B	250
		35	21.6	0.675	14	–	5–40	LS	A–B	251
	Butanone	25	13.4	0.71	6	–	25–346	LS	A	252
		25	42	0.62	15	–	2–120	SD,LS	A,B	253
		30	10.7	0.71	–	13	3–120	LS	C	244
	Chlorobenzene	25	110	0.50	9	–	0.15–7	OS	A	195
		25	94.4	0.56	6	–	4–34	OS	A	236
		53	53.7	0.60	6	–	4–34	OS	A	236
		67	28.9	0.65	6	–	4–34	OS	A	236
	Chloroform	20	15.8	0.74	?	?	7–68	OS		243
		25	20.3	0.72	5	–	4–34	OS	A	236
		53	14.7	0.74	5	–	4–34	OS	A	236
	Dioxane	25	11.4	0.74	5	–	4–34	OS	B	237
		53, 60	10.2	0.75	5	–	4–34	OS	B	237
	Ethanol	56.9 (θ)	90	0.50	5	–	4–150	OS, LS	A	236
	Ethyl formate	30	32	0.65	4	–	16–154	LS	A–B	247
	3-Heptanone	26.8 (θ)	82.0	0.50	5	–	4–150	OS, LS	A	236
		29 (θ)	92.9	0.50	18	–	5–83	LS	A–B	255
	Methanol	6 (θ)	101	0.50		–	0.3–150	OS, LS, VOS		236,245
		25	38.0	0.59	5	–	4–22	OS	B	237
		30	31.4	0.60	–	13	3–120	LS	C	244
		53	36.6	0.59	5	–	4–22	OS	B	237
	6-Methyl-3-heptanone	66 (θ)	82.0	0.50	9	–	14–83	LS	A–B	255
		66 (θ)	78.0	0.50	3	–	9–150	OS, LS	A	236
	4-Methyl-2-pentanone	30	44.9	0.60	5	–	12–69	LS		247
	Tetrahydrofuran	25	16	0.70	11	–	5–50	GPC	B,C	739
		35	15.6	0.708	9	–	1.7–117	GPC	B	740
	Toluene	25	108	0.53	4	–	4–15	OS	B	237
		67	156	0.49	4	–	4–15	OS	B	237
	1,2,4-Trichlorobenzene	35	33.0	0.623			5–40	LS		251
	Heptane/3-methyl-2-butanone (27.3/72.7, v/v)	25	92	0.50	6	–	25–287	LS	C	244
Poly(vinyl benzoate)	Xylene	32.5 (θ)	62.0	0.50	5	–	10–24	OS	B	334
Poly(vinyl butyrate)	Benzene	30	11.15	0.735	–	4	3–15	OS	C	256
Poly(vinyl caproate)	Benzene	30	15.47	0.689	–	4	3–126	OS	C	256
Poly(vinyl 4-chlorobenzoate)	Water	30	64.0	0.64	7	–	6–35	LV	B	336
	Butanol/butanone (47/53, v/v)	60 (θ)	73	0.50	7	–	6–35	LV	B	336
Poly(vinyl formate)	Acetone	30	29.3	0.63	–	9	3–41	LV	C	257
	Acetonitrile	30	14.1	0.717	–	9	3–41	LV	C	257
	Dioxane	30	20.7	0.68	–	8	3–41	LV	C	257
	Methyl acetate	30	37.6	0.61	–	7	3–24	LV	C	257
	Methyl formate	30	14.1	0.722	–	7	3–24	LV	C	257
Poly(vinyl isobutyrate)	Benzene	30	11.05	0.711	–	4	5–20	OS	C	256
Poly(vinyl isocaproate)	Benzene	30	51.0	0.575	–	4	3–17	OS	C	256
Poly(vinyl pivalate)	Acetone	25	2.88	0.77	4	–	40–217	LS	C	258
	Butanone–methanol (0.897 g/ml)	20	53	0.50	2	–	222–344	LS	C	258
Poly(vinyl sulfate)	Aq. NaCl (0.5 M)	20	0.55	1.06	6	–	1–6	LV	C	261
1.8. POLY(STYRENE) AND DERIVATIVES										
Poly(4-acetoxystyrene)	Butyl acetate	26.8 (θ)	52.0	0.50	13	–	15–219	LS	A–B	937
	Dioxane	25	16.7	0.65	22	–	0.91–352	LS	A–B	937
	Isopropyl acetate	19.7 (θ)	52.0	0.50	13	–	15–219	LS	A–B	937
	Tetrahydrofuran	25	17.5	0.64	20	–	0.91–352	LS	A–B	937

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TABLE 1. *cont'd*

Polymer	Solvent	Temp. (°C)	K ($\times 10^3$) (ml/g)	a	No. of samples Fr.	No. of samples W.P.	Mol. wt. range ($\times 10^{-4}$)	Method(s)	Remarks	Refs.
Poly(4-bromostyrene)	Benzene	20 (θ)	95.5	0.53	10	–	3–30	OS	B	347
		26.3 (θ)	50.0	0.50	5	–	84–250	LS	A,R	348
	Chlorobenzene	30	7.43	0.69	5	–	59–400	LS	A	348
	Toluene	30	18.2	0.57	5	–	63–400	LS	A	349
Poly(*p-tert*-butylstyrene)	Benzene	35	7.1	0.74	4	–	1.8–640	LS	A	741
	Benzene	35	6.58	0.739	7	–	1.3–174	LLS, SEC, OS	A	934
	Cyclohexane	25	8.52	0.717	10	–	1.3–240	LLS, SEC, OS	A	934
	Cyclohexane	35	9.9	0.71	4	–	1.8–640	LS	A	741
	1-Hexanol	65.0	64.7	0.480	6	–	16–240	LLS, SEC, OS	A	934
	Cyclohexane	35.0	11.1	0.694	7	–	2.7–45.5	OS, LLS	A	938
	1,4-Dioxane	25.0	21.4	0.604	4	–	9.3–45.5	OS, LLS	A	938
		38.0	14.3	0.644	4	–	9.3–45.5	OS, LLS	A	938
	1-Nitropropane	31.0	60.0	0.489	7	–	2.7–45.5	OS, LLS	A	938
	1-Nitropropane	31 (θ)	61	0.49	4	–	1.8–640	LS	A	741
	3-Nonanol	10.9	66.5	0.490	6	–	16–240	LLS, SEC, OS	A	934
	2-Octanol	32.7	60.8	0.492	6	–	16–240	LLS, SEC, OS	A	934
	2-Octanol	32.7	61.0	0.489	7	–	2.7–45.5	OS, LLS	A	938
	Tetrahydrofuran	30.0	10.4	0.70	7	–	2.7–45.5	OS, LLS	A	938
Poly(2-chlorostyrene)	Butanone	24.5 (θ)	46.8	0.50	7	–	20–80	LS	A,R	742
		25 (θ)	46.0	0.50	5	–	20–100	LS	A,B	743
	Toluene	25	11.5	0.66	6	–	14–101	LS	A,B	743
		30	14.3	0.65	10	–	23–143	LS	A	350
Poly(4-chlorostyrene)	Benzene	30	30.6	0.56	–	8	10–200	LS	C	351
		26.7	29.3	0.56	5	–	34–180	LV	B	744
	Benzene–methanol (4.5/1, v/v)	41.6 (θ)	56.8	0.50	5	–	34–180	LV	B	744
	Butanone	25	29	0.59	7	–	3–140	LS	B,R	352
		30	3.52	0.75	6	–	17–270	OS	B	353
	Chlorobenzene	30	2.19	0.80	6	–	17–270	OS	B	353
	Chloroform	30	14.8	0.65	–	8	10–200	LS	C	351
	Dioxane	30	17.6	0.62	–	8	10–200	LS	C	351
	Ethylbenzene	30	21.8	0.60	6	–	10–180	LS	B	745
	Toluene	20	24.1	0.605	–	7	2–40	LS	B	354
		25	13.2	0.645	–	7	1–244	LS	B	355
		30	13.0	0.64	6	–	3–140	LS	B,R	352
		30	11.8	0.65	7	–	21–140	LS	A	349
		30	5.37	0.71	7	–	17–270	OS	B	353
Poly(4-cyclohexylstyrene)	Heptane	30	32.3	0.54	6	–	4–30	OS	A–B	266
	Toluene	30	10.6	0.69	7	–	2–30	OS	A–B	266
Poly(2,5-dichlorostyrene)	Toluene	21	12.6	0.69	9	–	7–66	LS		356
	Ethanol/ethyl acetate (1/15, w/w)	30.5 (θ)	35.5	0.50	8	–	50–130	LS		357
Poly(3,4-dichlorostyrene)	Chlorobenzene	30	4.39	0.72	7	–	8–51	OS	A	358
	o-Dichlorobenzene	30	4.11	0.73	7	–	8–51	OS	A	358
	Butanol/butyl acetate (1/13, w/w)	32.9 (θ)		0.50	8	–	40–540	LS		359
Poly(2,4-dimethylstyrene)	Benzene	20	3.8	0.79	6	–	3–22	LS	B,C	746
	Butyl acetate	20	10.2	0.68	8	–	3–22	LS	B,C	746
	Cyclohexane	20	14.8	0.65	7	–	3–22	LS	B,C	746
	Toluene	30	9.52	0.70	–	9	5–120	LS	C	333
Poly(1,4-divinylbenzene)	*trans*-Decalin	25.0 (θ)	286	0.32	7	–	0.7–180	LS, SE	Branching	895
Poly(3-fluorostyrene)	Benzene	25	15.3	0.69						747
	Butanone	25	13.8	0.70						747
	Carbon tetrachloride	25	65.6	0.53			0.5–8	LS	C	747
	Chloroform	25	12.8	0.70	–	8	1–15	LS	C	747
Poly(4-fluorostyrene)	Benzene	25	40.8	0.58						747
	Butanone	25	11.1	0.73						747
	Carbon tetrachloride	25	82.8	0.50						747
	Chloroform	25	16.1	0.69	–	8	0.2–13	LS	C	747
Poly(4-hydroxystyrene)	Dioxane	25	20.3	0.66	11	–	3.8–583	LS	–	940
	Ethyl propionate	25	63.7	0.52	11	–	3.8–583	LS	–	940
	Isobutyl acetate	25	59.4	0.53	11	–	3.8–583	LS	–	940
	Tetrahydrofuran	25	37.2	0.60	10	–	3.8–583	LS	–	940
	1-Chloro-*n*-hexane	5.7	91.6	0.468	9	–	5.9–90.3	LS, SEC, OS	A	888

TABLE 1. *cont'd*

Polymer	Solvent	Temp. (°C)	K ($\times 10^3$) (ml/g)	a	No. of samples Fr.	No. of samples W.P.	Mol. wt. range ($\times 10^{-4}$)	Method(s)	Remarks	Refs.
Poly(4-iodostyrene)	Dioxane	20	33	0.51	10	6	10–118	LV	B-C	360
Poly((*p*-isopropyl-α-methylstyrene)										
	Tetrahydrofuran	25	45	0.55	8	–	1–63	LS	A-D	748
Poly(*p*-isopropylstyrene)	Toluene	25	12.3	0.69	–	5	14–75	LS	B,C	265
Poly(*o*-methoxystyrene)	Butanone	30	18.6	0.59	5	–	13–35	LS	A–B	362
	Toluene	30	6.40	0.71	5	–	13–35	LS	A–B	362
	Methanol/toluene (25/75, v/v)	30 (θ)	57.5	0.50	4	–	15–30	LS	A–B	362
Poly(*p*-methoxystyrene)	Butanone	30	3.75	0.73	5	–	13–75	LS	A–B	362
		35	8.6	0.68	6	–	1–100	LS	B	352
	Chlorocyclohexane	25	17.7	0.63	16	–	22–220	LS	A	363
	Pentyl acetate	25	55	0.52	16	–	22–220	LS	A	363
	Toluene	25	10.5	0.70	16	–	22–220	LS	A	363
		30	5.28	0.73	5	–	13–75	LS	B	362
		30	18.0	0.62	6	–	1–100	LS	B	352
	Methanol/toluene (28.1/71.9, v/v)	30 (θ)	62.1	0.50	5	–	7–180	LS	B	362
Poly(α-methylstyrene) anionic, (ca. 50%-hetero, ca. 40%-syndio)										
	Benzene	30	10.3	0.72	–	9	4–170	LS	A	319
		30	9.15	0.726	–	6	37.5–685	LS	A	873
	Cyclohexane	34.5 (θ)	73	0.50	–	10	4–750	LS, OS	A	320
		37 (θ)	78	0.50	–	9	9–400	LS	A	321
		38 (θ)	76	0.50	–	6	2–66	LS	A	322
		38.6 (θ)	76.0	0.50	–	9	4–170	LS	A	323
		39	71.3	0.51	–	9	3–140	LS	A	324
	trans-Decalin	9.5 (θ)	67	0.50	–	9	8–750	LS, OS	A	320
	Toluene	25	7.06	0.744	–	9	8–750	LS, OS	A	320
		25	7.81	0.73	–	6	3–60	SD	A	325
		30	10.8	0.71	–	13	2–66	LS	A	322,326
cationic	Benzene	30	24.9	0.647	4	–	14–91	OS	B	327
(10%-hetero, 90%-syndio)	Cyclohexane	32.5 (θ)	66.0	0.50	5	–	2–370	LS	B	328
(19%-hetero, 80%-syndio)		33.3 (θ)	72.7	0.50	8	–	2–18	LS	B	328
	Toluene	30 (θ)	2.2	0.80	6	–	1–100	LS	B	329
	Benzene/methanol (79.4/20.6, v/v)	30	76.8	0.50	4	–	14–91	OS	B	327
		10.0	71.8	0.491	9	–	5.9–90.3	LLS, SEC, OS	A	888
	1-Chloro-*n*-heptane	20.0	94.9	0.459	9	–	5.9–90.3	LLS, SEC, OS	A	888
		27.0	79.6	0.477	9	–	5.9–90.3	LLS, SEC, OS	A	888
	1-Chloro-*n*-octane	43.0	94.8	0.461	9	–	5.9–90.3	LLS, SEC, OS	A	888
		53.0	65.1	0.497	9	–	5.9–90.3	LLS, SEC, OS	A	888
		80.0	74.6	0.484	9	–	5.9–90.3	LLS, SEC, OS	A	888
	n-Hexyl acetate	85.0	86.4	0.474	9	–	5.9–90.3	LLS, SEC, OS	A	888
	Cyclohexane	34.5	74.0	0.493	11	–	2.01–90.3	LLS, SEC, OS	A	888
	trans-Decalin	10.0	83.0	0.480	11	–	2.01–90.3	LLS, SEC, OS	A	888
	n-Butyl chloride	35.5	40.0	0.56	16	–	0.2–130	OS, GPC	B	927
	Carbon tetrachloride	45	19.4	0.67	16	–	0.2–130	OS, GPC	B	927
	Chloroform	25	13.3	0.70	16	–	0.2–130	OS, GPC	B	927
	Tetrahydrofuran	25	11.1	0.69	16	–	0.2–130	OS, GPC	B	927
	Toluene	25	10.1	0.71	16	–	0.2–130	OS, GPC	B	927
	n-Butyl chloride	5	33.6	0.570	8	–	6.0–107	LLS, LS	A	935
		25	27.0	0.590	15	–	5.4–354	LLS, LS	A	935
		50	26.5	0.594	8	–	6.0–107	LLS, LS	A	935
Poly(*m*-methylstyrene)	Benzene	30	7.36	0.76	9	–	8–115	OS	A	330
	Cyclohexane	30	11.76	0.70	7	–	15–83	OS	A	330
	Ethyl acetate	30	17.42	0.64	7	–	15–83	OS	A	330
Poly(*p*-methylstyrene)	Diethyl succinate	16.4 (θ)	70	0.50	6	–	16–200	LS	A	331
	Toluene	30	8.86	0.74	9	–	19–180	LS	A	331
Poly(methylstyrene), position of substituent, unspecified										
	Cyclohexane	20	22	0.68	6	–	11–133	SV	A	332
Poly[(2,3,4,5,6-pentafluorostyrene)]										
	4-Methyl-2-pentanone	20	4.37	0.736	–	21	10–260	OS	C	364
Poly(styrene)	Benzene	20	6.3	0.78	18	–	1–300	SD	A	270
atactic		20	12.3	0.72	7	–	0.6–520	SD	A,R	271

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TABLE 1. *cont'd*

Polymer	Solvent	Temp. (°C)	K ($\times 10^3$) (ml/g)	a	No. of samples Fr.	No. of samples W.P.	Mol. wt. range ($\times 10^{-4}$)	Method(s)	Remarks	Refs.
		25	22.7	0.72	–	7	0.2–0.8	CR	C,L	272
		25	41.7	0.60	9	–	0.1–1	CR	B,L	272
		25	34.0	0.65	11	–	0.04–0.8	EG	A,L	273
		25	9.52	0.744	6	–	3–61	OS	A	274
		25	9.18	0.743	6	–	3–70	LS	A	275
		25	11.3	0.73	10	–	7–180	OS	A	276
		34	9.8	0.737	10	–	8–80	DV	A	277
	Butanone	25	39	0.58	16	–	1–180	LS	A,R	278
		25	30.5	0.60	5	–	7–150	OS	A	276
		25	19.5	0.635	7	–	12–280	LS	A	279
		30	23	0.62	7	–	40–370	LS	B	280
		34	28.9	0.60	10	–	8–80	DV	A	281,282
		35	17.1	0.64	13	–	4–640	LS	A	752
	Butyl chloride	40.8	15.1	0.659	5	–	29–106	LS	B	283
	n-Butyl chloride	25	17.4	0.662 ($M_w > 3.7 \times 10^4$)	8	–	0.97–67.5	LLS, SEC	A	933
		50	16.2	0.665 ($M_w > 3.7 \times 10^4$)	8	–	0.97–67.5	LLS, SEC	A	933
	Carbon tetrachloride	10	12.6	0.717	–	6	1.8–180	LV	A–B	901
		20	12.0	0.720	–	6	1.8–180	LV	A–B	901
		30	11.4	0.724	–	6	1.8–180	LV	A–B	901
		40	11.2	0.725	–	6	1.8–180	LV	A–B	901
		50	11.0	0.726	–	6	1.8–180	LV	A–B	901
	Chlorobenzene	25.7	7.4	0.749	4	–	62–424	LS	B	283
	Chloroform	25	7.16	0.76	8	–	12–280	LS	A	279
		25	11.2	0.73	5	–	7–150	OS	A	276
		30	4.9	0.794	4	–	19–373	OS	B	284
	Cyclohexane	28	108.0	0.479	7	–	0.6–69	OS	A	285
		34 (θ)	82	0.50	15	–	1–70	LV	A	274
		34 (θ)	90.2	0.503	9	–	0.6–69	OS	A	285
		34.5 (θ)	84.6	0.50	8	–	14–200	LS	A,R	286
		35 (θ)	80	0.50	3	–	8–42	LS	A	287
		35 (θ)	70	0.50	8	–	3–200	SD	B	288
		35 (θ)	76	0.50	10	–	4–137	LS	B	283
		40	41.6	0.554	10	–	4–137	LS	B	283
		45	34.7	0.575	10	–	4–137	LS	B	283
		50	26.9	0.599	10	–	4–137	LS	B	283
		50	36.4	0.584	7	–	4–52	LS	A	289
	cis-Decalin	25	40	0.574	8	–	4.8–2360	LS	A	936
	Decalin (100%-*trans*)	20	149	0.44	7	–	14–200	LS	A	290
		23	98	0.48	7	–	14–200	LS	A	290
		23.8 (θ)	–	0.50	–	–		LS	A	290
		25	67	0.52	7	–	14–200	LS	A	290
		30	61	0.53	6	–	14–200	LS	A	290
		60	22	0.63	4	–	14–200	LS	A	290
	Decalin (73%-*trans*)	18 (θ)	77	0.50	4	–	14–140	LS	A	290
		30	36	0.58	4	–	14–140	LS	A	290
		40	37	0.58	4	–	14–140	LS	A	290
		60	22	0.64	4	–	14–140	LS	A	290
		100	15.7	0.67	6	–	14–200	LS	A	290
	Dichloroethane	25	21.0	0.66	7	–	1–180	LS	A	278
		35	14.3	0.69	11	–	10–500	LS	A	689
	1,2-Dichloroethane	35	14.3	0.69	11	–	9–540	LS	A	752
	Diethyl malonate	34.2 (θ)	71.8	0.50	3	–	39–400	LV	B	291
	Diethyl oxalate	55.8 (θ)	73.0	0.50	3	–	39–400	LV	B	291
	Dimethylformamide	35	31.8	0.603	5	–	0.4–87	LS	A	754
	Dioxane	34	15.0	0.694	10	–	8–80	DV	A	282
	Ethyl acetate/cyclohexane (100/0–10/90)	–	18.2–43.8	0.54–0.67	5	–	11–96	–	A	939
		10	11.0	0.733	–	6	1.8–180	LV	A–B	901
		25	9.32	0.738	–	6	1.8–180	LV	A–B	901
		40	9.07	0.739	–	6	1.8–180	LV	A–B	901
		55	8.79	0.742	–	6	1.8–180	LV	A–B	901
		65	8.90	0.740	–	6	1.8–180	LV	A–B	901

TABLE 1. *cont'd*

Polymer	Solvent	Temp. (°C)	K ($\times 10^3$) (ml/g)	a	No. of samples Fr.	No. of samples W.P.	Mol. wt. range ($\times 10^{-4}$)	Method(s)	Remarks	Refs.
	Ethylbenzene	25	17.6	0.68	5	–	7–150	OS	A	276
	Ethylcyclohexane	70 (θ)	75	0.50	2	–	36–127	LV	B	292
	Methylcyclohexane	70 (θ)	76	0.50	?	?	?	?		293
		70.5 (θ)	69.6	0.50	3	–	39–400	LV	B	291
	4-Methyl-2-pentanone	35	61.9	0.53			5–100	LS	B	698
	Tetrahydrofuran	25	11.0	0.725	–	7	1–100	GPC	A	749
		25	14	0.70				LS	C	756
	Toluene	20	4.16	0.788	10	–	4–137	LS	B	283
		25	7.5	0.75	8	–	12–280	LS	A	279
		25	8.48	0.748	7	–	4–52	LS	A	289
		25	10.5	0.73	6	–	16–100	LS	A,R	294
		25	17	0.69	9	–	1–160	LS	A	278
		25	7.54	0.783	?	?	5–80	OS		295
		25	13.4	0.71	5	–	7–150	OS	A	276
		25	44	0.65	–	9	0.5–4.5	OS		296
		25	(a increases with M)		10	–	0.08–3.7	CR	L	297
		25	100	0.50	8	–	0.05–0.5	CR	A,R,L	298
		30	9.2	0.72	9	–	4–146	LS	A	299
		30	12.0	0.71	8	–	40–370	LS	B	280
		30	11.0	0.725	7	–	8–85	OS	A–B	300
		34	9.7	0.733	10	–	8–80	DV	A	282
		35	12.6	0.71	16	–	3–650	LS	A	752
		35	12.9	0.71			5–100	LS	B	698
	Trichloro benzene	135	1.75	0.67						697
	Benzene/methanol (74/26, v/v)	34 (θ)	89	0.50	10	–	8–80	DV	A	277
	Butanone/methanol									
	(97.5/2.5, v/v)	25	22.4	0.62	8	–	12–280	LS	A	279
	(95.9/5.0, v/v)	25	26.3	0.60	8	–	12–280	LS	A	279
	(92.5/7.5, v/v)	25	35.7	0.57	8	–	12–280	LS	A	279
	(89/11, v/v)	25 (θ)	73	0.50	8	–	12–280	LS	A	279
	Butanone/2-propanol									
	(6/1, v/v)	23 (θ)	73	0.50	9	–	4–146	LS	A	299
	(82.6/17.4, v/v)	34 (θ)	71.8	0.50	10	–	8–80	DV	A	282
	Chloroform/methanol									
	(90/10, v/v)	25	7.7	0.75	8	–	12–280	LS	A	279,278
	(80/20, v/v)	25	12	0.68	8	–	12–280	LS	A	279,278
	(75/25, v/v)	25	46	0.54	8	–	12–280	LS	A	279,278
	(74.7/24.3, v/v)	25 (θ)	73	0.50	8	–	12–280	LS	A	279,278
	Dioxane/methanol									
	(65.1/34.9, v/v)	34 (θ)	72.6	0.50	10	–	8–80	DV	A	282
	Toluene/methanol									
	(90/10, v/v)	25	10.4	0.715	8	–	12–280	LS	A	279
	(80/20, v/v)	25	26	0.612	8	–	12–280	LS	A	279
	(76.9/24.8, v/v)	25	92	0.50	12	–	0.07–3.5	DV	A,L	298,297
	(75.2/24.8, v/v)	34 (θ)	88	0.50	10	–	8–80	DV	A	282
atactic, anionic	Benzene	25	100	0.50	–	7	0.04–1	VOS, EB	A,L	301
		25	7.8	0.75	17	–	40–6000	LS	A,R	750
		30	8.5	0.75	–	12	2.5–150	VOS	A	301
		30	11.5	0.73	–	5	25–300	LS	A	302
		30	9.50	0.74	–	6	31–500	LS	A	649
	Cyclohexane	34 (θ)	74.5	0.50	–	?	?	LS	B	304
		34.5 (θ)	85	0.50	–	12	0.04–150	LS	A,R	301,303
		34.5 (θ)	88	0.50	–	9	31–970	LS	A	649
		34.5 (θ)	88	0.50	17	–	1–6000	LS	A	750
		34.6 (θ)	91	0.50	–	4	25–300	LS	A	302
		35 (θ)	86	0.50	–	7	2–50	LS	A	305
	Cyclohexene	25	16.3	0.68	–	3	20–107	LS	A	306
	Decalin (66%-*cis*)	12.2 (θ)	80	0.50	–	6	2–50	LS	A	303
	Decalin (99%-*trans*)	20.4 (θ)	81	0.50	–	8	31–760	LS	A	649
	Dichloroethane	30	8.38	0.74	–	5	25–300	LS	A	302
	Dioctyl phthalate	22.0 (θ)	80	0.50	–	4	40–160	LS	A	303
	Tetrahydrofuran	25	13.63	0.714	13	–	2–4000	LS, OS, SD	A,R	753

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TABLE 1. *cont'd*

Polymer	Solvent	Temp. (°C)	K ($\times 10^3$) (ml/g)	a	No. of samples Fr.	No. of samples W.P.	Mol. wt. range ($\times 10^{-4}$)	Method(s)	Remarks	Refs.
	Thiophenol	25	14.6	0.70	6	–	42–842	LS	A	778
	Toluene	20	10.69	0.724	20	–	3–4000	LS, OS, SD	A,R	753
		20	11.2	0.72	–	6	3–24	SD		307
		25	9.77	0.73	–	12	1–104	SD	A,R	308
		25	34.5	0.62	–	25	0.4–230	SD	B	309
		30	8.81	0.75	–	5	25–300	LS	A	302
		30.3	10.4	0.73	–	15	2.6–50	OS, LS	A	310
isotactic	Benzene	30	9.5	0.77	6	–	4–75	OS		311
		30	10.6	0.735	7	–	4–37	OS	A–B,R	312
	Chloroform	30	25.9	0.734	3	–	9–32	OS	C-D	284
	o-Dichlorobenzene	25	17.9	0.677	5	–	2–100	LV	C	313
	Toluene	30	11.0	0.725	7	–	3–37	OS	A–B	312
		30	9.3	0.72	5	–	15–71	LS	A–B,R	314
branched, random type	Butanone	25	(a decreases with M)		5	–	30–200	LS	B-C	315
	Cyclohexane	35 (θ)	(a decreases with M)		9	–	8–300	LS	A	316
	Toluene	30	(a decreases with M)		9	–	8–300	LS	A	316
head-to-head	Tetrahydrofuran	25	53	0.61	8	–		LS	C	756
		35 (not θ)	–	0.465	12	–	0.69–43.6	GPC	B	926
		40	–	0.5	3	–	16.1–43.6	GPC	B	926
		35	–	0.67	12	–	0.69–43.6	GPC	B	926
	Cyclohexane	34.5	53	0.50	8	–	3–27	LLS, GPC	A–B	928
		35	–	0.52	10	–	4.4–27.6	LS	A–B	930
	Tetrahydrofuran	30	12.0	0.68	8	–	3–27	LLS, GPC	A–B	928
		25	–	–	–	–	?–18	LS	A–B	930
	Toluene	25	6.38	0.734	8	–	3–27	LLS, GPC	A–B	928
ring	Cyclohexane	40.0	55.6	0.50	10	–	0.7–44	LS		755
	Toluene	35.0	12.4	0.67	10	–	0.7–44	LS		755
star type										
three branches	Benzene	25	5.7	0.76	5	–	3–96	OS, GPC	A	757
	Cyclohexane	35	36	0.55	5	–	3–96	OS, GPC	A	757
four branches	Cyclohexane	35 (θ)	63.1	0.50	9	–	5–140	OS, LS	A	758
		50	26.5	0.58	9	–	5–140	OS, LS	A	758
	Toluene	35	7.4	0.73	9	–	5–140	OS, LS	A	758
regular H-shaped	Cyclohexane	35 (θ)	66.5	0.50	6	–	11–170	LS	A	759
	Toluene	35	74.7	0.73	6	–	11–170	LS	A	759
star type 3 arm	Cyclohexane	16.6–30.1 (θ) (depend on M_w)	–	–	–	–	–	LS	–	931
	Toluene	35	–	Not const.	–	–	–	LS	–	931
star type 15 arm	Cyclohexane	34.5 (not θ)	30	0.5	4	–	86–302	LS, OS, GPC	A–B	941
20 arm	Cyclohexane	34.5 (not θ)	24	0.5	3	–	26–148	LS, OS, GPC	A–B	941
star type, anionic	Cyclohexane	34 (θ)	$g' = 0.94$ (3 branches)[a]							304
			$g' = 0.82$ (4 branches)[a]							304
	Decalin	15	$g' = 0.48$ (9 branches)[a]							318
	Toluene	25	$g' = 0.90$ (3 branches)[a]							304
		34	$g' = 0.84$ (4 branches)[a]							304
Poly(styrenesulfonic acid)	Aq. HCl (0.52 M)	25	(0.344)	(1.0)	3	–	18–46	LV		365
	Aq. NaCl (0.52 M)	25	(0.312)	(1.0)	3	–	18–46	LV		365
–, sodium salt	Aq. NaCl									
	(4.17 M)	25 (θ)	20.4	0.50	4	–	49–228	LS	B	366
	(0.5 M)	25	18.6	0.64	6	–	39–234	LS	B,R	366
	(0.1 M)	25	17.8	0.68	6	–	39–234	LS	B	366
	(0.05 M)	25	13.9	0.72	6	–	39–234	LS	B	366
	(0.02 M)	25	10.1	0.78	6	–	39–234	LS	B	366
	(0.01 M)	25	2.8	0.89	5	–	39–234	LS	B	366
	(0.05 M)	25	2.3	0.93	5	–	49–234	LS	B	366
Aq. KCl	(3.1 M)	25	20.4	0.50	4	–	49–234	LS	B	366

[a] $g' = [\eta]$ of branched molecules/$[\eta]$ of linear molecules with same mol. wt.

1.9. OTHER COMPOUNDS

Poly(2-acrylamino-2-methylpropanesulfonamide)										
	Water	25	12.3	0.757	10	–	85–122	OS, LS	B	1011
	Water/1,4-dioxane (81.5/18.5, v/v)	25 (θ)	172	0.50	10	–	85–122	OS, LS	B	1011

TABLE 1. *cont'd*

Polymer	Solvent	Temp. (°C)	K ($\times 10^3$) (ml/g)	a	No. of samples Fr.	No. of samples W.P.	Mol. wt. range ($\times 10^{-4}$)	Method(s)	Remarks	Refs.
Poly(allylammonium chloride)	Aqueous NaCl (0.05 M)	25	2.40	0.975	9	–	4.1–18	LS	–	900
	(0.2 M)	25	7.18	0.815	7	–	2.8–18	LS	–	900
	(0.5 M)	25	7.19	0.794	6	–	2.8–18	LS	–	900
	(1.0 M)	25	13.9	0.714	9	–	4.1–18	LS	–	900
Poly[(biphenyl-4-yl)-ethylene]	Benzene	20	21.4	0.619	5	–	7–170	LS	B	264
		30	29.5	0.59	6	–	1–110	LV	B	264
		75	27.7	0.589	5	–	7–170	LS	B	264
Poly(*tert*-butyl crotonate)	Butyl chloride	25	7.7	0.82	–	11	0.2–32	OS, GPC	A	760
	Toluene	25	7.7	0.82	10	–	0.6–35	OS, GPC	A	760
Poly(carbanilinoxyethylene), (Poly(vinyl carbanilate))	Dioxane	20	13.7	0.68	11	–	6–200	LS	A	335
	Dioxane/methanol (28/72, v/v)	20 (θ)	64.5	0.51	5	–	6–200	LS	A	335
Poly(dibutyl itaconate)	Toluene	25	5.70	0.70	8	–	20–105	LS	B	762
Poly(dicyclohexyl itaconate)	Tetrahydrofuran	25	23.3	0.58	5	–	5–56	OS	B	761
	Toluene	25	13.1	0.623	10	–	5–56	OS	B	761
Poly(didecyl itaconate)	Toluene	25	8.01	0.64	11	–	13–82	LS	B	762
Poly(diethyl fumarate)	Benzene	30	1.62	0.87	10	–	?–20	OS, GPC	A–B	1009
Poly(didodecyl itaconate)	Toluene	25	11.7	0.59	–	–	–	LS	–	945
Poly(diethyl itaconate)	Toluene	25	1.48	0.80	–	8	5–61	LS	B	762
Poly[di(ethylcyclohexyl) itaconate]										
	Toluene	25	2.62	0.73			16–170	LS	B	763
Poly(dihexadecyl itaconate)	Toluene	25	11.4	0.60	–	–	–	LS	–	945
Poly(dihexyl itaconate)	Toluene	25	3.71	0.72	–	8	12–122	LS	B	762
Poly(diicosayl itaconate)	Toluene	25	14.3	0.56	–	–	–	LS	–	945
Poly(diisopropyl fumarate)	Benzene	30	0.753	0.98	11	–	4.7–30	OS, GPC	A–B	1009
		(Wormlike behavior)								
Poly(dimethyl itaconate)	Benzene	25	5.15	0.68	–	8	4–120	LS	B	762
Poly[di(methylcyclohexyl) itaconate]										
	Toluene	25	2.02	0.76			13–102	LS	B	763
Poly(dioctyl itaconate)	Toluene	25	3.67	0.71	–	8	11–163	LS		762
Poly(diphenylmethylene)	Benzene		218	0.328	?		1–90	?		267
Poly(diphenyl itaconate)	Toluene	25	4.47	0.69	9	–	5.7–57	LS	–	943
Poly(dioctadecyl itaconate)	Toluene	25	13.1	0.59	–	–	–	LS	–	945
Poly(dipropyl itaconate)	Toluene	25	1.62	0.78	–	6	13–109	LS		762
Poly[di(propylcyclohexyl itaconate]										
	Pentyl acetate	25	14.0	0.56			16–91	LS	B	763
	Toluene	25	2.23	0.73			16–91	LS	B	763
Poly(ditetradecyl itaconate)	Toluene	25	9.91	0.61	–	–	–	LS	–	945
Poly(diundecyl itaconate)	Toluene	25	10.01	0.61	–	4	9–250	LS		762
Poly(1-methoxycarbonyl-1-phenylethylene)										
	Benzene	30	35.6	0.566	8	–	6–40	LS	A	361
	Chloroform	30	12.7	0.661	8	–	6–40	LS	A	361
	Ethylbenzene	15 (θ)	51.4	0.507	8	–	6–40	LS	A	361
Poly(monodecyl itaconate)	Tetrahydrofuran	25	–	Not const.	11	–	3.3–72.4	LS, SEC	A	1006
		(Wormlike behavior)								
Poly(monododecyl itaconate)	Tetrahydrofuran	25	11.2	0.65	9	–	1.7–233	LS, SEC	A	949
		(Wormlike behavior)								
Poly[bis(phenylethyl) itaconate]	Toluene	25	5.26	0.66	8	–	9.0–45	LS	–	943
Poly[bis(phenyl-*n*-propyl) itaconate]										
	Toluene	25	5.97	0.65	12	–	6.5–52	LS	–	943
Poly(9-vinyladenine)	Aq. NaCl (0.1 M)/ $NaAs(CH_3)_2$(0.1 M); pH7	26	241	0.35	3	–	9–51	OS		830
		40	29.2	0.53	3	–	9–51	OS		830
Poly(1-vinyl-3-benzylimidazolium chloride)										
	Aq. NaCl (0.2 M)	25	5.89	0.74	4	–	18–130	LS	B	813
	Methanol/$N(CH_3)_4$ Br(0.01 M)	25	13.4	0.63	5	–	18–160	LS	B	813
Poly(4-vinylbenzyl trimethylammonium chloride)										
	Aq. NaCl (0.5 M)	25	19.6	0.67	4	–	1–21	OS, GPC		764
	(0.1 M)	25	18.6	0.70	4	–	1–21	OS, GPC		764
	(0.01 M)	25	7.87	0.85	4	–	1–21	OS, GPC		764
	(0.002 M)	25	5.77	0.88	4	–	1–21	OS, GPC		764

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TABLE 1. *cont'd*

Polymer	Solvent	Temp. (°C)	K ($\times 10^3$) (ml/g)	a	No. of samples Fr.	No. of samples W.P.	Mol. wt. range ($\times 10^{-4}$)	Method(s)	Remarks	Refs.
Poly(vinylcarbazole)	Benzene	25	30.5	0.58	11	–	0.7–45	LS	A	367
	Bromobenzene	25	5.14	0.76	7	–	7–49	GPC	A–B	765
	Chlorobenzene	30	5.23	0.755	6	–	7–57	GPC	A–B	766
		45	4.44	0.776	6	–	7–57	GPC	A–B	766
	Chloroform	25	5.93	0.74	7	–	7–49	GPC	A–B	765
		25	13.6	0.67	8	–	3–45	LS	A	367
	Cyclohexanone	25	20.0	0.61	9	–	2–45	LS	A	367
	1,2-Dichlorobenzene	25	11.0	0.68	7	–	4–44	GPC	A–B	767
	1,3-Dichlorobenzene	25	5.6	0.75	6	–	7–49	GPC	A–B	767
	Nitrobenzene	25	9.25	0.69	6	–	7–49	GPC	A–B	765
		30	7.19	0.716	6	–	7–57	GPC	A–B	766
		45	6.03	0.739	6	–	7–57	GPC	A–B	766
	Tetrachloroethane	25	12.9	0.68	9	–	2–45	LS	A	367
	Tetrahydrofuran	25	14.4	0.65	10	–	1–45	LS	A	367
	Toluene	37 (θ)	76.2	0.50	7	–	4–107	OS	A	368
Poly(*N*-vinyl-3,6-dibromo carbazole)										
	p-Chloro-*m*-cresol	112.9 (θ)	30.2	0.50	7	–	4.8–125	–	–	942
	o-Chlorophenol	60.0 (θ)	27.5	0.50	8	–	4.8–125	–	–	942
Poly(1-vinylimidazole)	Aq. NaCl (0.1 M)	25	122	0.51	5	–	9–90	LS	B	813
	(5.0 M)	25 (θ)	121	0.50	8	–	5–90	LS	B	813
	Aq. NaSCN (0.1 M)	25 (θ)	105	0.50	5	–	9–90	LS	B	813
	Methanol/$N(CH_3)_4Br$(0.01 M)	25	48.5	0.63	6	–	9–130	LS	B	813
protonated	Aq. HCl (0.1 M)/ NaCl (1 M)	25 (θ)	169	0.50	5	–	9–90	LS	B	813
Poly(5-vinyl-2-methylpyridine)	Butanone	25	13.9	0.65	5	–	13–88	LS	A	375
		25	19	0.64	15	–	6–100	LS	A	376
	Dimethylformamide	25	13.0	0.76	6	–	4–40	OS	A–B	377
	Methanol	25	18.0	0.83	8	–	4–40	OS	A–B	377
		25	18.6	0.70	9	–	7–80	LS	A	376
		25	8.0	0.76	9	–	13–88	LS	A	375
Poly(1-vinylnaphthalene)	Benzene	20	2.20	0.82	4	–	4–17	LS	B	264
		75	1.03	0.88	4	–	4–17	LS	B	264
Poly(2-vinylnaphthalene)	Benzene	17	1.7	0.80	11	–	10–100	LS		268
		20	6.90	0.719	6	–	6–68	LS	B	264
		75	8.69	0.695	6	–	6–69	LS	B	264
	Decalin/toluene (13/10, w/w)	30.2 (θ)		0.50	8	–	10–100	LS		269
Poly(3-vinylpyrene)	Chloroform	25 (θ)	51.0	0.500	9	–	3–50	LS	A	768
	1,2-Dichlorobenzene	25	11.7	0.655	9	–	3–50	LS	A	768
	Tetrahydrofuran	25	31.8	0.547	9	–	3–50	LS	A	768
Poly(2-vinylpyridine)	Benzene	25	6.6	0.72	3	–	3–11	LS		769
		25	17.0	0.64	14	–	3–93	LS	B,C	371
	Benzene	10	151	0.445	5	–	9.4–196	LS, OS	A	944
	Benzene	10	149	0.43	5	–	9.4–196	LS, OS	A	952
		11.4 (θ)	81	0.50	5	–	9.4–196	LS, OS	A	952
		12	56.0	0.53	5	–	9.4–196	LS, OS	A	952
		15	31.8	0.59	5	–	9.4–196	LS, OS	A	952
	Butanone	25	97.2	0.47	14	–	3–93	LS	B,C	207
	Dimethylformamide	25	14.7	0.67	14	–	3–93	LS	B,C	371
	Dioxane	25	30.9	0.58	14	–	3–93	LS	B,C	371
	Methanol	25	11.3	0.73	14	–	3–93	LS	B,C	371
	Methyl ethyl ketone	25	93.3	0.480	5	–	9.4–196	LS, OS	A	944
	Pyridine	25	9.84	0.727	5	–	9.4–196	LS, OS	A	944
	2-Propanol	25	18.4	0.67	5	–	9.4–196	LS, OS	A	952
	Pyridine	25	9.9	0.73	4	–	9.4–196	LS, OS	A	952
	Pyridine	25	13.8	0.69	14	–	3–93	LS	B,C	207
	Ethanol/water (92/8, w/w)	25	12.2	0.73	14	–	3–93	LS	B,C	371
Poly(2-vinylpyridine 1-oxide)	Benzyl alcohol	25	9.35	0.73	14	–	1.3–34	LS	A–B	946
	1-Butanol	25	7.78	0.72	14	–	1.3–34	LS	A–B	946
	Chloroform	25	15.8	0.64	14	–	1.3–34	LS	A–B	946
	Methanol	25	7.55	0.72	14	–	1.3–34	LS	A–B	946

TABLE 1. *cont'd*

Polymer	Solvent	Temp. (°C)	K ($\times 10^3$) (ml/g)	a	No. of samples Fr.	No. of samples W.P.	Mol. wt. range ($\times 10^{-4}$)	Method(s)	Remarks	Refs.
	1-Propanol	25	10.3	0.70	14	–	1.3–34	LS	A–B	946
	2-Propanol	25	12.0	0.68	14	–	1.3–34	LS	A–B	946
Poly(4-vinylpyridine)	Ethanol	25	(1.51)	(0.52)	–	3	1–4	SD	C	372
		25	25.0	0.68	8	–	10–185	LS	A–B	373
	Water	25	22.0	0.687	8	–	10–185	LS	A–B	373
	Butanone/2-propanol	25	38.0	0.57	7	–	7–224	LS	B	374
	Ethanol/water (92/8, w/w)	25	12.0	0.73	7	–	7–224	LS	B	374
Poly(vinylpyrrolidone)	Chloroform	25	19.4	0.64	4	2	2–23	LS	B	378
	Methanol	30	23	0.65	–	6	2–23	LS	B	378
	Water	20	64	0.58	3	–	1–9	SD	B	379
		25	67.6	0.55	15	–	0.7–10	LS	B,R	378
		25	4.1	0.85	–	5	1–4	SD	C,D	211
		30	14	0.70	9	–	1–20	SD	B	381
		30	39.3	0.59	6	–	8–110	OS	A,R	383
	Acetone/water (66.8/33.2, v/v)	25 (θ)	75.0	0.50	–	3	1.2–108	LS	B	384
	Aq. Na_2SO_4 (0.55 M)	25 (θ)	58.0	0.500	5	–	9–46	OS	B	770
Poly(1-vinyl-2-pyrrolidone)										
high M	Aq. sodium acetate (0.1 M)	25	8.86	0.74 (Mixed)			4–220	–	–	948
low M	Aq. sodium acetate (0.1 M)	25	64	0.53 (Mixed)			0.2–4	–	–	948
Poly(vinylsulfonic acid)	Aq. KBr (0.347 M)	5.7 (θ)	68.8	0.50	5	–	4–39	LS	B	259
		15	30.8	0.61	5	–	8–39	LS	B	259
		30	24.5	0.75	5	–	8–39	LS	B	259
		50	26.6	0.76	5	–	8–39	LS	B	259
	Aq. KCl	5.5 (θ)	68.2	0.50	5	–	4–39	LS	B	259
	(0.349 M)	25	16.7	0.79	5	–	4–39	LS	B	259
	(0.650 M)	26.0 (θ)	79.5	0.50	5	–	4–39	LS	B	259
	(1.001 M)	44.5 (θ)	80.3	0.50	5	–	4–39	LS	B	259
	Aq. NaBr	−0.6 (θ)	95.5	0.50	5	–	4–39	LS	B	259
	(0.346 M)	10	26.8	0.73	5	–	8–39	LS	B	259
		20	25.1	0.76	5	–	8–39	LS	B	259
		30	22.0	0.79	5	–	8–39	LS	B	259
	(1.008 M)	40.1 (θ)	94.5	0.50	5	–	4–39	LS	B	259
	Aq. NaCl (1.003 M)	32.4 (θ)	96.1	0.50	5	–	4–39	LS	B	259
	(0.5 M)	20	21.5	0.65	–	6	0.3–3	SD	C	260
Poly(vinyltrimethylsilane)	Cyclohexane	25	8.2	0.71	5	–	59–213	LS	B	610
1.10. COPOLYMERS										
Poly(acrylonitrile-*co*-butadiene), see also Poly(butadiene-*co*-acrylonitrile) in group 1.1										
(18/82, w/w, random)	Toluene	25	251	0.50	7	–	0.06–1.26	OS	A	590
(26/74, w/w, random)	Toluene	25	260	0.50	5	–	0.15–0.40	OS	A	590
Poly(acrylonitrile-*co*-glycidyl methacrylate)										
	Dimethylformamide	30	175	0.65	?	?	?	?		591
Poly(acrylonitrile-*co*-methyl acrylate)										
	Dimethylformamide	20	17.9	0.79	6	–	2–21	LS	B	592
Poly(acrylonitrile-*stat*-methyl acrylate), (91.5/8.5, w/w)										
	Dimethylformamide	25	21.3	0.743	11	–	2–53	LS		772
	Ethylene carbonate/water (82.5/17.5, w/w)	25 (θ)	152	0.502	8	–				772
Poly(acrylonitrile-*co*-styrene)										
(38.3/61.7, mol/mol,)	Butanone	30	36	0.62	16	–	15–120	LS	B	593
	Tetrahydrofuran	25	21.5	0.68	4	–	10–78	LS	B	594
azeotropic (62.6/37.4, mol/mol, random)	Butanone	30	53	0.61	11	–	19–56	LS	B	595
	Dimethylformamide	30	12	0.77	11	–	19–56	LS	B	595
Poly(acrylonitrile-*stat*-styrene)										
(27.4/72.6, mol/mol)	Dimethylformamide	30	12.0	0.74	6	–	14–58	LS	B	773

TABLE 1. *cont'd*

Polymer	Solvent	Temp. (°C)	K ($\times 10^3$) (ml/g)	a	No. of samples Fr.	No. of samples W.P.	Mol. wt. range ($\times 10^{-4}$)	Method(s)	Remarks	Refs.
(38.5/61.5, mol/mol)	Dimethylformamide	30	16.2	0.73	6	–	22–106	LS	B	773
(47.5/52.5, mol/mol)	Dimethylformamide	30	17.2	0.73	6	–	14–78	LS	B	773
Poly(acrylonitrile-*alt*-styrene) (1/1, mol/mol)										
	Butanone	30	24.3	0.67	10	–	5–100	LS	B	774
	Dimethylformamide	30	7.63	0.76	9	–	8–100	LS	B	774
	Butanone/methanol (63.6/36.4, v/v)	30 (θ)	140	0.50	10	–	5–100	LS	B	774
Poly(acrylonitrile-*co*-vinylidene chloride) 58 wt.% AN										
	γ-Butyrolactone	25	112	0.576	8	–	4.2–50	LS	–	961
	Dimethylacetamide	25	99.9	0.603	8	–	4.2–50	LS	–	961
	Dimethylformamide	25	102	0.591	8	–	4.2–50	LS	–	961
	N-methyl-2-pyrrolidone	25	114	0.595	8	–	4.2–50	LS	–	961
	70 wt.% HNO_3	25	142	0.521	8	–	4.2–50	LS	–	961
Poly(*p*-aminobenzoic acid-*stat*-6-aminohexanoic acid) (1/1, mol/mol)										
	Dichloroacetic acid	30	23.7	1.13	4	–	12–60	LS		775
	Trifluoroacetic acid	30	132.5	0.99	4	–	12–60	LS		775
Poly(butadiene-*co*-methacrylamide) (90/10, w/w, random)										
	Toluene	25	437	0.50	5	–	0.09–0.11	OS	A	590
Poly(butadiene-*co*-2-methyl-5-vinylpyridine)										
	Toluene	25	309	0.50	5	–	0.08–1.04	OS	A	590
Poly(butadiene-*co*-styrene), see also Poly(butadiene-*co*-styrene) in group 1.1 (84/16 mol/mol, random)										
	Benzene	25	39.4	0.70	4	–	2–51	OS	A	596
	Dibutyl phthalate	56	472	0.40	6	–	2–51	OS	A	596
	2-Pentanone	23.8 (θ)	167	0.50	5	–	7–51	OS	A	596
Poly(butyl itaconate-*co*-dibutyl itaconate), (40/60, mol/mol, random)										
	Acetone	25	575	0.32	6	–	9–70	LS	B	597
	Methanol	25	354	0.32	7	–	11–110	LS	B	597
	m-Xylene	25	1040	0.21	7	–	11–110	LS	B	597
Poly(butyl methacrylate-*alt*-styrene)										
	Butanone	25	5.3	0.76	10	–	32–320	LS	B	776
Poly(butyl methacrylate-*stat*-styrene) (1/1, mol/mol)										
	Butanone	25	4.9	0.77	10	–	15–208	LS	B	776
		35	5.98	0.75	8	–	22–56	LS	B	777
	Cyclohexane	35	7.88	0.70	6	–	34–50	LS	B	777
Poly(*tert*-butylphenyl methacrylate)-*stat*-vinylpyrrolidone)										
(33.7/66.3, mol/mol)	Benzene	25	118	0.53	5	–	33–96	OS	C	779
	Chloroform	25	105	0.57	5	–	33–96	OS	C	779
(60.4/39.6, mol/mol)	Benzene	25	130	0.55	4	–		OS	C	779
	Chloroform	25	247	0.51	4	–		OS	C	779
Poly(*p*-*tert*-butylstyrene)-*block*-poly(dimethyl-siloxane)-*block*-poly(*p*-*tert*-butylstyrene) 28 wt.% PBS										
	Methyl ethyl ketone	10	252	0.39	4	–	12–129	OS, GPC	C–D	957
		15	58.9	0.50	4	–	12–129	OS, GPC	C–D	957
		20	40.5	0.54	4	–	12–129	OS, GPC	C–D	957
		31	19.3	0.61	4	–	12–129	OS, GPC	C–D	957
		38	10.7	0.66	4	–	12–129	OS, GPC	C–D	957
	Benzene	35	15.4	0.66	4	–	9.3–128	OS, LS	B	960
	Methyl ethyl ketone	15 (θ)	58.9	0.50	4	–	9.3–128	OS, LS	B	960
		20	40.5	0.54	4	–	9.3–128	OS, LS	B	960
		31	19.3	0.61	4	–	9.3–128	OS, LS	B	960
Poly(*p*-chlorostyrene-*stat*-methylmethacrylate), (52/48, mol/mol)										
	Benzene	27	7.94	0.72	9	–	15–120	LS	C	598
	Benzene/hexane (60/40, v/v)	22.3 (θ)	64	0.50	8	–	15–120	LS	C	598
Poly(4-chlorostyrene)-*block*-poly(styrene)-*block*-poly(4-chlorostyrene), A_k–B_n–A_k										
2*k*/*n*, (33/67, mol/mol)	Carbon tetrachloride	40	6.24	0.76	–	5	14–61	OS	A	780
	Cumene	40	5.88	0.76	–	5	14–61	OS	A	780
2*k*/*n*, (50/50, mol/mol)	Carbon tetrachloride	40	6.63	0.74	–	10	19–74	OS	A	780
	Cumene	40	5.76	0.75	–	10	19–74	OS	A	780
Poly(diethyl fumarate-*co*-isobutene)										
50/50, mol/mol	Benzene/petrol ether	20	340	0.44	4	–	1–14	SD	C	599
Poly(diethyl fumarate-*co*-vinylcarbazole)										
	Benzene	25	14.6	0.67	6	–	2–13	LS	B	789

TABLE 1. *cont'd*

Polymer	Solvent	Temp. (°C)	K ($\times 10^3$) (ml/g)	a	No. of samples Fr.	No. of samples W.P.	Mol. wt. range ($\times 10^{-4}$)	Method(s)	Remarks	Refs.
Poly(*p*-diethylphosphonomethylstyrene-*co*-styrene), (1/4, mol/mol, random)										
	Benzene	20	1.95	0.90	5	–	15–50	SV	B	
	Tetrachloroethane	20	0.0836	1.18	11	–	9–51	SV	B	
Poly(dimethyl itaconate-*co*-styrene)										
(75/25, w/w)	Toluene	25	6.6	0.68	6	–	6–22	LS	A	683
(67/33, w/w)		25	9.0	0.67	6	–	4–19	LS	A	683
(59/41, w/w)		25	9.7	0.67	8	–	5–38	LS	A	683
(49/51, w/w)		25	11.7	0.67	7	–	6–24	LS	A	683
(29.5/70.5, w/w)		25	12.8	0.67	8	–	7–36	LS	A	683
(27/73, w/w)		25	10.9	0.69	8	–	6–40	LS	A	683
(0/100, w/w)		25	11.45	0.712	12	–	3–58	LS	A	683
Poly(dimethyl siloxane-*co*-diphenylsiloxane)										
(54/45, mol/mol)	Benzene	25	40.7	0.60	5	–	7–57	OS	A	596
	Dimethyl phthalate	82.5	512	0.31	5	–	11–57	OS	A	596
	Ethanol/toluene (37/63, w/w)	29.5 (θ)	78	0.50	5	–	7–35	OS	A	596
(66/34, mol/mol)	Benzene	25	15.6	0.68	4	–	3.7–100	LS	A	596
	Hexane	36 (θ)	141	0.44	4	–	3.7–100	LS	A	596
	Benzene/2-propanol (44/56, w/w)	42 (θ)	74	0.50	4	–	3.7–100	LS	A	596
Poly(divinylstyrene-*co*-styrene), see also Poly(styrene), branched, random type, in group 1.8.										
	Benzene	25	37.2	0.70	5	–	5–80	SD		602
	Octane	21	162	0.50	6	–	5–80	SD		602
Poly(ethyl acrylate-*stat*-methyl methacrylate), (80/20, mol/mol)										
	Acetone	25	62	0.57	10	–	65–800	LS	B	114
Poly(ethyl methacrylate-*alt*-styrene)										
	Butanone	25	9.3	0.72	9	–	19–470	LS	B	776
Poly(ethyl methacrylate-*stat*-styrene)										
(1/1, mol/mol)	Butanone	25	12.0	0.70	10	–	3–185	LS	B	776
Poly(ethylene-*co*-α-methyl-styrene), $[(ET)_m(MS)_n]_p$										
$m/n = 3/4$	Cyclohexane	30	92	0.56	5	–	0.7–6	SA	B	604
	Dioxane	30	76	0.58	5	–	0.7–6	SA	B	604
	Toluene	30	32	0.68	5	–	0.7–6	SA	B	604
	Butanone/cyclohexane (60/40, v/v)	30 (θ)	135	0.50	5	–	0.7–6	SA	B	604
$m/n = 5/4$	Cyclohexane	30	65	0.60	5	–	0.8–7	SA	B	604
	Dioxane	30	89	0.56	5	–	0.8–7	SA	B	604
	Toluene	30	37	0.66	5	–	0.8–7	SA	B	604
	Butanone/cyclohexane (75/25, v/v)	30 (θ)	140	0.50	5	–	0.8–7	SA	B	604
$m/n = 5/7$	Cyclohexane	30 (θ)	112	0.50	4	–	1.5–7	SA	B	604
	Dioxane	30	123	0.49	4	–	1.5–7	SA	B	604
	Toluene	30	56	0.58	4	–	1.5–7	SA	B	604
Poly(hexadecyl methacrylate-*co*-methyl methacrylate)										
(25/75, mol/mol, random)	Heptane	25	85.0	0.38	8	–	4–47	LS	A	605
	Propyl acetate	25	17.1	0.62	8	–	4–47	LS	A	605
(38/62, mol/mol, random)	Chloroform	25	36.3	0.57	8	–	16–195	LS	A	605
	Heptane	25	6.9	0.65	8	–	4–47	LS	A	605
	Propyl acetate	25	53.6	0.50	8	–	4–47	LS	A	605
(50/50, mol/mol, random)	Chloroform	25	53	0.54	8	–	10–154	LS	A	605
	Heptane	25	32.0	0.52	8	–	4–47	LS	A	605
	Propyl acetate	25	91.3	0.43	8	–	4–47	LS	A	605
Poly(1-hexene-*co*-sulfur dioxide), see Poly[sulfonyl(butylethylene) in group 3.10.										
Poly(isobutene-*co*-isoprene), see group 1.2.										
Poly(isoprene)-*block*-poly(styrene), see group 1.1.										
Poly(maleic acid-*alt*-styrene)										
DN[b] = 9.5	Aq. NaCl (0.02 M)	25	395	0.59	7	–	29–130	LV	B	842
0.50		25	37.3	0.67	7	–	29–130	LV	B	842
0.20		25	0.51	0.87	7	–	29–130	LV	B	842
0.10		25	0.01	0.98	7	–	29–130	LV	B	842
Poly(methacrylic acid-*co*-methyl)methacrylate) (7.4/92.6, w/w)										
	Acetone	20	3.4	0.74	9	–	26–105	LS		607

[b] DN–Degree of neutralization

TABLE 1. *cont'd*

Polymer	Solvent	Temp. (°C)	K ($\times 10^3$) (ml/g)	a	No. of samples Fr.	No. of samples W.P.	Mol. wt. range ($\times 10^{-4}$)	Method(s)	Remarks	Refs.
Poly(4-methoxystyrene-*stat*-styrene)										
(24.4/75.6, mol/mol)	Toluene	25	7.0	0.75	9	–	4–42	OS	B	781
(26.4/73.6, mol/mol)	Butanone	25,50	40	0.585	8	–	7–80	LV	B	782
	Toluene	25	18.6	0.68	8	–	7–80	LV	B	782
(46.2/53.8, mol/mol)	Toluene	25	7.3	0.755	13	–	3.5–70	OS	B	781
(53.0/47.0, mol/mol)	Butanone	25 (θ)	100	0.49	7	–	7–80	LV	B	782
	Toluene	25	37	0.615	7	–	7–80	LV	B	782
(74.0/26.0, mol/mol)	Toluene	25	8.2	0.755	9	–	5–35	OS	B	781
(75.6/34.4, mol/mol)	*tert*-Butylbenzene	25 (θ)	83	0.49	6	–	7–80	LV	B	782
	Toluene	25	16.9	0.673	7	–	7–80	LV	B	782
Poly(methyl acrylate-*stat*-methylmethacrylate)										
(17/83, w/w)	Butanone	25	11.7	0.70	4	–	56–208	LS	B	131
(29/71, w/w)		25	11.1	0.63	4	–	37–137	LS	B	131
(67/33, w/w)		25	36.6	0.60	4	–	71–187	LS	B	131
Poly(methyl acrylate-*co*-styrene)										
(22/78, mol/mol, random)	Benzene	30	8.93	0.744	16	–	2.6–80	LS	A	129
	Butanone	30	21.1	0.640	12	–	2.6–80	LS	A	129
	2-Methylcyclohexanol	43.5 (θ)	77	0.50	8	–	2.6–80	LS	A	129
(33/67, mol/mol, random)	Benzene	30	7.18	0.759	9	–	6.6–36	LS	A	129
	Butanone	30	11.4	0.696	4	–	6.6–36	LS	A	129
	2-Methylcyclohexanol	35.0 (θ)	76	0.50	7	–	6.6–36	LS	A	129
(47/53, mol/mol, random)	Butanone	30	10.7	0.724	9	–	6.7–24.4	OS	A	129
(50/50, mol/mol, random)	Ethyl acetate	35	41.6	0.57	9	–	18–116	LS	A	133
(59/41, mol/mol, random)	Benzene	30	6.15	0.780	6	–	7–40	LS	A	129
	Butanone	30	11.3	0.703	4	–	12–40	LS	A	129
	2-Methylcyclohexanol	36.6 (θ)	76	0.50	6	–	7–40	LS	A	129
(76/24, mol/mol, random)	Benzene	30	7.42	0.766	6	–	7.2–28	LS	A	129
	Butanone	30	9.16	0.728	5	–	8.9–28	LS	A	129
	2-Methylcyclohexanol	29.4 (θ)	75	0.50	5	–	6.5–24	LS	A	129
Poly(methyl methacrylate-*co*-*p*-isopropylstyrene), 2/3, mol/mol, *graft*										
	Butanone	25	0.021	1.11	–	6	31–65	LS		611
Poly(methyl methacrylate-*co*-2-methyl-5-vinylpyridine) (85/15, mol/mol, random)										
	Acetic acid	25	170	0.51	3	–	37–150	LV	B	612
Poly(methyl methacrylate-*co*-styrene)										
(10/90, mol/mol, random)	1-Chlorobutane	40.8	16.6	0.609	5	–	20–82	LS	B	613
(30/70, mol/mol, random)	1-Chlorobutane	30	17.6	0.67	9	–	5–55	LS	B	614
	Cyclohexanol	64.0 (θ)	71.6	0.51	4	–	5–55	LS	B	614
	Toluene	30	8.32	0.75	10	–	5–55	LS	B	614
(44/56, mol/mol, random)	1-Chlorobutane	30	24.9	0.63	10	–	5–81	LS	B	614
	Cyclohexanol	64.0 (θ)	70.0	0.51	4	–	10–81	LS	B	614
	Toluene	30	13.2	0.71	11	–	4.8–81	LS	B	614
(50/50, mol/mol, random)	Butanone	25	15.4	0.675	11	–	5–227	LS	B	615
(52/48, mol/mol, random)	1-Chlorobutane	40.8	49.0	0.575	5	–	18–115	LS	B	613
(71/29, mol/mol, random)	1-Chlorobutane	30	24.9	0.63	10	–	4.8–81	LS	B	614
	Cyclohexanol	68.0 (θ)	97.3	0.47	5	–	15–106	LS	B	614
	Toluene	30	11.4	0.70	8	–	7–106	LS	B	614
(94/6, mol/mol, random)	1-Chlorobutane	40.8	27.6	0.617	5	–	20–100	LS	B	613
nearly equimolar, three blocks (MSM)	Cyclohexanol	81.0 (θ)	$\lim_{M_w \to 0} [\eta]_\theta / M^{1/2} = 63$		–	7	3.4–147	LS	B	616
PS% 86.1–90.4, *graft* (S on M; $M_{PS} = 0.7–1.0 \times 10^4$)										
	Benzene	25	$[\eta] = 0.00918\, M_{PS}^{0.743}\, g^{0.77}$				83–121	LV		617
	Butanone	25	$[\eta] = 0.0390\, M_{PS}^{0.58}\, g^{0.59}$				53–285	LV		617
graft	Bromoform	–	56	0.6	6	–	180–320	LV		618
Poly(methyl methacrylate)-*block*-poly(styrene), A_k–B_n, k/n, (54/46, w/w)										
	Butanone	30	9.4	0.69	6	–	5.8–93	LS	A	783
	1-Chlorobutane	30	22.4	0.60	6	–	5.8–93	LS	A	783
	Toluene	30	7.3	0.73	6	–	5.8–93	LS	A	783
Poly(2-methyl-1-pentene-*co*-sulfur dioxide), see Poly[sulfonyl(1-methyl-1-propylethylene)], group 3.10.										
Poly(α-methylstyrene-*co*-styrene)										
	Benzene	20	14.4	0.69	5	–	18–80	SV	A	332
Poly(1-octadecane-*alt*-maleic acid)										
	Ethyl acetate	25	55	0.48	6	–	2.4–9.9	LS	–	956

TABLE 1. *cont'd*

Polymer	Solvent	Temp. (°C)	K ($\times 10^3$) (ml/g)	a	No. of samples Fr.	No. of samples W.P.	Mol. wt. range ($\times 10^{-4}$)	Method(s)	Remarks	Refs.
Poly(octyl methacrylate-*alt*-styrene)										
	Butanone	25	7.4	0.72	11	–	12–450	LS	B	776
Poly(octyl methacrylate-*stat*-styrene), (1/1, mol/mol)										
	Butanone	25	7.8	0.71	10	–	10–198	LS	B	776
Poly(styrene)-*block*-poly(butadiene)-*block*-poly(styrene) 50 wt.%-PS										
	Toluene	30	71.3	0.62	7	–	5.7–140	OS, LS	A–B	958
Poly(styrene)-*block*-poly(4-chloro-styrene)-*block*-poly(styrene), B_n–A_k–B_n										
$k/2n$, (33/67, mol/mol)	Carbon tetrachloride	40	6.10	0.77	–	4	20–82	OS	A	780
	Cumene	40	3.99	0.79	–	4	20–82	OS	A	780
$k/2n$, (50/50, mol/mol)	Butanone	30	8.14	0.72	–	8	31–89	OS	A	780
	Carbon tetrachloride	40	5.58	0.76	–	8	31–89	OS	A	780
	Cumene	40	6.84	0.74	–	8	31–89	OS	A	780
	Toluene	30	4.62	0.79	–	8	31–89	OS	A	780
$k/2n$, (66/34, mol/mol)	Carbon tetrachloride	40	5.94	0.74	–	4	15–54	OS	A	780
	Cumene	40	5.21	0.75	–	4	15–54	OS	A	780
Poly(styrene-*co*-sulfur dioxide), see Poly[sulfonyl(phenylethylene)], group 3.10.										
Poly(styrene)-*graft*-poly(methyl methacrylate), MMA content, 13 wt.%										
	Bromoform		(16.5)	(0.58)	5	–	17–196	SD	A	784
Poly(styrene)-*block*-poly(dimethylsiloxane) 12-62% PS										
	Methyl ethyl ketone	25	Various	Various	Various	–	Various	OS, GPC	B-C	955
Poly(styrene-*co*-monoethyl maleate)										
	Acetone	26.4 (θ)	51.1	0.50	9	–	20–180	LS	A	317
	Dioxane	25	11.2	0.702	9	–	20–180	LS	A	317
	Tetrahydrofuran	25	7.50	0.695	9	–	20–180	LS	A	317
–, sodium salt	Aq. NaCl									
	(0.005 M)	25	5.8	0.87	4	–	40–130	LS	A	317
	(0.01 M)	25	5.5	0.85	5	–	40–180	LS	A	317
	(0.03 M)	25	6.3	0.80	5	–	40–180	LS	A	317
	(0.05 M)	25	11	0.73	5	–	40–180	LS	A	317
	(0.075 M)	25	10	0.71	5	–	40–180	LS	A	317
	(0.15 M)	25	15	0.65	5	–	40–180	LS	A	317
	(0.3 M)	25	21	0.60	5	–	40–180	LS	A	317
	(0.6 M)	25	55	0.50	5	–	40–180	LS	A	317
Poly(styrene)-*block*-poly(2-vinylpyridine) 50 wt.%-PS										
	Benzene	10	35.2	0.605	4	–	6.5–153	LS, OS	A	944
	Methyl ethyl ketone	25	31.9	0.587	4	–	6.5–153	LS, OS	A	944
	Pyridine	25	9.02	0.734	4	–	6.5–153	LS, OS	A	944

TABLE 2. MAIN-CHAIN CARBOCYCLIC POLYMERS

Polymer	Solvent	Temp. (°C)	K ($\times 10^3$) (ml/g)	a	No. of samples Fr.	No. of samples WP	Mol. wt. range M ($\times 10^4$)	Method	Remarks	Refs.
Poly(acenaphthenylene)	Benzene	25	30.04	0.594	11	–	2–100	OS	B	262
		25	2.82	0.74	4	–	4–100	LS	A,B	263
	Ethylene chloride	25	20.0	0.54	6	–	6–125	LS	A,B	263
	Dioxane	25	11.5	0.61	7	–	6–145	LS	A,B	263
	Methylene chloride	25	6.92	0.66	5	–	6–145	LS	A,B	263
	Toluene	25	6.76	0.66	17	–	3–175	LS	A,B	263
Poly(4,7-dimethylindene)	Benzene	25	3.5	0.77	9	–	5.8–140	LS	C,D	811
Poly(6-methylindene)	Benzene	25	34	0.60	13	–	30–1320	LS	C,D	811

Polymer–Solvent Interaction Parameters

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A. INTRODUCTION

The classical thermodynamics of binary polymer–solvent systems was developed independently by P. J. Flory (1–3) and M. L. Huggins (4–6). It is based on the well-known lattice model qualitatively formulated by K. H. Meyer (7), who pointed out the effect of the differences in molecular size of polymer and solvent molecules on the entropy of mixing. The quantitative calculation of the entropy of mixing led to the introduction of a dimensionless quantity, the so-called Flory–Huggins interaction parameter χ, for the thermodynamic description of polymer solutions.

It was evident from the beginning that χ is a function of T; however, at first χ was considered to be independent of the concentration of the polymer. Subsequent experiments have shown the necessity of treating χ as a function of composition (8,9). Furthermore, χ also depends on M_2 (the molecular weight of the polymer), not only at high dilution, but – according to recent experiments (10) – even at high concentrations of polymers.

B. CONCENTRATION VARIABLES

Since the numerical value of the interaction parameter depends on the concentration variable chosen, one has to specify it in each case. The following three quantities are most frequently used, where the subscript 1 stands for the solvent and the subscript 2 for the polymer:

1. Volume fractions φ_i:

$$\varphi_2 = \frac{n_2 V_2}{n_1 V_1 + n_2 V_2} \tag{B1}$$

n_i moles of component i
V_i molar volume of component i

2. Weight fractions w_i:

$$w_2 = \frac{m_2}{m_1 + m_2} \tag{B2}$$

m_i weight of component i

3. Segment fractions s_i (hard core volume fractions):

$$s_2 = \frac{n_2 V_2^*}{n_1 V_1^* + n_2 V_2^*} \tag{B3}$$

V_i^* molar hard core volume (characteristic volumes) of components related to reduced volumes $\tilde{V}_i$ by $\tilde{V}_i = V_i/V_i^*$ (11).

C. CONVERSION OF CONCENTRATION VARIABLES

	φ_2	w_2	s_2
φ_2	–	$w_2 \frac{\rho}{\rho_2}$	$s_2 \frac{\tilde{V}_2}{\tilde{V}}$
w_2	$\varphi_2 \frac{\rho_2}{\rho}$	–	$s_2 \frac{\rho_2^*}{\rho^*}$
s_2	$\varphi_2 \frac{\tilde{V}}{\tilde{V}_2}$	$w_2 \frac{\rho^*}{\rho_2^*}$	–

ρ, ρ_i are the densities of the solution and of the pure component i, $1/\rho = w_1/\rho_1 + w_2/\rho_2$;
ρ^*, ρ_i^* are the hard core (characteristic) densities of the solution and of the component i, $\rho_i^* = M_i/V_i^*$ where M_i is the molar mass, $1/\rho^* = w_1/\rho_1^* + w_2/\rho_2^*$;
$\tilde{V}$, $\tilde{V}_i$ are the reduced volumes of the solution and of the component i.

D. BASIC EQUATIONS

The reduced molar Gibbs energy of mixing, $\Delta G_M/RT$, is given by the following equation:

$$\frac{\Delta G_M}{RT} = x_1 \ln \varphi_1 + x_2 \ln \varphi_2 + g x_1 \varphi_2 \tag{D1}$$

where x_i is the mole fraction of component i, R is the gas constant, T is the absolute temperature and g stands for the integral polymer–solvent interaction parameter; g refers to the interaction (mixing of the pure liquid compounds) of a solvent molecule with a polymer segment, the size of which is defined by the molar volume of the solvent. This definition implies some difficulties as soon as mixed solvents or solvents with more than one segment are considered.

Alternatively, the Gibbs energy of mixing can be normalized to the volume, so that it reads

$$\frac{\Delta G_M}{V} = \frac{RT}{V_1}\varphi_1 \ln \varphi_1 + \frac{RT}{V_2}\varphi_2 \ln \varphi_2 + B\varphi_1\varphi_2 \qquad \text{(D2)}$$

where B is an interaction energy–density parameter that no longer depends on the definition of a segment, and relates to g and molar volume of the segment V_{seg} by

$$B = RT\frac{g}{V_{seg}} \qquad \text{(D3)}$$

The sum

$$x_1 \ln \varphi_1 + x_2 \ln \varphi_2 = \frac{\Delta G_M^{comb}}{RT} \qquad \text{(D4)}$$

of Eq. (D1) is the combinatorial part of ΔG_M. The remaining term

$$g x_1 \varphi_2 = \frac{\Delta G_M^R}{RT} \qquad \text{(D5)}$$

is the so-called reduced residual Gibbs energy of mixing.

Partial differentiation of $\Delta G/RT$ with respect to n_1, the number of moles of solvent, or n_2, the number of moles of polymer, respectively, yields the reduced partial molar Gibbs energy of mixing of the solvent $\Delta G_1/RT = \Delta\mu_1/RT$, or the reduced partial molar Gibbs energy of mixing of the polymer, $\Delta G_2/RT = \Delta\mu_2/RT$:

$$\frac{\Delta G_1}{RT} = \frac{\Delta\mu_1}{RT} = \ln(1-\varphi_2) + \left(1 - \frac{1}{N}\right)\varphi_2 + \chi\varphi_2^2 \qquad \text{(D6)}$$

$$\frac{\Delta G_2}{RT} = \frac{\Delta\mu_2}{RT} = \ln(1-\varphi_1) + (1-N)\varphi_1 + \xi N \varphi_1^2 \qquad \text{(D7)}$$

$N = V_2/V_1$ (where $V_1 = V_{seg}$), the ratio of the molar volumes of the components is, in general, different from the degree of polymerization but proportional to it; χ and ξ are the Flory–Huggins interaction parameters in the differential equation for the solvent and for the polymer, respectively.

Separating ΔG_1 and ΔG_2 like ΔG_M (Eqs. D1–D5) into a combinatorial and a residual contribution yields the following expressions for the different interaction parameters, which demonstrates that they measure the deviation of a real polymer solution from purely combinatorial behavior:

$$g = \frac{\Delta G_M^R}{RTx_1\varphi_2} \qquad \text{(D8)}$$

$$\chi = \frac{\Delta G_1^R}{RT\varphi_2^2} \qquad \text{(D9)}$$

$$\xi = \frac{\Delta G_2^R}{RTN\varphi_1^2} \qquad \text{(D10)}$$

From phenomenological thermodynamics, one obtains the interrelations between these parameters, given in Eqs. (D11–D13):

$$g = \varphi_2\chi + (1-\varphi_2)\xi = \frac{1}{\varphi_1}\int_0^{\varphi_1} \chi d\varphi_1 \qquad \text{(D11)}$$

$$\chi = g + \varphi_1\frac{\partial g}{\partial \varphi_1} = g - (1-\varphi_2)\frac{\partial g}{\partial \varphi_2} \qquad \text{(D12)}$$

$$\xi = g + \varphi_2\frac{\partial g}{\partial \varphi_2} \qquad \text{(D13)}$$

Since it is the chemical potential of the solvent that is normally measured, χ is practically the only interaction parameter that can be directly obtained. In the following text, the term polymer–solvent interaction parameter (Flory–Huggins parameter) is, therefore, exclusively applied to χ.

E. METHODS OF DETERMINATION

Rearrangement of Eq. (D6) yields

$$\chi = \frac{\Delta G_1^R}{RT\varphi_2^2} = \frac{\Delta G_1}{RT\varphi_2^2} - \frac{1}{\varphi_2^2}\left(\ln(1-\varphi_2) + \left(1 - \frac{1}{N}\right)\varphi_2\right) \qquad \text{(E1)}$$

METHODS FOR THE DETERMINATION OF POLYMER–SOLVENT INTERACTION PARAMETERS

Typical range of concentration	Methods	Abbreviation in text	Refs.
$\varphi_2 \to 0$	Scattering methods	LS SAXS SANS	20 129
$0 < \varphi_2 < 0.3$	Osmosis	OS	21–25
	Light scattering	LS	
	Critical miscibility (only applicable with poor solvents)	CM	
	Differential vapor–pressure methods	ΔVP	26
$0.3 < \varphi_2 < 0.8$	Vapor–pressure methods	VP	3
$\varphi_2 \to 1$	Inverse gas chromatography (gas liquid chromatography)	IGC	27–30

Since $\Delta G_1 = RT \ln a_1$, the interaction parameter χ is accessible from the measured activity of the solvent. In order to get the information for the entire range of concentrations, a combination of several methods is necessary. The table given on the previous page shows the concentration ranges for the applicability of the most commonly used methods, the abbreviations used in the text to specify the method, and some pertinent references. Information stemming from the following sources is not incorporated in the tables: melting point depression of polymer (3,12,13), freezing point depression of solvents (8), swelling equilibria (3,14–17), and intrinsic viscosities (18,19).

F. TEMPERATURE DEPENDENCE

The temperature dependence of χ can be described for most systems exhibiting UCSTs by means of the following equation:

$$\chi(T) = a + \frac{b}{T} \tag{F1}$$

Knowing the temperature dependence of χ, it is possible to split this quantity in its enthalpic and entropic part (χ_H and χ_S).

$$\chi = \chi_H + \chi_S \tag{F2}$$

where

$$\chi_H = -T\left(\frac{\partial \chi}{\partial T}\right)_{p,\varphi_2} = \frac{\Delta H_1^R}{RT\varphi_2^2} \tag{F3}$$

$$\chi_S = \left(\frac{\partial (T\chi)}{\partial T}\right)_{p,\varphi_2} = \frac{\Delta S_1^R}{R\varphi_2^2} \tag{F4}$$

G. CONCENTRATION DEPENDENCE

The following expression for the Flory–Huggins parameter was deduced on the basis of the lattice theory (25):

$$\chi = \alpha + \frac{\beta(1-\gamma)}{(1-\gamma\varphi_2)^2} \tag{G1}$$

where α and γ are constants within a certain temperature range and β varies with T ($\beta = \beta_0 + \beta_1/T$).

For the integral interaction parameter, g, the equation reads:

$$g = \alpha + \frac{\beta}{(1-\gamma\varphi_2)} \tag{G2}$$

For an analytical representation of the experimentally found concentration dependence, the following power series with $n = 2$ is normally adequate:

$$\chi = \sum_{i=0}^{n} \chi_i \varphi_2^i \tag{G3}$$

$$g = \sum_{i=0}^{n} \frac{\chi_i}{i+1} \frac{1-\varphi_2^{i+1}}{1-\varphi_2} \tag{G4}$$

According to experimental information, three characteristic behaviors can be distinguished:

1. Very often, χ increases greatly with polymer concentration, particularly in the case of poor solvents. The systems benzene/polyisobutylene (PIB) (21,31,32), *n*-pentane/polyisobutylene (33,34), and cyclohexane/polystyrene (22) (Figs. 1 and 2) constitute examples.

Figure 1. Examples for the variation of the Flory–Huggins interaction parameter, χ (Eq. D14), with the volume fraction φ_2 of polymer for the systems benzene/poly(isobutylene) (PIB), *n*-pentane/PIB and cyclohexane/PIB at the indicated temperatures.

Figure 2. Examples for the variation of the Flory–Huggins interaction parameter, χ (Eq. D14), with the volume fraction φ_2 of polymer for the systems cyclohexane/polystyrene (PS), *n*-octane/poly(dimethyl siloxane) (PDMS) and toluene/PS at the indicated temperatures.

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COEFFICIENTS χ_0, χ_1, χ_2 (Eq. G3) OF SYSTEMS SELECTED FOR GRAPHICAL REPRESENTATION (Figs. 1 AND 2)

System	T/(°C)	χ_0	χ_1	χ_2	Refs.
Benzene/PIB	25	0.506	0.229	0.317	21,31,32
n-Pentane/PIB	25	0.484	0.184	0.080	33,34
Cyclohexane/PIB	25	0.440	−0.083	0.068	30,31,35
Cyclohexane/PS	34	0.507	0.149	0.464	22
n-Octane/PDMS	20	0.501	−0.035	0.042	36
Toluene/PS	25	0.431	−0.311	−0.036	37

2. In some cases, χ seems to be independent of composition, as proposed by the original Flory–Huggins theory. These findings mainly concern good solvents; examples are the systems cyclohexane/polyisobutylene (30,31,35) and *n*-octane/poly(dimethyl siloxane) (PDMS) (36) (Figs. 1 and 2).
3. In a few cases, mostly with highly exothermal systems, χ decreases with concentration, as with toluene/polystyrene (37) (Fig. 2).

The lines drawn in Figs. 1 and 2 have been calculated by means of Eq. (G3) and the coefficients χ_i, collected in the table given above.

H. MOLECULAR WEIGHT DEPENDENCE

Second osmotic virial coefficients, as obtained from osmotic pressure or light scattering measurements with dilute polymer solutions, depend markedly on M_2; since this quantity is closely related (cf. Eq. I1) to χ, its dependence on chain length in this concentration regime is obvious. Recent experiments (10) have shown that χ may depend on the molar mass of the polymer even for concentrated solutions. Furthermore, there is some evidence (given in Ref. 60, resulting from a common valuation of the data given in Refs. 83,58,33,30 and 90, and from a comparison of the results reported in Refs. 99 and 110) that even χ_∞, the χ parameter for an infinitely large excess of polymer, may depend on chain length. According to the few presently available experimental data, a reduction of χ upon an increase of M_2 according to some scaling law seems to be the normal case.

I. POLYMER–SOLVENT INTERACTION PARAMETERS, χ

Values of the polymer–solvent interaction parameters, defined by Eq. (E1) in terms of volume fractions, have been collected. They are tabulated as a function of polymer concentration for various temperatures. Data given on the basis of segment fractions, s_2, or weight fractions, w_2, were converted into volume fractions φ_2.

If needed, χ_0 can be calculated from the second osmotic virial coefficient A_2 (see corresponding chapter in this Handbook by means of the following equation:

$$\chi_0 = 0.5 - \rho_2^2 V_1 A_2 \qquad \text{(I1)}$$

Solvent	T (°C)	M_2 (kg/mol)	χ (0.0)	χ (0.2)	χ (0.4)	χ (0.6)	χ (0.8)	χ (1.0)	Method	Refs.
Cellulose acetate 2.5										
Acetone	30	104		0.30	0.51				VP	38
Dioxane	30	104		0.31	0.51				VP	38
Methyl acetate	30	104		0.43	0.59				VP	38
Pyridine	30	104		0.07	0.09				VP	38
Cellulose acetate 3.0										
Dichloromethane	25	157		0.38	0.45	0.49			VP	39
Trichloromethane	30	157		0.36	0.45	0.51			VP	39
Cellulose acetate *x*										
Dimethylformamide	50	36				0.67	0.55		VP	40
Dimethylformamide	70	36				0.39	0.31		VP	40
Cellulose nitrate 2.6										
Acetone	20	100		0.14	0.06	−0.37	−1.24		VP	41
Acetonitrile	20	100			0.59	0.42	0.12	−0.1	VP	41
Cyclopentanone	20	100		0.42	0.07	−0.71	−2.4		VP	41
Dioxane	20	100			1.2	−0.25	−1.7		VP	41
Ethyl acetate	20	130		0.04	−0.43	−1.35			VP	42
Ethyl formate	20	130		−0.08	−0.14	−0.42	−3.2		VP	42
Isopentyl acetate	20	130		−0.89	−1.8	−3.3			VP	42
Isopropyl ketone	20	100		0.62	−0.08	−1.7			VP	41
Methyl isopropyl ketone	20	100		−0.5	−0.52	−1.6			VP	41
Methyl *tert*-butyl ketone	20	100		0.16	−1.5	−2.8	−3.7		VP	41
Nitromethane	20	100		0.66	0.64	0.6	0.45		VP	41
n-Propyl acetate	20	130		−0.38	−0.83	−2.0	−4.1		VP	42

Solvent	T (°C)	M_2 (kg/mol)	χ (0.0)	χ (0.2)	χ (0.4)	χ (0.6)	χ (0.8)	χ (1.0)	Method	Refs.
Cellulose, hydroxypropyl										
Acetone	25	100				0.52	0.67		VP	43
Ethanol	25	100				0.35	0.44		VP	43
Tetrahydrofuran	25	100				0.55	0.51		VP	43
Water	25	100				0.74	1.02		VP	44
Poly(acrylonitrile)										
Dimethylformamide	70	30.6					1.28		VP	40
Poly(α-methyl styrene)										
Cumene	65	17		0.49	0.47	0.51	0.6		VP	45
α-Methylstyrene	65	17			0.46	0.47	0.47		VP	45
Toluene	25				0.51	0.6				46
	25	53		0.41					VP	47
Poly(arylate)										
Chlorobenzene	140–200	7						0.54–0.30	IGC	48
o-Dichlorobenzene	140–200	7						0.59–0.27	IGC	48
Diethylene glycol diethyl ether	140–200	7						0.08–0.56	IGC	48
n-Dodecane	140–200	7						1.34–1.24	IGC	48
Ethylbenzene	140–200	7						0.82–0.48	IGC	48
Tetralin	140–200	7						0.75–0.57	IGC	48
p-Xylene	140–200	7						0.84–0.39	IGC	48
Poly(butadiene)										
Acetone	40–100	13.1						1.64–1.32	IGC	49
Acetonitrile	40–100	13.1						2.86–2.36	IGC	49
Benzene	23.5	65.2				0.06	0.02		VP	50
	40–100	13.1						0.26–0.19	IGC	49
1-Butanol	40–100	13.1						2.76–1.64	IGC	49
Butyl acetate	40–100	13.1						0.52–0.45	IGC	49
Butyronitrile	40–100	13.1						1.90–1.57	IGC	49
1-Chlorobutane	40–100	13.1						0.33–0.25	IGC	49
1-Chloropentane	40–100	13.1						0.37–0.32	IGC	49
1-Chloropropane	40–100	13.1						0.36–0.30	IGC	49
Cyclohexane	23.5	65.2					0.26		VP	50
	40–100	13.1						0.22–0.15	IGC	49
Dibutylether	40–100	12.2						0.37–0.34	IGC	49
Dichloromethane	23.5	65.2				0.27	0.12		VP	50
Diethylether	40–100	13.1						0.43–0.40	IGC	49
Diethylketone	40–100	13.1						0.82–0.67	IGC	49
Dipropylether	40–100	13.1						0.51–2.26	IGC	49
Ethanol	40–100	13.1						3.41–2.30	IGC	49
Ethyl acetate	40–100	13.1						0.86–0.69	IGC	49
Ethylbenzene	80	200				0.31	0.37		VP	51
Ethylcyclohexane	40–100	13.1						0.09–0.04	IGC	49
n-Heptane	40–100	13.1						0.36–0.31	IGC	49
1-Heptene	40–100	13.1						0.25–0.23	IGC	49
n-Hexane	40–100	13.1						0.37–0.38	IGC	49
1-Hexene	40–100	13.1						0.32–0.28	IGC	49
Methanol	40–100	13.1						3.85–2.70	IGC	49
Methyl acetate	40–100	13.1						1.14–0.92	IGC	49
Methyl cyclohexane	40–100	13.1						0.17–0.13	IGC	49
Methyl ethyl ketone	40–100	13.1						1.19–0.97	IGC	49
Methyl isobutyl ketone	40–100	13.1						0.95–0.72	IGC	49
n-Octane	40–100	13.1						0.34–0.28	IGC	49
1-Octene	40–100	13.1						0.23–0.20	IGC	49
n-Pentane	40–100	13.1						0.44–0.36	IGC	49
1-Propanol	40–100	13.1						2.97–1.97	IGC	49
2-Propanol	40–100	13.1						2.94–1.86	IGC	49
Propionitrile	40–100	13.1						2.25–1.82	IGC	49
Propyl acetate	40–100	13.1						0.67–0.55	IGC	49
Tetrachloromethane	23.5	65.2				−0.04	−0.12		VP	50
Tetrachloromethane	40–100	13.1						0.10–0.15	IGC	49
Tetrahydrofuran	40–100	13.1						0.35–0.29	IGC	49

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Solvent	T (°C)	M_2 (kg/mol)	χ (0.0)	χ (0.2)	χ (0.4)	χ (0.6)	χ (0.8)	χ (1.0)	Method	Refs.
Toluene	40–100	13.1						0.14–0.12	IGC	49
Trichloromethane	23.5	65.2				−0.2	−0.34		VP	50
Trichloromethane	40–100	13.1						0.05–0.07	IGC	49
Poly(butene-1)										
n-Decane	115–135	10						0.30	IGC	52
n-Heptane	115–135	10						0.38	IGC	52
n-Nonane	115–135	10						0.32	IGC	52
n-Octane	115–135	10						0.36	IGC	52
Poly(decene)										
Toluene	30	213.9		0.49	0.44	0.39	0.35	0.32	VP	53
Poly(dimethyl siloxane)										
Acetone	100							1.33	IGC	54
Benzene	20	50			0.64	0.71	0.77	0.85	VP	36
	25	1.54			0.56	0.65	0.72	(0.76)	VP	55
	25	4.17				0.66	0.8		VP	55
	25	10				0.66	0.73	0.79	OS, VP	56
	25	15.7		0.56	0.63	0.76	0.82		VP	57
	25	50				0.66	0.73	0.79	VP, IGC	58
	25	50						0.81	IGC	59
	25–70	50						0.79–0.74	VP, IGC	58
	25–70	50						0.81–0.75	IGC	59
	30	6.65					0.71	0.74	VP	60
	30	15.65					0.71	0.75	VP	60
	30	26					0.72	0.74	VP	60
	30	89					0.45		VP	61
	30	89					0.74	0.77	VP	60
	40	1.54				0.85	0.81	(0.72)	VP	55
	40	4.17				0.75	0.73	(0.83)	VP	55
Cycloheptane	25–70	50						0.56–0.53	VP, IGC	58
Cyclohexane	20	50	0.41	0.44					OS	62
	25	10		0.46	0.48	0.50		0.47	OS, VP	56
	25	50				0.50		0.47	VP, IGC	58
	25–70	50						0.47–0.48	VP, IGC	58
	30				0.43	0.43	0.42	0.42	VP	63
	30	89					0.46	0.45	VP	64
Cyclooctane	25–70	50						0.66–0.61	VP, IGC	58
Cyclopentane	25–70	50						0.42–0.46	VP, IGC	58
n-Decane	20	30						0.64		65
Diisobutyl ketone	35	80		0.49					OS	66
1,4-Dioxane	25–70	50						1.32–1.18	VP, IGC	58
	100							1.06	IGC	54
Ethyl *n*-butyl ketone	35	80		0.52					OS	66
Ethylbenzene	23.5	50			0.54	0.63	0.7		VP	36
	25–70	50						0.77–0.73	VP, IGC	58
	25–70	50						0.83–0.78	IGC	59
n-Heptane	20	30						0.50		65
	20	50			0.45	0.45	0.46	0.48	VP	36
	25–70	50						0.48–0.50	VP,IGC	58
	25–70	50						0.50–0.49	IGC	59
	30	89					0.43	0.45	VP	64
Hexamethyl disiloxane	23.2	50			0.3	0.28	0.26	0.25	VP	36
	25	1.54			0.27	0.25	0.24		VP	55
	25	4.17			0.21	0.22	0.25		VP	55
	25	50						0.28	VP, IGC	58
	25–70	50						0.28–0.34	VP, IGC	58
n-Hexane	20		0.40	0.40				0.45	VP	40
	20	30						0.50		65
	25	89					0.41	0.43	VP	61
	25–70	50						0.46–0.47	VP, IGC	58
	25–70	50						0.45	IGC	59
	30	6.65					0.37	0.39	VP	67
	30	15.65					0.38	0.40	VP	67
	30	26					0.38	0.41	VP	67

Solvent	T (°C)	M_2 (kg/mol)	χ (0.0)	χ (0.2)	χ (0.4)	χ (0.6)	χ (0.8)	χ (1.0)	Method	Refs.
	30	89					0.41	0.43	VP	61
	30	89					0.38	0.40	VP	64
	30	89					0.40	0.41	VP	67
	35	89					0.41	0.42	VP	61
Mesitylene	25–70	50						0.95–0.86	VP, IGC	58
Methyl ethyl ketone	20	80		0.57					OS	66
	25	280	0.50						OS	68
	30	50			0.51	0.64	0.79		VP	69
	35	80		0.57					OS	66
	50	80		0.56					OS	66
Methyl isobutyl ketone	20	80		0.54					OS	66
2-Methylbutane	25	50						0.39	IGC	59
	100							1.10	IGC	54
2-Methylheptane	25–70	50						0.49–0.47	VP, IGC	58
	25–70	50						0.52–0.50	IGC	59
2-Methylhexane	25–70	50						0.45–0.46	VP, IGC	58
	25–70	50						0.46	IGC	59
3-Methylhexane	25–70	50						0.45–0.43	VP, IGC	58
2-Methylpentane	25–70	50						0.45–0.43	IGC	59
Octamethylcyclo-tetra siloxane	140	10.1			0.51	0.38	0.25		VP	70
Octamethyltrisiloxane	23.2	50			0.22	0.19	0.17	0.14	VP	36
n-Octane	20	30						0.53		65
	20	50			0.50	0.51	0.52	0.55	VP	36
	20	50		0.42	0.50	0.49	0.50	0.51	OS	62
	25	4.17			0.36	0.40	0.44		VP	55
	25	50						0.52	VP, IGC	58
	25–70	50						0.56–0.52	IGC	59
	35	50						0.54	IGC	59
	35	144		0.42					OS	71
	40	4.17				0.40	0.40	(0.44)	VP	55
n-Pentane	25–70	50						0.45–0.49	VP, IGC	58
	25–70	50						0.41–0.43	IGC	59
	20	30						0.48		65
	20	50			0.43	0.41	0.40	0.40	VP	36
	25	50						0.45	VP, IGC	58
	100							0.31	IGC	54
Tetrachloromethane	100							0.36	IGC	54
Toluene	20	50	0.45	0.50	0.59	0.64	0.72	0.82	VP	36
	25	1.54			0.53	0.58	0.65	(0.74)	VP	55
	25	4.17				0.59	0.65		VP	55
	25	50						0.75	VP, IGC	58
	25–70	50						0.75–0.71	VP, IGC	58
	25–70	50						0.80–0.75	IGC	59
	40	4.17				0.63	0.68	(0.69)	VP	55
	100							0.59	IGC	54
Trichloromethane	30	89					0.64	0.65	VP	72
	100							0.60	IGC	54
2,2,4-Trimethylpentane	20	30						0.43		65
	25	4.17			0.35	0.35	0.38		VP	55
	25–70	50						0.45–0.43	VP, IGC	58
p-Xylene	25	50				0.58	0.67	0.78	VP	36
	25	50						0.75	VP, IGC	58
	25–70	50						0.80–0.77	IGC	59
m-Xylene	25–70	50						0.82–0.76	VP, IGC	58
o-Xylene	25–70	50						0.86–0.80	VP, IGC	58
Poly(dodecene)										
Toluene	30	94.9			0.34	0.47	0.61	0.74	VP	53
Poly(ε-caprolactam)										
Tetrachloromethane	65	10.7			0.54	0.46	0.39		VP	73
Poly(epichlorohydrin)										
Acetone	100							0.28	IGC	54
Benzene	100							0.25	IGC	54

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Solvent	T (°C)	M_2 (kg/mol)	χ (0.0)	χ (0.2)	χ (0.4)	χ (0.6)	χ (0.8)	χ (1.0)	Method	Refs.
n-Butane	100							1.65	IGC	54
1-Butanol	100							1.12	IGC	54
Butyl acetate	100							0.36	IGC	54
Chlorobenzene	100							0.24	IGC	54
1-Chlorobutane	100							0.62	IGC	54
Chloromethane	100							0.36	IGC	54
1-Chloropentane	100							0.65	IGC	54
Cycloheptane	100							1.19	IGC	54
Cyclohexane	100							1.25	IGC	54
Cyclohexene	100							0.84	IGC	54
Cyclooctane	100							1.20	IGC	54
Cyclopentane	100							1.16	IGC	54
n-Decane	100							2.12	IGC	54
1,1-Dichloroethane	100							0.33	IGC	54
1,2-Dichloroethane	100							0.20	IGC	54
Dichloromethane	100							0.18	IGC	54
1,4-Dioxane	100							0.04	IGC	54
Ethanol	100							1.58	IGC	54
Ethyl acetate	100							0.35	IGC	54
Ethyl benzene	100							0.44	IGC	54
n-Heptane	100							1.79	IGC	54
n-Hexane	100							1.72	IGC	54
Methyl acetate	100							0.39	IGC	54
Methyl ethyl ketone	100							0.20	IGC	54
n-Nonane	100							1.99	IGC	54
n-Octane	100							1.89	IGC	54
n-Pentane	100							1.64	IGC	54
1-Pentanol	100							1.03	IGC	54
Propane	100							1.71	IGC	54
1-Propanol	100							1.22	IGC	54
Propyl acetate	100							0.33	IGC	54
Tetrachloromethane	100							0.69	IGC	54
Tetrahydrofuran	100							0.01	IGC	54
Toluene	100							0.31	IGC	54
1,1,1-Trichloroethane	100							0.46	IGC	54
Trichloroethylene	100							0.53	IGC	54
Trichloromethane	100							0.25	IGC	54
n-Undecane	100							2.24	IGC	54
Poly(ethyl methacrylate)										
Dichloromethane	23.5	144				−0.52	−0.66		VP	74
Tetrachloromethane	23.5	144.4				−0.01	−0.12		VP	74
Toluene	23.5	144				0.19	0.15		VP	74
Trichloromethane	23.5	144			−0.94	−1.05			VP	74
Poly(ethylene glycol)										
Ethylbenzene	70	2				0.87	0.83		VP	75
	70	3.272			0.38	0.42	0.45		VP	40
	70	4				0.85	0.82		VP	75
	70	6				0.71	0.69		VP	75
Poly(ethylene oxide)										
Benzene	50.3	6.1		0.18	0.14	0.1			VP	76
	70	100				0.23	0.22		VP	73
	70	6.1		0.19	0.14	0.12	0.09		VP	76
	100							0.13	IGC	54
Cyclohexane	100							1.23	IGC	54
n-Decane	100							2.10	IGC	54
Ethanol	100							0.70	IGC	54
n-Octane	100							1.85	IGC	54
Toluene	99.8	5.2			0.41	0.3			VP	40
	100							0.26	IGC	54
Trichloromethane	100							−0.55	IGC	54
Poly(ethylene)HD										
cis-Decalin	149	105						0.07	IGC	77

Solvent	T (°C)	M_2 (kg/mol)	χ (0.0)	χ (0.2)	χ (0.4)	χ (0.6)	χ (0.8)	χ (1.0)	Method	Refs.
trans-Decalin	149	105						0.05	IGC	77
n-Decane	145–190							0.18	IGC	28
	149	105						0.31	IGC	77
	185	105						0.12	IGC	78
2,4-Dimethyl hexane	149	105						0.38	IGC	77
3,4-Dimethyl hexane	149	105						0.31	IGC	77
n-Dodecane	149							0.28	IGC	77
Ethylbenzene	149	105						0.37	IGC	77
Mesitylene	149	105						0.28	IGC	77
2-Methylheptane	149	105						0.39	IGC	77
3-Methylhexane	149	105						0.40	IGC	77
n-Nonane	149	105						0.34	IGC	77
n-Octane	149	105						0.36	IGC	77
Tetralin	149	105						0.32	IGC	77
Toluene	149	105						0.39	IGC	77
2,2,4-Trimethyl hexane	149	105						0.35	IGC	77
2,2,4-Trimethyl pentane	149	105						0.40	IGC	77
m-Xylene	149	105						0.34	IGC	77
p-Xylene	149	105						0.32	IGC	77
Poly(ethylene)L D										
Benzene	125–135							0.43–0.36	IGC	79
1-Butanol	135							1.38	IGC	79
Chlorobenzene	135							0.34	IGC	79
Cyclohexane	125–135							0.18	IGC	79
Cyclohexanol	135							1.22	IGC	79
cis-Decalin	120–145	82						0.03		77
trans-Decalin	120–145	82						0.02–0.00		77
n-Decane	120–145	82						0.25–0.26		77
2,4-Dimethyl hexane	120–145	82						0.34–0.32		77
2,5-Dimethyl hexane	120–145	82						0.35		77
3,4-Dimethyl hexane	120–145	82						0.25		77
n-Dodecane	110–145							0.18		28
	120–145	82						0.23–0.24		77
Ethylbenzene	120–145	82						0.33		77
n-Heptane	108.9	0.45		0.29	0.31	0.34	0.2		VP	80
Mesitylene	120–145	82						0.24–0.25		77
3-Methyl heptane	120–145	82						0.31–0.30		77
3-Methyl hexane	120–145	82						0.33–0.34		77
n-Nonane	120–145	82						0.28		77
n-Octane	120–145	82						0.31–0.30		77
Phenol	135							1.5	IGC	79
Tetrachloromethane	135							0.24	IGC	79
Tetralin	120–145	82						0.29–0.28		77
Toluene	120–145	82						0.34		77
Trichloromethane	135							0.41	IGC	79
2,2,4-Trimethyl hexane	120–145	82						0.29–0.28		77
2,2,4-Trimethyl pentane	120–145	82						0.34		77
m-Xylene	120–145	82						0.29		77
p-Xylene	120–145	82						0.27–0.28		77
Poly(heptene)										
Toluene	30	224.1			0.48	0.45	0.43		VP	53
Poly(isobutylene)										
Benzene	10	40			0.67	0.78	0.92		VP	32
	25							0.91	IGC	30
	25	40		0.57	0.66	0.75	0.88	1.06	VP	32
	25	40						0.87	IGC	81
	25	40						0.86	IGC	83
	25	50				0.76	0.82		VP	82
	25	90	0.50	0.57					OS	21
	25–50	66						0.91–0.79	IGC	30
	25–65	40						0.86–0.61	IGC	83
	26.9					0.73	0.82	1.07	VP	84
	39.6	40				0.70	0.80		VP	32

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Solvent	T (°C)	M_2 (kg/mol)	χ (0.0)	χ (0.2)	χ (0.4)	χ (0.6)	χ (0.8)	χ (1.0)	Method	Refs.
	40	50				0.69	0.75		VP	82
	40	50				0.65	0.74	0.83	VP	85
	40–65	53						0.87–0.77		86
	60	50				0.52	0.60	0.69	VP	82
	65	50				0.73	0.74	0.75	VP	82
	65	100				0.73	0.74	0.74	VP	82
	80	50				0.4	0.49	0.58	VP	85
n-Butane	100							0.65	IGC	87
Chlorobenzene	100							0.70	IGC	87
Cyclohexane	25	26.1	0.403						OS	88
	25	40			0.42	0.42	0.41	0.43	VP	35
	25	40						0.56	IGC	81
	25	40						0.54	IGC	83
	25	50				0.33	0.37		VP	82
	25	50	0.44						OS	89
	25	66						0.43	IGC	30
	25–65	40						0.54–0.42	IGC	83
	25–50	66						0.43–0.40	IGC	30
	40–65	53						0.47–0.42		86
	40	50				0.30	0.38		VP	82
	40	50					0.45	0.52	VP	82
	60	50					0.41	0.48	VP	85
	65	50				0.33	0.38		VP	82
	100							0.39	IGC	87
2,2-Dimethylpropane	25–46	1000						0.82–0.87	VP	90
	35	1000					0.82		VP	90
Ethylbenzene	25	50				0.34	0.55		VP	82
	40	50				0.4	0.5		VP	82
n-Heptane	25	40						0.57	IGC	81
	25–65	40						0.57–0.47	IGC	83
n-Hexane	25	40						0.65	IGC	81
	25	50				0.4	0.4		VP	82
	25–65	40						0.63–0.50	IGC	83
Methyl ethyl ketone	100							1.55	IGC	87
2-Methylbutane	25–35	1000					0.65		VP	90
	35–46	1000						0.65–0.68	VP	90
n-Nonane	25	40						0.49	IGC	81
n-Octane	25	40						0.52	IGC	81
	25	40		0.44	0.48				OS	91
	25–65	40						0.52–0.43	IGC	83
n-Pentane	25	40			0.57	0.62	0.68	0.75	VP	34
	25	40						0.73	IGC	81
	25	40						0.72	IGC	83
	25	50						0.28	VP, IGC	58
	25	62	0.48	0.53	0.57	0.62	0.63	0.68	VP	33
	25	66						0.70	IGC	30
	25	1000	0.48	0.53	0.57	0.62	0.63	0.68	VP	90
	25–50	66						0.70–0.60	IGC	30
	25–65	40						0.72–0.57	IGC	83
	35	62			0.58	0.63	0.63		VP	33
	35	1000			0.62	0.62	0.62	0.62	VP	90
	40	62		0.53	0.57				VP	33
	45	62			0.56	0.62	0.63		VP	33
	55	62				0.63	0.63		VP	33
Tetrachloromethane	100							0.48	IGC	87
Toluene	100							0.60	IGC	87
Trichloromethane	100							0.78	IGC	87
Poly(isoprene)										
Acetone	25						1.27	1.8	VP	92
Benzene	10	100				0.42	0.43		VP	93
	25		0.40	0.41	0.41	0.41	0.41	0.41	OS, VP	94
	25							0.46	IGC	96
	25					0.43	0.43		VP	95
	25	100	0.39	0.40	0.41	0.41	0.42	0.43	VP	93

Solvent	T (°C)	M_2 (kg/mol)	χ (0.0)	χ (0.2)	χ (0.4)	χ (0.6)	χ (0.8)	χ (1.0)	Method	Refs.
	25–55							0.46–0.43	IGC	96
	40						0.41	0.44	IGC	96
	40	100					0.41	0.44	VP	93
Ethyl acetate	25					0.82	0.96	1.24	VP	97
	25				0.69	0.81	0.96	1.23	VP	92
	50				0.68	0.77	0.91		VP	97
	50				0.68	0.79	0.92		VP	92
Ethylbenzene	25–55							0.34–0.30	IGC	96
n-Heptane	25–55							0.51–0.49	IGC	96
n-Hexane	25–55							0.54–0.50	IGC	96
Methyl ethyl ketone	25					0.86	1.05	1.43	VP	92
	45					0.83	0.99	1.20	VP	92
2-Methylheptane	25–55							0.50–0.47	IGC	96
2-Methylhexane	25–55							0.52–0.50	IGC	96
2-Methylpentane	25–55							0.56–0.52	IGC	96
n-Octane	25–55							0.49–0.46	IGC	96
n-Pentane	25–55							0.61–0.53	IGC	96
Tetrachloromethane	23.5	100				0.20	0.10		VP	50
Toluene	25–55							0.36–0.32	IGC	96
	30	270			0.46	0.42	0.38		VP	98
Trichloromethane	23.5	100				0.25	0.16		VP	50
2,2,4-Trimethylpentane	25–55							0.49–0.46	IGC	96
p-Xylene	25–55							0.28–0.26	IGC	96
Poly(methyl acrylate)										
Acetone	100							0.4	IGC	54
Benzene	90–110	200						0.51–0.46	IGC	99
n-Butane	100							1.86	IGC	54
1-Butanol	100							0.79	IGC	54
n-Butylbenzene	90–110	200						1.15–1.05	IGC	99
tert-Butylbenzene	90–110	200						1.03–0.95	IGC	99
n-Butylcyclohexane	90–110	200						2.34–2.13	IGC	99
Cyclohexane	90–110	200						1.72–1.51	IGC	99
cis-Decalin	90–110	200						2.07–1.84	IGC	99
trans-Decalin	90–110	200						2.13–1.90	IGC	99
n-Decane	88–110	200						2.68–2.43	IGC	99
Dichloromethane	23.5	63.2				−0.22	−0.43		VP	74
1,4-Dioxane	100							0.20	IGC	54
n-Dodecane	90–110	200						3.00–2.75	IGC	99
Ethanol	100							1.01	IGC	54
Ethyl acetate	100							0.43	IGC	54
Ethylbenzene	90–110	200						0.83–0.75	IGC	99
n-Heptane	100							2.10	IGC	54
n-Hexane	100							2.08	IGC	54
Methyl ethyl ketone	100							0.40	IGC	54
Naphthalene	100–110	200						0.49–0.47	IGC	99
n-Nonane	100							2.4	IGC	54
n-Octane	90–110	200						2.38–2.19	IGC	99
n-Pentane	100							1.92	IGC	54
Propane	100							2.5	IGC	54
n-Tetradecane	90–110	200						3.36–3.06	IGC	99
Tetrahydrofuran	100							0.34	IGC	54
Tetralin	90–110	200						1.04–0.95	IGC	99
3,3,4,4-Tetramethylhexane	90–110	200						2.17–1.95	IGC	99
Toluene	90–110	200						0.67–0.62	IGC	99
Trichloromethane	23.5	63.2				−0.53	−0.58		VP	74
3,4,5-Trimethylheptane	90–110	200						2.44–2.20	IGC	99
2,2,5-Trimethylhexane	90–110	200						2.48–2.21	IGC	99
2,2,4-Trimethylpentane	90–110	200						2.35–2.07	IGC	99
Poly(methyl methacrylate)										
1,2-Dichloroethane	23.5	33.2			−0.63	−0.7	−0.74		VP	74
	50	5.5			0.25	0.17	0.32		VP	40
	50	8.43			0.14	0.21	0.33		VP	40

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Solvent	T (°C)	M_2 (kg/mol)	χ (0.0)	χ (0.2)	χ (0.4)	χ (0.6)	χ (0.8)	χ (1.0)	Method	Refs.
	70	5.5			0.06	0.21	0.33		VP	40
	70	8.43				0.31	0.28		VP	40
3,3-Dimethyl-2-butanone	50	3.15			0.59	0.45	0.34		VP	100
	50.2	8.56			0.55	0.55	0.6		VP	100
	69.3	3.15				0.63	0.46		VP	100
	70.3	8.56				0.57	0.74		VP	100
Mesitylene	130	8.43				0.85	0.99		VP	40
Tetrachloromethane	50	3.16			0.56	0.56			VP	100
	50.2	8.56				0.6	0.65		VP	100
	69.7	3.15				0.57	0.62		VP	100
	70.7	8.56				0.53	0.66		VP	100
Toluene	23.5	33.2					0.45		VP	74
	48.5	19.77			0.62	0.53	0.45		VP	101
	49.8	3.16				0.60	0.69		VP	100
	50	36.41				0.50	0.51		VP	40
	50	72				0.51	0.53		VP	40
	50.1	8.56				0.58	0.73		VP	100
	69.6	3.16			0.53	0.53	0.63		VP	100
	70	36.41				0.45	0.51		VP	40
	70	72				0.44	0.50		VP	100
	70.4	8.56				0.51	0.71		VP	100
	160	110						0.89	VP	102
p-Xylene	50	8.43			0.71	0.67	0.89		VP	100
	70	8.43				0.89	0.84		VP	100
	100	8.46				0.77	0.73		VP	100
	136.2	8.46				0.46	0.63		VP	100
Poly(*n*-butyl acrylate)										
Benzene	23.5	33				0.17	0.02		VP	74
Toluene	23.5	33			0.12	0.05			VP	74
Trichloromethane	23.5	33			−0.32	−0.39			VP	74
Poly(*n*-butyl methacrylate)										
Acetone	120	35						0.93	IGC	103
Acetonitrile	120	35						1.40	IGC	103
Benzene	50.5	36.8			0.21	0.14			VP	40
1,2-Dichloroethane	50.8	36.8			0.41	0.37			VP	40
Ethanol	40	8.9	0.509	0.57	0.68	0.86	1.09	1.38	VP	104
	60	8.9	0.484	0.55	0.66	0.8	0.99	1.19	VP	104
	80	8.9	0.477	0.53	0.63	0.76	0.89	1.01	VP	104
Ethyl acetate	120	35						0.67	IGC	103
n-Hexane	120	35						0.78	IGC	103
Mesitylene	100	36.8				0.41			VP	40
Methyl ethyl ketone	50.5	36.8				0.3	0.44		VP	40
	120	35						0.62	IGC	103
1-Propanol	120	35						1.01	IGC	103
2-Propanol	27	8.9	0.492	0.54	0.65	0.82	1.03	1.29	VP	104
	56	8.9	0.432	0.49	0.59	0.72	0.88	1.11	VP	104
	86	8.9	0.399	0.46	0.54	0.64	0.77	0.95	VP	104
Toluene	50.2	36.8			0.24	0.17			VP	40
Trichloromethane	50.5	36.8			0.01				VP	40
	120	35						0.10	IGC	103
m-Xylene	70.8	36.8				0.48	0.4		VP	40
o-Xylene	71.3	36.8				0.26	0.27		VP	40
Poly(*o*-chlorostyrene)										
Benzene	25	607			0.56	0.58	0.60	0.62	VP	105
	40	607				0.56	0.62	0.67	VP	105
Methyl ethyl ketone	40	607					0.83	1.02	VP	105
Poly(octadecene)										
Toluene	30	193.5		0.50	0.51	0.74			VP	53
Poly(*p*-bromostyrene)										
Toluene	20	10			0.64	0.65			VP	106

Solvent	T (°C)	M_2 (kg/mol)	χ (0.0)	χ (0.2)	χ (0.4)	χ (0.6)	χ (0.8)	χ (1.0)	Method	Refs.
Poly(*p*-chlorostyrene)										
Toluene	22	10		0.53	0.58	0.55			VP	106
Poly(*p*-methyl styrene)										
Toluene	20	10		0.41	0.4	0.35			VP	106
Poly(propylene glycol)										
Benzene	47.2	500		0.16	0.03	−0.03	−0.07		VP	107
	74.7	500		0.15	0.08	0.02	−0.02		VP	107
Methanol	25	3.35		0.45	0.48				VP	108
Poly(propylene)										
Acetone	100							1.72	IGC	87
Benzene	100							0.51	IGC	87
Cyclohexane	100							0.22	IGC	87
2,4-Dimethyl-3-pentanone	25	20		0.55	0.61	0.7	0.86	1.11	VP	109
	45	20		0.57	0.57	0.64	0.79	1.01	VP	109
n-Hexane	80							0.18		29
n-Octane	100							0.22	IGC	87
3-Pentanone	25	20			0.70	0.82	1.08	1.66	VP	109
	45	20			0.70	0.71	0.97	1.55	VP	109
Tetrachloromethane	100							0.29	IGC	87
Tetrahydrofuran	100							0.55	IGC	87
Toluene	100							0.43	IGC	87
Trichloromethane	100							0.61	IGC	87
Poly(styrene)										
Acetic acid	162–229	20						3.00–2.15	IGC	110
Acetone	25	15.7				0.81	0.94	1.1	VP	111
	50	15.7				0.80	0.92		VP	111
	150	17.5						0.65	IGC	112
	162–229	20						1.30–0.56	IGC	110
Acetonitrile	162–229	20						2.02–0.93	IGC	110
Aniline	162–229	20						1.11–0.68	IGC	110
Benzaldehyde	162–229	20						1.22–0.80	IGC	110
Benzene	20	20			0.57	0.39	0.21		VP	113
	20	500			0.49	0.46	0.44		VP	113
	23.5	600				0.30	0.19		VP	114
	25	90		0.42	0.37	0.32	0.26		VP	37
	30	19.2				0.41	0.3		VP	115
	30	103.8				0.54	0.35		VP	115
	40	218				0.26	0.28		VP	116
	50	19.2				0.45	0.26		VP	115
	50	103.8				0.53	0.21		VP	115
	60	218				0.25	0.31		VP	116
	70	19.2				0.32	0.27		VP	115
	70	103.8				0.40	0.35		VP	115
	80	218				0.14	0.23		VP	116
	120							0.33	IGC	78
	133–210	200						0.32–0.20	IGC	117
	162–229	20						0.66–0.13	IGC	110
	140–200	76						0.59–0.60	IGC	118
	150–200	97						0.38	IGC	30
	130–155	275						0.31–0.28	VP	102
	160–180	120						0.29–0.24	IGC	99
Benzyl alcohol	162–229	20						1.42–0.65	IGC	110
1-Butanol	162–229	20						1.47–0.82	IGC	110
2-Butanol	162–229	20						1.71–0.81	IGC	110
n-Butyl acetate	162–229	20						1.01–0.45	IGC	110
tert-Butyl acetate	10	11	0.50	0.54	0.64				CM, LS	120
	30	11	0.50	0.54	0.64				LS, CM	119
	50	11	0.49	0.53	0.63				CM, LS	120
	143–183	11						0.73–0.52	CM	120
n-Butylbenzene	183–203	120						0.38–0.35	IGC	99
n-Butylcyclohexane	160–180	120						0.77–0.71	IGC	99

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Solvent	T (°C)	M_2 (kg/mol)	χ (0.0)	χ (0.2)	χ (0.4)	χ (0.6)	χ (0.8)	χ (1.0)	Method	Refs.
Chlorobenzene	162–229	20						0.68–0.28	IGC	110
Cyclohexane	20	500				0.68	0.92		VP	113
	30			0.57					CM	25
	30	19.2				0.78	0.77		VP	115
	30	100				0.79	0.98		VP	121
	30	103.8				0.87	0.89		VP	115
	30	150		0.47	0.65	0.71			VP	122
	30	218				0.69	0.92	1.14	VP	123
	34	25.1	0.50	0.57	0.64	0.75	0.93		OS, VP	22
	35	51		0.56					LS	23
	35	233	0.50	0.56	0.64	0.75	0.91	(1.15)	HSGC	124
	40	100				0.75	0.92		VP	121
	40	218				0.76	0.92		VP	116
	44	25.1	0.49	0.57	0.63	0.72	0.93		OS, VP	22
	45	51		0.55					LS	23
	45	233	0.49	0.55	0.63	0.73	0.85	(1.02)	HSGC	124
	50	100				0.66	0.82		VP	121
	50	103.8				0.52	0.73		VP	115
	50	150		0.34	0.55	0.72			VP	122
	55	233	0.48	0.53	0.59	0.66	0.73	(0.82)	HSGC	124
	60	100				0.62	0.78		VP	121
	60	218				0.72	0.89		VP	116
	65	51		0.53					LS	23
	65	233	0.48	0.51	0.55	0.60	0.65	(0.70)	HSGC	124
	70	19.2				0.65	0.65		VP	115
	70	103.8				0.57	0.71		VP	115
	80	218				0.68	0.8	0.92	VP	116
	150	17.5						0.47	IGC	112
	140–200	76						1.05–0.85	IGC	118
	162–229	20						1.11–0.46	IGC	110
	160–180	120						0.62–0.53	IGC	99
Cyclohexanone	162–229	20						1.08–0.49	IGC	110
cis-Decalin	183–203	120						0.47–0.42	IGC	99
trans-Decalin	183–203	120						0.52–0.46	IGC	99
n-Decane	140–200	76						1.51–1.13	IGC	118
	183–203	120						1.01–0.94	IGC	99
Di(*n*-propyl)ether	20	500			0.71	0.81	0.91		VP	113
o-Dichlorobenzene	133–210	200						0.59–0.30	IGC	117
1,2-Dichloroethane	162–229	20						0.85–0.22	IGC	110
Dichloromethane	23.5	600				0.24	0.10		VP	114
	162–229	20						0.62–0.21	IGC	110
Diethyl ether	162–229	20						0.78–0.71	IGC	110
Diisopropyl ether	162–229	20						1.42–0.41	IGC	110
Dimethylformamide	140–200	76						1.29–1.16	IGC	118
1,4-Dioxane	20	200				0.35	0.35		VP	113
	20	500				0.44	0.44		VP	113
	50	10.3			0.67	0.61	0.78	1.10	VP	101
	133–171	200						0.52–0.39	IGC	117
	162–229	20						0.95–0.42	IGC	110
n-Dodecane	183–203	120						1.09–1.00	IGC	99
Ethanol	162–229	20						1.80–0.43	IGC	110
Ethyl acetate	150	17.5						0.46	IGC	112
	162–229	20						1.14–0.35	IGC	110
Ethylbenzene	30	230			0.40	0.40			VP	123
	50	19.2			0.88	0.66	0.43		VP	125
	50	103.8				0.75	0.91		VP	125
	70	19.2				0.74	0.65		VP	125
	70	103.8				0.71	0.83		VP	125
	130	275		0.23	0.28	0.33	0.39	0.43	VP	102
	140	275						0.46	VP	102
	150	17.5						0.27	IGC	112
	120–185							0.22–0.14	IGC	29
	133–210	200						0.40–0.23	IGC	117
	140–200	76						0.57–0.58	IGC	118
	160–180	275						0.32–0.25	VP	102
Ethylene glycol	162–229	20						3.77–2.23	IGC	110

Solvent	T (°C)	M_2 (kg/mol)	χ (0.0)	χ (0.2)	χ (0.4)	χ (0.6)	χ (0.8)	χ (1.0)	Method	Refs.
Formamide	162–229	20						4.11–3.16	IGC	110
n-Heptane	140–200	76						1.49–1.14	IGC	118
	162–229	20						1.33–0.25	IGC	110
n-Hexadecane	183–203	120						1.22–1.14	IGC	99
n-Hexane	162–229	20						1.35–0.03	IGC	110
Methanol	162–229	20						2.19–0.44	IGC	110
Methyl cyclohexane	72	110	0.49	0.58	0.67				OS	126
Methyl ethyl ketone	25	290			0.63	0.69	0.77		VP	127
	48.5	10.3			0.63	0.67	0.73		VP	101
	70	290				0.63	0.72		VP	127
	120–200	35						1.13–0.9	IGC	128
	133–171	200						0.80–0.67	IGC	117
	162–229	20						1.16–0.36	IGC	110
Naphthalene	183–203	120						0.13–0.11	IGC	99
Nitrobenzene	162–229	20						1.18–0.72	IGC	110
n-Nonane	130–175	53.7						1.00–0.97	VP	51
n-Octane	150	17.5						1.24	IGC	112
n-Octane	162–229	20						2.19–0.80	IGC	110
i-Octane	162–229	20						1.72–0.35	IGC	110
1-Octanol	162–229	20						1.14–0.55	IGC	110
n-Pentane	162–229	20						1.12–0.83	IGC	110
1-Pentanol	162–229	20						1.75–0.86	IGC	110
3-Pentanone	20	200			0.63	0.65	0.95		VP	113
	20	500				0.65	0.87		VP	113
1-Propanol	120–200	9						1.54/1.38/1.4	IGC	128
	162–229	20						1.71–0.27	IGC	110
2-Propanol	162–229	20						1.74–0.15	IGC	110
Propyl acetate	25	290			0.66	0.66	0.66		VP	111
	70	290			0.61	0.6	0.59		VP	111
Pyridine	162–229	20						1.02–0.23	IGC	110
Styrene	133–210	200						0.23/0.28/0.23	IGC	117
Tetrachloromethane	20	500				0.37	0.37		VP	113
	23.5	600					0.31		VP	114
	133–171	200						0.49–0.19	IGC	117
	162–229	20						0.90–0.26	IGC	110
n-Tetradecane	183–203	120						1.14–1.08	IGC	99
Tetrahydrofuran	162–229	20						0.70–0.16	IGC	110
Tetralin	183–203	120						0.20–0.11	IGC	99
3,3,4,4-Tetramethyl-hexane	160–180	120						0.90–0.76	IGC	99
Toluene	20	200				0.52	0.34		VP	113
	20	500				0.41	0.33		VP	113
	22	10		0.40	0.42	0.39			VP	106
	23.5	600				0.39	0.25		VP	114
	25	51		0.37					LS	23
	25	90		0.37	0.30	0.23	0.16		VP	37
	25	100	0.44	0.41	0.40				SAXS	129
	25	170	0.43						OS	130
	25	290			0.42	0.37	0.31		VP	127
	40	218				0.36	0.37		VP	116
	45	51		0.37					LS	23
	48.5	10.3		0.35	0.34	0.33	0.32		VP	101
	49.8	45				0.45	0.53		VP	40
	60	218				0.35	0.37		VP	116
	65	51		0.37					LS	23
	69.5	45				0.57	0.57		VP	40
	80	290			0.40	0.35			VP	127
	100	103.8				0.48	0.3		VP	131
	110	275		0.52	0.40	0.37	0.35		VP	102
	130	275					0.21	0.18	VP	102
	133–210	200						0.32–0.21	IGC	117
	162–229	20						0.67–0.04	IGC	110
	140–200	76						0.57–0.56	IGC	118
Trichloroethane	23.5	600				0.07	−0.1		VP	114
Trichloroethylene	162–229	20						0.69–0.12	IGC	110

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Solvent	T (°C)	M_2 (kg/mol)	χ (0.0)	χ (0.2)	χ (0.4)	χ (0.6)	χ (0.8)	χ (1.0)	Method	Refs.
Trichloromethane	25	290		0.52	0.32	0.23	0.17		VP	111
	50	290		0.45	0.34	0.23	0.14		VP	111
	120–200	9						1.4–1.48	IGC	128
	162–229	20						0.43–0.01	IGC	110
Water	162–229	20						4.40–3.10	IGC	110
m-Xylene	100	19.2				0.61	0.52		VP	40
o-Xylene	100	19.2				0.48	0.43		VP	40
	100	103.8				0.53	0.43		VP	40
	100	1538				0.52	0.39		VP	40
	133–210	200						0.38–0.25	IGC	117
	162–229	20						0.72–0.26	IGC	110
m-Xylene	130–175	53.7						0.39–0.35	VP	51
Poly(*tert*-butyl methacrylate)										
Benzene	50	12				0.39	0.36		VP	40
	69.5	12				0.31	0.36		VP	40
Ethylbenzene	69.5	12				0.62	0.69		VP	40
Mesitylene	100	12				0.70	0.71		VP	40
Methyl ethyl ketone	50	12				0.33	0.52		VP	40
	69.5	12				0.43	0.62		VP	40
3-Pentanone	50	12				0.63	0.58		VP	40
Tetrachloromethane	50	12				0.42	0.42		VP	40
Toluene	100	12				0.47	0.44		VP	40
	50	12				0.44	0.44		VP	40
	69.6	12				0.37	0.44		VP	40
Trichloromethane	50	12			0.25	0.03			VP	40
m-Xylene	69.5	12				0.67	0.62		VP	40
o-Xylene	69.5	12				0.55	0.63		VP	40
p-Xylene	69.5	12				0.42	0.57		VP	40
Poly(vinyl acetate)										
Acetone	25		0.454						SAXS	132
	30	8.6				0.38	0.48		VP	133
	30	109.1			0.31	0.38	0.55		VP	133
	30	170					0.33	0.31	VP	134
	30	1041				0.41	0.55		VP	133
	40	170					0.34	0.35	VP	134
Vinyl acetate	30	110			0.41	0.29	0.22		VP	135
Poly (vinyl methyl ether)										
Acetone	150	68.5						0.54	IGC	112
Cyclohexane	150	68.5						0.47	IGC	112
Ethyl acetate	150	68.5						0.21	IGC	112
Ethylbenzene	150	68.5						0.10	IGC	112
n-Octane	150	68.5						0.97	IGC	112
Poly (vinyl methyl ketone)										
n-Decane	83–163	500						3.91–3.54	IGC	136
n-Dodecane	113–173	500						3.89–3.16	IGC	136
n-Heptane	73–163	500						3.56–3.05	IGC	136
n-Nonane	73–163	500						3.48–3.20	IGC	136
n-Octane	73–163	500						3.55–3.11	IGC	136
n-Undecane	83–163	500						3.86–3.68	IGC	136

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Concentration Dependence of the Viscosity of Dilute Polymer Solutions: Huggins and Schulz–Blaschke Constants

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A. INTRODUCTION

The dependence of the viscosity of dilute polymer solutions on concentration can be described by a power series:

$$\eta = \eta_0(1 + a_1c + a_2c^2 + a_3c^3 + \cdots) \qquad \text{(A1)}$$

where η is the viscosity of the solution and η_0 is the viscosity of the solvent. This equation is usually presented in another form:

$$\eta = \eta_0(1 + [\eta]c + k_1[\eta]^2c^2 + k_2[\eta]^3c^3 + \cdots) \qquad \text{(A2)}$$

where $[\eta]$ is the limiting viscosity number and $k_i(k_1, k_2, \cdots)$ is a dimensionless constant. If terms with the third and higher powers of concentration are neglected, then Eq. (A2) becomes

$$\eta = \eta_0(1 + [\eta]c + k_1[\eta]^2c^2) \qquad \text{(A3)}$$

which, since $\eta/\eta_0 = \eta_{rel}$ (viscosity ratio) and $\eta_{rel} - 1 = \eta_{sp}$ (specific viscosity), can be put in the form

$$\eta_{sp} = [\eta]c + k_1[\eta]^2c^2 \qquad \text{(A4)}$$

which becomes the Huggins equation (1)

$$\eta_{sp}/c = [\eta](1 + k_h[\eta]c) \qquad \text{(A5)}$$

where k_h is the Huggins viscosity constant that is the most commonly used dilute solution viscosity number or index. It is easily determined from the slope of a plot of η_{sp}/c versus c.

The Huggins constant can be thought of as a measure of the "goodness" of the solvent for the polymer with values around 0.3 in good solvents and 0.5–1 in theta solvents. It should be noted that these generalizations break down with extremely dilute solutions (2) and with chain aggregation (3). In both cases, values tend to be higher. The Huggins constant is independent of molecular weight for many polymers, but is dependent on molecular weight for polymers that associate easily in solution (3).

The Huggins equation and Huggins constants can be used to determine values for the limiting viscosity number, $[\eta]$. For extrapolation procedures related to $[\eta]$ and k_h, see (Ref. 4). Applications of the Huggins equation to measure $[\eta]$ are given in Refs. (5,6). The latter gives an equation for $[\eta]$:

$$[\eta] = \frac{(1 + 4k_h\eta_{sp})^{1/2} - 1}{2k_hc} \qquad \text{(A6)}$$

which can be used for single point determinations, i.e., calculating $[\eta]$ from a single viscosity measurement at a known concentration. Computer programs relating solution viscosity and molecular parameters are found in Refs. (7,8).

Other semiempirical equations, such as those of Kraemer and Schulz and Blaschke, also are used for processing viscosity data. The Kraemer equation (Ref. 9) is

$$\ln \eta_{rel}/c = [\eta](1 - k_k[\eta]c) \qquad \text{(A7)}$$

where k_k is the Kraemer constant. Sometimes, the term $k_k [\eta] c$ is written as positive and the constants are listed as negative numbers. The result is the same. The Schulz–Blaschke equation (10) is

$$\eta_{sp}/c = [\eta](1 + k_{sb}\eta_{sp}) \quad \text{(A8)}$$

Although few Schulz–Blaschke constants have been published, some investigators contend that the Schulz–Blaschke equation is superior because it works with a wider range of concentrations and is not bound to a constant specific viscosity region (11). On the other hand, it is not recommended for single point determinations because of large errors (6). Huggins' and Kraemer's equations, used singly or in combined form, are better (6).

In addition to the polymer–solvent system, k_h and k_{sb} depend on concentration (whether semidilute, dilute, or extremely dilute), molecular weight, degree of branching, shear rate of measurement, and whether there can be preferential solvation (copolymers and mixed solvents). With polymers in good solvents, measured values for the Huggins constant are between 0.3 and 0.4. In some cases, they are even lower (2). With decreasing goodness of the solvent, the Huggins constant increases steadily, reaching 0.55 or more for theta conditions.

Regarding concentration, deGennes (12) has defined a critical concentration, c^*, above which solutions are semidilute and below which they are dilute. Most k_h and k_{sb} values have been measured in the dilute region. Dondos (2) has defined another critical concentration, c^{**}, below which the solution is called extremely dilute. Values for k_h measured below c^{**} tend to be higher than those measured between c^* and c^{**}. It is interesting that Peterson and Fixman (13) predicted higher values for Huggins constants except for those below c^{**}. It may be that the low values in the dilute region are due to polymer coil compression because of lack of sufficient volume (2).

The Huggins constant is not supposed to be dependent on the molecular weight of the polymer. In many cases, it is not (14–18), or the dependence is small (14,19,20), but other results show definite molecular weight dependence (3,21). It appears that the Huggins constant is related to molecular weight in polymers that associate in solution, either by the effect of strong ionic or polar interactions, or by the effect of hydrogen bonds (3).

There is a relationship between k_h and the coil expansion factor or coefficient of expansion, α, which is a measure of the extent of the expansion of the polymer coil in a particular solvent. In good solvents, the coil is more extended than in poor solvents and α is correspondingly larger. The Huggins constant seems to vary with α^3 (3,14,22,23). One expression for this is (Ref. 23)

$$k_h = a + b\alpha^3 + c \quad \text{(A9)}$$

Although there is no agreement in the literature as regards the influence of branching on viscosity constants, most results indicate that k_h and k_{sb} increase with higher degrees of branching (24–26). There is no agreement on the effect of shearing on viscosity constants either, the literature indicating both increases (27) and decreases (28) with increasing shear rate. Shearing that produced chain scission lowered the limiting viscosity number $[\eta]$ and raised k_h, and did so more at higher shear rates, although there was a tendency toward stabilization at the highest shear rates (29). The influence of shear rate is usually neglected below 1500 sec^{-1} (11).

Huggins constants also can be determined for dilute suspensions. The k_h value for such a suspension is sensitive to the degree and nature of the polydispersity of the specimen (30).

The following tables contain Huggins and Schulz–Blaschke constants taken from the literature, along with the relevant references. The values are listed by limiting viscosity number $[\eta]$, the units of which are ml/g. Values marked with an asterisk (*) are interpolated values from the literature (mostly mean values calculated by Stickler and Sutterlin (11)). For information on molecular weight and other factors, as well as conditions of measurement not given in the tables, the reader may refer to the original publications.

B. TABLES

TABLE 1. HUGGINS CONSTANTS

Polymer	Solvent	T (°C)	Remarks	$[\eta]$	k_h	Refs.
1.1. POLY(DIENES) AND POLY(ALKENES)						
Poly(1,3-butadiene), *cis*	Toluene	25				31
	Phenyloctane	25		451	0.46	32
		50		447	0.46	
	Dioctyl phthalate	16.5		147	0.95	
		21.5		162	0.77	
Poly(isoprene) *cis*	Toluene	25				31
Poly(isoprene) stars	Cyclohexane	25	Three-armed stars	35.4	0.33	33
			Four-armed stars	37.6	0.35	
			Three-armed stars	185	0.4	
			Four-armed stars	195	0.46	

TABLE 1. *cont'd*

Polymer	Solvent	T (°C)	Remarks	$[\eta]$	k_h	Refs.
	Toluene	34	Chlorosilane-linked stars	14–780	0.35–0.88	33
	1,4-Dioxane	34		14–164	0.63–9.2	
	Toluene	34	Divinylbenzene-linked stars	82–195	0.50–1.02	33
	1,4-Dioxane	34		30–70.5	0.71–1.19	
Natural rubber	Benzene	30		354	0.32	34
	n-Hexane	30		170	0.35	34
Natural rubber (epoxidized)	Tetrahydrofuran	25?	1% Epoxy	415	0.84	35
			9.5% Epoxy	218	0.43	
			18% Epoxy	30	4.27	
Gutta percha	Toluene	25				31
Poly(chloroprene)	Benzene	25		10	0.58*	36
				30–120	0.34 ± 0.06*	
				150	0.43	
				200	0.52*	
Poly(ethylene)	Tetralin	80				37
	p-Xylene	100	Low pressure	38	0.71	38,39
				97	0.45	
				327	0.69	
	Tetralin	80	Low pressure			40
	p-Xylene	81	Low pressure	35	0.38	38,39
				71	0.27	
				141	0.39	
				153	0.65	
	p-Xylene	81	High pressure	159	0.89	38,39
Poly(isobutene)	Benzene	105	High pressure			39,41
		20		24	0.54	14
				107	0.87	
		24		128	0.49*	42
		25		27	0.49	14
				100	0.59	
				183	0.7	
		30		30	0.49*	14
				100	0.57*	
				240	0.70*	
		40		30–320	0.42* ± 0.02	14
Poly(isobutene)	Carbon tetrachloride	30		14–42	0.36	43
	Chlorobenzene	25		155	0.36	14
	Cyclohexane	25		19	0.38 ± 0.02	44
				54	0.35 ± 0.04	
				384	0.30 ± 0.01	
	Cyclohexane	30		309	0.32	45
				484	0.19	
	Cyclohexane	30	Ref. also includes data for 10	29	0.41	46
			20, 40, 50 C	84	0.34	
				261	0.33	
				389	0.31	
	Dibutyl ether	25		165	0.33	14
	Diisobutylene	25	$M_v = (16–926) \times 10^3$		0.40 ± 0.05	47
	Heptane	25		185	0.3	14
	Isooctane	30	Ref. also includes data for 10,	22	0.57	46
			20, 40, 50 C; only small	56	0.43	
			variation in k across range	157	0.37	
				219	0.42	
		30	Ref. also includes data for	8.4	0.94	48
			20, 40 C; only small	16.7	0.58	
			variation in k across range	35.7	0.47	
	Tetrachloroethane	25		276	0.27	14
	Tetradecane	25		189	0.33	14
	Toluene	25		171	0.36	14
Poly(propylene)	Benzene	30	Atactic	30	0.43	49
				95	0.42	50
				150	0.42	49
	Carbon tetrachloride	50	Atactic	253	0.25	50
	Chlorobenzene	30	Atactic	165	0.33	50
	Chloroform	30	Atactic	196	0.31	50

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TABLE 1. *cont'd*

Polymer	Solvent	T (°C)	Remarks	$[\eta]$	k_h	Refs.
	α-Chloronaphthalene	139	Atactic			51
	Cyclohexane	30	Atactic	45–330	0.27 ± 0.02	49
				276	0.24	50
		60–70	Isotactic		0.36	52
	Decalin	30	Atactic	277	0.25	50
		135	Isotactic			51
	2-Ethyl hexyl acetate	30	Atactic	120	0.38	50
	n-Heptane	30	Atactic	205	0.34	50
	Isoamyl acetate	34	Atactic	26	0.45	49
				65	0.65	
				98	0.83	
	Isopropyl ether	30	Atactic	156	0.36	50
	Tetrahydrofuran	30	Atactic	176	0.32	50
	Tetralin	30	Atactic	155	0.36	50
		130	Atactic			51
	Toluene	30	Atactic	30–120	0.36* ± 0.02	49
				190–220	0.40* ± 0.03	
				180	0.35	51
	p-Xylene	125	Atactic			51
1.2. POLY(ACRYLIC ACID) AND POLY(METHACRYLIC ACID) DERIVATIVES						
Poly(acrylic acid)	Water (0.1 M NaCl)	25				53
	Water (0.25 M NaCl)	25	Degree of neutr. = 0	20	0.35	54
			Degree of neutr. = 0.3	150	0.25	
			Degree of neutr. = 0.76; data also for 5, 15, 35, 45 C	240	0.25	
Poly(acrylonitrile)	Dimethyl formamide	25				55
		30		70–190	0.3	56,57
				157	0.4	55,58
				106	0.28	59
				134–296	0.31	
				170–245	0.31*	60
				309–342	0.34 ± 0.1	59
				239–711	0.33	56
				117	0.35	61
		40, 50, 60, 70				60
		60				62
Poly(ethyl acrylate)	Acetone	30		46–177	0.35	63,64
		30	Telomers			65
Poly(decyl methacrylate)	Isooctane	25	Ref. also includes data for 50, 75, 100 C	34	0.55	66
				36	0.45	
				38	0.35	
				40	0.25	
Poly(ethyl methacrylate)	Benzene	35		145	0.29	67
		52		148	0.29	
		60		145	0.36	
	n-Butanol	45		47	0.7	67
		52		55	0.54	
		60		64	0.45	
		70		72	0.4	
	n-Butyl bromide	42		160	0.24	67
		50		149	0.4	
		58		159	0.3	
		65		166	0.25	
	n-Butyl chloride	40		142	0.32	67
		47		144	0.3	
		61		147	0.26	
	Methyl acetate	20–53	Conformational changes occurred in this range	16–50	~0.5 to ~ −0.3	68
	Ethyl acetate	35		133	0.31	67
				120–970	0.25–0.27	69
		45		134	0.28	67
		55				
		65				

TABLE 1. *cont'd*

Polymer	Solvent	T (°C)	Remarks	[η]	k_h	Refs.
		20–65	Conformational changes occurred in this range	12–48	~0.45 to ~−0.1	68
	Isobutyl acetate	20–65	Conformational changes occurred in this range	13–45	~0.5 to ~−0.15	68
	Isoamyl acetate	50		145	0.39	67
		70		152	0.37	
		80		156	0.32	
	Isopropanol	37		88	1.06	67
		44		129	0.27	
		51		151	0.39	
		60		183	0.43	
	Methyl ethyl ketone	23–45		157–158	0.34–0.35	67
	Methyl *n*-propyl ketone	40		196	0.2	67
		50–70		183–189	0.33 ± 0.01	
	m-Xylene	47		131	0.39	67
		54		134	0.33	
		61		137	0.33	
		70		139	0.29	
Poly(methacrylic acid)	Water (0.1 M NaCl)	25				53
	Water (0.25 M NaCl)	25	Degree of neutr. = 0	30	2.33	54
			Degree of neutr. = 0.1	35	0.65	
			Degree of neutr. = 0.3	240	0.33	
			Degree of neutr. = 0.81; also data for 5, 15, 35, 45 C	575	0.3	
Poly(methacrylonitrile)	Dimethyl formamide	29	Anionic	26	0.4	70
				60–143	0.34* ± 0.03	
Poly(methyl acrylate)	Acetone	30		95–298	0.38	71
				333	0.37	72
		40		314	0.38	72
	Benzene	25		52–343	0.37	71
		30		383	0.31	72
		35		50–335	0.38	71
		40		382	0.38	72
		45, 55		48–330	0.38	71
	Carbon tetrachloride/ methanol	35	Vol. fraction of methanol: 0.33 ([η] maximum, k minimum)	25–214	2.94 ± 0.06	73
	Chlorobenzene	25		53–305	0.4	71
	Chloroform	30		220	0.41	74
		35		215	0.39	
		40		222	0.36	
	Ethyl acetate	30, 35, 40		115–120	0.50 ± 0.01	74
	Methyl ethyl ketone	25		45	0.65	75
				85	0.56	
				116	0.39	
		30		108	0.45	73
				302	0.43	72
		35, 40		104	0.44	73
	Toluene	25		34–147	0.59	71
		30		61	0.59	73
				201	0.33	72
		35		34–160	0.52	71
		40		69		73
		45		35–169		71
		55		35–175		71
Poly(methyl methacrylate)	Acetone	25				76
		25?			0.35	82
	Benzene	20		85	0.25	77
		25		4	1.65*	78
				9.5	0.69*	
				14	0.5	
				22	0.35	
				26–40	0.30*	
				68–331	0.25 ± 0.01	
				667	0.18	

TABLE 1. *cont'd*

Polymer	Solvent	T (°C)	Remarks	$[\eta]$	k_h	Refs.
			90% Isotactic	41	0.39	14
				49–61	0.33	
				73–125	0.3* ± 0.03	
	Butyl acetate	25		7	0.9	78
				29	0.67	
				64	0.58	
				110	0.47	
			90% Isotactic	22	0.67	14
				39	0.61	
				52	0.57	
	n-Butyl bromide	35		47	0.5	67
		50		63	0.41	
		58		70	0.35	
	Chloroform	25		19	0.32	
				146	0.25	
				223–275	0.38	79
				390	0.22*	
		30, 60		870	0.18	80
	Cyclohexanone	40, 60		138, 152	0.44	67
		50		146	0.45	
		70		136	0.4	
	Dimethyl formamide	25		56	0.48	14
					0.38	82
	Ethyl acetate	25		53	0.41	14
	Isoamyl acetate	50		36	0.71	67
		65		44	0.63	
		80		47	0.5	
	Methyl ethyl ketone	25		7	0.9	78
				27	0.49	
				56	0.4	14
				137	0.33	78
				151	0.4	75
				172	0.49	
		30, 60				80
	Di-*n*-propyl ketone	33.8	Star-branched polymer	11.4	1.66*	81
				17	1.48	
		35–50				78
	Tetrachloroethane	25		101	0.29	14
	Tetrahydrofuran	30	Star-branched polymer	24	0.161*	81
	Toluene	25		40	0.49*	78
				9	0.63	
				24	0.46	
				55	0.41	14
				83	0.33	78
				229	0.25	
				414	0.23	
		30		37	0.43 ± 0.04	44,80
				80	0.41 ± 0.03	
		60				80
	o-Xylene	40		68	0.34	67
		50		72	0.21	
		60		76	0.32	
		70		81	0.27	
	m-Xylene	40		55	0.48	67
		50		62	0.67	
		60		71	0.55	
		70		80	0.35	
	p-Xylene	40		42	1.31	67
		50		48	1.26	
		60		59	0.93	
		70		64	0.47	
Poly(hexyl methacrylate)	*n*-Heptane	30		31	0.5	83
Poly(heptyl methacrylate)	*n*-Heptane	30		45	0.44	83
Poly(octyl methacrylate)	*n*-Heptane	30		64	0.45	83
Poly(tetradecyl methacrylate)	*n*-Heptane	30		58	0.32	83

TABLE 1. *cont'd*

Polymer	Solvent	T (°C)	Remarks	$[\eta]$	k_h	Refs.
Poly(cyclobutyl methyl methacrylate)	1-Butanol	40		13	1.49	84
				20	1.16	
				36	1.33	
	Tetrahydrofuran	30		22	0.36	84
				57	0.31	
				142	0.3	
Poly(cyclohexyl methyl methacrylate)	1-Butanol	45		10	0.74	84
				17	0.81	
				41	0.62	
	Cyclohexane	30		17	0.18	84
				54	0.43	
				91	0.31	
	Tetrahydrofuran	30		16	0.52	84
				35	0.35	
				105	0.36	
Poly(cyclooctyl methacrylate)	1-Hexanol	38		10	0.94	84
				16	1.46	
				23	1.77	
	Cyclohexane	30		17	0.26	84
				38	0.39	
	Tetrahydrofuran	30		25	0.4	84
				76	0.37	
Poly(cycloundecyl methacrylate)						
	Cyclohexane	30		9	0.69	84
				18	0.49	
				36	0.38	
	Tetrahydrofuran	30		9	0.7	84
				17	0.55	
				36	0.37	
Poly(diphenyl methyl methacrylate)	Toluene	25		19	0.4	85
				95	0.34	
				230	0.35	
	3-Heptanone	45		13	0.76	85
				39	0.73	
				73	0.61	
Poly(2,6-diisopropyl phenyl methacrylate)	Tetrahydrofuran	25		22.6–98.0	0.42	224
	Toluene	25		34.0–88.4	0.41	
	Tetrahydrofuran/water (90.9/9.1, v/v)	25	Theta solvent	33.9–54.1	0.61	
Poly(2,3-epoxypropyl methacrylate)	Tetrahydrofuran	25		11.6	0.79	86
				24.7	0.47	
				28.2	0.52	
	1,4-Dioxane	25		13.5	0.32	86
				16.5	0.55	
				18.5	0.45	
				23	0.41	
				62.7	0.37	
Poly(pentachlorophenyl methacrylate)	Benzene	40		13–42	1.25	87
	Toluene	25		22–87	0.48	
	Ethyl benzene	25		14–23	1.17	
	o-Xylene	25		29–155	0.42	
	Chlorobenzene	25		29–148	0.43	
	o-Dichlorobenzene	25		33–178	0.36	
Poly(2-biphenyl methacrylate)	Chloroform	25		11–111	0.34	88
	Tetrahydrofuran	25		11.0–99	0.33	
	Benzene	25		11.0–98	0.35	
	1,4-Dioxane	25		10.0–91	0.35	
Poly(4-biphenyl methacrylate)	Chloroform	25		11–133	0.29	89
	Tetrahydrofuran	25		11–111	0.3	
	Benzene	25		9.0–64	0.4	
	1,4-Dioxane	25		10.0–87	0.33	

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TABLE 1. *cont'd*

Polymer	Solvent	T (°C)	Remarks	$[\eta]$	k_h	Refs.
Poly(di-isobornyl methacrylate)	Tetrahydrofuran	30		25.3–104	0.23 ± 0.01	90
	1-Octanol	39.6		13.1	1.29	
				23	1.13	
Poly(acrylamide)	Water	25		1300–1700	0.35 av.	6
				274	0.16	91
				1353	0.5	
	Water (1 M NaCl)	25		1200–1900	0.33 av.	6
	Water (pH 7)	30		21	0.46	92
1.3. VINYL POLYMERS						
Poly(4-isopropyl styrene)	Toluene	25		44–139	0.34 ± 0.04	93
Poly(4-isopropyl α-methyl styrene)	Toluene	21.5		16.5	0.52	94
				25.5	0.3	
				44	0.42	
				60	0.33	
Poly(styrene)	Benzene	25		105	0.37	95
		25	Atactic	73.5	0.36	96
		25	Atactic	1.7	0.79	109
				5.5	0.71	
				10.2	0.54	
	Benzene/isopropanol	25	Theta temperature, atactic	40.4	0.54	
	Butyl acetate	25		43	0.38	14
				126	0.35	
				150	0.33	
	4-*tert*-Butyltoluene	50	Atactic	7, 13.7	0.57	97
				82.9, 132	0.38	
				187, 432	0.36	
	Carbon tetrachloride	25				98
		30	Ref. also includes data for 10, 20, 40, 50 C	14.5	0.55	46
				43	0.41	
				180	0.33	
				386	0.29	
	Chloroform	30, 60				81
	Cyclohexane	30	Ref. also includes data for 15, 20, 25, 32, 40, 50 C	10.7–60.7	0.84 ± 0.03	46
		34.5 = Θ		10.8–114	0.77 ± 0.06	
		31, 95	Trifunctional star molecule	42	0.6	95
		34		16	0.5	99
				48	0.52	
		34.5	$c > c^{**}$		0.48	2
			$c < c^{**}$		0.78	
		34.5		178	0.61	100
		34.5	$k = 0.5$ for MW > 2.1×10^5; $k > 0.5$ for MW < 2.1×10^5			101
		34.5		1.5	1.3	109
				2.5	0.91	
				3.7	0.96	
				5.4	0.93	
				6.6	0.81	
				9	0.67	
		34	Branched	29–31	0.86* ± 0.02	102
		34.3, 34.8	Trifunctional star molecule	43, 44	0.59	95
		34.5	Atactic	97	0.59	97
		35				103
		36		152	0.51	14
		40		174	0.49	14
		40, 22	Trifunctional star	47	0.53	95
		45	$c < c^{**}$		1.28	2
		50		55	0.50 ± 0.005	99
	cis-Decaline	20		20	0.41* ± 0.02	14
				60	0.43* ± 0.02	
				120	0.45* ± 0.02	
	trans-Decaline	20		38	0.6	14
				80	0.71	

TABLE 1. *cont'd*

Polymer	Solvent	T (°C)	Remarks	$[\eta]$	k_h	Refs.
		25		50	0.49* ± 0.01	14
				130	0.51* ± 0.02	
		30		47	0.4	14
				117	0.42	
	Diethyl malonate	34	Theta temperature	45	0.47	14
				82	0.5	
		40		45	0.5	14
				83	0.47	
	Dimethyl formamide	25		19	0.5	14
				36	0.44	
				76–172	0.39	
		30				57
		35		12.2	0.48	104
				77.2	0.4	
				188	0.41	
		95		20–700	0.48	105
	Dioctyl phthalate	25		49	0.59	14
				89	0.58	
		35		51	0.57	14
				86	0.5	
		45		45	0.56	14
				54–87	0.5	
	1,4-Dioxane	25	$c < c^{**}$		0.81	2
			$c > c^{**}$		0.35	
	Ethyl benzene	25	Ref. also includes data for 10, 40, 55, 65 C	13.4	0.503	46
				26.1	0.423	
				41.7	0.365	
				384	0.291	
	Methyl ethyl ketone	25				98
		30				57,81
		40				64
		40.3		44–151	0.54 ± 0.09	106
		60				81
	1-Methyl naphthalene	25				107
	Toluene	15	Atactic	292	0.34	97
		21		40–125	0.35 ± 0.03	99
				360	0.30 ± 0.05	
				460	0.25 ± 0.08	
		25				98,107
		25	Anionic	8	0.51	39,108
				14	0.44	
				36–272	0.34 ± 0.03	
		25	Thermal	41–123	0.34 ± 0.02	39,108
			Branched	56	0.41	102
				71	0.38	
			Linear	63–84	0.31	102
		30		14	0.46 ± 0.02	39,81,83
				73–234	0.38 ± 0.015	106
				28	0.41 ± 0.02	83
				98	0.39	95
				203	0.34 ± 0.01	83
		30		12.6	0.56	104
				28.1	0.43	
				64	0.38	
				362	0.32	
		60				81
	Toluene/methanol (77/23)	25	Theta temperature	28–80	0.51–0.52	23
Poly(vinyl acetate)	Acetone	18		68	0.33	110
		25		30	0.46	39,64,110
				42–66	0.35*	
				91	0.37	
				134	0.41	
		25		3.7	1.54	111,112
				6.6	1.13	
				8.4	0.79	

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TABLE 1. *cont'd*

Polymer	Solvent	T (°C)	Remarks	$[\eta]$	k_h	Refs.
				11.6, 12.9	0.53	
				20.8	0.38	
				27.1	0.34	
		30		70	0.35* ± 0.02	113
				250	0.37* ± 0.02	
				450	0.39 ± 0.02	
		32, 39, 46		65, 64, 63	0.41, 0.42, 0.44	110
	Benzene	30		126	0.17	28
				50–450	0.37 ± 0.03	113
				147	0.25	28
				197	0.3	
				262	0.45	
				281	0.65	
		30	Zero shear plot	124–381	0.34	
			Emulsion polymer	77	1.42	113
				133	1.21	
				229	1.05	
		35	Branched	45	0.28	115
				72–200	0.35* ± 0.02	
				300	0.37* ± 0.02	
				500	0.39* ± 0.02	
				700	0.42* ± 0.02	
		35	Linear	137–177	0.33* ± 0.01	115
				196–250	0.34* ± 0.01	
				281–570	0.35* ± 0.01	
		40		204	0.25	28
				243	0.28	
				268	0.36	
				354	0.44	
			Zero shear plot	197–413	0.42	
	Chlorobenzene	18		71	0.44	110
		25		37–45	0.35* ± 0.03	39,110
				66–69	0.44* ± 0.01	
				99–121	0.35* ± 0.04	
		32, 39, 46		68, 67, 65	0.43, 0.44, 0.4	110
	2-Chloroethylene	25				64
	Chloroform	18		101	0.34	110
		25		45	0.31	39,110
				62–92	0.37* ± 0.02	
				146	0.28	
		32, 39, 46		99, 95, 92	0.37, 0.39, 0.41	110
	Dioxane	18		77	0.27	110
		25		75	0.29	39,110
		32, 39, 46		74, 73, 72	0.31, 0.32, 0.34	110
	Methanol	18		41	0.61	110
		25		30	0.41* ± 0.04	39,110
				40	0.49* ± 0.03	
				50	0.57* ± 0.03	
		30				116
		32, 39, 46		44, 45, 47	0.52, 0.41, 0.39	110
	Toluene	18		46	0.57	110
		25		46	0.55	39,110
		30				116
		32, 39, 46		47, 47, 48	0.56, 0.56, 0.54	110
	Water	25	Partially alcoholized			117
			72.5% Hydrolyzed, unfract.	21	0.67	118
			Middle fractions	20	0.98	
			77.9% Hydrolyzed, unfract.	9.5	2.27	
			Middle fractions	10	3.87	
			73.3% Hydrolyzed, unfract.	20.2	1.03	
			Middle fractions	20.6	1.2	
Poly(vinyl alcohol)	Dimethyl sulfoxide	30				119
	DMSO/water (4/1, w/w)	30	No cooling	122	0.43	225
			Precooled to form clusters	77–99	0.75 ± 0.03	

TABLE 1. *cont'd*

Polymer	Solvent	T (°C)	Remarks	[η]	k_h	Refs.
			Precooled to form clusters	100	1.1	
			Precooled to form clusters	132	1.8	
	Water	25			0.5	120,139
	Water	30		30	0.57*	119,121
		30(?)		42.1	0.59	122
				71, 77, 86.5	0.69	
				96	0.71	
				165	0.81	
		30		40	0.59*	119,121
		30		40	0.9	123
		30		50	0.60*	121
				60	0.66*	
				70–80	0.68*	
				100	0.74*	
				170	0.83*	
	Water (dil. NaOH)	30	0.042 M, 0.084 M NaOH	88, 85	0.65, 0.7	114
			0.167 M NaOH	78	1.6	
	Water (boric acid/	30	0.005 M Boric acid	22	25	114
	0.167 M NaOH)		0.01 M	28	16	
			0.02 M	42	5.5	
			0.06 M	84	1.8	
	Water	60		32	1.26	123
				59	0.93	
Poly(vinyl chloride)	Acetone	20		36	0.42	14
	Anisole	25		34	0.46	14
	Bromobenzene	25		40	0.4	14
	Butyl acetate	25		43	0.38	14
	γ-Butyrolactone	25		34	0.43	14
	Chlorobenzene	25		39	0.42	14
	Chloroform	20		38	0.49	14
	Cyclohexanone	20				64,124
		25		90–130	0.34	125,126
		30		100–121	0.35	127,128,129
		20–60		23–132		130
		80	Samples with different tacticity	94	0.36	131
				108	0.43	
				287	0.57	
				338	0.64	
				438	0.48	
	Cyclopentanone	20		46	0.33	14
	1,2-Dichloroethane	25		41	0.4	14
	Dimethyl formamide	25		40	0.3	14
	Dioxane	25		33	0.5	14
				40	0.48*	
				50	0.44*	
				60	0.41*	
				70	0.38*	
	Ethyl acetate	25		39	0.43	14
	Ethyl acetyl acetate	25		34	0.43	14
	Methyl ethyl ketone	25		26	0.34	14
				32	0.35	
				47–83	0.38 ± 0.01	
	Morpholine	30		71	0.64	132
				89	0.57	
				108	0.49	
		50		64	0.81	132
				79	0.67	
				98	0.53	
		69		58	0.85	132
				70	0.7	
				87	0.55	
	Nitrobenzene	25		41	0.33	14
	Tetrachloroethane	25		29	0.42	14
				36–76	0.37* ± 0.01	
				93	0.35	

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TABLE 1. *cont'd*

Polymer	Solvent	T (°C)	Remarks	$[\eta]$	k_h	Refs.
	Tetrahydrofuran	20	100% Conversion	20–143	0.28* ± 0.02	133
				49	0.35	14
				171	0.31	133
				201–220	0.36* ± 0.02	
		30		76–91	0.44* ± 0.01	132
				107	0.47	
	Tetrahydrofurfuryl alcohol	25		44	0.35	14
	Tetramethylene sulfoxide	25		46	0.46	14
Poly(vinyl cyanoethyl ether)	Water	30				121
	Acetone	30				121
Poly(vinyl biphenyl)	Benzene	20		7	0.55	134
				22–38	0.51* ± 0.04	
				93–134	0.34* ± 0.01	
		30		7	0.56	134
				21–37	0.51* ± 0.03	
				92–133	0.35* ± 0.01	
		45		21–37	0.54* ± 0.02	134
				91–129	0.36* ± 0.01	
		65		7	0.51	134
				21–36	0.51* ± 0.12	
				91–126	0.36* ± 0.01	
		75		21–36	0.43* ± 0.01	134
				90–122	0.36* ± 0.01	
Poly(vinyl butyral)	Methanol	25		30	2.69	135
	Ethanol	25		63.2	0.49	135
	n-Propanol	25		75.6	0.58	135
	Isopropanol	25		53.9	1.01	135
	n-Butanol	25		85.2	0.201	135
	Isobutanol	25		57.2	2.29	135
	Cyclohexanone	25		75.1	0.43	135
Poly(vinyl formate)	Acetone	30		50	0.34	136
				113	0.54	
	Acetonitrile	30		48	0.3	136
				162	0.51	
	Dioxane	30		44	0.3	136
				134	0.55	
	Methyl acetate	30		62	0.42	136
				74	0.46	
	Methyl formate	30		48	0.3	136
				107	0.46	
Poly(*N*-vinyl imidazole)	Water (0.2 M NaBr)	25	Degree of neutr. = 0	106	0.63	137
			Degree of neutr. = 0.3	131	0.5	
			Degree of neutr. = 0.8	206	0.36	
Poly(1-vinyl naphthalene)	Benzene	20		16	0.46	134
				27	0.45	
				37	0.41* ± 0.03	
		30		15	0.47	134
				27	0.48	
				37	0.43* ± 0.02	
		45		15	0.61	134
				26	0.57	
				36	0.43* ± 0.02	
		65		14	0.75	134
				25	0.46	
				36	0.44* ± 0.01	
		75		14	0.78	134
				25	0.6	
				35	0.49* ± 0.01	
Poly(2-vinyl naphthalene)	Benzene	20		18	0.5	134
				46	0.41	
				67–107	0.35* ± 0.01	
		30		18	0.5	134
				45	0.43	
				86	0.38	
				106	0.36	

TABLE 1. *cont'd*

Polymer	Solvent	T (°C)	Remarks	$[\eta]$	k_h	Refs.
		45		17	0.58	134
				43	0.45	
				63–103	0.39* ± 0.01	
		65		17	0.51	134
				20	0.43	
				43–101	0.38* ± 0.06	
		75		17	0.48	134
				43–100	0.38* ± 0.06	
Poly(vinyl phenylketone)	Benzene	25				112
Poly(4-vinylpyridine)	Ethanol	25				138
Poly(vinyl pyrollidone)	Dimethyl formamide	25			0.45	139
	Methanol	25		33		140
	Methanol + 0.33 N GC	25	GC; guanidine hydrochloride	30.7		
	Ethanol	25		34		
				28		
	Propanol	25		34		
				29		
	Water	15		17.2	0.45	141
		25		15	0.62	
		35		13.3	0.77	
		45		11.5	0.81	
		55		10.6	0.95	
		65		1.25	1.3	
	Water (salt soln.)	25	1.2 M NaH_2PO_4	15.5	0.97	226
		35	Theta temperature	14.7	1.99	
		25	0.5 M Na_2SO_4	16.9	0.85	
		36	Theta temperature	12.9	2.16	
		25	0.5 M Na_2CO_3	16.2	1.07	
		39	Theta temperature; Ref. contains data for seven other salts	15.5	2.6	
Poly(vinyltrimethylsilane)	Cyclohexane	25		96–154	0.35 ± 0.03	142
Poly(vinyl 4-trimethylsilyl benzoate)	Toluene	25		136	0.19	143
Poly(vinyl 3-trimethylsilyl benzoate)	Toluene	25		214	0.54	143
Poly(vinylidene fluoride)	Dimethylacetamide	25		76	0.35	144
				116	0.37	
				143	0.32	
				189	0.27	
				325		0.42
		25	$[\eta]$ corr. for aggregation	108	0.33	145
				124	0.37	
				132	0.42	
				174	0.47	
	Dimethyl formamide	25		74	0.31	144
				128	0.36	
				175	0.39	
Poly(ethylene glycol monovinyl ether)	Water	25		~75	0.54	146
	Ethanol	25		?	0.47	
	Dimethyl formamide	25		~65	0.4	
1.4. POLY(OXIDES)						
Poly(oxyethylene)	Benzene	20		2	~3.7	147
				48	0.4	
	Chloroform	20		3	~0.9	147
				82	0.4	
	Dimethyl formamide	20		3	~0.6	147
				45	0.4	
	Toluene	30		3	~2.5	147
				39	0.4	
		35		1.1	8.16	148
				1.9	3.41	
				2.4	2.06	
				5.5	2.3	

TABLE 1. *cont'd*

Polymer	Solvent	T (°C)	Remarks	$[\eta]$	k_h	Refs.
	Water	10.2	MW = 1.0×10^5	98.3	0.63	227
		18.1		91.4	0.71	
		24		84.9	0.87	
		32		77.5	0.97	
	Water	20		3	1.1	147
				5	0.4	
		25		37.7	0.39	149
		30		28.1	0.39	150
				36.5	0.46	149
				41.1	0.22	150
		35		1.7	4.95	148
				3	2.42	
				5	0.93	
				10.8	0.44	
	Water (2.40 M NaCl)	25		26.1	0.82	150
		54	Theta temperature	17	1.64	
	Water (1.5 M Na acetate)	25		28.9	0.56	149
		55	Theta temperature	20.8	0.9	
	Water (1.5 M Na formate)	25		29.5	0.57	149
		52	Theta temperature	21.2	0.98	
	Water (0.80 M KF)	25		29.5	0.56	151
		49	Theta temperature	22.7	0.76	
	Water (2.40 M KNO_3)	25		26	0.55	149
		53	Theta temperature; Refs. 149–151 include data on a number of other salts	20	0.87	
	Water (urea)	10.2		97	0.53	227
		20.1		89	0.57	
		32		80	0.72	
		10.2		116	0.43	
		16–32		109–96	0.47 ± 0.03	
Poly(oxymethylene)	*p*-Chlorophenol	60		135–270	0.3	152
	Dimethyl formamide	140		69	0.23	152
				102	0.21	
		150				152
Poly(oxypropylene)	Benzene	35				153
1.5. POLY(ESTERS)						
Poly(oxyethyleneoxy adipoyl)	Cyclohexanone	25				154
	Dimethyl formamide	25				154
Poly(bis(oxyethylene) oxyadipoyl)	Methyl ethyl ketone	25	Oligomers with different functionality			155
			Nonfunctional	3.1	0.39, 0.42	155
				3.6	0.46	
				4.3	0.42	
			Monofunctional	3.3	0.3	155
				4.2	0.34	
				4.5	0.42	
				5.2	0.32	
			Bifunctional	3.5	0.25	155
				4.1	0.32	
				4.8	0.26	
				5.3	0.22	
				5.7	0.3	
				8.7	0.25	
Poly(oxyethyleneoxy sebacoyl)	Cyclohexanone	25				154
Poly(oxyethyleneoxy terephthaloyl)	*m*-Cresol/phenol (1/1)	25				156
Poly(mono-ethyl itaconate)	Methanol (0.1 M KI)	25		40.2	0.25	157
				67.1	0.34	
				86	0.47	
	2-Ethoxyethanol	25		41.3	0.2	157
				55	0.22	
				71	0.3	

TABLE 1. *cont'd*

Polymer	Solvent	T (°C)	Remarks	[η]	k_h	Refs.
1.6. POLYAMIDES						
Poly(iminoadipoylimino hexamethylene) (Nylon 66)	*m*-Cresol	20				158
	Formic acid (90%)	25		83	0.2	159
				100	0.22* ± 0.01	
				120	0.24* ± 0.02	
				140	0.27* ± 0.02	
				200	0.29* ± 0.01	
Poly(iminoisophthaloyl imino-1,2-phenylene)	Dimethyl formamide (1.18 N LiCl)	25	1,3- and 1,4-phenylene polymers also in this Ref. (in DMF/LiCl and sulfuric acid/LiCl)			160
Poly[imino(1-oxohexa methylene)] (Nylon 6)	Tricresol	25	Polymers with different end groups			161
	m-Cresol	?	Branched polymers with different end groups	27–220	2.75–0.26	162
		20–60				163
	Tricresol	25	(0.019 vol.% water)	50	1.1	161,164
				109	0.49	
				335	0.29	
	Formic acid (85%)	25		70	0.32* ± 0.08	165
				80	0.22* ± 0.06	
				85	0.18* ± 0.02	
				48	0.24	164
				86	0.12	
				460	0.13	
	(68.8%)	25		32	0.38	164
				200	0.32	
				240	0.34	166
				558	0.56	
				965	0.89	
				1340	1.31	
				73	0.24	166
				101	0.66	
				155	1.36	
				305	3.36	
	Hexafluoroisopropanol	25	(0.05 M CF_3COONa)	200–500	0.23	167
	Sulfuric acid (96%)	25		94–104	0.30* ± 0.07	165
	(93%)	25		63	0.42	164
				125	0.26	
				490	0.23	
				502	0.19	
	(80%)	25		48	0.5	164
				90	0.34	
				325	0.3	
	(62%)	25		34	1.06	164
				60	0.74	
				195	0.36	
	(60%)	25		52	0.52* ± 0.1	165
				54	0.44* ± 0.1	
				57	0.34* ± 0.06	
	(52.5%)	25		30	1.37	164
				50	0.96	
				135	0.44	
				152	0.39	
	(33%)	25				165
Poly[imino(1-oxo-undeca-methylene)]	Phenol: CCl_4 (1 : 1)	25				168
	Nylon 12	45				
		75				
Poly(iminoterephthaloyl imino-1,2-phenylene)	Sulfuric acid	25	1,3- and 1,4-phenylene polymers also in this Ref. (in sulfuric acid)			160
	Dimethyl formamide (1.18 N LiCl)	25				160
Poly(amidobenzimidazole) Aramid fibers	Sulfuric acid	25	Virgin fibers	440	0.5	169
		25	Heated to 140°C	460	0.54	
		25	Heated to 160°C	440	0.65	
		25	Heated to 200°C	500	0.6	
		25	Heated to 250°C	520	0.6	

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TABLE 1. *cont'd*

Polymer	Solvent	T (°C)	Remarks	$[\eta]$	k_h	Refs.
Poly(*p*-benzanalide terephthalamide)	Sulfuric acid	25	Rod-like polymer, high MW	>100	~0.5	170
			Low MW	<10	>1.0	
Poly(caprolactam)	Sulfuric acid (80%)		Fibers	121–143	0.29* ± 0.02	171
1.7. OTHER COMPOUNDS						
Al-isopropoxypoly(vinyl butyral)	Methanol	25		32.4	1.87	135
	Ethanol	25		46.7	0.95	
	n-Propanol	25		51.9	0.87	
	Isopropanol	25		52.7	0.41	
	n-Butanol	25		58.6	0.54	
	Isobutanol	25		45.1	0.95	
	Cyclohexanone	25		51.4	0.91	
Poly(2-acrylamido-2-methyl propanesulfonic acid)	Water	25		68	0.53	228
	Water			218	0.27	
Poly(2-acrylamido-2-methyl propane sulfonamide	Water			178	0.31	228
	Water	25		480	0.25	229
Poly(epichlorohydrin)	Tetrahydrofuran	25		44–555	0.36* ± 0.03	172
	Cyclohexanone	25		51–755	0.36* ± 0.01	
Poly(*N*,*N'*-dimethyl(acryl amidopropyl) ammomium propane sulfonate	Water (0.5 M salt)	30	NH_4Cl	32	0.9	173
			LiCl	37	0.29	
			NaCl	39	0.16	
			KCl	40	0.15	
			$MgCl_2$	50	0.45	
			$CaCl_2$	55	0.48	
			$SrCl_2$	54	0.53	
Poly(dimethylaminoethyl methacrylate dimethyl sulfate)	Water (0.1 M salt)	30	KF	386	0.21	174
			KCl	243	0.23	
			KBr	224	0.25	
			KI	170	0.28	
			LiCl	280	0.11	
			NaCl	253	0.21	
			KCl	243	0.23	
			CsCl	247	0.5	
Poly[3-dimethyl(methacryl oyloxyethyl)ammonium propane sulfonate]	Water (KCl)	30	0.25 M	49	0.7	175
			0.30 M	55	0.55	
			0.40 M	62	0.41	
			0.50 M	74	0.41	
			0.8 M	80	0.34	
			1.50 M	93	0.29	
	Water (0.5 M)	30	LiCl	57	0.56	175
			NaCl	68	0.5	
			KCl	74	0.41	
			KBr	80	0.39	
			KI	98	0.38	
			$KClO_4$	106	0.37	
			$CaCl_2$	77	0.37	
Poly(ether imide)	Dichloromethane	10		43	0.43	176
		25		37	0.66	
	Pyridine	10		25	2.13	176
		25		23	2.44	
	N-Methyl pyrollidone	10		51	0.48	176
		25		45	0.59	
	NMP/water (96/9)	10		33	[illegible]	176
		25		34	0.8	
		50		29	1.16	
	NMP/water (95/5)	25		25	1.93	176
		50		23	2.23	
Poly(ethylene imine)	Water (1 M NaCl)	35		10.4–64.4	0.76* ± 0.02	230
Poly(ethylene oxide)urethanes	Tetrahydrofuran	25	Different hydrophobic end caps	19, 18.5, 24	0.4	177
Na-polyphosphate	Water (NaBr)	25		50–276	0.29* ± 0.04	178

TABLE 1. *cont'd*

Polymer	Solvent	T (°C)	Remarks	$[\eta]$	k_h	Refs.
Poly(di-*n*-hexylsilane)	Tetrahydrofuran	25		58	0.33	179
				87	0.36	
				133	0.34	
				143	0.4	
				192	0.44	
				515	0.38	
				831	0.66	
Poly(oxydimethylsilylene)	Benzene	25		251	0.44	180
	Carbon tetrachloride	25		312	0.51	180
	Chlorobenzene	25		219	0.61	180
	Cyclohexane	25		324	0.37	180
	n-Heptane	25		305	0.45	180
	Methyl ethyl ketone	25		151	0.8	180
	Tetrahydrofuran	25		319	0.39	180
	Toluene	25		62–241	0.55* ± 0.02	180
				146	0.51	181
				577–727	0.46* ± 0.01	182
				10–210	0.35–0.50	182
Poly(methylene *N,N*-dimethylpiperidinium chloride)	Water (NaCl)	20–60	Ionic strengths ranging 0.1–0.5 M			183
Poly[bis(2-phenylethoxy) phosphazene]	Tetrahydrofuran	25		8.4	0.42	231
				11.7	0.62	
				12.9	0.32	
Phenolphthalein poly(aryl ether sulfone)	Dimethyl formamide	25	MW = 0.8×10^5	29	0.49	Bo
			MW = 2.20×10^5	53.6	0.62	
			MW = 4.90×10^5	89.3	0.51	
	Chloroform	25	Reference includes data from additional solvents, molecular weights	28.5	0.74	Bo
				50.5	0.89	
				82.7	0.78	
Poly(phenyl quinoxaline)	Chloroform	25?		65	0.53	184
	Chloroform/toluene (98/2)			75	0.33	
	Chloroform/toluene (95/5)			62	0.31	
	Chloroform/ethanol (95/5)			78	0.06	
Poly(sodium acrylate)	Water (NaCl)	25	0.4% NaCl	256	0.38	185
			1.30%	153	0.42	
			5.00%	77	0.51	
			10.00%	59	0.65	
	Water (0.4% NaCl)	25	3% C8 substitution	276	0.34	
	10% NaCl			78	0.48	
	0.40% NaCl		3% C12 substitution	278	0.37	
	1.30% NaCl			165	0.6	
	5.00% NaCl			64	2.2	
	10.00% NaCl			34	6.3	
Poly(styrene sulfonic acid), potassium salt	Water (KCl)	25	Ionic str., $I = 1.00$ M	8.2	0.75	186,187
			$I = 4.0 \times 10^{-1}$ M, MW 41.5	15.7	1.14	
			$I = 1.0 \times 10^{-2}$ M	27.5	3.73	
			$I = 3.0 \times 10^{-1}$ M	39	12.4	
			$I = 1.0 \times 10^{-1}$ M	65.7	20	
			$I = 1.00$ M, MW 109.5	15.7	0.76	
			$I = 1.0 \times 10^{-1}$ M	39.9	0.49	
			$I = 7.0 \times 10^{-1}$ M	83.5	2.93	
			$I = 3.0 \times 10^{-1}$ M	105	6.62	
			$I = 1.0 \times 10^{-1}$ M	148	18.7	
			$I = 3.1$ M, MW 1170	16.6	4.92	
			$I = 1.0$ M	115	0.37	
			$I = 1.0 \times 10^{-1}$ M	361	0.26	
			$I = 1.0 \times 10^{-3}$ M	3353	0.73	
			$I = 3.0 \times 10^{-4}$ M	5786	1.28	
			$I = 3.0 \times 10^{-5}$ M	9661	7.91	
Sodium poly(styrene-sulfonate)-diallyldimethyl ammonium chloride			$I = 10^{-4}$ M	4480	22.9	233
			$I = 10^{-3}$ M	2750	2.51	
			$I = 10^{-2}$ M	1150	0.39	
			$I = 0.5$ M	202	0.29	

TABLE 1. *cont'd*

Polymer	Solvent	T (°C)	Remarks	$[\eta]$	k_h	Refs.
			Ref. also gives data for copolymers with acrylamide			
Poly(thiopropylene)	Benzene	20				188
1.8. CELLULOSE, CELLULOSE DERIVATIVES, AND POLYSACCHARIDES						
Alginate(sodium)	Water ($NaCl/CuCl_2$)	30	Near gelation point	180	0.27	234
Amylose	Water (KOH)	25				189
	Water (NaOH)	25				189
	Water (KOH–NaCl)	25				189
	Water (1 N KOH)	25		139	0.19	190
		30		129	0.2	190
		35		121	0.48	190
		40		107	0.88	190
Arabinoglucuronoxylan	Water	25		41.6 ± 2.2	3.6 ± 0.6	235
Cellulose	Cd-ethylenediamine	20		339–1395	0.50 ± 0.01	191
	(Cadoxen)	25		426–510	0.46* ± 0.01	192
	Cu-ethylenediamine	25		440	0.54* ± 0.02	192
	(Cuoxen)			466	0.59	
				510	0.65	
	Zn-ethylenediamine	25		248–383	0.47* ± 0.09	192
	(Zincoxen)					
	LiCl/dimethylacetamide	30	MW = 4.2 to 4.5 × 10^5	641–682	0.43–0.59	236
Cellulose acetate	Acetone	30				193
	Formic acid	30				193
	Pyridine	30				193
Cellulose diacetate		25		295	0.56	194
				196	0.8	
				185	1.3	
				155	1	
		30				
	Dimethyl formamide	25?	Subst. = 2.34 as-is reprecipitated	158	0.48	195
				145	0.87	
			Subst. = 2.34 as-is reprecipitated	230	0.32	
				200	0.72	
			Subst. = 2.55 as-is reprecipitated	199	0.29	
				195	0.35	
Cellulose triacetate	Acetic acid	25		72	0.42	196
				117	0.57	
	Chloroform	25		43	0.45	196
				72	0.43	
	Methylene chloride	15–30	Θ temp. = 27°C			197
	Tetrachloroethane	25		50	0.34	196
				82	0.38	
Cellulose acetate phthalate	Water (NaCl solns.)	35	Salt conc. = 0.002 M	90	8.64	198
			Salt conc. = 0.006 M	71	3.36	
			Salt conc. = 0.0.1 M	68	1.69	
Cellulose nitrate	Acetone	20		695–1195	0.53* ± 0.08	191
	Diethyl adipate	25				199
	Isoamyl acetate	25				200
Methyl cellulose	Water	20		400	1.2	237
Ethyl cellulose	Ethyl acetate	20		41–188	0.65 ± 0.15	191
Ethyl hydroxyethyl cellulose	Water	20		440	1	238
			0.5 mM/g SDS	175	11.3	
			1.0 mM/g	135	18	
			2.0 mM/g	125	13	
			5.0 mM/g	140	7.5	
Hydroxyethyl cellulose	Water	0		423	0.57	201
				845	0.74	
				1052	0.8	
				1218	0.87	
		15		402	0.43	201
				794	0.59	
				977	0.68	
				1130	0.75	

TABLE 1. *cont'd*

Polymer	Solvent	T (°C)	Remarks	$[\eta]$	k_h	Refs.
		20		273	1.22	237
		25		128	0.31	239
		25		381	0.3	201
				754	0.47	
				895	0.62	
				1062	0.67	
		35		370	0.22	201
				725	0.4	
				875	0.49	
				1010	0.57	
		40		100	0.75	239
		60		86	0.85	
	Water	25	pH 2.2	622	4.04	202
			pH 3.0	624	3.09	
			pH 5.0	610	2.94	
			pH 7.0	600	3.1	
			pH 9.0	674	2.39	
			pH 11.0	740	1.48	
			pH 12.0	792	1.23	
	Water (LiCl)	25	1×10^{-1} to 1×10^{-3} M	900* ± 42	0.98* ± 0.16	202
	Water (KCl	25		928* ± 14	0.90* ± 0.03	202
	Water ($CuCl_2$)	25		951* ± 1	0.86* ± 0.01	202
	Water ($MnCl_2$)	25		930* ± 15	0.98* ± 0.08	202
Degraded hydroxyethyl cellulose	Water	25	Thermal degradation in water or salt soln. at 60, 80, 100°C			202
Hydrophobically modified hydroxyethyl cellulose	Water	25		110	1.45	239
		40		91	2.22	
		60		69	3.75	
Hydroxypropyl cellulose	Water	20		134	0.83	237
Hydroxy propylmethyl cellulose	Water	20		740	0.54	
Na-carboxymethyl cellulose	Water (NaCl)	25	Subst. 0.75; 0.01, 0.1, and 0.2 M NaCl			198
	Water (1 M NaCl)	25	Subst. 0.5–2.5			203
	Water (1 N NaOH)	25	Subst. 0.5–2.5			203
	Water (NaCl)	25				204
Acidic hetero polysaccharides	0.5 M NaCl/10% cadox.	30	from *Auricularia auricula judae*	72	0.2	205
	0.5 M K, NaH phosphates			101	0.36	
β-D-Glucan	Water	30	from *Auricularia auricula judae*	4900	0.49	205
	10% Cadoxen			4050	0.41	205
	Water			265	0.21	205
	10% Cadoxen			353	0.23	205
	88% Formic acid			750	0.49	205
Lyzozyme	Water	5	Enzyme from egg-whites (glycoside hydrolase)	3.05	1.35	240
		15		2.83	1.42	
		25		2.66	1.48	
		40		2.49	1.54	
		55		2.41	1.58	
Microbial polysaccharide	Water (NaCl)	25?	Kelco S-657; 0.001 M NaCl	752	0.99	206
				838	0.62	
				1452	0.73	
				2194	0.81	
			0.1 M NaCl	680	0.7	206
				750	0.43	
				1380	0.59	
				2097	0.6	
Welan gum	Water (NaCl)	25?	Kelco S-130; 0.001 M NaCl	738	0.94	206
				1078	0.99	
				1537	1	
				2471	0.86	
			0.1 M NaCl	641	0.46	206
				984	0.55	
				1510	0.51	
				2370	0.62	
Xanthan gum	Water (0.1 M NaCl)	25	Native	10300	0.45	207
			Renatured	13200	0.46	

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TABLE 2. SCHULZ–BLASCHKE CONSTANTS

Polymer	Solvent	T (°C)	Remarks	$[\eta]$	k_{sb}	Refs.
Poly(isoprene)						
Gutta percha	Toluene[a]	25				208
Poly(chloroprene)	Benzene	25		19–208	0.32	209
Poly(methylene)	*m*-Xylene[a]	120				208
Poly(ethylene)	Decalin	135	Low pressure	121–1535	0.29	210
Poly(1-butene)	Decalin	115	Stereoregular	$\eta_{sp} < 1$	0.48	211
Poly(isobutene)	Diisobutylene	20				208
Poly(acrylonitrile)	Dimethyl formamide	25				208
Poly(methyl methacrylate)	Acetone	25				208
				$\eta_{sp} < 1$	0.5	211,212
		32		$1/k_{sb} = 6.09 \log(\eta_{sp} + 5) - 2.05$		213
	Benzene[a]	25				208,212
	Butyl acetate	25				212
	Chloroform	20		25–480	0.3	10
	Chloroform[a]	25				208
		27.3				214
		32		$1/k_{sb} = 5.41 \log(\eta_{sp} + 5) - 1.15$		213
	Methyl ethyl ketone	25		$\eta_{sp} < 1$	0.5	211
	Toluene[a]	25				208
Poly(ethyl methacrylate)	Methyl ethyl ketone	23		$\eta_{sp} < 1$	0.33	211
Poly(*n*-butyl methacrylate)	Isopropanol	21.5	Theta temperature	$\eta_{sp} < 1$	1	211
	Methyl ethyl ketone	23		$\eta_{sp} < 1$	0.36	211
Poly(1-ethylbutyl methacrylate	Isopropanol	27.4	Theta temperature	$\eta_{sp} < 1$	0.89	211
	Methyl ethyl ketone	25		$\eta_{sp} < 1$	0.3	211
Poly(*n*-hexyl methacrylate)	Isopropanol	32.6	Theta temperature	$\eta_{sp} < 1$	0.7	211
	Methyl ethyl ketone	23		$\eta_{sp} < 1$	0.36	211
Poly(*n*-octyl methacrylate)	*n*-Butanol	16.8	Theta temperature	$\eta_{sp} < 1$	0.8	211
	Methyl ethyl ketone	23		$\eta_{sp} < 1$	0.46	211
Poly(*n*-lauryl methacrylate)	*n*-Butyl acetate	23		$\eta_{sp} < 1$	0.38	211
	Isopropyl acetate	13	Theta temperature	$\eta_{sp} < 1$	0.59	211
Poly(acrylamide)	Water	25		1400–1800	$0.20^* \pm 0.06$	6
	Water (1 M NaCl)	25		1200–2000	$0.20^* \pm 0.07$	6
Poly(vinyl alcohol)	Water	30		42.5–178	$0.46^* \pm 0.02$	122
Poly(vinyl chloride)	Cyclohexanone	25	MW 69000–106000		0.28 ± 0.01	215
			reprecipitated		0.32 ± 0.03	
	Cyclohexanone[a]	25				208
		20–60		21–139		130
Poly(vinyl acetate)	Benzene	30		$1/k_{sb} = 5.224 \log(\eta_{sp} + 4) - 0.65$		213
	Toluene	25				208
Poly(styrene)	Benzene	25		1		208
		30		$1/k_{sb} = 10.534 \log(\eta_{sp} + 3) - 2.65$		213
	Butanone[a]	25				208
	Chloroform	25				208
	Cyclohexane	34				208
	Ethyl acetate	25				208
	Methyl ethyl ketone	30				214
	Toluene[a]	25				208
		30				214
	m-Xylene[a]	25				208
Poly(α-methyl styrene)	Cyclohexane	30		28	0.82	216
				34	0.99	
				52	1.05	
				68	1.02	
				78	0.77	
	Cyclohexane/ ethylacetate (50/50)	30		37	0.4	216
				56	0.29	
				88	0.37	
				119	0.38	
				164	0.39	
Poly(2-methyl-5-vinyl tetrazole)	Chloroform	20		26	0.4	217
				37	0.26	
				56	0.41	
				86	0.26	

TABLE 2. *cont'd*

Polymer	Solvent	T (°C)	Remarks	$[\eta]$	k_{sb}	Refs.
				186	0.19	
				270	0.19	
	Dimethyl formamide	20		20	0.59	217
				39	0.38	
				64	0.33	
				128	0.23	
				236	0.22	
	Methylene chloride	20		27	0.26	217
				34	0.19	
				55	0.29	
				89	0.25	
				168	0.3	
				244	0.35	
Poly(oxyethylene)	Acetonitrile	25		$M_v > 10^4$	0.22	218
	Benzene	10		$M_v > 10^4$	0.21	218
		37		$M_v > 10^4$	0.23	
	Benzyl alcohol	25		$M_v > 10^4$	0.19	218
	Carbon tetrachloride	25		$M_v > 10^4$	0.3	218
	Dimethylformamide	25		$M_v > 10^4$	0.27	218
	Dioxane	25		$M_v > 10^4$	0.27	218
	Methanol	25		$M_v > 10^4$	0.26	218
	Methyl acetate	25		$M_v > 10^4$	0.27	218
	Water	25		$M_v > 10^4$	0.17	218
Poly(oxydimethylsilylene)	Butanone[a]	25				208
	Chloroform[a]	25				208
Poly(iminoadipoylimino hexamethylene) (Nylon 66)	Formic acid (90%)	25		83	0.2	159
				100	0.22* ± 0.02	
				120	0.24* ± 0.02	
				140	0.26* ± 0.02	
				200	0.28* ± 0.01	
Poly(amide imide)	*N*-Methyl pyrollidone	30		19–87	0.3	219
Cellulose	Cadoxen	20		339–1395	0.29 ± 0.08	191
	Cuoxam	20		946–1125	0.29	220
	Cuoxen	20		190–2800	0.29	221
Cellulose acetate	Acetone	25				64
Cellulose nitrate	Acetone	20	(13.7% N)	180–500	0.29	222
				500–1000	0.34	
				1000–1400	0.37	
				1400–2000	0.4	
				695–1995	0.30 ± 0.03	191
		27				64
	Ethyl acetate	20	(13.7% N)	200–600	0.26	222
				600–1200	0.3	
				1200–1800	0.33	
				1800–2400	0.37	
Ethyl cellulose	Acetone	20, 30, 40	Subst. = 2.73	24–180	0.35, 0.33, 0.32	223
	Benzene	20, 30	Subst. = 2.73	26–450	0.36, 0.35	223
		40	Subst. = 2.73	362–418	0.34	
	Isobutanol	20, 30, 40	Subst. = 2.73	25–420	0.34, 0.33, 0.32	223
	n-Butyl chloride	20, 30, 40	Subst. = 2.73	25–470	0.33, 0.33, 0.32	223
	Ethyl acetate	20, 30, 40	Subst. = 2.73	25–450	0.29, 0.28, 0.27	223
		20		41–1888	0.31 ± 0.05	191

[a] k_{sb} is roughly calculable from the Arrhenius constant.

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Theta Solvents

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A. INTRODUCTION

1. Fundamentals

1.1 Thermodynamics The theta state is defined as that state of a polymer solution at which the excess chemical potential, and correspondingly, the excess Gibbs energy of dilution is zero. For a given polymer–solvent system, this state is obtained at a certain characteristic temperature, the theta temperature Θ. A solvent at this temperature is called a theta solvent.

Since Flory (110) was the first to show the importance of the theta state for a better understanding of physical structures and properties of polymers, the theta temperature is sometimes also called "Flory temperature". The name "van't Hoff temperature" has also been suggested (127). However, neither "Flory temperature" nor "van't Hoff temperature" has gained acceptance.

The exact definition of the theta state is given by chemical thermodynamics. The chemical potential of a solvent 1, $\Delta\mu_1$, can be split into an ideal term and an excess term:

$$\Delta\mu_1 = \Delta\mu_1^{\mathrm{id}} + \Delta\mu_1^{\mathrm{exc}} \tag{A1}$$

where the excess chemical potential at the thermodynamic temperature T is given by the enthalpy of dilution, ΔH_1, and the excess entropy of dilution, $\Delta S_1^{\mathrm{exc}}$:

$$\Delta\mu_1^{\mathrm{exc}} = \Delta H_1 - T\Delta S_1^{\mathrm{exc}} \tag{A2}$$

A zero excess chemical potential does not imply that both the enthalpy of solution and the excess entropy of solution are zero as in the case of true ideal solutions where $\Delta H_1 \equiv 0$ and $\Delta S_1^{\mathrm{exc}} = 0$. Rather, a theta state means only that the terms on the right side of Eq. (A2) compensate each other at the theta temperature Θ, i.e., $\Delta H_1 \equiv \Theta\Delta S_1^{\mathrm{exc}}$ for $\Delta\mu_1^{\mathrm{exc}}$ at $T = \Theta$. Solutions in the theta state are thus not thermodynamically ideal but thermodynamically pseudo-ideal (306).

The chemical potential cannot be measured directly. It may be expressed, however, by the product of the osmotic pressure Π of the solution and the partial specific volume ${}^*v_1$ of the solvent:

$$-\Delta\mu_1 = {}^*v_1\Pi \tag{A3}$$

The concentration dependence of the osmotic pressure of non-electrolyte solutions can be written as a power series

$$\Pi = A_1c_2 + A_2c_2^2 + A_3c_2^3 + \cdots \tag{A4}$$

where $c_2 = m_2/V$ is the mass concentration of the polymer (mass m_2 of the polymer 2 per total volume V of the solution *after* mixing polymer and solvent) and A_1, A_2, $A_3, \ldots$ are first, second, third,... virial coefficients, respectively. The second virial coefficient is a measure of the interaction between two bodies, the third virial coefficient a measure of interactions between three bodies, etc. Second and third virial coefficients depend on the chemical structure and the molar mass of the polymer, the chemical structure of the solvent (and thus its interaction with the polymer), and the temperature.

The first virial coefficient is given by

$$A_1 = RT/\overline{M}_n \tag{A5}$$

where R is the general gas constant ($R = 8.314510$ J/K/mol) and $\overline{M}_n$ is the number-average molar mass of the polymer. Eq. (A4) is thus often written as

$$\frac{1}{(\overline{M}_n)_{app}} \equiv \frac{\Pi}{RTc_2} = \frac{1}{\overline{M}_n} + Bc_2 + Cc_2^2 + \cdots \tag{A6}$$

where $(\overline{M}_n)_{app}$ is the apparent number-average molar mass, $B = A_2/RT$, and $C = A_3/RT$.

The third term of the right-hand side of Eq. (A4) is often negligible at low polymer concentrations. Combinations of Eqs. (A1), (A3) and (A4) then yields,

$$A_2 = -\Delta\mu_1^{exc}/({}^*\nu_1 c_2^2) \tag{A7}$$

Since by definition the excess chemical potential is zero at the theta temperature, the second virial coefficient (but not necessarily the third virial coefficient) is also zero ($A_2 = 0$ at $T = \Theta$). The concentration dependence of the reduced osmotic pressure, Π/c_2, is thus zero at the theta temperature, albeit at low concentrations only. The same reasoning applies to other colligative methods (cryoscopy, ebullioscopy, vapor phase osmometry) and also to those physical methods that measure concentration dependencies of apparent molar masses (static light scattering, sedimentation equilibrium, combination of sedimentation and diffusion coefficient, etc.). An example is static light scattering which yields at the scattering angle $\vartheta \to 0°$:

$$\frac{1}{(\overline{M}_w)_{app}} \equiv \frac{K_0 c_2}{R_0} = \frac{1}{\overline{M}_w} + 2Bc_2 + 3Cc_2^2 + \cdots \tag{A8}$$

where $(\overline{M}_w)_{app}$ = apparent mass-average molar mass, K_0 = optical constant at zero angle, and R_0 = Rayleigh ratio at zero scattering angle. The virial coefficients B and C of light scattering average differently over interactions than those of colligative measurements; B and C of polymolecular ("polydisperse") polymers are numerically different for osmotic pressure and light scattering measurements.

The theta temperature may also be phenomenologically defined as the critical miscibility temperature at the limit of infinite molar mass (110). Since a solution may exhibit two critical miscibility temperatures, a polymer solution may display two theta temperatures. In the case of endothermic solutions, a lowering of temperature leads to less positive second virial coefficients and the theta temperature corresponds to an upper critical solution temperature (UCST) in the limit of infinite molar mass. The theta temperature corresponds to a lower critical solution temperature (LCST) in the case of exothermic solutions (see, e.g., (92)).

1.2. Unperturbed Dimensions The thermodynamic behavior described above results from the fact that long-range interactions between polymer segments are absent in the theta state. Long-range interactions are intramolecular interactions between segments or groups of one and the same polymer molecule that are separated by many chemical bonds along the chain; they are remote in sequence but adjacent in space. Short-range interactions are interactions between chain groups that are near to each other in sequence. They are determined by the length of chain bonds, the valence angles between chain atoms, and the hindrance to rotation around chain bonds (usually due to a pair (4 chain bonds) or two pairs (5 chain bonds) of conformers in the chain).

In a thermodynamically good solvent ($A_2 \gg 0$), polymer–solvent interactions are much larger than polymer–polymer and solvent–solvent interactions. The polymer chain expands in order to minimize polymer–polymer contacts; the dimensions of these chains are said to be perturbed. In such perturbed chains, the space occupied by one polymer segment is excluded for all other segments of the same polymer chain, i.e., even at infinite dilution.

In a theta solvent ($A_2 = 0$), polymer–solvent interactions are just balanced by polymer–polymer and solvent–solvent interactions. Long-range interactions disappear and the polymer chain assumes its so-called unperturbed dimensions which manifest themselves for linear chains by a dependence of the root-mean square radii of gyration s, on the square root of molar masses:

$$\langle s^2 \rangle_0^{1/2} = K_{s,0} M^{1/2} \tag{A9}$$

Intrinsic viscosities $[\eta]$ are also controlled by the space requirements of polymer molecules. For unperturbed coils of linear chains, one can write (see textbooks of polymer science)

$$[\eta]_0 = \Phi_0 (\langle s^2 \rangle_0 / M)^{3/2} M^{1/2} = K_0 M^{a_v} \tag{A10}$$

where Φ_0 is usually assumed to be a universal constant (but see Ref. 498). The dependence of the radius of gyration, $\langle s^2 \rangle^{1/2}$, or the intrinsic viscosity, $[\eta]$, on the square-root of the molar mass is generally taken as a manifestation of unperturbed dimensions and thus also of the presence of the theta state of the polymer.

The assumption that theta conditions lead to unperturbed dimensions is often fulfilled within limits of error for most of the investigated polymers but it is not true in the general

sense. The thermodynamic definition of the theta state refers to the *global* properties of polymer solutions whereas the definition of unperturbed dimensions relates to the *local* properties of the chain. Both definitions agree *exactly* only if infinitely thin chains are surrounded by a locally and globally homogeneous continuum of solvent molecules.

The ability of a theta solvent to generate unperturbed dimensions thus depends on the constitution and configuration of the polymer, the solvent, and the temperature [83] since all these factors influence long-range interactions (excluded volume effects and interactions with the solvent). Small molar mass dependencies of theta temperatures are sometimes detectable for single solvents (230), especially at low molar masses when the effects of end groups or small helical segments (525) become noticeable.

However, if the macromolecules have long side chains and if the main chain and the side chains are constitutionally different, then the theta state of a polymer solution may not be identical with the unperturbed state of polymer coils, even for single solvents. An example is the solution of poly(octadecyl methacrylate) in butyl acetate which is in the theta state at 10.5°C ($A_2 = 0$). At this temperature, the exponent a_v of the intrinsic viscosity/molar mass relationship of Eq. (A10) was found as $a_v = 0.44$ instead of 0.50, due to a contraction of the long side chains (406). A similar discrepancy between the theta state of the polymer–solvent system and the unperturbed dimensions of the polymer coils has been found for cyclic poly(styrene) in cyclohexane where $\Theta = 28.5$°C according to thermodynamics but $a_v = 0.40$ at the same temperature; $a_v = 1/2$ was observed for the considerably higher temperature of $T = 40$°C (366). In both cases, intrinsic viscosities were assumed to reflect unperturbed dimensions. This is not necessarily true, however, since atactic poly(methyl methacrylate) exhibited the same reduced mean-square radius of gyration, $\langle s^2 \rangle_0 / \overline{M}_w$, in the two theta solvents acetonitrile ($\Theta = 44$°C) and *n*-butyl chloride ($\Theta = 40.5$°C) whereas the corresponding viscosity quantities, $[\eta]_\Theta / \overline{M}_w^{1/2}$, definitely differed from each other despite the almost identical theta temperatures (512).

In mixed solvents, these effects may be enhanced by a possible distribution of solvent components, depending on the polarities of the polymer 2 and liquids 1 and 3; 1 is a solvent and liquid 3 usually a non-solvent (precipitant). It seems that in the absence of large variations of theta temperatures, the unperturbed dimension of a given apolar polymer is approximately the same in various apolar solvents. However, unperturbed dimensions (as determined from intrinsic viscosities) may vary widely for polar polymers in various polar theta mixtures (31,95,154). For a review of various methods for the determination of unperturbed dimensions in mixed solvents see (526).

2. Methods to Determine Theta Solvents

Methods for the determination of theta temperatures are discussed in greater detail in two reviews (527,528). As mentioned above, theta conditions do not necessarily lead to unperturbed dimensions of coils (and *vice versa*).

2.1. Phase Equilibrium (PE) Binary mixtures of a polymer in a single solvent phase-separate at various temperatures, T_{sep}, depending on the volume fraction ϕ_2 of the polymer. The maximum of the $T_{sep} = f(\phi_2)$-function is called the critical solution temperature T_{cst}. The experiment is repeated for a series of dilute solutions of polymers of the same constitution and configuration but of different molar mass. The relation between the critical solution temperature and the molar mass of the polymer is based on the Flory–Huggins lattice theory which predicts that

$$\frac{1}{T_{cst}} = \frac{1}{\Theta}\left[1 + \frac{1}{\psi_1}\left(\frac{1}{r^{1/2}} + \frac{1}{2r}\right)\right] \qquad \text{(A11)}$$

where ψ_1 is the Flory residual-entropy parameter and r is the ratio of the molecular volume of the polymer to that of the solvent. Since r is proportional to the (number-average) molar mass of the polymer, Eq. (A11) can be written as

$$\frac{1}{T_{cst}} = \frac{1}{\Theta}\left[1 + \frac{b}{(\overline{M}_n)^{1/2}}\right] \qquad \text{(A12)}$$

for polymers of sufficiently high r (or $\overline{M}_n$) (Shultz–Flory method) (110,529). Extrapolation of the inverse critical solution temperatures to infinite molar mass delivers the inverse theta temperature Θ.

The data must be extrapolated not only to infinite molar mass but also to infinite dilution if used with mixed solvents (191). Furthermore, the method can be used only for phase separations into two liquid phases. Care must therefore be taken with crystalline polymers.

2.2. Second Virial Coefficient (A) All absolute methods for the determination of molar masses may be used; most commonly applied are membrane osmometry and static light scattering. Less frequently used are vapor phase osmometry and sedimentation equilibrium. Absolute methods that depend on specific solvent behaviour cannot be applied; examples are cryoscopy and ebullioscopy. Measurements must be performed at sufficiently low polymer concentrations in order to avoid effects of third virial coefficients.

The concentration dependence of reciprocal apparent molar masses is determined for a given polymer–solvent pair at different temperatures. Second virial coefficients are calculated from the slopes of these curves (see Eqs. (A6) and (A8)) and plotted against temperature (110). The dependence of the second virial coefficients on temperature is linear only in the proximity of the theta temperature. Care must be taken, therefore, to work close to the theta temperature. Alternatively, the second virial coefficient may be measured at a constant temperature, using different solvent–nonsolvent ratios. However, appropriate precautions and corrections have to be used if mixed solvents are

used (Donnan equilibria in membrane osmometry, effects of differences in refractive indices in static light scattering, etc).

2.3. Cloud-Point Titration (CP) Dilute polymer solutions of different concentrations are titrated at constant temperature with a nonsolvent until the first sign of cloudiness. The volume fraction $\phi_{3,cp}$ of the nonsolvent 3 at the cloud point is then plotted against the logarithm of the volume fraction $\phi_{2,cp}$ of the polymer at the cloud point (89,90,531) and extrapolated to pure polymer:

$$\phi_{3,cp} = \phi_{3,\Theta} - B_{cp} \ln \phi_{2,cp} \tag{A13}$$

where B_{cp} is the slope of the $\phi_{3,cp} = f(\ln \phi_{2,cp})$-curve and $\phi_{3,\Theta}$ is the volume fraction of the nonsolvent in the theta mixture solvent–nonsolvent. At high molar masses (small B_{cp}) and polymer densities $\rho_2 \approx 1$ g/ml, mass-concentrations $c_{2,cp} = \rho_2 \phi_{2,cp}$ (in g/ml) can be used instead of volume fractions $\phi_{2,cp}$ (93); neglect of these conditions may lead to errors (58). This "Elias method" has been shown to have theoretical justification from the Flory–Huggins lattice model (532,533); a comprehensive review of this method is available (93).

2.4. Cloud Temperature Titration (CT) In a variation of the cloud point titration method, cloud temperatures may be determined by cooling or heating of dilute polymer solutions of various concentrations until cloudiness appears (58). The inverse cloud point temperature T_{ct} is then plotted against the logarithm of the volume fraction $\phi_{2,ct}$ of the polymer 2 at the cloud point and extrapolated to pure polymer:

$$\frac{1}{T_{ct}} = \frac{1}{\Theta} - B_{ct} \ln \phi_{2,ct} \tag{A14}$$

This method is also based on the Flory–Huggins lattice model (522,533). In a modification of the method, inverse cloud temperatures are plotted against $1/r^{0.6}$ (530), again based on the Flory–Huggins theory:

$$\frac{1}{T_{ct}} = \frac{1}{\Theta}\left(1 + \frac{B_r}{r^{0.6}}\right) \tag{A15}$$

where r is the ratio of molecular volumes of polymer and solvent.

2.5. Unperturbed Dimensions (RGM, VM, DM, SM) Root-mean-square radii of gyration, $\langle s^2 \rangle^{1/2}$, depend on the a_s power of the molar mass M (110):

$$\langle s^2 \rangle^{1/2} = K_s M^{a_s} \tag{A16}$$

The exponent becomes $a_s = 1/2$ for the unperturbed state where $\langle s^2 \rangle = \langle s^2 \rangle_0$. The temperature dependence of the function $\langle s^2 \rangle = f(M)$ can thus be used to determine the temperature T_0 at which $a_s = 1/2$ (RGM method).

This method is cumbersome; more often used is the temperature dependence of the intrinsic viscosity/molar mass relationship

$$[\eta] = K_v M^{a_v} \tag{A17}$$

because $a_v = 1/2$ at the unperturbed state (at T_0) (VM method). Less often used are the corresponding relationships between molar masses and other hydrodynamic properties such as sedimentation coefficients (SM method) or diffusion coefficients (DM method).

Unperturbed radii of gyration (from scattering experiments) always seem to indicate theta conditions (cf. Ref. 512) but the database is too small to allow definite proof. Unperturbed dimensions from hydrodynamic measurements in single solvents sometimes do not coincide with the theta state (cf. Refs. 366,466,512); see also Section 1.2. Hydrodynamic measurements in mixed solvents very often deliver different unperturbed dimensions for theta conditions (cf. Refs. 31,83,95,154).

2.6. Other Methods (IG, PL, R) The theta state and/or unperturbed dimensions have occasionally been determined by various other methods: refractometry (R) (7,24), dielectric measurements (E) (5), polarized luminescence (PL) (399), inverse gas chromatography (IG) (412), and dynamic light scattering (LS) (376).

Common methods for the determination of theta temperatures Θ, theta compositions $\phi_{i,\Theta}$ of mixed solvents, and/or unperturbed dimensions are compared in the following table:

Method		Required for the application			
Abbreviation	Name	Minimum number of polymers	Knowledge of molar mass	Type of solvent	Determined parameter
A	Second virial coefficient	3	Yes	Preferably single	Θ
CP	Cloud point titration	1	No	Mixed	$\phi_{3,\Theta}$
CT	Cloud point temperature	1	No	Preferably single	Θ
PE	Phase equilibria (critical solution temperature)	3	Yes	Preferably single	Θ
VM	Intrinsic viscosity/molar mass	3	Yes	Single or mixed	$\Theta, \phi_{3,\Theta}$

B. TABLES OF THETA SOLVENTS FOR POLYMERS

In the following tables, theta solvents and theta temperatures have been compiled for various polymers from the literature. The polymers are subdivided into groups of chemically similar compounds (see beginning of chapter for Contents). Within each group, polymers are arranged alphabetically, mostly according to the polymer names used in the original reference; no attempt has been made to use either IUPAC names (systematic names) or poly(monomer) names exclusively. Monomer units in alternating and random copolymers are listed alphabetically, regardless of their proportions; their relative amounts are given in parentheses on a mole/mole basis. Segments of block and graft copolymers are usually noted in the sequence reported by authors. The following abbreviations are used: *alt* (alternating), *block* (self-explanatory), *co* (statistical or random (or unspecified)), *graft* (self-explanatory).

Polymers are further characterized by their tacticity (if any), provided it has been reported in the literature. Polymers by free radical polymerizations are usually assumed by authors to be "atactic". Tacticities are usually given as mole fractions of isotactic diads (x_i), syndiotactic diads (x_s), isotactic triads (x_{ii}), syndiotactic triads (x_{ss}), heterotactic triads (x_{is}), *cis*-configurations (x_{cis}), *trans*-configurations (x_{trans}). If no quantitative characterization was reported, tacticities are described as it (predominantly isotactic), st (predominantly syndiotactic), at (neither predominantly iso- nor syndiotactic), cis (predominantly cis-tactic), or trans (predominantly trans-tactic).

For each polymer, theta solvents are given in alphabetical order; no attempt was made to convert commonly used solvent names into systematic names (e.g. dioxane = 1,4-dioxane). In mixed solvents, the liquid listed first may thus be a solvent or a nonsolvent. Compositions of mixed solvents are given in vol./vol. unless otherwise noted (ex: w/w indicates weight per weight).

A recent (smaller) list (496) of "Theta Temperatures" is mainly concerned with unperturbed dimensions. Since these dimensions are often evaluated from measurements at nontheta temperatures using various theories of intrinsic viscosity/molar mass, or (far less frequent) radius of gyration/molar mass relationships, reported "theta temperatures" are often not theta temperatures *per se* but the temperatures at which measurements in thermodynamically *good* solvents have been performed. A comprehensive list of unperturbed dimensions of various polymers can be found in Section VII/1 of this Handbook and a list of characteristic ratios of polymethacrylates in (497).

TABLE 1. HOMOCHAIN POLYMERS

Polymer (mol/mol)	Theta solvent (v/v)	Theta temp. (°C)	Method	Refs.
1.1. POLY(ALKANES)				
Poly(acenaphthylene)	Ethylene dichloride (1,2-dichloro ethane)	35	A, VM	238
		30	A, VM	237
		20	PE, VM	16
Poly(1-butene), atactic	*i*-Amyl acetate	23	PE, VM	245,246
	Anisole	83	VM	245
		83	PE, VM	246
		86.2	PE	190
	Diphenyl ether	141	PE, VM	246
	Phenetole	61	VM	245
		61	PE, VM	246
	Toluene	−46	PE, VM	246
–, isotactic	Anisole	89.1	PE	190
		89	PE, VM	246
	Cyclohexane/*n*-propanol (69/31)	35.0	VM	304
	Diphenyl ether	148	PE, VM	246
	Phenetole	64.5	PE, VM	246
Poly(butene-*co*-ethylene), 40 branches per 100 backbone carbon atoms	3-Octanol	5.0	VM	514
	2-Octanol	29.0	VM	514
	1-Octanol	59.0	VM	514
Poly(ethylene)	*t*-Amyl alcohol	199.2	PE	251
	Anisole	153.5	PE	251
	Benzyl phenyl ether	191.5	PE	251
	Bis(2-ethylhexyl) adipate	170	PE	324
		145	VM	351
		145	PE	240
	Bis(2-ethylhexyl sebacate)	150	PE	324
	Carbon disulfide	−73	PE	510
	n-Decanol	153.3	PE	251
	Dibutyl phthalate	>200	PE	324
	Dioctyl adipate	145	VM	508
	Diphenyl	128	PE	353

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TABLE 1. *cont'd*

Polymer (mol/mol)	Theta solvent (v/v)	Theta temp. (°C)	Method	Refs.
		127.5	PE, VM	485
		127.5	VM	492
		125	PE	324
		118	CT	355
		118	PE	462
	Diphenyl ether	165	A	177
		163.9	PE, VM	251,485
		161.4	PE	46
	Diphenyl methane	142.2	PE, VM	251,485
	Diphenylene oxide	118	PE	324
	n-Dodecanol	143.4	PE	353
		138	PE, VM	324
		137.3	PE	251
	n-Heptane	173.9	PE	132
	n-Hexane	133.3	PE	132
		133	PE	252
	n-Hexanol/*p*-xylene (70/30)	155	PE	8
	n-Hexanol/xylene (70/30)	170	CT	136
	Nitrobenzene	>200	PE	324
	p-Nonyl phenol	162.4	PE	251
	n-Octane	210	PE	132
	n-Octanol	180.1	PE	251
	p-Octyl phenol	174.5	PE	251
	n-Pentane	85	PE	252
		80.0	PE	132
	3,5,5-Trimethylhexyl acetate	126	A	353
		121	PE	353
Poly(ethylene-*alt*-propylene)	Benzene	19–21.4	CP	453
	n-Decyl acetate	5.0	CP	453
	n-Heptyl acetate	38.0	CP	453
	n-Hexyl acetate	60.9	CP	453
	n-Octyl acetate	27.0	CP	453
Poly(ethylene-*co*-propylene)	Methanol/toluene (50/50)			346
Poly(ethyl ethylene)	2-Octanol	23.5	A, VM	458
		23.5	VM	514
Poly(1-hexene)	Phenetole	61.3	VM	210
	Butanone/*n*-hexane (29.8/70.2)	8	PE	18
	Butanone/*i*-propanol (37/63)	24	PE	18
		23.5	A, PE	154
	(41.5/58.5)	4	A, PE	154
	Dioxane/*n*-hexane (40/60)	20.5	VM	19
	n-Hexyl chloride	13	A, PE	154
		13	A	18
Poly(isobutene)	*i*-Amyl benzyl ether	23.7	A, VM	339
	i-Amyl butyrate	28	A, VM	339
	i-Amyl *i*-valerate	22.1	A	183
		25.0	DM, VM	427
		25.0	A	517
		27	A	499
	i-Amyl *n*-valerate	22.1	SM, VM	221
		21.0	A	339
	n-Amyl butyrate	22.0	A	339
	Anisole	105.5	PE, VM	113
	Benzene	25.0	A	517
		25		44
		24.0	PE, VM	113
		24	VM	320
		22.8	A, VM	339
	n-Butanol/*n*-hexane (23.6/76.4)	25.0	CP	100
	n-Butanol/methylcyclohexane (29.2/70.8)	25.0	CP	100
	(42.1/57.9)	49.0	CP	100
	Butanone/carbon tetrachloride (33.7/66.3)	25.0	CP	100
	Butanone/cyclohexane (36.8/63.2)	25.0	CP	100
	Butanone/*n*-hexane (36.6/63.4)	25.0	CP	100
	n-Butyl *n*-butyrate	46.2	A	339

TABLE 1. *cont'd*

Polymer (mol/mol)	Theta solvent (v/v)	Theta temp. (°C)	Method	Refs.
	Carbon tetrachloride/dioxane (63.8/36.2)	25.0	CP	100
	Chlorobenzene/*n*-propanol (67.5/37.5)	49.0	CP	100
	(76.0./24.0)	25.0	CP	100
	(79.7/20.3)	14.0	CP	100
	Chloroform/*n*-propanol (57.9/42.1)	49.0	CP	100
	(77.1/22.9)	25.0	CP	100
	(79.5/20.5)	14.0	CP	100
	Cyclohexane/dioxane (45.1/54.9)	25.0	CP	100
	Cyclohexane/*n*-propanol	35	VM	305
	Cyclohexanol/toluene (29.3/70.7)	25.0	CP	100
	Cyclopentane	188		536
	n-Decanol/*n*-hexane (41.1/58.9)	25.0	CP	100
	n-Decanol/methylcyclohexane (47.5/52.5)	25.0	CP	100
	Dibuty ether	204	A, RGM, VM	76
	Dioxane/*n*-hexane (48.2/51.8)	25.0	CP	100
	Dioxane/methylcyclohexane (51.0/49.0)	25.0	CP	100
	Diphenyl ether	148	PE	113
	Diphenyl ether/ethylbenzene (50/50)	76.0	PE	113
	(25/75)	26.8	PE	113
	Ethylbenzene	−24.0	PE	113
	Ethyl caproate	57	PE	113
	Ethyl caprylate	22	PE	263
	Ethyl heptanoate	33		44
		33	PE	113
	Ethyl hexanoate	57		44
	Ethyl octanoate	22		44
	3-Ethylpentane	185		536
	n-Heptanol/*n*-hexane (37.4/62.6)	25.0	CP	100
	n-Heptanol/methylcyclohexane (39.5/60.5)	25.0	CP	100
	n-Hexane/*n*-hexanol (68.3/31.7)	25.0	CP	100
	n-Hexane/3-methylbutanone (57.6/43.4)	25.0	CP	100
	n-Hexane/*n*-octanol (63.7/36.3)	25.0	CP	100
	n-Hexane/*n*-pentanol (71.7/28.3)	25.0	CP	100
	n-Hexane/*n*-propanol (80.3/19.7)	25.0	CP	100
	2-Methylbutane (M = 23000, 150000)	52 ± 2		536
	–, (M = 760000)	45		536
	Methyl capronate	72.7	A	183
	Methyl caprylate	24.0	A	183
	Methylcycohexane/*n*-octanol (56.0/44.0)	25.0	CP	100
	Methylcyclohexane/*n*-pentanol (65.2/34.8)	25.0	CP	100
	Methylcyclohexane/*n*-propanol (74.2/25.8)	25.0	CP	100
	2-Methylhexane	153		536
	Methyl heptanoate	47.7	A	183
	3-Methylheptanone-5	55.5	A, VM	339
	Methyl pelargonate	5.9	A	183
	2-Methylpentane	103		536
	Pentane	76.0	A, RGM, VM	76
	Phenetole	87		44
		86.0	PE, VM	113
	Toluene	−13.0	PE, VM	113
Poly(2-methyl-2-butylene) (= hydrogenated 1,4-poly(isoprene))	*n*-Hexyl acetate	60.9	A	363
Poly(methylethylene)	2-Octanol	37.6	VM	454
Poly([S]-4-methyl-1-hexene), $x_i > 0.95$	*o*-Chloronaphthalene	165	VM	262
	o-Dichlorobenzene	133	VM	262
Poly(4-methyl-1-pentene, $0.90 \leq x_i \leq 0.94$	Diphenyl	194.6	PE, VM	334
	Diphenyl ether	210.0	PE, VM	334
	Diphenylmethane	176.6	PE, VM	334
Poly[1-(4-methylpentyl)-1-butylene-*co*-1-(1,5-dimethylhexyl)ethylene (= hydrogenated poly(myrcene)	2-Octanol	51.0	VM	514
Poly(2-methylpentene-1-sulfone)	Butanone/*n*-hexane (35.4/64.6)	11.5	PE	18
	Butanone/*i*-propanol	22.5	PE	18
Poly(1-octene)	*n*-Pentane	162.5	PE	169
	Phenetole	50.4	PE	170

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TABLE 1. *cont'd*

Polymer (mol/mol)	Theta solvent (v/v)	Theta temp. (°C)	Method	Refs.
Poly(1-pentene), atactic	Anisole	85	PE, VM	472
	i-Butyl acetate	32.5	PE, VM	472
	Diphenylmethane	121.0	PE, VM	472
	Phenetole	64.0	PE, VM	472
	Phenetole	48.3	A	192
	Phenyl ether	149	PE, VM	472
–, isotactic	*i*-Amyl acetate	31.5	VM	243
	Anisole	85	PE, VM	472
	i-Butyl acetate	32.5	PE, VM	472
	Diphenylmethane	121.0	PE, VM	472
	2-Pentanol	62.4	PE	219
	Phenetole	55.8	A	192
		64.0	PE, VM	472
	Phenyl ether	149	PE, VM	472
Poly(propylene), atactic	*i*-Amyl acetate	34	VM	69
		34	VM	244
	n-Amyl acetate	36.6	A	333
	n-Butanol/carbon tetrachloride (33/67)	25.0	CP	78
	n-Butanol/*n*-hexane (32/68)	25.0	CP	78
	n-Butanol/methylcyclohexane (34/66)	25.0	CP	78
	i-Butyl acetate	65.5	A	333
		58.0	VM	244
	n-Butyl acetate	58.5	A	332
	Carbon tetrachloride/*n*-propanol (74/26)	25.0	CP	78
	1-Chloronaphthalene	74	PE	171,521
		68	A	314
	Cyclohexanone	92	PE	171,521
	Diphenyl	129	VM	244
	Diphenyl ether	153.3	PE	172
		146	VM	244
	n-Hexane/*n*-propanol	25	CP	78
	Methylcyclohexane/*n*-propanol (69/31)	25	CP	78
	1-Octanol	77	CP	453
	2-Octanol	37.6	CP	453
	3-Octanol	5.0	CP	453
	n-Propyl acetate	85.5	A	333
–, isotactic	*i*-Amyl acetate	70	A	152
		34		69
	i-Amyl benzylether	111	PE	448
	p-*t*-Amyl phenol	140.8	PE	448
	Benzyl phenyl ether	181.8	PE	448
	Benzyl propionate	132	PE	448
	n-Butyl alcohol	147.2	PE	448
	t-Butyl alcohol	122	PE	448
	p-*t*-Butyl phenol	166.0	PE	448
	1-Chloronaphthalene	74	A	521
	p-Cresol	206	PE	448
	Dibenzyl ether	183.2	PE	255
		183.2	PE	448
	Diphenyl	125.1	PE	255
		125.1	PE	448
		125.0	VM	244
	Diphenyl ether	146.2	PE	172
		145	PE, VM	171,521
		143	VM	244
		142.8	PE	255
		142.8	PE	448
	Diphenyl methane	116.5	PE	448
	p-Ethyl phenol	184	PE	448
	i-Octyl phenol	115	PE	448
	p-Octyl phenol	106	PE	448
–, syndiotactic	*i*-Amyl acetate	45	A	152
Poly(propylene), head-to-head	*i*-Amylacetate	43	PE	471
		56.8	VM	514
Poly(vinyl ethylene), at	2-Octanol	32.8	A, VM	458

TABLE 1. *cont'd*

Polymer (mol/mol)	Theta solvent (v/v)	Theta temp. (°C)	Method	Refs.
1.2. POLY(ALKENES)				
1,4-Poly(butadiene), 97.0% cis	*n*-Heptane	−1	PE	242
	n-Propyl acetate	35.5	A, VM	242
95.0% cis	Diethyl ketone	10.3	VM	362
94.6% cis	5-Methyl-2-hexanone/2-pentanone (1/3)	46.2	PE	2
	(1/1)	32.7	PE	2
	(3/1)	22.3	PE	2
	3-Pentanone	10.3	PE	2
	3-Pentanone/2-pentanone (3/2)	30.0	PE	2
94.0% cis	Diethyl ketone	213	PE	66
	Ethyl propyl ketone	240	PE	66
	Propylene oxide	146	PE	66
93.0% cis	Diethyl ketone	208	PE	66
		14	PE	66
	Ethyl propyl ketone	237	PE	66
		−22	PE	66
	Propylene oxide	141	PE	66
		35	PE	66
90.0% cis	*i*-Butyl acetate	20.5	A, VM	70
	n-Heptane/*n*-hexane (25/75)	20	PE	282
	(50/50)	5	PE	282
	5-Methyl-2-hexanone	12.6	PE	1
	2-Pentanone	59.7	PE	1
	3-Pentanone	10.6	PE	1
–, 70% cis-1,4; 23% trans-1,4; 7% 3,4	Dioxane	22.3	VM	447
–, 43% 1,2 units; trans/cis = 2.3/1	Dioxane	15.7	A	363
–, 36% cis; 57% trans; 7% 1,2-vinyl	Dioxane	26.5	A, VM	480
–, –, hydrogenated	*n*-Hexyl acetate	65.0	A	363
1,4-Poly(butadiene), 9% cyclization	Cyclohexanone/dioxane (12/88)	30	A, VM	358
31% cyclization	Cyclohexanone/dioxane (17/83)	30	A, VM	358
46% cyclization	Cyclohexanone/dioxane (21/79)	30	A, VM	358
63% cyclization	Cyclohexanone/dioxane (30/70)	30	A, VM	358
81% cyclization	Cyclohexanone/dioxane (39/61)	30	A, VM	358
Poly(butadiene-*co*-styrene) (76.1/23.9)	Methyl *i*-butyl ketone	46	PE	145
	2-Pentanone	21	PE	145
(75/25)	*n*-Octane	21	VM	284
(70/30)	*n*-Octane	21	PE, DM, SM, VM	283
1,4-Poly(chloroprene), cis	Butanone	25	A	133
		25	VM	455,495
	Cyclohexane	45.5	PE	133
	Cyclopentane	56.3	PE	133
	Decalin, *trans*	2	A	455
1,4-Poly(2,3-dimethylbutadiene)				
>85% trans-1,4; 3% 1,2-vinyl	Cyclohexane/*n*-propanol (81.3/18.7)	25	CP	483
1,4-Poly(isoprene),				
Natural rubber	Butanone	25	VM	88
	n-Hexane/*i*-Propanol (1/1)	21	VM	284
	2-Pentanone	14.5	PE	352
96% cis	Dioxane	31.2	PE	11
	n-Heptane/*n*-Propanol (69.5/30.5; w/w)	25	A, CP, VM	74
94% cis	Methyl isobutyl ketone	16.5	A	42
	Methyl propyl ketone	33	A	42
trans (gutta percha)	*n*-Propyl acetate	60	PE	352
trans (other)	Dioxane	47.7	PE	352
	i-Propanol/toluene (36.2/63.8)	50	A, CP	11
	(35.5/64.5)	45	A, CP	11
	(34.2/65.8)	40	A, CP	11
	(33.5/66.5)	35	A, CP	11
	(32.4/67.6)	30	A, CP	11
–, 51% 1,4-units (mainly trans; 49% 3,4-units, 1-2% 1,2-units	2-Octanol	41.3	A	363
–, –, hydrogenated	2-Octanol	55.3	A	363
–, <5% 1,4-units, 20–25% 1,2-units, 70–75% 3,4-units	2-Octanol	30.5	A	363

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TABLE 1. *cont'd*

Polymer (mol/mol)	Theta solvent (v/v)	Theta temp. (°C)	Method	Refs.
–, –, hydrogenated	2-Octanol	26.2	A	363
1,4-Poly(isoprene), star	Dioxane	34.1	A	130
4-arm star	Dioxane	33.4	A	130
6-arm star	Dioxane	33.5	A	130
8-arm star	Dioxane	32.8	A	20
12-arm star	Dioxane	32.9	A	20
1,4-Poly(isoprene), 94% cis, linear	Methyl propyl ketone	33	A	42
3 branches	Methyl propyl ketone	33	A	42
11 branches	Methyl propyl ketone	27.8	A	42
22 branches	Methyl propyl ketone	23.5	A	42
22 branches	Methyl isobutyl ketone	15	A	42
1,2-*co*-3,4-Poly(isoprene) (35/65)	Benzene/*i*-propanol (55/45)	20	CP	98
1,4-Poly(isoprene), brominated (30% of double bonds)	Cyclohexane	20	A	310
Poly(isoprene-*block*-styrene)	Butanone	44	VM	347
Poly(1-methyl-1-butenylene-*co*-isopropenylethylene)	2-Octanol	41.3	A	363
Poly(2-methyl-1,3-pentadiene) (= Poly(1,3-dimethyl-1-butenylene))	Dioxane	61.2	VM	454
	2-Octanol	28.9	VM	454
Poly[1-(4-methylpentyl)-1-butylene-*co*-1-(1,5-dimethylhexyl)ethylene]	2-Octanol	51.0	A	363
Poly(myrcene), 90% 1,4, 10% 3,4-	2-Octanol	35.9	VM	514
Poly(pentenamer), 80–85% trans	*i*-Amyl acetate	38	VM	347,125
85% trans	*i*-Amyl acetate	38	VM	361
Poly(1-phenyl-1-propyne)	Cyclohexane	36.0	A	491
1.3. POLY(STYRENES)				
Poly(4-acetoxystyrene)	Butyl acetate	26.8	VM	367
	i-Propyl acetate	19.7	VM	367
Poly(*p*-bromostyrene)	Benzene	20	VM	168
Poly(*p*-*t*-butylstyrene)	1-Hexanol	65.0	A, PE	515
	1-Nitropropane	31.0	A, VM	197,465
		31.0	A, PE	515
		31	VM	370
	3-Nonanol	10.9	A, PE	515
	2-Octanol	32.7	A, PE	515
	2-Octanol	32.7	VM	370,473
Poly(*p*-*t*-butylstyrene)-*block*-poly(dimethylsiloxane)-*block*-poly(*p*-*t*-butylstyrene); 28 wt.% butylstyrene units	1-Nitropropane	157	PE	365
	Butanone	31	PE	365
Poly(*o*-chlorostyrene)	Butanone	25	PE, VM	224
Poly(*p*-chlorostyrene)	Benzene	8	PE, VM	224
	Benzene/methanol (5.5/1)	26.7	PE	139
	(5.0/1)	32.4	PE	139
	(4.5/1)	41.6	PE	139
	n-Butyl acetate	33.7	VM	195
	t-Butyl acetate	65.4	PE	156
	n-Butyl carbitol	50.1	PE	156
	Carbon tetrachloride	58.9	PE	196
		52.3	PE	158
		50.7	PE	156
	Carbon tetrachloride/toluene (1/1)	13.4	PE	196
	(5/2)	32.0	PE	196
	Cumene	60.9	PE	158
		59.0	PE	157
	Ethyl acetate	11.7	VM	195
	Ethylbenzene	–7.5	PE	158
		–14.7	PE	156
	Ethyl chloroacetate	–1.3	PE	158
		–1.8	PE	156
	Methyl chloroacetate	65.0	PE	158
		64.6	PE	156
	i-Propyl acetate	75.7	PE	156
		65.0	PE	158

TABLE 1. *cont'd*

Polymer (mol/mol)	Theta solvent (v/v)	Theta temp. (°C)	Method	Refs.
	i-Propyl benzene	59.0	PE	156
	i-Propyl chloroacetate	−8.2	PE	156
		−8.2	PE	158
	Tetrachloroethylene	44.4	PE	156
Poly(*p*-chlorostyrene-*co*-methyl methacrylate) (51.6/48.4)	*trans*-Decalin/trichloroethylene (78/22)	22.3	VM	239
Poly(*p*-decylstyrene)	Butanone/ethylbutyl ketone (1/1.24)	21.0	A	464
		18.1	PE	464
Poly(2,5-dichlorostyrene)	Ethanol/ethyl acetate (6.3/93.7; w/w)	30.5	A	103
Poly(3,4-dichlorostyrene)	*n*-Butanol/*n*-butyl acetate (7.1/92.9; w/w)	32.9	A	102
Poly(*p*-hexylstyrene)	Butanone	30.0	A	464
		29.3	PE	464
Poly(*p*-methoxystyrene)	*i*-Amyl acetate	75.0	PE	281
	Benzene/cyclohexanol (61.2/38.8)	25	A, CP	226
	Benzene/*n*-heptane (72.5/27.5)	25	CP	295
	Benzene/methanol (73.7/26.3)	25	A, CP	226
	Butanone/*n*-heptane (80.0/20.0)	25	A, CP	226
	Butanone/*n*-propanol (80.6/19.4)	25	A, CP	226
	t-Butylbenzene	52.2	PE	281
	Chloroform/cyclohexane (63.9/36.1)	25	A, CP	226
	Chloroform/methanol (66.5/33.5)	25	A, CP	226
	Cyclohexanol/toluene (37.2/62.8)	25	A, CP	226
	Dichlorodecane	92.6	PE	281
	Methyl isobutyl ketone	23.4	CP	281
Poly(*p*-methoxystyrene-*co*-styrene)				
26.4/73.6	*i*-Amyl formate	30.5	CT	280
53.0/47.0	*i*-Amyl formate	22.8	CT	280
	i-Amyl propionate	18.1	CT	280
	Hexyl methyl ketone	27.0	CT	280
75.6/24.4	*i*-Amyl formate	37.0	CT	280
	i-Amyl propionate	>50.0	CT	280
	t-Butylbenzene	12.5	CT	280
	Hexyl methyl ketone	>30	CT	280
Poly(α-methylstyrene) $x_s = 0.95$; $x_{ss} = 0.90$	Cyclohexane	32.3	A	63
$x_s = 0.91$; $x_{ss} = 0.81$	Cyclohexane	33.1	A	63
$x_s = 0.83$; $x_{ss} = 0.68$	Cyclohexane	34.3	A	63
$x_s = 0.65$; $x_{ss} = 0.44$	Cyclohexane	36.8	A	63
$x_{ss} = 0.44$	Cyclohexane	37.0	VM	64
$x_s = 0.64$	Cyclohexane	39	A, VM	3
atactic	Benzene/methanol (79.4/20.6)	30		272
	Butanone	31		217
	n-Butyl chloride	−10		536
		139		536
	1-Chlorodecane	80.0	VM	470
	1-Chloroheptane	20, 27	VM	479
	1-Chlorohexane	5.7, 10	VM	479
	1-Chlorooctane	43, 53	VM	479
	Cyclohexane	34.5	VM	479
		38	VM	59
	trans-Decalin	9.5	VM	266
		10.0	VM	479
	Diethyl succinate	16.4	A, VM	494
	n-Hexyl acetate	85.0	VM	479
isotactic	Butanone	45		217
Poly(*p*,*i*-propylstyrene)	Dioxane/*i*-propanol (35/65)	20	CP	98
Poly(*p*,*i*-propylstyrene-*co*-styrene)				
(88/12)	Dioxane/*i*-propanol (37/63)	20	CP	98
(56/44)	Dioxane/*i*-propanol (44/56)	20	CP	98
(33/67)	Dioxane/*i*-propanol (48/52)	20	CP	98
Poly(styrene)	*i*-Amyl acetate	220	PE	296
		−49	PE	296
	Benzene	249.8	PE	460
	Benzene/*i*-Propanol (58/42)	35	A	62
	Benzene/cyclohexanol (38.4/61.6)	25	A, CP	95
	Benzene/*n*-heptane (44/56)	35	A	62

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TABLE 1. *cont'd*

Polymer (mol/mol)	Theta solvent (v/v)	Theta temp. (°C)	Method	Refs.
	Benzene/*n*-hexane (38/61)	20	CP	128
	(34.7/65.3)	25	A, CP	95
	Benzene/methanol (74.7/25.3)	35	A	62
	(74/26)	34	VM	31
	(77.8/22.2)	25	A, CP	95
	(78/22)	23.5	A	42
	(78/22)	21.5	PE	42
	Benzene/*i*-propanol (66/34)	20	CP	98
	(64.2/35.8)	25	A, CP	95
	(69/31)	35	A	62
	Bicyclohexyl	61	PE	522
	Butanone	148.8	PE	460
	Butanone/methanol (89/11)	25	A, VM	273
	(89.7/11.3)	25	A, CP	95
	(88.9/11.1)	30	PE	315
	Butanone/*i*-propanol (85.7/14.3)	23	A	53
	(82.6/17.4)	34	VM	31
	(87/13)	67	A	115
	(87/13)	67	A	274
	i-Butyl acetate	−46	PE	296
	t-Butyl acetate	−34.7	PE	374
		109.3	PE	374
	Butylchloride	35.6	SM	233
	n-Butyl formate	−9	A	307
		−7.5	CP	375
	Carbon tetrachloride/*n*-butanol (65/35)	35	A	62
	Carbon tetrachloride/heptane (53/47)	35	A	62
	Carbon tetrachloride/methanol (81.7/28.3)	25	A, CP	95
	Chlorobenzene/di-*i*-propyl ether (32/68)	25	A, CP	95
	1-Chlorodecane	6	CT	22
		6.6	A	269
		8.5	VM	456
	1-Chlorodecane/3-methylcyclohexane			
	(21.8/78.2)	22.8	CT	22
	(25.0/75.0)	35.0	CT	22
	(50.5/49.5)	59.6	CT	22
	(90.0/10.0)	87.8	CT	22
	1-Chlorododecane	58.6	A	269
		58.6	VM	456
	Chloroform/methanol (74.7/25.3)	25	A, VM	273
	(75.2/24.8)	25	A, CP	95
	1-Chloroundecane	32.8	A	269
		32.8	A	270
		32.8	VM	456
	Cyclodecane	16	PE	445
	Cycloheptane	17	PE	445
		19.0	VM	456
	Cyclohexane	213	PE	371
		34.0	VM	31
		34.0	PE	189
		34.0	A	307
		34.0	PE	439
		34.4	A, VM	188
		34.5	VM	2, 476
		34.5	VM	488
		34.5	A	42
		34.5	VM	290
		34.5	DM, VM	427
		34.5	VM	456
		34.8	A	270
		35.0	A	274
		35.0	DM, SM	43,308
		35.0	DM	232
		35.0	A	229
		35.0	SM	144

TABLE 1. *cont'd*

Polymer (mol/mol)	Theta solvent (v/v)	Theta temp. (°C)	Method	Refs.
		35.0		328
		35.0	A	439
	Cyclohexane, deuterated	40.2		328
		40.0	A	439
		38	PE	438
	Cyclohexane/methylcyclohexane (2/1)	43	VM	2
	(1/1)	48	VM	2
	(1/2)	54	VM	2
	Cyclohexane/toluene (86.9/13.1)	15	PE	315
	Cyclohexanol	79	CT	135
		83.5	A	118
		83.5	VM	290
		83.5	A	307
		86	PE	461
		87	PE	8
		87.8	CT	22
	Cyclopentane	19.6	PE	203
		19.6	A, VM	368
		19.8	PE	460
		20		536
		20.5	VM	456
		20.6	PE	204
		154		536
		154.5	A, VM	368
		154.2	PE	203
	Cyclooctane	12	PE	445
		20.5	VM	456
	Decalin ($w_{cis} = 0$)	23.8	A	153
	($w_{cis} = 0$)	22.8	CT	22
	($w_{cis} = 0$)	21.2	A	26
	($w_{cis} = 0$)	21.0	DM, VM	427
	($w_{cis} = 0$)	20.4	PE, VM	119
	($w_{cis} = 0.20$)	21.2	A	26
	($w_{cis} = 0.23$)	19.3	PE	268
	($w_{cis} = 0.50$)	15.5	A	26
	($w_{cis} = 0.54$)	16.0		160
	($w_{cis} = 0.60$)	15.0	A	26
	($w_{cis} = 0.66$)	15.2	A	451
	($w_{cis} = 0.80$)	14.0	A	26
	($w_{cis} = 1.00$)	12.5	A	26
	($w_{cis} = 1.00$)	12.2	A	451
	($w_{cis} = 1.00$)	10.8	CP	523
	cis/trans	19.3	PE	271
	cis/trans	14.5	A	42
	unknown	31	A	289
	unknown	29.5	A	153
	unknown	18.2	DM	182
	Diethyl ether/dimethoxy ethane (0.7/0.3)	−5	A	356
		−27	A	356
	Di(2-ethylhexyl) phthalate	22		160
	Diethyl malonate	31	A	307
		34.2	VM	2
		34.5	VM	456
		35.6	PE	42
		35.9	A	270
		36.0	VM	503
	Diethyl malonate/diethyl oxalate (4/1)	40	VM	2
	(1/1)	47	VM	2
	(1/4)	52.6	VM	2
	Diethyl oxalate	51.5	A	307
		55.8	VM	2
		58.2	VM	456
		59.6	CT	22
	Dimethyl succinate	67.6	VM	456
	Dioctylphthalate	22		26

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TABLE 1. *cont'd*

Polymer (mol/mol)	Theta solvent (v/v)	Theta temp. (°C)	Method	Refs.
	Dioxane/*n*-heptane (41.5/58.5)	35	A	62
	Dioxane/*n*-hexane (38/62)	20	CP	128
	Dioxane/methanol (71.4/28.6)	25	A, CP	95
	(65.1/34.9)	34	VM	31
	(66.5/33.5)	35	A	62
	(66.5/33.5)	35	A, VM	82
	Dioxane/*i*-propanol (55/45)	20	CP	98
	(51.5/48.5)	35	A	62
	Ethyl acetate	−44.3	LS	376
		−44	PE	296
		−43.5	CP	375
		139	PE	296
	Ethyl acetoacetate	108.5	CP	147
	Ethylcyclohexane	70	PE	114
		75.0	VM	456
	Heptane/nitropropane (58/42)	35	A	62
	Heptane/toluene (52.4/47.6)	30	PE	315
	Hexane/3-methylbutanone (48/52)	20	CP	99
	Hexyl *m*-xylene	12.5	A	307
	Methanol/tetrahydrofuran (28.7/71.3)	25	A, CP	95
	Methanol/toluene (20/80)	25	A, VM	273
	(23/77)	25.0	CP	505
	(23.1/76.6)	25.0	VM	490
	(24.8/75.2)	34	VM	31,490
	(27.2/72.8)	45.0	VM	490
	Methyl acetate	43	PE	296
		114	PE	296
	Methyl cyclohexane	60	VM	290
		67.2	A	184
		68	A	307
		68.0	VM	456
		69.3	A	438
		70.5	VM	2
		70.5	VM	85
	3-Methyl cyclohexanol	98.0	CT	22
		98.0	VM	296
	Methyl cyclopentane	75	PE	440
		144	PE	440
	D,L-Menthol	115	VM	290
	1-Phenyldecane	28.0	A	124
		30.6	PE	124
	i-Propyl acetate	−27	PE	296
		107	PE	296
	n-Propyl acetate	−80	PE	296
		178	PE	296
	D,L-Terpineol	78.5	VM	290
	Tetrahydrofuran/water (92.3/7.7)	25	CP	322
	Toluene (estimated theta temperature)	−154		375
Poly(styrene), deuterated	Cyclohexane	30		328
		30	A, PE	439
	Cyclohexane, deuterated	36		328
		36	A	439
		35	PE	439
	Carbondisulfide	36	RGM	60
Poly(styrene), H-shaped	Cyclohexane	34.8	VM	372
Poly(styrene), head-to-head	Cyclohexane	19	A	329
		16		369
Poly(styrene), combs (theta temperatures depend strongly on number and length of branches)	Benzene/methanol (78/22)	16–24	PE	42
		16–24	A, VM	502
	Cyclohexane	18–33	PE	42
		18–33	A, VM	502
		20–36	A, CT	75
		28–33	A	294

TABLE 1. *cont'd*

Polymer (mol/mol)	Theta solvent (v/v)	Theta temp. (°C)	Method	Refs.
	Decalin (cis-trans)	4.5	PE	42
		4.5	A, VM	502
	Diethyl malonate	22	PE	42
		22	A, VM	502
Poly(styrene), 3-star	Cyclohexane	34.8	A	493
Poly(styrene), 9.4-star	Cyclohexane	22	VM	486
Poly(styrene), (6–15.5) stars	Cyclohexane	18–33	A	524
Poly(styrene), cyclic	Cyclohexane	40	VM	366
		28.5	A	373
Poly(1,4-divinylbenzene) (soluble; by anionic polymerization)	Decalin (trans)	25	A	364
1.4. POLY(VINYLS)				
Poly(2,5-dimethyl-4-vinylethynylpiperidol-4)	Dimethylformamide	25	VM	444
Poly(divinyl ether-*co*-maleic anhydride methyl ester) (1/2)	Tetrahydrofuran	30	VM	302
Poly(isobutyl vinyl ether-*alt*-maleic anhydride)	Acetone	29.8	VM	235
	NaCl/water (1 mol/l)	25	VM	235
Poly(maleic acid-*alt*-vinyl pyrrolidone)	Acetone/dimethylsulfoxide (65.4/34.6)	25	VM	434
	Na_2SO_4/water (0.986 mol/l)	25	VM	434
Poly(2-methyl-5-vinylpyridine)	*i*-Amyl acetate	53.2	PE	123
	n-Amyl acetate	48.2	VM	120
		48.4	PE	123
	i-Butyl acetate	49.0	PE	123
	n-Butyl acetate	21.8	VM	120
		21.8	PE	123
	i-Butyl methyl ketone	37.4	VM	120
		38.7	PE	123
	Ethyl *n*-butyrate	50.0	PE	123
	Ethyl propionate	25.4	PE	123
	Propionitrile	−3.6	PE	123
	n-Propyl acetate	19.3	PE, VM	123
	n-Propyl propionate	58.0	PE	123
	Tetrahydronaphthalene	49.5	PE	123
Poly(9-vinyl adenine)	Sodium cacodylate/water (0.1 mol/l)	26	A	167
	Sodium chloride/water (0.1 mol/l)	40	A	167
Poly(vinyl acetate)	Acetone/*i*-propanol (23/77)	30	PE	338
	Butanone/*i*-propanol (73.2/26.8)	25	A,PE	316
	n-Butyl ethyl ketone	29.0	VM	223
	Cetyl alcohol	123	PE	28
	Di-*i*-butyl ketone	136.5	CP	147
	Ethanol	19	A	42
	Ethanol/methanol (80/20)	17	PE	250
	(60/40)	26.5	PE	250
	(50/50)	34	PE	338
	(40/60)	36	PE	250
	n-Heptane/3-methylbutanone (26.8/73.2)	25	A,PE	316
	(27.3/72.7)	30	A,PE	222
	3-Heptanone	29	A,PE	223
		29	A	42
	Methanol	6	PE	250
		6	PE	345
	6-Methyl-3-heptanone	66	A,PE	223
	i-Propanol	52.6	CP	380
	i-Propanol, deuterated	51.8	CP	380
–, branched	Ethanol	12–15	A	42
	3-Heptanone	26	A	42
–, grafted by styrene	Di(*i*-butyl) ketone	136.5	CP	147
	Ethyl acetoacetate	108.5	CP	147
Poly(vinyl alcohol)	*t*-Butanol/water (32.0/68.0; w/w)	25	CP	357
	Ethanol/water (41.5/58.5; w/w)	25	CP	357
	Methanol/water (41.7/58.3; w/w)	25	CP	357
	i-Propanol/water (39.4/60.6; w/w)	25	CP	357
	n-Propanol/water (35.1/64.9; w/w)	25	CP	357
	NaCl/water (2 mol/l)	25	CP	258
		27 ± 3		536

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TABLE 1. *cont'd*

Polymer (mol/mol)	Theta solvent (v/v)	Theta temp. (°C)	Method	Refs.
	Water	97	PE	79
–, urethanized 4.9%	*n*-Propanol/water (30/40)	30	CT	299
	(40/50)	60	CT	299
8.1%	*n*-Propanol/water (30/40)	30	CT	299
	(40/50)	60	CT	299
11.5%	*n*-Propanol/water (30/40)	30	CT	299
	(40/50)	60	CT	299
Poly(vinyl benzoate)	Xylene	32.5	A	301
Poly(4-vinyl biphenyl)	2-Methoxyethanol/dimethoxyethane (70.6/29.4)	30	A,VM	237
Poly(vinyl bromide)	Methanol/tetrahydrofuran (17/83)	20	A	56
Poly(vinyl carbanilate)	Acetone/water (92.2/7.8)	20	A	41
	Butanone/water (44/56)	20	A	41
	Diethyl ketone	35	A	41
	Dioxane/methanol (28/72)	20	A	41
	Methanol/tetrahydrofuran (71.5/28.5)	20	A	41
Poly(*N*-vinyl carbazole)	Chlorobenzene	–37.4	VM	207
	Chlorobenzene/methanol (85.9/14.1)	25	CP,VM	126
	1,3-Dichlorobenzene/methanol (85.0/15.0)	25	CP,VM	126
	Nitrobenzene	–21.4	VM	207
	Toluene	37	A,VM	200
		39	A	249
Poly(vinyl chloride)	Benzyl alcohol	155.4	PE	303
	n-Butanol/cyclohexanone (15.8/100)	59	E	4
	(41.5/100)	72	E	4
	Cyclohexane/dimethylformamide (100/12.8)	40.5	E	4
	Cyclohexanone	22	A	321
		51	E	4
	Dimethylformamide	36.5	E	4
	Methanol/tetrahydrofuran (42/58)	22	A,CP	137
	Phenetol	88	VM	377
	Tetrahydrofuran/water (100/5)	17	E	4
	(91.5/8.5)	25	A	186
	(100/11.9)	30	CT	253
	(100/11.9)	30	E	4
	(100/9.5)	30	CT	253
	o-Xylene	84	VM	377
–, isotactic and syndiotactic			E	6
Poly(vinyl *p*-chlorobenzoate)	*n*-Butanol/butanone (47/53)	60	PE,VM	298
Poly(vinyl cyclohexane)	Tetrahydrofuran	25	A	97
Poly(vinylethylene) (98% 1,2-, 2% 1,4-)	1-Hexanol	66	VM	514
Poly(*N*-vinylimidazole)	*n*-Butanol	25		337
Poly(vinyl methyl ether)	Cyclohexane	51	A	520
Poly(β-vinyl naphthalene)	Decalin/toluene (56.5/43.5)	30.2	A,VM	104
Poly(vinyl pivalate)	Acetone/methanol (38.2/61.8)	20	CP	80
	Benzene/methanol (33.3/66.7)	20	CP	80
	Butanone/methanol (24.6/75.4)	20	CP	80
Poly(3-vinylpyrene)	Chloroform	25	VM	319
	Methanol/tetrahydrofuran (8/92)	25	CP,VM	319
Poly(2-vinylpyridine)	Benzene	11.4	VM	413
		15	VM	81
		16.2		378
	n-Heptane/*n*-propanol (59.6/40.4; w/w)	25.0	PE	149
Poly(*N*-vinylpyrrolidone)	Acetone/water (66.8/33.2)	25.0	CP,VM	90
	Dioxane	–10	A	39
	NaCl/water (0.55 mol/l)	25	PE	234
	Water	130.5	CT	381
Poly(vinyl stearate)	*n*-Octane	17	VM	313
Poly(*N*-vinyl succinamic acid)	NaCl/water (0.2 mol/l)	25	VM	265
Poly(vinyl sulfonic acid)	KBr/water (0.347 mol/l)	5.7	PE	87
	KCl/water (0.349 mol/l)	5.5	PE	87
	(0.65 mol/l)	26.0	PE	87
	(1.001 mol/l)	44.5	PE	87
	NaBr/water (0.346 mol/l)	–0.6	PE	87
	(1.008 mol/l)	40.1	PE	87
	NaCl/water (1.003 mol/l)	32.4	PE	87

TABLE 1. *cont'd*

Polymer (mol/mol)	Theta solvent (v/v)	Theta temp. (°C)	Method	Refs.
Poly(1-vinyl-1,2,4-triazole)	Dimethylformamide	25	VM	430
	Dimethylformamide/dioxane (76.6/23.4)	25	CP	91
		25	CP	211
1.5. POLY(ACRYLICS) AND RELATED COMPOUNDS				
Poly(acrylamide)	Methanol/water (2/3)	20	VM	33
	(41/59)	25	A, VM	463
	NaCl in water (0.1 mol/l)/methanol (59/41)	21	A, RGM	442
Poly(2-acrylamido-2-methylpropane-sulfone amide)	Dioxane/water (18.5/81.5)	25	CP	391
Poly(acrylic acid)	Dioxane	30	A, PE	263
	Water/0.2 mol/l HCl	14 ± 5		536
Poly(acrylonitrile)	Dimethylformamide/methanol (81/19)	20	A, VM	387
	Ethylene carbonate	60	VM	163
	Ethylene carbonate/water (85/15; w/w)	29.3	VM	384
	(85/15; v/v)	44	VM	468
	Nitric acid/water (55/45; w/w)	25	VM	384
Poly(acrylonitrile-*co*-butadiene) (35/65)	Butanone/cyclohexane (47.5/52.5)	25	SM, VM	306
(40/60)	Acetonitrile/butanone (79/21)	19–22	DM, SM	285
	Benzene/cyclohexane (85.5/14.5)	19–22	DM, SM	285
	Butanone/cyclohexane (47.4/52.5)	22	DM, SM	285
	Butanone/*i*-propanol (60/40)	20	DM, SM	285
	Cyclohexane/ethyl acetate (32.7/67.3)	19–22	DM, SM	285
Poly(acrylonitrile-*co*-methyl acrylate) (95/5)	Ethylene carbonate/water (82.5/17.5; w/w)	24.8	VM	385
	Nitric acid/water (51/49; w/w)	24.8	VM	385
Poly(acrylonitrile-*co*-methyl methacrylate)				
$x_{AN} = 0.236$	Benzene	19.8	VM	379
$x_{AN} = 0.5$	Benzene/dimethylformamide (6.5/1)	30		379
$x_{AN} = 0.74$	Benzene/dimethylformamide (5/3)	30		379
Poly(acrylonitrile-*co*-styrene) (1/2)	Benzene/methanol (66.7/33.3)	25	CP	91
	Dimethylformamide/methanol (44.7/55.3)	25	CP	91
(51/49)	Ethyl acetate	40–43	PE	216
Poly(*t*-butyl acrylate)	Benzene/methanol (52/48)	25		213
	n-Hexane	24.2	VM	159
Poly(*t*-butyl acrylate-*co*-vinylidene chloride) (16.7/83.3)	Benzyl alcohol	44	PE	12
Poly(cetyl acrylate)	Butyl acetate	15.2	VM	341
Poly(cyclohexyl methacrylate)	*n*-Butanol	23.0	VM	450
Poly(decyl acrylate)	*i*-Amyl alcohol	−8.5	A, PE	340
	n-Butyl alcohol	−24.5	A, PE	340
	Ethyl acetate	9–11	A, PE	340
	n-Hexanol	34	A	388
		43.2	PE	388
	n-Pentanol	70	A	388
		75.6	PE	388
Poly(ethyl acrylate)	*n*-Butanol	44.9	PE	212
	Ethanol	37.4	PE	212
	Methanol	20.5	PE	212
	n-Propanol	39.5	PE	212
		39.5	VM	323
Poly(ethyl acrylate-*co*-vinylidene chloride) (14.9/85.1)	Ethyl acetoacetate	49.6	PE	12
Poly(hexyl acrylate-*co*-vinylidene chloride) (14.5/85.5)	Benzyl alcohol	56.8	PE	12
Poly(hexadecyl acrylate)	*n*-Heptanol	20.5	A	388
		30.1	PE	388
	n-Hexanol	52.2	A	388
		60.2	PE	388
Poly(phenyl acrylamide)	Water	−8	A	441
Poly(*N*-*i*-propyl acrylamide)	Dioxane	20		389
	Water	31	PE	142
		30.6	VM	390
		30.6	LS	534
		20	VM	382

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TABLE 1. *cont'd*

Polymer (mol/mol)	Theta solvent (v/v)	Theta temp. (°C)	Method	Refs.
Poly(*i*-propyl acrylate), atactic	1,2-Butanediol/1,3-butanediol (68.4/31.6)	121.0	PE	218
	n-Decane	166.6	PE	218
isotactic	1,2-Butanediol/1,3-butanediol (68.4/31.6)	123.5	PE	354
	n-Decane	178.0	PE	354
syndiotactic	*n*-Decane	168.3	PE	218
Poly(*n*-octyl acrylate-*co*-vinylidene chloride) (15.5/84.4)	Benzyl alcohol	77.9	PE	12
Poly(phenyl acrylate)	Ethyl lactate	11.7	A, CP	146
		13.8	VT	383
Sodium poly(acrylate)	NaBr/water (1.504 mol/l)	15.0	A	452
1.6. POLY(METHACRYLICS) AND RELATED COMPOUNDS				
Poly(benzyl methacrylate)	Cyclohexanone	73.2	PE,VM	291
	Cyclopentanol	83.5	A	292
Poly(*p*-biphenyl methacrylate)	Benzene	10	VM	129
Poly(DL-*i*-bornyl methacrylate)	1-Octanol	39.6	A	396
Poly(4-*t*-butylcyclohexyl methacrylate)	Cyclohexane	−133		288
	n-Butanol	40		288
Poly(*n*-butyl methacrylate)	*i*-Butanol	10.7	VM	205
	n-Decane	84.8	VM	205
	Dimethylformamide	23.6	PE	254
	n-Dodecane	101	VM	205
	Ethanol	≈45	IG	412
	n-Hexadecane	119.8	VM	205
	Methyl carbitol	87.9	PE	254
	Methyl cellosolve	59.6	PE	254
	n-Octane	68.9	VM	205
	i-Propanol	20.9	VM	205
		21.5	A,VM	50
		23	IG	412
		23.7	A, PE	54
		25	A	348
Poly(*i*-butyl methacrylate), isotactic	Dimethylformamide	48.1	PE	254
	Methyl carbitol	115.6	PE	254
	Methyl cellosolve	74.9	PE	254
Poly(*t*-butyl methacrylate)	Cyclohexane	10	VM	466
		10	PE	518
	n-Heptane	64	PE	518
Poly(2-*t*-butylphenyl methacrylate)	Cyclohexane	18.5	PE,VM	336
Poly(*p*-*t*-butylphenyl methacrylate)	Cyclohexane	25	VM	121
Poly(2-chloroethyl methacrylate)	*o*-Dichlorobenzene	35.7	A	397
Poly(cyclobutyl methacrylate)	*n*-Butanol	37.5	PE	404
Poly(cyclobutylmethyl methacrylate)	*n*-Butanol	40.0	VM	504
Poly(cyclododecyl methacrylate)	Hexyl acetate	35	PE	404
Poly(cyclohexyl methacrylate)	*n*-Butanol	22.5	A,VM	166
		22.5	VM	131
		22.5	VM	312
	n-Decane	93.6	VM	312
	n-Decanol	23.0	VM	312
	n-Dodecane	97.5	VM	312
	n-Hexanol	9.2	VM	312
	n-Nonanol	20.2	VM	312
	n-Octane	83.4	VM	312
	n-Octanol	17.9	VM	312
	n-Propanol	39.5	VM	312
Poly(cyclooctyl methacrylate)	2-Butanol	45	PE	404
Poly(cyclopentyl methacrylate)	Cyclohexane	36	A	404
Poly(decyl methacrylate)	Ethyl acetate	11	A	401,457
	n-Pentanol	9.6	PE	140
Poly(2,6-dimethylphenyl methacrylate)	Toluene	25.0	A	411
	Tetrahydrofuran/water (90.6/9.4)	25.0	A	411
Poly(2,6-diisopropylphenyl methacrylate)	Tetrahydrofuran/water (90.1/9.1)	25	VM	467

TABLE 1. *cont'd*

Polymer (mol/mol)	Theta solvent (v/v)	Theta temp. (°C)	Method	Refs.
Poly(diphenylmethyl methacrylate)	3-Heptanone	45	PE,VM	405,478
Poly(docosyl methacrylate)	Amyl acetate	31	A	401,457
Poly(dodecyl methacrylate)	*n*-Amyl alcohol	29.5	A,VM	247
Poly(ethylbutyl methacrylate)	*i*-Propanol	27.4	A, PE	77
Poly(ethyl methacrylate)	Butanone/*i*-propanol (12.5/87.5)	23	A, PE	52
	n-Butyl bromide	0	VM	349
	Methyl *n*-propyl ketone	−1	VM	349
	i-Propanol	36.9	A, PE	54
		36.9	VM	474
	m-Xylene	−3	VM	349
Poly(glycidyl methacrylate-*co*-lauryl methacrylate) (3/97)	Ethanol/*n*-heptane (69/31)	−24	CP	257
	(62/38)	1	CP	257
	(56/44)	24	CP	257
	(49/51)	40	CP	257
	n-Heptane/*n*-propanol (56/44)	1	CP	257
	(70/30)	24	CP	257
Poly(*n*-hexyl methacrylate)	*i*-Propanol	32.6	A, PE	47
		37	VM	34
	n-Propanol	20.0	A	388
		21.3	PE	388
	Urea/water (4 mol/l)	10	VM	86
	(6 mol/l)	27.2	VM	86
	(8 mol/l)	52.5	VM	86
Poly(2-hydroxyethyl methacrylate), it	2-Butanol	3.7	VM	484
	Ethanol	15.8	VM	484
	1-Propanol	32.1	VM	484
	2-Propanol	14.0	VM	484
	Water	15.3	VM	484
Poly(isobutyl methacrylate)	2-Hydroxymethyltetrahydrofuran	19.5	PE	507
Poly(*n*-lauryl methacrylate)	*i*-Propyl acetate	13	A, PE	48
		13	PE,VM	489
	n-Pentanol	29.5	A, PE	206
		29.5	VM	208
Poly(5-*p*-menthyl methacrylate)	2-Pentanone	25	VM	336
Poly(methacrylic acid)	Dioxane/dimethylformamide (7/5)	26.9	VM	392
	HCl/water (0.002 mol/l)	30	VM	165
	Methanol	151	PE	393
		26	VM	394
	NaCl/water (0.5 mol/l)	43	A	164
	(0.05 mol/l)	68	A	164
Poly(methacrylonitrile)	Dimethylformamide	29.2	VM	275
Poly(hexyleneoxyphenylenecarboxy-phenyleneoxymethylene methacrylate)	Toluene	15.5	A	402
	Toluene-d_8	6.5	A	402
Poly(methyl *n*-butacrylate)	*n*-Butanol	13	A	155
Poly(methyl ethacrylate)	Di(*i*-butyl) ketone	11.4	A	155
Poly(methyl methacrylate)	Acetone	−126		288
		−(55 ± 10)	VM	112
	Acetone/ethanol (47.7/52.3)	25	A, CP	96
	Acetone/methanol (78.1/21.9)	25	VM	278
	Acetonitrile	28	VM	278
		30	A,VM	57
		30.5	RGM	414
		32.3	A,VM	409
		38	VM	162
		44	A	407,410,519
		44	DM,VM	427
		44.0	RGM	512,513
		45 ± 10	VM	112
		60	PE,VM	112
	Acetonitrile/butanol (93/7)	25	A	220
	Acetonitrile/methanol (90/10)	25	A	220
	Acetonitrile/pentyl acetate (93/7)	25	A	220
	Acetonitrile/*n*-propanol	25	A	220

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TABLE 1. *cont'd*

Polymer (mol/mol)	Theta solvent (v/v)	Theta temp. (°C)	Method	Refs.
	i-Amyl acetate	57.5	A	174
	n-Amyl acetate	41	VM	112
	n-Amyl methyl ketone	15	VM	293
	Benzene	−223	VM	112
	Benzene/*n*-hexane (70/30)	20	CP	128
	2-Butanol/1-chlorobutane (80/20)	39.2	A	403
	Butanone	−98	VM	112
	Butanone/cyclohexane (59.5/40.5)	25	A, CP	96
	Butanone/*n*-hexane (70.7/29.3)	25	A, CP	96
	Butanone/*i*-propanol (58.2/41.8)	4	A	174
	(55/45)	7.0	A	311
	(55/45)	12.8	A	174
	(38/62)	20	CP	128
	(50/50)	22.8	A	174
	(50/50)	25	PE	300
	(50/50)	25	VM	32
	(50/50)	25	A	49
	(58.2/41.8)	25	A	96
	(46.8/53.2)	28.5	A	174
	2-Butoxyethanol	75.0	VM	278
		75.0	VM	443
	n-Butyl acetate	−20	A	174
	n-Butyl chloride	32.6	A	173
		34.0	VM	278
		35.0	A	311
		35.0	RGM	414
		35.0		509
		35.4	A	174
		35.4	VM	400
		40.6	A	407
		40.8	DM,VM	427
		40.8	RGM	512,513
		40.8	A	519
	Carbon tetrachloride	27	VM	112
	Carbon tetrachloride/*n*-hexane (99.4/0.6)	25	CP	96
	Carbon tetrachloride/methanol (53.3/46.7)	25	CP	96
	Chloroform	−273	VM	112
	Cyclohexane/dioxane (53/47)	20	A,VM	82
	(53.4/46.6)	25	A,CP	96
	Cyclohexanol	77.6		117
	Cyclohexanone/*i*-propanol (51.6/48.4)	21–22	VM	279
	Decalin (trans)	23.5	VM	277
	Dichloroethane	−233	VM	112
	2,2-Dimethyl-4-pentanone	35	PE	112
	2,4-Dimethyl-3-pentanone	41	VM	32
		46	PE	112
	Dioxane/*n*-hexane (59/41)	20	CP	98
	Dioxane/water (85/15)	25	A	343
	2-Ethoxyethanol	27.1	VM	443
		30.1	VM	278
		37.8	A,VM	409
	Ethyl acetate	−98	VM	112
	Ethyl *n*-butyraldehyde	22	PE	112
	2-Heptanone	11	VM	112
		11.5	RGM	414
	3-Heptanone	25	VM	112
		33.7	PE	300
	4-Heptanone	33.8	PE	112,516
		34 ± 10	VM	112
		40.4	A	174
	n-Hexane/3-methyl-2-butanone (17/83)	20	CP	99
	n-Hexane/toluene (18.8/81.2)	25	CP	96
	Methanol/toluene (64.3/35.7)	26.2	A, PE	54

TABLE 1. *cont'd*

Polymer (mol/mol)	Theta solvent (v/v)	Theta temp. (°C)	Method	Refs.
	2-Methoxyethanol	−2	VM	278
		−2	VM	443
	Methyl *i*-butyrate	−(53 ± 10)	VM	112
	Methyl methacrylate	−163	VM	112
	2-Methyl-4-pentanone	−42	A	174
	Methyl *i*-valerate	−37	A	174
	Nitrobenzene/*i*-propanol (51.6/48.4; w/w)	18	VM	227
	Nitromethane	32.0	RGM	414
	2-Octanone	60	PE	112
	3-Octanone	72	PE	112,516
	Tetralin	74	CT	147
	Toluene	−(65 ± 10)	VM	112
		−178	PE	408
	m-Xylene	24	VM	277
$x_i = 0.07$	*p*-Cymene	159.7	PE	300
	n-Propanol	84.4	PE	300
$x_i = 0.08$	Acetonitrile	43.0	A	511
$x_i = 0.09$	Butanone/*i*-propanol (50/50)	30.3	PE	300
	p-Cumene	152.1	PE	300
	3-Heptanone	40.0	PE	300
	n-Propanol	75.9	PE	300
$x_i = 0.94$	Acetonitrile	27.6	PE	187
	Butanone/*i*-propanol (55/45)	25.0	A	311
	n-Butyl chloride	26.5	A	311
$x_i = 1.00$	Butanone/*i*-propanol (55/45)	8.0	A	311
	n-Butyl chloride	26.5	A	311
	n-Propanol	85.2	PE	300
Poly(methyl methacrylate-*co*-9,10-anthrylenedimethyl dimethacrylate (99.86/0.14)	Toluene/octane (78/22)	25	PL	399
Poly(methyl methacrylate-*block*-α-methylstyrene)	1-Chlorohexane	93	PE	179
	3-Heptanone	84	PE	179
	2-Methyl cyclohexanol	62	PE	179
	2-Octanone	94	PE	179
Poly(methyl methacrylate-*alt*-styrene) (50/50)	Cyclohexanol	60.8	A,VM	181
Poly(methyl methacrylate-*block*-styrene)				
(14.9/85.1)	Cyclohexanol	84	A,VM	181
(15.4/84.6)		84	A	267
(26.8/73.2)		84	A,VM	180
(27.6/72.4)		84	A	267
(various)		82	PE	179
(50/50)		81.6	A	118
(50/50)		81.1	A,VM	181
(50.4/49.6)		81.3	A,VM	180
(50.4/49.6)	2-Ethoxyethanol	81.0	A,VM	180
(51.4/48.6)		81.0	A	267
(51.4/48.6)	Cyclohexanol	81.3	A	267
(64.1/35.9)		80.5	A	267
(64.1/35.9)	2-Ethoxyethanol	69.5	A	267
Poly(methyl methacrylate-*co*-styrene)				
(23.7/76.3)	Benzene/*n*-hexane (44/56)	20	CP	99
	Benzene/*i*-propanol (57/43)	20	CP	99
	n-Hexane/3-methylbutane (40/60)	20	CP	99
(29.8/70.2)	Cyclohexanol	63.0	A,VM	180
	2-Ethoxyethanol	72.8	A,VM	180
(30.6/69.4)	Cyclohexanol	63.0	A	267
	2-Ethoxyethanol	72.8	A	267
(41.9/58.1)	Benzene/*n*-hexane (51/49)	20.0	CP	99
	Benzene/*i*-propanol (51/49)	20.0	CP	99
	n-Hexane/3-methylbutanone (34/66)	20.0	CP	99
(43.8/56.2)	Cyclohexanol	61.3	A,VM	180
	2-Ethoxyethanol	58.4	A,VM	180
(44.8/55.2)	Cyclohexanol	61.3	A	267
	2-Ethoxyethanol	58.4	A	267

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TABLE 1. *cont'd*

Polymer (mol/mol)		Theta solvent (v/v)	Theta temp. (°C)	Method	Refs.
	(48.0/52.0)	Cyclohexanol	61.6	A,VM	181
	(50.0/50.0)	Cyclohexanol	68.6	A	118
	(51.4/48.6)	Cyclohexanol	81.3	A	178
		2-Ethoxyethanol	81.0		178
	(57.7/42.3)	Benzene/*n*-hexane (59/41)	20	CP	99
		Benzene/*i*-propanol (48/52)	20	CP	99
		n-Hexane/3-methylbutanone (29/71)	20	CP	99
	(64.1/35.9)	Cyclohexanol	80.5	A	178
		2-Ethoxyethanol	69.5	A	178
	(70.7/29.3)	Cyclohexanol	68.0	A,VM	180
		2-Ethoxyethanol	40	A,VM	180
	(71.5/28.5)	Cyclohexanol	68.2	A	267
		2-Ethoxyethanol	40	A	267
	(73.9/26.1)	Benzene/*n*-hexane (62/38)	20	CP	99
		Benzene/*n*-propanol (41/59)	20	CP	99
		n-Hexane/3-methylbutanone (24/76)	20	CP	99
Poly(β-naphthyl methacrylate)		Tetralin	20	VM	264
		Toluene	52	VM	264
Poly(octadecyl methacrylate)		Butyl acetate	10.5	A	406
Poly(*n*-octyl methacrylate)		*n*-Butanol	16.8	A, PE	51
Poly(*i*-octyl methacrylate)		Acetone/*n*-heptane (64.1/35.9)	25	A, CP	161
Poly(*i*-octyl methacrylate-*co*-styrene) (20/80)		Butanone/methanol (99.4/0.6)	25	A, CP	161
Poly(pentachlorophenyl methacrylate)		Benzene	37	PE	287
			40	R,VM	24
		Benzene/ethylbenzene (5/5)	30	PE	287
		Benzene/toluene (1/9)	10	PE	287
		(5/5)	14	PE	287
		Chloroform	35	PE	287
		o-Dichlorobenzene	−126		288
		Ethylbenzene	25	PE	287
			25		288
			25	R,VM	24
Poly(4-phenylbutyl-1-methacrylate)		1-Chloroundecane	23.0	VM	477
Poly(2-phenylethyl-1-methacrylate)		1-Chloroheptane	27.5	VM	477
Poly(phenyl thiolmethacrylate)		Butanone	25	VM	176
Poly(stearyl methacrylate)		Propyl acetate	36	A	401,457
Poly(tetrahydrofurfuryl methacrylate)		2-Hydroxymethyltetrahydrofuran/methanol (80/20)	31.2	PE,VM	359
Poly(tetrahydro-4*H*-pyranyl-2-methacrylate)		*i*-Butanol	30.5	A	481
Poly(2,4,5-trichlorophenyl methacrylate)		Benzene	21.8	VM	395
			25.0	VM	398
Poly(tridecyl methacrylate)		Ethyl acetate	27	A	401,457
1.7. OTHER CARBON CHAINS					
Poly[di(*n*-amyl) itaconate]		Acetone/methanol (99/1)	30	CP	350
		Acetone/water (98/2)	30	CP	350
		Benzene/methanol (60/40)	30	CP	350
		Butanone/methanol (63/37)	30	CP	350
		Chloroform/methanol (52/48)	30	CP	350
		Ethyl acetate/methanol (65/31)	30	CP	350
		Methanol/toluene (43/57)	30	CP	350
Poly(dibenzyl itaconate)		Tetrahydrofuran/water (87.4/12.6)	25.0	VM	470
Poly[di(*n*-butyl) itaconate]		Acetone/methanol (99/1)	30	CP	350
		Acetone/water (97/3)	30	CP	350
		Benzene/methanol (42/58)	30	CP	350
		Butanone/methanol (38/62)	30	CP	350
		Chloroform/methanol (40/60)	30	CP	350
		Ethyl acetate/methanol (40/60)	30	CP	350
		Methanol/toluene (54/46)	30	CP	350
Poly[di(*n*-decyl) itaconate]		Benzene/methanol (82/18)	30	CP	350
		Chloroform/methanol (75/25)	30	CP	350
		Methanol/toluene (21/79)	30	CP	350
Poly(diethyl itaconate)		Acetone/water (91/9)	30	CP	350
		Benzene/*n*-heptane (53/47)	30	CP	350

TABLE 1. *cont'd*

Polymer (mol/mol)	Theta solvent (v/v)	Theta temp. (°C)	Method	Refs.
	Butanone/mineral spirits (34/66)	30	CP	350
	Ethanol/water (91/9)	30	CP	350
Poly[di(*n*-heptyl) itaconate]	Benzene/methanol (42/58)	30	CP	350
	Butanone/methanol (88/12)	30	CP	350
Poly[di(*n*-hexyl) itaconate]	Benzene/methanol (64/36)	30	CP	350
	Butanone/methanol (68/32)	30	CP	350
	Chloroform/methanol (64/36)	30	CP	350
	Ethyl acetate/methanol (78/22)	30	CP	350
	Methanol/toluene (28/72)	30	CP	350
Poly(dimethyl itaconate)	Acetone/methanol (71/29)	30	CP	350
	Acetone/water (80/20)	30	CP	350
	Benzene/*n*-hexane (93/7)	30	CP	350
	Benzene/methanol (41/59)	30	CP	350
	Butanone/cyclohexane (86/14)	30	CP	350
	Butanone/*n*-hexane (90/10)	30	CP	350
	Butanone/methanol (62/38)	30	CP	350
	Chloroform/methanol (32/68)	30	CP	350
	Ethanol/water (95/5)	30	CP	350
Poly(*N*-2,4-dimethyl phenylmaleimide)	Butyl acetate	21	DM,VM	342
Poly[di(*n*-nonyl) itaconate]	Ethanol/water (5/95)	30	CP	350
Poly[di(*n*-octyl) itaconate]	Benzene/methanol (80/20)	30	CP	350
	Butanone/methanol (99/1)	30	CP	350
	Chloroform/methanol (71/29)	30	CP	350
	Ethyl acetate/methanol (99/1)	30	CP	350
	Methanol/toluene (22/78)	30	CP	350
Poly[di(*n*-propyl itaconate]	Acetone/water (94/6)	30	CP	350
	Ethanol/water (8/2)	30	CP	350
Poly[di(*n*-undecyl) itaconate]	Benzene/methanol (83/17)	30	CP	350
	Chloroform/methanol (77/23)	30	CP	350
Poly[*N*-(*n*-octadecyl) maleimide]	*n*-Butanol	120.5	CP,VM	17
	n-Decanol	39.3	CP,VM	17
	n-Hexanol	78.9	CP,VM	17
	n-Octanol	53.6	CP,VM	17
Poly(mono(*n*-octyl) itaconate)	2-Propanol	30	VM	386
Poly(tetrafluoroethylene-*co*-trifluoronitrosomethane (1/1)	Trichlorotrifluoroethane	35	VM	248

TABLE 2. HETEROCHAIN POLYMERS

Polymer (mol/mol)	Theta solvent (v/v)	Theta temp. (°C)	Method	Refs.
2.1. POLY(ACETALS) AND POLY(ETHERS)				
Poly(oxy-2,6-dimethyl-1,4-phenylene)	Methylene chloride	89.2	VM	317
Poly(oxyethylene); poly(ethylene oxide)	Acetonitrile/*i*-propyl ether (45/55)	20	CP	98
	Benzene/*i*-octane (100/48)	70.8	CT	134
		71	PE	8
	$CaCl_2$/water (2 mol/l)	82	CT	260
		86	CT	36
	Chloroform/*n*-hexane (54/46)	20	CP	98
	(47.4/52.6)	20	CT,VM	90
	CsCl/water (2 mol/l)	60	CT	260
	Diethylene glycol diethylether	50	VM	25
	KCl/water (2 mol/l)	54	CT	36
		57	CT	260
	KF/water (0.30 mol/l)	78.0	PE	482
	(0.50 mol/l)	66.0	PE	482
	(0.80 mol/l)	49.0	PE	482
	(1.00 mol/l)	38.0	PE	482
	KNO_3/water (2 mol/l)	65	CT	36
	KOH/water (1.24 mol/l)	25	PE,VM	416
	K_3PO_4/water (0.20 mol/l)	63.0	PE	482

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Table 2. *cont'd*

Polymer (mol/mol)	Theta solvent (v/v)	Theta temp. (°C)	Method	Refs.
	(0.30 mol/l)	45.0	PE	482
	(0.35 mol/l)	38.0	PE	482
	(0.40 mol/l)	26.0	PE	482
	K_2SO_4/water (0.45 mol/l)	34	CT	259
		34	CT	36
		35	PE	13
		35	VM	25
	LiCl/water (2 mol/l)	90	CT	36
		90	CT	260
	Methyl *i*-butyl ketone	50	VM	25
	$MgCl_2$/water (2 mol/l)	80	CT	260
		90	CT	36
	$MgSO_4$/water (0.39 mol/l)	42	CT	259
		42	CP	36
		42		536
		45	PE	13
	NaCl/water (2 mol/l)	60	CT	260
		61	CT	260
	Na acetate/water (0.75 mol/l)	75.0	PE	482
	(1.50 mol/l)	55.0	PE	482
	(2.00 mol/l)	45.0	PE	482
	(3.00 mol/l)	31.0	PE	482
	$Na_2S_2O_3$ (0.20 mol/l)	74.0	PE	482
	(0.30 mol/l)	63.0	PE	482
	(0.40 mol/l)	52.0	PE	482
	(0.50 mol/l)	41.0	PE	482
	NH_4Cl/water (2 mol/l)	76	CT	260
		77	CT	36
	Nitroethane/*i*-propyl ether (45/55)	20	CP	98
	RbCl/water (2 mol/l)	56	CT	260
	$SrCl_2$water (2 mol/l)	73	CT	260
		82	CT	36
	$ZnSO_4$/water (0.30 mol/l)	54.0	PE	482
	(0.35 mol/l)	48.0	PE	482
	(0.45 mol/l)	35.0	PE	482
	21 salts in water (various concentrations)	97		417
	Water	5.1	DM,VM	45
		96	CT	36
		102	A	418
		103	VM	416
		108.3	VM	419
		117	CT	260
		92 – 109	VT	383
Poly(oxyethylethylene), poly(butylene oxide)	*i*-Propanol	29.8	VM	225
		30	VM	35
Poly(oxy(2-hydroxytrimethylene)oxy-1,4-phenylene-isopropylidene-1,4-phenylene)	Cyclohexanone/toluene (32.5/67.5)	22	VM	194
	Tetrahydrofuran/toluene (2/1)	30	SM	37
Poly(oxypropylene); poly(propylene oxide)	*i*-Octane	50	A	10
Poly(oxytetrafluoroethylene)-*co*-poly(oxydifluoromethylene) (40/60)	Freon TF	25	VM	415
Poly(oxytetramethylene); poly(tetrahydrofuran)	Acetonitrile/benzene (61.5/38.5)	25	CP	94
	Acetonitrile/butanone (38.3/61.7)	25	CP	94
	Acetonitrile/carbon tetrachloride (50.2/49.8)	25	CP	94
	Acetonitrile/chlorobenzene (60.1/39.9)	25	CP	94
	Acetonitrile/tetrahydrofuran (58.7/41.3)	25	CP	94
	Acetonitrile/toluene (61/39)	25	CP	94
	n-Butanol	5	PE	107
	Butanone	25	VM	214
	Chlorobenzene	25	VM	214
	Chlorobenzene/*n*-octane (25.0/75.0)	10	A, CP	106
	(21.5/78.5)	25.8	A, CP	106

Table 2. *cont'd*

Polymer (mol/mol)	Theta solvent (v/v)	Theta temp. (°C)	Method	Refs.
	(14.5/85.5)	46.0	A, CP	106
	(13.0/87.0)	63.0	A, CP	106
	(10.9/89.1)	80.0	A, CP	106
	Cyclohexane/*n*-heptane	26	VM	214,228
	Diethyl malonate	33.5	PE	105
	Ethyl acetate/*n*-hexane (22.7/77.3)	30.4	PE	105
		33	A	199
	i-Propanol	44.6	PE	105
	Toluene	28.3	A	9
Poly(oxytrimethylene)	Cyclohexane	27	PE	55
2.2. POLY(ESTERS)				
Poly(bisphenol A-*co*-(isophthalic acid + terephthalic acid; 1:1)	Cyclohexane/dioxane (32/68)	25	CP	437
Poly(decamethylene perfluorosebacate)	*s*-Tetrachloroethane	25	VM	446
Poly(diphenylphthalide dicarboxylic acid-*alt*-*p,p'*-dihydroxydiphenyl)	Dichloroethane	25	A	420
Poly(β-hydroxybutyrate)	Chloroform/heptane (50.2/49.8)	25	CP	421
	2,2,2-Trifluoroethanol/water (52.6/47.4)	25	CP	421
Poly(1-(6-[4-(4-methoxyphenoxycarbonyl)-phenoxy]hexyloxycarbonyl)-1-methyl-ethylene)	Toluene	17.0	A,VM	506
Poly(oxyadipoyloxyhexamethylene); poly(hexamethylene adipate)	Cyclohexanol	64	PE	360
Poly(oxyadipoly-poly(oxyethylene) mol. wt. of PEOX = 150	Chloroform/*n*-hexane (65/35)	20	CP	98
200	(63/37)	20	CP	99
300	(62/38)	20	CP	98
387	(60/40)	20	CP	98
600	(59/41)	20	CP	98
2580	(57/43)	20	CP	98
7000	(56/44)	20	CP	98
Poly(oxyadipoyloxytetramethylene); poly(tetramethylene adipate)	Benzene/*n*-hexane (83.3/16.7)	25	CP	175
	Cyclohexanol	77	PE	360
	Chlorobenzene/*n*-hexane (75.9/24.1)	25	CP	175
	n-Hexane/nitrobenzene (43.3/56.7)	25	CP	175
Poly(oxycaproyl); poly(ε-caprolactone)	Benzene/*n*-hexane (85.1/14.9)	25	CP	175
	Chlorobenzene/*n*-hexane (70.2/29.8)	25	CP	175
	Nitrobenzene/*n*-hexane (67.0/33.0)	25	CP	175
Poly(oxycarbonyloxy-1,4-phenylene-isopropylidene-1,4-phenylene); bisphenol A polycarbonate	*n*-Butyl benzyl ether	170	A	27
	Chloroform	20	A	73
	Chloroform/ethanol (74.5/25.5)	18	CP	193
	Cyclohexane/dioxane (36.1/63.9; w/w)	25	VM	241
Poly(oxyethyleneoxyadipoyl)	Cyclohexanol	114.5	PE	360
Poly(oxyethyleneoxysuberoyl)	Cyclohexanol	88	PE	360
Poly(oxyethyleneoxyterephthaloyl); poly(ethylene terephthalate)	Cyclohexane/dichloroacetic acid (6/4)	25	A,VM	344
Poly(oxyoctamethyleneoctasebacoyl)	Benzene/*n*-hexane (48.3/51.7)	25	CP	175
	Bromobenzene/*n*-hexane (45.0/55.0)	25	CP	175
	Chlorobenzene/*n*-hexane (37.5/62.5)	25	CP	175
DL-Poly(oxy(1-oxo-3-methyltrimethylene)) poly(DL-β-methyl-propiolactone)	Butyl chloride	13	A,VM	143
Poly(oxysebacoyloxy-poly(oxyethylene)); mol. wt. of PEOX = 387	Acetonitrile/*i*-propyl ether (35.8/64.2)	20	CP	98
	Chloroform/*n*-hexane (56/44)	20	CP	98
Poly(12-oxystearoyl); poly(12-hydroxystearic acid)	*n*-Butanol/*n*-heptane (81/19)	1	CP	257
	Ethanol/*n*-heptane (39/61)	1	CP	257
	(51/49)	24	CP	257
	(59/41)	40	CP	257
	n-Heptane/*n*-propanol (35/65)	1	CP	257
	(16/84)	24	CP	257

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Table 2. *cont'd*

Polymer (mol/mol)	Theta solvent (v/v)	Theta temp. (°C)	Method	Refs.
Poly(oxysuberoyl-poly(oxyethylene)) mol. wt. of PEOX = 387	Acetonitrile/*i*-propyl ether (38.6/61.4)	20	CP	98
	Chloroform/*n*-hexane (58/42)	20	CP	98
Poly(oxysebacoyloxy-poly(oxyethylene)); mol. wt. of PEOX = 387	Acetonitrile/*i*-propyl ether (35.8/64.2)	20	CP	98
	Chloroform/*n*-hexane (61/39)	20	CP	98
Poly(phenolphthalein-*alt*-terephthalic acid)	Tetrahydrofuran	19	A	420
Poly[2,2-propane-bis(4-phenylthiocarbonate)]	Chloroform/cyclohexane (76.5/23.5)	25	VM	469
2.3. POLY(AMIDES)				
Poly(2-acrylamido-2-methylpropane sulfonamide)	Dioxane/water (18.5/81.5)	25	A,VM	475
Poly(γ-benzyl-L-glutamate)	Dichloroethane/diethylene glycol (80/20)	25	A	209
Poly([*n*-hexylimino)carbonyl]; poly(*n*-hexyl isocyanate)	Carbon tetrachloride/methanol (81.5/18.5)	25	CP	29
	Methanol/toluene (19.5/80.5)	25	CP	29
Poly(iminoadipoyliminohexamethylene); poly(hexamethylene adipamide)	Carbon tetrachloride/*m*-cresol/cyclohexane	20	SM	335
	Formic acid/KCl/water	25	A,VM	101
Poly(imino(1-oxohexamethylene)); poly(ε-caprolactam)	$CaCl_2$/methanol (15 g/dl)	35	VM	256
	Chloroform/perfluoro alcohol (7/3)	25	PE	198
	m-Cresol/decalin (25/75)	30	CT	148
	KCl in formic acid (2.3 mol/l)/water (90/10)	25	VM	422
Poly(iminoterephthaloylimino-2,2,4/2,4,4-trimethylhexamethylene)	Aniline	142	CT, PE	141
	Pyrroline	62	PE	141
Poly[*N*-methylimino(1-oxodecamethylene)]; poly(*N*-methyldodecane lactam)	Dioxane	30.5	A,VM	286
Poly(L-proline)	Trifluoroethanol	130	A	227
	Water	100	A	227
Poly(pyromellitic acid-*co*-4-amino-1,4-phenyleneoxy-1,4-phenyleneamine)	Dimethylacetamide/dioxane (1/2.5)	21	A,VM	449
Poly(pyromellitic acid-*co*-4-amino-1,4-phenyleneoxy-1,4-phenyleneoxy-1,4-phenyleneamine)	Dimethylacetamide/dioxane (1/7.5)	21	A,VM	449
2.4. POLYUREAS, POLYURETHANES AND OTHER NITROGEN CHAINS				
Poly(1,4-butylene glycol-*co*-4,4′-diphenyl-methanediisocyanate-*co*-poly(oxycaprolyl))	Dimethylformamide	82	VM	318
Poly(ethylene glycol-*co*-4,4′-diphenyl-methane diisocyanate)	Acetone/dimethylformamide (21/79)	25	VM	23
Poly[2-methoxy-4,6-di(*p,p*′-isopropylidene diphenyloxy) *s*-triazine]	Butanol/1,2-dichloroethane (38/62)	30	VM	435
Poly(ureylene heptamethylene); Poly(heptamethylene urea)	Dichloroacetic acid	46	VM	109
	Sulfuric acid (90%)	46	VM	109
Polyurethane from polypropylene glycol and 2,4,4-tolylene diisocyanate	2,4,4-Trimethyl pentane	39.5	VM	236
2.5. POLYSACCHARIDES				
Amylopectin	Water	25	A	325
Amylose	Acetone/dimethyl sulfoxide (43.5/56.5)	20	VM	40
	Dimethyl sulfoxide/methanol (49/51)	25.0	VM	61
	Dimethyl sulfoxide/0.5 mol/l KCl in water (25/75)	25	VM	61
	Guanidinium chloride in water (4.2 mol/l)	25	VM	424
	0.33 mol/l KCl in water	22.5	VM	14
		25	VM	108
	Sodium acetate buffer	25	VM	61
Amylose tricarbanilate	Pyridine/water (86.7/13.3)	25	A	15
Cellulose diacetate	Acetone	155	PE	330
		159.8	PE	426
	Butanone	37	PE	331
		49	PE	426

Table 2. *cont'd*

Polymer (mol/mol)	Theta solvent (v/v)	Theta temp. (°C)	Method	Refs.
		50	A	332
		158.8	PE	426
		170	PE	331
Cellulose triacetate	Acetone	27	PE	65
		181	PE	65
Cellulose tributyrate	Tetrachloroethane	56.6	A	150
Cellulose tricaproate	Dimethylformamide	41	A	191
Cellulose tricaprylate	Dimethylformamide	140	PE	215
	3-Phenylpropanol	48	PE	215
Cellulose tricarbanilate	Anisole	94	A	425
	Cyclohexanol	73	A	425
Dextran	Water	101.8	A	535
Hydroxyethyl cellulose	Water	−73	A	423
2.6. CARBON–SULFUR CHAINS				
Poly(arylate-arylenesulfonoxide)	Dioxane	23.5		501
Poly(arylate-*block*-arylenesulfonoxide)	Dioxane	23.5		501
Poly(propylene sulfide)	*n*-Heptane/toluene (31.5/68.5)	25	CP	261
Poly(sulfonyl-1,4-phenyleneoxy-1,4-phenylene-dimethylmethylene-1,4-phenylene-oxy)	Dimethylsulfoxide	105.5	VM	428
Poly(arylene sulfonate)	Dioxane	26.8	PE	436
Poly(diphenylether sulfone)	Dimethylformamide/methanol (83/17)	25.0	VM	500
2.7. SILICON–OXYGEN CHAINS				
Poly(oxydimethylsilylene) poly(dimethyl siloxane)	Acetone/toluene (6/5)	29.5	A	68
	Benzene	−7	A	202
		−5.2	VM	201
		−3	A	202
	Benzyl alcohol/carbon tetrachloride (21.2/78.8)	25	CP	94
	Benzyl alcohol/chloroform (12.8/87.2)	25	CP	94
	Benzyl alcohol/ethyl benzene (14.6/85.4)	25	CP	94
	Benzyl alcohol/methylene chloride (22.7/77.3)	25	CP	94
	Benzyl alcohol/trichloroethylene (21.7/78.3)	25	CP	94
	Benzyl alcohol/toluene (16.2/83.8)	25	CP	94
	Bromobenzene	78.3	VM	201
		78.7	A	309
	Bromocyclohexane	28	VM	433,459
		36.8	VM	201
		39.0	A	209
	Bromocyclohexane/phenetole (85.7/14.3)	36.3	A	309
	Butanone	19.8	PE	432
		19.8	VM	201
		20.0	A	67
		20.0	PE	111
		20.0	A	202
	n-Butyl acetate	−38.2	VM	201
	Chlorobenzene	−19.2	VM	201
		68	A	202
	Chlorobenzene/dimethyl phthalate (88.2/11.8)	56.3	A	309
	Cyclohexane	−81	A	202
		−68.2	VM	201
	Cyclohexanol/toluene (34/66)	25	CP	94
	Dichlorobenzene	87	PE	71
	Ethanol/*n*-heptane (49/51)	63	CT	72
		65	PE	72
		67 ± 2		536
	Ethyl acetate	4.8	VM	201
		18	A	202
	Ethyl iodide	2.1	A	309
	n-Heptane	−173.2	VM	201
	n-Hexane	−173.2	VM	201
	Methylcyclohexane	−113.2	VM	201

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Table 2. *cont'd*

Polymer (mol/mol)	Theta solvent (v/v)	Theta temp. (°C)	Method	Refs.
	Methylcyclopentane	−98.2	VM	201
	Nitroethane/toluene (25.9/74.1)	25	CP	94
	Nitromethane/toluene (18.9/81.1)	25	CP	94
	Nitropropane/toluene (36/64)	25	CP	94
	n-Nonane	−113.2	VM	201
	n-Octane	−143.2	VM	201
	Perfluorooctane/tetrachlorodifluoroethane (33.2/66.8; w/w)	22.5	A, PE	67
	Phenetole	83.0	PE	111
		83.0	A	202
		89.3	VM	201
		89.5	A	309
	n-Propyl acetate	−28.2	VM	201
	Styrene	35	A	429
	Toluene	−30	A	202
		−33.2	VM	201
	Xylene	−47	A	202
		−48.2	VM	201
Poly(methylphenylsiloxane)	Di-*i*-butylamine	30.4	VM	487
Poly(phenylsilasesquioxane)	1,2-Dichloroethane	50.5	VM	138,431
		56		276
	Mesitylene/toluene (30/70)	25	A	185
Poly(γ-trifluoropropyl methyl siloxamer)	Cyclohexyl acetate	25	VM	38
	Methyl hexanoate	72.8	VM	38
2.8. PHOSPHORUS–OXYGEN CHAINS				
Poly(phosphate)	LiBr/water (1.80 mol/l)	25	A	326
	LiCl/water (0.40 mol/l)	20	A	297
	NaBr/water (0.415 mol/l)	25	A	327

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Table 2. *cont'd*

Polymer (mol/mol)	Theta solvent (v/v)	Theta temp. (°C)	Method	Refs.
	Methylcyclopentane	−98.2	VM	201
	Nitroethane/toluene (25.9/74.1)	25	CP	94
	Nitromethane/toluene (18.9/81.1)	25	CP	94
	Nitropropane/toluene (36/64)	25	CP	94
	n-Nonane	−113.2	VM	201
	n-Octane	−143.2	VM	201
	Perfluorooctane/tetrachlorodifluoroethane (33.2/66.8; w/w)	22.5	A, PE	67
	Phenetole	83.0	PE	111
		83.0	A	202
		89.3	VM	201
		89.5	A	309
	n-Propyl acetate	−28.2	VM	201
	Styrene	35	A	429
	Toluene	−30	A	202
		−33.2	VM	201
	Xylene	−47	A	202
		−48.2	VM	201
Poly(methylphenylsiloxane)	Di-*i*-butylamine	30.4	VM	487
Poly(phenylsilasesquioxane)	1,2-Dichloroethane	50.5	VM	138,431
		56		276
	Mesitylene/toluene (30/70)	25	A	185
Poly(γ-trifluoropropyl methyl siloxamer)	Cyclohexyl acetate	25	VM	38
	Methyl hexanoate	72.8	VM	38
2.8. PHOSPHORUS–OXYGEN CHAINS				
Poly(phosphate)	LiBr/water (1.80 mol/l)	25	A	326
	LiCl/water (0.40 mol/l)	20	A	297
	NaBr/water (0.415 mol/l)	25	A	327

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Solvents and Non Solvents for Polymers

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A. INTRODUCTION

The tables contain qualitative solubility data for a selected number of polymers. Since no standard definition for solvent–nonsolvent systems has been used in most of the original sources, the recognition of a certain compound as a solvent or nonsolvent is to some extent influenced by personal interpretation. No attempt has been made to edit the original information. Division into only two classes, solvents and nonsolvents, is dictated by the practical point of view. For more quantitative information, the user is referred to the tables of theta solvents and fractionation of polymers in this Handbook.

The arrangement of polymers into classes is based on chemical structure. Since properties change gradually within a series of homologs, polymers are arranged according to increasing complexity, as regards the size of the monomer unit, and the kind and number of substituents. Only when this principle could not be applied was an alphabetical listing chosen. We believe that a typical solution behavior of similar polymers may be recognized more easily by this arrangement. When formulas are given, they refer to the main structures present in the polymers.

Polymers are named in a manner thought to be most recognizable to the reader. IUPAC or common names (and sometimes both) are used.

The table has nearly doubled in size since the last edition. New polymer categories include copolymers, main-chain carbonyl polymers, block copolymers and dendrimers, emphasizing recently developed materials. Copolymers are generally named with the dominant monomer given first, but the reader should check alternate names, since each polymer is listed only once. Solubility of copolymers generally resemble more or less the properties of the dominating monomer, although they often exhibit higher solubilities than the corresponding homopolymers. The solubility of block copolymers may reflect the solubilizing/dispersing power of one of the polymer segments rather than true solubility of all segments. Dendrimers are shown as the repeating monomer unit, with the terminal unit specified when known.

Solubility normally increases with rising temperature. However, negative temperature coefficients in some solvents are observed. This is particularly true for cellulose and poly(ethylene oxide)s.

Increasing molecular weight generally reduces solubility.

Increased branching increases the solubility compared to a linear polymer of the same molecular weight.

Certain combinations of two or more solvents may become nonsolvents. Conversely, mixtures of two or more nonsolvents may sometimes become solvents. These possibilities should be considered if new solvent–nonsolvent combinations are to be examined. It is recommended that the reader consults the solubility parameter section in this Handbook.

The classification of a certain compound as a nonsolvent does not necessarily imply its ability to act as a precipitant since this is also influenced by the nature of the particular solvent of a solvent–nonsolvent pair. However, most nonsolvents combine both properties.

The list of solvents and nonsolvents for each polymer is arranged alphabetically. If class names are used, they refer to the most common compounds. Less common compounds, although falling into a class already mentioned, are additionally cited.

Water is a nonsolvent for most polymers and is, therefore, often not mentioned or only mentioned if similar polymers or derivatives are water soluble.

The data refer to room temperature unless otherwise stated.

Homologs and closely related compounds generally have similar solubility properties. When specific solvents or nonsolvents are cited, it is done so with the understanding that homologs and compounds with similar structures can be expected to exhibit similar properties.

B. ABBREVIATIONS

bzn.	Benzene
DMA	*N,N*-Dimethylacetamide
DMF	*N,N*-Dimethylformamide
DMSO	Dimethyl sulfoxide
HMPT	Hexamethylphosphoric triamide
TMS	Tetramethylene sulfone
THF	Tetrahydrofuran
W	Water
aqu.	Aqueous
conc.	Concentrated
DS	Degree of substitution
degrad.	Degradation
dil.	Diluted
mol. wt.	Molecular weight
rt	Room temperature
SC	Substituent content
sw	Swelling
temp.	Temperature

C. TABLES OF SOLVENTS AND NONSOLVENTS

TABLE 1. MAIN-CHAIN ACYCLIC CARBON POLYMERS

Polymer	Solvents	Nonsolvents	Refs.
1.1. POLY(DIENES), POLY(ACETYLENES) (see also 6.1, 6.2)			
Poly(dienes) unsubstituted			
Poly(allene)	Bzn., halogenated hydrocarbons	Hexane, methanol	1
Poly(1,2-butadiene)	Toluene		2
57% 1,2-	Chloroform		3
Poly(1,3-butadiene)	Higher aliphatic ethers, hydrocarbons, higher ketones, THF	Alcohol, dil. acids, dil. alkalies, hypochlorite solutions, lower ketones and esters, nitromethane, propionitrile, W	4–6
98% *cis*-, 2% 1,2-	Bzn., toluene		7
95% *cis*-, 1% *trans*-	Cyclohexane		7
100% *cis*-	Bzn., heptane/hexane (1/1)		7
97% *trans*-, 3% 1,2-	Cyclohexane, toluene		7
Poly(isoprene),	See Poly(1,3-butadiene)		
cis-, with chlorosulfonylisocyanato groups	Toluene	Diethyl ether, hexane	8
Poly(dienes) substituted			
Poly(2-*tert*-butyl-1,3-butadiene)	Bzn., carbon disulfide, carbon tetrachloride, chloroform, diethyl ether, heptane	Acetone, alcohol	9,10
Poly(dicyclopentadiene)	Toluene	Methanol	11
Poly(5,7-dimethyl-1,6-octadiene)	See Poly(2-*tert*-butyl-1,3-butadiene)		
Poly(1-methoxybutadiene), crystalline		Acetone, bzn., dioxane, heptane, methanol	12
Poly(2-chlorobutadiene), chloroprene	Bzn., carbon tetrachloride, chlorinated hydrocarbons, cyclohexane/toluene, cyclohexanone, dioxane, ethyl acetate, pyridine	Alcohols, aliphatic hydrocarbons, hydrogen fluoride, ketones, mineral oils, nonoxidizing conc. acids incl. hydrogen fluoride, toluene (sw), W	4–7,13
1,4-*cis*-	Bzn., chloroform, ether, hexane, THF	Acetone, ethanol, methanol	14
Poly[2-(chloromethyl)butadiene]	Dichloromethane, THF, toluene	Ethanol, methanol	686
Poly(perfluoro-1,4-pentadiene)	Hexafluorobenzene		
Poly(2,5-diheptyl-1,4-phenylenehexa-1,3,5-triene-1,6-diyl)	Acetone, bzn., chloroform		16
Poly(1,5-pentamethyl-2-enediyl)	Methylene chloride	Methanol	17
Poly(butadiene-*co*-styrene) (7 : 3–95 : 5)	Bzn., cyclohexane, toluene		7
Buna-S			
GR-S			
SBR rubber			
Poly(acetylenes)			
Poly(acetylene)	Aniline, DMF, isopropylamine	Acetone, bzn., carbon tetrachloride, cyclohexane, methanol, methylene chloride, pyridine	18
Poly(phenylacetylene)			
low mol. wt.	Acetone, carbon tetrachloride, methanol		19,20
high mol. wt.	Bzn., cyclohexane (hot), toluene	Methanol	19–21
Poly(diphenyldiacetylene), poly-(1,4-diphenyl-1,3-butadiene), $-C(C_6H_5)=C(C{\equiv}CC_6H_5)-$	Chloroform, cyclohexane, dioxane	Methanol	22
Poly[bis(alkylthio)acetylene]	Aromatic hydrocarbons, halogenated hydrocarbons		23
Poly[3-(*tert*-butoxycarbonylmethyleneiminocarbonyloxy)-8-(5-pyrimidyl)-oct-5-yn-7-ene-1,8-diyl]	Chloroform, hexane, THF		24
Poly[2-(dodecyloxycarbonyl)-1,4-phenyleneethynylene]	THF (hot)	Methanol	25
Poly(9,9-dipropargylfluorene),	Dichlorobenzene		26
Poly(1-propynyleneoxy-1,4-phenyleneisopropylidene-1,4-phenyleneoxy-2-propynylene)	DMF/pyridine	W	27,247
Poly(ethynylene-1,4-phenyleneoxy-1,4-phenyleneethynylene)	Dioxane, pyridine	Methanol	28
Poly(butadiene-*co*-acrylonitrile)	Acetone, bzn., chloroform		7

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TABLE 1. *cont'd*

Polymer	Solvents	Nonsolvents	Refs.
1.2. POLY(ALKENES)			
Poly(methylene)	See Polyethylene		
Polyethylene			
high density	Above 80°C: 1,2,4-trichlorobenzene, decalin, di-*n*-amyl ether, halogenated hydrocarbons, higher aliphatic esters and ketones, hydrocarbons, xylene	All common organic solvents at room temperature, more polar organic solvents even at elevated temperatures, inorganic solvents	4–7,13, 29,30
low density	As above, but temperature 20–30°C lower, depending on degree of branching	As above	5,7
chlorinated, 40% Cl	At elevated temperature: chlorobenzene, cyclohexanone, tetrachloroethane, tetrahydronaphthalene, toluene, xylene	Acetone, butanol, chloroform, dioxane, MEK, methanol, methyl acetate, THF	31
chlorinated, 60% Cl	At elevated temperature: acetone/carbon disulfide (1/1), aromatic hydrocarbons, chloroform, cyclohexane, THF	Acetone, aliphatic and cycloaliphatic hydrocarbons, ethanol, methanol, methyl acetate	31
chlorosulfonated, 30% Cl, 1.5% S	Chlorinated hydrocarbons, MEK, THF, toluene		32,33
Poly(ethylene *g*-maleic anhydride) (97 : 3)	Toluene, xylene	W	34
Poly(ethylene-*co*-propylene) (3 : 2)	Bzn., xylene (hot)		32
Poly(ethylene-*co*-acrylic acid) (6 : 1)	Xylene		32
Poly(vinyl chloride-*co*-ethylene) (1 : 9)	Cyclohexanone (hot), nitrobenzene/chloroform (1/1)		127
Poly(ethylene-*co*-propylene-*co*-5-methylene-2-norbornene) (40 : 55 : 5), PolyEPDM	1,2,4-Trichlorobenzene		32
Poly(propylene)			5,7
atactic	Bzn., chlorinated hydrocarbons at rt., cyclohexane, diethyl ether, ethylcyclohexane, hydrocarbons, isoamyl acetate, toluene	More polar organic solvents with small hydrocarbon group even at elevated temperature	
isotactic	See Polyethylene		
Poly(1-butene)			7,32
atactic	Bzn., chloroform, decalin, ethylcyclohexane, toluene		
isotactic	See Polyethylene, ethylcyclohexane		7
Poly(isobutene)	Aliphatic ethers, anisole, carbon disulfide, chlorinated hydrocarbons, di(2-chloroethyl) ether, diethylsulfide, higher alcohols, higher esters, hydrocarbons, THF	Lower alcohols, lower ketones and esters, nitromethane, lower organic acids, propionitrile	5,6,13, 30,35
Poly(4-methyl-1-pentene), isotactic	See Polyethylene		
Poly(2-methyl-3-hydroxy-1,4-butylene)	THF		36
Poly(1-hexene)	Chloroform, THF		37
Poly(cyclopentylethylene)	Chloroform, diethyl ether, toluene	Methanol	38
Poly(cyclohexylethylene)			
atactic	Chlorinated hydrocarbons, hydrocarbons, THF	Alcohols, ethers, dioxane, esters, ketones	39
stereospecific	At elevated temperature: bzn., chlorobenzene, decahydronaphthalene, *o*-dichlorobenzene, methylcyclohexane, tetrahydronaphthalene, xylene	Heptane, MEK, nitrobenzene	40
Poly(cyclohexylalkenes)	Chloroform, diethyl ether (partially), toluene	Methanol	41
Poly(cyclohexenylethylene)			
atactic	Aliphatic hydrocarbons	Acetone, ethanol	42
isotactic	Aromatic hydrocarbons, halogenated hydrocarbons (partially)	Acetone, aliphatic hydrocarbons, diethyl ether, ethanol	42
Poly(pentenamer), Poly(cyclopentene) $-[CH=CH(CH_2)_3]-$	Chlorinated hydrocarbons, hydrocarbons	Alcohols, aliphatic ketones, ethers	43
Poly(3,4-dicarboxypent-1-ene-1,5-diyl)	Chloroform, methanol	Diethyl ether	44

TABLE 1. *cont'd*

Polymer	Solvents	Nonsolvents	Refs.
Poly(3,4-dihydroxypent-1-ene-1,5-diyl)	DMSO, methanol	Ethanol	44
Poly(1,1-diphenyl-2-vinylcyclopropane)	Chloroform	Methanol	45
Poly(*p*-anthrylphenylethylene)	Bzn., chlorobenzene, methylene chloride	Methanol, ethanol, hexane, W	46
Poly(1-methylbicyclo-[2.2.1]-hept-2-ene)	Chlorobenzene, *p*-xylene	Methanol	47
Poly(vinylborazine)	Bzn.	Pentane	48
Poly(methylene-*alt*-5-hydroxycyclohexene-1,3-diyl)	Hexanes		49
Poly(ethylene-*co*-1,4-hexadiene) (97 : 3)	Toluene		50
Poly(ethylene-*co*-1-cyano-1,4-butylene) (1 : 2)	Acetone (hot), chloroform, DMA, DMSO	Methanol	51
Poly(isobutylene-*co*-4-methylstyrene) (95 : 5)	Chloroform		52
Poly[hexene-*co*-*N*,*N*-di(isopropyl)amino-1-pentene] (2 : 3)	Hexane		53
1.3. POLY(ACRYLICS), POLY(METHACRYLICS)			
1.3.1. POLY(ACRYLIC ACIDS)			
Poly(acrylic acid)			
atactic	Alcohols, dil. alkali solutions, formamide, DMF, W	Dioxane (hot) (sw), esters, hydrocarbons, ketones	4–6, 13,54
isotactic	Dioxane/water (80/20)	Dioxane	55
Poly(methacrylic acid)			
atactic	Alcohols, aqu. hydrogen chloride (0.002 M, >30°C), dil. aqu. sodium hydroxide, W	Carboxylic acids, esters, hydrocarbons, ketones	4,5
isotactic, syndiotactic	W(partially)		56
Poly(acrylic acid-*co*-9-vinylphenanthrene) (3 : 2)	THF		57
Poly(itaconic acid)	DMF, methanol, W	Acetone, aniline, bzn., carbon disulfide, chloroform, ethanol, ethyl acetate, THF	58
1.3.2. POLY(ACRYLATES)			
General	Aromatic hydrocarbons, chlorinated hydrocarbons, esters, ketones, THF	Aliphatic hydrocarbons, hydrogenated naphthalenes, diethyl ether	
Poly(methyl acrylate)	See General, acetone, bzn., ethyl acetate, glycol ester ethers, phosphorus trichloride	Alcohols, carbon tetrachloride	5,7, 30,59
Poly(ethyl acrylate)	See General, acetone, butanol, bzn., glycol ether, methanol, THF, *p*-xylene	Aliphatic alcohols C>4, cyclohexanol, tetrahydrofurfuryl alcohol	5,7, 30,59
Poly(2-hydroxyethyl acrylate)	Methanol, W		32
Poly(*n*-butyl acrylate)	See General, butanol, turpentine	Cyclohexyl acetate, ethanol, ethyl acetate, methanol	30
Poly(*tert*-butyl acrylate)	Acetone, methanol		7
Poly(4-hydroxybutyl acrylate)	Isopropanol		32
Poly(isobornyl acrylate)	THF		60
Poly(cyclohexyl acrylate)	Bzn., THF, toluene		32
Poly(2-ethylhexyl acrylate)	Esters, ketones, THF, toluene		32
Poly(benzyl acrylate)	Bzn., THF, toluene		32
Poly(5-cyano-3-thiapentyl acrylate)	Acetone, acetonitrile, dioxane, pyridine	Solvents of low solubility parameter	61
Poly[1-(*N*-ethyl-*N*-(1,4,7,10,13-pentaoxacyclopentadecyl)carbamoyl)ethylene]	Bzn., chloroform	Hexane	62
Poly(pentachlorophenyl acrylate)	Bzn., THF	Hexane, methanol, W	63
Poly(4–10,15,20-triphenylporphorin-21H,23H-5-ylphenyl acrylate)	Bzn., chloroform, THF, trifluoroacetic acid	Acetone, ethanol, hexane, methanol, W	64
Poly(vinylcyclohexane-*co*-methyl acrylate) (9 : 1)	THF	W	65
1.3.3. POLY(METHACRYLATES)			
General	Acetic acid, acetone, bzn., chlorobenzene, chloroform, cyclohexanol (hot), cyclohexanone, cyclohexyl acetate, dioxane, 2-ethoxyethanol, ethyl acetate, isobutanol (hot), isobutyric acid, MEK, methylene chloride, xylene	Castor oil, cyclohexane, diethyl ether, ethylene glycol, formamide, gasoline, glycerol, hexane, methanol, nujol	

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TABLE 1. *cont'd*

Polymer	Solvents	Nonsolvents	Refs.
Poly(methyl methacrylate)			
atactic	See General, ethanol/water, ethanol/carbon tetrachloride, isopropanol/MEK (1/1) above 25°C, formic acid, nitroethane	Butylene glycol, carbon tetrachloride, *m*-cresol, diethyl ether, ethanol (absolute), higher esters, hydrogenated naphthalenes, linseed oil, turpentine	4,5,13, 30,66,67
isotactic	Acetone, acetonitrile, bzn., MEK, THF		7,32
syndiotactic	See isotactic		32
Poly(methyl methacrylate-*co*-2-acrylamido-2-methyl-1-propanesulfonic acid) (95 : 5)	Bzn., toluene		A32
Poly(ethyl methacrylate)	See General, carbon tetrachloride, ethanol (hot), ethyl ether, ethyl acetate, formic acid, isopropanol above 37°C, tetralin, turpentine (hot)	Alcohols, cyclohexane	5,7,67,68
Poly(2-hydroxyethyl methacrylate)	DMF, methanol, methyl Cellosolve®		32
Poly(*n*-propyl methacrylate)	See General, carbon tetrachloride, castor oil (hot), cyclohexane (hot), diethyl ether, ethanol, gasoline (hot), linseed oil (hot), turpentine	Formic acid	67
Poly(*n*-butyl methacrylate) and Poly(isobutyl methacrylate)	See General, carbon tetrachloride, castor oil (hot), cyclohexane, diethyl ether, ethanol (hot), gasoline, hexane, isopropanol above 23.7°C, linseed oil (hot), nujol (hot), turpentine	Ethanol (cold), formic acid	5,13,30, 67–69
Poly(butyl methacrylate-*co*-*i*-butyl methacrylate) (1 : 1)	Acetone, MEK, methylene chloride, THF, toluene		32
Poly(*n*-hexyl methacrylate)	Isopropanol above 33°C, MEK		5
Poly(cyclohexyl methacrylate)	Bzn., dioxane, THF		32
Poly(cyclohexylmethyl methacrylate)	Bzn., THF	Methanol	70
Poly(*n*-octyl methacrylate)	*n*-Butanol, MEK		5
Poly(2-ethylhexyl methacrylate)	Bzn., MEK, THF		32
Poly(*n*-decyl methacrylate)	Bzn., THF		32
Poly(*n*-lauryl methacrylate)	*n*-Pentanol above 29°C, isopropyl acetate, MEK	Ethyl acetate, methanol	5,71
Poly(phenyl methacrylate)	Bzn., MEK, THF, toluene		32
Poly(benzyl methacrylate)	Bzn., chloroform, dioxane, THF		32
Poly(4-*tert*-butylphenyl methacrylate)	Acetone		5
Poly[(4-(*tert*-butyoxycarbonyloxy)phenyl) methacrylate]	Bzn.		696
Poly(bornyl methacrylate)	Bzn.	Methanol	72
Poly(isobornyl methacrylate)	Bzn., THF, toluene		32
Poly[2-(dimethylamino)ethyl methacrylate]	Bzn., toluene		32
Poly[(2-trimethylsiloxy)ethyl methacrylate]	THF		73
Poly[2-(*N*-carbazoyl)ethyl methacrylate], crystalline	Aniline (hot, partially), diphenyl ether (hot), nitrobenzene (hot)	MEK	74
Poly(cyanomethyl methacrylate)	Acetone, acetonitrile, ethyl acetate, THF	Bzn., chloroform, methanol	75
Poly[2-(4-phenylazophenyl)ethyl methacrylate]	THF	Methanol	76
Poly[(methacryloyloxyundecyloxycarbonyldecyl)-2-(trimethylamino)ethyl phosphate]	Ethanol (hot), methanol	Acetone, bzn.	77
Poly[4-(4-methoxyphenyloxycarbonyl) phenoxyhexamethylene methacrylate]	Chloroform, THF, bzn., methylene chloride, *o*-dichlorobenzene,	Hexane, methanol	78
Poly[2-(dimethylamino)ethyl methacrylate-*co*-acrylamide] (4 : 1 to 2 : 3)	W		79
1.3.4. POLY(DISUBSTITUTED ESTERS)			
Poly(dimethyl itaconate)	Acetone, acetonitrile, bzn., DME, furfurol, halogenated hydrocarbons, methyl acetate, nitrobenzene, nitromethane, THF	Aliphatic hydrocarbons, carbon tetrachloride, diisopropyl ether, ethanol, ethyl acetate, methanol, propylene carbonate, toluene, W	80–82
Poly(di-*n*-butyl itaconate)	Acetone, amyl acetate, dioxane, ethanol, halogenated hydrocarbons, hydrocarbons, methyl acetate, THF	Acetonitrile, DMF, furfurol, methanol, nitrobenzene, nitromethane, propylene carbonate	81,82
Poly(diphenyl itaconate)	Bzn., chloroform, dioxane, DMF, ethyl acetate, THF		83

TABLE 1. *cont'd*

Polymer	Solvents	Nonsolvents	Refs.
Poly(diamyl fumarate)	Chloroform, THF, toluene	Hexane, W	84
Poly(methyl *tert*-butyl fumarate)	Bzn., chloroform, methanol, THF	Hexane, W	85
1.3.5. POLY(ACRYLAMIDES), POLY(METHACRYLAMIDES)			
Polyacrylamide	Ethylene glycol (partially), morpholine, W	Alcohols, diethyl ether, DMF, esters, higher glycols, hydrocarbons, nitrobenzene, propylene glycol, THF	4,5,13
Poly(*N*-isopropylacrylamide)	W (cold)	W (hot)	86,87
Poly(*N*,*N*-dimethylacrylamide)	Methanol, W (40°C)	W (sw)	5
Poly(*N*,*N*-diethylacrylamide)	THF		88
Poly[*N*-(1,1-dimethyl-3-oxobutyl) acrylamide]	Butanol, MEK, toluene	W (sw)	89
Poly(2-acrylamido-2-methyl-1-propanesulfonic acid), PolyAMPS	W		32
Poly(*N*-*tert*-butyl-*N*-allylacrylamide)	Chloroform	Petroleum ether	90
Poly(*N*-dodecylacrylamide-*co*-*N*-vinylcarbazole) (15 : 1 to 2 : 1)	Chloroform	Acrylonitrile	91
Polymethacrylamide	Acetone, ethylene glycol, methanol, W	Diethyl ether, hydrocarbons	4,5,13
Poly(*N*-carbazolylcarbonylethylene), Poly(9-acryloylcarbazole)			
atactic	Bzn. (partially)	Methanol	92
tactic	Chloroform (partially), conc. or moderately conc. sulfuric acid		5
Poly(morpholinocarbonylethylene), Poly(*N*-acryloylmorpholine)	DMF		5
Poly(piperidinocarbonylethylene), Poly(acryloylpiperidide)	DMF		5
1.4. POLY(VINYL ETHERS)			
General	Bzn., *n*-butanol, cyclohexanone, halogenated hydrocarbons, MEK	Heptane	
Unsubstituted			
Poly(methoxyethylene), Poly(methyl vinyl ether)			
amorphous	See General, acetone, ethanol, ethyl acetate, methylene chloride, THF, W (cold)	Diethyl ether, ethylene glycol, hexane, W (hot)	4,5,13,30,93–95
crystalline		Acetone, methanol, W	95,96
Poly(ethoxyethylene), Poly(ethyl vinyl ether),	See Poly(methoxyethylene)		
Poly(propoxyethylene), crystalline		Acetone, heptane	95
Poly(propyl vinyl ether)			
Poly(isopropoxyethylene), crystalline, Poly(isopropyl vinyl ether)	See Poly(propoxyethylene)		
Poly(butoxyethylene), Poly(butyl vinyl ether)	See General, bis(2-ethoxyethyl) ether, cyclohexane, diethyl ether, *n*-heptane	Ethanol, 2-ethoxyethanol	95,97
Poly(isobutoxyethylene), Poly(isobutyl vinyl ether)			
amorphous	See General, aliphatic alcohols C > 2, bis(2-ethoxyethyl) ether, carbon disulfide, cyclohexane, diethyl ether, *n*-heptane, isopropyl acetate, MEK, methylene chloride	Ethanol 2-ethoxyethanol, methanol	4,13,30, 93,98,99
crystalline	Chloroform above 50°C	Heptane, bis(2-ethoxyethyl) ether, bzn. (sw at 20°C), chloroform (sw at 20°C), isopropanol (hot), MEK	95
Poly(*tert*-butoxyethylene), Poly(*tert*-butyl vinyl ether)			
amorphous	Acetone, MEK		95,98
crystalline		Bzn., heptane	95,98
Poly(neopentyloxyethylene), Poly(neopentyl vinyl ether), crystalline		Bzn., heptane	95
Poly(cyclohexyloxyethylene), Poly(cyclohexyl vinyl ether)	Methylene chloride		100
Poly(benzyloxyethylene), Poly(benzyl vinyl ether) atactic	Acetone, bzn., toluene	Ethanol, methanol, W	101

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TABLE 1. *cont'd*

Polymer	Solvents	Nonsolvents	Refs.
Substituted			
Poly(carbomethoxymethoxyethylene)	Chloroform, methylene chloride	Diethyl ether	102
Poly[2-(methoxyethoxy)ethylene], crystalline	W	Diethyl ether	95
Poly[2-(chloroethoxy)ethylene], crystalline		Acetone	95
Poly(2,2,2-trifluoroethoxyethylene), crystalline	Bzn., dioxane, heptane		95
Poly(methyl vinyl ether-*alt*-methyl tricyanoethylenecarboxylate)	DMA, DMF, nitromethane	Diethyl ether	103
Poly(phenyl vinyl ether-*alt*-2-phenyl-1,1-dicyanoethylene)	Acetone, carbon tetrachloride, chloroform, DMF, DMSO, THF	Hexane methanol	104
1.5. POLY(VINYL ALCOHOLS), POLY(ACETALS), POLY(VINYL KETONES)			
Poly(vinyl alcohol)			
atactic	Acetamide, DMF, DMSO (hot), formamide, glycerol (hot), glycols (hot), HMTP, piperazine, triethylenediamine, W	Carboxylic acids, chlorinated hydrocarbons, esters, hydrocarbons, ketones, lower alcohols, conc. aqu. salt solutions, THF	4–6,13, 30,105
syndiotactic	1,3-Propandiol above 160°C, W above 160°C		106
12% acetyl	W (cold)	Carboxylic acids, esters, halogenated hydrocarbons, hydrocarbons, ketones, W (hot)	4
35% acetyl	Alcohols, aqu. sol. of tetraalkyl-ammonium bromide and iodide	W	38
Poly(vinyl alcohol-*co*-ethylene) (1 : 1)	DMF (hot), DMSO (hot)	Methylene chloride, THF	107
Poly(vinyl alcohol-*co*-maleic anhydride) (1 : 1)	Acetone		108
Poly(allyl alcohol)			
lower mol. wt.	Cresol, dioxane, glycerol, methanol, pyridine, THF		13
high mol. wt. (DP>350)	Mixtures of conc. hydrochloric acid and dioxane, methanol, THF	Most organic solvents, W	13
Poly(vinyl formal)	Acetic acid, benzyl alcohol, bzn./alcohol (70/30), carbon tetrachloride/alcohol (70/30), 2-chloroethanol, chloroform, cyclohexanone, dichloroethylene/diacetone alcohol (50/50), dioxane, DMF, furfurol, THF, toluene	Acetone (sw), aliphatic hydrocarbons, aromatic hydrocarbons (sw), dilute acids, dioxane, esters, ethanol, methanol, pyridine (sw), W	4,6,30
Poly(vinyl acetal)	Acetone, benzyl acetate, bzn./ethanol (1/1), bzn., butanol, carbon tetrachloride, 2-chloroethanol, chloroform, chloroform/methanol (9/1), cyclohexanone, dioxane, ethanol, ethyl acetate, ethylene glycol, THF	Dil. acids, aliphatic hydrocarbons, diethyl ether (sw), pyridine (sw), W	6,30
high degree of acetalization	Acetic acid (glacial), dioxane, ethanol, ethylene dichloride, methanol, nitromethane, pyridine	Acetone, bzn.	4
Poly(vinyl butyral)			
acetalization 70%	Alcohols, cyclohexanone, ethyl glycol acetate, ethyl lactate	Aliphatic ketones, hydrocarbons, methylene chloride, most esters, W	109
acetalization 77%	Acetone, alcohols, cyclohexanone, lower esters, methylene chloride	Higher esters, hydrocarbons, methyl isobutyl ketone	109
acetalization 83%	Alcohols, lower esters, ketones, methylene chloride	Higher esters, hydrocarbons, methanol	109
Poly(vinyl alcohol-*co*-vinyl pentanal)	Bzn., chloroform	Methanol	110
Poly(2-vinyl-4,7-dihydro-1,3-dioxepine),	Acetone, 2-buten-1,2-diol	W	111
Poly(vinyl cyclohexanone ketal),	Butanol, chloroform, cyclohexanone, ethanol, ethylene glycol, ethylene chloride, THF	Aliphatic hydrocarbons, carbon tetrachloride (sw), diethyl ether (sw)	30

TABLE 1. *cont'd*

Polymer	Solvents	Nonsolvents	Refs.
Poly(vinyl methyl ketone)	Acetic acid, acetone, chloroform, dioxane, DMF, ethyl acetate, pyridine, THF	Alcohol, carbon tetrachloride, diethyl ether, petroleum ether, W	4,6,13
Poly(methyl isopropenyl ketone)	Acetone, dioxane, esters	Alcohol, petroleum ether, W	6,13
1.6. POLY(VINYL HALIDES)			
Poly(vinyl chloride)			
high mol. wt.	Acetone/carbon disulfide, chlorobenzene, cyclohexanone, cyclopentanone, DMF, DMSO, MEK, nitrobenzene, THF	Acetic anhydride (sw), acetone (sw), nonoxidizing acids, alcohols, conc. alkalies, aniline (sw), carbon disulfide, carboxylic acids, esters, hydrocarbons, nitroparaffins (sw), vinyl chloride	4–7,13, 30,112
lower mol. wt.	Acetone/carbon disulfide, cyclohexanone, 1,2-dichlorobenzene, diisopropyl ketone, dioxane, DMF, ethylene chloride, HMPT, isophorone, mesityl oxide, nitrobenzene, perchloroethylene/acetone, toluene, tricresyl phosphate		4–6,13,30
chlorinated, 63% Cl	Acetone, aromatic hydrocarbons, butyl acetate, chlorobenzene, chloroform, cyclohexanone, dioxane, DMF, DMSO, nitrobenzene, THF	Aliphatic and cycloaliphatic hydrocarbons, carbon tetrachloride, methyl acetate, nitromethane, organic and inorganic acids	6
Poly(vinylidene chloride)	Benzonitrile, butyl acetate, cyclohexanone, 1,2-dichlorobenzene, dioxane, DMA, DMF, NMP, tetrahydrofurfuryl alcohol, tetralin (hot), THF (hot), trichloroethane	Conc. and moderately conc. acids and alkalies (except ammonia), alcohols, carbon disulfide, chloroform, cyclohexanone (cold, sw), dioxane (cold, sw), ethyl bromide, hydrocarbons, phenols, THF (cold, sw)	4,6,30, 113,114
Poly(vinyl bromide)	Cyclohexanone, THF	DMF, ethanol, HMPT, hydrocarbons, methanol	5
Poly(vinyl fluoride)	Cyclohexanone (hot), dinitrile, DMA (hot), DMF, DMSO (hot)	Aliphatic, cycloaliphatic, and aromatic hydrocarbons	115
chlorinated, 30% Cl	DMF	Aliphatic, cycloaliphatic, and aromatic hydrocarbons	115
chlorinated, 60% Cl	Carbon tetrachloride	Aliphatic, cycloaliphatic, and aromatic hydrocarbons	115
Poly(vinylidene fluoride)	γ-Butyrolactone, cyclohexanone, DMA, DMF, DMSO, ethylene carbonate, NMP	Acetone, alcohols, aliphatic and cycloaliphatic hydrocarbons, chlorinated solvents, methyl isobutyl ketone	116–119
Poly(1,2-difluoroethylene)	Acetone, DMF, methyl isobutyl ketone	Ethanol, hydrocarbons, methanol	118
Poly(1-chloro-1-fluoroethylene)	Toluene		120
Poly(chlorotrifluoroethylene)	2,5-Dinitrotrifluorobenzene (130°C), bzn. (200°C), carbon tetrachloride (114°C), cyclohexane (235°C), 1,2-dichlorotrifluorobenzene, HMPT, mesitylene (140°C), toluene (142°C), 1,1,1-trichloroethane (120°C), 1,2,3-trifluoropentachloropentane	Common organic solvents at RT	4,5,13, 121,674
Poly(tetrafluoroethylene)	Perfluorokerosene (350°C), no other solvent known		4,13,122,123
Poly(3,3,3-trifluoropropylene)	Acetone, hexafluorobenzene	Ethanol, hydrocarbons, methanol	124
Poly(hexafluoropropylene)	Hexafluorobenzene, perfluorodibutylamine, perfluorodibutyl ether		125
Poly(3,3,4,4,5,5,5-heptafluoro-1-pentene)	Perfluorohexane		126
Poly(vinylidene chloride cyanide-*alt*-1,3-cyclohexadiene)	Chloroform	Pentane	128
Poly(chlorotrifluoroethylene-*co*-vinylidene fluoride) (3 : 1)	MEK	Amyl acetate	129
Poly(tetrafluoroethylene-*co*-hexafluoropropylene) (4 : 1)	Carbon dioxide (>200°C)		130
Poly[tetrafluoroethylene-*co*-4,5-difluoro-2,2-bis(trifluoromethyl)-1,3-dioxole] (13 : 87 and 35 : 65)	Hexafluorobenzene, perfluorooctane		131

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TABLE 1. *cont'd*

Polymer	Solvents	Nonsolvents	Refs.
1.7. POLY(VINYL NITRILES)			
Polyacrylonitrile	Acetic anhydride, γ-butyrolactone, ε-caprolactam, bis(2-cyanoethyl)ether, bis(4-cyanobutyl)sulfone, chloroacetonitrile/water, chloroacetonitrile, cyanoacetic acid, dimethyl phosphite, dimethyl sulfone, dioxanone, DMA, DMF, DMSO, ethylene carbonate, *N*-formylhexamethyleneimine, 2-hydroxyethyl methyl sulfone, *N*-methyl-β-cyanoethylformamide, methylene dithiocyanate, *N*-methyl-α,α,α,-trifluoroacetamide, 1-methyl-2-pyridone, 3-,4-nitrophenol, nitromethane/W (94 : 6), *N*-nitrosopiperidine, 2-oxazolidone, 1,3,3,5-tetracyanopentane, tetramethylene sulfoxide, 1,1,1-trichloro-3-nitro-2-propane, sulfuric acid, nitric acid, *p*-phenol sulfonic acid, conc. aqu. sodium thiocyanate, molten quat. ammonium salts and their aqu. solutions	Acetonitrile (sw), acrylonitrile, alcohols, aliphatic nitro compounds, bis(2-hydroxyethyl) sulfoxide, chlorinated hydrocarbons, 3,4-dimethyl sulfolane, diethyl ether, diethyl sulfone (sw), diethyl sulfoxide, diethylformamide, dimethylmalonitrile, dimethyloxamide, 1,1-dimethylsuccinonitrile, ethylene urea, formamide, hexamethylene dithiocyanate, 1,6-hexanediamine, hydrocarbons, 1-hydroxypropionitrile, ketones, methanol, methoxyacetamide, methoxyacetonitrile, methyl thiocyanate, 1-nitrophenol, propyl formate	5,6,13,132, 133,675
ultrahigh MW	DMF (100°C)		134
Poly(2-fluoroacrylonitrile)	DMF	THF	135
Poly(acrylonitrile-*co*-vinyl acetate) (98 : 2)	DMF		136
Poly(acrylonitrile-*alt*-1,3-isoprene)	1,2-Dichloroethane	Methanol	137
Poly(vinylidine fluoride-*co*-ethyl vinyl ether) (1 : 1)	THF		135
Poly(acrylonitrile-*co*-butadiene) (2 : 3 to 1 : 4)	MEK, THF (partially), toluene		32
Polymethacrylonitrile	Acetic anhydride, acetone, benzonitrile, cyanoacetic acid, cyclohexanone, dinitriles, DMF (>20°C), DMSO, ethylene carbonate, furfural, HMPT, methylene chloride, nitromethane, pyridine	Aliphatic hydrocarbons, alcohols, esters, methacrylonitrile, toluene	4,5
1.8. POLY(VINYL ESTERS)			
Poly(vinyl acetate)			
atactic	Acetic acid, acetone, acetonitrile, allyl alcohol, benzyl alcohol, bzn., carbon tetrachloride/ethanol, chlorobenzene, chloroform, dichloroethylene/ethanol (20/80), 2,4-dimethyl-3-pentanol, dioxane, DMF, DMSO, lower aliphatic esters, ethanol/W, glycol ether esters, glycol ethers, methanol, nitromethane, tetrahydrofurfuryl alcohol, THF, toluene	Dil. acids, dil. alkalies, carbon tetrachloride (sw), carbon disulfide, cyclohexanol, diethyl ether (anhydrous, alcohol free), higher esters C>5, ethanol (anhydrous, sw), ethylene glycol, saturated hydrocarbons, mesitylene, W (sw)	4,5,13
syndiotactic	Chlorobenzene, chloroform	Acetone, bzn.	106
Poly(vinyl trifluoroacetate)	Acetone, chloroform, ethyl acetate, hexamethyldisiloxane		138
Poly(vinyl propionate)	See Poly(vinyl acetate)		
Poly(vinyl *n*-butyrate)	See Poly(vinyl acetate), amyl alcohol, cyclohexane, hexyl acetate		31
Poly(vinyl isobutyrate)	See Poly(vinyl acetate), amyl alcohol, cyclohexane, hexyl acetate		31
Poly(vinyl pivalate)	Acetone, butanone, bzn., ethyl acetate, toluene	Hexane, methanol, W	139
Poly(vinyl caproate)	Bzn.		5

TABLE 1. *cont'd*

Polymer	Solvents	Nonsolvents	Refs.
Poly(vinyl caprylate)	Acetone, aliphatic and aromatic hydrocarbons	Lower alcohols	4
Poly(vinyl laurate)	Aliphatic and aromatic hydrocarbons	Lower alcohols, acetone	4
Poly(vinyl benzoate),	See Poly(vinyl acetate)		5,87
Poly(vinyl chloroacetate)	Chlorobenzene, chloroform, cyclohexanone, dioxane, ethyl acetate, pyridine	Acetone (sw), saturated hydrocarbons	4
Poly(vinyl acetylacetate)	Acetic acid, acetone, chloroform, dioxane, DMF, ethyl acetate, pyridine, THF, saturated aqu. sol. of magnesium perchlorate	Alcohols, bzn., diethyl ether, W	140
Poly(vinyl-*N*-octadecylcarbamate)	Toluene (hot)		327
Poly(vinyl acetate-*alt*-*N*-alkyl/arylmaleimide)	Bzn., chloroform	Petroleum ether	142
1.9. POLY(STYRENES)			
Poly(styrene)			
atactic	Bzn., carbon disulfide, lower chlorinated aliphatic hydrocarbons, chloroform, cyclohexane (above 35°C), cyclohexanone, cyclohexane/acetone, decahydronaphthalene/diethyl oxalate, dimethyl phthalate, dioxane, ethyl acetate, ethylbenzene, glycol formal, MEK, methylene chloride, NMP, 1-nitropropane, phenol/acetone, phosphorus trichloride, THF, tributyl phosphate	Acetic acid, acetone, alcohols, diethyl ether, diols, ethylene chlorohydrin, glycol ethers, saturated hydrocarbons, isobutyl phthalate, phenol, 1,2,3, 4-tetrafluorobenzene (lower than 10°C), tri(chloroethyl) phosphate, tricresyl phosphate	4,5,7, 13,30,143
isotactic	Bzn., chloroform, *o*-dichlorobenzene, toluene		7
syndiotactic	*n*-Tetradecane/decahydronaphthalene (2/1)		144
Poly(4-acetoxystyrene)	THF	Methanol	144
Poly(α-methylstyrene),	See Polystyrene		
Poly(2-,3-, or 4-chlorostyrene)	MEK, THF, toluene		32
Poly(chloromethylstyrene)	Bzn., THF, toluene		32
Poly(4-cyanostyrene)	Acetone, acetonitrile, DMF, DMSO, nitromethane	Bzn., carbon tetrachloride, ethyl acetate, diethyl ether, hexane, methanol	146
Poly(2-,3-, or 4-bromostyrene)	Bzn., THF		5,32
Poly(4-iodostyrene)	Bzn., dioxane, THF		5,32
Poly(2,5-dichlorostyrene)	Ethyl acetate/ethanol (15/1) toluene		5
Poly(2,4,6-tribromostyrene)	THF		32
Poly(4-hydroxystyrene), Poly(*p*-hydroxyphenylethylene)	Methanol and higher alcohols, methyl acetate, THF, THF/chloroform (1/1)	Chloroform, toluene	147,148
Poly(4-methoxystyrene)	MEK, toluene		5
Poly(2,5-dimethoxystyrene)	Bzn., toluene, chloroform	Hexane, methanol	149
Poly(3,4-dimethoxystyrene)	Chloroform		150
Poly(*tert*-butyl-4-vinyl perbenzoate)	Acetone, bzn., chlorohexane, DMF, methylene chloride	Hexane	141
Poly(4-formylphenyl)ethylene, Poly(*p*-formylstyrene)	THF	Hexane, methanol, W	151
Poly(styrenesulfonic acid)	Ethanol, lower glycols, W		32
Poly(styrene-*co*-styrenesulfonic acid) (95 : 5)	DMF, methylene chloride, THF		152
sodium salt	Lower glycols, W		153
Poly(4-trimethylsilylethynylenestyrene)	THF		154
Poly(styrene-*co*-allyl alcohol) (94 : 6)	Alcohols, aromatic hydrocarbons, esters, THF		32
Poly(styrene-*co*-acrylonitrile) (3 : 2)	Chloroform, MEK, methylene chloride, THF	Methanol	7,32,155
Poly(styrene-*co*-*tert*-butoxycarbonyloxystyrene) (4 : 5)	THF, pyridine	Methanol, W	156
Poly(styrene-*co*-butyl methacrylate) (1 : 1)	MEK, toluene		32
Poly(styrene-*alt*-2,4-diamino-6-vinyl-1,3,5-triazine)	DMSO, hexafluoroisopropanol		157

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TABLE 1. *cont'd*

Polymer	Solvents	Nonsolvents	Refs.
Poly(styrene-*co*-maleic anhydride)			
(9 : 1)	Cyclohexane/ethyl acetate (3/2)	Methanol	65
(1 : 1)	Acetone, acetonitrile, MEK		32,158
Poly(styrene-*alt*-maleimide)	THF		157
Poly(styrene-*co*-4-thiomethylstyrene) (95 : 5)	THF	Ethanol, hexane	159
Poly(styrene-*co*-4-vinylpyridine) (1 : 1)	DMF, THF		32

1.10. OTHER COMPOUNDS
(alphabetically ordered)

Polyacrolein, (redox polymerization)	Above 60°C: pyridine/water (55/45 to 90/10), above 130°C: nitrobenzene, sat. stannous chloride solution, γ-butyrolactone (160–170°C), ethylene carbonate (130–135°C), DMF (153°C), DMSO (160–170°C), divinyl sulfone (150–155°C), TMS (160–165°C)	Lower alcohols, hydrocarbons, chlorinated hydrocarbons, diethyl ether, esters, aromatic ketones	160,161
Polyacrolein (ionic polymerization), See 3.1.1			
Poly(anthrylethylene)	Methylene chloride	Methanol	15
Poly(*N*-benztriazolylethylene)	Chlorinated hydrocarbons, cyclohexanol, DMF, glacial acetic acid	Alcohols, esters, hydrocarbons, ketones, W	162
Poly(biphenylyethylene)	Bzn., dimethoxyethane, toluene	Methanol	163
Poly(*N*-carbazolyethylene), Poly(*N*-vinylcarbazole)	Benzyl acetate, bzn., chlorobenzene, chloroform, cyclohexanone, dioxane, conc. nitric acid, conc. sulfuric acid, tetrachloroethane	Acetals, alcohols, dil. alkalies, dil. carboxylic acids, chlorohydrin, 1-chlorotoluene (sw), diethyl ether, dimethyltetrahydrofuran, diols, aliphatic esters, glycol monoethers, aliphatic ketones, saturated hydrocarbons, trichloroethylene (sw), W	4,6,13, 30,164
Poly[6-(*N*-carbazolyl)hexylethylene]	Acetone, methanol (partially), NMP (123°C)	Methanol	165,166
Poly(diallyldimethylsilane)	Bzn.		167
Poly(3,6-dichloro-*N*-carbazolylethylene)	Dichloroethane	Methanol	168
Poly(2,4-dimethyl-6-triazinylethylene)	Alcohols, bzn., esters, ketones, W (cold)	Aliphatic hydrocarbons, W (ppt. below 73°C)	169
Poly(diphenylphosphinylideneethylene), Poly(vinyldiphenylphosphine oxide)	Bzn., ethanol, methanol, toluene	Hexane, W	170,171
Poly(diphenylthiophosphinylideneethylene), Poly (vinyldiphenylphosphine sulfide)	Bzn., chloroform	Methanol	171
Poly(2-methyl-5-pyridylethylene)	Methanol, DMF		5
Poly(3-morpholinylethylene)	W		172
Poly(1-nitropropylene)	DMF (partially)		173
Poly(2-pyridylethylene), Poly(2-vinylpyridine)	Acetone, alcohols/water, bzn., chloroform, dioxane, ethanol, glacial acetic acid, aqu. mineral acids, nitroethane, pyridine, THF	Carbon tetrachloride toluene, W (sw)	4,13,35, 174,175
crystalline	Aromatic hydrocarbons (reflux), chlorinated solvents, methanol	Aliphatic hydrocarbons (reflux), diethyl ether, MEK	
Poly(4-pyridylethylene), Poly(4-vinylpyridine)	Acetone/W (1/1), benzyl alcohol, bzn., cyclohexanol, dioxane/W (1/1), ethanol/water (92/8), isopropanol/MEK (86/14), methanol, aqu. mineral acids, nitromethane, pyridine, THF	Acetone, diethyl ether, dioxane, ethyl acetate, MEK, petroleum ether, W	5,13,175
Poly(*N*-pyrrolidonylethylene), Poly(*N*-vinylpyrrolidone)	(solubility depending on small amounts of W): acetone, dil. acids, aromatic alcohols, chloroacetic acid esters, chloroform, chlorohydrins, ethanol, glacial acetic acid, methanol, nitromethane, pyridine	Acetic esters, acetone, acid esters, carbon tetrachloride, 1-chlorotoluene, diethyl ether, hydrocarbons, methoxybutyrate esters, nitomethane/W	4–6,13,30

TABLE 1. *cont'd*

Polymer	Solvents	Nonsolvents	Refs.
Poly(*N*-1,2,4-triazolylethylene)	Glacial acetic acid, DMF, DMSO, W	Alcohols, chlorinated hydrocarbons, esters, hydrocarbons ketone	162
Poly(*N*-vinylthiopyrrolidone)	DMF	Butanol, hydrocarbons, MEK, W	176
Poly(5-vinyl-1,3-benzodioxole)	Chloroform		150
Poly(2-vinylthiophene)	Chloroform	Methanol	177
Poly(vinyl sulfate)	Aqu. NaCl (0.5 M), W		5
Poly(vinylsulfofluoride)	Acetone, DMF, ethyl acetate, THF	Diethyl ether	13
Poly(vinylsulfonic acid)	Acetone, dioxane, ethanol, W	Esters, hydrocarbons, ketones	4,13,179
sodium salt	Methanol, W, aqu. NaCl (0.5 M)	Acetone, methanol	13,179
Poly(vinyl sulfoxide)	Chloroform, DMSO, methanol, W	Acetone, bzn.	180,181
Poly(vinyl 4-methoxyphenyl sulfoxide)	THF	Diethyl ether	182
Poly(*N*-vinylpyrrolidone-*co*-acrylic acid) (3 : 1 to 1 : 3)	Acetone/W (1/1), isopropanol/W (1/1), NMP	Methanol, MEK, THF	183
Poly(vinyl amine), Poly(aminoethylene)	Butanol, DMSO, ethylene glycol, formamide, methanol, W		179,184,185
Poly(vinylformamide)	DMSO, ethylene glycol (partially), formamide, W	Acetone, isopropanol	179,185
Poly(*N*-vinylpyrrolidone-*co*-1-hexadecene) (1 : 2)	Saturated hydrocarbons	*n*-Propanol, W	186
Poly(vinylnaphthalene)	Bzn., dioxane, THF		32
Poly(*N*-vinylpyrrolidone-*co*-vinyl acetate) (1 : 4 to 3 : 2)	Ethanol, isopropanol		186
Poly(*N*-vinylpyrrolidone-*co*-vinyl alcohol) (13 : 1)	Ethanol	Diethyl ether	187
Poly(*N*-vinylpyrrolidone-*co*-vinyl acetate) (1 : 1)	Isopropanol, W		32,681
Poly(*N*-vinylformamide-*co*-methyl 3-phenyl-2-cyanopropenoate) (1 : 1)	DMF, DMSO (partially), NMP	Chloroform, diethyl ether, ethyl acetate, methylene chloride	697
Poly(2-vinylpyridine-*co*-styrene) (7 : 3)	Bzn., chloroform, MEK, THF		32
Poly(4-vinylpyridine-*co*-styrene) (3 : 2)	DMF, THF		32

TABLE 2. MAIN-CHAIN CARBOCYCLIC POLYMERS

Polymer	Solvents	Nonsolvents	Refs.
2.1. POLY(PHENYLENES)			
Poly(2-hydroxy-1,4-phenylene)	Methylene chloride		188
Poly(dihydroxyl-1,4-phenylene), Polyhydroquinone	DMF (partially)	Acetone, chloroform, ethanol	181
Poly(2,5-di-*n*-butoxy-1,4-phenylene)	1,2-Dichloroethane, methylene chloride, nitrobenzene	Methanol	189
Poly(2,5-di-*n*-decyl-1,4-phenylene)	Toluene	Acetone	190
Poly(*N*,*N*-dimethylaniline)	Acetic acid, chloroform, DMF, ethanol	Aqu. sodium hydroxide	191
Poly(2,1′ : 4′,1″ : 4″,1‴-quaterphenylene-1,4), Poly [2-(phenyl-1,4-phenylene-1,4-phenylene)-1,4-phenylene]	Toluene	Methanol	192
Poly(2-benzoyl-1,4-phenylene), Poly(2,5-benzophenone)	*m*-Cresol, DMA, methylene chloride, NMP	Methanol	193,194
Poly(nitrophenylene)		All common organic compounds	195
Poly[2-(4-methylbenzoyl)-1,4-phenylene]	DMA		196
Poly(2,5-dihydroxy-1,4-phenylenethenylene)		Common organic solvents, aqu. potassium hydroxide	197
Poly(1,4-benzophenone-*N*-phenyloxime)	DMA, NMP		194
Poly(2,5-dimethoxy-1,4-phenylenethenylene)	Bromoform	Common organic solvents	197,198
Poly(2,5-dimethyl-1,4-phenylenethenylene) low mol. wt.	Chloroform, 1,2- and 1,4-dichlorobenzene		199
Poly(2,5-dimethyl-1,4-phenylenemethylene) low mol. wt.	Chloroform, 1,2- and 1,4-dichlorobenzene (hot)		199
Poly(1,4-phenyleneethenylene), Poly(phenylenevinylene)	Biphenyl, benzyl benzoate, chlorinated biphenyls, diphenyl ether, nitrobenzene		197,200
Poly(1,4-phenylene-1,2-diphenylethenylene)	Chloroform	Methanol	201
Poly[1,4-phenyleneethenylene-1,4-phenyleneethynylene-2,5-(dodecyloxy)-1,4-phenyleneethynylene]	Chloroform, THF, toluene		202
Poly[3-nitro-1,4-phenyleneethenylene-2-(dihexylamino)-1,4-phenyleneethenylene]	Chloroform, 1,2-dichloroethane, THF		203

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TABLE 2. *cont'd*

Polymer	Solvents	Nonsolvents	Refs.
Poly(tetramethyl-1,4-phenylenethenylene)		Bzn., 1-chloronaphthalene (sw), ethanol	197
Poly(5-*n*-dodecyloxy-1,4-phenylene)	DMA, DMF		204
Poly(2,5-di-*n*-decyloxy-1,4-phenylene)	THF	Methanol	205
Poly(2,5-di-*n*-decyloxy-4,4′-biphenylylene)	THF	Methanol	205
Poly[2-bis(methoxycarbonyl)-1,4-phenylenethenylene]	Methylene chloride	Methanol	206
Poly[1,4-phenylene-1,2-di(4-phenoxyphenyl)ethenylene]	Chlorobenzene, chloroform, toluene		207
Poly[2-(2-phenylethenyl)-1,4-phenyleneethenylene]	DMF		208
Poly(6-*n*-hexyl-1,4-naphthalenediylethenylene)	Chloroform	Methanol	209
Poly(2,6-naphthalenediylethenylene)	Tetrachloroethylene (partially)		210
2.2. OTHER COMPOUNDS (alphabetically ordered)			
Poly(acenaphthylene)	Bzn., carbon tetrachloride, chloroform, 1,2-dichloroethane (>30°C), THF, toluene	Acetone, acids, alcohols, dimethoxyethane, ethers	4,32,211
Poly[*N*-(3-bromophenyl)norbornenedicarboximide]	1,2-Dichloroethane, methylene chloride	Methanol	212
Poly(1,3-cyclohexadiene)	Bzn., xylene	Methanol	213
Poly(1,3-cyclohexyleneethenylene)	Bzn.	Methanol	214
Poly(1,5-cyclooctadiene)	Aromatic hydrocarbons, chlorinated hydrocarbons, diethyl ether (partially) methanol (oligomers)	Methanol	215
Poly(cyclopentadiene),	Bzn., chloroform, dioxane, THF	Ether, hexane, methanol, petrol	216
Poly(1,3-cyclophenylenemethylene)	Toluene (hot)		217,218
Poly(*endo*-dicyclopentadiene)	Bzn., carbon disulfide, chlorobenzene	Acetone, hexane, methanol	219
Poly(2,3-dimethoxycarbonyl-2,5-cyclohexadien-1,4-diylethenylene), Poly(dimethyl barrelene-2,3-carboxylate)	Bzn.	Methanol	206
Poly(1,2-dihydronaphthalene)	Bis(phenoxyphenyl) ether (above 290°C)	Amyl acetate, chloronaphthalene, diphenyl ether, tetrachloroethane, tetrahydronaphthalene	220
Poly(dimethylfulvene)	Acetone, bzn., chlorinated hydrocarbons, diethyl ether, hexane	Alcohol	221
Poly(indene)	Aromatic chlorinated hydrocarbons, diethyl ether, dioxane, drying oils, ketones, pyridine	Acids, aliphatic hydrocarbons (sw), alkalies, lower alcohols, W	6
Poly(1-isopropylidene-3a,4,7,7a-tetrahydroindene)	Bzn., carbon disulfide, chloroform, THF	Acetone, cyclohexane, ethanol, hexane	222
Poly[1,4-phenylene-1,2-dicyano-1,2-bis(propoxycarbonyl)ethenylene]	Acetone, acetonitrile, bzn., chloroform, DMF, DMSO, THF	Diethyl ether, hexane, methanol	164

TABLE 3. MAIN-CHAIN CARBONYL POLYMERS

Polymer	Solvents	Nonsolvents	Refs.
Poly(carbonylethylene)	*m*-Cresol		328
Poly(carbonyl-1,2-propylene)	Hexafluoroisopropanol	Methanol	329
Poly(carbonylethylene-*co*-carbonyl-1,2-propylene) (7 : 3)	Cresol, hexafluoropropylene, methylene chloride		330,331
Poly(carbonyl-1-furfuryltrimethylene)	Acetone, dioxane	Chloroform, ethanol, W	332
Poly(carbonylphenylethylene), Poly(carbon monoxide-*co*-styrene)	Chlorobenzene, hexafluoroisopropanol, MEK (hot), methylene chloride	Methanol	333–335
Poly(carbonyl-1-phenyltrimethylene)	Chloroform		336
Poly(carbonyl-1,4-cyclohexan-3-onediyl)	Chloroform	Methanol	337
Poly(carbonyl-1,4-cyclohexan-3-onediylmethylene)	Chloroform		338
Poly[carbonyl-2,3-di(ethoxycarbonyl)bicyclo[2.2.2]hepta-2,5-diene-5,6-diyl]	Acetone, common organic solvents	Alkyl hydrocarbons	339
Poly(carbonyl-4,4′-biphenylylene)		DMA, NMP	194
Poly(carbonyl-1,4-phenyleneoxy-1,4-phenylene)	Chloroform, DMA, 1,1,2,2-tetrachloroethane	MEK, methanol, toluene	340

TABLE 3. *cont'd*

Polymer	Solvents	Nonsolvents	Refs.
Poly(carbonyl-1,3-phenyleneoxy-1,4-phenylene)	*o*-Chlorophenol		341
Poly[carbonyl-1,4-phenyleneoxy-2-(methoxymethylene)-1,4-phenyleneoxy-1,4-phenylene]	Chloroform, THF		342
Poly(carbonyl-1,3-phenylenecarbonyl-1,4-phenyleneoxy-1,4-phenylene), PEKK	Pentafluorophenol (80°)		343,344
Poly(carbonyl-1,4-phenylenecarbonyl-1,4-phenyleneoxy-1,4-phenylene), PEKK	Pentafluorophenol		344
Poly(carbonyl-1,3-phenylenecarbonyl-1,4-phenyleneoxy-1,3-phenylenemethylene-1,3-phenyleneoxy-1,4-phenylene)	DMA, DMF, NMP		345
Poly(carbonyl-1,4-phenylenecarbonyl-1,4-phenyleneoxy-1,4-phenylene-2-pentylidene-1,4-phenyleneoxy-1,4-phenylene)	DMA	Methanol	346
Poly(carbonyl-1,4-phenyleneoxy-1,4-phenyleneoxy-1,3-pyridinediyloxy-1,4-phenyleneoxy-1,4-phenylene)	DMA		347
Poly(carbonyl-1,4-phenyleneoxy-4,4′-biphenylyleneoxy-1,4-phenylene-*co*-carbonyl-1,4-phenyleneoxy-1,4-phenyleneoxy-1,4-phenylene) (1 : 1 to 1 : 3)	Sulfuric acid, 0.1 wt.%		348
Poly(carbonyl-1,3-phenylenecarbonyl-1,4-phenyleneoxy-1,3-phenylenemethylene-1,3-phenyleneoxy-1,4-phenylene)	DMA, DMSO, NMP		345

TABLE 4. MAIN-CHAIN ACYCLIC HETEROATOM POLYMERS

Polymer	Solvents	Nonsolvents	Refs.
4.1. MAIN-CHAIN -C-O-C- POLYMERS			
4.1.1. POLY(OXIDES)			
Unsubstituted			
Poly(oxymethylene), Polyformaldehyde	At elevated temp.: aniline, benzyl alcohol, benzyl benzoate, bromobenzene, γ-butyrolactone, chlorophenols, diphenyl ether, DMF, ethylene carbonate, formamide, malodinitrile, phenol	Lower alcohols, diethyl ether, lower esters, hydrocarbons	4,224,225
Poly(oxyethylene), Poly(ethylene glycol), Poly(ethylene oxide)	Acetonitrile, alcohols, bzn., chloroform, cyclohexanone, esters, DMF, W (cold), aqu. K_2SO_4 (0.45 M above 35°C), aqu. Mg_2SO_4 (0.39 × M above 45°C)	Aliphatic hydrocarbons, ethers, dioxane (sw), W (hot)	4,5,13
Poly(oxyethylidene), Polyacetaldehyde			
amorphous	Alcohols, aromatic hydrocarbons, chloroform, esters, ketones	Aliphatic hydrocarbons	226
crystalline	Chloroform (partially)	Alcohols, esters, hydrocarbons, ketones	226
Poly(oxypropylene), Poly(1,2-propylene glycol), Poly(propylene oxide), crystalline	Acetone, bzn., chloroform, dioxane, DMF, ethanol, methanol (hot), THF	2-Aminoethanol, diethyl ether (sw), ethyl acetate (sw)	13
Poly(oxypropylidene), crystalline	Chloroform (partially)	Common organic solvents	227
Poly(oxyisopropylidene), Polyacetone	Acetone, chloroform		228
Poly(1,3-dioxolane)	Methylene chloride, W (70°C)		229
Poly(oxytetramethylene), Poly(tetrahydrofuran)	Bzn., chloroform, ethanol, THF	Hexane, methanol, petroleum ether, W	230–233
Poly(oxycyclopentenylene)	Bzn., carbon disulfide, chloroform	Methanol	677
Poly(oxycyclohexenylene)	Aliphatic hydrocarbons, chinese wood oil, methyl acetate, toluene	Acetone, ethanol, 2-ethoxyethanol	13
Poly(oxymethylenecyclopropylidenemethyleneoxyhexamethylene)	Methylene chloride	Hexanes	234
Poly(oxy-1,3-phenylene)	Benzophenone, bzn., diphenyl ether, DMF, DMSO, nitrobenzene, 3-pentanol, pyridine	Methanol	235

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TABLE 4. *cont'd*

Polymer	Solvents	Nonsolvents	Refs.
Substituted			32,94,236,237
Polyepichlorohydrin, Poly(oxy-3-chloro-1,2-propylene)	Acetone, bzn., chloroform, diethyl ether, MEK, THF, toluene	Methanol	32,94, 236,237
Poly(oxy-2-chloroethylidene)			
amorphous	Chloroform	Methanol	238
crystalline		Chloroform, methanol	238
Poly(oxy-2-methyltetramethylene)	Bzn., Cloroform	Methanol	239
Poly(oxy-2,2,2-trichloroethylidene), crystalline Polychloral		Chloroform, methanol, other common solvents	227
Poly[oxy-2,2-bis(chloromethyl)trimethylene,	Cyclohexanone	Methanol	237,240
Poly(oxy-2,6-dimethyl-1,4-phenylene), Poly(2,6-dimethyl-1,4-phenylene oxide)			241–244
amorphous	α-Pinene (hot)	α-Pinene (cold), methanol, ethanol	241–244
crystalline	Bzn., chlorobenzene, chloroform, toluene	Ethanol, methanol, nitromethane, α-pinene (hot)	241–244
Poly(oxy-2,6-dichloro-1,4-phenylene)	2-Methoxymethanol	Methanol	688
Poly(oxy-1,4-phenylene-1,2-cyclopropylene-1,4-phenyleneoxymethylene)	Chloroform, DMA, NMP	Methanol	245
Poly(oxy-4,4′-biphenylylene-1,2-propylene-1,4-phenyleneoxydodecamethylene)	Chloroform		246
Poly(1-propynylene-1,3-diyloxy-1,4-phenylene-isopropylidene-1,4-phenyleneoxy-2-propynylene 1,3-diyl)	Toluene		247
Poly[oxyethylene-*co*-oxy(chloromethyl)ethylene] (1 : 1)	Chloroform	Methanol	237
Poly[oxy-3,5-bis(4-carboxyphenyl)-1,4-phenylene-*co*-oxy-3,5-bis(phenyl)-1,4-phenylene] (13 : 87 to 62 : 38)	DMF, DMSO	Chloroform, toluene	248
Poly(oxy-1,4-phenyleneisopropylidine-1,4-phenyleneoxy-*alt*-2-hydroxy-1,3-propylene), Poly(Bisphenol A), epoxy resin	Esters, ethers, ketones		249
Polymeric structures, not 100% specific			
Poly(dimethylketene), $-(OC(=C(CH_3)_2))-$			
low mol. wt.	Diethyl ether	Methanol	250,251
higher mol. wt.	Bzn., carbon tetrachloride	Chloroform (partially)	250, 251
Polyacrolein, (ionic polymerization) $-(OCH(CH=CH_2))-$	Acetone, bzn., dioxane, THF, DMF	Methanol, petroleum ether	252
Polyacrolein, (redox polymerization) see 1.10			
Poly(α-methylacrolein)	Aniline, γ-butyrolactone, DMF, nitrobenzene, pyridine	Alcohols, hydrocarbons	13
Poly[1,2-di(epoxyethyl)benzene],	Chloroform, THF		253
Poly(phenyl glycidyl ether)	1,2-Dichlorobenzene (hot), DMF (hot), xylene (hot)	Common organic solvents at rt	254
Poly(glutardialdehyde)			
low mol. wt.	Bzn., chloroform, diethyl ether, THF	Petroleum ether, W	133,197, 255,256
high mol. wt.	Methylene chloride, THF, pyridine	Bzn., (partially)	133,197, 255,256
Poly(β-methylglutardialdehyde), low mol. wt.	Chloroform, diethyl ether, dioxane, THF	Petroleum ether, W	255
Poly(β-phenylglutardialdehyde), low mol. wt.	Bzn., chloroform, diethyl ether, THF, dioxane	Petroleum ether, W	255
Poly(*trans*-1,2-cyclohexanedicarboxaldehyde),	Bzn., chloroform, hexane	Methanol	257
Poly(2-formyl-Δ^5-dihydropyran)	Aromatic hydrocarbons, chloroform, pyridine, THF		258

TABLE 4. *cont'd*

Polymer	Solvents	Nonsolvents	Refs.
4.1.2. POLY(CARBONATES)			
Poly(oxycarbonyloxypropylene)	Dioxane, methylene chloride	Methanol, W	678
Poly(oxycarbonyloxyhexamethylene)	Acetone, bzn., chloroform, toluene	Ethanol, ether	13
Poly(oxycarbonyloxy-2,4-dihydroxy-1,4-butylene)	Methylene chloride	Ethanol	260
Poly(oxycarbonyloxy-1,4-butyleneoxycarbonyloxy-1,4-cyclohexylene)	Chloroform, THF		261
Poly(oxycarbonyloxymethylene-1,2-cylcohex-4-enylenemethylene)	Chloroform		262
Poly(oxycarbonyloxy-1,3-phenylene)		Common organic solvents	13
Poly(oxycarbonyloxy-1,4-phenylene)		Common organic solvents	13
Poly(oxycarbonyloxy-1,4-phenylene-isopropylidene-1,4-phenylene), Poly(Bisphenol A carbonate)	Chloroform, *m*-cresol, cyclohexanone, dioxane, DMF, pyridine, THF	Acetone, carbon tetrachloride, lower esters, hydrocarbons, styrene	13,263–265
chlorinated (8% Cl and more)	Bzn., methyl methacrylate, styrene		265
Poly(oxycarbonyloxy-1,4-phenylene-2-pentylidene-1,4-phenylene)	Bzn., chloroform, ethyl acetate		13
Poly(carbon dioxide-*co*-propylene oxide) (1 : 1)	THF	Methanol	266
Poly(propylene carbonate-*co*-propylene oxide) (9 : 1)	Chlorobenzene		267
Poly(oxycarbonyloxy-1,2-cyclohexyleneoxy-1,2-cylclohexylene)	Methylene chloride, THF	Methanol	268
4.1.3. POLY(ESTERS) (alphabetically ordered)			
Poly(ethylene terephthalate), see Poly(oxyterephthaloyloxyethylene)			
Poly(oxyadipoyloxyethylene, Poly(ethylene adipate)	Bzn., THF		32
Poly(oxyadipoyloxy-1,4-phenylene-1,2-propenylene-1,4-phenylene)	Chloroform		269
Poly(oxyadipoyloxytetramethylene), Poly(1,4-butylene adipate)	Chloroform, DMF, THF	Methanol	32,270
Poly(oxyadipoyloxytrimethylene), Poly(1,3-propylene adipate)	Chloroform, MEK, THF		32
Poly(oxyazelaoyloxyethlylene), Poly(ethylene azelate)	Bzn., THF		32
Poly(oxycarbonyl-4,4′-biphenylylenecarbonyloxy-hexamethylene)	Pentafluorophenol/methylene chloride (3/1), THF		271,272
Poly(oxycarbonyl-1,4-cyclohexylene-carbonyloxyoctamethylene), *cis* and *trans*	Chloroform		5
Poly(oxycarbonyldodecamethylenecarbonyloxy-4,4′-biphenylylene)	Phenol/tetrachloroethane (3/2)		273
Poly(oxycarbonylethylene), Poly(β-propiolactone)	Chloroform, formic acid	Hydrocarbons	274,275
Poly(oxycarbonylethyleneoxyethylene)	THF, toluene		278
Poly(oxycarbonylethylidene), Poly(DL-lactic acid)	Acetone, chloroform, toluene	Ethanol	276,277
Poly(oxycarbonylethynylene-1,4-phenylene-ethynylenecarbonyltetramethylene)	DMA	Methanol	279
Poly(oxycarbonyl-2,6-naphthalenediylcarbonyloxy-butylene, Poly(butylene 2,6-naphthalate)	Methylene chloride	Chloroform THF	280,281
Poly(oxycarbonyl-2,6-naphthalenediylcarbonyloxy-ethylene, Poly(ethylene 2,6-napthalenedicarboxylate)	Hexafluoroisopropanol		282
Poly(oxycarbonyl-2,6-naphthalenediyl-*co*-oxycarbonyl-1,4-phenylene) (1 : 3)	Pentafluorophenol/hexafluoro-isopropanol		283
Poly(oxycarbonyloctadecamethylenecarbonyloxyethylene)	Toluene	Methanol	284
Poly(oxycarbonylpentamethylene), Poly(ε-caprolactone), Poly(oxyhexanoyl)	Chloroform, methylene chloride, THF, toluene	Hexane, methanol	285–287
Poly(oxycarbonylpentamethylene-*co*-oxycarbonyl-3-hydroxypentamethylene) (9 : 1 to 1 : 9), Poly(5-hydroxyvaleric acid-*co*-4-hydroxyvaleric acid)	Methylene chloride	Methanol (cold)	288
Poly(oxycarbonyl-1,4-phenylene), Poly(4-hydroxybenzoic acid)	No known solvent		32
Poly(oxycarbonyl-1,4-phenyleneoxyhexamethyleneoxy-1,4-phenylene)	Phenol/*p*-chlorophenol/ trichloroethylene (25/40/35)		289

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TABLE 4. *cont'd*

Polymer	Solvents	Nonsolvents	Refs.
Poly(oxycarbonyl-1,4-phenyleneoxyterephthaloyloxy-tetramethylene) (7 : 3 to 2 : 3), Poly(butylene terephthalate-*co*-4-hydroxybenzoic acid)	*p*-Chlorophenol/tetrachloroethane, trifluoroacetic acid		291
Poly(oxycarbonyl-2-phenyl-1,3-propylene)	Chloroform	Hexane	290
Poly(oxycarbonylpolyethylenecarbonylpolyethylene)	Cyclohexane		292
Poly(oxycarbonyl-1,2-propylene), Poly(3-hydroxybutyric acid)	Chloroform		7
Poly(oxycarbonyl-1,3-propylene), Poly(γ-butyrolactone), Poly(4-hydroxybutyric acid)	Carbon tetrachloride, chloroform, dichloroethylene, trifluoroethanol		293,294
Poly(oxycarbonyl-1,2-propylene-*co*-oxyethylenecarbonyloxyethylene) (9 : 1 to 1 : 9)	Chloroform	Diethyl ether/hexane (1 : 3)	295
Poly(oxycarbonyltetradecamethylene)	Chloroform		296
Poly(oxycarbonyltrimethyleneoxyethylene-*co*-methyl vinyl ether) (1 : 2 to 4 : 1)	Bzn.	Diethyl ether	297
Poly(oxycarbonyl-1-vinylethylene), Poly(β-vinyl-β-propiolactone)	Butyrolactone, chlorinated hydrocarbons, DMF		298
Poly(oxy-α,α-dibutylsebacoyloxyhexamethylene)	Bzn.		5
Poly(oxydodecanedioyloxy-1,4-phenylene-2-methylethenylene-1,4-phenylene)	Chloroform	Hexane, W	299
Poly(oxyfumaroyloxyhexamethylene)	Chloroform		5
Poly(oxyfumaroyloxytetramethylene)	Chloroform, NMP	Methanol, W	300
Poly(oxyglutaroyloxyhexamethylene)	Bzn., chlorobenzene, chloroform, THF		301
Poly(oxyglutaroyloxypropylene), Poly(1,3-propylene glutarate)	Chloroform, MEK, THF, toluene		32
Poly(oxyisophthyloyloxy-4,4′-biphenylylene)	See poly(oxyisophthaloyloxy-1,4-phenylene)		
Poly(oxyisophthaloyloxy-1,4-phenylene), Poly(phenylene isophthalate)	At elevated temp.: benzophenone, halogenated biphenyls, halogenated diphenyl oxides, halogenated naphthalenes, *m*-terphenyl, 2,4,6-trichlorophenol	Common organic solvents	302
Poly(oxyisophthaloyloxy-1,4-phenylene-fluorenylidene-1,4-phenylene)	Dichloroethane	Methanol, W	303
Poly(oxyisophthaloyloxy-1,1,3-trimethylindan-3,5-diyl-1,4-phenylene)	Chloroform, DMF, *m*-cresol, NMP, nitrobenzene, pyridine, THF	DMSO, hexane, methanol	304
Poly(oxymaleoyloxyhexamethylene), Poly(hexamethylene malonate)	Bzn., chloroform, THF		5
Poly(oxymaleoyloxytetramethylene), Poly(butylene malonate)	Chloroform, NMP, THF	Methanol	300
Poly(oxyoxalyloxyethylene), Poly(ethylene oxalate)		Bzn., Chlorobenzene, chloroform, THF	301
Poly(oxyoxalyloxyhexamethylene), Poly(hexamethylene oxalate)	Chlorobenzene, chloroform, dioxane, nitromethane, toluene	Bzn., methanol, toluene, THF	301,305
Poly(oxy-1-oxo-3-methyltrimethlylene-*co*-oxy-3-ethyltrimethylene) (9 : 1), Poly(3-hydroxybutryic acid-*co*-3-hydroxyvaleric acid)	Chloroform		306
Poly(oxy-1-oxo-3-methyltrimethylene-*co*-oxy-1-oxotrimethylene) (1 : 0 to 3 : 1), Poly(3-hydroxybutyric acid-*co*-3-hydroxypropionic acid)	Chloroform	Hexane, methanol	307
Poly(oxy-1-oxo-1,2-propylene), Poly(lactic acid)	Acetone, chloroform, dioxane, DMF, methylene chloride, pyridine	Ethanol, hexane, methanol	276,277,308,690
Poly(oxy-1-oxo-1,2-propylene-*co*-oxycarbonylmethylene), Poly(lactic acid-*co*-glycolic acid) (1 : 1 to 1 : 3)	Chloroform		309
Poly(oxysuccinoyloxy-2,2-dimethyl-1,3-propylene)	Bzn., chloroform, THF		32
Poly(oxysuccinoyloxydoeicosan-10,12-diyne-1,22-diyl)	Chloroform, THF		310
Poly(oxysebacoyloxyhexamethylene), Poly(hexamethylene sebacate)	Bzn., chlorobenzene, chloroform, THF		5,301
Poly(oxysebacoyloxyhexadecamethylene)	Chloroform		5
Poly(oxysuccinoyloxyhexamethylene), Poly(hexamethylene succinate)	Bzn., chlorobenzene, chloroform, nitromethane, THF	Methanol	5,301,305
Poly(oxysuccinoyloxymethylene-1,4-cyclohexylene-methylene)	Bzn., chloroform, THF (hot)		32
Poly(oxysuccinoyloxynonamethylenebutadyne-1,3-diylnonamethylene)	Chloroform, THF		310

TABLE 4. *cont'd*

Polymer	Solvents	Nonsolvents	Refs.
Poly(oxysuccinoyloxytetramethylene), Poly(tetramethylene succinate)	Chloroform, toluene	Diethyl ether	311
Poly(oxysuccinoyloxytrimethylene), Poly(1,3-propylene succinate)	Chloroform, MEK, THF, toluene		32
Poly[oxyterephthaloyloxy-1,4-(2-*n*-alkyl)phenylene]	*p*-Chlorophenol, methylene chloride	Acetone, ethanol, hexane	312
Poly(oxyterephthaloyloxytetramethylene), Poly(butylene terephthalate)	Phenol/tetrachloroethane		313
Poly[oxyterephthaloyloxybutylene-*co*-oxycarbony-2,6-naphthanenediylcarbonylpoly(oxyethylene)] (1 : 1)	*m*-Cresol		314
Poly(oxyterephthaloyloxyethylene), crystalline, Poly(ethylene terephthalate), Poly(oxyethyleneoxyterephthaloyl)	Chloral hydrate, chlorophenol, DMSO (hot), halogenated aliphatic carboxylic acids, anhydrous hydrogen fluoride, nitrobenzene, phenol/2,4,6-trichlorophenol (10/7), phenol, phenol/tetrachloroethane (1/1)	Aliphatic alcohols, carboxylic esters, chlorinated hydrocarbons, ethers, hydrocarbons, ketones	4,5,315, 316
Poly(oxyterephthaloyloxyethylene-*co*-oxyhexanoyl) (1 : 1), Poly(ethylene terephthalate-*co*-ε-caprolactone)	Chloroform	Methanol	317
Poly(oxyterephthaloyloxyethylene-*co*-oxycarbonyl-naphthalene-2,6-diylcarbonyloxyethylene) (<4 : 1, >4 : 1)	Phenol/tetrachloroethane (3/2)		318
Poly(oxyterephthaloyloxy-1,4-phenylenecarbonyloxy tetraethylene) (2 : 1 : 1)	*p*-Chlorophenol/tetrachloroethane, trifluoroacetic acid		291
Poly(oxyundecanoyl)	Bzn., chloroform		5
4.1.4. POLY(ANHYDRIDES)			
Poly(oxysebacoyl)	Chloroform		276
Poly(oxyterephthaloyl)	DMF		319,320
4.1.5. POLY(URETHANES) (alphabetically ordered)			
Poly(urethanes) (general)	Phenol, *m*-cresol, formic acid, sulfuric acid	Alcohols, diethyl ether, saturated hydrocarbons	4
Poly(oxy-1,4-butyleneoxycarbonylimino-1,4-phenylenemethylene-1,4-phenyleneiminocarbonyl), Poly(butanediol-*alt*-diphenylmethane-1,4-diisocyanate)	DMA		321
Poly(oxy-1,4-cyclohexyleneoxycarbonylimino-1,4-phenylenemethylene-1,4-phenylene-iminocarbonyl)	Dioxane (hot), DMF, THF	1,1,2-Trichloroethane	322
Poly(oxyethyleneoxycarbonyliminoethylene-iminocarbonyl)	*m*-Cresol	Chloroform, formic acid, methylene chloride	323
Poly(oxyethyleneoxycarbonyliminohexa-methyleneiminocarbonyl)	DMF	Diethyl ether	324
Poly(oxyethyleneoxycarbonylimino-1,3-phenyleneiminocarbonyl)	*m*-Cresol (hot), DMSO, sulfuric acid	Chlorobenzene, chloroform, cyclohexanone (sw), DMF (sw), xylene	325
Poly(oxytrimethyleneiminocarbonyl)	DMSO		326

4.2. MAIN-CHAIN -O- HETEROATOM POLYMERS

4.2.1. POLY(SULFONATES)

Poly(aryl sulfonates)

$-(SO_2ArSO_2OAr'O-)$ $Ar = -C_6H_4-$ $= -C_6H_4C_6H_4-$ $= -C_6H_4CH_2C_6H_4-$ $= -C_6H_4SO_2C_6H_4-$	DMF	Methanol	349
	DMA, DMF, NMP	Chloroform, methanol, methyl ethyl ketone, tetrahydrofuran	676

TABLE 4. *cont'd*

Polymer	Solvents	Nonsolvents	Refs.
4.2.2. POLY(SILOXANES) (ordered according to increasing complexity)			
Poly(siloxanes) (general)			
fluids and greases	Aromatic and chlorinated hydrocarbons, esters	Moderately conc. acids and alkalies, lower alcohols, W	6
rubbers		Aromatic and chlorinated hydrocarbons (sw), esters (sw)	6
Poly(oxydimethylsilylene), Poly(dimethylsiloxane)	Amyl acetate, chlorobenzene, chloroform, cyclohexyl acetate, dichlorobenzene, 1,2-dimethoxyethane, ethyl bromide, ethyl acetate, *o*-fluorotoluene, hydrocarbons, hydrogenated xylene, isopropyl acetate, MEK (above 20°C), octylamine, phenetol (above 13°C), trichloroethylene	Acetone, acetonitrile, acetophenone, aniline, benzyl alcohol, benzyl acetate, bromobenzene, γ-butyrolactone, Carbitol®, cyclohexanone, cyclohexanol, 1,4-dibromobutane, 1,2-dichloroethane, di(chloroethyl) ether, dichlorobenzene, dimethylnaphthalene, dioxane, diphenyl oxide, ethyl formate, ethyl benzoate, 2-isopropoxyethanol, mesityl oxide, methanol, nitrobenzene, 1-nitropropane	4,5
Poly(oxydiethylsilylene), Poly(diethylsiloxane)	Toluene	W	32
Poly(oxyhydrophenylsilylene)	THF		351
Poly(oxymethylphenylsilylene), Poly(methylphenylsiloxane)	Acetone (hot), butanol, chloroform, diethyl ether, ethyl acetate, toluene	Ethanol, ethylene glycol, methanol	352
Poly(oxymethylhexadecylsilylene)	Chloroform, THF, toluene	W	32
Poly(oxyalkylmethylsilylene)-ω-4-(4-cyanobenzoyl)phenoxy	DMF, toluene	Hexane, methanol	353
Poly(oxydiphenylsilylene), Poly(diphenylsiloxane)	Acetone (hot)	Acetone (cold)	352
Poly[oxybis(3,4-dichlorophenyl)silylene]	Acetone, bzn.		354
Poly(oxydimethylsilyleneethyleneoxydimethylsilylene)	Toluene		355
Poly(oxydimethylsilyleneoxydimethylsilylene-1,4-phenylenedimethylsilylene)	THF		356
Poly[oxymethyl(5-*t*-butoxycarbonyloxy-2-norbornyl)silylene]	Chloroform, toluene	Methanol	357,358
Poly(oxydimethylsilylene-*co*-oxyalkylmethylsilylene), Poly(dimethylsiloxane-*co*-alkylmethylsiloxane)	Aliphatic hydrocarbons, aromatic hydrocarbons, isopropanol	Ethanol, W	359
Poly(oxydimethylsilylene-*co*-oxycarbonyl-1,4-phenyleneisopropylidene-1,4-phenylene) (1 : 3 to 1 : 1)	Bzn., carbon tetrachloride, chloroform, methylene chloride, pyridine, THF		360
4.3. MAIN-CHAIN -C-S-C- AND -C-S-N-POLYMERS			
4.3.1. POLY(SULFIDES) (alphabetically ordered)			
Poly(2,5-dioxopyrrolidine-1,3-diylthio-1,4-phenylene)	Tricresol	Methanol	361
Poly(dithioethyleneoxyethylene)	1,1,2-Trichloroethane (partially), other chlorinated hydrocarbons (partially)	Dil. acids, alcohols, dil. alkalies, bzn. (sw), carbon disulfide, carbon tetrachloride (sw), gasoline (sw), turpentine (sw)	6,178
liquid polymers	Bzn., ethylene dichloride		6,178
Poly(tetrathioethylene)	No solvent known	Dil. acids, alcohols, dil. alkalies, bzn. (sw), carbon tetrachloride, carbon disulfide, gasoline	6,178
Poly(tetrathioethyleneoxyethylene)	1,1,2-Trichloroethane (partially), other chlorinated hydrocarbons (partially)	Dil. acids, alcohols, dil. alkalies, bzn. (sw), carbon tetrachloride, carbon disulfide, gasoline	6,178
liquid polymers	Bzn., ethylene dichloride		6,178
Poly(thio-4,4-biphenylylene)	Biphenyl, dichlorobiphenyl, dimethyl-*p*-terphenyl		362
Poly(thiodifluoromethylene)	Chloroform/methanol	Conc. nitric acid (reflux), aqu. sodium hydroxide (10%, reflux)	363
Poly(thio-2,5-dimethyl-1,4-phenylene)	Hexane, methylene chloride		364
Poly(thiomethylene-1,4-*trans*-cyclohexylene-methylenethiomethylene)	Bzn., chloroform	Methanol, W	365
Poly(thio-1,4-phenylene), Poly(phenylene sulfide)	Biphenyl, *m*-dichlorobenzene, dichlorobiphenyl, dimethyl-*p*-terphenyl, hexachlorobiphenyl	At reflux temp.: 2,4-lutidine, phenyl sulfide, phenyl oxide, pyridine, toluene	362,366, 367

TABLE 4. *cont'd*

Polymer	Solvents	Nonsolvents	Refs.
Poly(thio-1,4-phenylenecarbonyl-1,4-phenylene-isopropylidene-1,4-phenylenecarbonyl-1,4-phenylene)	Chloroform, NMP	Methanol	368
Poly(thio-1,4-phenyleneiminocarbonyl-1,4-phenyleneoxy carbonylethylene)	Chloroform, NMP	Hexane, methanol	369
Poly(thio-1,4-phenyleneoxymethyleneoxy-1,4-phenylene)	Chloroform, methylene chloride	Methanol	364
Poly(thio-1,4-phenyleneoxy-1,4-phenylene)	Hexane, methylene chloride		364
Poly(thiotetramethyl-1,4-phenylene)	Durene		364
	DMA, DMF, NMP	Methanol	370
4.3.2. POLY(SULFONES) (ordered according to increasing complexity)			
Poly(ethylene-*co*-sulfur dioxide)	No solvent known		13,178
Poly(propylene-*co*-sulfur dioxide)	Conc. nitric acid, conc. sulfuric acid	Common organic solvents	13,178
Poly(1-butene-*co*-sulfur dioxide)	Acetone, cyclohexanone	Paraffins, cycloparaffins, aromatic hydrocarbons	13
Poly(butylethylene-*co*-sulfur dioxide)	Bzn., chloroform, dioxane		7
Poly(1,3-hexadiene-*co*-sulfur dioxide) (1 : < 3)	Acetone, chloroform, DMA, DMF, THF		371
Poly(dimethylbutadiene-*co*-sulfur dioxide)	Conc. nitric acid, conc. sulfuric acid	Common organic solvents	13
Poly(1-pentyne-*co*-sulfur dioxide)	Dioxane		13
Poly(1-hexyne-*co*-sulfur dioxide)	Acetone, dioxane		13
Poly(1-heptyne-*co*-sulfur dioxide)	Acetone, dioxane		13
Poly[4-(*tert*-butoxycarbonyloxy)styrene-*co*-sulfur dioxide] (5 : 1)	Toluene		372
Poly(1,4-phenyleneoxymethyleneoxy-1,4-phenylenesulfonyl)	Chloroform	Methanol	364
Poly(1,4-phenylenesulfonyl)	Aniline, DMA, pyridine		373
Poly(oxy-1,4-phenylenesulfonyl-1,4-phenylene)	Aniline, aromatic amines, DMF, DMSO, methylene chloride, NMP, pyridine	Alcohols, halogenated hydrocarbons, hydrocarbons, silicone oil	32,373–375
Poly(thio-1,4-phenylenesulfonyl-1,4-phenylene)	DMF, DMSO, NMP		376
Poly(carbonyl-1,3-phenylenemethylene-1,4-phenylenesulfonyl-1,4-phenylene)	No known solvent	Acetone, DMF, THF, toluene	377
Poly(thio-1,4-phenylenesulfonyl-1,4-phenylenethio-1,4-phenyleneisopropylidine-1,4-phenylene)	DMA/toluene		378
Poly(3-amino-1,4-phenylenesulfonyl-2-amino-1,4-phenyleneoxy-1,4-phenyleneisopropylidene-1,4-phenylene)	THF	Ethanol/W (1 : 1)	379
Poly(2,5-thiophenediylsulfonyl-1,4-phenyleneoxy-1,4-phenyleneisopropylidene-1,4-phenyleneoxy)	DMA, methylene chloride, THF	Methanol, W	380
Poly(1,4-phenylenesulfonyl-1,4-phenyleneoxy–4,4′-biphenylyleneoxy)	Aniline, DMA, pyridine		373
Poly(1,4-phenylenesulfonyl-1,4-phenyleneoxy-1,4-phenylenecarbonyl-1,4-phenyleneoxy-1,4-phenyleneoxy)	Chloroform, sulfolane	Methanol	381
Poly(1,4-phenylenesulfonyl-1,4-phenyleneoxy-1,3-phenyleneethenylene-1,3-phenyleneoxy)	DMA		382
Poly(1,4-phenylenesulfonyl-1,4-phenyleneoxy-1,4-phenylenevinylidene-1,4-phenylene)	Chloroform, DMA		181
Poly(1,4-phenylenesulfonyl-1,4-phenyleneoxy-1,4-phenyleneoxy-1,3-pyridinediyloxy-1,4-phenyleneoxy)	DMA		347
Poly(1,4-phenylenesulfonyl-1,4-phenyleneoxy-1,4-phenylenemethylphosphineoxide-1,4-phenyleneoxy)	DMA	Methanol/W	383
	Dichlorobenzene	Isopropanol, methanol	384
Poly(1,3,4,6-tetraoxyperhydrocyclopentene-(1,2-c : 3,4-c′)-dipropyl-2,5-diylethylenesulfonylethylene)	DMF, DMSO, formic acid, NMP, sulfuric acid	Hexane	385

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TABLE 4. *cont'd*

Polymer	Solvents	Nonsolvents	Refs.
4.3.3. OTHERS			
Poly(trimethylenesulfite)	Methylene chloride		386
4.4. MAIN-CHAIN -C-N-C- POLYMERS			
4.4.1. POLY(AMIDES)			
Poly(amides) 1			
Poly(*N*-ethyliminocarbonyl), Poly(ethyl isocyanate)	Sulfuric acid, trifluoroacetic acid		387
Poly(*N*-butyliminocarbonyl) Poly(butyl isocyanate)	Bzn., carbon tetrachloride, THF		387,388
Poly(*N*-*n*-hexyliminocarbonyl), Poly(*n*-hexyl isocyanate)	Bzn., chloroform, DMF	Methanol	389–391
Poly(*N*-*m*-tolyliminocarbonyl)	DMF		387
Poly(*N*-vinyliminocarbonyl)	DMA, DMF, DMSO, pyridine	Alcohols, carbon disulfide, chloroform, dioxane	392
Poly(amide) 1,5			
Poly(iminoglutaroyliminomethylene)	1,4-Butanediol, dichloroacetic acid		393,394
Poly(amide) 1,6			
Poly(iminoadipoyliminomethylene), Poly(methylene adipamide)	1,4-Butanediol		394
Poly(amide) 1,12			
Poly(iminododecanoyliminomethylene)	2-Methyl-2,4-pentanediol		394
Poly(amides) 2			
Poly(γ-benzyl glutamamide)	*m*-Cresol, DMF		395,396
Poly(lysine-*co*-lactic acid) (1 : 19)	Chloroform	Methanol	397
Poly(amides) 3			
Poly[imino-(1-oxo-2,2-dimethyl-3-phenyltrimethylene)], Poly(3,3-dimethyl-4-phenylazetidine-2-one)	Phenol, sulfuric acid, trifluoroethanol	Chloroform, HMPT, methanol, sol. of $Ca(CNS)_2$ in methanol	399
Poly[imino-(1-oxo-3-methyltrimethylene)], Poly (4-methylazetidine-2-one)			399,691
optical activity < 75%	Formic acid, phenol, sulfuric acid, sol. of $Ca(SCN)_2$ in methanol	Chloroform, HMPT, methanol, trifluoroethanol	
optical activity > 80%	Chlorobenzene/trichloroacetic acid (1/1), dichloroacetic acid, formic acid/trichloroacetic acid (3/7)	Formic acid, sulfuric acid	691
Poly[imino-(1-oxotrimethylene)]	Aqu. chloral hydrate, aqu. sol. of $CaBr_2$ or $FeCl_3$, chloroacetic acid, cyanoacetic acid, formic acid, glycerol (hot), nitric acid, nitrophenols, phenol (hot), sulfuric acid, W>140°C	Most organic solvents, dilute bases and acids, DMF, DMSO, phenol (cold)	13,400,401
Poly(aspartic acid-*co*-lactic acid) (1 : 9)	Methylene chloride		402
Poly(amides) 4			
Poly[imino-(1-oxotetramethylene)], Polypyrrolidone	α-Pyrrolidone (hot), acetic acid (hot), aqu. sol. of $Ca(CNS)_2$, benzyl alcohol (hot), *o*-chlorophenol, *m*-cresol, dichloroacetic acid, formic acid, methanol, sulfuric acid	DMF, formamide, W	403, 404
Poly(iminooxalyliminotetramethylene)	Dichloroacetic acid, sulfuric acid, trifluoroacetamide	Formic acid, phenol, W	405
Poly(imino-1-carboxy-1,3-propylenecarbonyl), Poly (γ-glutamic acid)	W	Ethanol	406
Poly(amide) 4,6			
Poly(iminoadipoyliminotetramethylene), Poly(butylene adipamide)	Hexafluoroisopropanol		407
Poly(amides) 5,5			
Poly(iminoglutaroyliminopentamethylene), Poly (1,5-pentamethylene glutaramide)	Dichloroacetic acid		408
Poly(amide) 5,6			
Poly(iminoadipoyliminopentamethylene), Poly (pentamethylene adipamide)	Dichloroacetic acid, trifluoroethanol	Methanol	409,410
Poly(amides) 6			
Poly[imino-(1-oxohexamethylene)], Poly (ε-caprolactam)	Acetic acid, chlorophenol, *m*-cresol, ethylene carbonate, formic acid, HMPT, phosphoric acid, sulfuric acid, trichloroacetic acid	Alcohols, chloroform, esters, ethers, hydrocarbons, ketones	4,5
chlorinated	*o*-Chlorophenol, DMSO, sulfuric acid	Formic acid	411

TABLE 4. *cont'd*

Polymer	Solvents	Nonsolvents	Refs.
Poly[imino-(1-oxohexamethylene)], partially *N*-trifluoroacetic acid substituted	Acetone, chloroform, THF	Hexane, W	412
Poly[imino-(1-oxohexamethylene)-*co*-imino-(1-oxyundecamethylene)] (1 : 1)	2,2,2-Trifluoroethanol/methylene chloride (3/2)		413
Poly[imino-(1-oxohexamethylene)-*co*-iminosuccinoyl], (9 : 1 to 2 : 8)	Mesitylene/sulfolane		414
Poly(amide) 6,6			
Poly(iminoadipoyliminohexamethylene), Poly(hexamethylene adipamide)]	rt: Chloral hydrate, chloroacetic acids, formic acid, HCl, HF, liquid sulfur dioxide, methanol, phenols, phosphoric acid, sulfuric acid, trichloroethanol, trifluoroethanol, saturated solutions of: alcohol-soluble salts, e.g. calcium chloride, magnesium chloride in methanol, at 120–180°C: acetic acid, *N*-acetylmorpholine, benzyl alcohol, 2-butene-1,4-diol, 1,3-chloropropanol, di(ethylene glycol), DMSO, ethylene chlorohydrin, formamide	Aliphatic alcohols, chloroform, diethyl ether, hydrocarbons, aliphatic ketones, aliphatic esters	13
Poly(amide) 6,9			
Poly(iminoazelaoyliminohexamethylene)	*m*-Cresol		32
Poly(amide) 7			
Poly[imino-(1-oxohepamethylene)-*co*-imino-(1-oxodedecamethylene)], (1 : 1)	2,2,2-Trifluoroethanol/methylene chloride (3/2)		413
Poly(amide) 8,6			415
Poly(iminoadipoyliminooctamethylene)	1,4-Butanediol, hot		
Poly(amide) 10,6	Chlorobenzene, diethyl succinate (79°C)		5
Poly(iminoadipoyliminodecamethylene), Poly(decamethylene adipamide)			
Poly(amide) 11			
Poly[imino-(1-oxoundecamethylene)], Poly(11-aminoundecanoic acid)	Higher primary alcohols, DMF, DMSO, hexafluoropropanol		13,692
Poly(amide) 12			
Poly[imino-(1-oxododecamethylene)], Poly(12-aminododecanoic acid)	Cresol		416
Poly(amide) 12/2			
Poly(iminocarbonylmethyleneiminocarbonylundecamethylene)	DMSO	Diethyl ether	398
Poly(amide) 12,6			
Poly(iminoadipoyliminododecamethylene)	Cresol		416
Poly(amide) 18			
Poly[amino-(1-oxooctadecamethylene)], Poly (18-aminostearic acid)	DMF, DMSO, pyridine	Hexane, methanol, W	417
Other aliphatic poly(amides)			
Poly(iminotartronoyliminohexamethylene)	Chloroacetic acid, DMSO	Acetone, hexane, methanol, W	418
Aromatic poly(amides)			
Poly(imino-1,4-phenylenecarbonyl-*co*-oxy-1,4-phenylenecarbonyl) (1 : 1 to 1 : 9), Poly(*p*-aminobenzoic acid-*co*-*p*-hydroxybenzoic acid)	Conc. sulfuric acid (decomp.)	Insoluble in all common solvents	419
Poly(iminocarbonyl-1,4-phenyleneoxyterephthaloyloxy-1,4-phenylenecarbonylimino-1,4-phenylenehexafluoroisopropylidene-1,4-phenylene)	NMP		693
Poly(iminocarbonylpyridine-2,6-diyl-carbonylimino-1,4-phenyleneoxy-1,4-phenylene)	NMP, sulfuric acid	Methanol	420
Poly(iminoterephthaloyliminoethylene), Poly(ethylene terephthalamide)	Sulfuric acid	Acetone, chloroform, *m*-cresol, DMF, ethanol/W (4/1), formamide, trifluoroacetic acid	421
Poly(*N*-methyliminoterephthaloyl-*N*-methyliminoethylene)	Acetone, chloroform, *m*-cresol, DMF, formamide, sulfuric acid, trifluoroacetic acid	Ethanol/W (4/1)	421
Poly(*N*-methyliminoterephthaloyl-	Chloroform, *m*-cresol (hot),	Acetone, DMF	421

TABLE 4. *cont'd*

Polymer	Solvents	Nonsolvents	Refs.
N-methyliminotetramethylene)	ethanol/W (4/1) (hot), formamide, sulfuric acid		
Poly(iminoisophthaloylimino-1,3-phenylene), *N*-methyl substituted	DMSO, sulfuric acid	Hexane, W	422
Poly(iminoisophthaloylimino-1,4-phenyleneoxy-1,4-phenylene)	NMP, sulfuric acid	Methanol	420
Poly(iminoisophthaloylimino-2,4-pentylene)	DMF, DMSO, methanol, trifluoroacetic acid, trifluoroethanol	Hexane, methanol	423
Poly(iminoisophthaloylimino-4,4′-biphenylylene)	Conc. sulfuric acid	*m*-Cresol (hot), DMA (sw), DMF (sw), DMSO (sw), formic acid (85%) (sw), glacial acetic acid (sw), methanol, NMP (sw)	424
Poly(iminoisophthaloylimino-1,4-phenylene)	HMPT		425
Poly(iminoterephthaloyliminoethylene oxyisophthaloyl-oxyethylene)	DMSO, NMP, trifluoroacetic acid	Methanol, DMF	426
Poly(iminoterephthaloyliminotetramethylene) Poly(butylene terephthalamide)	DMF, formamide, sulfuric acid, trifluoroacetic acid	Acetone, chloroform, *m*-cresol	421
Poly(iminoterephthaloylimino-2,4-pentylene)	LiCl, sulfuric acid, trifluoroacetic acid	DMF, DMSO, trifluoroethanol, W	423
Poly(iminoterephthaloylimino-1,4-phenylene), Poly (*p*-phenylene tetrephthalamide)	DMF/LiCl, NMP		427,428
Poly(iminocarbonyl-1-methyl-4,5-imidazolediyl-carbonyliminoethylene)	Chloroform, DMF, methylene chloride, NMP		429
Poly(iminocarbonyl-1,4-phenyleneiminocarbonyl-pentamethylene)	Ethyl acetate		430
Poly(iminoterephthaloylimino-3-methyl-1,4-phenyleneoxyethyleneoxy-2-methyl-1,4-phenylene)	Tetrachloroethane		431
Poly(iminocarbonyl-1,4-phenylenehexafluoroiso-propylidene-1,4-phenylenecarbonylimino-1,4-phenyleneoxy-1,4-phenylene)	DMA	Methanol	432
Poly(iminocarbonyl-1,4-phenyleneoxyterephthaloyloxy-1,4-phenylenecarbonylimino-1,4-phenylenehexafluoro-isopropylidene-1,4-phenylene)	NMP		693
Poly(imino-3-alkylisophthaloylimino-1,4-phenylene)	NMP		433
Poly(iminotetra(octylthio)terephthaloylimino-1,4-phenylene)	Methylene chloride/methanesulfonic acid	Chlorobenzene, chloroform, dioxane, THF, trifluoroacetic acid	434
Poly(pyromellitic dianhydride-*co*-aromatic diamines), Poly(amic acids)	DMF, DMA, DMSO, tetramethylurea		435
Sulfur and phosphorus containing poly(amides)			
Poly(iminoadipoyliminotrimethylene-1,4-phenylene-phosphinidene-1,4-phenylenetrimethylene)	Aqu. hydrochloric acid (5%), cresol, DMF, ethanol, formic acid	Acetone, acetonitrile, chlorobenzene, chloroform, C-7 fluoroalcohol, hexane (sw), W	436
Poly(iminoethyleneiminocarbonyl-1,4-phenylene-sulfonyl-1,4-phenylenecarbonyl)	Formic acid, tetrachloroethane/phenol (2/3), 1,1,2-trichloroethane/formic acid (3/2)	2-Chloroethanol, *m*-cresol, DMF	437
Poly(iminohexamethyleneiminocarbonylethylene-1,4-phenylenephosphinylidene-1,4-phenyleneethylenecarbonyl)	Cresol, DMF, ethanol, C-7 fluoroalcohol, formic acid	Acetone, acetonitrile, aqu. hydrochloric acid (5%, sw), chlorobenzene, chloroform (sw), HX, W (sw)	
Poly(iminohexamethyleneiminocarbonyl-ethylenethioethylenecarbonyl)	Cresol, DMF, formic acid	Acetone, acetonitrile, aqu. hydrochloric acid (5%), chlorobenzene, chloroform, ethanol, C-7 fluoroalcohol (sw), hexane, W	436
Poly(iminoisophthaloylimino-1,3-phenylene-sulfonyl-1,3-phenylene)	DMA, DMF, NMP		438
Poly(iminoterephthaloylimino-1,3-phenylene-sulfonyl-1,3-phenylene)	DMA, DMF	NMP	438
Poly(iminoterephthaloylimino-1,4-phenylene-sulfonyl-1,4-phenylene)	Sol. of LiCl in DMF (5%)	DMF, NMP	438
Poly(iminoterephthaloyliminotrimethylene-1,4-phenylenephosphinidene-1,4-phenylenetrimethylene	Cresol, DMF, formic acid, hydrochloric acid (5% sw)	Acetone, acetonitrile, chlorobenzene, chloroform, ethanol (sw), hexane, W	436
4.4.2. POLY(HYDRAZIDES)			
Poly[diazo-1,4-phenylenecarbonyltri(oxyethylene)-oxycarbonyl-1,4-phenylene]	Chloroform, *o*-dichlorobenzene, nitrobenzene, THF	Acetone, hexane, methanol	439

TABLE 4. *cont'd*

Polymer	Solvents	Nonsolvents	Refs.
Poly(hydrazoadipoylhydrazoisophthaloyl)	DMSO, HMPT		440
Poly(hydrazoadipoylhydrazosuccinoyl)		DMSO (sw)	440
Poly(hydrazoisophthaloylhydrazoterephthaloyl)	*m*-Cresol, dichloroacetic acid (degrad.), DMA, DMSO (cold), formic acid (degrad.), NMP, sulfuric acid (degrad.), trifluoroacetic acid (degrad.), trifluoropropanol	Chloroform, nitrobenzene, trichloroethane (sw), trifluoropropanol, W	441
Poly(4,4′-benzaldehydeazineoxy-1,4-phenylene-isopropylidene-1,4-phenyleneoxy)	Toluene	Methanol	442
4.4.3. POLY(UREAS)			
Poly(ureas) (general)	*m*-cresol, formic acid, phenol, sulfuric acid	Alcohols, diethyl ether	30
Poly(iminocarbonyliminononamethylene), Poly(ureylene-nonamethylene)	Sulfuric acid (60% and 95%)	*m*-Cresol (sw), glacial acetic acid, aqu. NaOH (45%, sw)	679
Poly(iminocarbonylimino-1,3-phenyleneimino-carbonylimino-2-methyl-5-sulfo-1,3-phenylene), Poly(ureylene-1,3-phenyleneureylene-2-methyl-5-sulfo-1,3-phenylene)	Aqu. NaOH	W	443
4.4.4. POLY(CARBODIIMIDES) (arranged according to increasing complexity) $\left[\overset{NR}{\overset{\|}{C}}N\right]_{R}$			
Poly(diethylcarbodiimide)	Formic acid, aqu. mineral acids	Heptane	444
Poly(diallylcarbodiimide)	Formic acid	Heptane	444
Poly(di-*n*-butylcarbodiimide)	Formic acid	Heptane	444
Poly(diisobutylcarbodiimide)	Formic acid		444
Poly(methylhexylcarbodiimide)	Toluene		445
Poly(di-*n*-hexylcarbodiimide)	Formic acid, *n*-heptane, toluene		445,446
Poly(diphenylcarbodiimide) $-N=C=N-R-$	Formic acid		444
Poly(hexamethylenecarbodiimide)	No solvent known		447
Poly(4,4′-biphenylylenemethylenecarbodiimide)	*m*-Cresol, trichlorophenol/phenol (7/10)		447
Poly(3-methyl-1,4-phenylenecarbodiimide)	No solvent known		447
Poly(1,3-xylylenecarbodiimide)	No solvent known	Chlorobenzene, chloroform, cyclohexanone, DMF, DMSO, ethylene chlorohydrin, formic acid, trichloroethylene, xylene	447
Poly(2,2′-dimethyl-4,4′-biphenylylenecarbodiimide)	No solvent known		447
Poly(2,2′-dimethoxy-1,4-biphenylylenecarbodiimide)	No solvent known		447
Poly(1,5-naphthylenediylcarbodiimide)	No solvent known		447
4.4.5. OTHER COMPOUNDS			
Poly(*N*-propanoyliminoethylene), Poly(2-ethyl-2-oxazoline)	Ethanol, W		448,449
Poly[*N*-(perfluorooctylethylenecarbonyl)iminoethylene]	Hexafluoroisopropanol	Methanol	450
Poly(*N*-benzoyliminoethylene)	Chloroform	Diethyl ether	451
Poly[*N*-((9-carbazolyl)acetyl)iminoethylene]	Chloroform, THF	Ethanol, diethyl ether	452
Poly[*N*-2-((9-carbazolyl)propanoyl)iminoethylene]	Chloroform, THF	Ethanol, diethyl ether	452
Polysuccinimide	Mesitylene sulfolane		453
Poly(*tert*-butylmaleimide)	Bzn., carbon tetrachloride, DMF, THF	Hexane	454
Poly(phenylmaleimide)	DMF, DMSO	Bzn., hexane	454
Poly(*m*-aniline)	DMF, DMSO, methylene chloride (partially), NMP		455
Polyaniline, camphorsulfonic acid doped	Benzyl alcohol, chloroform, *m*-, *p*-cresol, DMF, NMP		456,457
Poly[*N*-(*p*-*tert*-butylbenzoyl)aniline]	Acetone (partially), chloroform (partially), DMSO, THF		458
Poly(2-pentadecylaniline)	Chloroform, THF		459
Poly(3-trifluoromethylaniline)	Acetone, acrylonitrile, toluene		460
Poly(4-amino-3-sulfoaniline)	Methanol, W		461

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TABLE 4. *cont'd*

Polymer	Solvents	Nonsolvents	Refs.
Poly[*N*-(*p*-sulfophenyl)imino-3-hydroxymethyl-1,4-phenyleneimino-1,4-phenylene]	DMF (partially), DMSO (partially), NMP (partially), W		462
Poly[*N*-(4-methylphenyl)-6-iminohexamethylenecarbonyl-1,4-phenylene]	Methylene chloride, THF	Diethyl ether, methanol	463
Poly(imino-1,4-phenylenecarbonyloxy-1,4-phenyleneoxycarbonyl-1,4-phenylene)	*m*-Cresol, DMA (partially), DMSO (partially), NMP (partially), sulfuric acid	Chloroform, hexane	464
Poly[*N*-(methyl)imino-3-phenyltriazine-1,5-diyl]	Bzn., cresols, phenols	Hexane	465
Poly(9-nitriloanthraquinone-10-nitrilo-1,4-phenylene)	Chlorobenzene, chloroform	Hexanes	466
Poly(9-nitriloanthraquinone-10-nitrilo-1,4-phenylene-methylene-1,4-phenylene)	Chlorobenzene		467
Poly[carbonyliminocarbonyl-1,4-phenylene-carbonyliminocarbonyloxy-2,2-(dimethyl) tetramethyleneoxy]	DMA	Diethyl ether	468
Poly(oxy-3-methyl-1,4-phenylene-*ONN*-azoxy-2-methyl-1,4-phenyleneoxy-1,12-dodecanoyl),	Chloroform		469
Poly[*N*-(acetyl)iminoethylene-*co*-*N*-(3-thiopheneylcarbonyl)iminoethylene]		Acetone, acetonitrile, DMF, DMSO, THF	470

4.5. POLY(PHOSPHAZENES) AND RELATED COMPOUNDS

Poly(dichlorophosphazene)	Acetonitrile, cyclohexane, methylene chloride, THF		682
Poly[bis(trifluoroethoxy)phosphazene]	Acetone, cyclohexanone (hot), dimethyl ether, ethyl acetate, glycol, methanol (hot), THF	Diethyl ether, dioxane, ethanol, hydrocarbons, W	471–473
Poly(dimethoxyphosphazene)	Acetonitrile, chloroform, dimethoxyethane, dioxane, DMF, methanol, pyridine, THF	Acetone, bzn., diethyl ether, ethanol, W	471
Poly(dihexyloxyphosphazene)	Bzn.		7
Poly(methylphenylphosphazene)	THF		474
Poly(diphenoxyphosphazene)	Bzn. (hot), chlorobenzene, DMF, THF	Acetone, DMSO, ethanol, hexane, W	471
Poly(4-nitrophenoxyphenoxyphosphazene)	Dioxane, THF	Hexane, methanol, W	475
Poly[(phenylthiophosphonoyl)trimethyene]	Acetone (partially), acetonitrile (partially), chloroform, DMF, DMSO	Toluene, ethyl acetate, methanol, W	476
	Chloroform	Methanol/W (9/1)	477
	Methylene chloride	Diethyl ether	478

4.6. POLY(SILANES), POLY(SILAZANES)

Poly(alkyltrisilazane)	Aromatic hydrocarbons, carbon tetrachloride, cyclohexane	Acetone (partially), DMSO (partially)	479
Poly(dimethylsilylene-1,4-phenylene)	Aromatic hydrocarbons	Aliphatic hydrocarbons, ethanol	480
Poly(dimethlylsilylenetrimethylene)	Diethyl ether, THF		481
Poly(*n*-pentyl-*n*-hexylsilylene)	Toluene	Isopropanol/ethyl acetate	482
Poly(di-*n*-hexylsilylene)	Isooctane		483
Poly(methylphenylsilylene)	Chloroform		484
Poly(phenylchlorosilylene)	Carbon tetrachloride		485
Poly(1,1,2,2-tetramethyldisilylenemethylene)	Toluene	Ethanol	486
Poly(diethoxysilylene-1,4-phenylene)	THF	Chloroform/methanol	487
Poly(octamethyltetrasilylenedimethylsilylene)	Toluene	Methanol	488
Poly(octamethyltetrasilylenemethylene)	Toluene	Methanol	488
Poly(dihydrosilylene-1,4-phenylene)	Chloroform, diethyl ether	Ethanol	489
Poly(hydrophenylsilyleneethynylene-1,3-phenyleneethynylene)	Bzn., THF	Hexane, methanol	490,491

TABLE 4. *cont'd*

Polymer	Solvents	Nonsolvents	Refs.
Poly(dibutylsilylene-1,4-phenyleneethenylene-1,4-phenyleneethenylene-1,4-phenylene)	Chloroform	THF	492
Poly(hexamethylcyclotrisilazane)	Carbon tetrachloride, hydrocarbons	Acetone, DMSO	493
Poly(dihexylsilyleneferrocenediyl)	THF		680
Poly(dimethylsilylene-*N*-methylimino)	THF		494
Poly(dimethylsilyleneiminoethyleneimino)	Xylene		495
Poly(dimethylsilylene-*co*-1,3-dihydro-1,3-dimethyldisilazane) (1 : 1 to 3 : 1)	Decaline, toluene		496
	Toluene	Methanol	497

TABLE 5. MAIN-CHAIN HETEROCYCLIC POLYMERS

Polymer	Solvents	Nonsolvents	Refs.
5.1. POLY(BENZOXAZOLES), POLY(OXADIAZOLES), POLY(OXADIAZOLIDINES)			
Poly(benzoxazoles)			
Poly(2,5-benzoxazolediyl)	Sulfuric acid		498
Poly(2,6-benzoxazolediyl)	Sulfuric acid		498
Poly(dibenzothiazoles)			499
R = 1,3-phenylene	Sulfuric acid	Organic solvents	499
R = 1,4-phenylene	Sulfuric acid	Organic solvents	499,500
R = octamethylene	*m*-Cresol, formic acid, sulfuric acid		500
R = 1,4-cyclohexylene	Sulfuric acid	Acetic acid, DMA, DMF, DMSO, formamide, NMP	501
R = tetramethylene	Chloroform, *m*-cresol, DMF (hot), pyridine (hot), sulfuric acid (hot), tetrachloroethane (hot), THF (hot)	Benzyl alcohol, formic acid	502
R = 1,3-phenylene	Benzyl alcohol (hot), chloroform, *m*-cresol (hot), pyridine, sulfuric acid, tetrachloroethane (hot), THF	DMF (partially), formic acid (partially)	502
R = 1,4-phenylene	Chloroform, *m*-cresol, formic acid (hot), sulfuric acid (hot)	Benzyl alcohol, DMF, pyridine, tetrachloroethane, THF	502
R =	Polyphosphoric acid		503
R =	DMA, NMP	Methanol	504–506
Poly(1,3,4-oxadiazoles)			
R = octamethylene	Bzn., chloroform, *m*-cresol, dichloroethylene, DMA (hot), DMF, DMSO (hot), NMP (hot), sulfuric acid		507–509
R = methylene to eicosamethylene	DMA (hot), DMSO (hot), NMP (hot), DMSO (sw), NMP (sw) sulfuric acid (95%)		509

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TABLE 4. *cont'd*

Polymer	Solvents	Nonsolvents	Refs.
Poly(dibutylsilylene-1,4-phenyleneethenylene-1,4-phenyleneethenylene-1,4-phenylene)	Chloroform	THF	492
Poly(hexamethylcyclotrisilazane)	Carbon tetrachloride, hydrocarbons	Acetone, DMSO	493
Poly(dihexylsilyleneferrocenediyl)	THF		680
Poly(dimethylsilylene-*N*-methylimino)	THF		494
Poly(dimethylsilyleneiminoethyleneimino)	Xylene		495
Poly(dimethylsilylene-*co*-1,3-dihydro-1,3-dimethyldisilazane) (1 : 1 to 3 : 1)	Decaline, toluene		496
	Toluene	Methanol	497

TABLE 5. MAIN-CHAIN HETEROCYCLIC POLYMERS

Polymer	Solvents	Nonsolvents	Refs.
5.1. POLY(BENZOXAZOLES), POLY(OXADIAZOLES), POLY(OXADIAZOLIDINES)			
Poly(benzoxazoles)			
Poly(2,5-benzoxazolediyl)	Sulfuric acid		498
Poly(2,6-benzoxazolediyl)	Sulfuric acid		498
Poly(dibenzothiazoles)			499
R = 1,3-phenylene	Sulfuric acid	Organic solvents	499
R = 1,4-phenylene	Sulfuric acid	Organic solvents	499,500
R = octamethylene	*m*-Cresol, formic acid, sulfuric acid		500
R = 1,4-cyclohexylene	Sulfuric acid	Acetic acid, DMA, DMF, DMSO, formamide, NMP	501
R = tetramethylene	Chloroform, *m*-cresol, DMF (hot), pyridine (hot), sulfuric acid (hot), tetrachloroethane (hot), THF (hot)	Benzyl alcohol, formic acid	502
R = 1,3-phenylene	Benzyl alcohol (hot), chloroform, *m*-cresol (hot), pyridine, sulfuric acid, tetrachloroethane (hot), THF	DMF (partially), formic acid (partially)	502
R = 1,4-phenylene	Chloroform, *m*-cresol, formic acid (hot), sulfuric acid (hot)	Benzyl alcohol, DMF, pyridine, tetrachloroethane, THF	502
R =	Polyphosphoric acid		503
R =	DMA, NMP	Methanol	504–506
Poly(1,3,4-oxadiazoles)			
R = octamethylene	Bzn., chloroform, *m*-cresol, dichloroethylene, DMA (hot), DMF, DMSO (hot), NMP (hot), sulfuric acid		507–509
R = methylene to eicosamethylene	DMA (hot), DMSO (hot), NMP (hot), DMSO (sw), NMP (sw) sulfuric acid (95%)		509

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TABLE 5. *cont'd*

Polymer	Solvents	Nonsolvents	Refs.
R = 1,4-cyclohexylene	Formic acid (80%), sulfuric acid	DMA, DMSO, NMP	510
R = 1,3-cyclohexylene	DMA, DMSO, formic acid (80%), NMP, sulfuric acid		510
R = 1,2-phenylene	Sulfuric acid		511
R = 1,3-phenylene	Sulfuric acid, trifluoroacetic acid	Chloroform, *m*-cresol, DMF, nitrobenzene, tetrafluoropropanol	512–514
Poly(oxadiazolidines)			
R = 1,3-phenylene	DMSO	Methanol	515

5.2. POLY(DITHIAZOLES), POLY(BENZOTHIAZOLES)

Poly(dithiazoles)			
R = 1,4-phenylene	Sulfuric acid (cold)	Diethyl ether, diphenyl ether, diphenylmethane, DMA, DMF, DMSO, ethanol, formic acid, quinoline	516
R = 1,4-phenylenehexamethylene-1,4-phenylene	Sulfuric acid (cold)		516
$M_w = 11000$	DMF (cold)		516
$M_w = 12000$	DMF (hot)		516
$M_w = 27000$		DMF (hot)	516
Poly(benzothiazoles)			
R = 1,4-phenylene	Methanesulfonic acid		517
R = 5-alkoxy-1,3-phenylene	Methanesulfonic acid		433
R = 1,4-bicyclo[2.2.2]octane	Methanesulfonic acid, sulfuric acid		518
R = 1,4-phenylene and 1,4-phenyleneimino-1,4-phenylene	Methanesulfonic acid, polyphosphoric acid		519
R = 1,3-phenylene	Conc. sulfuric acid		520
R = 3,5-pyridinediyl	Conc. sulfuric acid		520
R = 1,4-phenyleneoxy-1,4-phenylene	Conc. sulfuric acid		520
R = 1,4-phenylenecarbonyl-1,4-phenylene	Conc. sulfuric acid		520
R = 1,4-phenylene	Conc. sulfuric acid		500
R = 1,6-anthracenediyl	Sulfuric acid (partially)		521
Poly(2,6-benzothiazolediyl)	Sulfuric acid		498

5.3. POLY(IMIDES)

5.3.1. POLY(BENZIMIDES)

R = 1,4-phenylenecarbonyloxyethyleneoxy-ethyleneoxycarbonyl	Methylene chloride/trifluoroacetic acid (4/1)	Methanol	522
R = poly(isobutylene)iminocarbonyl	*n*-Butyl acetate, diethyl ether	Ethanol, methanol	313
R = 1,4-phenyleneoxy-1,4-phenyleneiminocarbonyl	NMP		523
R = 4,4′-biphenylyleneiminocarbonyl	NMP/xylene		524
R = 1,4-phenylenemethylene-1,4-phenyleneiminocarbonyl	DMA, DMSO, NMP		525,539
R = 1,4-phenylenecarbonyloxymethyleneoxycarbonyl	*m*-Cresol (150°C), trichlorobenzene (reflux)		526
R = 1,4-phenyleneoxy-1,4-phenyleneiminocarbonyl	DMA	Methanol	527
R = 1,4-phenyleneoxy-1,4-phenylenecarbonylimino-1,4-phenyleneoxy-1,4-phenyleneiminocarbonyl	DMA, NMP	Methanol	528

TABLE 5. *cont'd*

Polymer	Solvents	Nonsolvents	Refs.
R = 1,4-phenylene R′ = 5-oxy-1,4-phenyleneisopropylidene-1,4-phenylene-5′-oxy	DMA		529
R = hexamethylene R′ = 5,5′-oxy	Conc. sulfuric acid		530
R = 2,2′-di(trifluoromethyl)-4,4′-biphenylylene R′ = 5,5′-hexafluoroisopropylidene	Acetone, chloroform, *m*-cresol		531
R = 1,4-phenyleneoxy-1,4-phenylene R′ = 5,5′-phenylphosphineoxide	NMP		532
R = 2,2′-ditrifluoromethyl-4,4′-biphenylylene R′ = 5,5′-idyl	*m*-Cresol (hot)		533
R = 1,4-phenyleneoxy-1,4-phenylene R′ = 5,5′-carbonyl	DMA		534
R = 1,3-phenylene R′ = 5,5′-oxy-1,4-phenyleneisopropylidene-1,4-phenyleneoxy	NMP		535
5.3.2. POLY(PYROMELLITIMIDES)			
R = nonamethylene	*m*-Cresol	Common organic solvents	13,540
R = 1,3-phenylene; 1,4-phenylene	Conc. sulfuric acid	Common organic solvents	13,540
R = 4,4′-biphenylylene	Fuming nitric acid	Common organic solvents	13,540
R = 1,4-phenylenemethylene-1,4-phenylene; 1,4-phenyleneisopropylidene-1,4-phenylene	Conc. sulfuric acid	Common organic solvents	13,540
R = 1,4-phenyleneoxy-1,4-phenylene amic acid	DMA, *N*-methylcaprolactone, fuming nitric acid DMA, DMF, DMSO	Common organic solvents	13,540, 541 542
R = 1,4-phenylenethio-1,4-phenylene	Fuming nitric acid	Common organic solvents	13,540
R = 1,4-phenylenesulfonyl-1,4-phenylene	Conc. sulfuric acid	Common organic solvents	13,540
R = 1,3-phenylenesulfonyl-1,3-methylene	Conc. sulfuric acid	Common organic solvents	13,540
R = pentaerythrityl	No solvent known		543
R = 4-hydroxy-1,3-phenyleneisopropylidene-4-hydroxy-1,3-phenylene	DMF, DMA, DMSO, nitrobenzene, tetramethylene sulfone		223
R = ethylidenecarbonyloxysebacoyloxy-carbonylethylidene, <40% imide	Chloroform		544
R = hexa-2,4-diyne-1,6-diyl	DMSO	W	545
R = 1,3-phenyleneoxy-1,3-phenyleneoxy-1,3-phenylene	DMA		525
R =	DMA (partial), DMSO (partial), NMP (partial)		546
5.3.3. OTHERS			
	Cresol, DMA, DMF, DMSO, NMP		536
	4-Butyrolactone		537
	No known solvent		538

TABLE 5. *cont'd*

Polymer	Solvents	Nonsolvents	Refs.
5.4. POLY(QUINOXALINES)			
Poly(quinoxaline-2,6-diylquinoxaline-6,2-diyl-1,4-phenylene)	Sulfuric acid		547
Poly(quinoxalines) several different compositions	1,3-Dichloro-1,1,3,3-tetrafluoro-2,2-dihydroxypropane, methanesulfonic acid		548,549
5.5. POLY(BENZIMIDAZOLES)			
Poly(benzimidazoles)			
R = tetramethylene	DMSO (partially), formic acid	DMF	550
R = 1,4-phenylene		DMF, DMSO, formic acid	550
R = 1,3-phenylene	Formic acid (partially)	DMF, DMSO	550
Poly(dibenzimidazoles)			
R = tetramethylene to eicosane-1,20-diyl	*m*-Cresol, formic acid (85%), DMA, DMSO, NMP, conc. sulfuric acid	Glacial acetic acid, DMF (sw)	551
R = cyclohexylene	Acetic acid, *m*-cresol, DMF, DMSO, formic acid, NMP, sulfuric acid		501
R = 1,3-phenylene	DMA, DMSO, formic acid, NMP, conc. sulfuric acid	Glacial acetic acid, *m*-cresol, DMF (partially), formic acid (85%, sw)	550,551
R = 1,4-phenylene	Formic acid (2–3% soluble)	DMF, DMSO	550,551
R = 2,2′-biphenylylene	DMF, DMSO, formic acid		550,551
R = 4,4′-biphenylylene	Formic acid (partially)	DMF, DMSO	550,551
R = 3,5-pyridyenediyl	DMF (partially), DMSO, formic acid (partially)		550,551
R = 2,5-furandiyl	DMF, DMSO, formic acid (partially)		550,551
R = 1,4-phenyleneiminocarbonyl-R′-carbonylimino-1,4-phenylene; R′ = octamethylene; 1,4-phenylene; 1,3-phenylene	DMA, DMF, DMSO, NMP, conc. sulfuric acid	Glacial acetic acid (sw), *m*-cresol (sw), formic acid (sw), methanol	550,551
5.6. POLY(PIPERAZINES)			
Poly(2,5-diketo-1,4-piperazinediyl-1,4-phenylene sulfonyl-1,4-phenylene)	Dichloroacetic acid, formic acid, trifluoroacetic acid	DMA, DMF, DMSO	552
Poly(2,5-dimethyl-1,4-piperazinediylcarbonyl-1,4-phenylenesulfonyl-1,4-phenylene)	DMF, *sym*-tetrachloroethane/phenol (2/3)	Methanol, W	13
Poly(1,4-piperazinediylcarbonylethylene-1,4-phenylenephosphinylidene-1,4-phenyleneethylenecarbonyl)	Chloroform, cresol, DMF, ethanol, C-7 fluoroalcohol, formic acid, aqu. hydrochloric acid (5%)	Acetone, acetonitrile (sw), chlorobenzene, hexane	436
Poly(piperazinediylcarbonyloxy-*cis*-cyclohexyleneoxycarbonyl)	Chloroform, *m*-cresol, formic acid		323
Poly(1,4-piperazinediylcarbonyl-2,5-pyridinediylcarbonyl)	*m*-cresol, formic acid, conc. aqu. HCl, phenol, sulfuric acid		553
Poly(1,4-piperazinediyl-2-hydroxytrimethyleneoxy-1,4-phenyleneisopropylidene-1,4-phenyleneoxy-1-hydroxyethylene)	DMF		554
Poly(1,4-piperazinediylcarbonyl-2,5-norbornadiene-2,3-diylcarbonyl)	Chloroform, *o*-cresol	Methanol	555

TABLE 5. *cont'd*

Polymer	Solvents	Nonsolvents	Refs.
5.7. POLY(ANHYDRIDES)			
Poly(maleic anhydride)	Acetic anhydride, acetonitrile, acetophenone, lower aliphatic alcohols, butanone, dioxane, DMF, ethers, ketones, nitroparaffins	Hydrocarbons, most chlorinated hydrocarbons	556
Poly(acrylic anhydride)	DMF, DMSO	Alcohols, bzn., diethyl ether	13
Poly(methacrylic anhydride)	DMF, DMSO	Aliphatic hydrocarbons, diethyl ether, methanol, W	557,558
Poly(itaconic acid anhydride)	Acetic acid, acetone, cyclohexanone, THF	Chloroform, diethyl ether	687,700
Poly(maleic anhydride-*alt*-2-cyclohexylene-1,3-dioxepin-5-ene)	THF	Hexenes	559
Poly(maleic anhydride-*alt*-isopropenylisocyanate)	Acetone, DMF		560
Poly(maleic anhydride-*alt*-2-propenylisocyanate)	MEK	Bzn.	561
Poly(maleic anhydride-*co*-styrene) (3 : 1)	Acetone, MEK		153
Poly(maleic anhydride-*alt*-methyl vinyl ether)	MEK, THF	Carbon tetrachloride, diethyl ether, hexane	186
Poly(maleic anhydride-*alt*-1-octadecene)	Acetone, bzn., carbon tetrachloride, ethyl acetate	Ethanol	562
Poly(maleic anhydride-*co*-*N*-vinylformamide) (1 : 1)	THF		563
5.8. POLY(THIOPHENES)			
Poly(3-alkyl-2,5-thiophenediyl)	Chloroform, methylene chloride, THF (partially)		564
Poly(3-hexyl-2,5-thiophenediyl)	THF, toluene		7
Poly(3-hexyloxycarbonyl-2,5-thiophenediyl)	Chloroform, DMF	Methanol	565
Poly(3,4-oxyethyleneoxy-2,5-thiophenediyl)	Chloroform	Methanol	566
Poly(2,5-thiophenediyl-*co*-3-undecyl-2,5-thiophenediyl) (1 : 1)	Nitrobenzene, THF	Methanol	567
Poly(3-methyl-2,5-thiophenediyl-*co*-3-oligodimethylsiloxane-2,5-thiophenediyl)	Chloroform		568
Poly(2,5-thiophenediylethylene)	THF		569
Poly(2,5-thiophenediyl-*co*-dimethylsilylene) (3 : 1 to 3 : 2)	Dimethoxyethane	Methanol	570
Poly(2,5-thiophenediyl-*co*-*N*-*n*-dodecyl-2,5-pyrrolediyl) (4 : 1)	THF		571
Poly(2,5-thiophenediyl-1,2-dimethoxyethenylene)	Chloroform	Hexane	572
Poly(2,5-thiophenediylethynylene-2,5-dioctyloxy-1,4-phenylene)	Chloroform, THF, toluene		573
Poly(2,5-thiophenediylethynylene-1,4-tetrafluoro phenyleneethynylene)	Chloroform, THF, toluene		573
Poly(thieno[3.2-b]thiophene-2,5-diyl)	Chloroform	Methanol	574
Poly(2,5-thiophenediylcarbonyl-1,4-phenyleneoxy-1,4-phenyleneisopropylidene-1,4-phenyleneoxy)	Chloroform, DMA, NMP	Methanol	575–577
Poly(4,4′-diphenyl-2,2′-bisthiazole-5,5′-diyl)	Hexane	Methanol	578
	Chloroform		579
5.9. OTHERS			
Poly(2,3-dihydrofuran-3,4-diyl)	Toluene	Methanol	580
Poly(2,5-furandiylethylene)	THF		569
Poly(3,5-dicarboxytetrahydropyran-3,5-diylmethylene)	DMSO	Acetone	581

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TABLE 5. *cont'd*

Polymer	Solvents	Nonsolvents	Refs.
Poly(*N*-*n*-butylitaconimide)	Bzn., THF, toluene		7
Poly(*N*-phenylmaleimide)	DMF, DMSO, THF	Methanol	582
Poly(2,5-pyridinediylethenylene)	Formic acid, sulfuric acid		583
Poly(*N*-2-ethylhexyl-3,6-carbazolediylethenylene)	1 M LiCl in NMP	Methanol	584
Poly(*N*-methyleneimidazoleimide-1,5-diyl)	DMA (partially), sulfuric acid (partially)		585
Poly(3-phenyl-3,5-triazolediyl-1,4-phenyleneoxy-1,4-phenyleneisopropylidene-1,4-phenyleneoxy-1,4-phenylene)	Toluene	Methanol	586
Poly[3-(2′-pyridyl)-1,2,4-triazine-5,6-diyl-1,4-phenyleneoxy-4,4′-biphenylyleneoxy-1,4-phenylene]	Chlorobenzene, NMP	Methanol	587
Poly(3,5-pyrazolediyl-1,4-phenyleneoxy-1,4-phenylenecarbonyl-1,4-phenyleneoxy-1,4-phenylene)	DMA, NMP	Chloroform, methanol	588

TABLE 6. FORMALDEHYDE RESINS

Polymer	Solvents	Nonsolvents	Refs.
Aniline-formaldehyde resins			
low mol. wt.	Methylcyclohexanone	Alcohols, aniline (sw), hydrocarbons	6
high mol. wt.	No solvent known	Aniline, chlorinated hydrocarbons (sw)	6
Melamine-formaldehyde resins			
very low mol. wt.	Alcohol, W		6
intermediate mol. wt.	Dil. and conc. acids, formalin, formic acids, pyridine		6
final resin, high mol. wt.	No solvent known		6
Phenol-formaldehyde resins			
Novolaks and low mol. wt.	Acetone, diethyl ether, esters, hydrocarbons		6
4-*tert*-butylphenol and 4-phenylphenol polymers	Drying oils		6
final resins	Molten phenols (with some decomposition)	Most common organic compounds	6
fully cured resins		Dil. acids (sw), dil. alkalies (sw), alcohol, W (sw)	6
p-Toluenesulfonamide-formaldehyde resins	Alcohols, bzn., esters, ethers, ketones	Aliphatic hydrocarbons, W	6,589
Urea-formaldehyde resins			
very low mol. wt.	Alcohol, W		6
intermediate mol. wt.	Dil. and conc. acids, formalin, formic acid, pyridine		6
final resin, high mol. wt.	No solvent known		6
Phenyl glycidyl ether-formaldehyde resins, low mol. wt.	Acetone, MEK, methyl isobutyl ketone		590

TABLE 7. NATURAL POLYMERS AND MODIFIED NATURAL POLYMERS

Polymer	Solvents	Nonsolvents	Refs.
7.1. NATURAL RUBBER AND DERIVATIVES (see also 1.1)			
Natural rubber	Bzn., chlorinated hydrocarbons, cyclohexane, hydrocarbons, methyl isobutyl ketone (low mol. wt.), *n*-propyl ketone (above 14.5°C), toluene (low mol. wt.)	Acetone, alcohols, carboxylic acids	4,5,7, 591
cyclic	Aromatic and chlorinated hydrocarbons	Acetone, acids, alcohol, alkalies, diethyl ether, aliphatic hydrocarbons, oils (sw), W	6
hydrochlorinated	Chlorinated hydrocarbons	Alcohol, W	6
chlorinated	Aromatic and chlorinated hydrocarbons, hydrogenated naphthas	Conc. acids, oxidizing acids, acetone (sw), alcohol, moderately conc. alkalies, aliphatic hydrocarbons, diethyl ether (sw), W	6
dichlorocarbene modified	Chloroform	Methanol	592

TABLE 7. *cont'd*

Polymer	Solvents	Nonsolvents	Refs.
7.2. GUTTA PERCHA			
Gutta percha	Bzn., cloroform, hot petroleum ether	Alcohol, W	6
7.3. CELLULOSE AND DERIVATIVES			
7.3.1. CELLULOSE			
Cellulose	*N*-Ethylpyridinium chloride/DMF (1/1), *N*-ethylpyridinium chloride/pyridine (1/1), trifluoroacetic acid, aqu. solutions of: alkalies (ice-cold), beryllium perchlorate, calcium thiocyanate, cupriammonium hydroxide, cupriethylenediamine, sodium xanthate, tetramethylammonium hydroxide, zinc chloride/hydrochloric acid (cold), zinc chloride (hot), conc. phosphoric acid, conc. sulfuric acid. See also table on cellulose in this Handbook	Dil. aqu. alkalies, hydrocarbons, mineral oils, W (sw)	4–6, 593,594
7.3.2. CELLULOSE ETHERS			
Methyl cellulose			
SC = 3–10%	Aqu. alkalies	W	6,595
= 22–32%	Aqu. alkali, *N*-ethylpyridinium chloride/DMF, methanol/methylene chloride, W (cold)	Diethyl ether, methanol, methylene chloride, W (hot)	6,594,595
= >40%	Acetone, chloroform, cyclohexanone, esters, pyridine	Aliphatic hydrocarbons, diethyl ether, ethanol, W	6,595
Ethyl cellulose			5,6,30,
DS = 0.5–0.7	Aqu. alkali	W (cold)	595,596
= 1.0–1.5	Acetic acid, cuoxam, formic acid, pyridine, W (cold)	Ethanol	
= 2	Chloroform, chlorohydrins, dichloroethylene, ethanol, methylene chloride, THF	Alcohols, diethyl ether, esters, hydrocarbons, ketones, tetrachloroethylene, W	
= 2.3	Acetic esters, alcohols, alkyl halides, bzn., carbon disulfide, furan derivatives, ketones, nitromethane	Acetone (cold), ethylene glycol	
= 3	Alcohols, bzn., esters, methylene chloride	Carbon tetrachloride, diols, di-*n*-propyl ether, hydrocarbons, tetrahydrofurfuryl alcohol	
Isopropyl cellulose			
DS = 0.5	W (cold)	W (hot)	595
= 2.5	Acetone, butanol, bzn., chloroform, cyclohexanone, dichloroethane, dioxane, glycol formal, methyl acetate, methylcyclohexanone, THF	Ethanol, ethanol/diethylether (1/3), hydrocarbons, methanol, propanol	30
Butyl cellulose			
DS = 0.8	Polar organic solvents	Hydrocarbons, W	595
= 1.9	Aromatic hydrocarbons, polar organic solvents	Aliphatic hydrocarbons, W	595
Benzyl cellulose			
DS = 1.65	Methylene chloride, methyl ether glycol acetate, nitrobenzene	Bzn., chlorobenzene, butyl acetate	210
= 2	Acetates (<C5), acetone, bzn./acetone, bzn./alcohol, chlorobenzene, chlorohydrins, dichloroethylene, ethanol/carbon tetrachloride (1/1), MEK, methylene chloride, pyridine, tetrahydrofurfuryl alcohol, tetralin, trichloroethylene	Alcohols, (>C5), carbon tetrachloride, *o*-chlorotoluene, diethyl ether, dioxane, dipropyl ketone, hydrocarbons	6,30

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TABLE 7. *cont'd*

Polymer	Solvents	Nonsolvents	Refs.
DS = 3	Acetone, butyl acetate, chlorobenzene, chloroform, cyclohexanone, ethyl acetate, MEK	Aliphatic hydrocarbons, aromatic hydrocarbons (sw), carbon tetrachloride, diethyl ether, dioxane, ethanol	199
Hydroxyethyl cellulose			
SC = < 30%	Alkali		
= 35–55%	Ethylene chlorohydrin, DMSO, formic acid, W	Cellosolve®, hexane, methanol, toluene	597
= > 55%	Bzn./acetone, bzn./alcohol, chloroform, pyridine, esters	Acetone, bzn., methanol (sw), methyl acetate, THF	
Hydroxypropyl cellulose	Cellosolve®, dioxane, ethanol, methanol, W (< 45°C)	W (> 45°C)	597
Carboxymethyl cellulose			
SC = 5–10%	Alkali		
= 15–30%	W (sodium salt)		
= high	Acetone, bzn./acetone, bzn./alcohol, chloroform, esters, pyridine		
Cyanoethyl cellulose			6
SC = 8–12%	Alkali		
= 24–32%	W		
= > 50%	Acetone, bzn./acetone, bzn./alcohol, chloroform, esters, pyridine		
7.3.3. CELLULOSE ESTERS			
Cellulose triformate	Formic acid, pyridine		30
Cellulose acetate			
DS = 0.6–0.8	W		
= 1.3–1.7	2-Methoxyethanol	Acetone, W	595
= 2–2.3	Acetic acid (glacial), acetone, aniline, benzyl alcohol, chloroform/methanol, cyclohexanone, diethanolamine, dioxane, ethyl acetate/nitrobenzene, ethylene glycol ethers, formic acid, glycol monoethyl ether acetate, methyl acetate, methylene chloride/methanol (4/1), nitromethane, phenols, pyridine	Aliphatic ethers, hydrocarbons, weak mineral acids	4,6
Cellulose triacetate	Acetone/W (4/1), chloroform/alcohol, chloroform, dioxane, ethyl acetate, ethylene glycol ether acetates, ethylene carbonate, methyl acetate, methylene chloride/ethanol (4/1), methylene chloride, THF, trichloroethane	Acetone (partially), aliphatic hydrocarbons, aliphatic ethers, bzn., chlorobenzene, *o*-chlorotoluene, dichloroethane, ethanol (absolute), glycol ethers, methyl *i*-butyl ketone, weak mineral acids	4–6,30, 598,599
Cellulose acetate hydrogen phthalate	Acetone		32
Cellulose tripropionate	Acetone, bzn., chlorobenzene, dichloroethane, ethyl acetate	*o*-Chlorotoluene, ethanol, hydrocarbons	30
Cellulose tributyrate	Acetone, amyl acetate, bzn., chlorobenzene, chloroform, cyclohexanone, dodecane/tetralin (3/1 above 130°C), ethanol (hot), ethyl acetate, nitrobenzene, THF, xylene (hot)	2-Ethylhexanol, cyclohexane, diethyl ether, hexane, methanol	595
Cellulose tricaproate	Acetone, bzn., chlorobenzene, chloroform, cyclohexanone, diethyl ether, dioxane, DMF, ethanol (hot), ethyl acetate, glacial acetic acid (hot), hexane, nitroethane, THF, xylene	2-Hydroxyethyl acetate, formamide, methanol, nitromethane	595
Cellulose tricaprylate	DMF (above 140°C), 3-phenylpropanol (above 48°C), toluene		5
Cellulose stearate DS = 3	bzn., tetrachloroethane, toluene	Acetone, butyl acetate, dichloroethane, ethyl acetate	595

TABLE 7. *cont'd*

Polymer	Solvents	Nonsolvents	Refs.
Cellulose acetate butyrate			
DS (acetate) = 0.5 DS (butyrate) = 2.35	Acetone, amyl acetate, bzn., chloroform, cyclohexanone, dioxane, esters, methanol (hot), nitroethane, tetrachloroethane, toluene (hot)	Aliphatic hydrocarbons, diethyl ether, ethanol, methanol	595
DS (acetate) = 2.1 DS (butyrate) = 0.7	Acetone, chloroform, cyclohexanone, dichloroethane, dioxane, ethyl acetate, nitroethane	Amyl acetate, bzn./methanol (1/4 and 4/1), carbon tetrachloride, diethyl ether, ethanol, hydrocarbons, methanol, W	595
Cellulose tricarbanilate	Acetone, bzn., chloroform, dioxane, DMF, *N*-ethylpyridinium chloride/DMSO (1/1), *N*-ethylpyridinium chloride/pyridine (1/1), pyridine, THF	Methanol, W	7,594, 595
Propyl cellulose benzoate	Acetone, bzn., chloroform, dioxane, DMA, ethyl acetate, pyridine, TMF, toluene, xylene		600
Hydroxypropyl cellulose perfluorooctanoate DS = 3 (ester), DS = 4 (ether)	Acetone	Ethanol	601
7.3.4. CELLULOSE NITRATE AND SULFATE			
Cellulose nitrate			
N = 6.8%	W		602
N = 10.5–12%	Acetic acid (glacial), acetone, alcohol/diethyl ether, alcohol (lower), amyl acetate, ethylene glycol ethers	Higher alcohols, higher carboxylic acids, higher ketones, tricresyl phosphate	4,6,595
N = 12.7%	Acetone, cyclohexanone, ethanol/diethyl ether, ethyl lactate, ethyl butyrate, ethylene carbonate, ethylene glycol ether acetates, furan derivatives, halogenated hydrocarbons, methyl acetate, methyl amyl ketone, nitrobenzene	Dil. carboxylic acids, aliphatic hydrocarbons, aromatic hydrocarbons (sw), diethyl ether, ethylene glycol, higher alcohols (sw), lower alcohols, W	4–6,595
Cellulose sulfate, sodium salt			
DS = 1	W	Ethanol	595
7.4. STARCH AND DERIVATIVES			
Amylose	Ethylenediamine, *N*-ethylpyridinium chloride/pyridine (1/1), DMSO, nitromethane, W (hot), aqu. KOH, aqu. KCl (0.33 M, above 25°C)	*n*-Butanol, diethyl ether	5,7,363,594,595,603
Amylose acetate DS = 2	Chloroform, methyl acetate, nitromethane	W	5
Amylose tricarbanilate	Acetone, dioxane, pyridine		5
Amylopectin	W, W/butanol	Acetone, diethyl ether, ethanol	604
Benzyl amylose DS = 3	Bzn., chloroform, dioxane, DMF, DMSO, THF	Ethanol, methanol, W	605
Starch	Liquid ammonia, aqu. sol. of cupriethylenediamine, fused chloral hydrate, *N*-ethylpyridinium chloride/pyridine (1/1), W (hot, pressure)	Alkali (sw), diethyl ether, W (sw)	6,363, 594,595
Starch, methyl ether			
DS = 0.5–2	W (cold)	W (hot)	595
DS = 3	Chloroform		595
7.5. OTHER POLY(SACCHARIDES)			
Alginic acid	Aqu. alkalies, aqu. sodium carbonate, W (sparingly)	Dil. acids, aqu. calcium salt solutions, hydrophilic organic compounds (sw), hydrophobic organic compounds	6,363
alkali and ammonium salts	Aqu. alkali, W	Organic hydrophobic compounds	6
magnesium and ferrous salts	W	Organic hydrophobic compounds	

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TABLE 7. *cont'd*

Polymer	Solvents	Nonsolvents	Refs.
calcium salts	Weak aqu. alkali	Organic hydrophobic compounds, W	
copper, zinc, aluminum salts	Aqu. ammonium hydroxide	Organic hydrophobic compounds, W	
beryllium, chromium, ferric salts		Aqu. alkali, organic hydrophobic compounds	
ι-Carrageenan	W		694
Chitin	Formic acid, conc. mineral acids (degrad.)	Dil. acids, organic solvents	363
Chitosan	Acetic acid, W (pH <6.5)		606
N-[(3′-hydroxy-2′,3′-dicarboxy)ethyl]chitosan	W		607
Glycogen	Dil. trichloroacetic acid	Alcohol	363
Gum arabic	W (warm)	Alcohol	363
Gum tragacanth, Tragacanthin, tragacanthic acid	W	Acetone, alcohol	363
2,3-Di-O-benzyl-(1,5)-α-D-furanan	*o*-Dichlorobenzene (hot)	Acetone, cyclohexanone, ethyl acetate, hexane, methanol	608
Heparin	Dil. alkali solution, alkaline solution of ammonium sulfate, W	Acetic acid, acetone, alcohol	363
Konjac glucomannan	W		609
Pectin	Dil. acids, W	Alcohol	363
Pullulan	W		609
Xanthan gum	W		610
7.6. NATURAL RESINS			
Colophony	Acetone, aromatic hydrocarbons (partially), carbon tetrachloride, chloroform, diethyl ether, ethanol, ethyl acetate, methanol	Aliphatic hydrocarbons	30
Copal	Acetone (25–90%)[a], bzn. (35–60%)[a], carbon tetrachloride (15–40%)[a], chloroform (30–90%)[a], diethyl ether (10–90%)[a], ethanol (20–100%)[a], hydrocarbons (10–55%)[a], methanol (20–70%)[a]		30
Shellac	Acetone (50–80%)*, bzn. (10–20%)[a], carbon tetrachloride (5–15%)[a], chloroform (25–40%)[a], diethyl ether (10–25%)[a], ethanol (85–98%)[a], methanol (100%)	Aliphatic hydrocarbons	30
Zein	Aqu. alcohols, glycols, DMF		32

[a] Percentage soluble, depending on source.

TABLE 8. INORGANIC POLYMERS

Polymer	Solvents	Nonsolvents	Refs.
Poly(phosphorus nitrile chloride)	Bzn., carbon tetrachloride, chloroform, cyclohexane	Aliphatic hydrocarbons	611
Poly(sodium-*m*-phosphate)	Aqu. sol. of LiCl, NaCl or NH_4Cl	Acetone, ethanol, W	612
Poly(tri-*n*-butyl tin fluoride)	Aliphatic hydrocarbons		259
Poly(phosphoryldimethylamide)	Carbon tetrachloride (hot), W	Acetone	613
Poly(2,5-selenienylene)	Chloroform, THF	Methanol, W	614
Poly[η^5-(vinylcyclopentadienyl)tricarbonylmethyltungsten]	Bzn., chloroform, THF	Hexane	615
Poly(*n*-dibutyl stannane)	Chloroform, THF, toluene	Methanol	616

TABLE 9. POLY(ELECTROLYTES)

Polymer	Solvents	Nonsolvents	Refs.
Poly(allyammonium chloride)	W	Methanol	617
Poly(allylammonium phosphate)	HCl, W	Methanol, W	617
Poly(diallyldimethylammonium chloride)	W		618
Poly(benzyltrimethylammonium chloride)	W		32
Poly(diallyldimethylammonium chloride-*co*-*N*-isopropylacrylamide), (2 : 98)	W		619
Poly(sodium trimethyleneoxyethylenesulfonate)	DMSO, W	Bzn., hexane	620
Poly[dimethyldodecyl(2-acrylamidoethyl) ammonium bromide]	W		701
Poly(4-*N*-butylpyridiniumethylene bromide)	Benzyl alcohol, DMSO, nitromethane, W	Bzn., hexane	621
Poly(2-*N*-methylpyridiniumethylene iodine)	Methanol, W	Methylene chloride	687
Poly(*N*-methylpyridinium-2,5-diylethenylene)	DMF, DMSO, NMP, W		583
Poly(4,4′-bipyridiniumdiyl-*N*,*N*′-decamethylene dibromide)	DMF/methanol, W	*tert*-Butyl methyl ether	622
Poly(1,4-pyridiniumdiyl-*N*,*N*′-tetramethylene-4,1-pyridiniumdiylethenylene methylsulfate)	Ethanol	Ethyl acetate	623
Poly(2,6-diphenyl-1,4-pyridiniumdiyl-*N*,*N*′-1,4-phenylene-4,1-pyridiniumdiyl-1,4-phenylene)	DMA, DMF, DMSO, NMP	Diethyl ether	624
Poly[ethyldipropargyl-4-sulfobutyl ammonium betaine]	Formic acid, W	Hexane, methanol, THF, toluene	625

TABLE 10. BLOCK COPOLYMERS
(alphabetically listed)

Polymer	Solvents	Nonsolvents	Refs.
Poly(*t*-butyl methacrylate)-b-polystyrene-b-poly(*t*-butyl methacrylate) (1 : 6 : 1)	Dioxane	Hexane	626
Poly(*t*-butyl methacrylate)-b-poly(oxytetramethylene)-b-poly(butyl methacrylate) (2 : 6 : 2 to 4 : 2 : 4)	Toluene		627
Poly(butyl acrylate)-b-poly[3-(pentamethyldisiloxy)propyl methacrylate] (3 : 1)	THF		628
Poly(butyl vinyl ether)-b-poly(2-ethyloxazoline)	Chlorobenzene, THF	Hexanes	629
Poly(2-cinnamoylethyl methacrylate)-b-poly(acrylic acid) (4 : 5)	Methanol, methylene chloride	Isopropanol/hexane (3/7)	630
Poly(ε-caprolactone)-b-poly(oxytetramethylene)-b-poly(ε-caprolactone) (4 : 2 : 4 to 1 : 3 : 1)	THF, toluene		631
Poly(dimethylsiloxane)-b-poly(6-aminohexanoic acid) (1 : 2)	2,2,2-Trifluoroethanol		632
Poly(2-ethyl-2-oxazoline)-b-poly(lactic acid) (3 : 2 to 2 : 4), Poly(*N*-proponyliminoethylene)-b-poly(oxy-1-oxo-2-methylethylene)	Chlorobenzene	Hexane	633
Poly(3-hydroxybutyric acid)-b-poly(ε-caprolactone) (3 : 5 to 2 : 1)	Chloroform	Methanol	634
Polyisobutylene-b-poly(α-methylstyrene) (9 : 1)	Chloroform	Methanol	635
Poly(methacrylic acid)-b-polystyrene-b-poly(methacrylic acid) (1 : 8 : 1)	Dioxane	Hexane	626
Poly(3-methyl-2,5-thiophenediyl)-b-poly(2-vinylpyrrolidone)	Anisole		636
Poly(oxy-2,2-di(chloromethyl)trimethlylene)-b-poly(oxytetramethylene)-b-polyoxy-2,2-di(chloromethyl)trimethylene (7 : 86 : 7)	Methylene chloride		637
Poly(oxytetramethylene)-b-poly(ε-caprolactone) (1 : 4)	THF, toluene		638
Polystyrene-b-polybutadiene-b-polystyrene) (7 : 86 : 7 to 15 : 70 : 15)	Toluene		639
Polystyrene-b-poly(*tert*-butyl methacrylate) (2 : 3 to 4 : 1)	Dioxane	Hexane	626
Polystyrene-b-poly(dimethylsiloxane) (1 : 1)	THF	Methanol	350
(1 : 9 to 7 : 3)	Bzn./2-methoxyethyl ether, dioxane	Methanol, W	640

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TABLE 10. *cont'd*

Polymer	Solvents	Nonsolvents	Refs.
Polystyrene-b-poly(ethylene/butylene)-b-polystyrene (1 : 8 : 1 to 1 : 3 : 1)	Toluene		641,642
Polystyrene-b-poly(ethylene/propylene) (3 : 7)	THF		643
Polystyrene-b-(*N*-ethyl-2-ethynylpyridinium trifluoromethanesulfonate) (8 : 1)	Diethyl ether/petroleum ether (1/1), THF		644
Polystyrene-b-poly(hexyl isocyanate) (1 : 4)	Carbon tetrachloride, chloroform, toluene		645
Polystyrene-b-poly(hydroxyethyl methacrylate) (2 : 3)	DMF, THF		646
Polystyrene-b-polyisoprene (1 : 1)	Dioctyl phthalate		647
Polystyrene-b-polyisoprene-b-polystyrene (1 : 12 : 1 to 2 : 1 : 2)	MEK/isobutyl isobutyrate, methylcylcohexane/methylene chloride (3/2), methyl amyl ketone, methylene chloride, xylene		639, 548–650
Polystyrene-b-poly(methyl methacrylate) (7 : 3)	Toluene		7,698
Polystyrene-b-poly(methylphenylsiloxane) (3 : 2)	Cyclohexane		651
Polystyrene-b-poly(methyl vinyl ether) (2 : 1)	Methylene chloride		652
Polystyrene-b-poly(4-vinylpyridine) (5 : 1)	THF	Hexanes	653
Polystyrene-b-poly(2-vinylpyridine) (1 : 1 to 6 : 1)	Bzn.	Hexane/methanol (8/2)	654
Polystyrene-b-poly(vinylpyridine) (1 : 1)	THF	Hexane	655
Polypropylene-b-poly(methacrylic acid) (2 : 1)	Dioxane, THF, toluene	Methanol	653,626

TABLE 11. DENDRIMERS

Polymer	Solvents	Nonsolvents	Refs.
$\leftarrow OCH_2CH_2 \rightarrow$ $-OH$	DMSO, methanol, THF (partially), W		656
$\leftarrow OCHO \rightarrow$ $CH_2O \rightarrow$ $-CH_3$	THF		657
$\leftarrow OC(=O)C(CH_3)(CH_2)_2 \rightarrow$ $-OCH_3$	Methylene chloride, most organic solvents	Hexane, W	658,684
$-OH$	Acetone, DMSO		689
$\leftarrow (OC(=O)OCH_2CH_2)_2NCH_2CH(CH_3) \rightarrow$ $-(CH_2CH_2CH(CH_3)_2)_2$	Toluene		659
$\leftarrow CH_2CH_2NHCH_2CH_2N \rightarrow$ hyperbranched	Lower alcohols, ethyl acetate, W	Hydrocarbons	683
$-NH_2$	Alcohol, glycols, W		660
$-CN$	Acetone, chloroform		
$\leftarrow N(CH_2CH_2C(=O)NHCH_2CH_2)_2 \rightarrow$ $-NH_2$	W		661,685
	THF, toluene	Methanol	662
$\leftarrow CH_2CH \rightarrow$	Bzn., chloroform, cyclohexane, methylene chloride		287

TABLE 11. *cont'd*

Polymer	Solvents	Nonsolvents	Refs.
—I	THF	Methanol	663
	THF	Methanol	664
—OH, —F	DMF, NMP, THF		665
			666,667
—CH_2—	Chloroform	Methanol	668
—$COCH_2CH_3$	THF	Methanol	669
—CH_2—	THF		
	Ethyl acetate, chloroform, DMF, DMSO, methylene chloride, THF, toluene		670
—OH	DMF, DMSO, THF		671
—O—	Methylene chloride		524
—OH	THF	Diethyl ether, W	672
	DMF		673
	NMP, THF		695

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Specific Refractive Index Increments of Polymers in Dilute Solution*

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A. INTRODUCTION

This section presents a compilation of the specific index of refraction increments, $\nu = dn/dc$, of polymer solutions. This table has been updated since the third edition. The trend of using $\lambda_0 = 633$ nm from the HeNe laser continues and thus the 633 nm data has been given its own column in this compilation. As in the previous edition, most copolymer data has not been included.

Perhaps the most significant change since the previous edition is the coupling of size exclusion chromatography (SEC) with multiple detectors, largely eliminating the need for ν for obtaining molecular weights. In addition, the measurement of the specific refractive index increment has become so routine that many authors no longer report the results of these measurements. These two factors combine to reduce the number of new entries to a mere 46 new references and about 160 new entries.

Finally, the excellent introduction written by Huglin for the third edition has been retained in its entirety and follows this brief introduction.

B. INTRODUCTION FROM THE THIRD EDITION

This is the limiting value at $c = 0$ of the quantity $(n - n_0)/c$, where n and n_0 are the refractive indices of the solution and solvent, respectively, and c (g/ml) denotes the concentration of the polymer in solution. Conditions of constant pressure p, constant temperature T, and a fixed wavelength of light in vacuum, λ_0, are implied. Specific refractive index increments are required to determine the weight-average molecular weight, $\overline{M}_w$, of a polymer and the second virial coefficient, A_2, of a polymer in solution, using the light scattering equation.

$$\frac{K^* c}{R_\Theta} = \frac{1}{\overline{M}_w P(\Theta)} + 2A_2 c \qquad \text{(A1)}$$

where

$$K^* = K(n_0 \nu)^2 \quad \text{and} \quad K = 2\pi^2/N_A \lambda_0^4 \qquad \text{(A2)}$$

Here, c is the concentration of the polymer in solution (g/ml) R_Θ (cm^{-1}) is the reduced intensity at an angle Θ, $P(\Theta)$, is the particle scattering function, A_2 is expressed in mol cm^3/g^2, N_A (mol^{-1}) is the Avogadro number. Because

* Based on a table by M. B. Huglin in the 3rd ed. of the Polymer Handbook.

ν appears as a squared term, an error of $E\%$ in ν will result in an error of $2E\%$ in the derived molecular weight, and consequently an accurate determination of ν is imperative. Examination of reported data discloses that about 20 different values of λ_0 have been used by different workers, this increase over the earlier more restricted number being due to growing use of various laser light sources. The values of the constant K appropriate to nine common values of λ_0 are as follows:

$10^7 \times \lambda_0$ (cm)	$10^6 \times K$ (cm^{-4} mol)
366	18.3
403	12.4
436	9.07
488	5.78
514	4.69
546	3.69
578	2.94
633	2.04
1086	0.236

For a copolymer comprising monomers A and B or a terpolymer comprising units A, B and C, the specific increment is an additive function of the composition of the polymer expressed in terms of weight fractions w. Thus,

$$\nu = w_A\nu_A + w_B\nu_B \quad \text{(A3)}$$

$$= w_A\nu_A + w_B\nu_B + w_C\nu_C \quad \text{(A4)}$$

Equations (A3) and (A4) have been verified with copolymer samples of known composition (5,6). In studies on terpolymerization, Kambe and Honda (7,897) have found that the value of ν, from monomer feeds other than the azeotropic composition, changes with conversion, on account of a composition distribution. On the other hand, a constant value of ν, independent of conversion, is yielded for the azeotropic case in which feed and polymer have the same composition. When ν_A and ν_B differ appreciably in a given solvent, Eq. (A3) affords a convenient means of estimating composition from the measured value of ν. If this is not the situation, it is possible to introduce changes in the specific increment by using mixed solvents. The appropriate specific increment to be utilized in light scattering is then ν_μ, that is, one at constant potential of low molecular weight solvent. ν_μ is measured after dialysis equilibrium between solution and pure mixed solvent. ν and ν_μ allow one to obtain the coefficient of preferential adsorption γ_1 (ml/g) of the liquid (solvent 1) in the binary solvent mixture, which has a greater affinity for the polymer:

$$\gamma_1 = (\nu_\mu - \nu)/(dn_0/d\phi_1) \quad \text{(A5)}$$

In Eq. (A5), $dn_0/d\phi_1$ is the variation of the refractive index of the mixed solvent, with its composition expressed in terms of the volume fraction ϕ_1 of liquid 1.

For a copolymer derived from A and B, light scattering always yields the true value of the molecular weight M if $\nu_A = \nu_B$. However, it is not possible to derive the molecular weights M_A and M_B of the constituent portions or the heterogeneity parameters P and Q. If $\nu_A \neq \nu_B$, an apparent value of M is obtained. Tuzar et al. (8) have summarized the criteria for the most sensitive characterization of a copolymer:

Quantity to be determined	Criterion
M	ν_A and ν_B both large and of same sign; or $\nu_A = \nu_B$
M_A	ν_A large and $\nu_B = 0$
M_B	ν_B large and $\nu_A = 0$
Q	$\nu = 0$

Normally, these conditions cannot be satisfied by using single solvents alone, and recourse must be made to using mixed solvents and employing ν_μ, $(\nu_A)_\mu$, and $(\nu_B)\mu$ of the appropriate composition to satisfy them.

The concentration dependence of ν is expressed by the coefficient a_2, in Eq. (A6).

$$(n - n_0)/c = \nu + a_2c \quad \text{(A6)}$$

Lorimer (1) has derived an expression for coefficient a_2 in terms of n_0, ν, and the concentration dependence of the partial specific volume of the polymer in solution, $\bar{v}_2$. However, within the range of c normally used to measure v, the value of a_2 is usually close to zero. Expressions have also been formulated for v in terms of n_0, v_2, and the refractive index of the polymer in solution, n_2. These afford an indirect means of obtaining $\bar{v}_2$ from an experimental value of v (see Refs. 2–5). Actually $\bar{v}_2$ can now be measured to a very high level of accuracy with the Kratky digital densimeter, provided there is an appreciable difference between the densities of polymer and solvent. The main uncertainty or difficulty lies in the value of n_2, when one wishes to calculate ν via $\bar{v}_2$.

1. Measurement and Calibration

Experimental methods and refinements have been summarized elsewhere (4). The main approaches are given below.

Interferometry In this absolute method, light beams of identical geometrical paths traverse two different optical paths and the number (f) of displaced fringes is measured by an optical compensator. If l is the length of the troughs, $(n - n_0)$ is given by

$$(n - n_0) = f\lambda_0/l \quad \text{(A7)}$$

When $(n - n_0)$ is very small, for example, in extremely dilute solutions, the accuracy can be enhanced by increasing the trough length. A range of troughs of different lengths is normally available with a commercial instrument. The slope of a plot f versus c, when multiplied by (l/λ_0),

yields the value of ν. Baltog et al. (10) have developed an improved cell which prevents the formation of a liquid film at the central surface with the trough, thus enabling accurate measurements to be made with volatile liquids.

Differences in the dispersion of the refractive index of the solvent and the solute can lead to discontinuities in the plot of f versus c. This problem can be overcome by measuring f for a large number of solutions of gradually increasing concentration, i.e., by the dropwise addition of concentrated polymer solution to pure solvent (5,11).

Differential Refractometry This relies on the image displacement ΔX of beams from the light source, which traverse pure solvent and polymer solution in a divided cell. Adequate temperature control is necessary and it is essential to utilize a stoppered cell to prevent solvent "creep". The method is not an absolute one and necessitates calibration with solutions of accurately known $(n - n_0)$, so that the calibration constant k can be determined for the apparatus:

$$k = (n - n_0)/\Delta X \qquad \text{(A8)}$$

In Eq. (A8), n is the refractive index of the solution of calibrant, and n_0 that of the solvent. The value of k decreases slightly with increase in λ_0 and must therefore be re-determined if measurements are to be conducted at a different wavelength. A selection of useful calibration data (all involving aqueous solutions) has been gathered from several sources in the literature and is given in Section C. The Brice–Phoenix differential cell is satisfactory for liquids having refractive indices not in excess of about 1.60. At higher values than this, the slit image disappears from the field of vision because of total reflection in the glass partition dividing the cell. Kratochvil and Babka (9) have described a useful modification whereby the partition is replaced with glass of a higher refractive index. This extends the useful range of the different refractometers so that even such highly refractive liquids as 1-bromonaphthalene can be accomodated.

The calibration data at $\lambda_0 = 436$ nm for aq. KCl in Section C have been fitted by Abdel–Azim and Huglin (676) to the following polynomial in which C is the concentration expressed is g salt/100 g water

$$(n - n_0) \times 10^6 = 1.862 + 1415.8C - 17.699C^2 + 0.428C^3$$

Some light scattering and refractometric data relating to wavelengths different from those in Section C have been summarized elsewhere (833). The most common light source for recent light scattering studies is probably the He–Ne laser affording $\lambda_0 = 633$ nm. At this λ_0, directly measured specific refractive index increments for certain aqueous salt solutions have been reported. On the assumption of direct proportionality between $(n - n_0)$ and concentration, these may be represented as follows for $\lambda_0 = 633$ nm and C in g salt/100 g water (Ref. 942):

$$\text{Aq. } NH_4HO_3 \quad (n - n_0) \times 10^6 = 1239C$$
$$\text{Aq. KCl} \quad (n - n_0) \times 10^6 = 1371C$$
$$\text{Aq. NaCl} \quad (n - n_0) \times 10^6 = 1766C$$

Also, for $\lambda_0 = 1086$ nm and C expressed in g salt/100 ml solution, the following holds at 20°C (Ref. 943):

$$\text{Aq. KCl} \quad (n - n_0) \times 10^6 = 1351C$$

Mandel and coworkers (722) have calibrated the Chromatix differential refractometer for $\lambda_0 = 633$ nm and have also indicated the range over which ΔX is directly proportional to $(n - n_0)$. Values of the latter quantity were interpolated to $\lambda_0 = 633$ nm via a Cauchy dispersion from the values at other wavelengths in Section C. Within the interval $3.6 > C > 0.46$ g salt/100 g water, the following polynomial was found for aq. NaCl at 633 nm

$$(n - n_0) \times 10^6 = 1735C - 27C^2 + C^3$$

Abbreviations/Symbols Used

Arochlor	(approximately) Chlorinated diphenyl
(B)	Branched polymer
Cadoxen	Triethylenediamine cadmium hydroxide
Calgon	Sodium hexametaphosphate
Cuoxam	Cuprammonium hydroxide
Cuoxen	Cupriethylenediamine hydroxide
DCA	Dichloroacetic acid
DMA	*N,N*-Dimethylacetamide
DMSO	Dimethyl sulfoxide
DN	Degree of neutralization (also α)
DS	Degree of substitution
EDTA	Ethylenediamine tetraacetic acid
FeTNa	Iron–tartaric acid–sodium complex solution
Freon 113	1-Fluorodichloro-2-chlorodifluoroethane
GHCl	Guanidine hydrochloride
Halothane	1,1,1-Trifluoro-2-chloro-2-bromoethane
HEMA	2-Hydroxyethyl methacrylate
HMP	Hexamethyl phosphoramide
I	Ionic strength
M	Relative molar mass (M) or molarity (M), according to context
MEK	Methyl ethyl ketone
MMA	Methyl methacrylate
TEAB	Tetraethyl ammonium bromide
TFP	2,2′,3,3′-Tetrafluoropropanol
THF	Tetrahydrofuran
Versene	Sodium salt of EDTA
(μ)	Specific increment measured at dialysis equilibrium

C. REFRACTOMETRIC CALIBRATION DATA

	Concentration			$(n - n_0)$ ($\times 10^6$)			
Solute	(g/100 ml solution)	(g/100 g water)	Temp. (°C)	436 nm	546 nm	578 nm	589 nm
NaCl	0.0938	0.09412	25	173	166	165	165
	0.1034	0.1037	25	190	184	182	182
	0.3362	0.3375	25	614	592	588	587
	0.5602	0.5627	25	1019	982	976	974
	0.6866	0.6900	25	1246	1202	1194	1191
	0.9090	0.9142	25	1645	1586	1576	1572
	1.1240	1.1311	25	2028	1956	1943	1939
	1.6465	1.6595	25	2954	2848	2830	2824
	2.0327	2.0513	25	3634	3504	3481	3474
	3.7307	3.7854	25	6583	6345	6306	6293
	6.7405	6.9092	25	11673	11247	11174	11151
NH_4NO_3	0.07878	0.07906	25	103.5	98.77	–	97.73
	0.1671	0.1677	25	218.9	208.9	–	206.7
	0.3433	0.3450	25	448.5	428.0	–	423.5
	1.0314	1.0408	25	1336	1275	–	1262
	2.8884	2.9479	25	3702	3531	–	3494
	5.8417	6.0732	25	7410	7066	–	6992
Na_2SO_4	0.09566	0.09595	25	153.1	151.0	–	150.5
	0.2198	0.2205	25	349.0	344.1	–	343.0
	0.2686	0.2694	25	425.3	419.3	–	417.9
	0.3939	0.3952	25	620.1	611.5	–	609.4
	0.7508	0.7536	25	1168	1151	–	1148
	1.2640	1.2693	25	1940	1913	–	1906
	1.5417	1.5488	25	2352	2319	–	2311
	2.5322	2.5471	25	3796	3744	–	3731
	5.7875	5.8500	25	8309	8195	–	8168
$SrCl_2$	0.08474	0.08506	25	159.8	155.1	–	154.1
	0.1749	0.1755	25	328.5	318.9	–	316.7
	0.2430	0.2437	25	455.5	442.2	–	439.1
	0.3580	0.3591	25	669.2	649.6	–	645.1
KCl	0.0696	0.0699	25	100	96	96	96
	0.1067	0.1070	25	153	148	147	146
	0.2799	0.2812	25	399	386	383	382
	0.5964	0.5994	25	845	817	812	810
	1.0794	1.0869	25	1521	1469	1460	1457
	1.4911	1.5037	25	2093	2022	2009	2005
	2.9821	3.0250	25	4135	3994	3969	3962
	3.9969	4.0703	25	5500	5314	5281	5271
	4.4732	4.5647	25	6136	5926	5890	5879
	5.9642	6.1217	25	8105	7828	7781	7766
	6.4680	3.6526	25	8763	8465	8414	8398
Sucrose	0.100	0.100	20	–	–	–	140
	–	–	28	–	–	–	140
	0.200	0.200	20	–	–	–	290
	–	–	28	–	–	–	290
	0.300	0.301	20	–	–	–	430
	–	–	28	–	–	–	430
	0.400	0.402	20	–	–	–	580
	–	–	28	–	–	–	570
	0.500	0.502	20	–	–	–	720
	–	–	28	–	–	–	720
	0.600	0.604	20	–	–	–	860
	–	–	28	–	–	–	860
	0.701	0.705	20	–	–	–	1010
	–	–	28	–	–	–	1000
	0.801	0.806	20	–	–	–	1150
	–	–	28	–	–	–	1140
	0.902	0.9082	20	–	–	–	1300
	–	–	28	–	–	–	1290
	1.002	1.010	20	–	–	–	1440
	–	–	28	–	–	–	1430
	1.506	1.523	20	–	–	–	2160

Solute	Concentration (g/100 ml solution)	Concentration (g/100 g water)	Temp. (°C)	$(n - n_0)$ ($\times 10^6$) 436 nm	546 nm	578 nm	589 nm
	–	–	28	–	–	–	2150
	2.012	2.041	20	–	–	–	2890
	–	–	28	–	–	–	2870
	3.030	3.093	20	–	–	–	4340
	–	–	28	–	–	–	4300
	3.52	–	25	5100	5000	–	–
	4.056	4.167	20	–	–	–	5810
	–	–	28	–	–	–	5760
	5.089	5.263	20	–	–	–	7280
	–	–	28	–	–	–	7220
	6.14	–	25	8900	8800	–	–
	7.181	7.527	20	–	–	–	10270
	–	–	28	–	–	–	10190
	8.240	8.696	20	–	–	–	11780
	–	–	28	–	–	–	11680
	9.306	9.890	20	–	–	–	13300
	–	–	28	–	–	–	13190
	10.6	–	25	15400	15200	–	–
	16.3	–	25	23600	23200	–	–

D. TABLES OF SPECIFIC REFRACTIVE INDEX INCREMENTS OF POLYMER SOLUTIONS

TABLE 1. MAIN-CHAIN ACYCLIC CARBON POLYMERS

Polymer	Solvent	dn/dc (ml/g) $\lambda_0 = 436$ nm	$\lambda_0 = 546$ nm	$\lambda_0 = 633$ nm	Others	T (°C)	Refs.
1.1. POLY(DIENES)							
Poly(1,3-butadiene)	Benzene		0.011				57
		0.0117	0.0086			20	58
		0.022	0.021			25	647
	Bromoform		– 0.115				58
	1-Bromonaphthalene		– 0.185				58
	Chloroform		0.083				58
	Cyclohexane	0.144					59,60
		0.126	0.118				61
pure 1,4		0.121	0.113			25	62
pure 1,2		0.092	0.087			25	62
	Diethyl ketone	0.156				25	63
	n-Heptane	0.151	0.141				61
	THF		0.132				57
hydroxyl terminated and acetyl terminated	Chloroform	0.092	0.087			25	859
	Chloroform	0.096	0.093			37	859
	Cyclohexane			0.106		20	835
	Cyclohexane	0.127	0.118			25	647
98% *cis* 1,4	Cyclohexane			0.111		30	836
98% *trans* 1,4	Cyclohexane			0.110		30	836
7% vinyl-99% vinyl	Cyclohexane			0.110–0.087		30	836
high 1,4; $M = 0.96 \times 10^3$ to 90.6×10^3	Cyclohexane			0.094–0.111		30	836
	Cyclohexanone		0.081			25	647
	1,2-Dichloroethane	0.092	0.088			25	647
hydroxyl terminated and acetyl terminated	*n*-Heptane	0.157	0.150			25	859
	Hexane	0.177	0.169			35	859
	Isobutyl acetate	0.149	0.143			20.5	859
	MEK	0.165	0.159			26	859
	5-Methyl-2-hexanone	0.125	0.120			12.6	859
	3-Pentanone	0.145	0.139			10.3	859
	THF			0.130		23	830
	Toluene	0.034	0.031			25	647

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TABLE 1. *cont'd*

Polymer	Solvent	dn/dc (ml/g) $\lambda_0 = 436$ nm	$\lambda_0 = 546$ nm	$\lambda_0 = 633$ nm	Others	T (°C)	Refs.
Poly(chloroprene)	*n*-Butyl acetate	0.146				25	64
	Carbon tetrachloride	0.0976				25	64
	trans-Decalin	0.0799				25	64
		0.0820				40	64
		0.0777				10	64
	MEK	0.160				25	64
		0.162	0.156			25	65
					0.152		66
	THF				0.138		66
Poly(cyclopentadiene)	Benzene		0.0394			21	67
	Carbon tetrachloride		0.125			21	67
Poly(isoprene)							
97.8% *cis* 1,4	Benzene	0.0143	0.0194			20	58
73–80% *cis* 1,4	Bromobenzene		−0.041			20	73
Poly(isoprene) anionically polymerized	Carbon tetrachloride			0.082		25	964
	Chloroform	0.100	0.095			25	68
73–80% *cis* 1,4	*o*-Chlorotoluene		−0.003			20	73
73–80% *cis* 1,4	Cyclohexane		0.104			20	73
70–75% *cis* 1,4			0.1034			23	34
trans		0.117					59
cyclic			0.131				74,75
		0.1305	0.1238			25	69
			0.124			27	69
			0.117			7	69
	Cyclohexene	0.0988	0.0943			25	68
		0.0992	0.0947			27	68
		0.0953	0.0909			17	68
		0.0914	0.0869			7	68
(non-extracted)			0.145			20	70
(extracted)			0.0946			20	70
	Decalin	0.0669	0.0605			25	69
73–80% *cis* 1,4	*n*-Hexane		0.168			20	73
		0.1886	0.1802			25	68
73–80% *cis* 1,4	Methyl isobutyl ketone		0.139			20	73
cyclic	THF		0.156				73,74
cis 1,4			0.128			20	70
			0.128			20	70
		0.160 (calc.)				19–21	71
70–75% *cis* 1,4	Toluene		0.0308			35	34
73–80% *cis* 1,4			0.028			20	73
		0.0308	0.0339			25	68
chlorinated	MEK	0.131				35	72
synthetic high *cis*	Chloroform	0.104	0.100			25	655
natural hevea		0.106	0.104			25	655
natural guayule		0.108	0.101			25	655
	Cyclohexane	0.117				35	704
				0.106		20	835
trans 1,4					0.117	30	838
star branched				0.104–0.113		25	833
93% 1,4- $M = 0.9 \times 10^3 - 10.1 \times 10^3$				0.093–0.105		25	833
93% 1,4- $M \geq 19.5 \times 10^3$				0.106		25	833
synthetic high *cis*	*n*-Hexane	0.192	0.191			25	655
natural hevea		0.200	0.198			25	655
natural guayule		0.198	0.193			25	655
	THF			0.124		20	835
synthetic, high *cis*		0.153	0.148			25	655
natural hevea		0.160	0.156			25	655
natural guayule		0.157	0.153			25	655
synthetic	Toluene	0.030	0.028			25	655
natural hevea		0.034	0.032			25	655
natural guayule		0.033	0.030			25	655
Poly(trichlorobutadiene)	Benzene				0.06	25	76

TABLE 1. *cont'd*

Polymer	Solvent	dn/dc (ml/g) $\lambda_0 = 436$ nm	$\lambda_0 = 546$ nm	$\lambda_0 = 633$ nm	Others	T (°C)	Refs.
1.2. POLY(ALKENES)							
Poly(1-butene)	*n*-Nonane	0.092				35	13
		0.108				80	13
isotactic	1-Chloronaphthalene	−0.206	−0.187			135	867
					−0.183 (578)	135	867
				−0.177		135	867
	Cyclohexane		0.074			25	621
	Cyclohexane/*n*-propanol						
	(10/90, v/v)		0.068			35	767
			0.072			35	767
	(20/80, v/v)		0.072			35	767
	(30/70, v/v)		0.075			35	767
	(35/65, v/v)		0.079			35	767
	1,2,4-Trichlorobenzene	−0.120	−0.108		−0.127 (403)	135	867
				−0.103	−0.105 (578)	135	867
Poly(ethylene)	Biphenyl		−0.174			123.2	14
	Bromobenzene	−0.101	−0.089		−0.107 (403)	135	863
				−0.083	−0.085 (578)	135	863
B		−0.095	−0.083		−0.101 (403)	135	863
B				−0.078	−0.080 (578)	135	863
B							
	1-Bromonaphthalene		−0.208			135	863
				−0.205	−0.207 (578)	135	863
B			−0.210			135	863
B					−0.208 (578)	135	863
B				−0.206		135	863
B	*o*-Chlorobenzene			−0.076		135	863
	1-Chloronaphthalene		−0.195			65–80	15
			−0.199			90	16,17
			−0.198			90	18
			−0.197			100	19
			−0.188			105	20,21
			−0.195			110	19
			−0.1957			114	23
			−0.193			120	19
			−0.192			125	24
			−0.195			125	25,18
			−0.191			125	16
			−0.214			125	26
		−0.245				125	27
			−0.1967			127	23
			−0.1955			128	23
			−0.191			130	19
$M_n =$ 12300			−0.1931			135	22
13500			−0.1929			135	22
18300			−0.1932			135	22
25200			−0.1916			135	22
110000			−0.1883			135	22
112000			−0.1879			135	22
			−0.190			135	17,28
			−0.1956			139	23
			−0.1961			140	23
			−0.191			140	25
			−0.189			140	19
			−0.1967			145	23
			−0.187			150	19
			−0.1943			151	23
			−0.193			115	832,917
			−0.192			120	931
			−0.191			125	931
			−0.191			127	610

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TABLE 1. *cont'd*

Polymer	Solvent	dn/dc (ml/g) $\lambda_0 = 436$ nm	$\lambda_0 = 546$ nm	$\lambda_0 = 633$ nm	Others	T (°C)	Refs.
		−0.215	−0.192	−0.183	−0.188 (578)	135	863,867
			−0.192			135	866
			−0.191			135	932
			−0.193			135	832,917,934
			−0.196			135	631
			−0.188 to −0.193			135	815,914
			0.195 to −0.192			135	933
increase with *M*			−0.193 to −0.188			135	914
B		−0.212	−0.189			135	863,867
B				−0.178	−0.184 (578)	135	863,867
B			−0.190			140	935,936
			−0.196			145	934
				−0.177		145	864
			−0.195				937,938
	n-Decane		0.0881			65	15
			0.0890			70	15
			0.0901			75	15
			0.0917			80	15
			0.0870			111	23
			0.0881			114	23
			0.095			115	24
			0.0915			120	23
			0.0922			125	23
			0.0937			130	23
			0.0955			138	23
			0.0971			139	23
			0.0985			143	23
			0.0979			146	23
			0.0995			149	23
		0.114	0.113		0.114 (404)	106	632
					0.112 (577)	106	632
		0.121	0.117		0.119 (404)	106	632
					0.116 (577)	106	832
		0.126	0.121		0.123 (404)	106	832
					0.120 (577)	106	832
		0.132	0.126		0.130 (404)	106	832
					0.124 (577)	106	832
		0.117	0.114		0.119 (403)	135	863
				0.112	0.113 (578)	135	863
B		0.120	0.118		0.122 (403)	135	863
B				0.116	0.117 (578)	135	863
B							
			0.098			140	935
	p-Dibromobenzene	−0.179	−0.162		−0.184 (403)	135	863
				−0.155	−0.159 (578)	135	863
B		−0.176	−0.159		−0.182 (403)	135	863
B				−0.153	−0.157 (578)	135	863
B							
	o-Dichlorobenzene		−0.078			120	939
			0.078			120	29
				−0.056		135	864
		−0.095	−0.083		−0.101 (403)	135	863
				−0.078	−0.080 (578)	135	863
B		−0.091	−0.081		−0.099 (403)	135	863
B					−0.078 (578)	135	863
	Diphenyl		−0.174			123	939
		−0.202	−0.176		−0.215 (403)	127	863
				−0.166	−0.172 (578)	127	863
B		−0.199	−0.173		−0.212 (403)	127	863
B				−0.165	−0.169 (578)	127	863
B							
		−0.195	−0.172		−0.209 (403)	135	863
				−0.163	−0.168 (578)	135	863

TABLE 1. *cont'd*

Polymer	Solvent	dn/dc (ml/g) $\lambda_0 = 436$ nm	$\lambda_0 = 546$ nm	$\lambda_0 = 633$ nm	Others	T (°C)	Refs.
B		−0.192	−0.167		−0.207 (403)	135	863
B				−0.158 (633)	−0.163 (578)	135	863
B							
	Diphenylmethane	−0.146	−0.129		−0.155 (403)	142	863
			−0.126			142	866
				−0.126	−0.127 (578)	142	863
B		−0.135	−0.120		−0.142 (403)	142	863
B				−0.116	−0.118 (578)	142	863
B							
	1-Dodecanol	0.048	0.046		0.049 (403)	137	863
				0.045	0.046 (578)	137	863
B		0.049	0.047		0.050 (403)	137	863
B				0.047	0.047 (578)	137	863
B							
	1-Methylnaphthalene	−0.206	−0.177		−0.220 (403)	135	863
				−0.167	−0.172 (578)	135	863
B		−0.199	−0.170		−0.211 (403)	135	863
B				−0.159	−0.164 (578)	135	863
B							
	Paraffin oil	−0.001	−0.001		−0.001 (403)	135	863
			–	−0.001	−0.001 (578)	135	863
B		0.001	0.001		0.001 (403)	135	863
B				0.001	0.001 (578)	135	863
B							
	Tetralin		−0.075			120	931
			−0.074			125	931
			−0.094			125	940
			−0.094			129	941
		−0.087	−0.077		−0.091 (403)	135	863
				−0.074	−0.075 (578)	135	863
B		−0.085	−0.075		−0.089 (403)	135	863
B				−0.071	−0.073 (578)	135	863
B							
			−0.0834			50	15
			−0.0811			80	15
		0.104				81.5	30,20
		−0.0887	−0.075			81.5	25
			−0.0910			95	23
			−0.0918			95	23
			−0.0903			100	23
			−0.893			104	23
		−0.0805	−0.0691			105	25
			−0.100			105	21*
			−0.078			105	29*
			−0.072			105	29*
			−0.083			105	29*
			−0.088			110	23
			−0.0866			116	23
			−0.0858			119	23
			−0.075			125	15
			−0.0837			128	23
			−0.0813			138	23
			−0.0801			144	23
	1,2,4-Trichlorobenzene		−0.106			135	631
					−0.109 (488)	135	746,900
		−0.125	−0.116		−0.130 (403)	135	863,867
				−0.107	−0.108 (578)	135	863,867
				−0.104		135	864
			−0.111			135	866
B		−0.177	−0.105		−0.122 (403)	135	863,867
B				−0.102	−0.103 (578)	135	863,867

*Values reported erroneously as positive in these references.

TABLE 1. *cont'd*

Polymer	Solvent	dn/dc (ml/g) $\lambda_0 = 436$ nm	$\lambda_0 = 546$ nm	$\lambda_0 = 633$ nm	Others	T (°C)	Refs.
B							
increase with M			−0.109 to −0.106			135	914
$M_n =$ 2000			−0.1085			135	22
18400			−0.1085			135	22
34000			−0.1082			135	22
77000			−0.1073			135	22
110000			−0.1063			135	22
Poly(hexene-1)	Cyclohexane	−0.063				25	858
	Toluene	−0.042				25	858
Poly(isobutylene)	Benzene	−0.007				25	956
	Cyclohexane		0.105			20	31
					0.099	25	32
	Cyclohexane	0.067				25	872
	Cyclohexane	$0.0285 + 2.08 \times 10^{-4}\ T$ (K)	$0.0198 + 2.29 \times 10^{-4}\ T$ (K)				956
	Cyclohexane	0.0991	0.0966			25	957
	1-Chloronaphthalene	−0.146	−0.131			135	867
	Decalin	0.043	0.0374			25	33
	n-Decane		0.1036			35	34
	Dibutyl ether		0.124			22.5	35
			0.167			120	35
	n-Heptane		0.135			25	36
		0.140				25	37
		0.1422				25	38
	n-Hexane	0.1008				25	38
		0.155				25	872
	Isoamyl isovalerate	0.1066				15	38
		0.1091				25	38
		0.1129				40	38
	Isooctane	0.140				25.5	39
					0.135	25	32
			0.139			25	40
				−0.122	−0.128 (578)	135	867
	Toluene	0.001				25	872
	1,2,4-Trichlorobenzene	−0.066	−0.054		−0.070 (403)	135	867
				−0.051	−0.053 (578)	135	867
Poly(1-octene)	Bromobenzene		−0.105			30	41
trans-poly(pentenamer)							
	n-Hexane	0.175	0.171			25	894
Poly(propylene)	Benzene		−0.0497			25	42
	Bromobenzene		−0.1125			40	42
			−0.0599			25	43
	n-Butyl chloride		−0.1082			25	43
	n-Butyl propionate		0.1101			25	43
	Carbon tetrachloride		0.0112			25	43
	1-Chloronaphthalene	−0.228	−0.227			125	44
			−0.195			140	25
		−0.227				145	27
		−0.231				145	45
isotactic			−0.189			125	46
			−0.188			140	28,47
		−0.2275	−0.2157			145	48
		−0.195	−0.184		−0.200 (365)	150	49
	Cyclohexane		0.0570			25	42
	Decalin				0.023	120	50
isotactic	*n*-Heptane	0.1105				30	51
syndiotactic		0.1077				30	52
	n-Hexane		0.1152			25	42
	Methylcyclohexane		0.0652			25	42
	Toluene		−0.0368			25	42
			−0.0027			25	43
	p-Xylene		−0.0380			25	43
atactic	1-Chloronaphthalene	−0.211	−0.188	−0.177	−0.183 (578)	135	867

TABLE 1. *cont'd*

Polymer	Solvent	dn/dc (ml/g) $\lambda_0 = 436$ nm	$\lambda_0 = 546$ nm	$\lambda_0 = 633$ nm	Others	T (°C)	Refs.
isotactic		−0.205	−0.184	−0.173	−0.180 (578)	135	867
atactic	1,2,4-Trichlorobenzene	−0.123	−0.111		−0.130 (403)	135	867
				−0.105	−0.109 (578)	135	867
isotactic		−0.121	−0.107		−0.128 (403)	135	867
				−0.102	−0.105 (578)	135	867
				−0.092 to −0.094		145	646
Poly(1-phenyl-1-propyne)	Toluene	0.1861	0.1656			25	979
	Cyclohexane	$0.264 + 5.3 \times 10^{-4}$(T°C-30)	$0.234 + 4.7 \times 10^{-4}$(T°C-30)			30–45	979
Poly(trifluorochloroethylene)	Mesitylene		0.026			145	53
Poly(vinylcyclohexane)	Cyclohexane		0.101			25	305
	Cyclohexane/dioxane (50.1/49.9, v/v)		0.103			25	305
	Cyclohexane/MEK (64.6/35.4, v/v)		0.138			25	305
	Decalin/dioxane (50.6/49.4, v/v)		0.078			25	305
	Decalin/MEK (59.7/40.3, v/v)		0.075			25	305
	n-Heptane/dioxane (56.8/43.2, v/v)		0.147			25	305
	n-Heptane/MEK (82.6/17.4, v/v)		0.167			25	305
	n-Hexane		0.170			25	305
	THF		0.131			25	305
1.3. POLY(ACRYLIC ACID) AND DERIVATIVES							
Poly(acrylamide)	Acetic acid	0.199	0.194	0.192		25	627
	DMSO	0.091	0.089	0.089		25	627
	Ethanolamine	0.093	0.089	0.088		25	627
	Ethylene glycol		0.177			25	657
			0.095–0.110			25	657
			0.084			25	620
		0.117	0.113	0.111		25	627
	Formamide	0.109	0.109	0.109		25	627
		0.103				30	898
			0.127			65	928
	Formic acid	0.172	0.169	0.166		25	627
	Aq. 1% LiCl				0.181	25	928
	Aq. 5% LiCl		0.110			65	928
	Aq. 1 M $Mg(ClO_4)_2$		0.165			25	728
	Aq. 2.8 M $Mg(ClO_4)_2$		0.145			25	728
	Aq. 3 M $Mg(ClO_4)_2$		0.138			25	728
	Aq. 1 M NaCl		0.175			RT	674
	Aq. 1 M NaCl		0.175 (μ)			20	714
	Aq. 1 M NaCl			0.156–0.159		25	926
	Aq. 0.2 M NaCl	0.186	0.182			20	714
	Aq. 0.2 M NaCl		0.172 (μ)			20	714
	Aq. 0.1 M NaCl		0.17			20	929
	Aq. 0.1 M NaCl				0.164		927
	Aq. 1 M $NaNO_3$	0.182				30	899
	Aq. 0.02 M Na_2SO_4			0.1869		25	980
	Water	0.185	0.182			20	714
					0.149	20–65	77
			0.163				78
					0.195 (589)	30	79
					0.179		80
			0.173 (μ)			20	714
		0.167	0.160		0.172 (405)	25	639
					0.157 (579)	25	639
			0.187			25	657
			0.183			25	728
			0.170			25	845
			0.169			25	785
			0.162			25	657

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TABLE 1. *cont'd*

Polymer	Solvent	dn/dc (ml/g) $\lambda_0 = 436$ nm	$\lambda_0 = 546$ nm	$\lambda_0 = 633$ nm	Others	T (°C)	Refs.
			0.161			25	804
				0.183		25	926
		0.18				25	888
					0.165		927
		0.193	0.187	0.185		25	627
				0.146		23	924
				0.142		23	925
On aging containing carboxyl groups	Water		0.197–0.326			25	620
	Water			0.149 (488)		53.7	604
Poly[*N*-(1,1-dimethyl-3-imidazolylpropyl)acrylamide]							
	0.01 M Tetrabutyl-ammonium	0.209				25	944
Poly(acrylic acid)							
DN = 0.102, I = 0.10	Aqueous NaCl	0.158				30	85
0.335, 0.10		0.179				30	85
0.994, 0.10		0.261				30	85
	Dioxane				0.090	25	86
					0.088	25	86
	HCl 0.1 N				0.140 (589)		87
	0.2 N				0.146	20–65	77
	Water				0.137		80
			0.156			25	617
	Water/dioxane (90/10, v/v)		0.160			25	617
			0.112 (μ)			25	617
	(80/20, v/v)		0.164			25	617
			0.105 (μ)			25	617
	(60/40, v/v)		0.171			25	617
			0.119 (μ)			25	617
	(50/50, v/v)		0.174			25	617
			0.117 (μ)			25	617
	(40/60, v/v)		0.178			25	617
			0.117 (μ)			25	617
	(35/65, v/v)		0.166			25	617
			0.112 (μ)			25	617
	(30/70, v/v)		0.159			25	617
			0.101 (μ)			25	617
	(25/75, v/v)		0.141			25	617
			0.079 (μ)			25	617
	(10/90, v/v)		0.204			25	617
			0.138 (μ)			25	617
	(5/95, v/v)		0.092			25	617
			0.075 (μ)			25	617
	(1.5/98.5, v/v)		0.078			25	617
			0.084 (μ)			25	617
–, lithium salt	Methanol $\alpha = 0$			0.191		20	743
	0.04			0.198		20	743
	0.09			0.199		20	743
	0.21			0.233		20	743
	0.40			0.235		20	743
	0.60			0.251		20	743
	0.69			0.224		20	743
–, sodium salt	Water		0.231			25	617
	Water/dioxane (90/10, v/v)		0.246			25	617
			0.126 (μ)			25	617
	(80/20, v/v)		0.258			25	617
			0.100 (μ)			25	617
	(60/40, v/v)		0.238			25	617
			0.073 (μ)			25	617
	(50/50, v/v)		0.219			25	617
			0.082 (μ)			25	617
	(40/60, v/v)		0.203			25	617
			0.069 (μ)			25	617

TABLE 1. *cont'd*

Polymer	Solvent	dn/dc (ml/g) $\lambda_0 = 436$ nm	$\lambda_0 = 546$ nm	$\lambda_0 = 633$ nm	Others	T (°C)	Refs.
	(30/70, v/v)		0.184			25	617
			0.066 (μ)			25	617
	(20/80, v/v)		0.223			25	617
	Aq. 0.3 M NaCl				0.159 (μ) (488)	25	678
	Aq. 1 M NaCl				0.152 (μ) (488)	25	678
DN = 0.2	Aq. NaBr	0.128 (μ)				25	711
	(M = 0.01, 0.025, 0.1)						
DN = 0.2	(M = 0.5)	0.122 (μ)				25	711
DN = 0.6	(M = 0.01, 0.025, 0.1)	0.156 (μ)				25	711
DN = 0.6	(M = 0.5)	0.138 (μ)				25	711
DN = 1	(M = 0.01, 0.025, 0.1)	0.183 (μ)				25	711
DN = 1	(M = 0.5)	0.166 (μ)				25	711
DN = 1	(M = 1.5)	0.140 (μ)				25	711
Poly(benzyl acrylate)	Benzene	0.062	0.062			20	6
	DMF	0.124	0.119		0.132 (365)	20	6
					0.118 (578)	20	6
					0.117 (589)	20	6
					0.116 (644)	20	6
	MEK	0.1760				20	88
		0.1746	0.1665			20	6
		0.1746	0.1665		0.1653 (578)	20	5
					0.1647 (589)	20	5
					0.1623 (644)	20	5
Poly(*n*-butyl acrylate)	Acetone	0.112				20	89
	Benzene		−0.0292			30	84
	Chlorobenzene		−0.0525			30	84
	Cyclohexanone				0.021 (488)	30	729
	Dioxane				0.043 (488)	30	729
	n-Hexane		0.0885			30	84
	MEK				0.088 (488)	30	729
	THF		0.0651			30	84
			0.062				803
	Toluene		−0.0239			30	84
Poly(*tert*-butyl acrylate)	MEK		0.0818			25	90
Poly(1,1-dihydroperfluoro-butyl acrylate)	Benzotrifluoride				0.30	25	91
					0.0311	25	91
Poly(*N,N*-dimethyl-acrylamide)	Methanol				0.194	25	83
	Water				0.150	25	83
Poly(ethyl acrylate)	Acetone		1.107			25	10,92,93
		0.109				20	89
	Benzene		−0.042			25	10
	Chloroform		0.0363			25	10
	Cyclohexanone				0.017 (488)	30	729
	Dichloroethane		0.23			25	10
	Dioxane		0.036			25	10,93
					0.045 (488)	30	729
	DMF		0.032			25	10
	Ethyl acetate		0.0916			25	10
	MEK	0.0870	0.0856		0.0854 (578)	20	5
					0.088 (488)	30	729
					0.0853 (589)	20	5
					0.0852 (644)	20	5
			0.086			25	10,93
			0.1407			30	94
	n-Methylpyrrolidone		−0.027			25	10
	Water				0.131	25	95
Poly(2-ethylhexyl acrylate)	Butanone	0.101					982
	n-Heptane	0.096					982
	Tetrahydrofuran	0.070					982
	Toluene	−0.040					982
	Chlorobenzene	−0.072					982
Poly(isopropyl acrylate) isotactic, syndiotactic and atactic	Bromobenzene	−0.103	−0.0870			60	101

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TABLE 1. *cont'd*

Polymer	Solvent	dn/dc (ml/g) $\lambda_0 = 436$ nm	$\lambda_0 = 546$ nm	$\lambda_0 = 633$ nm	Others	T (°C)	Refs.
isotactic and atactic	TFP		0.124			25	101
Poly(methyl acrylate)	Acetone	0.113				20	89
	Acetonitrile	0.120	0.118			25	96
		0.121	0.119			32	96
		0.122	0.120			40	96
		0.123	0.122			48	96
		0.123				30	96
		0.127	0.125			56	96
	Benzene	−0.019				30	97
	o-Chlorophenol	−0.056				30	916–918
	m-Cresol	−0.035				30	916–918
	1,2-Dibromoethane	−0.0606	−0.560			25	96
		−0.0598	−0.0528			32	96
		−0.0578	−0.0532			40	96
		−0.0579	−0.0523			48	96
		−0.062				30	916–918
	Dioxane	0.0503	0.0497			25	96
		0.052				30	96
		0.055				30	97
		0.0524	0.0515			32	96
		0.0533	0.0526			40	96
		0.0547	0.0537			48	96
		0.0566	0.0562			56	96
	Ethyl acetate	0.0940	0.0920			19.5	96
		0.0989	0.0967			25	96
		0.0967	0.0964			32	96
		0.100				30	96
		0.102				35	98
		0.102	0.101			40	96
		0.105	0.103			48	96
	Isoamyl acetate	0.077				30	97
	MEK	0.090				RT	99
		0.0938	0.0923		0.0921 (578)	20	5
					0.0919 (589)	20	5
					0.0915 (644)	20	5
		0.097				30	97,100
		0.090				35	72
	TFP	0.126				30	916–918
	TFP/*o*-chlorophenol						
	(10/90, v/v)	−0.050				30	916–918
		−0.050 (μ)				30	916–918
	(26/74, v/v)	−0.014				30	916–918
		−0.004 (μ)				30	916–918
	(32/68, v/v)	−0.005				30	916–918
		−0.016 (μ)				30	916–918
	(40/60, v/v)	0.004				30	916–918
		0.029 (μ)				30	916–918
	(50/50, v/v)	0.043				30	916–918
		0.064 (μ)				30	916–918
	(70/30, v/v)	0.075				30	916–918
		0.123 (μ)				30	916–918
	(90/10, v/v)	0.102				30	916–918
		0.135 (μ)				30	916–918
	Toluene	−0.009				30	97
Poly(*n*-octadecyl acrylate)	Benzene		−0.0505			30	84
			−0.0269			30	84
			−0.0363			30	84
	n-Butyl acetate		0.0883			30	84
	Carbon tetrachloride		0.0114			30	84
	Chlorobenzene		−0.0682			30	84
			−0.0489			30	84
			−0.0563			30	84
	Cyclohexane		0.0175			30	84
	n-Hexane		0.1096			30	84
			0.1292			30	84

TABLE 1. *cont'd*

Polymer	Solvent	dn/dc (ml/g) $\lambda_0 = 436$ nm	$\lambda_0 = 546$ nm	$\lambda_0 = 633$ nm	Others	T (°C)	Refs.
	THF		0.0702			30	84
			0.0898			30	84
			0.0723			30	84
	Toluene		−0.0425			30	84
Poly(phenyl acrylate)	MEK	0.183				30	634
Poly(*n*-propyl acrylate)	MEK		0.1102			30	94
Poly(trimethylammoniumethyl chloride acrylate)							
	Aq. 1 M NaCl		0.154			RT	674
1.4. POLY(METHACRYLIC ACID) AND DERIVATIVES							
Poly(allyl methacrylate)	Carbon tetrachloride				0.0508 (589)	25	982
Poly(benzyl methacrylate-*co*-cyclohexylmethyl methacrylate) (1/1, (mol/mol)							
	Di-isobutyl ketone				0.123	12	922
Poly(*N*-*tert*-butylacrylamide)	Methanol	0.249	0.234				81
			0.234			20	82
Poly(*n*-butyl methacrylate)	Acetone	0.1249	0.1236		0.1257 (366)	25	105
		0.122				20	89
	Benzene	−0.023	−0.014			25	106
		−0.024	0.015			25	107
	Bromobenzene	−0.084	−0.073			25	106,107
	Bromoform	−0.129	0.118			25	106
	n-Butyl chloride	0.085				25	911
	Carbon tetrachloride	0.026	0.027			25	106
	m-Cresol/*n*-heptane (30/70, v/v)		0.155			25	789
			0.358 (μ)			25	789
	DMF			0.016		20	769
	Isopropanol	0.102	0.102			23	108
		0.1059				20	109
		0.1066				23.7	109
		0.1068				25	109
		0.1076				31	109
		0.1097				45	109
	MEK	0.103	0.102			25	106,107
		0.1059	0.1046		0.1064 (366)	25	105
			0.104			23	108
				0.097		20	869
			0.100			25	807
	TFP		0.169			25	789
				0.067		20	869
	Toluene			−0.024		20	869
		−0.017				25	911
Poly(*tert*-butyl methacrylate)	*n*-Butyl acetate				0.09		110
Poly(*p*-*tert*-butylphenyl methacrylate)	Acetone				0.183		111
	Chloroform/THF (90/10, v/v)				0.110	25	665
					0.107 (μ)	25	655
	(70/30, v/v)				0.120	25	665
					0.100 (μ)	25	665
	(50/50, v/v)				0.130	25	665
					0.129 (μ)	25	665
	(30/70, v/v)				0.133	25	665
					0.206 (μ)	25	655
	(10/90, v/v)				0.164	25	665
					0.266 (μ)	25	655
	Water/THF (2/98, v/v)				0.142	25	796
					0.124 (μ)	25	796
	(4/96, v/v)				0.208	25	796
					0.143 (μ)	25	796
	(7/93, v/v)				0.177	25	796
					0.194 (μ)	25	796
	(9/91, v/v)				0.192	25	796
					0.205 (μ)	25	796

TABLE 1. *cont'd*

Polymer	Solvent	dn/dc (ml/g) $\lambda_0 = 436$ nm	$\lambda_0 = 546$ nm	$\lambda_0 = 633$ nm	Others	T (°C)	Refs.
Poly(cetyl methacrylate)	Benzene				0.02		112
	n-Butyl acetate	0.095				25	113
	Carbon tetrachloride				−0.015		112
	n-Heptane				0.114	21	112
Poly(2-chloroethyl methacrylate)	THF			0.096		30	749
Poly(4-chlorophenyl methacrylate)	Benzene		0.0758			25	114
Poly(cyclohexyl methacrylate)	*n*-Butyl alcohol		0.098			25	762
	n-Butyl chloride	0.116				25	911
	Cyclohexane		0.0845			25	115
	Toluene	0.019				25	911
Poly(decahydro-β-naphthyl methacrylate)	Cyclohexane		0.104			25	856
Poly(*n*-decyl methacrylate)	Cyclohexane			0.054		30	744
	Ethyl acetate	0.115				25	744
Poly-[2-(2-diethylaminoethoxy)ethyl methacrylate]							
	Methanol			0.163		RT	680
Poly(dimethylaminoethyl methacrylate)	Methanol			0.157		RT	680
Poly(*N*,*N*-dimethylaminoethyl methacrylate *N*-oxide)							
	Aq. 0.1 M NaCl			0.119		25	679
Poly(*n*-docosyl methacrylate)	*o*-Dichlorobenzene	0.102	0.090			25	116
	Tetralin	0.094	0.084			25	116
		0.0935				29	116
		0.093	0.082			35	116
		0.091	0.081			50	116
		0.088	0.077			65	116
		0.084	0.070			75	116
		0.076	0.068			85	116
	THF	0.0745	0.0745			25–48	116
	n-Amyl acetate	0.090				31	744
	Cyclohexane			0.054		30	744
Poly(2-ethylbutyl methacrylate)	Isopropanol	0.109	0.105			25	117
	MEK	0.104	0.102			25	117
Poly(ethyl methacrylate)	*n*-Butyl chloride	0.087				25	911
	Ethyl acetate	0.109					122
	Ethyl acetate/ethanol (1/4.5 – 1/6, v/v)	0.113					122
	MEK		0.104			23	123
			0.101			25	807
	MEK/isopropanol (1/7, v/v)		0.107			23	123
	Methyl cellusolve		0.075			25	807
	Toluene	−0.009				25	911
Poly(*n*-hexyl methacrylate)	MEK	0.105	0.105			23	124
	Isopropanol	0.108	0.106			32.6	124
Poly(2-hydroxyethyl methacrylate)	2-Chloroethanol		0.048			25	616
	DMF		0.076			25	807
			0.076				120
	Dioxane/water (90/10, v/v)		0.083			25	119
			0.066 (μ)			25	119
	(80/20, v/v)		0.086			25	119
			0.071 (μ)			25	119
	(60/40, v/v)		0.095			25	119
			0.100 (μ)			25	119
	(40/60, v/v)		0.108			25	119
			0.120 (μ)			25	119
	(20/80, v/v)		0.123			25	119
			0.130 (μ)			25	119
	Ethanol/water (80/20, v/v)		0.124			25	119
			0.121 (μ)			25	119

TABLE 1. *cont'd*

Polymer	Solvent	dn/dc (ml/g) $\lambda_0 = 436$ nm	$\lambda_0 = 546$ nm	$\lambda_0 = 633$ nm	Others	T (°C)	Refs.
	(70/30, v/v)		0.121			25	119
			0.119 (μ)			25	119
	(60/40, v/v)		0.120			25	119
			0.120 (μ)			25	119
	(40/60, v/v)		0.123			25	119
			0.127 (μ)			25	119
	(30/70, v/v)		0.125			25	119
			0.132 (μ)			25	119
	Formamide		0.045				120
	n-Heptane/*m*-cresol (50/50, v/v)		0.033			25	698
	(50/50, v/v)		0.361 (μ)			25	698
	Methanol		0.162				120
	Methanol/HEMA (25/75, v/v)		0.078			25	726
	(25/75, v/v)		0.070 (μ)			25	726
	(35/65, v/v)		0.090			25	726
	(35/65, v/v)		0.081 (μ)			25	726
	(50/50, v/v)		0.110 (μ)			25	726
	(50/50, v/v)		0.093 (μ)			25	726
	(62.5/37.5, v/v)		0.120			25	726
			0.107 (μ)			25	726
	(75/25, v/v)		0.135			25	726
			0.122 (μ)			25	726
	(87.5/12.5, v/v)		0.151			25	726
			0.140 (μ)			25	726
	2-Methoxy ethanol		0.091				769
	Methyl cellusolve		0.095			25	807
	n-Propanol/dioxane						
	(85/15, v/v)		0.105			25	119
			0.108 (μ)			25	119
	(70/30, v/v)		0.100			25	119
			0.103 (μ)			25	119
	(60/40, v/v)		0.096			25	119
			0.097 (μ)			25	119
	(40/60, v/v)		0.091			25	119
			0.090 (μ)			25	119
	(30/70, v/v)		0.087			25	119
			0.086 (μ)			25	119
	n-Propanol/water (95/5, v/v)		0.110			25	121
			0.105 (μ)			25	121
	(90/10, v/v)		0.113			25	121
			0.105 (μ)			25	121
	(80/20, v/v)		0.115			25	121
			0.106 (μ)			25	121
	(75/25, v/v)		0.103 (μ)				120
	(70/30, v/v)		0.119			25	121
			0.109 (μ)			25	121
	(60/40, v/v)		0.122			25	121
			0.110 (μ)			25	121
	(50/50, v/v)		0.125			25	121
			0.123 (μ)			25	121
	(40/60, v/v)		0.128			25	121
			0.138 (μ)			25	121
	(30/70, v/v)		0.131			25	121
			0.149 (μ)			25	121
	(20/80, v/v)		0.135			25	121
			0.153 (μ)			25	121
	TFP/HEMA (50/50, v/v)		0.105			25	726
			0.083 (μ)			25	726
	Toluene/methanol (42/58, v/v)		0.101			25	118
			0.063 (μ)			25	118
	Toluene/isopropanol		0.087			25	118
	(38/62, v/v)		0.064 (μ)			25	118

TABLE 1. *cont'd*

Polymer	Solvent	dn/dc (ml/g) $\lambda_0 = 436$ nm	$\lambda_0 = 546$ nm	$\lambda_0 = 633$ nm	Others	T (°C)	Refs.
	Water/2-chloroethanol						
	(80/20, v/v)		0.031			25	616
			0.131 (μ)			25	616
	(72/25, v/v)		0.046			25	616
			0.127 (μ)			25	616
	(70/30, v/v)		0.023			25	616
			0.120 (μ)			25	616
	(60/40, v/v)		0.015			25	616
			0.101 (μ)			25	616
	(50/50, v/v)		0.016			25	616
			0.103 (μ)			25	616
	(40/60, v/v)		0.020			25	616
			0.091 (μ)			25	616
	(20/80, v/v)		0.034			25	616
			0.066 (μ)			25	616
	Water/Hema						
	(20/80, v/v)		0.068			25	726
			0.049 (μ)			25	726
			0.069			30	726
			0.051 (μ)			30	726
			0.071			40	726
			0.053 (μ)			40	726
			0.074			50	726
			0.055 (μ)			50	726
			0.076			60	726
			0.057 (μ)			60	726
			0.079			70	726
			0.059 (μ)			70	726
	(60/40, v/v)		0.103			25	726
			0.143 (μ)			25	726
			0.104			30	726
			0.144 (μ)			30	726
			0.107			40	726
			0.147 (μ)			40	726
			0.109			50	726
			0.149 (μ)			50	726
			0.111			60	726
			0.151 (μ)			60	726
			0.114			70	726
			0.154 (μ)			70	726
Poly [1(2-hydroxyethyl)pyridinium methacrylate]], benzenesulfonate							
	Aq. 0.5 M KBr		0.178			25	818
		0.136 (μ)	0.129 (μ)			25	813
	0.5 M KCl		0.178			25	818
		0.122 (μ)	0.117 (μ)			25	813
	1M KCl		0.174			25	818
		0.118 (μ)	0.114 (μ)			25	813
	2 M KCl		0.167			25	818
		0.113 (μ)	0.108 (μ)			25	813
	3M KCl		0.161			25	818
		0.104 (μ)	0.100 (μ)			25	813
	1.86 M KSCN		0.119 (μ)			25	813
	0.05 M NaF	0.123 (μ)	0.118 (μ)			25	813
	0.05 M NaI		0.183			25	818
			0.155 (μ)			25	818
	4 M NaI		0.121			25	818
			0.119 (μ)			25	818
Poly [1(2-hydroxyethyl)pyridinium methacrylate], toluenesulfonate							
	Benzyl alcohol		0.039			25	813
	Benzyl alcohol/methyl-α-naphthyl ether (45/55, v/v)		0.000			25	813
	DMF		0.130			25	813

TABLE 1. *cont'd*

Polymer	Solvent	dn/dc (ml/g) $\lambda_0 = 436$ nm	$\lambda_0 = 546$ nm	$\lambda_0 = 633$ nm	Others	T (°C)	Refs.
	Ethanol		0.182			25	813
	Aq. 0.5 M KBr		0.181			25	813
			0.129 (μ)			25	818
	0.5 M KCl		0.182			25	813
		0.121 (μ)	0.114 (μ)			25	813,818
	1 M KCl		0.178			25	813
		0.117 (μ)	0.111 (μ)			25	813,818
	2 M KCl		0.171			25	813
		0.109 (μ)	0.105 (μ)			25	813,818
	3 M KCl		0.163			25	813
		0.100 (μ)	0.097 (μ)			25	813,818
	Methanol		0.209			25	813
	Methanol + 0.5 M LiCl		0.205			25	813
	0.5 M NaF		0.186			25	813
	4 M NaI		0.121			25	813
			0.116 (μ)			25	818
	7 M NaI		0.072			25	813
	n-Propanol		0.159			25	813
	Tetrahydrofurfuryl alcohol		0.106			25	813
	TFP		0.196			25	813
	Water		0.187			25	813
Poly[1(2-hydroxyethyl)trimethylammonium methacrylate], benzene sulfonate							
	Aq. 0.5 M KCl		0.101 (μ)			25	813
Poly[1(2-hydroxyethyl)trimethylammonium methacrylate], toluene sulfonate							
	Aq. 0.5 M KCl		0.095 (μ)			25	813
Poly(*N*-2-hydroxypropyl methacrylamide)							
	Aq. 0.1 M KCl		0.166			25	755
Poly(isobutyl methacrylate)	Acetone	0.122	0.117			25	103,104
	n-Butyl chloride	0.084				25	911
	Toluene	−0.021				25	911
Poly(isooctyl methacrylate)	*n*-Heptane				0.109		168
Poly(*n*-lauryl methacrylate)	*n*-Amyl alcohol	0.0744	0.0781				125
	n-Butyl acetate	0.092	0.090			23	126
	Isopropyl acetate	0.107	0.104			13	126
Poly(methacrylamide)	Aq. 0.4 M Mg perchlorate		0.180			25	775
			0.180 (μ)			25	775
	Water				0.209	20–65	77
Poly(methacrylic acid)	Water		0.175			25	628
	Water/dioxane (95/5, v/v)		0.170			25	628
			0.179 (μ)			25	628
	(90/10, v/v)		0.165			25	628
			0.180 (μ)			25	628
	(80/20, v/v)		0.163			25	628
			0.200 (μ)			25	628
	(70/30, v/v)		0.150			25	628
			0.191 (μ)			25	628
	(60/40, v/v)		0.150			25	628
			0.196 (μ)			25	628
	(50/50, v/v)		0.139			25	628
			0.169 (μ)			25	628
	(40/60, v/v)		0.134			25	628
			0.155 (μ)			25	628
	(35/65, v/v)		0.148 (μ)			25	628
	(25/75, v/v)		0.125			25	628
			0.122			25	628
	(15/85, v/v)		0.115			25	628
			0.109 (μ)			25	628
	Dimethyl formamide/ 1,4-dioxane (5 : 7, v/v)	0.099				26.9	977
	Alcoholic LiBr	0.154				25	127
	Ethanol	0.154				25	127
	HCl 0.1 N				0.159 (589)		87
	0.5 N		0.137			25	128

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TABLE 1. *cont'd*

Polymer	Solvent	dn/dc (ml/g) $\lambda_0 = 436$ nm	$\lambda_0 = 546$ nm	$\lambda_0 = 633$ nm	Others	T (°C)	Refs.
	0.045 N				0.156 (560)	20	129
					0.162 (μ) (560)	20	129
	0.02 N				0.158	20–65	77
	0.001 N		0.140			25	128
	Methanol		0.134			25	128
	NaBr 0.1 M				0.234 (560)	20	129
					0.209 (μ) (560)	20	129
	NaCl 0.1 M				0.213 (μ) (560)	20	129
	NaF 0.1 M				0.229 (560)	20	129
					0.219 (μ)(560)	20	129
	NaI 0.1 M				0.197 (μ) (560)	20	129
	Na_2SO_4 0.1 M				0.210 (μ) (560)	20	129
	$(NH_4)_2Mo_7O_{24}$ 0.01 M				0.227	20	129
					0.169 (μ) (560)	20	129
	Water		0.142			25	128
					0.153		80
Poly(methacrylic acid), sodium salt							
	Water		0.260			25	628
	Water/dioxane (95/5, v/v)		0.256			25	628
			0.230 (μ)			25	628
	(90/10, v/v)		0.240			25	628
			0.189 (μ)			25	628
	(80/20, v/v)		0.250			25	628
			0.154 (μ)			25	628
	(75/25, v/v)		0.252			25	628
			0.121 (μ)			25	628
	(70/30, v/v)		0.238			25	628
			0.108 (μ)			25	628
Poly(methoxybiphenyl methacrylate)							
	THF		0.196				958
50/50 Poly(methoxy-biphenyl methacrylate-*co*-methoxybiphenyl ethylene oxide methacrylate)							
	THF		0.194				958
Poly(methoxybiphenyl ethylene oxide methacrylate)							
	THF		0.212				958
50/50 Poly(methoxy-biphenyl ethylene oxide methacrylate-*co*-methoxy-biphenyl bis(ethylene oxide)methacrylate)							
	THF		0.188				958
Poly(methoxybiphenyl bis(ethylene oxide) methacrylate							
	THF		0.205				958
Poly(methoxybiphenyl methacrylate-*co*-methoxybiphenyl tris(ethylene oxide)methacrylate)							
	THF		0.170				958
Poly(methoxybiphenyl tris(ethylene oxide)methacrylate)							
	THF		0.181				958
50/50 poly(methoxybiphenyl methacrylate-*co*-methoxybiphenyl tetrakis(ethylene oxide) methacrylate							
	THF		0.153				958
Poly(methoxybiphenyl tetrakis(ethylene oxide) methacrylate)							
	THF		0.171				958
Poly(methoxybiphenyl methacrylate)							
	$CHCl_3$		0.163				958
Poly(methoxybiphenyl ethylene oxide methacrylate)							
	$CHCl_3$		0.180				958
50/50 Poly(methoxybiphenyl ethylene oxide methacrylate-*co*-methoxybiphenyl bis(ethylene oxide)methacrylate)							
	$CHCl_3$		0.153				958
Poly(methoxybiphenyl bis(ethylene oxide) methacrylate)							
	$CHCl_3$		0.167				958
Poly(methoxybiphenyl tris(ethylene oxide) methacrylate)							
	$CHCl_3$		0.152				958
Poly(methoxybiphenyl tetrakis(ethylene oxide) methacrylate)							
	$CHCl_3$		0.152				958
Poly(2-methacryloyloxyethyl trimethylammonium chloride)							
	1 M aqueous NaCl			0.157			971
Poly(2-methoxyethyl methacrylate)	Halothane		0.125			25	589
	MEK		0.108			25	589,902

TABLE 1. *cont'd*

Polymer	Solvent	dn/dc (ml/g) $\lambda_0 = 436$ nm	$\lambda_0 = 546$ nm	$\lambda_0 = 633$ nm	Others	T (°C)	Refs.
	Nitrobenzene		−0.058			25	589
	THF		0.078			25	589
	Toluene		0.000			25	589
	1,2,4, Trichlorobenzene		−0.067			25	653
Poly(methyl methacrylate)	Acetone	0.1391				27	130
		0.107				27	131
		0.137	0.134			23 ± 2	132
		0.129					133
					0.131		134
		0.1313	0.1293		0.134 (366)	25	135
		0.136	0.134			25	10,136
					0.132		92
		0.132				20	89
		0.1305	0.1285		0.1281 (578)	20	5
					0.1279 (589)	20	5
					0.1276 (644)	20	5
			0.132			20	93
			0.135			20	137,138
		0.1312	0.1292			20	139
			0.1330			25	140,141
	Acetone		0.135			25	759
				0.130			618
				0.129		25	689
$M_w > 5060$	Acetone	0.134				25	947
isotactic	Acetone	0.136	0.134			20	142
	Acetone/benzene (88/12, v/v)		0.1170			25	141
	(76/24, v/v)		0.1005			25	141
	(64/36, v/v)		0.0861			25	141
	(52/48, v/v)		0.0734			25	141
	(40/60, v/v)		0.0590			25	141
	Acetone/chloroform						
	(80/20, v/v)		0.1170			25	140
	(60/40, v/v)		0.1005			25	140
	(52/48, v/v)		0.091			25	140
	(40/60, v/v)		0.0861			25	140
	(20/80, v/v)		0.0734			25	140
	Acetone/water	0.136				20	626
	(62.2/37.8, mol)						
	Acetonitrile		0.133			25	721
		0.140	0.137			20	136
$M_w > 10^4$	Acetonitrile	0.144				44	947
	Acetonitrile/MMA						
	(17/83, v/v)		0.094			25	726
						25	726
			0.078 (μ)			25	726
	(32/68, v/v)		0.100			25	726
			0.085 (μ)			25	726
	(50/50, v/v)		0.110			25	726
			0.097 (μ)			25	726
	(68/32, v/v)		0.119			25	726
			0.113 (μ)			25	726
	Acetophenone/MMA						
	(50/50, v/v)		0.034			25	726
			0.033 (μ)			25	726
	Acetophenone/isopropanol						
	(30/70, v/v)		0.074			25	825
			0.115 (μ)			25	825
	(40/60, v/v)		0.059			25	825
			0.104 (μ)			25	825
	(50/50, v/v)		0.044			25	825
			0.084 (μ)			25	825
	(60/40, v/v)		0.027			25	825
			0.050 (μ)			25	825

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TABLE 1. *cont'd*

Polymer	Solvent	dn/dc (ml/g) $\lambda_0 = 436$ nm	$\lambda_0 = 546$ nm	$\lambda_0 = 633$ nm	Others	T (°C)	Refs.
	(70/30, v/v)		0.017			25	825
			0.030 (μ)			25	825
	(80/20, v/v)		0.001			25	825
			0.005 (μ)			25	825
	(90/10, v/v)		−0.012			25	825
			−0.012 (μ)			25	825
	Arochlor	−0.124				20	144
	Benzene	0.0398				27	130
			−0.010				145
		0.002				25	146
		0.0039	0.0110			25	139
			0.004				147
					~0		148
			−0.016			25	10
		0.001	0.007			20	6
		0.006				30	677
				0.015		25	689
	Benzene/MMA (30/70, v/v)		0.061			25	726
			0.054 (μ)			25	726
	(50/50, v/v)		0.046			25	726
			0.044 (μ)			25	726
	(70/30, v/v)		0.033			25	726
			0.032 (μ)			25	726
	Benzyl alcohol/MMA		0.026			25	726
	(50/50, v/v)		0.027 (μ)			25	726
	Benzyl alcohol/*n*-butanol						
	(90/10, v/v)		−0.036			25	782
			−0.034 (μ)			25	782
	(80/20, v/v)		0.012			25	782
			0.017 (μ)			25	782
	(70/30, v/v)		0.016			25	782
			0.024 (μ)			25	782
	(60/40, v/v)		0.030			25	782
			0.043 (μ)			25	782
	(50/50, v/v)		0.041			25	782
			0.060 (μ)			25	782
	(40/60, v/v)		0.057			25	782
			0.084 (μ)			25	782
	Benzyl alcohol/*sec*-butanol						
	(90/10, v/v)		−0.037			25	782
			−0.070 (μ)			25	782
	(80/20, v/v)		0.011			25	782
			−0.012 (μ)			25	782
	(70/30, v/v)		0.012			25	782
			0.013 (μ)			25	782
	(60/40, v/v)		0.029			25	782
			0.082 (μ)			25	782
	(50/50, v/v)		0.040			25	782
			0.160 (μ)			25	782
	(40/60, v/v)		0.056			25	782
			0.254 (μ)			25	782
	(30/70, v/v)		0.074			25	782
			0.316 (μ)			25	782
	Bromobenzene		−0.058				145
		−0.050				25	624
	Bromoform/isopropanol		0.056			25	825
	(30/70, v/v)						
			0.196 (μ)			25	825
	(40/60, v/v)		0.036			25	825
			0.166 (μ)			25	825
	(50/50, v/v)		0.019			25	825
			0.136 (μ)			25	825

TABLE 1. *cont'd*

Polymer	Solvent	dn/dc (ml/g) $\lambda_0 = 436$ nm	$\lambda_0 = 546$ nm	$\lambda_0 = 633$ nm	Others	T (°C)	Refs.
	(60/40, v/v)		0.002			25	825
			0.092 (μ)			25	825
	(70/30, v/v)		−0.017			25	825
			0.034 (μ)			25	825
	(80/20, v/v)		−0.036			25	825
			−0.031 (μ)			25	825
	(90/10, v/v)		−0.059			25	825
			−0.067 (μ)			25	825
	Bromoform/acetophenone/ isopropanol	Values for numerous solvent ratios given in reference					825
	1-Bromonaphthalene		−0.147				145
			−0.148			25	9
	2-Butanol	0.0802 + 0.0004* T (°C)				$55 \leq T \leq 76$	954
	n-Butyl acetate	0.0987	0.0970		0.101 (366)	25	135
		0.0986	0.0969			25	139
		0.1				25	113
			0.0970			25	149
			0.097			25	670
					0.096	25	689
					0.096	25	802
syndiotactic					0.097	25	742
	n-Butyl acetate/chloroform						
	(20/80, v/v)				0.063	25	802
	(40/60, v/v)				0.070	25	802
	(60/40, v/v)				0.073	25	802
	(80/20, v/v)				0.083	25	802
	(90/10, v/v)				0.094	25	802
	n-Butyl chloride	0.0913	0.0898			20	143
		0.0948	0.0934			30	143
		0.0984	0.0970			40	143
					0.096	40	615
			0.093			25	721
		0.098				40	731
atactic		0.0931	0.0914			25	150
		0.1021	0.1001			50	150
syndiotactic		0.1001	0.0986			50	150
isotactic		0.0902	0.0875			25	150
		0.0965	0.0954			50	150
	n-Butyl chloride/toluene						
	(83/17, v/v)	0.080				25	911
	(56.9/43.1, v/v)	0.058				25	911
	(32.1/67.9, v/v)	0.035				25	911
	(20/80, v/v)	0.026				25	911
	Carbon tetrachloride		0.023				145
		0.033				30	677
	Chlorobenzene		−0.026				145
		−0.004				35	697
					−0.010	25	689
		−0.018				25	146
					−0.026		148
	1-Chlorobutane	0.098				40	955
	Chloroform	0.0631	0.0629		0.0635 (366)	25	135
					0.056		134
		0.0630	0.0628			25	139
					0.050		148
			0.059			25	10,140
		0.056				30	677
					0.062	25	689
					0.059	25	802
	Cyclohexanone				0.046	30	729
	o-Dichlorobenzene				−0.037	25	689

TABLE 1. *cont'd*

Polymer	Solvent	dn/dc (ml/g) $\lambda_0 = 436$ nm	$\lambda_0 = 546$ nm	$\lambda_0 = 633$ nm	Others	T (°C)	Refs.
	1,2-Dichloroethane	0.050	0.051				151
		0.050				30	152
			0.050				147
			0.046			25	10
			0.079			30	826
					0.050	25	689
	Dioxane		0.075				154
		0.0720	0.0707		0.074 (366)	25	135,139
			0.068				145
			0.071			25	93
					0.0703 (589)	25	155
			0.07			25	121,147
					0.070		148
			0.066			25	10
			0.0707			25	156,157
					0.072 (488)	30	729
				0.068			618
				0.069		25	689
			0.070			25	807,822
	Dioxane/water (95/5, v/v)		0.072			25	121
			0.076 (μ)			25	121
	(90/10, v/v)		0.076			25	121
			0.083 (μ)			25	121
	(85/15, v/v)		0.079			25	121
			0.072			25	118
			0.090 (μ)			25	118,121
			0.090			30	158
	(82/18, v/v)		0.082 (μ)			25	121
			0.096 (μ)			25	121
	DMF	0.0600	0.0614		0.0617 (578)	20	5,6
					0.0168 (589)	20	5,6
					0.0619 (644)	20	5,6
					0.055 (365)	20	6
			0.055			25	10
			0.069			30	159
			0.095			90	159
					0.042		148
		0.060	0.058			20	897
			0.086			30	826
			0.058			25	807
					0.063	25	689
Polymer modified with RCH_2Li							
$R = SC_6H_5$					0.079–0.096	25	700
$R = SO_2CH_3$			0.070–0.081			25	700
$R = SO_2N(CH_3)_2$			0.075–0.107			25	700
	Ethyl acetate	0.1200	0.1180		0.123 (366)	25	135,139
					0.1174 (589)	25	155
			0.118			25	10
				0.118			618
isotactic					0.117	25	771
			0.138			30	826
			0.116			25	720
	Furfuryl alcohol		0.010			30	691
	n-Heptane/*m*-cresol		0.040			25	698
	(50/50, v/v)		0.349 (μ)			25	698
	Isoamyl acetate	0.0931	0.0911			20	143
		0.0945	0.0926			30	143
		0.0959	0.0942			40	143
		0.0974	0.0957			50	143
	MEK		0.111				154
			0.112			RT	160
		0.093					131
					0.111		134

TABLE 1. *cont'd*

Polymer	Solvent	dn/dc (ml/g) $\lambda_0 = 436$ nm	$\lambda_0 = 546$ nm	$\lambda_0 = 633$ nm	Others	T (°C)	Refs.
			0.1173			RT	163
		0.100				RT	99
					0.110		148
		0.1131	0.1112		0.1110 (578)	20	5,6,88
					0.1107 (589)	20	5
					0.1102 (644)	20	5
		0.113	0.111			23 ± 2	132
			0.117			25	162
		0.111				25	146
			0.111			25	132,161
			0.110			25	10,93
			0.108			25	165
		0.01385				27	130
					0.111 (488)	28	134
		0.114	0.113				151
			0.111				145
		0.113				30	152
					0.059	30	164
					0.131		153
			0.113				147
			0.1147			35	34
		0.113				35	72
				0.111		25	689
			0.112			25	807
			0.134			30	826
		0.110	0.108			20	897
	MEK/isopropanol	0.1090	0.1075			10	143
		0.1130	0.1114			20	143
		0.1167	0.1153			30	143
		0.1208	0.1192			40	143
atactic	(55/54, v/v)	0.1169	0.1153			30	150
syndiotactic		0.1165	0.1155			30	150
isotactic		0.1167	0.1152			30	150
	MEK/2-propanol (43.6/56.4, mol/mol)	0.109				20	626
	2-Methoxy ethanol	0.089				40	731
	Methyl cellusolve		0.082			25	807
	MMA/styrene (50/50, v/v)		0.025			25	726
			0.025 (μ)			25	726
	Methyl methacrylate		0.075			30	158
	N-Methylpyrrolidone		0.0176			25	10
	Nitroethane		0.100				154
			0.094			25	161
	2-Propanol/isopropylamine (5.6/94.4, mol/mol)	0.109				20	626
	TFP		0.141			25	121
	TFP/water (92/5, v/v)		0.141			25	121
			0.140 (μ)			25	121
	(90/10, v/v)		0.139			25	121
			0.137 (μ)			25	121
	(80/20, v/v)		0.135			25	121
			0.131 (μ)			25	121
	(70/30, v/v)		0.133			25	121
			0.124 (μ)			25	121
	(65/35, v/v)		0.132			25	121
			0.121 (μ)			25	121
	THF	0.0887	0.0871		0.091 (366)	25	135
		0.0886	0.0870			25	139
			0.0902			36	34
		0.09					166
				0.087			618
				0.098		25	637
				0.086		25	689

TABLE 1. *cont'd*

Polymer	Solvent	dn/dc (ml/g) $\lambda_0 = 436$ nm	$\lambda_0 = 546$ nm	$\lambda_0 = 633$ nm	Others	T (°C)	Refs.
$M_w > 10^4$				0.110–0.114			984
atactic				0.084		25	811
isotactic				0.086		25	811
varying tacticities				0.084–0.088		25	686
	THF/cyclopentane (65.7/34.3, mol/mol)	0.089				20	626
	Toluene	0.004				30	152
		0.010				25	146
		0.0094	0.0157			25	139
					0.004		153
			0.005				147
			0.003			30	691
		0.004				30	697,699,834
		0.009				50	699
		0.014				70	699
		−0.003				15	834
		0.001				20	834
		0.003				25	834
		0.007				25	911
atactic		0.010				25	146
syndiotactic		0.007				25	146
isotactic		0.014				25	146
	Toluene/methanol (42/58, v/v)		0.094			25	118
			0.152 (μ)			25	118
			0.096			25	167
			0.154 (μ)			25	167
	Toluene/isopropanol (38/62, v/v)		0.073			25	118
			0.121 (μ)			25	118
	Toluene/*p*-cymene (73.4/26.6, w/w)	0.006				30	699
	(49.7/503, w/w)	0.008				30	699
Poly(*o*-methylphenylthio methacrylate	Benzene	0.133			0.133	35	666
Poly(β-naphthyl methacrylate)	Benzene		0.142			25	856
Poly(nonyloxy-1,4-phenyleneoxycarbonylphenyl methacrylate)							
	Carbon tetrachloride				0.096	24	890
Poly(*N*-octadecylacrylamide)	Benzene		0.0269			30	84
	Chlorobenzene		0.0489			30	84
	Cyclohexane		0.0651			30	84
	n-Hexane		0.1292			30	84
			0.1168			30	84
	THF		0.0898			30	84
	Toluene		0.0154			30	84
Poly(*n*-octyl methacrylate)	*n*-Butanol	0.083	0.080			16.8	169
	MEK	0.107	0.107			28	169
Poly(4-phenylbutyl-1-methacrylate)	1-Chloroundecane			0.100	0.105 (488)	23	965
Poly(2-phenylethyl-1-methacrylate)	1-Chloroheptane			0.128	0.134 (488)	27.5	965
Poly(phenyl methacrylate)	Acetone		0.234				170
	MEK		0.182			25	115
Poly(phenylthiol methacrylate)	Benzene	0.142				35	666
Poly[2-(3-sodium sulfonato-2-methylpropyl) methacrylamide]							
	Aq. 0.05 M NaCl	0.142 (μ)				RT	701
	Aq. 5 M NaCl	0.097 (μ)				RT	701
Poly(3-sodium sulfonatopropyl methacrylate)							
	Aq. 0.01 M NaCl	0.11				25	824
	Aq. 0.1 M NaCl	0.13				25	824
Poly(*n*-stearyl methacrylate)	Cyclohexane			0.054		20	744
	n-Propyl acetate	0.107				36	744

TABLE 1. *cont'd*

Polymer	Solvent	dn/dc (ml/g) $\lambda_0 = 436$ nm	$\lambda_0 = 546$ nm	$\lambda_0 = 633$ nm	Others	T (°C)	Refs.
Poly(tetrahydro-4H-pyranyl-2-methacrylate)	THF			0.092		20	840
Poly(*n*-tridecyl methacrylate)	Ethyl acetate	0.121				27	744
	THF			0.083		30	744
Poly(3-trimethylammonium ethyl chloride methacrylate)							
	Aq. 1 M NaCl	0.157	0.155	0.154		25	882
		0.158 (μ)	0.155 (μ)	0.154 (μ)		25	882
Poly[2-(triphenylmethoxy)ethyl methacrylate]							
	Dioxane		0.180			25	770

1.5. OTHER α- OR β-SUBSTITUTED POLY(ACRYLICS) AND POLY(METHACRYLICS)

Poly[bis(phenylethyl) itaconate]	MEK	0.180				20	738
Poly[bis(phenyl-*n*-propyl) itaconate]	MEK	0.173				20	738
Poly(*tert*-butyl crotonate)	*n*-Butyl chloride	0.083				25	718
	Ethyl acetate	0.111				25	718
Poly(di-*n*-amyl itaconate)	*n*-Amyl acetate	0.074				20	102
	Benzene	−0.035				20	102
	Carbon tetrachloride	0.018				20	102
	Chloroform	0.036				20	102
	Ethyl acetate	0.102				20	102
	MEK	0.096				20	102
	Toluene	−0.027				20	102
Poly(dibenzyl itaconate)	MEK	0.183				20	738
Poly(di-*n*-butyl itaconate)	Acetone	0.109				20	102
	n-Amyl acetate	0.074				20	102
	Benzene	−0.030				20	102
	Carbon tetrachloride	0.020				20	102
	Chlorobenzene	−0.050				20	102
	Chloroform	0.036				20	102
	Ethyl acetate	0.101				20	102
	Ethylbenzene	−0.021				20	102
	n-Hexane	0.101				20	102
	MEK	0.096				20	102
	Methyl acetate	0.112				20	102
	Styrene	−0.077				20	102
	Toluene	−0.023				20	102
Poly(di-cyclohexyl itaconate)	*n*-Amyl acetate	0.109				20	763
	n-Butyl acetate	0.126				20	763
	Carbon tetrachloride	0.058				20	763
	Chlorobenzene	−0.005				20	763
	n-Propyl acetate	0.132				20	763
	Toluene	0.017				20	763
Poly(di-*n*-decyl itaconate)	*n*-Amyl acetate	0.079				20	102
	Benzene	−0.041				20	102
	Carbon tetrachloride	0.015				20	102
	Toluene	−0.032				20	102
Poly(diethyl itaconate)	*n*-Amyl acetate	0.074				20	102
	Benzene	−0.018				20	102
	Carbon tetrachloride	0.024				20	102
	Ethyl acetate	0.100				20	102
	MEK	0.096				20	102
	Toluene	−0.014				20	102
Poly(di-*n*-heptyl itaconate)	*n*-Amyl acetate	0.075				20	102
	Benzene	−0.037				20	102
	Benzene	−0.036				20	102
	Carbon tetrachloride	0.017				20	102
	Chloroform	0.035				20	102
	Ethyl acetate	0.102				20	102
	Ethyl acetate	0.102				20	102

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TABLE 1. *cont'd*

Polymer	Solvent	dn/dc (ml/g) $\lambda_0 = 436$ nm	$\lambda_0 = 546$ nm	$\lambda_0 = 633$ nm	Others	T (°C)	Refs.
	MEK	0.095				20	102
	MEK	0.095				20	102
	Toluene	−0.029				20	102
	Toluene	−0.028				20	102
Poly(dimethyl itaconate)	Acetone	0.118				20	102
	Benzene	0.000				20	102
	Chlorobenzene	−0.022				20	102
	Chloroform	0.041				20	102
	MEK	0.096				20	102
	Methyl acetate	0.110				20	102
Poly(*N*-1,1-dimethyl-3-oxobutylacrylamide)	MEK	0.137				25	622
Poly(di-*n*-nonyl itaconate)	*n*-Amyl acetate	0.079				20	102
	Benzene	−0.030				20	102
	Toluene	−0.039				20	102
Poly(di-*n*-octyl itaconate)	*n*-Amyl acetate	0.078				20	102
	Benzene	−0.039				20	102
	Carbon tetrachloride	0.016				20	102
	Chloroform	0.033				20	102
	Ethyl acetate	0.105				20	102
	MEK	0.096				20	102
	Toluene	−0.030				20	102
Poly(diphenyl itaconate)	Benzene	0.083				20	768
	Chlorobenzene	0.060				20	768
	Ethyl acetate	0.191				20	768
	MEK	0.189				20	768
	Styrene	0.040				20	768
	Toluene	0.087				20	768
Poly(di-*n*-propyl itaconate)	*n*-Amyl acetate	0.074				20	102
	Benzene	−0.025				20	102
	Carbon tetrachloride	0.021				20	102
	Chloroform	0.036				20	102
	MEK	0.096				20	102
	Toluene	−0.019				20	102
Poly(di-*n*-undecyl itaconate)	*n*-Amyl acetate	0.079				20	102
	Benzene	−0.042				20	102
	Carbon tetrachloride	0.014				20	102
	Chlorobenzene	−0.064				20	102
	Chloroform	0.030				20	102
	Ethyl benzene	−0.030				20	102
	n-Hexane	0.112				20	102
	Styrene	−0.088				20	102
	Toluene	−0.032				20	102
Poly(methyl α-chloroacrylate)	Chloroform	0.072					707
Poly(methyl *n*-butacrylate)	*n*-Butanol	0.0878				13	286
	MEK	0.1192				30	286
Poly(methyl ethacrylate)	Diisobutyl ketone	0.0791				11.4	286
	MEK	0.1357				30	286
1.6. POLY(STYRENES)							
Poly(4-acetoxystyrene)	Dioxane	0.139				25	654
Poly(4-acetoxymethyl styrene)	Toluene			0.0643		25	974
Poly(0.05 wt.% 4-acetoxymethyl styrene-*co*-0.95 wt.% *tert*-butyloxy carbonyloxy styrene)	Toluene			0.0344		25	974
Poly(0.10 wt.% 4-acetoxymethyl styrene-*co*-0.90 wt.% *tert*-butyloxy carbonyloxy styrene)	Toluene			0.0368		25	974
Poly(0.20 wt.% 4-acetoxymethyl styrene-*co*-0.80 wt.% *tert*-butyloxy carbonyloxy styrene)	Toluene			0.0391		25	974
Poly(0.35 wt.% 4-acetoxymethyl styrene-*co*-0.65 wt.% *tert*-butyloxy carbonyloxy styrene)	Toluene			0.0443		25	974

TABLE 1. *cont'd*

Polymer	Solvent	dn/dc (ml/g) $\lambda_0 = 436$ nm	$\lambda_0 = 546$ nm	$\lambda_0 = 633$ nm	Others	T (°C)	Refs.
Poly(0.50 wt.% 4-acetoxymethyl styrene-*co*-0.50 wt.% *tert*-butyloxy carbonyloxy styrene)							
	Toluene			0.0486		25	974
Poly(*p*-*tert*-butylstyrene)	Cyclohexane		0.139			35	778
	1-Nitropropane		0.162			35	778
Poly(*o*-chlorostyrene)	MEK		0.191			25	765
Poly(*p*-chlorostyrene)	Benzene	0.095					171
	Chloroform	0.157					171
	Dioxane	0.164					171
	MEK	0.207	0.197			20	172
	Toluene	0.121				35	173
Poly(*p*-iodostyrene)	Dioxane	0.156	0.144		0.166 (365)	20	174
					0.143 (578)	20	174
					0.142 (589)	20	174
					0.140 (644)	20	174
14% iodine	Bromoform				0.032	874	
27% iodine					0.050	874	
Poly(*p*-isopropyl-α-methylstyrene)	Toluene		0.084			25	776
Poly(*p*-isopropylstyrene)	Chloroform	0.134	0.124			25	187
	MEK	0.198	0.186			25	187
	THF	0.177	0.167			25	188
Poly(*p*-isopropylstyrene)	MEK	0.195–0.203	0.184–0.197			25	187
hydroperoxide	THF	0.177	0.167			25	189
Poly(*p*-methoxystyrene)	Benzene/cyclohexanol (61.19/38.81, v/v)		0.112				175
	Benzene/methanol (73.69/26.31, v/v)		0.125				175
	Chloroform/cyclohexane (36.08/63.92, v/v)		0.163				175
	Chloroform/methanol (66.49/33.51, v/v)		0.190				175
	MEK/*n*-heptane (80.01/19.99, v/v)		0.211				175
	MEK/*n*-propanol (80.64/19.36, v/v)		0.215				175
	Toluene	0.105	0.101			25	176
	Toluene/cyclohexanol (62.8/37.2, v/v)		0.113				175
Poly(α-methylstyrene)	Benzene	0.1238				25	177
			0.138			25	178
		0.134				30	179
		0.131				30	180
Poly(α-methylstyrene)	Carbon tetrachloride	0.178	0.168		0.193 (366)	23	181
	Cyclohexane	0.206				32	183
		0.208				36	183
		0.199				37	182
		0.200				39	179
		0.1967				39	177
		0.210				40	183
		0.212				45	183
		0.214				50	183
		0.204	0.192		0.219 (366)	35	181
	1,2-Dichloroethane	0.1764				25	177
	Toluene		0.1165			23	34
		0.131				25	184
		0.1307				25	177
		0.130	0.126		0.135 (366)	23	181
					0.129	25	185
					0.137		186
		0.137				25	613
Poly(*p*-methylstyrene)	Toluene			0.093		20	976
Poly(styrene)	Acetone/cyclohexane (26.6/73.4, v/v)		0.192			25	783

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TABLE 1. *cont'd*

Polymer	Solvent	dn/dc (ml/g) $\lambda_0 = 436$ nm	$\lambda_0 = 546$ nm	$\lambda_0 = 633$ nm	Others	T (°C)	Refs.
	(38.2/61.8, v/v)		0.202			25	783
	(49.1/50.9, v/v)		0.207			25	783
	(59.1/40.9, v/v)		0.214			25	783
	(68.4/31.6, v/v)		0.220			25	783
	(77.2/22.8, v/v)		0.225			25	783
	Isoamyl acetate	0.205				30	97
	n-Amyl acetate	0.205				20	102,190
	Arochlor		−0.017				144
	Benzene	0.1151					191
		0.111				20	102
		0.1066	0.1034			20	6
		0.113				20	203
		0.1066	0.1034		0.1030 (578)	20	5
					0.1028 (589)	20	5
					0.1021 (644)	20	5
		0.115				25	205
		0.108	0.105			25	106
		0.109	0.105			25	107
					0.109		32
		0.112	0.109		0.107 (589)	25	206
			0.110			25	193
					0.115		194
			0.108				57
			0.1025			25	195
		0.108				25	146,197
		0.1094	0.1062			25	139
					0.106		148
			0.105			25	10
		0.111				25	198
			0.106			25	145,196, 199,201
		0.113				28	192
			0.109			30	204
			0.106				147
		0.101				30	97
		0.115				30	200
			0.1123			30	84
		0.112				35	202
		0.131				70	203
		0.107	0.103			20	709
			0.111			25	664
				0.105		25	593,705
			0.106			25	779,751
			0.103			25	774
		0.109	0.106			25	890,647
					0.109 (488)	25	812
increase with M:			0.093–0.109			25	648
$M = 1.3 \times 10^3 - 1.3 \times 10^5$			0.091–0.106			25	612
$M > 1.05 \times 10^6$			0.108			25	612
star shaped			0.104			25	612
star shaped			0.126			35	683
comb shaped			0.104–0.109			25	612
				0.102		30	671
		0.116				30	677
		0.113				30	821
			0.112			35	683
				0.105			618
	Benzene	$0.0495 + 2.20 \times 10^{-4}\ T$ (K)					962
	Benzene/bromoform						
	(95/5, v/v)	0.101				25	198
	(90/10, v/v)	0.096				25	198
	(85/15, v/v)	0.099				25	198

TABLE 1. *cont'd*

Polymer	Solvent	dn/dc (ml/g) $\lambda_0 = 436$ nm	$\lambda_0 = 546$ nm	$\lambda_0 = 633$ nm	Others	T (°C)	Refs.
	(75/25, v/v)	0.083				25	198
	(50/50, v/v)	0.074				25	198
	(25/75, v/v)	0.036				25	198
	Benzene/$(CH_2Cl)_2CHOH$						
	(33/67, v/v)		0.112				207
	Benzene/cyclohexane						
	(82.9/18.1, mol/mol)	0.137				20	208
		0.155				70	208
	(65.3/34.7, mol/mol)	0.155				20	208
		0.172				70	208
	(44.8/55.2, mol/mol)	0.170				20	208
		0.186				70	208
	(23.6/76.4, mol/mol)	0.183				20	208
		0.197				70	208
	(10/90, mol/mol)	0.189				20	208
		0.202				70	208
	(4.8/95.2, mol/mol)	0.191				20	208
	(90/10, v/v)	0.116	0.113			20	709
	(80/20, v/v)	0.126	0.120			20	709
		0.138				30	692
		0.142 (μ)				30	692
	(75/25, v/v)		0.124			25	751
	(70/30, v/v)	0.135	0.129			20	709
	(60/40, v/v)	0.144	0.135			20	709
			0.137			25	751
	(50/50, v/v)	0.151	0.142			20	709
			0.145			25	751
		0.150				30	692
		0.159 (μ)				30	692
	(40/60, v/v)	0.158	0.148			20	709
	(35/65, v/v)		0.153			25	751
	(30/70, v/v)	0.165	0.154			20	709
	(20/80, v/v)	0.171	0.158			20	709
			0.162			25	751
		0.166				30	692
		0.175 (μ)				30	692
	(10/90, v/v)	0.175	0.162			20	709
	Benzene/cyclohexanol						
	(61.6/38.4, v/v)		0.108			25	209
	(81.8/18.2, mol/mol)	0.121				20	208
		0.134				70	208
	(90.9/9.1, mol/mol)	0.119				20	208
	(99.628/0.372, mol/mol)	0.124				20	208
		0.134				70	208
	Benzene/*n*-docosane						
	(98.7/1.3, mol/mol)	0.122				20	210
		0.140				70	210
	(95.7/4.3, mol/mol)	0.135				20	210
		0.147				70	210
	(90.3/9.7, v/v)	0.147				20	210
		0.150				70	210
	Benzene/*n*-dodecane						
	(96.2/3.8, mol/mol)	0.123				20	210
		0.139				70	210
	(92.7/7.3, mol/mol)	0.131				20	210
		0.145				70	210
	(86.4/13.6, mol/mol)	0.140				20	210
		0.149				70	210
	Benzene/1-dodecanol						
	(98.1/1.9, mol/mol)	0.116				20	210
	(94.6/5.4, mol/mol)	0.122				20	210
	(89.7/10.3, mol/mol)	0.132				20	210

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TABLE 1. *cont'd*

Polymer	Solvent	dn/dc (ml/g) $\lambda_0 = 436$ nm	$\lambda_0 = 546$ nm	$\lambda_0 = 633$ nm	Others	T (°C)	Refs.
	Benzene/ethanol						
	(70.4/29.6, v/v)	0.156				19.6	611
	(70.4/29.6, v/v)	0.155				25	611
	(94.3/5.7, v/v)	0.115				20	210
	(89.1/10.9, v/v)	0.119				20	210
		0.131				70	210
	(62.1/37.9, v/v)	0.162				20	210
		0.151				70	210
	Benzene/*n*-heptane						
	(44/56, v/v)	0.130				35	211
	(90/10, v/v)	0.124				35	202
	(50/50, v/v)		0.157			25	751
	(60/40, v/v)		0.152			25	751
	Benzene/*n*-hexane						
	(88/12, mol/mol)	0.141				20	210
	(78.6/21.4, mol/mol)	0.160				20	210
		0.174				70	210
	(63.2/36.8, mol/mol)	0.188				20	210
		0.199				70	210
	(55.1/44.9, mol/mol)	0.197				20	210
		0.205				70	210
	Benzene/1-hexanol						
	(92.7/7.3, mol/mol)	0.119				20	210
	(84.9/15.1, mol/mol)	0.126				20	210
		0.135				70	210
	(76.6/23.4, mol/mol)	0.136				20	210
	(67.8/32.2, mol/mol)	0.148				20	210
		0.144				70	210
	Benzene/MEK						
	(25.1/74.9, mol/mol)	0.210				20	203
		0.224				70	203
	(50.2/49.8, mol/mol)	0.178				20	203
		0.193				70	203
	(75.1/24.9, mol/mol)	0.145				20	203
		0.162				70	203
	Benzene/methanol						
	(70.9/29.1, mol/mol)	0.154				20	208
	(83.9/16.1, mol/mol)	0.124				20	208
	(92.4/7.6, mol/mol)	0.114				20	208
	(22.2/77.8, v/v)		0.145			25	209
	(76.6/23.4, v/v)		0.122			25	193
	(80/20, v/v)		0.137				207
	(74.7/25.3, v/v)		0.159			35	211
	(95/5, v/v)		0.114			25	751
	(80/15, v/v)		0.127			25	751
	(83/17, v/v)		0.132			25	751
	(80/20, v/v)		0.136			25	751
	(78/22, v/v)		0.141			25	751
	(76.8/23.2, v/v)	0.190				16.7	611
	(76.8/23.2, v/v)	0.187				25	611
	(75/25, v/v)		0.144			25	751
	Benzene/1-octadecanol	0.116				20	210
	(99.15/0.85, mol/mol)	0.134				70	210
	Benzene/poly(oxyethylene)						
	420 (95.9/4.1, mol/mol)	0.125				20	210
	2100						
	(99.41/0.59, mol/mol)	0.120				20	210
	Benzene/isopropanol						
	(35.8/64.2, v/v)		0.159			25	212
	(65/35, v/v)		0.154				207
	(61/39, v/v)	0.142				35	211
	(64/36, v/v)	0.150				30	692
		0.216 (μ)				30	692

TABLE 1. *cont'd*

Polymer	Solvent	dn/dc (ml/g) $\lambda_0 = 436$ nm	$\lambda_0 = 546$ nm	$\lambda_0 = 633$ nm	Others	T (°C)	Refs.
	Benzene/n-propanol	0.131				21.7	611
	(63.7/36.3, v/v)	0.130				29.7	611
	Bromobenzene	0.0492				18	213
		0.043	0.042			25	106
		0.0495	0.0485				107
					0.0455	25	214
			0.042			25	145,215
		0.047				25	624
			−0.005				57
		0.015	0.012			25	106
		0.014				30	216
	Bromoform		0.012				874
		0.014				30	216,919
	1-Bromonaphthalene		−0.051				145
			−0.091				57
			−0.0517			25	9
	n-Butyl chloride		0.1997			25	43
	n-Butyl propionate		0.2018			25	43
	Carbon tetrachloride	0.156				20	102
		0.161				25	217
			0.144				154
			0.146				145
		0.159	0.147			25	106
		0.160	0.150		0.145 (589)	25	206
			0.1518			30	84
			0.148			30	204
		0.162				35	202
		0.159	0.148			25	647
			0.15			25	651
		0.162				30	677
				0.156		30	671
Poly(styrene) anionically polymerized	Carbon tetrachloride			0.145		25	964
	Carbon tetrachloride/ n-butanol (65/35, v/v)	0.176				35	211
	Carbon tetrachloride/ n-heptane (53/47, v/v)	0.189				35	211
	Carbon tetrachloride/ methanol (18.3/81.7, v/v)		0.162			25	209
	Chlorobenzene		0.079				145
		0.0833				18	213
		0.082				20	102
		0.079				25	146
			0.079			25	215
			0.0848			30	84
					0.079		148
					0.081		891
		0.083				35	697
	Chlorobenzene/isopropyl ether (68/32, v/v)		0.192			25	209
	1-Chlorodecane	0.165				6.2	661
	1-Chlorodecane/3-methyl-cyclohexanol						
	(78.2/21.8, v/v)	0.165				22.8	661
	(75/25, v/v)	0.168				35	661
	(49.5/50.5, v/v)	0.166				59.6	661
	(10/90, v/v)	0.155				87.8	661
	Chloroform		0.158				57
		0.1554				18	213
		0.165				20	102
			0.169			25	26
					0.152		148
		0.161				25	146
		0.157				30	677

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TABLE 1. *cont'd*

Polymer	Solvent	dn/dc (ml/g) $\lambda_0 = 436$ nm	$\lambda_0 = 546$ nm	$\lambda_0 = 633$ nm	Others	T (°C)	Refs.
	Cyclohexane	0.1795	0.1682			20	219
		0.1798	0.1685			21	219
		0.1801	0.1687			22	219
		0.1804	0.1690			23	219
		0.1810	0.1695			25	139,219
$\overline{M}_w = 2.18 \times 10^3$		0.168	0.156			25	220
2.92×10^3		0.171	0.160			25	220
4.69×10^3		0.174	0.163			25	220
11.8×10^3		0.177	0.165			25	220
22.2×10^3		0.180	0.167			25	220
167×10^3		0.181	0.167			25	220
		0.1825	0.1709			30	219
		0.181				34.5	221
		0.1840	0.1723			35	219
			0.171			35	209
		0.181				35	202,222
			0.179			40	218
		0.1855	0.1738			40	219
		0.1870	0.1752			45	219
		0.188				50	223
					0.181		224
				0.163			618
		0.179	0.166			20	709
		0.181	0.170			25	647
			0.169			25	751
		0.191				30	677
		0.181	0.171			34.5	712,705
		0.181	0.169			34.5	809
$M = 1.2 \times 10^3 - 1.07 \times 10^5$				0.156–0.168		34.5	732
star shaped				0.157–0.163		34.5	737
after photoisomerization: *trans* → *cis*			0.100			28	736
		0.181				34.8	611
			0.171			34.8	664
					0.175 (488)	35	642
		0.181				35	659,694,704
		0.184				35	661
				0.161		35	671
			0.168			35	683
			0.170			35	683
	Cyclohexane			0.187		30	943
				0.191		40	943
				0.195		50	943
	Cyclohexane/cyclohexanol						
	(75.3/24.7, v/v)	−0.043				36	611
		−0.044				38	611
		−0.045				44	611
		−0.046				52.2	611
		−0.047				58.2	611
	(37.3/62.7, v/v)	−0.048				65.1	611
		−0.049				74	611
		−0.050				82	611
		−0.051				86	611
	Cyclohexane/ethanol	0.065				29.2	611
	(97/3, v/v)	0.064				39.8	611
	Cyclohexane/ethyl acetate						
	(10/90, v/v)	0.229	0.216			20	709
	(20/80, v/v)	0.226	0.213			20	709
	(30/70, v/v)	0.223	0.210			20	709
	(40/60, v/v)	0.219	0.206			20	709
	(50/50, v/v)	0.216	0.202			20	709
	(60/40, v/v)	0.211	0.197			20	709
	(70/30, v/v)	0.206	0.191			20	709

TABLE 1. *cont'd*

Polymer	Solvent	dn/dc (ml/g) $\lambda_0 = 436$ nm	$\lambda_0 = 546$ nm	$\lambda_0 = 633$ nm	Others	T (°C)	Refs.
	(80/20, v/v)	0.198	0.184			20	709
	(90/10, v/v)	0.189	0.176			20	709
	Cyclohexane/methanol	0.099				29.2	611
	(95.5/4.5, v/v)	0.098				39.8	611
	Cyclohexane/*n*-propanol	0.041				28.2	611
	(97.6/2.4, v/v)	0.040				37.8	611
	Cyclohexane/styrene						
	(15/85, v/v)		0.075			25	726
			0.086 (μ)			25	726
	(30/70, v/v)		0.092			25	726
			0.112 (μ)			25	726
	(40/60, v/v)		0.104			25	726
			0.129 (μ)			25	726
	(50/50, v/v)		0.120			25	726
			0.152 (μ)			25	726
	(60/40, v/v)		0.129			25	726
			0.160 (μ)			25	726
	(70/30, v/v)		0.138			25	726
			0.166 (μ)			25	726
	(85/15, v/v)		0.155			25	726
			0.173 (μ)			25	726
	Cyclohexanol	0.165				84.2	611
		0.141				87.8	661
		0.169				92.5	611
		0.169				100	611
	Cyclohexanone	0.151				30	216
		0.151				25	647
		0.151				30	216,919
	Cyclohexene	0.165				25	23
	Decalin		0.129			24	217
			0.129			25	215
		0.118				25	23
			0.137			52	23
			0.138			60	23
			0.143			87	23
			0.147			104	23
			0.152			123	23
			0.155			139	23
				0.120		20	615,713
			0.125		0.123 (579)	20	625
		0.119	0.110			20	827
		0.137	0.130			20.4	809
		0.141				22.8	661
		0.120	0.110			25	827
			0.127		0.125 (579)	30	625
		0.120	0.111			30	827
			0.128		0.126 (579)	40	625
		0.120	0.111			40	827
			0.130		0.128 (579)	50	625
			0.132		0.130 (579)	60	625
50 bar pressure			0.119			20	625
			0.120			30	625
			0.121			40	625
50 bar pressure			0.122			50	625
50 bar pressure			0.123			60	625
	cis-Decalin	0.124				12	221
	Decalin, 50% *trans*		0.115			20	885
			0.115			30	885
			0.116			40	885
			0.117			50	885
			0.118			60	885
	1,2-Dibromoethane	0.065				30	216,919

TABLE 1. *cont'd*

Polymer	Solvent	dn/dc (ml/g) $\lambda_0 = 436$ nm	$\lambda_0 = 546$ nm	$\lambda_0 = 633$ nm	Others	T (°C)	Refs.
	Dibutyl phthalate		0.108			25	863
			0.120			135	863
	1,2-Dichloroethane	0.168	0.155			25	647
		0.168	0.155				151
			0.161			20	218
		0.168				30	152
			0.168				147
					0.168		152
		0.166				30	200
			0.158			30	826
	Diethyl ether/methylcyclohexane						
	(70/30, v/v)	0.215				25	693
	(65/35, v/v)	0.220				25	693
	(60/40, v/v)	0.215				25	693
	(50/50, v/v)	0.225				25	693
	(40/60, v/v)	0.240				25	693
	(35/65, v/v)	0.245				25	693
	Diethyl oxalate	0.195				59.6	661
	Diethyl fumarate/CH_2ClCH_2OH						
	(80/20, v/v)		0.152				207
	Dioxane		0.171				154
			0.176				225
			0.168				145
			0.172				196
		0.185	0.173		0.204 (365)	20	174
					0.171 (578)	20	174
					0.170 (589)	20	174
					0.168 (644)	20	174
		0.1852	0.1731			25	139
					0.1702 (589)	25	155
		0.193	0.182		0.176 (589)	25	206
					0.170		148
		0.181				35	97
		0.190				35	202
			0.184				147
				0.166			618
			0.170			25	807,822
			0.173			25	751
				0.181		30	671
			0.170			35	683
star shaped			0.195			35	683
deuterated polymer	Dioxane/1-bromonaphthalene		0.164				645
	(96/4, v/v)	0.134 (μ)				30	216,919
	(90/10, v/v)	0.075 (μ)				30	216,919
	(83/17, v/v)	0.000 (μ)				30	216,919
	(81.5/18.5, v/v)	−0.010 (μ)				30	216,919
	(50/50, v/v)	−0.298 (μ)				30	216,919
	Dioxane/*n*-heptane	0.212				35	211
	(41.5/58.5, v/v)						
	Dioxane/methanol						
	(28.6/71.4, v/v)		0.191			25	209
	(66.5/33.5, v/v)	0.218				35	211
	Dioxane/methanol					25	
	(71.4/28.6, v/v)		0.222			35	683
	(71.4/28.6, v/v)		0.197			35	683
	Dioxane/isopropanol	0.212				35	211
	(51.5/48.5, v/v)						
star shaped	Dioxane/styrene						
	(15/85, v/v)		0.076			25	726
	(15/85, v/v)		0.084 (μ)			25	726
	(30/70, v/v)		0.092			25	726
			0.102 (μ)			25	726

TABLE 1. *cont'd*

Polymer	Solvent	dn/dc (ml/g) $\lambda_0 = 436$ nm	$\lambda_0 = 546$ nm	$\lambda_0 = 633$ nm	Others	T (°C)	Refs.
	(40/60, v/v)		0.104			25	726
			0.112 (μ)			25	726
	(50/50, v/v)		0.116			25	726
			0.129 (μ)			25	726
	(60/40, v/v)		0.126			25	726
			0.138 (μ)			25	726
	(70/30, v/v)		0.137			25	726
			0.147 (μ)			25	726
	(85/15, v/v)		0.155			25	726
			0.163 (μ)			25	726
	DMF	0.1703				18	213
		0.1739	0.1648		0.1632 (578)	20	5,6
					0.1625 (589)	20	5,6
					0.1604 (644)	20	5,6
					0.145		148
					0.189 (365)	20	6
			0.165			25	215
		0.175				25	146
			0.166				658
					0.171		658
				0.165		20	869
		0.168	0.158			20	897
			0.166			25	638
			0.178			30	826
Microgel			0.174				608
	DMF/tetralin (35.2/64.8, v/v)		0.119 (μ)			25	638
			0.119			80	638
	Ethyl acetate	0.2310				18	213
		0.234				20	102
			0.2231			25	226
		0.231	0.218			20	709
			0.223			25	779
			0.226			30	826
				0.216			618
	Ethyl acetate/ethanol						
	(94.81/5.19, v/v)		0.2196			25	226
	(91.76/8.24, v/v)		0.2210			25	226
	(89.34/10.66, v/v)		0.2238			25	226
	Ethylbenzene	0.111				25	102
			0.093			20	885
			0.093			30	885
			0.096			40	885
			0.102			50	885
			0.114			60	885
	Ethylcyclohexane		0.128			70	806
	Furfuryl alcohol		0.117			30	691
	n-Heptane/styrene						
	(10/90, v/v)		0.075			25	726
			0.089 (μ)			25	726
	(20/80, v/v)		0.091			25	726
			0.109 (μ)			25	726
	(30/70, v/v)		0.106			25	726
			0.136 (μ)			25	726
	(40/60, v/v)		0.122			25	726
			0.162 (μ)			25	726
	(50/50, v/v)		0.137			25	726
			0.191 (μ)			25	726
	(60/40, v/v)		0.154			25	726
			0.195 (μ)			25	726
	MEK	0.2258	0.2138			7.5	219
		0.2275	0.2155			15	219
		0.2290				18	213
		0.2287	0.2167			20	219

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TABLE 1. *cont'd*

Polymer	Solvent	dn/dc (ml/g) $\lambda_0 = 436$ nm	$\lambda_0 = 546$ nm	$\lambda_0 = 633$ nm	Others	T (°C)	Refs.
		0.2296	0.2170			20	6
			0.214			20	227
		0.243				20	203
					0.232		153
		0.229				20	88,231
		0.228				20	102,190
		0.2296	0.2170		0.2150 (578)	20	5
					0.2143 (589)	20	5
					0.2110 (644)	20	5
		0.2298	0.2175			25	139
					0.2146 (589)	25	155
			0.2165			25	165
		0.2298	0.2178			25	219
			0.214			25	195
			0.220				145,154,196
		0.229					146
		0.226				25	217
		0.231	0.220			25	212
		0.231	0.218		0.208 (589)		151,232
					0.220 (589)		232
		0.226				25	228
					0.220		148
			0.219			25	215
			0.230				147
		0.227	0.215			25	106
					0.210*		224
		0.229	0.217				107
					0.222 (437)	25	233
		0.232	0.223		0.216 (589)	25	206
		0.238				30	216
		0.232				30	152
		0.223				30	229
		0.229	0.219				230
					0.170	30	164
		0.2309	0.2189			30	219
		0.227				35	97
		0.2321	0.2201			35	219
		0.2333	0.2213			40	219
		0.2345	0.2225			45	219
			0.230			67	218
		0.254				70	203
				0.212			618
					0.222		891
				0.214		20	869
		0.225	0.207			20	897
			0.217			25	751
			0.220			25	807
		0.230	0.217			25	809
			0.218			25	902
increase with *M*			0.207–0.211			25	648
			0.220			30	826
		0.238				30	216,919
randomly branched		0.235					599
branched with divinyl benzene		0.240				35	598
	MEK/$(CH_2Cl)_2CHOH$ (46/54, v/v)		0.165				207
	MEK/1-dodecanol (95.4/4.6, mol/mol)	0.238				20	203
		0.253				70	203

* Given erroneously as 0.110 in journal.

TABLE 1. *cont'd*

Polymer	Solvent	dn/dc (ml/g) $\lambda_0 = 436$ nm	$\lambda_0 = 546$ nm	$\lambda_0 = 633$ nm	Others	T (°C)	Refs.
	(91.2/8.8, mol/mol)	0.232				20	203
		0.248				70	203
	MEK/1-hexanol						
	(93.3/6.7, mol/mol)	0.241				20	203
	(84.8/15.2, mol/mol)	0.238				20	203
		0.251				70	203
	(73.7/26.3, mol/mol)	0.234				20	203
		0.249				70	203
	MEK/methanol						
	(11.3/88.7, v/v)		0.214			25	209
	MEK/isopropanol		0.211			25	209
	(11.4/88.6, v/v)						
	(85/15, v/v)		0.219				207
	MEK/styrene (50/50, v/v)		0.140			25	726
			0.149 (μ)			25	726
	Methylcyclohexane		0.188				26
	Methylcyclohexane/acetone						
	(17/83, v/v)	0.242				22	234
	(22.2/77.8, v/v)	0.242				22	234
	(28/72, v/v)	0.239				22	234
	(39/61, v/v)	0.231				22	234
	(50/50, v/v)	0.228				22	234
	(61/39, v/v)	0.223				22	234
	(72/28, v/v)	0.222				22	234
	(83/17, v/v)	0.217				22	234
	(88.3/11.7, v/v)	0.210				22	234
	3-Methyl cyclohexanol	0.154				98.4	661
	3-Methyl cyclohexanol/1-chlorodecane						
	(21.8/78.2, v/v)	0.165				22.8	661
	(25/75, v/v)	0.168				35	661
	(50.5/49.5, v/v)	0.166				59.6	661
	(90/10, v/v)	0.155				87.8	661
	3-Methylcyclohexanol/tetralin						
	(23.2/76.8, v/v)	0.096				98.4	903,676
	(43.4/56.6, v/v)	0.115				98.4	903,676
	(49.5/50.5, v/v)	0.112				98.4	903,676
	(61/39, v/v)	0.131				98.4	903,676
	(77/23, v/v)	0.145				98.4	903,676
	Nitropropane	0.208				35	202
	Nitropropane/*n*-heptane						
	(42/58, v/v)	0.216				35	202
		0.218				35	211
	Phenylcyanide	0.0775				25	146
	Styrene	0.054				20	102
	Tetralin	0.072				34.5	903
		0.075				98.4	676,903
	Tetralin/cyclohexane						
	(89.4/10.6, v/v)	0.082 (μ)				34.5	903
	(88/12, v/v)	0.087				34.5	903
	(81/19, v/v)	0.093				34.5	903
	(79.4/20.6, v/v)	0.095 (μ)				34.5	903
	(69.7/30.3, v/v)	0.119 (μ)				34.5	903
	(59.7/40.3, v/v)	0.139 (μ)				34.5	903
	(39.6/60.4, v/v)	0.159 (μ)				34.5	903
	(20/80, v/v)	0.173 (μ)				34.5	903
	THF	0.195				30	216
			0.1926			30	84
					0.190		235
			0.198				57
					0.194		166
$\bar{M}_w =$ 2.4×10^4		0.205	0.193			25	236
5.31×10^4		0.202	0.189			25	236
16.5×10^4		0.207	0.194			25	236

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TABLE 1. *cont'd*

Polymer	Solvent	dn/dc (ml/g) $\lambda_0 = 436$ nm	$\lambda_0 = 546$ nm	$\lambda_0 = 633$ nm	Others	T (°C)	Refs.
54.1×10^4		0.208	0.195			25	236
150×10^4		0.209	0.196			25	236
570×10^4		0.211	0.198			25	236
				0.186			618,798
				0.193		20	869
				0.192		23	830
				0.186		25	637
		0.195				30	216,919
		0.208	0.193	0.188		RT	630
100% mol deuterated		0.186	0.171	0.165		RT	630
62% mol deuterated		0.190	0.177	0.172		RT	630
25% mol deuterated		0.193	0.182	0.178		RT	630
	THF/methanol (28.7/71.3, v/v)		0.179			25	209
	Toluene	0.111	0.109			RT	232
		0.112				12	221
			0.104			20	31,227
		0.112				20	102
			0.109			20	238
		0.1113	0.1079		0.1073 (578)	20	5
					0.1071 (589)	20	5
					0.1060 (644)	20	5
					0.113		153
		0.112	0.108				230
		0.195				20	231
			0.110			20	240
		0.111				23	237
		0.112				25	239
			0.109				225
		0.1188	0.1079			25	241
		0.1129	0.1091			25	242
			0.1130			25	43
			0.110			25	243
			0.111			25	240
		0.111				25	217,228
		0.112				25	146
		0.1150	0.1111			25	139
			0.111			28	29
			0.110				147
		0.113				30	152,216
		0.118				30	229
		0.114				35	97
			0.118			45	243
			0.125			65	243
				0.110			244
			0.118			67	218
				0.106			618
				0.101			842
		0.113				15	834
		0.115				20	834
				0.111		20	869
					0.103 (1086)	20	915
$M = 1.2 \times 10^3 - 1.07 \times 10^5$				0.089–0.105		20	732
star shaped polymer				0.103		20	737
					0.105 (1086)	25	915
			0.109		0.113	25	647
			0.111			25	751
			0.110			25	601
		0.112				25	613
			0.105			25	633
increase with M			0.110–0.112	0.107–0.110		25	635
increase with M:			0.093–0.109			25	648
			0.112			25	664
		0.117				25	834

TABLE 1. *cont'd*

Polymer	Solvent	dn/dc (ml/g) $\lambda_0 = 436$ nm	$\lambda_0 = 546$ nm	$\lambda_0 = 633$ nm	Others	T (°C)	Refs.
$M > 2 \times 10^4$				0.108		25	833
star branched				0.103–0.106		25	833
				0.107–0.112		23–27	652
				0.108		30	671
			0.110			30	691
		0.113				30	697,699,216
		0.118				30	834
$M = 2 \times 10^3 - 18 \times 10^5$		0.101–0.118				30	837
		0.113				35	659
$M = 2 \times 10^3 - 18 \times 10^5$		0.114				35	704
		0.119				50	699
		0.125				70	699
			0.125			80	638
			0.126			90	609
isotactic		0.111				30	245
$M_w = 0.02 \times 10^5 - 0.5 \times 10^5$	Toluene	0.101–0.107				30	962
$M_w = 1.10 \times 10^5$	Toluene	0.106				30	962
$M_w = 1.60 \times 10^5$	Toluene	0.107				30	962
$M_w = 2.00 \times 10^5 - 8.67 \times 10^5$	Toluene	0.110–0.117				30	962
$M_w = 18 \times 10^5$	Toluene	0.118				30	962
$M_w = 1.25 \times 10^5 - 2.5 \times 10^5$	Toluene	0.117				30	962
dispersion	Water				0.250	25	95
					0.241		246
		0.256				25	247
latex		0.257					248
sulfonated	Neutralization equiv.						
	= 0.9 mEq/g: 0.05 M NaCl		0.212			25	247
	1.8 mEq/g: 0.056 M NaCl		0.207			25	247
	2.0 mEq/g: 0.10 M NaCl		0.195			25	247
	2.7 mEq/g: 0.10 M NaCl		0.205			25	247
	Toluene/*p*-cymene						
	(73.4/26.6 w/w)	0.115				30	699
	(49.7/50.3 w/w)	0.117				30	699
	Trichlorobenzene		0.028			25	653
	Water/THF (1/99, v/v)				0.183	25	796
					0.166 (μ)	25	796
	(3/97, v/v)				0.192	25	796
					0.183 (μ)	25	796
	(4.5/95.5, v/v)				0.180	25	796
					0.177 (μ)	25	796
	(7/93, v/v)				0.180	25	796
					0.188 (μ)	25	796
Poly(styrene-*p*-sulfonic acid)	Aq. KCl 2.5 M		0.0347*			25	249
–, K-salt, DN = 1.0	Aq. KCl; $I = 0.10$	0.197				30	85
–, Na-salt	THF/ethanol (76/24, v/v)		0.124			25	675
			0.128 (μ)			25	675
	Aq. 0.1 M Na_2SO_4		0.152 (μ)			25	879
	Aq. 1 M Na_2SO_4		0.122 (μ)			25	879
Poly(styrene-co-acrylonitrile), (1/1, mol/mol)							
	MEK		0.198			25	753
Poly(styrene-*co*-*n*-butyl methacrylate) (1/1, mol/mol)							
	MEK	0.164				35	814
Poly(styrene-*co*-*p*-chlorostyrene), ($\sim$1/1, mol/mol)							
	Cumene	0.122				25	795
		0.124				40	795
		0.125				55	795
Poly(styrene-*co*-ethylene-*co*-butene) (Kraton G)							
	THF		0.116			25	675
	THF/ethanol (94/6, v/v)		0.118			25	675
			0.120 (μ)			25	675
	(88/12, v/v)		0.120			25	675
			0.124 (μ)			25	675

*Expressed in 1/g-segment.

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TABLE 1. *cont'd*

Polymer	Solvent	dn/dc (ml/g) $\lambda_0 = 436$ nm	$\lambda_0 = 546$ nm	$\lambda_0 = 633$ nm	Others	T (°C)	Refs.
1.7. OTHER COMPOUNDS							
Poly(acrylonitrile)	γ-Butyrolactone		0.079			25	276
			0.078			30	277
	Dimethylacetamide	0.0767	0.0769			25	278
	Chlorobenzene				0.00		891
	DMF		0.080				643
					0.085		891
		0.870				18	213
			0.082			20	238
			0.0874			20	281
		0.0877				20	283
		0.0914				20	283
		0.0924				20	283
			0.196			25	284
			0.083			25	215,276, 278,280
			0.089				279
		0.080				25	282
			0.084			25	277
			0.087			25	10
		0.085	0.084			20	897
			0.078			25	985
	DMSO	0.029	0.031			25	278
			0.043			25	285
			0.092			140	278
			0.0263			25	284
	DMSO/acrylonitrile						
	(65/35, v/v)		0.061			25	726
			0.067 (μ)			25	726
	(73/27, v/v)		0.055			25	726
			0.062 (μ)			25	726
	(82/18, v/v)		0.048			25	726
			0.053 (μ)			25	726
	(91/9, v/v)		0.040			25	726
			0.044 (μ)			25	726
	MEK				0.132		891
Poly(diacetylenes) $=C-C\equiv C-C=$ $(CH_2)_9$ $(CH_2)_9$ $O-COR$ $O-COR$							
R = isopropyl	Chloroform				0.174 (580)		644
R = benzyl					0.198 (580)		644
R = 1-methylene naphthalene					0.228 (580)		644
R = 1-methylene naphthalene							
	1,2-Dichloroethane		0.267		0.220 (578)	RT	740
				0.190		RT	740
Poly(*tert*-butyl vinyl ketone)	*sec*-Butyl alcohol		0.097			25	715
Poly(*N*-isobutyl maleimide)	Chlorobenzene				0.01		577
Poly(maleic acid-*co*-ethyl vinyl ether) (1/1, mol/mol)							
	THF			0.091		25	663
Poly(maleic acid-*co*-ethyl vinyl ether) (1/1 mol), sodium salt							
	Aq. 0.18 M NaCl			0.180		25	663
Poly(maleic anhydride-*co*-ethyl vinyl ether (1/1, mol/mol)							
	THF			0.088		25	663
	Acetone	0.133				30	896
Poly(maleic anhydride-*co*-octadecene) (1/1, mol/mol)							
	Ethyl acetate		0.119			25	733
Poly(2-methyl 5-vinylpyridine; *N*-oxide)							
	Methanol			0.262		25	679
Poly(2-methyl-5-vinylpyridine)							
	n-Butyl acetate	0.200	0.188			25	269
	MEK	0.212	0.202			25	269

TABLE 1. *cont'd*

Polymer	Solvent	dn/dc (ml/g) $\lambda_0 = 436$ nm	$\lambda_0 = 546$ nm	$\lambda_0 = 633$ nm	Others	T (°C)	Refs.
	Methanol	0.273	0.257			25	270
				0.250		RT	680
Poly(phenyl vinyl ketone)	Benzene		0.102			25	759
Poly(vinyl acetate)	Acetone		0.095			20	238
		0.104					287
					0.116	25	32
			0.104			25	289
		0.104				25	288
			0.105			25	201
			0.1021			35	34
	Acetonitrile				0.104		290
	Benzene				0.030		194
			−0.0225			30	84
	n-Butyl acetate		0.0716			30	84
	Chlorobenzene		−0.0426			30	84
					−0.049	25	32
	Dioxane				0.028		290
	Ethyl acetate				0.087	25	32
	Ethyl formate				0.095		290
	MEK				0.080	15	32
			0.080				291
		0.080					252,287,292
					0.080	25	32,293
		0.083				25	205
			0.080			25	289
					0.080	35	32
				0.075			618
	Methanol	0.107				25	287
		0.130				25	288
		0.132				25	205,294
					0.124	25	32
			0.132				289
		0.1319				34–38	295
				0.119			618
		0.130	0.132		0.128 (366)		881
	Methyl isobutyl ketone				0.068		290
	Methyl isopropyl ketone/ *n*-heptane (3/1–6/1, v/v)	0.075	0.075			25	252
	THF		0.0582			30	84
				0.050			618
Poly(vinyl acetate)							
				0.057		25	637
			0.059				803
				0.054		25	865
	Trichlorobenzene	0.1030				34–38	296
Poly(vinyl acetate) (partially hydrolyzed)							
Deg. of Hydrolysis							
= 0.840	Water		0.151				297
0.883			0.155				297
0.964			0.161				297
0.008	Acetone		0.103			25	289
0.029			0.101			25	289
0.049			0.098			25	289
0.119			0.090			25	289
0.008	MEK		0.083			25	289
0.029			0.087			25	289
0.049			0.092			25	289
0.119			0.110			25	289
0.008	Methanol		0.128			25	289
0.029			0.115			25	289
0.049			0.107			25	289
0.119			0.071			25	289
Poly(9-vinyl adenine)	Aq. 0.1 M NaCl+Na cacodylate		0.326			26	823
			0.331			40	823

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TABLE 1. *cont'd*

Polymer	Solvent	dn/dc (ml/g) $\lambda_0 = 436$ nm	$\lambda_0 = 546$ nm	$\lambda_0 = 633$ nm	Others	T (°C)	Refs.
Poly(vinyl alcohol)	Water/*n*-propanol (98/2, w/w)	0.134	0.135		0.128 (366)	25	881
					0.133 (404)	25	881
		0.145	0.147		0.142 (366)	40	881
					0.144 (404)	40	881
		0.158	0.160		0.151 (366)	70	881
					0.153 (404)	70	881
	Water		0.150			20	298
		0.144				20	299
		0.168	0.164		0.164 (578)	30	287
$M_w = 39900$	Water			0.151		25	948
$M_w = 120000$				0.153		25	948
$M_w = 160000$				0.153		25	948
Poly(vinylbiphenyl)	Benzene	0.182	0.165			24	300
	Carbon tetrachloride	0.220	0.207			24	300
	Dioxane	0.257	0.233			24	300
	Ethylene glycol dimethyl ether	0.301	0.277			24	300
	Ethylene glycol dimethyl ether/ethylene glycol monomethyl ether (56/44, v/v)	0.297–0.301	0.271–0.275			30	300
Poly(vinyl bromide)	THF		0.112				251
					0.112 (644)		252
Poly(vinyl *n*-butyl ether)	MEK	0.0792				25	250
Poly(vinyl butyral) – acetylated							
	Acetone		0.119			25	880
	Acetonitrile		0.130			25	880
	n-Butyl acetate		0.084			25	880
	n-Butyl chloride		0.075			25	880
	THF		0.071			25	880
Poly(vinyl *n*-butyrate)	MEK				0.0684	20	301
Poly(vinyl carbanilate)	Dioxane	0.159	0.155			20	302
Poly(*N*-vinylcarbazole)	Benzene	0.210	0.190			25	304
		0.219	0.195			25	303
		0.222	0.198			30	303
		0.225	0.201			35	303
		0.228	0.204			40	303
		0.231	0.207			45	303
	Chloroform	0.268	0.232			25	304
	Tetrachloroethane	0.214	0.185			25	304
	THF	0.282	0.262			25	304
Poly(9-vinylcarbazole-*co*-diethyl fumarate)							
	Benzene		0.128			25	781
Poly(*N*-vinyl-3,6-dibromocarbazole)							
	o-Dichloroenzene		0.113			25	800
	THF		0.174			25	800
Poly(vinyl chloride)	Acetone		0.138			20	238
	iso-Amyl acetate			0.098		20	682
	Aq. NH_4OH; pH 9–10 (latex)		0.200				253
	n-Butyl acetate			0.112		20	682
	Cyclohexanone	0.0718	0.0705		0.0701 (578)	15.5	259
		0.0723	0.0714		0.0708 (578)	20	259
			0.0840			25	255,256
		0.079	0.077		0.076 (589)	25	206
			0.075			25	10
			0.074			25	254,257
					0.078		258
		0.0739	0.0727		0.0716 (578)	25	259
		0.0758	0.0742		0.0740 (578)	25	259
		0.0764	0.0746		0.0745 (578)	30	259
		0.0767	0.0756		0.0753 (578)	35	259

TABLE 1. *cont'd*

Polymer	Solvent	dn/dc (ml/g) $\lambda_0 = 436$ nm	$\lambda_0 = 546$ nm	$\lambda_0 = 633$ nm	Others	T (°C)	Refs.
			0.0905			50	255
			0.0840			50	256
			0.0900			75	256
			0.0970			75	255
			0.0940			95	256
				0.075		20	682
			0.074			25	851
	Di-*n*-butyl phthalate		0.0380			25	256
	Diethyl adipate			0.085		20	682
	Di-2-ethylhexyl phthalate		0.0435			25	256
			0.0465			50	256
			0.0494			80	256
			0.0518			105	256
	Diethyl malonate			0.094		20	682
	Diethyl oxalate			0.103		20	682
	Diethyl succinate			0.094		20	682
	Di-2-heptylnoyl phthalate		0.0420			25	256
	Di-*n*-hexyl phthalate		0.0250			25	256
			0.0260			50	256
			0.0280			70	256
			0.0300			105	256
	Dimethyl phthalate		0.0260			25	256
	Dioxane		0.0900			25	256
			0.0925			25	260
		0.107	0.104		0.107 (589)	25	206
			0.11			25	261
$M_w = 2.04 \times 10^6$			0.0850			28.5	262
1.78×10^6			0.0865			28.5	262
	Di-*n*-propyl phthalate		0.0395			25	256
	DMF		0.069			25	256
			0.078			50	256
			0.0875			75	256
			0.095			95	256
		0.084					258
		0.0816	0.0810		0.0813 (578)	25	259
	Ethyl heptanoate			0.102		20	682
	Tetrachloroethane		0.0432			20	255
			0.0450			25	255
			0.0540			50	255
			0.0630			75	255
	THF	0.1040	0.1017		0.1010 (578)	16.5	259
		0.115	0.110			RT	265
					0.102		258
			0.106				266
		0.1124				20	263
			0.105			25	261
			0.1123			25	256
		0.119	0.116		0.115 (589)	25	206
			0.1065			25	267
		0.1079	0.1052		0.1068 (578)	25	259
		0.1067	0.1053		0.1046 (578)	25	259
		0.1093	0.1064		0.1059 (578)	30	259
		0.1118	0.1087		0.1093 (578)	35	259
			0.1045			35	34
			0.1065				264
				0.111		20	682
				0.102		25	637
			0.106			25	851
	THF/water (91/9, v/v)	0.112 (μ)	0.1085 (μ)			25	267
–, chlorinated 56.4, wt.% Cl	Tetrachloroethane		0.045			25	255
58.3, wt.% Cl			0.0424			25	255
61.5, wt.% Cl			0.525			25	255
63.4, wt.% Cl			0.0606			25	255
66.6, wt.% Cl			0.073			25	255

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TABLE 1. *cont'd*

Polymer	Solvent	dn/dc (ml/g) $\lambda_0 = 436$ nm	$\lambda_0 = 546$ nm	$\lambda_0 = 633$ nm	Others	T (°C)	Refs.
Poly(vinyl dimethylamylsilane)	Cyclohexane		0.070			25	884
Poly(vinyl dimethylheptylsilane)	Cyclohexane		0.085			25	884
Poly(vinyl dimethylphenylsilane)	Cyclohexane		0.142			25	884
Poly(vinylidene chloride)	1-Methyl-2-pyrrolidone		0.080			RT	695
	Tetramethylene sulfoxide		0.049			RT	695
Poly(vinyl ethyl ether)	MEK	0.0736				25	250
Poly(vinyl fluoride)	DMF				≈0.02		268
Poly(vinylidene fluoride)	DMA		−0.033	−0.031		25	986
	DMF		−0.023	−0.021		25	986
	DMSO		−0.062	−0.060		25	986
	N,N'-dimethylethyleneurea		−0.055	−0.053		25	986
	Hexamethylphosphoric triamide		−0.046	−0.044		25	986
	N-methyl pyrrolidone		−0.052	−0.50		25	986
	3-methyltetramethylene sulfone		−0.064	−0.063		25	986
	Tetramethylurea		−0.042	−0.040		25	986
Poly(*N*-vinyl-imidazole) incr. with mol. wt.	Ethanol		0.180–0.192			25	887
	Methanol	0.235				25	719
	Tetrabutyl ammonium bromide	0.224				25	719
	Tetrabutyl ammonium bromide	0.224 (μ)				25	719
Poly(vinyl isopropyl ether)	MEK	0.0827				25	250
Poly(vinyl methyl ether)	MEK	0.0944				25	250
	Chloroform			0.044			842
	THF			0.063			842
	Toluene			0.001			842
Poly(α-vinylnaphthalene)	Benzene	0.192	0.175			24	300
	Ethylene dichloride	0.239	0.217			24	300
	Ethylene glycol dimethyl ether	0.268	0.248			24	300
	Toluene	0.162–0.192				24	300
Poly(β-vinylnaphthalene)	Benzene	0.182–0.197	0.167–0.181			24	300
	Carbon tetrachloride	0.215	0.194			24	300
	Ethylene glycol dimethyl ether	0.309	0.284			24	300
	Ethylene glycol dimethyl ether/ethylene glycol monomethyl ether (56/44, v/v)	0.283	0.258			24	300
Poly(2-vinylpyridine)	Aniline	0.023				25	907
	Benzene	0.107				25	907
	n-Butanol	0.209				25	907
	2-Butanol	0.216				25	907
	Chloroform		0.1372			23	34
		0.168				25	907
			0.1215			35	39
	Cyclohexanone	0.144				25	907
	1,2-Dichloroethane	0.148				25	907
	Dioxane	0.175				25	907
	DMF	0.165				25	907
atactic			0.157				271
isotactic			0.163				271
	DME/methacrylic acid (95/5, v/v)				0.187 (589)	20	797
					0.195 (μ) (589)	20	797
	Ethanol	0.245				25	907
atactic			0.221				271
isotactic			0.221				271
isotactic	Ethanol + 0.1 M sodium acetate		0.222				271

TABLE 1. *cont'd*

Polymer	Solvent	dn/dc (ml/g) $\lambda_0 = 436$ nm	$\lambda_0 = 546$ nm	$\lambda_0 = 633$ nm	Others	T (°C)	Refs.
	MEK	0.215				25	907
	Methanol			0.254		RT	680
		0.270				25	907
$M = 2.1 \times 10^3$–22.9×10^3		0.259–0.263				25	909
Poly(vinyl-2-pyridine)	0.950 Nitromethane/0.050 carbon tetrachloride		0.2020			25	967
	0.900 Nitromethane/0.100 carbon tetrachloride		0.1989			25	967
	0.800 Nitromethane/0.200 carbon tetrachloride		0.1918			25	967
	0.750 Nitromethane/0.250 carbon tetrachloride		0.1889			25	967
	0.700 Nitromethane/0.300 carbon tetrachloride		0.1847			25	967
	0.625 Nitromethane/0.375 carbon tetrachloride		0.1793			25	967
	0.565 Nitromethane/0.435 carbon tetrachloride		0.1740			25	967
	0.500 Nitromethane/0.500 carbon tetrachloride		0.1705			25	967
	0.470 Nitromethane/0.530 carbon tetrachloride		0.1684			25	967
	0.400 Nitromethane/0.600 carbon tetrachloride		0.1560			25	967
	0.250 Nitromethane/0.750 carbon tetrachloride		0.1525			25	967
	0.214 Nitromethane/0.786 carbon tetrachloride		0.1500			25	967
	Nitroethane	0.197				25	907
	n-Propanol	0.215				25	907
	2-Propanol	0.221				25	907
	1,1,2,2-Tetrachloroethane	0.109				25	907
	THF	0.195				25	907
					0.182		272
	1,1,1-Trichloroethane	0.162				25	907
Poly(4-vinylpyridine)	Chloroform	0.150				25	146
	DMF	0.160				25	146
			0.153				658
				0.153		RT	680
	Ethanol	0.231					273
	Ethanol/water (95/5, w/w)	0.231					273
	Isopropanol	0.224				25	274
	MEK/isopropanol (85/15, w/w)	0.221				25	274
	(86/14, w/w)	0.224				25	274
	Methanol	0.267				25	274
	Nitromethane				0.180		275
					0.159		275
					0.152		275
	Phenyl cyanide	0.052				25	146
Poly(2-vinylpyridine 1-oxide)	Aq. 1 M NaCl			0.220		25	679
	2-Propanol	0.209				25	640,987
Poly(4-vinylpyridine *N*-oxide)	Aq. 0.1 M NaCl			0.241		25	679
Poly(vinylpyrrolidone)	Chloroform	0.108	0.108				306
	Methanol		0.183			25	201
			0.176			25	193
	Water		0.135			25	193
		0.185	0.185				306
		0.181	0.176		0.176 (578)	20	792
		0.180	0.176		0.175 (578)	25	792
		0.179	0.175		0.174 (578)	30	792
		0.179	0.174		0.173 (578)	35	792
$M_w = 10100$	Water			0.181		25	948
$M_w = 35100$				0.181		25	948
$M_w = 46400$				0.185		25	948
$M_w = 1540000$				0.179		25	948
Poly(vinylsulfonic acid), potassium salt	KCl 0.35 M		0.01664 (μ)*			23	308
	0.65 M		0.01638 (μ)*			23	308
Poly(vinyltrimethyl silane)	Carbon tetrachloride		0.048				307
	Cyclohexane		0.083				307
	Cyclohexane		0.087			25	884

* Expressed in i/g-segment.

Particle Scattering Factors in Rayleigh Scattering

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A. INTRODUCTION: GENERAL RELATIONS FOR A HOMOGENEOUS SOLUTE (1,2)

When electromagnetic radiation interacts with any fluid medium, inhomogeneities in refractive index (dielectric constant) arising from microscopic thermal fluctuations in density and composition cause scattering of a small fraction of the incident radiation. If scattering elements are spatially correlated over distances of the order of magnitude of the wavelength of the exciting radiation, the scattering is subject to optical interferences that affect the angular intensity distribution. This distribution can provide information on the size and shape of macromolecular solutes or suspended colloidal particles: in principle, the molecular radius of gyration is determinable unambiguously, and calculated scattering distributions for idealized models can be compared with experimental data to infer an acceptable molecular conformation. However, an experimental scattering distribution does not permit a unique model assignment in the absence of additional information or supposition.

The limiting dilute-solution behavior of the reduced intensity $R(q, c)$ (Rayleigh's ratio) of light scattered through an angle θ is given by (3)

$$Kc/R(q,c) = 1/MP(q) + 2A_2Q(q,c)c + O(c^2) \qquad \text{(A1)}$$

where M is the molecular weight of the solute, c is the concentration in units of mass/volume, A_2 is the second virial coefficient, and q is an angle variable

$$q = (4\pi\tilde{n}/\lambda)\sin(\theta/2) \qquad \text{(A2)}$$

$\tilde{n}$ denoting the refractive index of the solution, and λ the vacuum wavelength of the incident radiation. In the optical constant (assuming incident radiation polarized perpendicular to the plane containing angle θ)

$$K = \frac{2\pi^2\tilde{n}^2(\partial\tilde{n}/\partial c^2)}{N_A\lambda^4} \qquad \text{(A3)}$$

$\partial\tilde{n}/\partial c$ is the specific refractive index increment at constant pressure and temperature, and N_A is Avogadro's number. The intensity $R(q, c)$ is that due to the solute; the (relatively weak) background solvent scattering is assumed to be that measured for the pure solvent.

The first term on the right-hand side of Eq. (A1) contains the *intramolecular* interference function, or particle scattering factor, defined by (4,5)

$$P(q) = [R(q,c)/R(0,c)]^0 \qquad \text{(A4)}$$

the superscript zero denoting the limit of infinite dilution. Thus the intensity distribution $P(q)$ is normalized to unity at zero scattering angle. Unless particle dimensions are infinitesimally small compared with λ, $P(q)$ is less than unity for $q < 0$; and for particles of less than colloidal dimensions, it is almost always a monotonously decreasing function of q throughout the accessible range of q with visible light.

The second term of Eq. (A1) contains the effects of pairwise interactions between solute molecules (and, implicitly, of interactions involving solvent). The dimensionless angle factor, $Q(q)$, is a function generally unknown, dependent on both *intermolecular* and *intramolecular* correlations (3,6). Like $P(q)$ it is normalized to unity at $\theta = 0$, but usually the approximation is made that $Q(q)$ is unity at all angles so that

$$Kc/R(q,c) = 1/MP(q) + 2A_2c + \cdots \qquad \text{(A5)}$$

replaces Eq. (A1). In all that follows, Eq. (A5), which is Zimm's "single contact" approximation (4), is assumed to hold for any macromolecular species in solution. At $\theta = 0$, Eqs. (A1) and (A5) revert to a thermodynamic equation of a state in virial form.

A scattering entity (polymer molecule, particle) may be represented by n optically isotropic point scattering centers whose spatial arrangement in any given conformation is specified by $n(n-1)/2 \approx n^2/2$ vectors $\mathbf{r}_{ij}$, separating pairs of scattering centers i, j. The scattering function $P(q)$ is then

$$P(q) = n^{-2} \sum_i \sum_j \int F(\mathbf{r}_{ij}) \exp(i\mathbf{q} \times \mathbf{r}_{ij}) d\mathbf{r}_{ij} \tag{A6}$$

The vector $\mathbf{q}$ is the difference between vectorial wave numbers of incident and scattered rays such that $|\mathbf{q}| = q$, as defined above. The nonsubscript i has the usual significance of $(-1)^{1/2}$, and $F(\mathbf{r}_{ij})$ is the probability distribution function (probability density) for the vector $\mathbf{r}_{ij}$. Since the molecules in solution exhibit no preferential orientation in space, $F(\mathbf{r}_{ij})$ is spherically symmetric, and $P(q)$ assumes the form (7)

$$P(q) = \sum_i \sum_j \left\langle \frac{\sin(qr_{ij})}{qr_{ij}} \right\rangle \tag{A7}$$

where the pointed brackets indicate averaging over molecular conformations. It is evident from Eq. (A7) that $P(q)$ can be expanded in the even moments of the intramolecular distances $\mathbf{r}_{ij}$. It follows that (7)

$$P(q) = 1 - \frac{1}{3}\left(\frac{4\pi\tilde{n}}{\lambda} \sin\frac{\theta}{2}\right)^2 R_g^2 + \cdots \tag{A8}$$

where R_g denotes the root-mean-square (rms) radius of gyration of the molecule about its center of mass

$$R_g^2 \equiv \frac{1}{2n^2} \sum_i \sum_j \langle r_{ij}^2 \rangle^2 \tag{A9}$$

B. SCATTERING FACTORS FOR VARIOUS MOLECULAR MODELS (1,2)

The scattering factor $P(q)$ has been calculated for a number of simple molecular geometries. For monodisperse random-flight (Gaussian) coils it is given by (7)

$$P(q)_{\text{coil}} = 2u^{-2}(e^{-u} + u - 1) = 1 - u/3 + \cdots \tag{B1}$$

$$u \equiv (nb^2/6)q^2 = R_g^2 q^2 \tag{B2}$$

where n is the number of equivalent statistical segments of root-mean-square length b in the chain.

For a flexible-ring model (a long chain of Gaussian segments constrained to have ends joined), $P(q)$ is given by (8)

$$P(q)_{\text{ring}} = 2u^{-1/2} I_D(u^{1/2}/2) \tag{B3}$$

where

$$I_D(x) = \exp(-x^2) \int_0^x \exp(t^2) dt \tag{B4}$$

is Dawson's integral, for which tabulations are available (9). The variable u is defined as in the first equality in Eq. (B2), so that in this case $u = 2q^2 R_{g,\text{ring}}^2$ since the mean-square radius $R_{g,\text{ring}}^2$ is $nb^2/12$.

For flexible regular-star branched molecules with f identical arms (f random-flight chains starting from a common node), $P(q)$ is given by (10,11)

$$P(q)_{\text{star}} = \frac{2}{u^2}\left[\frac{f(f-1)}{2} e^{-2u/f} - f(f-2)e^{-u/f} + u + \frac{f(f-3)}{2}\right] \tag{B5}$$

The mean-square radius of the star model is $[(3f-2)/f^2][nb^2/6]$. Scattering functions have also been calculated for certain random-flight comb-shaped models of flexible backbones with uniform side chains (11). Provided $q^2 R_g^2 \leq 2$, a good approximation to $P(q)$ for a variety of branched chains and for the ring model is afforded by the form of Eq. (B1) for a linear chain with u replaced by gu, g denoting the ratio of the mean-square radius of the nonlinear structure to that of the linear chain of the same mass (2,10).

Strictly, Eqs. (B1–B5) apply only to flexible chain molecules in a theta solvent. To account approximately for the chain expansion in a good solvent, the most obvious expedient is to increase the statistical mean-square segment length b^2 by the same factor as that for the increase of the overall mean-square radius over the unperturbed value and assume that the foregoing equations still apply. Several derivations (12–15) however, recognize the non-Gaussian character of the segment distribution perturbed by the excluded volume effect. Scattering factors have also been obtained for another type of modification of the random flight, the "wormlike" chain of Kratky and Porod, which introduces a persistence length to account for chain "stiffness" (1,16).

For thin cylindrical rods of length L, $P(q)$ is (7,17,18)

$$\begin{aligned} P(q)_{\text{rod}} &= \frac{1}{y}\text{Si}(2y) - \left(\frac{\sin y}{y}\right)^2 \\ &= 1 - \frac{1}{9}y^2 + \frac{2}{225}y^4 - \frac{1}{2205}y^6 + \cdots \end{aligned} \tag{B6}$$

where $y = qL/2$, and

$$\text{Si}(x) = \int_0^x \frac{\sin w}{w} dw \tag{B7}$$

The "sine integral" function $\text{Si}(x)$ is given in standard tabulations (9). For large y this $P(q)$ function asymptotically approaches $(\pi/2y) - (1/2y^2)$; and, in fact, the asymptotic relation is less than 1% in error for $y > 4$. The four terms of the series form given in Eq. (B6) are within 1% of the correct value for $y < 2$.

For spheres of diameter D, $P(q)$ is (7,18)

$$P(q)_{\text{sphere}} = [(3/v^3)(\sin v - v\cos v)]^2 = 1 - \frac{1}{5}v^2 + \cdots \tag{B8}$$

where $v = qD/2$; and for thin disks of diameter D, the function is (18)

$$P(q)_{\text{disk}} = \frac{2}{w^2}\left[1 - \frac{1}{w}J_1(2w)\right] = 1 - \frac{1}{6}w^2 + \cdots \tag{B9}$$

with $w = qD/2$, and $J_1(x)$, the Bessel function of the first kind, of order one (9).

Scattering factors have been calculated for a variety of more complicated particles; e.g., oblate and prolate ellipsoids, cylinders of finite thickness, shells of different forms, particles of nonuniform density, and assemblages of simple geometrical shapes (see Ref. 19 and citations therein).

C. EFFECTS OF DISPERSION IN MOLECULAR WEIGHT (2)

For a mixture of solutes all having the same specific refractive increment, e.g., a polymer heterogeneous in molecular weight, the reciprocal scattering function in Eq. (A5), for the single-contact approximation, is replaced by (2, 20–22)

$$\frac{Kc}{R(q,c)} = \frac{1}{M_{\text{w}}P_X(q)} + 2A_{2,\text{app}}c + \cdots \tag{C1}$$

Here, M_{w} denotes the weight-average molecular weight $\sum_i M_i w_i$, M_i being the molecular weight of the ith solute and w_i its weight fraction in the solute mixture; c is the total solute concentration. The measured particle scattering factor is the average

$$P_X(q) = M_{\text{w}}^{-1}\sum_i M_i P_i(q) w_i \tag{C2}$$

where $P_i(q)$ is the scattering factor for the ith polymer. The quantity $A_{2,\text{app}}$ is an apparent, angle-dependent second virial coefficient

$$A_{2,\text{app}} = \sum_i\sum_j B_{ij}M_i w_i P_i(q) M_j w_j P_j(q)/[M_{\text{w}}P_X(q)]^2 \tag{C3}$$

where B_{ij} is the virial coefficient for interaction between components i and j (B_{ii} is just A_2 for a solution of component i alone). At the limit $\theta \to 0$, $A_{2,\text{app}}$ reduces to a true thermodynamic quantity:

$$\lim_{\theta\to 0} A_{2,\text{app}} = A_2^{(\text{LS})} = M_{\text{w}}^{-2}\sum_i\sum_j B_{ij}M_i w_i M_j w_j \tag{C4}$$

which might be described as a "light-scattering-average" second virial coefficient (to distinguish it from the analogous average obtained from an osmotic pressure experiment).

Series expansion of $P_X(q)$ gives an average over the mean-square radii of gyration R_{gi}^2 of the solute species

$$P_X(q) = 1 - (q^2/3)R_X^2 + \cdots \tag{C5}$$

$$R_X^2 = M_{\text{w}}^{-1}\sum_i R_{gi}^2 M_i w_i \tag{C6}$$

The average R_X^2 is sometimes called the Z-average mean-square radius (for a distribution of random-flight chain species R_X^2 is proportional to the so-called Z-average molecular weight

$$M_z = \sum_i (M_i^2 w_i/M_{\text{w}}) \tag{C7}$$

Angular scattering functions $P_X(q)$ have been calculated for various molecular size distributions. In particular, distributions of linear random-flight chains have been studied for the exponential weight-fraction distribution of Schulz and Zimm (20)

$$w(M) = \frac{b^{h+1}}{\Gamma(h+1)}M^h e^{-bM} \tag{C8}$$

with $b = (h+1)/M_{\text{w}} = h/M_{\text{n}}$, $\Gamma(x)$ the gamma function, and the dispersion parameter $h = 1/[M_{\text{w}}/M_{\text{n}}) - 1]$. For a system of random flight chains with this distribution, the averaged scattering factor is

$$P_X(q) = \frac{2}{h(h+1)}\left(\frac{h+2}{u_X}\right)^2\left[\left(\frac{u_X}{h+2}+1\right)^{-h} + \frac{h}{h+2}u_X - 1\right] \tag{C9}$$

where $u_X = q^2R_X^2$. For a monodisperse polymer, h is infinite; and for increasing dispersion in molecular weight it decreases towards zero. It is unity for the "most probable" distribution (characteristic of the products of step-growth polymerization at high conversion and of free-radical polymerization at low conversion with chain transfer). In this special case, $P_X(q)$ for random-flight linear chains is given by the very simple relation (20)

$$[P_X(q)]^{-1} = 1 + \frac{1}{3}u_X \tag{C10}$$

Plots of $[P_X(q)]^{-1}$ versus u_X for $h < 1$ curve upward, and for $h > 1$ curve downward.

The asymototic dependence of $[P_X(q)]^{-1}$ for heterogeneous chains at large q is (23)

$$\frac{1}{P_X(q)} \sim \frac{M_{\text{w}}}{2M_{\text{n}}} + \frac{M_{\text{w}}}{2M_z}u_X \tag{C11}$$

so that, in principle, this dependence could provide information on M_{n}. In practice, the experimental limit on q imposed by the upper bound on θ of 180° makes it difficult to ascertain whether the asymptotic behavior is accessible, even for polymers of high molecular weight.

Calculations for branched monodisperse Gaussian chain models and for systems with certain distributions of

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branching and molecular weight suggest as a reasonable approximation for such heterogeneous systems in general, the $P_X(q)$ obtained by replacement of the variable u in Eq. (B1) by $(u_X)_1 R_X^2/(R_X^2)_1$, where $(u_X)_1$ and $(R_X^2)_1$ denote u_X and R_X^2, as defined above, for the system of linear chains with the same weight distribution as the structurally heterogeneous system. Derivations of $P(q)$ for randomly branched systems have been based on cascade models and moment generating functions (24–26). Branching and molecular-weight dispersion have opposing effects on the $P(q)$ function and in randomly branched systems are largely compensatory (2,26). Interestingly, however, the asymptotic behavior of $P(q)$ for Gaussian chains is unaffected by chain branching; it depends only on molecular weight and weight distribution (10).

$P_X(q)$ has been obtained in closed analytical form for systems of thin rodlike (cylindrical) particles distributed in length (and therefore in mass) according to Eq. (C8) for integral values of the parameter h (27). For $h = 1$, the result is

$$P_X(q) = y_w^{-1} \arctan y_w \qquad \text{(C12)}$$

where $y_w = (q/2)\sum_i L_i w_i$, L_i being the length of the ith rod species. For large qL, the asymptotic dependence of $[Kc/R(\theta)]^\circ$ on q (not q^2) for rods of uniform diameter and density is linear, and the slope of the plot is $(L_i/M_i)/\pi$: i.e., the slope yields the linear density or mass per unit rod length, independent of any dispersion in L (28). If the rods are heterogeneous in diameter, the limiting slope is $[\pi \sum_i (M_i w_i/L_i)]^{-1}$. Unlike the asymptotic behavior for Gaussian coils, this asymptotic dependence for rods is manifested in practical situations with both synthetic polymers and biopolymers. Some care in interpretation is needed, however. For thin oblate ellipsoids ("needles"), a model seemingly scarcely different from thin cylinders, the asymptotic dependence of $[(Kc/R(\theta)]^\circ$ on q is also linear but with slope 5/6 that for the cylinder system (28).

D. DETERMINATION OF MOLECULAR WEIGHT AND RADIUS OF GYRATION

In general, information from a light scattering experiment on a polymer/solvent system consists of an array of intensity data determined at a number of concentrations and a number of angles. These are usually represented as values of the reciprocal intensity function $Kc/R(\theta, c)$. The form of Eq. (A5) suggests use of the popular Zimm plot: i.e., the values of $Kc/R(\theta, c)$ are plotted against $C_1 c + C_2 \sin^2(\theta/2)$, with C_1 and C_2 being arbitrary constants chosen merely to separate data points conveniently, to form a gridlike pattern (4,20). In conformity with Eq. (A5), a homogeneous polymer gives contours at constant angles (θ) that form a family of parallel straight (or nearly parallel and straight) lines, and contours at constant concentrations that form another family of curves of similar shape, displaced from one another by translations. This representation, shown schematically in Figure 1, facilitates simultaneous extrapolations of angular data to

Figure 1. Schematic Zimm plot for a solute polydisperse in molecular weight, illustrating empirical determination of averaged molecular weight M_w, scattering factor $P_x(q)$, and radius of gyration R_x according to Eq. 19. The filled circles simulate experimental data; the open circles represent extrapolations to zero scattering angle and zero concentration.

zero concentration and concentration data to zero angle, and extrapolation of both limiting dependences to a common intercept $[Kc/R(0,c)]^\circ$. In general, the ratio of the initial slope to the intercept of the angular plot extrapolated to $c = 0$ is $16\pi^2 \tilde{n}^2 R_X^2/3\lambda^2$; the slope of the concentration dependence extrapolated to $\theta = 0$ is twice the averaged second virial coefficient $A_2^{(LS)}$; and the double limit $[Kc/R(0,c)]^\circ$ is M_w^{-1}. The dominant cause of lack of parallelism of the contours in experimental Zimm plots is dispersion in molecular weight (cf. Eqs. C19, C21).

If both the molecular architecture of a polymer in solution and its molecular weight dispersion are known, the scattering function $P_X(q)$ is known (in principle) and can be combined with limited angular scattering data to deduce M_w and R_X^2. Thus, in the "dissymmetry" method (7) scattered intensities at 90° and the ratio of intensities at 45° and 135° (or another pair of complementary angles) are measured for each concentration. Then the extrapolated transverse scattering function $[Kc/R(q_{90})]^\circ$ and the extrapolated dissymmetry ratio

$$Z_{45} = [R(q_{45}, c)]/R(q_{135}, c)]^\circ \qquad \text{(D1)}$$

determine the molecular weight and radius of gyration, given the $P_X(q)$ function. Tables correlating Z_{45} with $P^{-1}(q_{90})$ and the molecular dimensions have been compiled for monodisperse coils (5,29), rods (5,29), spheres (5,29), and disks (5,29,30), and for polydisperse coils (5,31).

Except for routine characterization of systems of well known character exhibiting low dissymmetry, the dissymmetry method cannot be recommended if a photometer is available that is capable of a full complement of angular readings. Apart from the desirability of determining M_w and R_X^2 without assumptions, it is

helpful to have the maximum amount of information as an aid in detecting any spurious angular dependence of scattering due to instrumental artifacts or to contamination by "dust".

In current practice, photometers that do not provide scattering measurements over a continuous angular range, are typically dedicated to the limited task of monitoring the output stream in size exclusion chromatography, perhaps on line with other detection modes. In this application, passage of the polymer through the chromatographic column effectively eliminates the problem of contamination by foreign particulate matter. One popular instrument of this kind reads scattering only at right angles and at 15°.

E. CALCULATIONS OF SCATTERING FACTORS

Figure 2 and Tables 1 and 2 illustrate some quantitative comparisons among scattering factors for several molecular models and the effects of dispersion in molecular weight for Gaussian coils. Tables of $P(q)$ and Z_{45} in the older literature are much more extensive and reflect the needs of a time without widely available computer technology. Today, for careful work to compare experimental $R(q, 0)$ data with theoretical scattering functions, investigators will find it preferable to return to the mathematical functions and write computer routines to do calculations for data analysis rather than to routinely interpolate in tables. For those who may wish to use a traditional programming language such as FORTRAN, the following rational approximation formulas will facilitate accurate calculation of the special functions that appear in the various expressions for $P(q)$.

The sine integral $\mathrm{Si}(x)$ for $x \leq 1$ (Refs. 32,33):

$$\mathrm{Si}(x) = \frac{\pi}{2} - f(x)\cos x - g(x)\sin x$$

$$f(x) = \frac{1}{x}\left(\frac{a_0 + a_2x^2 + a_4x^4 + x^6}{b_0 + b_2x^2 + b_4x^4 + x^6}\right) + \epsilon$$

$$a_0 = 8.493336 \quad a_2 = 47.411538 \quad a_4 = 19.394119$$
$$b_0 = 30.038277 \quad b_2 = 70.376496 \quad b_4 = 21.361055$$
$$10^6|\epsilon| < 8$$

$$g(x) = \frac{1}{x^2}\left(\frac{a_0 + a_2x^2 + a_4x^4 + x^6}{b_0 + b_2x^2 + b_4x^4 + x^6}\right) + \epsilon$$

$$a_0 = 5.08904 \quad a_2 = 49.719775 \quad a_4 = 21.383724$$
$$b_0 = 76.707878 \quad b_2 = 119.918932 \quad b_4 = 27.177958$$
$$10^6|\epsilon| < 6$$

The Bessel function $J_1(x)$ for $0 \leq x \leq 3$ (Ref. 34):

$$\begin{aligned} x^{-1}J_1(x) = {} & \frac{1}{2} - 0.56249985(x/3)^2 + 0.21093573(x/3)^4 \\ & - 0.03954289(x/3)^6 \\ & + 4.43319 \times 10^{-3}(x/3)^8 - 3.1761 \times 10^{-4}(x/3)^{10} \\ & + 1.109 \times 10^{-5}(x/3)^{12} + \epsilon \end{aligned}$$

$$10^8|\epsilon| < 1.3$$

The Bessel function $J_1(x)$ for $x \geq 3$ (Ref. 34):

$$x^{1/2}J_1(x) = f_1 \cos\theta_1$$

$$\begin{aligned} f = {} & 0.79788456 + 1.56 \times 10^{-6}(3/x) \\ & + 0.01659667(3/x)^2 \\ & + 1.7105 \times 10^{-4}(3/x)^3 - 2.49511 \times 10^{-3}(3/x)^4 \\ & + 1.13653 \times 10^{-3}(3/x)^5 \\ & - 2.0033 \times 10^{-4}(3/x)^6 + \epsilon \end{aligned}$$

$$10^8|\epsilon| < 4$$

$$\begin{aligned} \theta_1 = {} & x - 2.35619449 + 0.12499612(3/x) \\ & + 5.650 \times 10^{-5}(3/x)^2 \\ & - 6.37879 \times 10^{-3}(3/x)^3 \\ & + 7.4348 \times 10^{-4}(3/x)^4 \\ & + 7.9824 \times 10^{-4}(3/x)^5 \\ & - 2.9166 \times 10^{-4}(3/x)^6 + \epsilon \end{aligned}$$

$$10^8|\epsilon| < 9$$

Modern mathematics programs such as Mathematica and Maple constitute higher level languages that make possible direct operations with special functions on a personal computer (35,36).

F. PARTICLE SCATTERING FACTORS AND DISSYMMETRIES

Figure 2. Reciprocal scattering factors $1/P(q)$ versus $q^2R_g^2$ for monodisperse systems of the models indicated. R_g^2 is: $nb^2/6$ (linear Gaussian coil); $5nb^2/48$ (4-branch regular star); $nb^2/12$ (flexible ring); $L^2/12$ (thin rod); $D^2/8$ (disk); $3D^2/20$ (sphere).

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TABLE 1. DISSYMMETRIES FOR MONODISPERSE SYSTEMS

	Z_{45} and $P^{-1}(q_{90})$				
$R_g\tilde{n}/\lambda$	Coil	4-Star[a]	Rod	Disk	Sphere
0.00	1.000 (1.000)[b]	1.000 (1.000)	1.000 (1.000)	1.000 (1.000)	1.000 (1.000)
0.01	1.004 (1.003)	1.004 (1.003)	1.004 (1.003)	1.004 (1.003)	1.004 (1.003)
0.02	1.015 (1.011)	1.015 (1.011)	1.015 (1.011)	1.015 (1.011)	1.015 (1.011)
0.03	1.034 (1.024)	1.034 (1.024)	1.034 (1.024)	1.034 (1.024)	1.034 (1.024)
0.04	1.060 (1.043)	1.061 (1.043)	1.060 (1.043)	1.061 (1.043)	1.062 (1.043)
0.05	1.094 (1.067)	1.095 (1.067)	1.093 (1.067)	1.097 (1.068)	1.098 (1.068)
0.06	1.136 (1.097)	1.139 (1.098)	1.137 (1.097)	1.143 (1.099)	1.146 (1.100)
0.07	1.186 (1.133)	1.191 (1.135)	1.187 (1.133)	1.200 (1.138)	1.204 (1.139)
0.08	1.245 (1.175)	1.253 (1.178)	1.245 (1.176)	1.268 (1.183)	1.277 (1.186)
0.09	1.311 (1.224)	1.325 (1.229)	1.311 (1.225)	1.351 (1.237)	1.365 (1.242)
0.10	1.386 (1.280)	1.407 (1.287)	1.384 (1.280)	1.448 (1.301)	1.473 (1.308)
0.11	1.469 (1.342)	1.500 (1.353)	1.463 (1.343)	1.564 (1.374)	1.604 (1.386)
0.12	1.559 (1.412)	1.604 (1.428)	1.546 (1.412)	1.700 (1.459)	1.765 (1.477)
0.13	1.657 (1.490)	1.720 (1.512)	1.632 (1.488)	1.859 (1.558)	1.963 (1.584)
0.14	1.761 (1.575)	1.848 (1.607)	1.717 (1.570)	2.044 (1.671)	2.208 (1.710)
0.15	1.872 (1.669)	1.987 (1.712)	1.801 (1.659)	2.258 (1.800)	2.514 (1.858)
0.16	1.987 (1.771)	2.138 (1.828)	1.879 (1.753)	2.504 (1.949)	2.901 (2.034)
0.17	2.108 (1.881)	2.299 (1.957)	1.951 (1.853)	2.783 (2.120)	3.397 (2.242)
0.18	2.231 (2.001)	2.470 (2.098)	2.013 (1.956)	3.096 (2.315)	4.045 (2.490)
0.19	2.357 (2.129)	2.650 (2.253)	2.067 (2.063)	3.439 (2.538)	4.906 (2.789)
0.20	2.485 (2.266)	2.837 (2.422)	2.110 (2.171)	3.807 (2.791)	6.080 (3.149)
0.21	2.613 (2.413)	3.030 (2.606)	2.145 (2.279)	4.190 (3.079)	7.724 (3.589)
0.22	2.741 (2.568)	3.277 (2.806)	2.173 (2.387)	4.574 (3.403)	10.112 (4.130)
0.23	2.868 (2.733)	3.427 (3.022)	2.195 (2.493)	4.942 (3.768)	
0.24	2.993 (2.906)	3.627 (3.254)	2.212 (2.597)	5.278 (4.174)	
0.25	3.116 (3.089)	3.826 (3.502)	2.226 (2.698)	5.566 (4.622)	
0.26	3.236 (3.280)	4.022 (3.768)	2.238 (2.796)	5.797 (5.112)	
0.27	3.353 (3.481)	4.214 (4.051)	2.249 (2.892)	5.970 (5.640)	
0.28	3.466 (3.690)	4.400 (4.350)	2.259 (2.985)	6.089 (6.202)	
0.29	3.576 (3.908)	4.579 (4.667)	2.268 (3.076)	6.163 (6.788)	

[a] Regular star with four arms.
[b] Entries in parentheses indicate $P^{-1}(q_{90})$ values.

TABLE 2. DISSYMMETRIES FOR MONODISPERSE AND POLYDISPERSE COILS[a]

	$P^{-1}(q_{90})$ and $\left(\frac{1000\tilde{n}}{\lambda}(R_g^2)_w^{1/2}\right)$				
Z_{45}	$\rho=1$	$\rho=1.2$	$\rho=1.5$	$\rho=2.0$	$\rho=5.0$
1.00	1.000 (0)[b]	1.000 (0)	1.000 (0)	1.000 (0)	1.000 (0)
1.02	1.014 (23)	1.014 (21)	1.014 (20)	1.014 (19)	1.014 (17)
1.04	1.028 (33)	1.028 (30)	1.028 (29)	1.028 (27)	1.028 (24)
1.06	1.042 (40)	1.042 (37)	1.042 (35)	1.042 (33)	1.042 (30)
1.08	1.056 (46)	1.056 (43)	1.056 (40)	1.056 (38)	1.056 (35)
1.10	1.070 (51)	1.070 (48)	1.071 (45)	1.071 (43)	1.071 (39)
1.12	1.085 (56)	1.085 (53)	1.086 (49)	1.086 (47)	1.087 (43)
1.14	1.099 (61)	1.099 (57)	1.100 (53)	1.101 (51)	1.102 (47)
1.16	1.113 (65)	1.114 (61)	1.115 (57)	1.116 (54)	1.116 (50)
1.18	1.128 (69)	1.129 (65)	1.130 (61)	1.131 (58)	1.133 (53)
1.20	1.142 (72)	1.143 (68)	1.145 (64)	1.146 (61)	1.148 (56)
1.22	1.157 (76)	1.159 (71)	1.161 (67)	1.162 (64)	1.164 (59)
1.24	1.171 (79)	1.173 (75)	1.176 (71)	1.177 (67)	1.180 (62)
1.26	1.186 (82)	1.189 (78)	1.191 (73)	1.193 (70)	1.196 (65)
1.28	1.201 (85)	1.204 (80)	1.207 (76)	1.210 (73)	1.213 (68)

TABLE 2. *cont'd*

	$P^{-1}(q_{90})$ and $\left(\frac{1000\bar{n}}{\lambda}(R_g^2)_w^{1/2}\right)$				
Z_{45}	$\rho=1$	$\rho=1.2$	$\rho=1.5$	$\rho=2.0$	$\rho=5.0$
1.30	1.215 (88)	1.219 (83)	1.222 (79)	1.225 (76)	1.229 (70)
1.40	1.290 (102)	1.297 (97)	1.303 (92)	1.308 (88)	1.314 (82)
1.50	1.366 (113)	1.377 (109)	1.387 (104)	1.394 (100)	1.404 (93)
1.60	1.444 (124)	1.460 (119)	1.473 (115)	1.484 (111)	1.498 (104)
1.70	1.524 (134)	1.546 (129)	1.564 (125)	1.578 (121)	1.597 (114)
1.80	1.607 (144)	1.636 (139)	1.659 (135)	1.677 (131)	1.703 (125)
1.90	1.693 (152)	1.729 (149)	1.758 (145)	1.782 (141)	1.815 (134)
2.00	1.781 (161)	1.826 (158)	1.861 (154)	1.890 (150)	1.932 (144)
2.10	1.874 (169)	1.927 (167)	1.971 (163)	2.007 (160)	2.058 (154)
2.20	1.969 (178)	2.032 (175)	2.084 (172)	2.128 (169)	2.190 (163)
2.30	2.069 (185)	2.143 (184)	2.205 (181)	2.257 (178)	2.332 (173)
2.40	2.174 (194)	2.260 (192)	2.332 (190)	2.393 (188)	2.484 (183)
2.50	2.283 (201)	2.382 (201)	2.466 (199)	2.538 (198)	2.645 (193)
2.60	2.397 (209)	2.510 (209)	2.607 (209)	2.691 (207)	2.817 (203)
2.70	2.517 (217)	2.645 (218)	2.757 (218)	2.855 (217)	3.003 (214)
2.80	2.643 (225)	2.788 (227)	2.916 (227)	3.029 (227)	3.202 (225)
2.90	2.776 (233)	2.939 (235)	3.085 (236)	3.215 (237)	3.416 (236)
3.00	2.916 (240)	3.099 (244)	3.264 (246)	3.414 (247)	3.648 (247)
3.50	3.755 (283)	4.070 (292)	4.375 (299)	4.665 (305)	5.145 (312)
4.00	4.948 (333)	5.488 (349)	6.044 (364)	6.601 (377)	7.588 (397)

[a] Polydisperse systems characterized by the Schulz–Zimm distribution: $\rho = M_w/M_n$.
[b] Entries in parentheses denote weight-average value of R_g^2.

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Dipole Moments of Polymers in Solution

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A. INTRODUCTION

Each conformation of a polymer chain has a dipole moment, μ, in Debye units D ($=10^{-18} \times$ u.e.e. $\times$ 1 cm or 3.338×10^{-30} C $\times$ m), equal to the vectorial sum of the moments of N dipolar groups along the chain, that is, $\mu(\zeta) = \sum_i m_i$, where m_i is the dipole moment associated with the skeletal bond i in the conformation ζ. The mean-square dipole moment $\langle\mu^2\rangle$ can be written as (22,91)

$$\langle\mu^2\rangle = \left\langle \sum_i \sum_j m_i m_j \right\rangle = \sum_i m_i^2 + \left\langle \sum_i \sum_{i \neq j} m_i m_j \right\rangle \tag{A1}$$

where m_i and m_j are the dipole moments associated with the skeletal bonds i and j, respectively, and the brackets mean averages. For a freely jointed chain, the last term in Eq. (A1) averages to zero, and the corresponding mean-square dipole moment is given by

$$\langle\mu^2\rangle = \sum_i^N m_i^2 \tag{A2}$$

The values of the mean-square dipole moment are currently expressed in terms of the dipole moment ratio, $D_n = \langle\mu^2\rangle / \sum m_i^2$, or the dipolar correlation coefficient, g, by means of the following expression:

$$g = D_n = 1 + \frac{\left\langle \sum_i \sum_{i \neq j} m_i m_j \right\rangle}{\sum_i m_i^2} \tag{A3}$$

Debye (13) pioneered the theories which allow calculation of the dipole moments of molecules in the vapor or gas phase. Other theories (23,32,53) developed to determine the dipole moments of molecules in the liquid state were not so successful because of the difficulties involved in defining the internal field in a polar, condensed medium. This problem was circumvented by calculating the dipole moment of polymers and polar liquids in very dilute solutions using nonpolar solvents. In this way, the solute molecules are separated from one another by nonpolar molecules, and the dielectric behavior of the system resembles that of a gaseous condition. The method developed by Guggenheim (27) and Smith (106), based on this approach, permits calculation of the mean-square dipole moments of polymers by means of the following equation:

$$\langle\mu^2\rangle = \frac{27\, k_B M T}{4\pi\rho N_A (\varepsilon_1 + 2)^2} \left[\frac{d\varepsilon}{dw} - \frac{dn^2}{dw} \right] \tag{A4}$$

where k_B and N_A are, respectively, the Boltzmann constant and Avogadro's number, M is the molecular weight of the solute, T the absolute temperature, ρ and ε_1 the density and the dielectric permitivity of the solvent, respectively. The term $d\varepsilon/dw$ (proportional to the total polarization of the solute) can be obtained from plots of the dielectric permitivity of the solution, ε, against the weight fraction of solute w, in the limit $w \to 0$. The values of dn^2/dw (proportional to the electronic polarization) can be obtained from the increments of the indices of refraction of the solution n with respect to that of the solvent n_1, also in the limit $w \to 0$. A shortcoming of this equation is that a ficticious atomic polarization (instead of the true one) is assumed. However, with the exception of the silicones, the atomic polarization for most systems is less than 10% of the electronic polarization and, consequently, the error involved in the determination of $\langle\mu^2\rangle$ with Eq. (A4) is negligible. The mean-square dipole moment presents some advantages over other more traditional conformation-dependent properties such as the mean-square end-to-end distance $\langle r^2\rangle_0$. For example, since the skeletal bonds change much more in polarity than they do in length, $\langle\mu^2\rangle$ is usually more sensitive to structure than $\langle r^2\rangle_0$. Moreover, with the exception of a relatively few number of polymers that have dipole moments in their structure with a component parallel and the other perpendicular to the chain contour, excluded volume effects are negligible.

In the tables, the dipole moments are expressed in terms of either the dipolar correlation coefficient g, or the mean-square dipole moment per repeating unit, $\langle\mu^2\rangle/x$. For relatively long chains in which dipole contributions of the end groups are not important, $\langle\mu^2\rangle/x$ and g are related by

$$\frac{\langle\mu^2\rangle}{x} = g\mu_0^2 \qquad \text{(A5)}$$

where x is the degree of polymerization, and μ_0^2 is the sum of the squares of the dipole moments associated with the repeating unit. Below the generic name of each family of polymers, the dipole moments associated with the backbone are indicated.

B. DIPOLE MOMENTS OF POLYMERS IN SOLUTION

TABLE 1. POLYOXIDES (POLYETHERS)*

Polymer	Solvent	Temp. (°C)	g or D_n	$\langle\mu^2\rangle/x$, D^2	Remarks	Refs.
Poly(oxymethylene)						
Polyformaldehyde						
With $x = 1$	Benzene	25	0.1			109
With $x = 2$	Benzene	25	0.29			109
With x = infinite	Melt	202	0.3			56
Poly(oxyethylene)						
Poly(ethylene oxide)						
$x = 2-6$	Benzene	20		1.32–1.23	End groups: $-OC_2H_5$	47
$M_n = 4000$	Benzene	20–60	0.603–0.644		$m(CH_2-O) = 0.99D$	59
$x = 1-6$	Benzene	25		1.30–1.14	End groups: $-OC_2H_5$	34
$x = 4.0-176.2$	Benzene	25		2.82–1.28		46
$x = 4.1-153.0$	Benzene	25		2.59–1.28		2
$x = 1-33.6$	Benzene	20		1.99–1.19		45
$M_n = 4000$	Benzene	20–60	0.621–0.693		$m(CH_2-O) = 0.99D$	4
$x = 1-7$	Dioxane	25		2.82–1.66		110
$x = 2-227$	Benzene	20–30		2.13–1.14		47
Poly(oxypropylene)						
Poly(propylene oxide)						
$x = 6.6-69.0$	Benzene	25		1.96–1.04		45
	Benzene	25	0.54		Isotactic	1
	Dioxane	25	0.49		Isotactic	1
Poly(oxytrimethylene)						
Poly(trimethylene oxide)	Benzene	25	0.41			50
Poly[oxy(2,2-dimethyltrimethylene)]						
Poly(3,3-dimethyloxetane)						
$M_n = 8500$	Benzene	20–60	0.25–0.30			94
$M_n = 19000$	Benzene	30–60	0.20–0.22			25
$M_n = 35000$	Benzene	30–60	0.21–0.23			25
Poly[oxy(1-methyltrimethylene)]						
Poly(2-methyloxetane)						
$M_n = 13000$	Cyclohexane	30–60	0.36–0.41			78
Poly[oxy(2-methyltrimethylene)]						
Poly(3-methyloxetane)						
$M_n = 125000$	Cyclohexane	30–60	0.35–0.38			77

*If not indicated otherwise, the dipole moments associated with the skeletal bonds used in the calculation of g were $m(CH_2-O) = 1.07D$, $m(CH_2-CH_2) = 0D$, and $m(O-H) = 1.7D$.

TABLE 1. *cont'd*

Polymer	Solvent	Temp. (°C)	g or D_n	$\langle\mu^2\rangle/x$, D^2	Remarks	Refs.
Poly(oxytetramethylene)					$m(CH_2-O) = 0.99D$	
Poly(tetramethylene oxide)						
$M_n = 2500$	Benzene	20–60	0.60–0.65			61
$M_n = 408000$	Benzene	20–60	0.59–0.65			4
Poly[oxy(2-methyltetramethylene)]						
Poly(3-methyltetrahydrofuran)						
$M_n = 6700$	Benzene	30–60	0.52–0.55			81
Poly(oxyhexamethylene)					$m(CH_2-O) = 0.99D$	
Poly(hexamethylene oxide)						
$M_n = 5500$	Benzene	35–60	0.65–0.68			59
$M_n = 2460$	Benzene	35–60	0.64–0.67			80
Poly(oxydecamethylene)					$m(CH_2-O) = 0.99D$	
Poly(decamethylene oxide)						
$M_n = 2000$	Benzene	35–60	0.64–0.68			61
Poly(oxyethyleneoxymethylene)					Polyformals: alternating copolymer of methylene oxide and alkylene oxide	
Poly(1,3-dioxolane)						
$M_n = 12000$	Benzene	20–60	0.160–0.204			62
$M_n = 16000$	Benzene	20–60	0.164–0.213			62
$M_n = 42000$	Benzene	20–60	0.177–0.227			62
Poly(oxytetramethyleneoxymethylene)						
Poly(1,3-dioxepane)						
$M_n = 17000$	Benzene	25–60	0.160–0.190			63
Poly(oxypentamethyleneoxymethylene)						
Poly(1,3-dioxocane)						
$M_n = 1850$	Benzene	20–60	0.190–0.232			64
$M_n = 2560$	Benzene	20–60	0.183–0.207			64
$M_n = 3700$	Benzene	20–60	0.168–0.207			64
Poly(oxyhexamethyleneoxymethylene)						
Poly(1,3-dioxonane)						
$M_n = 4020$	Benzene	20–60	0.190–0.230			64
$M_n = 2600$	Benzene	20–60	0.180–0.217			64
Poly(*trans*-oxymethylene-1,4-cyclohexyleneoxymethylene)						
Poly(trans-1,4-cyclohexane dimethanol-alt-formaldehyde)						
$M_n = 6500$	Benzene	20–60	0.17–0.21			71
Poly(oxypropyleneoxymethylene)						
Poly[(4-methyl)-1,3-dioxolane]						
$M_n = 40000$	Benzene	20–60	0.237–0.281			73
$M_n = 48000$	Benzene	20–60	0.216–0.256			73
Poly(*trans*-7-oxabicyclo-[4.3.0]nonane)						
Poly(trans-7-oxabicyclo-[4.3.0]nonane)	Benzene	30–60	0.63–0.66			111

TABLE 2. POLYSULFIDES (POLYTHIOETHERS)*

Polymer	Solvent	Temp. (°C)	g or D_n	$\langle\mu^2\rangle/x$, D^2	Remarks	Refs.
Poly(thiotrimethylene)						
Poly(trimethylene sulfide)						
$M_n = 14000$	Benzene	20–60	0.60–0.63			75
Poly(thiopentamethylene)						
Poly(pentamethylene sulfide)						
$M_n = 3200$	Benzene	20–60	0.75–0.78		End bonds: CH_2-Br; $m(CH_2-Br) = 1.96D$	74
Poly(thiopropylene)						
Poly(propylene sulfide)						
	Benzene	20–60	0.434–0.449			67
$M_n = 5000000$	Carbon tetrachloride	20–60	0.362–0.407			68
$M_n = 5000000$	Benzene	20–60	0.429–0.458			68
$M_w = 1.6 \times 10^6$	Carbon tetrachloride	20–60	0.325–0.347	Isotactic		68
$M_n = 5000$	Benzene	20–60	0.448–0.460			67
$M_n = 6000$	Carbon tetrachloride	20–60	0.357–0.389			67
$M_n = 1.6 \times 10^6$	Benzene	20–60	0.386–0.420	Isotactic		68

* $m(CH_2-CH_2) = 0D$, $m(CH_2-S) = 1.21D$, $m(O-H) = 1.7D$.

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TABLE 2. *cont'd*

Polymer	Solvent	Temp. (°C)	g or D_n	$\langle\mu^2\rangle/x$, D^2	Remarks	Refs.
Poly[thio(2,2-dimethyltrimethylene)]						
Poly(3,3-dimethylthietane)						
$M_n = 8200$	Benzene	30–60	0.62–0.63			72
Poly(thiopentamethylenethioethylene)						
Poly(ethylene sulfide-alt-pentamethylene sulfide)						
$M_n = 3800$	Benzene	30–60	0.64–0.67		End bonds: CH_2–Br, $m(CH_2\text{–}Br) = 1.96D$	70
Poly(thiopentamethylenethiomethylene)					Alternating copolymer of pentamethylene sulfide and methylene sulfide	
Poly(1,3-dithiocane)						
$M_n = 14000$	Benzene	20–60	0.26–0.31			112
Poly(thiomethylene-1,4-cyclohexylenemethylenethiomethylene) *trans*						
$M_n = 8000$	Benzene	30–60	0.176–0.207			54

TABLE 3. HYDROXYL TERMINATED OXIDE/SULFIDE COPOLYMERS[a]

Polymer	Solvent	Temp. (°C)	g or D_n	Remarks	Refs.
Poly(thioethyleneoxyethylene)				Alternating copolymer of ethylene sulfide and methylene sulfide	
Poly(thiodiethylene glycol)					
$M_n = 13000$	Benzene	20–60	0.607–0.648		66
$M_n = 8000$	Benzene	20–60	0.627–0.659		66
Poly(thiomethyleneoxymethylenethiopentamethylene)					
Poly(3-oxa-1,5-dithiadeca-methylene)					
$M_n = 5200$	Benzene	30–60	0.323–0.358		84
Poly(oxymethyleneoxyethylenethioethylene)					
Poly(1,3-dioxa-6-thiocane)					
$M_n = 2500$	Benzene	20–60	0.419–0.432		65
$M_n = 3000$	Benzene	20–60	0.419–0.432		65
Poly(oxymethyleneoxyethylenethiomethylenethioethylene)					
Alternating copolymer of *1,3-dioxolane and 1,3-dithiolane*	Benzene	30	0.26		66

[a] $m(CH_2\text{–}CH_2) = 0D$, $m(CH_2\text{–}O) = 1.07D$, $m(CH_2\text{–}S) = 1.21D$.

TABLE 4. POLYESTERS DERIVED FROM AROMATIC DIACIDS*

Polymer	Solvent	Temp. (°C)	g or D_n	Remarks	Refs.
Poly[di(oxyethylene) oxyterephthaloyl]					
Poly(diethyleneglycol terephthalate)					
$M_n = 2500$	Benzene	35–60	0.688–0.692		60
Poly[di(oxyethylene) oxyisophthaloyl]					
Poly(diethyleneglycol isophthalate)					
$M_n = 5900$	Benzene	30–60	0.691–0.692		79
Poly[di(oxyethylene) oxyphthaloyl)					
Poly(diethyleneglycol phthalate)					
$M_n = 10300$	Benzene	30–60	0.637–0.679		86
Poly(oxypropyleneoxyterephthaloyl)					
Poly(propyleneglycol terephthalate)					
$M_n = 11000$	Benzene	30–60	0.582–0.609		87
Poly[di(oxypropylene) oxyterephthaloyl)					
Poly(dipropyleneglycol terephthalate)					
$M_n = 10000$	Benzene	30–60	0.715–0.750		14
Poly(tri(oxytrimethylene) oxyterephthaloyl)					
Poly(triethyleneglycol terephthalate)					
$M_n = 7800$	Benzene	30–60	0.677–0.695		82
Poly[di(oxytrimethylene) oxyterephthaloyl]					
Poly(ditrimethyleneglycol terephthalate)					
$M_n = 15500$	Benzene	30–60	0.805–0.798		26
(Poly(thioethyleneoxyethyleneoxyterephthaloyl)					
Poly(thiodiethyleneglycol terephthalate)					
$M_n = 6400$	Dioxane	40–70	0.540–0.552	$m(CH_2\text{–}S) = 1.21D$	69

*Hydroxyl terminated polyesters $m(C_6H_5COOCH_2) = 1.98D$; $m(CH_2\text{–}O)$ (ether) $= 1.07D$; $m(CH_2\text{–}CH_2) = 0D$; $m(O\text{–}H) = 1.7D$.

TABLE 5. ALIPHATIC AND CYCLOALIPHATIC POLYESTERS*

Polymer	Solvent	Temp. (°C)	g or D_n	$\langle\mu^2\rangle/x$	Refs.
Poly[oxy (2,2-dimethyltrimethylene) oxysuccinoyl]					
Poly(neopentylglycol succinate)					
$M_n = 6900$	Benzene	30–60	0.548–0.586		88
Poly(oxysuccinoyloxymethylene-1,4-cyclohexylenemethylene) *trans*					
Poly(trans-1,4-cyclohexane dimethanol succinate)					
$M_n = 5800$	Dioxane	70	0.454		90
Poly[oxy(2,2-dimethyltrimethylene) oxyadipoyl]					
Poly(neopentylglycol adipate)					
$M_n = 5500$	Benzene	30–60	0.653–0.688		85
Poly(oxyadipoyloxymethylene-1,4-cyclohexylenemethylene) *cis*					
Poly(cis-1,4-cyclohexane dimethanol adipate)					
$M_n = 11000$	Benzene	30–60	0.950–0.972		90
$M_n = 11000$	Dioxane	30–60	0.914–0.959		90
Poly(oxyadipoyloxymethylene-1,4-cyclohexylenemethylene) *trans*					
Poly(trans-1,4-cyclohexane dimethanol adipate)					
$M_n = 10000$	Dioxane	50–70	0.596–0.65		90
Poly(oxysebacoyloxymethylene-1,4-cyclohexylenemethylene) *trans*					
Poly(trans-1,4-cyclohexane dimethanol sebacate)					
$M_n = 4600$	Benzene	30–60	0.631–0.709		83
Poly[oxy(2,2-dimethyltrimethylene) oxyhexafluoroglutaroyl]					
Poly(neopentylglycol hexafluoroglutarate)					
$M_n = 3640$	Benzene	30–60		9.16–9.78	58
Poly[oxy(2,2-dimethyltrimethylene) oxyglutaroyl]					
Poly(neopentylglycol glutarate)					
$M_n = 4500$	Benzene	30–60		4.26–4.52	58
Poly(oxysebacoyloxymethylene-1,4-cyclohexylenemethylene) *cis*					
Poly(cis-1,4-cyclohexane dimethanol sebacate)					
$M_n = 5200$	Benzene	300–60	0.983–1.04		83
Poly[di(oxyethylene) oxycarbonyl-1,4-cyclohexylenecarbonyl] *trans*					
Poly(diethyleneglycol-1,4-trans-cyclohexane dicarboxylate)					
$M_n = 5300$	Benzene	30–60	0.585–0.608		89

* Hydroxyl terminated polyesters $m(CH_2COOCH_2) = 1.89D$.

TABLE 6. POLYCARBONATES

Polymer	Solvent	Temp. (°C)	$\langle\mu^2\rangle/x$, D^2	Remarks	Refs.
Poly(oxycarbonyloxy-1,4-phenylene-1-(R)-1-methylmethylene-1,4-phenylene)					
Polycarbonate					
$x = 97$	Benzene	25	9.36	R = 3-chlorophenyl	28
$x = 88$	Benzene	25	11.70	R = 4-chlorophenyl	28
$x = 73$	Benzene	25	17.64		28
Poly(thiocarbonate)					
Poly(thiocarbonate)					
$x = 128$	Benzene	25	1.69	R = isobutyl	21
$x = 75$	1,4-Dioxane	25	1.88	R = H	21
$x = 280$	1,4-Dioxane	25	2.07	R = phenyl	21
$x = 75$	Benzene	25	2.76	R = H	21
$x = 49$	Benzene	25	2.13	R = ethyl	21
Poly(thiocarbonate of 2,2*l*-bis(4-hydroxylphenyl)propane)					
Poly(thiocarbonate of 2,2l-bis(4-hydroxylphenyl)propane)					
$M_n = 9400$	1,4-Dioxane	25	0.92		97
Poly(thiocarbonate of 1,1*l*-bis(4-hydroxyphenyl)-1-(3-chlorophenyl)ethane)					
Poly(thiocarbonate of 1,1l-bis(4-hydroxyphenyl)-1-(3-chlorophenyl)ethane)					
With $x = 97$	Benzene	25	7.40		99,28
Poly(thiocarbonate of 1,1*l*-bis(4-hydroxyphenyl)-1-(4-chlorophenyl)ethane)					
Poly(thiocarbonate of 1,1l-bis(4-hydroxyphenyl)-1-(4-chlorophenyl)ethane)					
With $x = 88$	Benzene	25	6.05		99,28

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TABLE 6. *cont'd*

Polymer	Solvent	Temp. (°C)	$\langle\mu^2\rangle/x$, D^2	Remarks	Refs.
Poly(thiocarbonate of 1,1/-bis(4-hydroxyphenyl)-1-(3,4-dichlorophenyl)ethane)					
Poly(thiocarbonate of 1,1/-bis(4-hydroxyphenyl)-1-(3,4-dichlorophenyl)ethane)					
With $x = 73$	Benzene	25	12.25		99,28

TABLE 7. VINYL POLYMERS*

Polymer	Solvent	Temp. (°C)	g or D_n	$\langle\mu^2\rangle/x$, D^2	Remarks	Refs.
Poly(1-phenylethylene)						
Poly(styrene)						
Atactic	Toluene	38.4	0.36		$\mu_0 = 0.60D$	35
Atactic	Carbon tetrachloride	25	0.56		$\mu_0 = 0.35D$	37
Isotactic	Toluene	38.4	0.53		$\mu_0 = 0.60D$	35
Poly(2-bromophenylethylene)						
Poly(o-bromostyrene)			0.50			57
			1.21			57
Poly(4-bromophenylethylene)						
Poly(p-bromostyrene)						
PPBSI	*p*-Dioxane	20–50		2.20–2.49		108
PPBSI	Carbon tetrachloride	20–50		2.12–2.54		108
PPBSII	*p*-Dioxane	20–50		2.44–2.72		108
Poly(1-phenylethylene/(4-pyridyl) ethylene)						
Poly(styrene/4-vinylpyridine)	Benzene	25	0.73		$\mu_0 = 2.65D$	5
Poly[1-methyl-1-(4-fluorophenyl) ethylene]						
Poly(p-fluoromethylstyrene)	Benzene	25	0.62		$\mu_0 = 1.82D$	6
	Benzene	25	0.27	0.89	$\mu_0 = 1.82D$	5
Poly[(4-methoxyphenyl) ethylene]						
Poly(p-methoxystyrene)	Toluene	25	0.54	0.78	$\mu_0 = 1.21D$	31
	Benzene	25	0.72	1.06	$\mu_0 = 1.21D$	5
	Benzene	25	0.64	0.94	$\mu_0 = 1.21D$	6
Poly[(4-fluorophenyl) ethylene]						
Poly(p-fluorostyrene)	Benzene	25	0.62	2.05	$\mu_0 = 1.82D$	6
	Benzene	25	0.51	1.69	$\mu_0 = 1.82D$	5
Poly[(2-chlorophenyl) ethylene]						
Poly(o-chlorostyrene)						
				2.85		57
Poly[(3-chlorophenyl) ethylene]						
(Poly(m-chlorostyrene)	Toluene	25	0.63	1.61	$\mu_0 = 1.60D$	93
Poly[(4-chlorophenyl) ethylene]						
Poly(p-chlorostyrene)	Xylene	30	0.71	2.00	$\mu_0 = 1.68$	11
		30–50	0.42–0.56			57
	Benzene	30	0.56	2.10	$\mu_0 = 1.93$	12
	Carbon tetrachloride	50		1.89		108
	p-Dioxane	20–50		2.11–2.46		108
	Toluene	25		1.82		113
	Cumene	25–65		1.87–1.73		113
	Toluene	30	0.77	2.17	$\mu_0 = 1.68$	11
	Isopropylbenzene	30–90	0.73–0.70	2.06–1.98	$\mu_0 = 1.68$	9
	Toluene	30–60	0.74–0.75	2.09–2.12	$\mu_0 = 1.68$	9
	Benzene	25	0.64		$\mu_0 = 2.0$	5
	Toluene	25		1.65		31
	Isopropylbenzene	30	0.53	1.50	$\mu_0 = 1.68$	11
	n-Propylbenzene	20–90	0.436–0.499	1.641–1.878		114
	Carbon tetrachloride	25	0.57		$\mu_0 = 1.88D$	6
	Benzene	30		1.49		55
	Benzene	30		1.49	Isotactic	55
	Toluene	25	0.60	1.59	$\mu_0 = 1.63$	93
	Isopropylbenzene	30–90	0.493–0.520	11.854–1.956		114
	Benzene	15–70	0.599–0.562	2.373–2.224		114

*In vinyl polymers the dipolar correlation coefficient is expressed by $g = \langle\mu^2\rangle/x\mu_0^2$, where x is the degree of polymerization and μ_0 is the dipole moment of a model compound of the repeating unit.

TABLE 7. *cont'd*

Polymer	Solvent	Temp. (°C)	g or D_n	$\langle\mu^2\rangle/x$, D^2	Remarks	Refs.
Poly(1-acetoxyethylene)						
Poly(vinyl acetate)	Benzene and CCl_4	25	0.89 and 0.94	2.59–2.89	$\mu_0 = 1.80D$	38
	Benzene	20	0.84	2.89	$\mu_0 = 1.86$	101
			0.75–0.80			107
Poly(1-bromoethylene)						
Poly(vinyl bromide)						
Several fractions	*p*-Dioxane	25		1.97–3.20	$\mu_0 = 1.93D$	40
	p-Dioxane	30–60	0.53–0.86	2.29–2.38	$\mu_0 = 2.08D$	95
	1-Methylnaphthalene	30–60	0.45–0.46		$\mu_0 = 2.08D$	95
Poly(1-chloroethylene)						
Poly(vinyl chloride)						
Atactic fraction	*p*-Dioxane	20 and 40	0.59	2.65	$\mu_0 = 2.12D$	33
	p-Dioxane	20–65	0.70–0.75	2.79–3.06	$\mu_0 = 2.00D$	29
Atactic fraction	Tetrahydrofuran	40		1.716	$\mu_0 = 1.64D$	33
Atactic fraction	Tetrahydrofuran	20 and 40	0.64–0.62	1.72–1.67	$\mu_0 = 1.64D$	33
Eight fractions (atactic)	*p*-Dioxane	25	0.66–0.72	2.59–2.82	$\mu_0 = 2.00D$	39
Syndiotactic fraction	Tetrahydrofuran	20	0.71	1.93	$\mu_0 = 1.64D$	33
$M_n = 26000$ (atactic)	*p*-Dioxane	25–55	0.68–0.65	2.72–2.60	$\mu_0 = 2.00D$	8
			0.75			12
$M_n = 47000$ (atactic)	*p*-Dioxane	25–55	0.70–0.68	2.80–2.72	$\mu_0 = 2.00D$	8
Poly(isobutoxyethylene)						
Poly(vinyl isobutylether)						
Isotactic fraction	Benzene	25 and 50	0.90 and 0.98	1.345 and 1.464	$\mu_0 = 1.22D$	107
Atactic fraction	Benzene	25	0.77 and 0.83		$\mu_0 = 1.22D$	107
Isotactic fraction	Benzene	30		0.98		55
Atactic fraction	Benzene	30	0.98	0.96		55
Poly(carbazolylethylene)						
Poly(vinyl carbazole)	Toluene	25	0.36	3.71	$\mu_0 = 3.21D$	30
	p-Dioxane	30–60	0.41–0.44	3.52–3.78	$\mu_0 = 2.93D$	102
Poly(ethylenethiophenylene)						
Poly(vinylphenyl sulfide)	Benzene	20–50	1.10–1.06	2.34–2.26	$\mu_0 = 1.46D$	100
Poly[1-methyl-1-(4-bromophenyl) ethylene]						
Poly(p-bromo-α-methylstyrene)	Benzene	25	0.28	1.21	$\mu_0 = 2.08D$	6

TABLE 8. ACRYLIC POLYMERS*

Polymer	Solvent	Temp. (°C)	g or D_n	$\langle\mu^2\rangle/x$, D^2	Remarks	Refs.
Poly[1-methoxycarbonyl) ethylene]						
Poly(methyl acrylate)	Benzene	20	0.717	2.22	$\mu_0 = 1.76D$	51
	Benzene	25	0.64–0.67	1.99–2.07	$\mu_0 = 1.76D$	43
Poly[2-(biphenyloxycarbonyl) ethylene]						
Poly(2-biphenyl acrylate)	Benzene	30–60	0.69–0.74	2.05–2.22	$\mu_0 = 1.723–1.732D$	16
Poly[1-(cyclohexyloxycarbonyl) ethylene]						
Poly(cyclohexyl acrylate)	Benzene	30–60	0.75–0.81	2.79–3.01	$\mu_0 = 1.93D$	15
Poly[1-(ethoxycarbonyl) ethylene]						
Poly(ethyl acrylate)						
Atactic fraction	Benzene	30	1.04			55
Syndiotactic fraction	Benzene	30	1.04			55
Poly[1-(phenoxycarbonyl) ethylene]						
Poly(phenyl acrylate)	Benzene	30–60	0.62–0.66	1.73–1.91	$\mu_0 = 1.669–1.700D$	98
Poly[1-((3-chloro) phenoxycarbonyl) ethylene]						
Poly(m-chlorophenyl acrylate)	Benzene	30–60	0.57–0.61	1.85–2.02	$\mu_0 = 1.800–1.824D$	98
Poly[1-((2-chloro) phenoxycarbonyl) ethylene]						
Poly(o-chlorophenyl acrylate)	Benzene	30–60	1.09–1.09	3.30–3.97	$\mu_0 = 1.74–1.91D$	98
Poly[1-((4-chloro) phenoxycarbonyl) ethylene]						
Poly(p-chlorophenyl acrylate)	Benzene	30–60	0.524–0.501		$\mu_0 = 2.590–2.694D$	98
Poly[1-((4-benzoyl) phenoxycarbonyl) ethylene]						
Poly(4-benzoylphenyl acrylate)	1,4-Dioxane	30–60	0.81–0.84	10.27–10.41	$\mu_0 = 3.561–3.521D$	17
Poly[1-(4-phenoxy) phenyloxycarbonyl) ethylene]						
Poly(4-phenoxyphenyl acrylate)	Benzene	30–60	0.82–0.84	3.61–3.74	$\mu_0 = 2.10–2.11D$	18
Poly[1-(hydroxyethylenedi(oxyethylene) oxycarbonyl) ethylene]						
Poly(triethyleneglycol acrylate)	Benzene	30–60		7.97–8.16		92

* μ_0 is the dipole moment of a model compound of the side group.

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TABLE 9. METHACRYLIC POLYMERS*

Polymer	Solvent	Temp. (°C)	g or D_n	$\langle\mu^2\rangle/x$, D^2	Remarks	Refs.
Poly[1-methoxycarbonyl)-1-methylethylene]						
Poly(methyl methacrylate)						
Atactic fraction	Five solvents	25	0.62		$\mu_0 = 1.73D$	48
Atactic fraction	Benzene	25	0.53–0.66			57,107
Atactic fraction	Benzene	25	0.55–0.72	1.77–2.31	$\mu_0 = 1.80D$	42
Syndiotactic fraction	Toluene	30–90	0.67–0.79	1.72–2.01	$\mu_0 = 1.60D$	105
Isotactic fraction	Toluene	25–65	0.65–0.75	1.66–1.93	$\mu_0 = 1.60D$	105
Syndiotactic fraction	Benzene	25–65	0.70–0.78	1.79–1.99	$\mu_0 = 1.60D$	105
Atactic fraction	Benzene	25–65	0.69–0.78	1.77–1.99	$\mu_0 = 1.60D$	105
Isotactic fraction	Benzene	25–65	0.77–0.81	1.96–2.07	$\mu_0 = 1.60D$	105
Isotactic fraction	Benzene	30	0.67	2.00	$\mu_0 = 0.73D$	3
Atactic fraction	Benzene	30	0.56–0.61	1.66–1.82	$\mu_0 = 1.73D$	3
Atactic fraction	Toluene	25–65	0.66–0.78	1.69–1.99	$\mu_0 = 1.60D$	105
Syndiotactic fraction	Benzene	30	0.53	1.61	$\mu_0 = 1.73D$	3
Atactic fraction	*p*-Dioxane	23		2.25		10
Poly[1-(ethoxycarbonyl)-1-methylethylene]						
Poly(ethyl methacrylate)	1,4-Dioxane	25	0.58	2.00	$\mu_0 = 1.86D$	36
	Carbon tetrachloride	25	0.54	1.87	$\mu_0 = 1.86D$	36
	Toluene	25	0.62	2.14	$\mu_0 = 1.86D$	36
			0.59–0.62			57
	Benzene	25	0.58	2.00	$\mu_0 = 1.86D$	
Poly[1-(propoxycarbonyl)-1-methylethylene]						
Poly(propyl methacrylate)			0.56–0.59			57
Poly[1-(isopropoxycarbonyl)-1-methylethylene]						
Poly(isopropyl methacrylate)			0.61–0.66			57
Poly(butyl methacrylate)						
Poly(butyl methacrylate)				1.93–2.72		10
	Four solvents	23	0.55–0.59			57
Poly(phenylmethacrylate)						
Poly(phenylmethacrylate)			0.55			57
Poly(*p*-chlorophenylmethacrylate)						
Poly(p-chlorophenylmethacrylate)			0.35			57
Poly(dichlorophenylmethacrylate)						
Poly(dichlorophenylmethacrylate)			0.38			52

*μ_0 is the dipole moment of a model compound of the side group.

TABLE 10. ITACONATE POLYMERS

Polymer	Solvent	Temp. (°C)	$\langle\mu^2\rangle/x$, D^2	Refs.
Poly[1-(cyclohexylmethylene oxycarbonylmethylene)-1-(carboxy)ethylene]				
Poly(monocyclohexylmethylene itaconate)	1,4-Dioxane	20–50	5.75–5.70	20
Poly[1-(cyclohexylmethyleneoxycarbonylmethylene)-1-(cyclohexylmethyleneoxycarbonylmethylene) ethylene]				
Poly(dicyclohexylmethylene itaconate)	Benzene	30–60	6.89–7.00	19
Poly[1-benzyloxycarbonylmethylene)-1-(carboxy) ethylene]				
Poly(monobenzyl itaconate)	1,4-Dioxane	25	3.84	96
Poly[1-(benzyloxycarbonylmethylene)-1-(benzyloxycarbonylmethylene)ethylene]				
Poly(dibenzyl itaconate)	1,4-Dioxane	25–33	2.31–2.79	24

TABLE 11. POLYDIENES

Polymer	Solvent	Temp. (°C)	g or D_n	Remarks	Refs.
Poly(1-methyl-1-butenylene)					
Poly(isoprene)					
cis 1,4	Benzene	25	0.70	$\mu_0 = 0.34D$	41
trans 1,4	Benzene	25	0.82	$\mu_0 = 0.34D$	41
Poly(1-chloro-1-butenylene)					
Poly(chloroprene)	Benzene	20	2.70		101

TABLE 12. SILICON BASED POLYMERS[a]

Polymer	Solvent	Temp. (°C)	g or D_n	$\langle\mu^2\rangle/x$, D^2	Remarks	Refs.
Linear Poly(dimethylsiloxane)						
Linear Poly(dimethylsiloxane)						
$x+1=188$	Undiluted	10–60	0.306–0.297			44
$x=9.85$	Cyclohexane, benzene	30	0.18–0.21		Cyclic PDMS	76
$x=1$, 102	Undiluted	25			Linear PDMS; $\langle\mu^2\rangle^{1/2}=2.07D$, 14.4$D$	7
$x=4$, 95.0	Undiluted	25			Cyclic PDMS; $\langle\mu^2\rangle^{1/2}=1.50D$, 14.3$D$	7
$x=69.6$	Cyclohexane, benzene	30	0.20,0.33			76
$x=14.8$	Cyclohexane, benzene	30	0.21,0.28		Cyclic PDMS	76
$x=70.55$	Cyclohexane, benzene	30	0.21,0.30			76
$x=15.8$	Cyclohexane, benzene	30	0.19,0.26			76
$x=10.5$	Cyclohexane, benzene	30	0.18,0.27			76
$x+1=239$	Undiluted	10–60	0.305–0.297			44
$x+1=97$	Undiluted	10–60	0.314–0.306			44
$x+1=1038$	Cyclohexane	10–60	0.398–0.444			44
$x+1=239$	Cyclohexane	10–60	0.377–0.412			44
$x+1=188$	Cyclohexane	10–60	0.377–0.369			44
$x+1=97$	Cyclohexane	10–60	0.387–0.407			44
$x+1=1038$	Undiluted	10–60	0.308–0.301			44
Poly(1,1-dimethylsilazane)						
Poly(1,1-dimethylsilazane)	Cyclohexane	20–50		0.370–0.326		104
	Hexamethyldisilazane	25		0.246		104
$M_n=750$	Hexane	20		0.330		104
	Carbon tetrachloride	20–50		0.310–0.310		104
	Benzene	20–50		0.342–0.359		104
Poly(methylphenyl siloxane)						
Poly(methylphenyl siloxane)						
$M_n=45000$	Cyclohexane	25	0.31			103
Poly(dimethyl siloxane-*co*-methylphenyl siloxane) (35.7/54.3)						
Poly(dimethyl siloxane-co-methylphenyl siloxane) (35.7/54.3)						
$M_n=4200$	Cyclohexane	25	0.22			103
Poly(dimethylsiloxane-*co*-methylphenylsiloxane) (90.5/9.5)						
Poly(dimethylsiloxane-co-methylphenylsiloxane) (90.5/9.5)						
$M_n=6400$	Cyclohexane	25	0.27			103
Poly(methylsilmethylene)						
Poly(methylsilmethylene)	Cyclohexane	20	0.391		m(Si–C) = 0.50D	49

[a] m(Si–O) = 0.60D.

TABLE 13. STYRENE COPOLYMERS*

Polymer	Solvent	Temp. (°C)	g or D_n	$\langle\mu^2\rangle/x$, D^2	Remarks	Refs.
Poly[1-phenylethylene-*co*-(4-methoxyphenyl) ethylene]						
Poly(styrene-co-p-methoxystyrene)						
$x_p=0.157$	Toluene	25	1.07	1.56	$\mu_0=1.21D$; $\langle\mu^2\rangle/x$ is referred to the polar unit	31 30
$x_p=0.328$	Toluene	25	0.84	1.23		31 30
$x_p=0.480$	Toluene	25	0.74	1.08		31 30
$x_p=0.721$	Toluene	25	0.69	1.01		31 30
$x_p=1$	Toluene	25	0.54	0.78		31 30
Poly(1-phenylethylene-*co*-carbazolylethylene)						
Poly(styrene-co-vinylcarbazole)						
$x_p=0.074$	Toluene	25	0.53		$\mu_0=3.21D$	30
$x_p=1.00$	Toluene	25	0.36			30
$x_p=0.368$	Toluene	25	0.53			30
$x_p=0.665$	Toluene	25	0.39			30
Poly[1-phenylethylene-*co*-(4-pyvidyl) ethylene]						
Poly(styrene-co-4-vinylpyridine)						
$x_p=0.028$	Toluene	25	0.31		$\mu_0=2.655D$	30
$x_p=0.183$	Toluene	25	0.50			30
$x_p=0.154$	Toluene	25	0.34			30

* x_p is the molar fraction of polar comonomer and μ_0 is the dipole moment of the polar repeating unit.

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TABLE 13. *cont'd*

Polymer	Solvent	Temp. (°C)	g or D_n	$\langle\mu^2\rangle/x$, D^2	Remarks	Refs.
$x_p = 0.118$	Toluene	25	0.29			30
$x_p = 0.051$	Toluene	25	0.29			30
$x_p = 0.082$	Toluene	25	0.23			30
Poly[1-phenylethylene-*co*-(4-chlorophenyl) ethylene]						
Poly(styrene-co-p-chlorostyrene)						
$x_p = 0.247$	Toluene	25	0.67	2.67	$\mu_0 = 2.0D$	31,30
$x_p = 0.802$	Toluene	25	0.44	1.76		31,30
$x_p = 1.00$	Toluene	25	0.41	1.4		31,30

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Heat, Entropy, and Volume Changes for Polymer–Liquid Mixtures

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A. INTRODUCTION

Tabulated below are references to the studies of the enthalpy, entropy, and volume changes that occur when polymer and solvent are mixed to form a homogeneous liquid solution. This bibliography follows closely the form employed by C. Booth (Manchester) in his contribution under the same title in the second edition of this Handbook. With several exceptions, references to work reported before 1972 were compiled by Professor Booth for the second edition.

1. Scope of the Table

This table includes literature citations to studies from which the thermodynamic properties named in the title can be deduced. The experimental methods utilized are also identified.

This tabulation is limited to reports of measurements on solutions that contain only one nonelectrolyte homopolymer; solutions with a copolymer, polyelectrolyte, or polymer mixture have been excluded. Solvents for the solutions in this compilation are liquids comprising single molecular entities; i.e., references to studies in which the solvent is a binary or ternary mixture or a mixture of oligomers are not included.

Most studies whose primary goal is to characterize the individual polymer molecule and its interaction in an infinitely dilute solution will not be found in this table. However, references to studies of dilute solutions are presented in some of the other tables of Part VII ("Solution Properties"). Most of the reports of changes in free energy on mixing or on dilution cited here have been limited to those that also provide sufficient data to determine the change in the enthalpy (or entropy). References to measurements of solvent activities which can yield information about changes in free energy can be found in "Polymer–Solvent Interaction Parameters".

These references were collected without regard for the quality of data.

2. Experimental Methods

Heat Several different kinds of enthalpy changes are recognized in the formation of solutions. The *integral heat of mixing or integral heat of solution,*

$$\Delta H_{\text{mix}} = H_{\text{soln}} - n_1 H_1^0 - n_2 H_2^0 \qquad \text{(A1)}$$

is the heat absorbed when pure solvent and pure polymer are combined to form a solution at constant temperature and pressure. Here H_{soln}, H_1^0, and H_2^0 are the molar enthalpies of solution, pure solvent, and pure solute respectively; and n_1 and n_2 the number of moles of each component. The value of ΔH_{mix} is dependent on the degree of crystallinity for semicrystalline polymers and, usually to a lesser extent, on the thermal history of glassy polymers. However, if a

polymer solution already exists and more solvent is added, the accompanying enthalpy change, which is called the *integral heat of dilution,* is independent of any crystalline or glassy aspect of the pure polymeric solute. The integral heats, both of mixing and of dilution, are usually determined calorimetrically. The latter is often preferable for experimental reasons, because its measurement is not complicated by the long dissolution times usually required in the direct measurements of integral heats of solution.

The *partial* or *differential heat of solution,* $\overline{\Delta H_2}$, is the change in enthalpy when a very small amount of pure solute is added to a large amount of either solution or pure solvent. In the latter instance, the resultant quantity which is properly identified as the *partial heat of solution at infinite dilution* is sometimes referred to more simply as the heat of solution. For polymer solutions, $\overline{\Delta H_2}$ is often expressed as the heat absorbed per unit mass of solute added and can be found as the derivative of the integral heat of mixing:

$$\overline{\Delta H_2} = (\partial \Delta H_{\text{mix}}/\partial m_2)_{T,p,n_1} \qquad \text{(A2)}$$

Here m_2 is the mass of polymeric solute. Values of $\overline{\Delta H_2}$ at infinite dilution for some polymer–solvent systems are listed in "Heats of Solution of Some Common Polymers".

The *partial or differential heat of dilution* $\overline{\Delta H_1}$ differs from $\overline{\Delta H_2}$ in that it is a consequence of adding solvent, rather than solute, to a solution and is almost always expressed as the heat per mol of added solvent. Accordingly,

$$\overline{\Delta H_1} = (\partial \Delta H_{\text{mix}}/\partial n_1)_{T,p,m_2} = (\partial H_{\text{soln}}/\partial n_1)_{T,p,m_2} - H_1^0 \qquad \text{(A3)}$$

It can also be obtained from the variation with concentration of the integral heat of dilution. Or it may be determined from the temperature dependence of the activity a_1 of solvent according to the Gibbs–Helmholtz equation

$$\Delta H_1 = \mathrm{R}[\partial \ln a_1/\partial(1/T)]_{p,n_1,m_2} \qquad \text{(A4)}$$

I turn, the activity a_1 of solvent in a polymer solution has a variety of sources including the osmotic pressure of the solution, the vapor pressure of solvent above the solution relative to that of the pure solvent, the gas-chromatographic retention volumes of volatile solvent on columns with polymeric solute as the stationary phase, swelling equilibria for polymer networks, the concentration dependence of Rayleigh scattering, and sedimentation equilibria. The first three methods are the ones used most frequently.

Entropy The entropy of mixing pure polymer with pure solvent can be obtained from the difference between the integral heat of mixing and the free energy of mixing

$$\Delta S_{\text{mix}} = (\Delta H_{\text{mix}} - \Delta G_{\text{mix}})/T \qquad \text{(A5)}$$

Free energies of mixing can be determined by integrating concentration-dependent functions of the chemical potential of the solvent.

More often, the partial molar entropy of solvent

$$(\partial \Delta S_{\text{mix}}/\partial n_1)_{T,p,m_2} = \overline{\Delta S_1} \qquad \text{(A6)}$$

is reported, using the temperature dependence of the activity of solvent

$$\overline{\Delta S_1} = -R[\ln a_1 + (\partial \ln a_1/\partial T)_{p,n_1,m_2}] \qquad \text{(A7)}$$

Volume Volume changes reported in the literature cited below are measured directly (dilatometry) or from density determinations.

B. KEY FOR THE TABLES

The following abbreviations are used to identify the experimental methods utilized for the studies cited:

CD	Calorimetry: integral heat of dilution
CM	Calorimetry: integral heat of mixing
D	Density
DL	Dilatometry
GC	Gas chromatography with polymeric stationary phase
LS	Rayleigh light scattering
OS	Osmotic pressure
SD	Sedimentation equilibrium
SW	Swelling of polymer network
VP	Vapor pressure including manometry, isopiestic distillation, vapor phase osmometry, etc.
XS	X-ray scattering

A Chemical Abstracts Service registry number accompanies most of the polymers named in the table. Although some polymers have more than one registry number owing to particular stereochemistries, different terminal groups, etc., only the most common number appears in the table for each polymer.

C. TABLES OF LITERATURE REFERENCES FOR HEAT, ENTROPY, AND VOLUME CHANGES FOR POLYMER–SOLVENT MIXTURES

TABLE 1. MAIN-CHAIN CARBON POLYMERS

Polymer–Solvent	Method	Refs.
1.1. POLY(DIENES)		
Poly(1,3-butadiene) [9003-17-2]		
Benzene	CD	140
	CM	19,84
	GC	308,327
	VP	73
cis-Bicyclo[4.4.0]decane	CM	293
trans-Bicyclo[4.4.0]decane	CM	293
1,3-Butadiene	DL	374
	GC	327
Butane	DL	374
	GC	327

TABLE 1. *cont'd*

Polymer–Solvent	Method	Refs.
Poly(1,3-butadiene) *cont'd*		
1-Butene	DL	374
cis-2-Butene	DL	374
trans-2-Butene	DL	374
Carbon dioxide	SW	350
Carbon tetrachloride	GC	308
1-Chlorobutane	GC	308
Chloroform	GC	308
	VP	119
Cyclohexane	CM	293
	GC	327
Cyclooctane	CM	293
Cyclopentane	CM	293
	GC	327
Decane	GC	327
3,3-Diethylpentane	CM	293
2,2-Dimethylbutane	GC	327
2,2-Dimethylpentane	CM	293
2,3-Dimethylpentane	CM	293
2,4-Dimethylpentane	CM	293
3,3-Dimethylpentane	CM	293
1,4-Dioxane	VP	165
Dodecane	CM	294
	GC	327
Ethane	SW	350
Ethylbenzene	GC	327
Ethylene	SW	350
3-Ethylpentane	CM	293
2,2,4,4,6,8,8-Heptamethylnonane	CM	294
Heptane	CM	294
	GC	327
Hexadecane	CM	294
Hexane	GC	327
2-Methylbutane	GC	327
3-Methylhexane	CM	293
2-Methylpropane	DL	374
	GC	327
2-Methylpropene	DL	374
Nonane	CM	294
	GC	327
Octane	CM	294
	GC	308,327
1-Octene	GC	308
2,2,4,6,6-Pentamethylheptane	CM	294
Pentane	GC	308,327
2,2,4,4-Tetramethylpentane	CM	293,294
2,3,3,4-Tetramethylpentane	CM	293
Toluene	CD	140
	GC	308,327
1,3,5-Trimethylbenzene	GC	327
2,2,4-Trimethylpentane	CM	294
m-Xylene	GC	327
Water	SW	388
Poly(chloroprene) [9010-98-4]		
Benzene	CM	19
	GC	308
Butyl alcohol	GC	308
Carbon tetrachloride	GC	308
2-Chloro-1,3-butadiene	VP	126
1-Chlorobutane	GC	308
Chloroform	GC	308
Decane	GC	308
Octane	GC	308
1-Octene	GC	308
2-Pentanone	GC	308

TABLE 1. *cont'd*

Polymer–Solvent	Method	Refs.
Poly(*cis*-1,3-isoprene) [9003-31-0] and [104389-31-3]		
Acetone	SW	9,120
	VP	120
Benzene	CM	6,8,55
	DL	5,166
	OS	5,166
	SW	9,121,130
	VP	5,8,74,130,166
Butane	VP	46
2-Butanone	DL	120
	SW	9,120
	VP	120
Butyl acetate	SW	9
Butyl butyrate	SW	9
Carbon disulfide	SW	9
Carbon tetrachloride	SW	9
Chloroform	SW	9
Cyclohexane	SW	9
2,4-Dimethyl-3-pentanone	SW	9
2,2-Dimethylpropane	VP	46
Ethyl acetate	DL	120
	SW	9,120
	VP	63,120
Heptane	CM	6
	SW	9
Hexane	VP	59
Isoprene	VP	126
Methyl acetate	SW	9,120
Methyl alcohol	VP	6
2-Methylbutane	VP	46
2-Methylpropane	VP	46
Octane	VP	177
Pentane	SW	9
	VP	46
2-Pentanone	SW	120
Propyl acetate	SW	9
Toluene	OS	1
	SW	9
	VP	1
2,2,4-Trimethylpentane	VP	177
Poly(*trans*-1,3-isoprene) [9003-31-0] and [104389-32-4]		
Octane	VP	177
Toluene	OS	2
2,2,4-Trimethylpentane	VP	167,177

1.2. POLY(ALKENES)

Poly(1-butene) [9003-28-5]		
cis-Bicyclo[4.4.0]decane	CM	293
trans-Bicyclo[4.4.0]decane	CM	293
Cyclohexane	CM	293
Cyclooctane	CM	293
Cyclopentane	CM	293
Decane	CM	248
3,3-Diethylpentane	CM	293
2,2-Dimethylpentane	CM	293
2,3-Dimethylpentane	CM	293
2,4-Dimethylpentane	CM	293
3,3-Dimethylpentane	CM	293
Dodecane	CM	248
	VP	107
3-Ethylpentane	CM	293
2,2,4,4,6,8,8-Heptamethylnonane	CM	294
Heptane	CM	248
Hexadecane	CM	248

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TABLE 1. *cont'd*

Polymer–Solvent	Method	Refs.
Hexane	CM	248
3-Methylhexane	CM	293
Nonane	CM	248
Octane	CM	248
	VP	102
2,2,4,6,6-Pentamethylheptane	CM	294
Pentane	CM	248
Tetradecane	CM	248
	GC	281
2,2,4,4-Tetramethylpentane	CM	293,294
2,3,3,4-Tetramethylpentane	CM	293
2,2,4-Trimethylpentane	CM	294
Poly(1-decene) [25189-70-2]		
Toluene	VP	195
Poly(1-dodecene) [25067-08-7]		
Toluene	VP	195
Poly(ethylene) [9002-88-4]		
Benzene	GC	299
Bromomethane	VP	87
2-Butanone	GC	351
Butyl acetate	GC	351
Butyl alcohol	GC	299
Carbon tetrachloride	GC	299
Chlorobenzene	GC	299,351
1-Chlorobutane	GC	351,299
Chloroform	GC	299,351
1-Chlorohexane	GC	351
1-Chloronaphthalene	CM	151,367
Cyclohexane	CM	367
	GC	299,351
Cyclohexanol	GC	299
Cyclohexanone	GC	299,351
Cyclohexyl chloride	GC	299
Cyclopentane	CM	367
Decahydronaphthalene	CD	246
	CM	367,369
Decane	DL	252
	GC	299,351
2,6-Di-*tert*-butyl-4-methylphenol	VP	361
1,5-Dichloropentane	GC	351
N,N-Dimethylacetamide	GC	351
N,N-Dimethylformamide	GC	351
1,2-Dimethylnaphthalene	GC	234
1,3-Dimethylnaphthalene	GC	234
1,4-Dimethylnaphthalene	GC	234
1,5-Dimethylnaphthalene	GC	234
1,6-Dimethylnaphthalene	GC	234
1,7-Dimethylnaphthalene	GC	234
1,8-Dimethylnaphthalene	GC	234
2,3-Dimethylnaphthalene	GC	234
2,6-Dimethylnaphthalene	GC	234
2,7-Dimethylnaphthalene	GC	234
2,4-Dimethylpentane	CM	367
Dodecane	VP	100,107,351
1-Ethylnaphthalene	GC	234
2-Ethylnaphthalene	GC	234
Ethyl propionate	GC	351
2,2,4,4,6,8,8-Heptamethylnonane	CM	367
Heptane	GC	351
	VP	38
Hexadecane	CM	367
Hexane	VP	87
2-Methylbutane	CM	367
1-Methylnaphthalene	GC	234
2-Methylnaphthalene	GC	234

TABLE 1. *cont'd*

Polymer–Solvent	Method	Refs.
Methyl sulfoxide	GC	351
Nonane	GC	299
Octacosane	SW	93
Octane	GC	281,351
1-Octene	GC	299
2-Pentanone	GC	299
Phenol	GC	299
Phenyl ether	VP	180
Propyl ether	GC	351
Propyl sulfide	GC	351
1,1,2,2-Tetrachloroethane	GC	351
Tetradecane	GC	281
1,2,3,4-Tetrahydronaphthalene	CM	151
Toluene	GC	351
1,2,4-Trichlorobenzene	CM	367
1,1,2-Trichloroethane	GC	351
p-Xylene	VP	131
Poly(1-heptene) [25511-64-2]		
Toluene	VP	195
Poly(isobutene) [9003-27-4], polyisobutylene		
Benzaldehyde	GC	291
Benzene	CD	72,98
	CM	19,88,94,116, 141,157,184,278
	D	73,82,128,211,254
	DL	69,137,159,184
	GC	263,287,291,378
	OS	61,159
	VP	56,73,159,259,318
cis-Bicyclo[4.4.0]decane	CM	293
trans-Bicyclo[4.4.0]decane	CM	293
Butane	VP	35
2-Butanone	GC	291
Butyl ether	CM	95
Butyl propionate	VP	105
Carbon tetrachloride	CD	104
	CM	104,116,278
	D	254
	VP	105
Chlorobenzene	CD	98
	CM	88,94,184
	D	82,254
	DL	137,184
	OS	96
Chloroform	D	254
	GC	291
Cyclohexane	CD	255
	CM	88,94,104,116, 184,278,293
	D	128
	DL	137,155,184
	GC	263,378
	LS	158
	OS	61
	VP	26,56,105,155
Cyclooctane	CM	293
Cyclopentane	CM	293
Decahydronaphthalene	D	254
Decane	CM	94
	D	254
	DL	137,160
Decyl alcohol	GC	291
o-Dichlorobenzene	D	254
p-Dichlorobenzene	D	254
3,3-Diethylpentane	CM	293

TABLE 1. *cont'd*

Polymer–Solvent	Method	Refs.
2,2-Dimethylbutane	GC	378
2,3-Dimethylbutane	GC	378
2,2-Dimethylhexane	GC	378
2,5-Dimethylhexane	GC	378
2,2-Dimethylpentane	CM	293
	GC	378
2,3-Dimethylpentane	CM	293
	GC	378
2,4-Dimethylpentane	CM	293
	GC	378
3,3-Dimethylpentane	CM	293
2,2-Dimethylpropane	VP	35
Dodecane	CM	94,278,294
	D	254
Ethyl acetate	GC	291
Ethylbenzene	CM	88,297,378
Ethyl decanoate	CM	95
Ethyl ether	CM	94,95
Ethyl heptanoate	CM	95
Ethyl hexadecanoate	CM	95
Ethyl hexanoate	CM	95
Ethyl nonanoate	CM	95
Ethyl octanoate	CM	95
3-Ethylpentane	CM	293
Ethyl tetradecanoate	CM	95
Heptadecane	D	254
2,2,4,4,6,8,8-Heptamethylnonane	CM	294
Heptane	CM	19,88,94,116,157, 184,278,294
	DL	69,137,160,184
	GC	263,378
	OS	221
Hexadecane	CM	94,278,294
	DL	160
Hexane	CM	94,184
	D	254
	DL	137,160,184
	GC	263,378
	OS	221
Hexyl ether	CM	95
Methyl alcohol	VP	105
2-Methylbutane	CM	94
	VP	35
Methylcyclohexane	CM	94,116,184
	DL	137,184
2-Methylheptane	GC	378
4-Methylheptane	GC	378
2-Methylhexane	GC	378
3-Methylhexane	CM	293
	GC	378
2-Methylpentane	GC	378
3-Methylpentane	CM	94
	GC	378
2-Methylpropane	VP	35
Naphthalene	GC	291
Nitrobenzene	GC	291
Nonane	CM	94,294
	GC	291,378
Octane	CM	94,294
	D	254
	DL	160
	GC	263,378
	OS	160
2,2,4,6,6-Pentamethylheptane	CM	294
Pentanal	GC	291

TABLE 1. *cont'd*

Polymer–Solvent	Method	Refs.
Pentane	CD	255
	CM	94,278
	D	254,338
	DL	97,160
	GC	263,378
	LS	238
	OS	221
	VP	35,97,156
Pentyl ether	CM	95
Propyl alcohol	GC	291
Propyl ether	CM	95
Pyridine	GC	291
Tetradecane	CM	94
1,2,3,4-Tetrahydronaphthalene	D	254
2,2,4,4-Tetramethylpentane	CM	293,294
2,3,3,4-Tetramethylpentane	CM	293
Toluene	CD	98,104
	CM	19,104,184
	D	254
	DL	69,137,184
	GC	291,378
	VP	105
Tridecane	CM	94
2,2,4-Trimethylpentane	CM	19,94,104,157,294
	D	211
	DL	69
	GC	287,378
	LS	145,158,238
	VP	14,237,259
2,3,4-Trimethylpentane	GC	378
Undecane	CM	94
Poly(1-octadecene) [25511-67-5]		
Toluene	VP	195
Poly(propylene) [9003-07-0]		
Benzene	CM	315
	D	315
	VP	101
cis-Bicyclo[4.4.0]decane	CM	293
trans-Bicyclo[4.4.0]decane	CD	293
Carbon tetrachloride	CD	280
	CM	315
	D	315
	VP	216
Chloroform	CD	280
	CM	315
	D	315
1-Chloronaphthalene	CM	151
Cyclohexane	CM	293,315
	D	315
Cyclooctane	CM	293
Cyclopentane	CM	293
Decane	CM	315
	GC	281
3,3-Diethylpentane	CM	293
2,2-Dimethylpentane	CM	293
2,3-Dimethylpentane	CM	293
2,4-Dimethylpentane	CM	293
3,3-Dimethylpentane	CM	293
2,4-Dimethyl-3-pentanone	VP	123
Dodecane	CM	294
	GC	281
	VP	125,171
Ethylbenzene	CM	315
3-Ethylpentane	CM	293
2,2,4,4,6,8,8-Heptamethylnonane	CM	294

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TABLE 1. *cont'd*

Polymer–Solvent	Method	Refs.
Heptane	CM	294,315
	D	315
	VP	101,217
Hexadecane	CM	294
Hexane	CM	315
	D	315
	VP	101
3-Methylhexane	CM	293
Nonane	CM	294,315
Nonyl alcohol	VP	134
Octane	CM	294,315
2,2,4,6,6-Pentamethylheptane	CM	294
Pentane	CM	315
	D	315
	VP	217
3-Pentanone	VP	117,123
Tetradecane	GC	281
1,2,3,4-Tetrahydronaphthalene	CM	151
2,2,4,4-Tetramethylpentane	CM	293,294
2,3,3,4-Tetramethylpentane	CM	293
Toluene	CM	315
2,2,4-Trimethylpentane	CM	294
	VP	101
m-Xylene	CM	315
o-Xylene	CM	315
p-Xylene	CM	315
1.3. POLY(ACRYLICS)		
Poly(acrylamide) [9003-05-8]		
Water	CD	313
	D	196,313
Poly(acrylic acid) [9003-01-4]		
Butyl alcohol	CM	381
N,N-Dimethylformamide	CM	381
Ethyl alcohol	CD	343
	D	343
Ethylene glycol	CD	292
	CM	292
Formamide	CD	292
	CM	292
Water	CD	233,292,343
	CM	292,381
	D	196,343
	VP	366
Poly(butyl methacrylate) [9003-63-8]		
Benzene	GC	307
Butyl acetate	CM	55
	GC	307
Butyl alcohol	GC	307
Butylbenzene	GC	307
tert-Butylbenzene	GC	307
Butylcyclohexane	GC	307
Carbon tetrachloride	GC	307
Chlorobenzene	GC	307
1-Chlorobutane	GC	307
Chloroform	CM	260
	GC	307
Cyclohexane	GC	307
Cyclohexanol	GC	307
Decane	GC	307
Dichloromethane	GC	307
Octane	GC	307
2-Pentanone	GC	307
3,4,5-Trimethylheptane	GC	307
2,2,4 ~ -Trimethylpentane	GC	307

TABLE 1. *cont'd*

Polymer–Solvent	Method	Refs.
Poly(*N,N*-dimethylacrylamide) [26793-31-0]		
Water	CD	313
	D	313
Poly(ethyl methacrylate) [9003-42-3]		
Acetone	CD	284
Acetonitrile	CD	284
Acrylonitrile	CD	284
Benzene	CD	284
Bromobenzene	CD	284
1-Bromobutane	CD	284
2-Butanone	CD	284
Butyl acetate	CD	284
Butyl alcohol	CD	284
Butylamine	CD	284
Butyraldehyde	CD	284
Carbon tetrachloride	CD	284
Chlorobenzene	CD	284
Chloroform	CD	284
Cyclohexane	CD	284
Decane	CD	284
Ethane	D	360
Ethylbenzene	CD	284
Ethylcyclohexane	CD	284
Ethylene	D	360
Heptane	CD	284
Methylcyclohexane	CD	284
Nitroethane	CD	284
Nitromethane	CD	284
1-Nitropropane	CD	284
Nonane	CD	284
Octane	CD	284
1-Octene	CD	284
Pentyl alcohol	CD	284
Propane	D	360
	VP	341
Propionic acid	CD	284
Propionitrile	CD	284
Propyl acetate	CD	284
Propyl alcohol	CD	284
Propyl ether	CD	284
Toluene	CD	284
Poly(*N*-isopropylacrylamide) [25189-55-3]		
Acetic acid	GC	198
Butyl alcohol	GC	198,281
1-Chloronaphthalene	GC	198
Hexadecane	GC	198
Naphthalene	GC	198
Water	CM	353
	OS	368
Poly(methacrylic acid) [54193-36-1]		
Water	CM	381
Poly(*N*-methylacrylamide) [25722-14-9]		
Water	CD	313
	D	313
Poly(methyl acrylate) [9003-21-8]		
Benzene	GC	282
Butylbenzene	GC	282
tert-Butylbenzene	GC	282
Butylcyclohexane	GC	282
Cyclohexane	GC	282
cis-Decahydronaphthalene	GC	282
trans-Decahydronaphthalene	GC	282
Decane	GC	282
Dodecane	GC	282
Ethylbenzene	GC	282
Naphthalene	GC	282

TABLE 1. *cont'd*

Polymer–Solvent	Method	Refs.
Octane	GC	282
Tetradecane	GC	282
1,2,3,4-Tetrahydronaphthalene	GC	282
3,3,4,4-Tetramethylhexane	GC	282
Toluene	GC	282
3,4,5-Trimethylheptane	GC	282
2,2,5-Trimethylhexane	GC	282
2,2,4-Trimethylpentane	GC	282
Poly(methyl methacrylate) [9011-14-7]		
Acetone	CD	148,161
	D	60,178
	OS	31,178,261
	VP	220
Benzene	CD	162,186
	CM	224
	D	60,178
	OS	31,178,261
	VP	220
2-Butanone	D	60
	OS	261
Butyl acetate	D	60
	OS	36
Carbon dioxide	DL	387
	VP	387
Carbon tetrachloride	D	60
Chlorobenzene	CD	162
	D	60
Chloroform	CD	212
	CM	193
	D	60
	DL	210
	OS	31
Cyclohexane	OS	261
o-Dichlorobenzene	CD	162
	CM	266
	D	60
Dichloroethane	CM	83
	VP	83
1,2-Dichloroethylene	OS	149
1,4-Dioxane	CD	148
	D	60
	OS	31,149
Ethyl acetate	D	60
	OS	36,261
Methyl isobutyrate	CM	83
	VP	83
3-Pentanone	D	60
	OS	31
Tetrahydrofuran	D	60
	OS	31
Toluene	CD	148,212
	D	60
	DL	210
	OS	31,261
m-Xylene	D	60
	OS	31
1.4. VINYL POLYMERS		
Poly(acrylonitrile) [25014-41-9]		
Acrylonitrile	VP	126
Benzene	CM	47
	VP	47
N,N-Dimethylformamide	CM	47
Poly(vinyl acetate) [9003-20-7]		
Acetone	CM	75,184,345
	DL	184

TABLE 1. *cont'd*

Polymer–Solvent	Method	Refs.
	GC	354
	LS	158
	OS	261
	VP	37,75
Acetonitrile	GC	354
Benzene	CD	170
	CM	41,224
	GC	288,295,299,354
	OS	261
	VP	37,76,85
2-Butanone	CD	170
	CM	184
	DL	184
	GC	354
	LS	158
	OS	15,261
Butyl acetate	CM	55,184
	DL	184
Butyl alcohol	GC	299
Butylbenzene	GC	288
Butylcyclohexane	GC	288
Carbon tetrachloride	GC	299,354
Chlorobenzene	CM	41
	D	49,82
	GC	299,354
	LS	158
1-Chlorobutane	GC	299
Chloroform	CM	41,345
	GC	299,354
1-Chlorohexane	GC	354
1-Chloropropane	VP	37
3-Chloropropene	VP	37
Cyclohexane	GC	288,295,299,354
	OS	261
Cyclohexanol	GC	299
Cyclohexanone	GC	299
Cyclohexyl chloride	GC	299
cis-Decahydronaphthalene	GC	288
Decane	GC	288,299
Dichloroethane	CD	232
1,2-Dichloroethane	CM	41
	GC	295,354
1,5-Dichloropentane	GC	354
Diethyl adipate	CD	27
	D	27
Diethyl malonate	CD	27
	D	27
Diethyl oxalate	CD	27
	D	27
Diethyl sebacate	CD	27
	D	27
Diethyl succinate	CD	27
	D	27
N,N-Dimethylacetamide	GC	354
N,N-Dimethylformamide	GC	354
1,4-Dioxane	CM	342
	GC	295,354
Dodecane	GC	288
Ethyl acetate	CM	30,184
	D	211
	DL	184
	GC	354
	LS	158
	OS	261
	VP	237

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TABLE 1. *cont'd*

Polymer–Solvent	Method	Refs.
Heptane	GC	295,354
3-Heptanone	CM	141,184
	DL	184
Hexane	GC	354
Isopropyl alcohol	GC	295
Isopropylamine	VP	37
Methyl acetate	CM	184
	DL	184
Methyl alcohol	CD	271
	CM	41,48,345
	D	211,271
	LS	158
Methyl sulfoxide	GC	354
Nonane	GC	288,299
1-Octene	GC	299
2-Pentanone	CM	184
	DL	184
	GC	299
Propyl acetate	CM	184
	DL	184
Propyl alcohol	VP	37
Propylamine	VP	37
Propyl ether	GC	354
Propyl sulfide	GC	354
1,1,2,2-Tetrachloroethane	CM	41,48
Tetrahydrofuran	GC	354
1,2,3,4-Tetrahydronaphthalene	GC	288
3,3,4,4-Tetramethylhexane	GC	288
Toluene	CD	64,232
	CM	41
	GC	295,354
	OS	261
1,2,3-Trichloropropane	OS	15
Undecane	GC	288
Vinyl acetate	VP	85
Water	CM	342
Poly(vinyl alcohol) [9002-89-5]		
Carbon tetrachloride	CM	359
Chloroacetic acid	CM	112
1,4-Dioxane	CD	342
Ethyl alcohol	CM	30
Water	CD	57,58
	CM	30,55,342
	LS	219
	VP	86,219
Poly(*N*-vinylcarbazole) [25067-59-8]		
Benzene	CD	161
	VP	124
Poly(vinyl chloride) [9002-86-2]		
Benzene	GC	295
Cyclohexane	GC	295
Cyclohexanone	CD	231
	CM	106,231
	D	273
	DL	106
Cyclopentanone	CD	243
	CM	243
Dibutyl phthalate	VP	250
Dichloroethane	CM	55
1,2-Dichloroethane	GC	295
Diethyl phthalate	VP	250
Dioctyl phthalate	VP	250
1,4-Dioxane	GC	295
Dodecane	GC	281
Heptane	GC	295

TABLE 1. *cont'd*

Polymer–Solvent	Method	Refs.
Isopropyl alcohol	GC	295
Tetrahydrofuran	CD	244
	CM	244
Toluene	GC	295
Poly(vinylidene fluoride) [24937-79-9]		
Acetophenone	GC	354
2-Butanone	GC	354
Butyl acetate	GC	354
Butylbenzene	GC	354
γ-Butyrolactone	GC	354
Chlorobenzene	GC	354
1-Chlorodecane	GC	354
2-Chloroethyl ether	GC	354
1-Chlorohexane	GC	354
1-Chlorooctane	GC	354
Cyclohexanone	GC	354
cis-Decahydronaphthalene	GC	354
1,2-Dichlorobenzene	GC	354
1,2-Dichloroethane	GC	354
1,5-Dichloropentane	GC	354
N,N-Dimethylacetamide	GC	354
N,N-Dimethylethyleneurea	GC	354
N,N-Dimethylformamide	GC	354
N,N-Dimethylpropyleneurea	GC	354
Dodecane	GC	354
Ethyl acetate	GC	354
Ethylbenzene	GC	354
Ethyl propionate	GC	354
Hexadecane	GC	354
Hexamethylphosphoramide	GC	354
1-Methyl-2-pyrrolidinone	GC	354
Methyl sulfoxide	GC	354
Pentachloroethane	GC	354
Propylene carbonate	GC	354
Propyl sulfide	GC	354
Pyridine	GC	354
1,1,2,2-Tetrachloroethane	GC	354
Tetradecane	GC	354
Tetrahydronaphthalene	GC	354
Tetramethylene sulfone	GC	354
1,1,3,3-Tetramethylurea	GC	354
Toluene	GC	354
1,1,2-Trichloroethane	GC	354
m-Xylene	GC	354
Poly(vinyl methyl ether) [9003-09-2]		
Cyclohexane	VP	372
Ethylbenzene	CM	332
	D	332
	OS	332
Toluene	CM	332
	D	332
	OS	332
Water	CM	353
Poly(2-vinylpyridine) [25014-15-7]		
Benzene	D	267
2-Butanone	D	267
Butyl alcohol	D	267
Cyclohexanone	D	267
1,4-Dioxane	D	267
Ethyl alcohol	D	267
	LS	111
Methyl alcohol	D	267
Propyl alcohol	D	267
Poly(*N*-vinylpyrrolidone) [9003-39-8]		
Butyl alcohol	CD	309

TABLE 1. *cont'd*

Polymer–Solvent	Method	Refs.
Chloroform	CD	330
	CM	174
	D	174
Ethyl alcohol	CD	309
Methyl alcohol	CD	269
Propyl alcohol	CD	309
Water	CD	269
	CM	174
	D	174
	OS	214

1.5. POLY(STYRENES)

Poly(*p*-bromostyrene) [24936-50-3]		
Toluene	VP	103
Poly(*p*-chlorostyrene) [24991-47-7]		
Benzene	GC	363
Ethyl acetate	VP	199
Heptane	GC	363
Hexane	GC	363
Isopropylbenzene	GC	363
Pentane	GC	363
Propylbenzene	GC	363
Toluene	GC	363
	VP	103
Poly(α-methylstyrene) [25014-31-7]		
Benzene	CM	223
Isopropylbenzene	VP	136
α-Methylstyrene	VP	136,355
Toluene	VP	355
Poly(*p*-methylstyrene) [24936-41-2]		
Toluene	VP	103
Poly(styrene) [9003-53-6]		
Acetic acid	GC	306
Acetone	CM	29,34,43
	D	43,60
	GC	306
	OS	261
	VP	51,220
Acetonitrile	GC	306,354
Acetophenone	CD	279
Aniline	GC	306
Anisole	CD	135,279,286
	GC	336
Benzaldehyde	GC	306
Benzene	CD	28,70,81,147, 191,192,225
	CM	19,29,32,44,55, 90,184,192 222, 333
	D	24,39,60,128,247, 283,296,329
	DL	12,69,184
	GC	235,282,305,306, 307,325,336,354
	LS	23,114,143, 145,158
	OS	12,33,147,261
	SW	147
	VP	13,28,32,147, 192,220
	XS	200
Benzyl alcohol	GC	306
Benzyl ether	CD	279
Bromobenzene	D	25

TABLE 1. *cont'd*

Polymer–Solvent	Method	Refs.
Butane	VP	337
2-Butanone	CD	135,249,255
	CM	29,68,146
	D	24,39,45,60
	DL	12,207,256
	GC	235,306,354
	OS	12,18,33, 207,256,261
	VP	17
Butyl acetate	CM	29
	D	60
	GC	306
	OS	33
	VP	13
Butyl alcohol	GC	306
sec-Butyl alcohol	SW	115
Butylbenzene	CM	184
	DL	184
	GC	282,325
tert-Butylbenzene	GC	307
Butylcyclohexane	GC	282
Carbon dioxide	DL	339
Carbon tetrachloride	CD	104,240
	CM	104,240
	D	60
	GC	235,306,307
	LS	114
	OS	33
	VP	13,220
Chlorobenzene	CD	53
	CM	53,146
	D	25,60,82
	GC	306,354
	LS	114
	OS	127
	SW	115
1-Chlorobutane	GC	307
Chloroform	CD	54,191,225
	CM	29
	D	45,60,82
	GC	306,307,354
	OS	33
	SW	115
	VP	51
1-Chlorohexane	GC	354
Cyclohexane	CD	53,70,81,192,285
	CM	29,34,43,53, 184,192,359
	D	43,45,60,189, 211,296,329
	DL	12,69,184, 189,209
	GC	282,306, 307,325,354
	LS	114,143,190,206
	OS	18,33,71,80,261
	SD	189,229
	SW	115
	VP	13,52,80, 192,237,259
Cyclohexanone	CD	289
	GC	306,354
Cyclohexene	CD	192
	CM	29,192
	VP	201

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TABLE 1. *cont'd*

Polymer–Solvent	Method	Refs.
Decahydronaphthalene	CD	192
	CM	184,192,359
	D	24
	DL	184
	LS	114,145
	VP	201
cis-Decahydronaphthalene	GC	282
trans-Decahydronaphthalene	GC	282
	LS	238
	OS	290
Decane	GC	281,282,305,307
o-Dichlorobenzene	D	24,60
	GC	235
1,2-Dichloroethane	GC	306,354
Dichloromethane	GC	306,307
1,5-Dichloropentane	GC	354
N,N-Dimethylformamide	GC	354
2,2-Dimethylpropane	VP	245
1,4-Dioxane	CD	135
	CM	55,184
	D	24,60
	DL	184
	GC	235,306,354
	OS	127
	VP	13
1,3-Diphenylbutane	CD	113,147
	SW	113,147
Dodecane	GC	281,282
Ethane	VP	337
2-Ethoxyethyl acetate	CM	29
Ethyl acetate	CD	135,257
	CM	29,68
	D	24,60,296
	DL	257
	GC	306
	OS	18,33,261
	VP	52
Ethyl alcohol	GC	306
Ethylbenzene	CD	50,53,54,81,113, 147,192,228,255
	CM	30,44,53,78,90, 104,184,192, 228,264
	D	24,39,113,147,211
	DL	69,184,208
	GC	235,325,336,354
	LS	114
	OS	113,147,208
	SW	113,115,147
	VP	50,90.113,147, 237,259
Ethylene glycol	GC	306
Ethyl ether	GC	306
Formamide	GC	306
Heptane	GC	306,325,335,354
	SW	115
Hexadecane	GC	281,282
Hexane	GC	306,325,335,354
	SW	115
Hexyl alcohol	SW	115
Hexylbenzene	GC	325
Isobutyl alcohol	GC	306
Isopentyl alcohol	SW	115
Isopropyl alcohol	GC	306

TABLE 1. *cont'd*

Polymer–Solvent	Method	Refs.
Isopropyl ether	GC	306
Methyl alcohol	GC	306
2-Methylbutane	VP	245
2-Methylheptane	GC	325
2-Methylpentane	GC	325
3-Methylpentane	GC	325
Naphthalene	GC	282
Nitrobenzene	GC	306
Nitromethane	VP	13
Nonane	GC	305,325
Octane	GC	305,306,307,325
	SW	115
	VP	13
1-Octene	GC	325
cis-2-Octene	GC	325
Octyl alcohol	GC	306
Pentane	GC	306
	SW	115
	VP	245
3-Pentanone	CD	319
	D	60
	VP	13
Pentyl alcohol	GC	306
Pentylbenzene	GC	325
Propane	VP	337
Propyl acetate	VP	51
Propyl alcohol	GC	306
	SW	115
Propylbenzene	CM	184
	DL	184
	GC	325
Propyl ether	GC	354
	VP	13
Propyl sulfide	GC	354
Pyridine	GC	306,336,354
Styrene	CM	10,29
	GC	235
	VP	126
Tetradecane	GC	281,282
Tetrahydrofuran	D	60
	GC	306
1,2,3,4-Tetrahydronaphthalene	CM	192
	GC	282
3,3,4,4-Tetramethylhexane	GC	282
Toluene	CD	28,53,54,81,135, 183,188,191,192, 225,228,240, 255,286
	CM	29,34,43,53,55,90, 146,154,184,192, 226,228,240, 264,332,333
	D	11,24,39,43, 45,60,189,332
	DL	12,69,184, 189,210
	GC	235,305,306, 325,336,354
	LS	114,190
	OS	12,18,33,71,144, 203,261,332
	SD	189
	SW	115
	VP	13,17,28,52,103

TABLE 1. *cont'd*

Polymer–Solvent	Method	Refs.
Trichloroethylene	GC	306
1,3,5-Trimethylbenzene	CM	29,184
	D	60
	DL	184
	GC	305
3,4,5-Trimethylheptane	GC	307
2,2,4-Trimethylpentane	GC	306,307,325
Water	GC	306
m-Xylene	CM	29,184
	D	60
	DL	184
	GC	305
	OS	33
	VP	13
o-Xylene	CM	29
	GC	235,306
	OS	33
1.6. OTHER COMPOUNDS		
Poly(nitro-1,4-phenylene)	VP	187
1,4-Dioxane		

TABLE 2. MAIN-CHAIN CARBON HETEROATOM POLYMERS

Polymer–Solvent	Method	Refs.
2.1. POLY(OXIDES) AND POLY(ESTERS)		
Epoxy from bis(4-glycidylphenyl) propane and 1,6 hexanediamine		
Chloroform	SW	110
	VP	110
1,4-Dioxane	SW	110
	VP	110
Poly(oxy-1,4-butanediyl) [25190-06-1], polytetrahydrofuran		
Acetone	GC	376
Acetonitrile	GC	376
Benzene	GC	376
2-Butanone	GC	376
Butyl acetate	GC	376
Carbon tetrachloride	GC	376
Chlorobenzene	GC	376
Chloroform	GC	376
1-Chlorohexane	GC	376
Cyclohexane	GC	376
Decane	GC	376
1,2-Dichloroethane	GC	376
Dichloromethane	GC	376
1,5-Dichloropentane	GC	376
1,4-Dioxane	GC	376
Ethyl acetate	GC	376
Ethylbenzene	GC	376
Heptane	GC	376
Propyl ether	GC	376
Propyl sulfide	GC	376
Pyridine	GC	376
Tetrahydrofuran	GC	376
Toluene	GC	376
Poly(oxycarbonyloxy-1,4-phenyleneisopropylidene-1,4-phenylene) [24936-68-3] and [25037-45-0], poly(bisphenol A carbonate), poly(carbonate)		
Acetone	DL	386
Benzene	GC	362
Butyl acetate	GC	362
Butylbenzene	GC	362
tert-Butylbenzene	GC	362

TABLE 2. *cont'd*

Polymer–Solvent	Method	Refs.
Butylcyclohexane	GC	362
Carbon dioxide	CM	377,385
	DL	338,386
Chlorobenzene	GC	310,362
Chloroform	GC	362
Cyclohexanol	GC	362
Cyclohexanone	GC	362
Decane	GC	310,362
o-Dichlorobenzene	GC	310
Dichloromethane	GC	362
1,4-Dioxane	CD	161
Dodecane	GC	362
Ethylbenzene	GC	362
Methane	DL	386
Methylcyclohexane	GC	362
2-Pentanone	GC	362
Propyl alcohol	GC	362
1,1,2,2-Tetrachloroethane	GC	362
Tetradecane	GC	362
Toluene	GC	362
Water	DL	386
Poly(oxyethylene) [25322-68-3] and [9004-74-4], poly(ethylene glycol), poly(ethylene oxide)		
Acetone	GC	268,302,317,376
Acetonitrile	GC	268,320,376
Acetophenone	GC	316
Aniline	GC	239
Benzaldehyde	GC	239
Benzene	CD	262,312
	CM	138,277,312
	D	213,382
	GC	239,268,274,276, 302,317,320,376
	VP	175,213
Benzyl alcohol	GC	239
p-Bromoacetophenone	GC	316
2-Butanone	GC	268,302,320,376
Butyl acetate	GC	268,376
Butyl alcohol	CD	218
	GC	258,268,302
sec-Butyl alcohol	GC	258,302
Carbon tetrachloride	CM	129,185,277,357
	DL	185
	GC	268,302,376
	VP	185,357
p-Chloroacetophenone	GC	316
Chlorobenzene	GC	239,317
Chloroform	CD	230
	CM	185,230
	DL	185
	GC	268,302,320,376
	VP	117,185
1-Chlorohexane	GC	376
Chloromethane	CD	230
	CM	230
Cyclohexane	GC	302,317,320
Decane	GC	239,302,320,376
1,2-Dichloroethane	GC	268,376
Dichloromethane	GC	276,376
1,5-Dichloropentane	GC	376
1,2-Dimethoxyethane	GC	320
1,2-Dimethylnaphthalene	GC	234
1,3-Dimethylnaphthalene	GC	234
1,4-Dimethylnaphthalene	GC	234
1,5-Dimethylnaphthalene	GC	234

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TABLE 2. *cont'd*

Polymer–Solvent	Method	Refs.
1,6-Dimethylnaphthalene	GC	234
1,7-Dimethylnaphthalene	GC	234
1,8-Dimethylnaphthalene	GC	234
2,3-Dimethylnaphthalene	GC	234
2,6-Dimethylnaphthalene	GC	234
2,7-Dimethylnaphthalene	GC	234
1,4-Dioxane	CM	129
	GC	302,320,376
Dodecane	GC	239,302,320
2-Ethoxyethyl ether	GC	317
Ethyl acetate	GC	276,317,320,376
Ethyl alcohol	CD	218
	CM	138,277
	GC	258,276,302,317
Ethylbenzene	GC	320,376
Ethyl ether	GC	302
1-Ethylnaphthalene	GC	234
2-Ethylnaphthalene	GC	234
o-Fluoroacetophenone	GC	316
p-Fluoroacetophenone	GC	316
Heptane	GC	239,302,320,376
3-Heptanone	GC	302
1-Heptene	GC	302
Heptyl alcohol	GC	258
Hexane	GC	239,276,302,317
2-Hexanol	GC	258
3-Hexanol	GC	258
1-Hexene	GC	302
Hexyl alcohol	GC	258
o-Hydroxyacetophenone	GC	316
p-Hydroxyacetophenone	GC	316
Isopropyl alcohol	GC	258,320
o-Methoxyacetophenone	GC	316
p-Methoxyacetophenone	GC	316
2-Methoxyethyl ether	GC	320
Methyl acetate	GC	302
o-Methylacetophenone	GC	316
p-Methylacetophenone	GC	316
Methyl alcohol	CD	218
	CM	138,277
	GC	258,268,274,317
	LS	242
1-Methylnaphthalene	GC	234
2-Methylnaphthalene	GC	234
o-Nitroacetophenone	GC	316
p-Nitroacetophenone	GC	316
Nitroglycerin	GC	346
Nitromethane	GC	302
Nonane	GC	239,302,344
Octane	GC	239,302,317
Octyl alcohol	GC	258
Pentane	GC	302
2-Pentanol	GC	258
Pentyl alcohol	GC	258
Phenol	GC	239
Phenyl acetate	GC	239
Propyl alcohol	GC	258,317,320,344
Propyl ether	GC	376
Propyl sulfide	GC	376
Pyridine	GC	302,320,376
Tetrahydrofuran	GC	268,376
Toluene	GC	268,302,317, 320,376
	LS	314
1,1,2-Trichloroethane	GC	268

TABLE 2. *cont'd*

Polymer–Solvent	Method	Refs.
2,2,2-Trifluoroethanol	GC	320
Undecane	GC	239,302
Water	CD	150,230,303,312, 324,352,365
	CM	62,91,139,194, 230,311,312,324, 348,356
	D	62,176,300, 365,382
	GC	268
	OS	214,368
	VP	62,176,375
m-Xylene	GC	302
o-Xylene	GC	268
Poly(oxyethyleneoxyadipoyl) [24937-05-1]		
1,2-Dimethylnaphthalene	GC	234
1,3-Dimethylnaphthalene	GC	234
1,4-Dimethylnaphthalene	GC	234
1,5-Dimethylnaphthalene	GC	231
1,6-Dimethylnaphthalene	GC	234
1,7-Dimethylnaphthalene	GC	234
1,8-Dimethylnaphthalene	GC	234
2,3-Dimethylnaphthalene	GC	231
2,6-Dimethylnaphthalene	GC	234
2,7-Dimethylnaphthalene	GC	234
1,4-Dioxane	CD	265
	CM	132
	D	265
	VP	132,165
1-Ethylnaphthalene	GC	234
2-Ethylnaphthalene	GC	234
1-Methylnaphthalene	GC	234
2-Methylnaphthalene	GC	234
Poly(oxyethyleneoxysebacoyl) [26762-06-11]		
Butyl butyrate	VP	197
1,4-Dioxane	CM	132
	VP	132
Poly(oxyethyleneoxysuccinyl) [25667-11-2]		
1,4-Dioxane	CM	132
	VP	132
Poly(oxyhexamethyleneoxyadipoyl) [24937-10-8]		
1,4-Dioxane	CD	265
	D	265
Poly(oxy-1-oxopentamethylene) [26354-94-9]		
1,4-Dioxane	CD	265
	D	265
Poly(oxypropylene) [25322-69-4], poly(propylene glycol), poly(propylene oxide)		
Benzene	CM	347,349
	GC	331
	VP	215
Butyl alcohol	CM	118
	DL	118
	SW	118
sec-Butyl alcohol	CM	118
	SW	118
tert-Butyl alcohol	CM	118
	SW	118
Carbon tetrachloride	CM	118,163,371
	DL	163
	SW	118
	VP	163,371
Chloroform	CM	163
	DL	163
	VP	163

TABLE 2. *cont'd*

Polymer–Solvent	Method	Refs.
Cyclohexane	CM	118
	GC	331
	SW	118
Cyclohexene	GC	331
Ethyl alcohol	CM	118,347,348
	DL	118
	SW	118
Heptane	GC	331
1-Heptene	GC	331
2-Heptene	GC	331
Hexane	CD	241
	CM	118,241
	D	241
	GC	331
	SW	118
1-Hexene	GC	331
cis-2-Hexene	GC	331
trans-2-Hexene	GC	331
Isobutyl alcohol	CM	118
	SW	118
Isopropyl alcohol	CM	118
	SW	118
Methyl alcohol	CM	89
	D	89
	VP	89
2-Methylhexane	GC	331
2-Methylpentane	GC	331
Nonane	GC	344
2-Pentanol	CM	118
	SW	118
Pentyl alcohol	CM	118
	SW	118
Propyl alcohol	CM	118
	GC	344
	SW	118
Pyridine	CM	347
Water	CD	241
	CM	62,91,164,241,272, 311,322,348,353,373
	D	62,241
	VP	62,323
Poly(oxytrimethyleneoxyadipoyl) [36221-42-8]		
1,4-Dioxane	CM	132
	VP	132
2.2. POLY(AMIDES)		
Poly[L-iminocarbonyl(benzyloxycarbonylethyl) methylene] [25038-53-3], poly(γ-benzyl-L-glutamate)		
Chloroform	CD	179
Dichloroacetic acid	CD	179
	CM	142
1,2-Dichloroethane	CM	142
	D	133
	VP	133
N,N-Dimethylformamide	VP	227
Pyridine	D	133
	VP	133
Poly[L-iminocarbonyl(benzyloxycarbonylmethyl) methylene] [25736-41-8], poly(γ-benzyl-L-aspartate)		
Chloroform	D	133
	VP	133
Poly[imino(1-oxohexamethylene)] [25038-54-4], nylon 6		
Decyl alcohol	VP	197
Water	VP	370

TABLE 2. *cont'd*

Polymer–Solvent	Method	Refs.
2.3. POLY(SILOXANES)		
Poly(oxydimethylsilylene) [9016-00-6], poly(dimethylsiloxane)		
Acetone	SW	182
Benzene	CD	253
	CM	20,116,169
	D	169
	SW	182
	VP	20,204
cis-Bicyclo[4.4.0]decane	CM	293
trans-Bicyclo[4.4.0]decane	CM	293
Bromocyclohexane	CM	184
	DL	184
Butane	VP	99
2-Butanone	CM	141,184,205,380
	DL	184
	GC	383
	LS	380
	SW	182
Butyl acetate	CM	122
Butyl ether	CM	122
Butyl propionate	CM	122
Carbon dioxide	CM	377
Carbon tetrachloride	CM	116
Chlorobenzene	CM	116
	GC	310
	OS	168
Cyclohexane	CM	116,169,293
	D	169
	OS	168
Cyclopentane	CM	293
Cyclooctane	CM	293
Decane	CD	253
	CM	95
	GC	270,310
Decyl acetate	CM	122
o-Dichlorobenzene	GC	310
Diethoxymethane	CM	122
3,3-Diethylpentane	CM	293
1,2-Dimethoxyethane	CM	122
2,3-Dimethylbutane	GC	270
2,5-Dimethylhexane	GC	270
2,2-Dimethylpentane	CM	293
	GC	270
2,3-Dimethylpentane	CM	293
2,4-Dimethylpentane	CM	293
3,3-Dimethylpentane	CM	293
2,2-Dimethylpropane	VP	99
Dodecane	CM	95,294
Ethyl acetate	CM	122,184,205
	DL	184
Ethylbenzene	CD	253
	CM	169
	D	169
	VP	204
Ethyl butyrate	CM	122
Ethyl decanoate	CM	122
Ethyl dodecanoate	CM	122
Ethyl ether	CM	122,205
Ethyl heptanoate	CM	122
Ethyl hexanoate	CM	122
Ethyl nonanoate	CM	122
Ethyl octanoate	CM	122
3-Ethylpentane	CM	293
Ethyl pentanoate	CM	122

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TABLE 2. *cont'd*

Polymer–Solvent	Method	Refs.
Ethyl propionate	CM	122
Ethyl undecanoate	CM	122
2,2,4,4,6,8,8-Heptamethylnonane	CM	294
Heptane	CD	253
	CM	95,116,169,184
	D	169
	DL	184
	GC	270
Heptyl acetate	CM	122
Hexadecane	CM	95,294
Hexamethyldisiloxane	CD	253
	CM	181,184
	DL	184
Hexane	CD	253
	CM	95,184
	DL	184
	GC	270
	VP	204
Hexyl acetate	CM	122
Hexyl alcohol	SW	182
Hexyl ether	CM	122
Isopropylbenzene	CM	169
	D	169
Methyl alcohol	SW	182
Methyl butyrate	CM	122
Methylcyclohexane	CM	169
	D	169
Methyl decanoate	CM	122
Methyl heptanoate	CM	122
3-Methylhexane	CM	293
Methyl heptanoate	CM	122
Methyl nonanoate	CM	122
Methyl octanoate	CM	122
Methyl pentanoate	CM	122
2-Methylpropane	VP	99
Methyl propionate	CM	122
Nonane	CM	95
	GC	270
Nonyl acetate	CM	122
Octamethylcyclotetrasiloxane	CM	40,184
	DL	184
	VP	40
Octamethyltrisiloxane	CD	253
Octane	CD	253
	CM	95,294
	GC	270
	VP	204
Octyl acetate	CM	122
2,2,4,6,6-Pentamethylheptane	CM	294
Pentane	CD	253
	CM	95
	GC	270
	VP	99
2-Pentanone	SW	182
Pentyl acetate	CM	122
Pentyl ether	CM	122
Pentyl propionate	CM	122
Propyl acetate	CM	122,184
	DL	184
Propyl alcohol	SW	182
Propyl ether	CM	122
Propyl propionate	CM	122
Tetradecane	CD	253
	CM	95
2,2,4,4-Tetramethylpentane	CM	293,294

TABLE 2. *cont'd*

Polymer–Solvent	Method	Refs.
2,3,3,4-Tetramethylpentane	CM	293
Toluene	CD	253
	CM	169
	D	169
	OS	168
	SW	182
	VP	204,372
Tridecane	CM	95,205
1,3,5-Trimethylbenzene	CM	169
	D	169
2,2,4-Trimethylpentane	CM	294
	GC	270
Undecane	CM	95
m-Xylene	CM	169
	D	169
	SW	182
o-Xylene	CM	169
	D	169
	SW	182
p-Xylene	CD	253
	CM	169
	D	169
	SW	182

2.4. DERIVATIVES OF CELLULOSE

Cellulose acetate [9004-35-7]		
Acetone	D	65,152
	LS	304
	OS	65
	VP	65,108
Acetonitrile	D	152
Aniline	D	152
Chloroform	D	152
	VP	109
Chloromethane	D	152
N,N-Dimethylacetamide	CM	251
1,4-Dioxane	D	152
	VP	108
Ethyl alcohol	DL	335
Methyl acetate	D	152
	VP	108
Methyl sulfoxide	CM	251
	VP	109
Phenol	D	65
	OS	65
	VP	65
Pyridine	D	152
	VP	108
Tetrachloroethane	D	3
	OS	3
Cellulose nitrate [9004-70-0], nitrocellulose		
Acetone	CD	4,7
	CM	21,55
	D	4,7,128
	OS	202
	VP	4,7,16,42,67,108
Acetonitrile	VP	42
2-Butanone	D	128
Butyl acetate	CM	21,55
	D	128
Cyclopentanone	VP	42
Dibutyl phthalate	CM	21,328,379
2,4-Dimethyl-3-pentanone	VP	42
1,4-Dioxane	VP	42

TABLE 2. *cont'd*

Polymer–Solvent	Method	Refs.
Ethyl acetate	CM	21,22
	D	128
Ethyl propyl ether	VP	42
2-Heptanone	D	128
Methyl acetate	D	128
	VP	108
Methyl alcohol	CM	22,55
3-Methyl-2-butanone	VP	42
Nitroglycerin	VP	384
Nitromethane	VP	42
2-Pentanone	D	128
	VP	42
Pinacolone	VP	42
Propyl acetate	D	128
Triacetin	CM	326,334
Tritolyl phosphate	CM	21
Ethyl cellulose [9004-57-3]		
Acetone	D	172
	VP	66
Benzene	D	172
	VP	66
Butane	VP	77
2-Butanone	D	172
Butyl acetate	D	172
Carbon tetrachloride	D	172
Chloroform	D	172
	GC	364
Dichloromethane	GC	364
2,2-Dimethylpropane	VP	77
Ethyl acetate	D	172
Methyl alcohol	VP	66
2-Methylbutane	VP	77
Pentane	VP	77
1,1,1-Trichloroethane	GC	364
Water	VP	79
Hydroxyethyl cellulose [9004-62-0]		
Water	OS	214
Hydroxypropyl cellulose [9004-64-2]		
Water	CM	353
Methyl cellulose [9004-67-5]		
Water	CM	321,340
Cellulose tricarbanilate [9047-07-8]		
Cyclohexanol	CD	271
	D	271
5-Nonanone	CD	271
	D	271
2.5. OTHER COMPOUNDS		
Dextran [9004-54-0]		
Ethanolamine	CM	301
Ethylene glycol	CM	298,301
Formamide	CM	298,301
Glycerol	CM	301
Methyl sulfoxide	CD	298,301
	CM	298,301
Water	CD	298,301
	CM	275,298,301
	OS	214,358
	VP	236,375
Lignin [9005-53-2]		
N,N-Dimethylformamide	VP	153
1,4-Dioxane	VP	153
Methyl sulfoxide	VP	153
Starch [9005-25-8]		
Water	VP	173

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Heats of Solution of Some Common Polymers

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A. Introduction VII-671
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A. INTRODUCTION

Heats of solution (at infinite dilution) are tabulated below for some common polymers dissolved in some common solvents. The values were determined calorimetrically and are reported here as the heat (in Joules) absorbed per gram of polymer as pure polymer and a large excess of pure solvent mixed isothermally to form a homogeneous solution.

The state of the polymer before dissolution is indicated in the fourth column. It can significantly affect the heat of solution. An amorphous polymer below its glass transition temperature (G) often dissolves with release of heat. The heat of solution for a glass is usually dependent on temperature and, to some extent, on the thermal history of the glass. The dissolving of a semicrystalline polymer (C) requires an additional amount of heat associated with the disordering of crystalline regions. Consequently its heat of solution is usually positive and depends on the extent of crystallinity of the sample. An amorphous polymer above its glass transition temperature (L) usually dissolves with the absorption of a small amount of heat but may also dissolve with the release of heat.

Most of the references to measurements made before 1972 were collected by D. R. Cooper (Manchester) for the second edition of this Handbook. A more complete listing of references to heats of solution can be found in the chapter "Heat, Entropy, and Volume Changes for Polymer–Liquid Systems."

B. TABLE OF HEATS OF SOLUTION

Solvent	ΔH (J/g)	Temp. (°C)	State	MW × 10^{-4} (g/mol)	Refs.
Poly(butadiene)					
Benzene	13	27	L	8	5
Cyclohexane	5.4	25	L	–	23
n-Hexadecane	4.9	25	L	–	24
Poly(dimethyl siloxane)					
Benzene	14	25	L	10	11
Carbon tetrachloride	2.4	25	L	10	11
Cyclohexane	5.1	25	L	10	11
Cyclohexane	5.2	25	L	2.0	23
n-Decane	3.9	25	L	10	7
Ethyl ether	−1.3	25	L	8	10
n-Hexadecane	5.5	25	L	10	7
n-Hexadecane	5.5	25	L	2	24
n-Pentane	−0.9	25	L	10	7
Poly(ethylene)					
Cyclohexane	205	106	C	90	32
1,2,3,4-Tetrahydronaphthalene[a]	39	130	L	67	12
1,2,3,4-Tetrahydronaphthalene[a]	560	80	C	67	12
1,2,3,4-Tetrahydronaphthalene[b]	88	150	L	14	12
1,2,3,4-Tetrahydronaphthalene[b]	1200	110	C	14	12
Toluene	262	126	C	90	32
Poly(isobutylene)					
Benzene	19	25	L	3	8
Benzene	19	30	L	4.8	25

Solvent	ΔH (J/g)	Temp. (°C)	State	MW × 10^{-4} (g/mol)	Refs.
Benzene	23	25	L	0.13	21
Carbon tetrachloride	4.1	–	L	200	9
Carbon tetrachloride	5.0	25	L	0.13	21
Cyclohexane	−0.7	25	L	3	8
Cyclohexane	−0.6	25	L	4.5	24
Cyclohexane	1.1	25	L	0.13	21
n-Decane	−0.5	25	L	3	8
Ethylbenzene	3.5	69	L	4.8	25
Ethylbenzene	9.3	18	L	4.8	25
Ethyl ether	2.8	25	L	3	8
n-Hexadecane	0.04	25	L	3	1
n-Hexadecane	0.9	25	L	0.45	24
n-Hexadecane	1.0	25	L	0.13	21
n-Pentane	−3.6	25	L	3	8
n-Pentane	−3.2	25	L	0.13	21
Poly(isoprene)					
Benzene	12	16	L	0.4	2
Poly(methyl methacrylate)					
Chloroform	−84	25	G	10	14
Chloroform	−37	25	C	–	14
Poly(oxyethylene)					
Benzene	170	30	C	4.3	26
Carbon tetrachloride[c]	16	30	L	0.06	31
Carbon tetrachloride[d]	−12	30	L	0.04	31
Chloroform	52	30	C	0.6	18
Water	−120	80	L	0.5	4
Water[c]	−160	25	L	0.02	30
Water[d]	−200	25	L	0.02	30
Water	10	25	C	2	28
Water	24	30	C	0.6	18
Water	40	30	C	4.3	26
Poly(oxypropylene)					
Carbon tetrachloride	−20	6	L	0.2	13
Carbon tetrachloride[c]	−8	30	L	0.2	33
Carbon tetrachloride[d]	−14	30	L	0.16	33
Chloroform	−100	6	L	0.2	13
Methyl alcohol	−7	27	L	0.1	6
Poly(propylene)					
Benzene	31	25	L	1.8	27
Carbon tetrachloride	6.4	25	L	1.8	22
Carbon tetrachloride	6.6	25	L	1.8	27
Chloroform	17	25	L	1.8	22
Chloroform	17	25	L	1.8	27
Cyclohexane	2.3	25	L	0.6	23
Cyclohexane	3.9	25	L	1.8	27
n-Decane	3.1	25	L	1.8	27
Ethylbenzene	14	25	L	1.8	27
n-Hexadecane	2.3	25	L	0.6	24
n-Pentane	−4.7	25	L	1.8	27
1,2,3,4-Tetrahydronaphthalene	320	120	C	–	12
Toluene	16.5	25	L	1.8	27
Poly(styrene)					
Carbon tetrachloride	−20	25	G	50	19
Chloroform	−24	45	G	10	16
Cyclohexane	−8.2	26	G	70	15
Ethylbenzene	−6	110	L	11	20
Ethylbenzene	−24	35	G	11	20
Ethylbenzene	−22	30	G	6	17
Ethylbenzene	−5	78	G	11	20
Toluene	−3	100	L	11	20
Toluene	−26	35	G	11	20
Toluene	−22	26	G	70	15
Toluene	−21	30	G	6	17
Toluene	−7	78	G	11	20
Toluene	−2.5	25	G	–	29
Poly(vinyl acetate)					

Solvent	ΔH (J/g)	Temp. (°C)	State	MW × 10^{-4} (g/mol)	Refs.
Benzene	2.3	25	G	14	3
Chloroform	−45	25	G	14	3
Methyl alcohol	28	25	G	14	3

[a] High-pressure poly(ethylene).
[b] Low-Pressure poly(ethylene).
[c] Hydroxy terminated.
[d] Methoxy terminated.

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Solubility Parameter Values

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A. INTRODUCTION

Applications of solubility parameters include selecting compatible solvents for coating resins, predicting the swelling of cured elastomers by solvents, estimating solvent vapor pressure in polymer solutions for devolatilization and reaction systems (16), and predicting phase equilibria for polymer–polymer (107), polymer–binary (93), random copolymer (102), and multicomponent solvents (38, 98,108,109).

Cohesive energy density and solubility parameters are defined in the section on miscibility of solvents and polymers (Section B). In addition, the applicability of solubility parameters to thermodynamic calculations and their limitations are discussed. Section C contains methods for measuring, calculating and correlating solubility parameters of solvents and polymers. Section D contains

alphabetical listings of solubility parameters (Table 7), a list of solubility parameters in rank order (Table 8), a list of three-component solubility parameters of solvents (Table 9), and a list of solubility parameters of polymers (Table 10). With the exception of Table 7, solubility parameter values are reported in $MPa^{1/2}$ units. The table showing solubility parameter value ranges for polymers (Table 3.4 in the third edition) has not been reproduced here.

B. MISCIBILITY OF SOLVENTS AND POLYMERS

1. Cohesive Energy Density and the Solubility (Hildebrand) Parameter

Dissolution of an amorphous polymer in a solvent is governed by the free energy of mixing

$$\Delta G_m = \Delta H_m - T\Delta S_m \tag{B1}$$

where ΔG_m is the Gibbs free energy change on mixing, ΔH_m is the enthalpy change on mixing, T the absolute temperature, and ΔS_m is the entropy change on mixing. A negative value of the free energy change on mixing means that the mixing process will occur spontaneously. Otherwise, two or more phases result from the mixing process. Since the dissolution of a high molecular weight polymer is always connected with a small or modest increase in entropy, the enthalpy term (the sign and magnitude of ΔH_m) is the deciding factor in determining the sign of the Gibbs free energy change. Solubility parameters were developed to describe the enthalpy of mixing of simple liquids (nonpolar, nonassociating solvents), but have been extended to polar solvents and polymers.

Hildebrand and Scott (59) and Scatchard (101) proposed that

$$\Delta H_m = V\left(\left(\frac{\Delta E_1^v}{V_1}\right)^{1/2} - \left(\frac{\Delta E_2^v}{V_2}\right)^{1/2}\right)^2 \phi_1\phi_2 \tag{B2}$$

where V is the volume of the mixture, ΔE_i^v the energy of vaporization of species i, V_i the molar volume of species i, and ϕ_i the volume fraction of i in the mixture. ΔE_i^v is the energy change upon isothermal vaporization of the saturated liquid to the ideal gas state at infinite volume (94). The cohesive energy density (CED), ΔE_i^v, is the energy of vaporization per cm^3. The solubility parameter has been defined as the square root of the cohesive energy density and describes the attractive strength between molecules of the material.

$$\delta_i = \left(\frac{\Delta E_i^v}{V_i}\right)^{1/2} \tag{B3}$$

The dimensions of δ_i are

$$(\text{cal/cm}^3)^{1/2} = (4.187\,\text{J}/10^{-6}\,\text{m}^3)^{1/2} = 2.046\times10^3(\text{J/m}^3)^{1/2} = 2.046\,\text{MPa}^{1/2} \tag{B4}$$

The solubility parameter can be interpreted as the "internal pressure" of the solvent (9–11). δ_i is called the Hildebrand parameter by some authors. Other researchers (13) prefer the term, "cohesion parameter", since it correlates with a large number of physical and chemical properties, and not just the miscibility of the components. The solubility parameter of a mixture is often taken as the sum of the products of the component solubility parameters with their volume fractions:

$$\delta_{\text{mixture}} = \sum_i \delta_i\phi_i \tag{B5}$$

Relation between δ_1 and ΔH_m Equation (B2) can be rewritten to give the heat of mixing per unit volume for a binary mixture:

$$\frac{\Delta H_m}{V} = (\delta_1 - \delta_2)^2\phi_1\phi_2 \tag{B6}$$

Equation (B6) gives the heat of mixing of regular solutions in which the components mix with: (a) no volume change on mixing at constant pressure, (b) no reaction between the components, and (c) no complex formation or special associations (114). The heat of mixing must be smaller than the entropic term in Eq. (B1) for polymer–solvent miscibility ($\Delta G_m \le 0$). When $\delta_1 = \delta_2$, the free energy of mixing will always be less than zero for regular solutions and the components will be miscible in all proportions. In general, the solubility parameter difference, $(\delta_1 - \delta_2)$ must be small for miscibility over the entire volume fraction range.

Relation between δ_1 and ΔH_1^v The energy change on isothermal vaporization can be related to the enthalpy of vaporization:

$$\Delta E_i^v = \Delta H_i^v + \Delta H_i^\infty - RT + p_i^s V_i \tag{B7}$$

where ΔH_i^v is the enthalpy of vaporization at standard conditions, ΔH_i^∞ the molar increase in enthalpy on isothermally expanding the saturated vapor to zero pressure, R the ideal gas constant, and p^s the saturation vapor pressure at temperature, T. At pressures below 1 atm, the ΔH_i^∞ and p^sV_i terms are usually much less than the ΔH_i^v and RT terms, and Eq. (B7) reduces to Eq. (B8):

$$\Delta E_i^v = \Delta H_i^v - RT \tag{B8}$$

The solubility parameter of volatile materials (solvents for example) can be determined by measuring their enthalpy of vaporization or using a correlation for this quantity, and using Eq. (B9):

$$\delta_i = \left(\frac{\Delta H_i^v - RT}{V_i}\right)^{1/2} \tag{B9}$$

Equation (B9) should be used at pressures near 1 atm. Near the critical point, $\Delta H_i^v = 0$, and Eq. (B8) incorrectly

predicts a negative value for the cohesive energy density while Eq. (B7) yields a small positive value.

Dissolution of crystalline polymers The free energy of mixing for crystalline polymers contains terms for the free energy of fusion for the crystalline volume fraction of the material. The free energy of fusion may contain terms that account for the loss of crystallite surface area and the mixing of amorphous material with oriented material. These terms would be added to Eq. (B1). The enthalpy of mixing could still be modeled using Eqs. (B2) or (B6). Some crystalline polymers obey the solubility parameter model at temperatures near their melting point, $T > 0.9T_m$ (123). Solvent swelling experiments with crystalline polymers may fit Eq. (B1), particularly if the solvent is a poor one for the polymer and does not significantly dissolve crystalline regions.

2. Cohesive Energy Parameters for Polar Systems

The solubility parameter describes well the enthalpy change on mixing of nonpolar solvents but does not always give reliable results when extended to polar systems. The free energy change of mixing for polar systems is dominated by hydrogen-bonding forces between various groups in the solvent and polymer. Hydrogen-bonding forces are much stronger than van der Waals or dipole forces and often dominate the free energy of mixing. Complete miscibility is expected to occur if the solubility parameters are similar and the degree of hydrogen bonding (p: poor, m: moderate and s: strong) is similar between the components. Hydrocarbons, chlorinated hydrocarbons and nitrohydrocarbons are considered to be poor hydrogen-bonding solvents. Ketones, esters, and glycol monoethers give moderate hydrogen bonding. Alcohols, amines, acids, amides and aldehydes are strong hydrogen-bonding solvents. Table 7 classifies materials using these categories (21–24). Alternative classifications have been given by Lieberman (69), Gardon (41,85,86) and Dyck and Hoyer (32).

Other investigators have decomposed the Hildebrand parameter into several terms representing different contributions to the free energy of mixing. Hildebrand (59) used dispersive and polar solubility terms for solvents, with the complete parameter being given by

$$\delta^2 = \delta_d^2 + \delta_p^2 \tag{B10}$$

where δ_d is the dispersive term and δ_p the polar term. The additional term improved agreement between δ and experimental data. Prausnitz and coworkers accounted for polar bonding by including parameters for permanent dipole interactions and dispersion type interactions. This approach has been applied to polymer solutions (15) and complex formation (57). Crowley et al. (26,27) proposed a three-parameter system.

Hansen (49–53,56) and Hansen and Skaarup (54) assume that the cohesive energy arises from dispersive, permanent dipole–dipole interactions and hydrogen bonding forces:

$$\delta^2 = \delta_d^2 + \delta_p^2 + \delta_h^2 \tag{B11}$$

where δ_h accounts for a variety of association bonds, including hydrogen bonds and permanent dipole-induced dipole (47). The values of these components for solvents were calculated from a large number of solubility data sets. Polymer solubility parameters can also be decomposed to a three-term set. The Hansen parameters give improved agreement with data but are still not completely accurate in predicting solutions thermodynamics for every system. Peiffer (172) has related dispersion, polar and induced solubility parameters to intermolecular forces and molecular size. The dispersive component increases with molecular size, while the polar component decreases with molecular size.

Temperature effects The solubility parameter decreases with temperature. The individual terms have varied dependence on temperature, namely (Ref. 55)

$$\begin{aligned} \frac{d\delta_d}{dT} &= -1.25 \times \alpha \times \delta_d \\ \frac{d\delta_p}{dT} &= -\frac{\delta_p \times \alpha}{2} \\ \frac{d\delta_p}{dT} &= -\delta_h\left(1.22 \times 10^{-3} + \frac{\alpha}{2}\right) \end{aligned} \tag{B12}$$

where $\alpha(K^{-1})$ is the volumetric thermal expansion coefficient.

3. Relationship between Solubility Parameters and other Thermodynamic Parameters

Hildebrand and Hansen parameters can be calculated using other thermodynamic quantities. This section contains some of the relationships for binary systems. Extensions to multicomponent systems are described by Flory (37) and Olabisi et al. (89).

Activity coefficients Excess free energy calculations for regular solutions (93) can be used to relate solubility parameters and solvent activity coefficients:

$$RT \ln\gamma_1 = V_1\phi_2^2(\delta_1 - \delta_2)^2 \tag{B13}$$

$$RT \ln\gamma_2 = V_2\phi_1^2(\delta_1 - \delta_2)^2 \tag{B14}$$

where γ_i is the activity coefficient of component i. Equations (B13) and (B14) depend on the use of the geometric mean, $\delta_{12} = (\delta_1 \times \delta_2)^{1/2}$. Funk and Prausnitz (40) show that there are deviations from this rule for aromatic hydrocarbons.

Molar excess free energy of mixing The molar excess free energy of mixing for binary solutions is

$$\Delta G^E = \sum_i (\delta_{1-i} - \delta_{2-i})^2 \tag{B15}$$

where δ_{j-i} is the solubility term of group i for species j.

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Polymer–solvent interaction parameter The polymer–solvent interaction parameter, χ, is modeled as the sum of entropic and enthalpic components:

$$\chi = \chi_H + \chi_S \tag{B16}$$

where χ_H is the enthalpic component and χ_S is the entropic component. χ_S is usually taken to be a constant between 0.3 and 0.4 for nonpolar systems: $\chi_S = 0.34$ is often used (15,104). The enthalpic component can be related to the Hildebrand parameters:

$$\chi_H = \frac{V_1}{RT}(\delta_1 - \delta_2)^2 \tag{B17}$$

Substituting Eq. (B17) into Eq. (B16)

$$\chi = \frac{V_1}{RT}(\delta_1 - \delta_2)^2 + 0.34 \tag{B18}$$

Equation (B18) permits only positive values of the interaction parameter. Since the Flory–Huggins criterion for complete solvent–polymer miscibility is $\chi < 0.5$, the enthalpic contribution must be small and the solubility parameters of the solvent and polymer must be similar (21). The molar volume of the solvent also affects miscibility and phase equilibria: a Hildebrand parameter needed for phase separation or miscibility cannot be specified without specifying V_1.

Interchange energy density Equation (B18) works well for nonpolar systems for which Eq. (B17) is a good description of the enthalpic component of the interaction parameter. The geometric mean assumption of regular solution theory is not appropriate for polar systems, and better models include an extra term describing the interchange energy density for the solvent–polymer pair. For example

$$\chi = \chi_S + \frac{V_1 A_{12}}{RT} \tag{B19}$$

with

$$A_{12} = \delta_1^2 + \delta_2^2 - 2 \times l_{12}\delta_1\delta_2 \tag{B20}$$

where l_{12} characterizes the intermolecular forces between molecules (rather than using the geometric mean assumption). Equation (B20) allows the modeling of specific interactions between components 1 and 2. Mixed solvents can be treated as a single solvent by determining the solubility parameter of the solvent mixture, and then using this value in Eq. (B18). If both the solvents and the polymers interact, the description is more complicated. An alternative definition of A_{12} uses the two-component solubility parameter (Ref. 25)

$$A_{12} = (\delta_{1d} - \delta_{2d})^2 + (\delta_{1p} - \delta_{2p})^2 \tag{B21}$$

The Hansen parameters may also be used to model A_{12}.

Several recent theories for polymer solution thermodynamics include entropic, enthalpic and free-volume contributions to the free energy of mixing. The free-volume contributions modify the entropic components, and have the opposite temperature dependence from the combinatorial term, helping to explain the lower critical solution temperature. Since Eq. (B18) assumes a constant value for the entropic component, it may not be valid over large temperature ranges. However, Eq. (B18) will predict the upper critical solution temperature, and, from this standpoint, is adequate for a number of phase equilibria applications near this condition.

The Lattice Fluid model (170) can be used to predict the solubilities of hydrocarbon and chlorinated hydrocarbons in nonpolar polymers. Three-dimensional solubility parameters can be used to provide an empirical correction to the geometric mean approximation (171). This correction predicts the solubility of polar and nonpolar solvents in polymers using only the pure component equation-of-state and solubility parameters.

Guide to polymer–solvent miscibility A region of solubility has been characterized by the distance between solvent and solute coordinates (Ref. 14)

$$R_{ij} = \left(4(\delta_{1d} - \delta_{2d})^2 + (\delta_{1p} - \delta_{2p})^2 + (\delta_{1h} - \delta_{2h})^2\right)^{1/2} \tag{B22}$$

A more general definition of the region of solubility is

$$R_{ij} = \delta_1 - \delta_2 = (a(\delta_{1d} - \delta_{2d})^2 + b(\delta_{1p} - \delta_{2p})^2 + b(\delta_{1h} - \delta_{2h})^2)^{1/2} \tag{B23}$$

where a and b are empirical weighing factors. If the distance between the solvent and the solute Hansen coordinate position exceeds R_{ij}, the two components are not soluble, or swelling is less than expected. R_{ij} reduces the need for three-dimensional plots. Some investigators have used two-dimensional plots for polar and hydrogen bonding terms, but the technique may be misleading for materials with large dispersion contributions. Barton (12) gives a number of models and contour map examples. As mentioned previously, Eqs. (B17)–(B19) suggest that the solvent molar volume can have a significant effect on miscibility.

Zeller (131) reviewed graphical three-dimensional solubility parameter estimation methods (12,14,49,55,172,173) as applied to solvent swelling of crosslinked elastomers. In general, the graphical method (Eqs. B22 and B23) does not account for the known influence of molar volume and crosslink density of solubility, and incorrectly assumes a linear relationship between the solubility parameter difference and solubility. An improved method used the Flory–Rehner equation to modify the interaction parameter for the effects of crosslink density (132).

Guide to polymer–polymer miscibility In many polymer–polymer systems, miscibility can be predicted by comparing the solubility parameters (139). The following table proposes misciblity guidelines. Polymer–polymer miscibility is enhanced when hydrogen bonding is present.

TABLE OF MISCIBILITY GUIDELINES[a]

Intermolecular interaction	Polymer blend example	Critical value of the interaction parameter, χ_{crit}	Upper limit of the non-hydrogen bonded solubility parameter difference, $\Delta\delta$ (MPa$^{1/2}$)
Dispersive forces only	Polyisoprene–Poly-(vinylethylene)	<0.002	<0.02
Dipole–dipole interactions	Poly(methyl methyacrylate)–poly(ethylene oxide)	0.002–0.001	0.2–1.0
Weak hydrogen bonds	Poly(vinyl chloride)–polycaprolactone	0.02–0.2	1.0–2.0
Moderate hydrogen bonds	Poly(vinyl phenol)–poly(vinyl acetate)	0.2–1.0	2.0–5.0
Strong hydrogen bonds	Poly(vinyl phenol)–poly(vinyl methyl ether	1.0–1.5	5.0–6.0

[a] Ref. 139.

C. SOLUBILITY PARAMETER MEASUREMENTS, CALCULATIONS, AND CORRELATIONS

Solubility parameters can be determined by direct measurements, indirect calculations, or correlations with other physical parameters. The solubility parameters of solvents usually can be determined directly by measuring the energy of vaporization. The solubility parameters of polymers can only be determined indirectly and may be affected by variations in their chemical constitutions, i.e., the number of crosslinks and the distribution of chain branches or substitutive groups along the polymer backbone. The methods presented in this section can be used to develop correlations of solubility parameters with other physical properties for specific commercial polymer products or to estimate the solubility parameters of new polymers.

1. Solvents

Calculation of the solubility term (δ) by relating the enthalpy of vaporization to the energy of vaporization Equation (B8) can be used to calculate ΔE_i^v when ΔH_i^v is available. The molar volume of the solute is needed to complete the calculation of δ, using Eq. (B3). This is the most direct and accurate method of determining the solubility parameter. However, δ's determined in this way may not give the best prediction of solution behavior. The solubility parameter values in Tables 7–9 reflect the solvent's behavior in a variety of systems.

Correlations Both the enthalpy of vaporization and the molar volume of a solvent can be estimated from correlations. When ΔH_i^v is known at the normal boiling point, it can be converted to the appropriate value at a second temperature using (126)

$$\frac{\Delta H_i^v(T_2)}{\Delta H_i^v(T_1)} = \left(\frac{T_c - T_2}{T_c - T_1}\right)^{0.38} \tag{C1}$$

This corresponding state-type procedure gives estimates within 2% of experimental values over a wide range of temperatures (13). Hildebrand and Scott (59) proposed an empirical correlation between ΔH_i^v at 25°C and the normal boiling point, T_b:

$$\Delta H_i^v(298K) = 0.2950 + 23.6\,T_b + 0.020\,T_b^2 \tag{C2}$$

with enthalpy units of kcal/mol. Lawson (67) suggests different coefficients to include fluorocarbon liquids. The Clausius–Clapeyron equation can be applied if vapor pressure data are available. Eq. (C2) is reasonably accurate only for liquids that are not hydrogen bonded. The Hildebrand parameter calculated by Eq. (C2) should be adjusted as follows for different solvents (24): add 1.4 (cal/cm^3)$^{1/2}$ for alcohols, add 0.6 (cal/cm^3)$^{1/2}$ for esters, and add 0.5 (cal/cm^3)$^{1/2}$ for ketones if the boiling point is less than 100°C. Jayasri and Yaseen (64) suggest adding 1.7 (cal/cm^3)$^{1/2}$ for alcohols.

Solvent molar volumes are available or can be calculated by group molar volume methods at 25°C (35,163–165). The molar volume for solids at 25°C can be extrapolated from liquid state values (the liquid is assumed to be subcooled).

Thermodynamic coefficients The internal pressure, π, is defined as (Ref. 88)

$$\pi = \frac{\partial E}{\partial V} = T\beta - P \tag{C3}$$

where β is the constant volume thermal pressure coefficient (the ratio of the coefficient of thermal expansion, α, to the isothermal compressibility, κ). Since the external pressure is usually small with respect to $T\beta$, the internal pressure is approximated by

$$\pi = T\beta = T\frac{\alpha}{\kappa} = T\left(\frac{\partial P}{\partial T}\right) \tag{C4}$$

The Hildebrand parameter is the square root of the internal pressure. Eq. (C4) provides a method for scaling the Hildebrand parameter with temperature. This equation also provides a method for the direct estimation for δ of polymers; α and κ are measurable when ΔH_i^v is not meaningful (B7). The thermal pressure coefficient (C4) can be evaluated from vapor-pressure data and is easier to apply than the Clausius–Clapeyron equation. For high pressure applications, such as phase equilibria in reverse osmosis membranes, the external pressure term in Eq. (C3) may not be negligible. Solubility parameters generally decrease with increasing pressure.

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van der Waals gas constant Tables are available in many Handbooks for the van der Waals correction constants to the ideal gas law, a and b, where a has units of l^2/atm. For some liquids, these values may be at hand when other data are not available. They can be used to check Hildebrand parameter values obtained from other sources.

$$\delta = 1.2\frac{\sqrt{a}}{V} \tag{C5}$$

The form of Eq. (C5) can be obtained by substituting the van der Waals equation of state into Eq. (C3).

Critical pressure The solubility parameter is related to the critical pressure, P_c of a substance through the empirical equation

$$\delta = 1.25\,P_c^{1/2} \tag{C6}$$

where the critical pressure is expressed in atmospheres. Equation (C6) is not very accurate, but is simple to apply when critical pressure data are available.

Surface tension Michaels (83) has shown that the surface tension can be related to the cohesive energy density:

$$\frac{\Delta E_i^v}{V_i} = A\left(\frac{1}{V_i}\right)^{1/3}\gamma_L \tag{C7}$$

where γ_L is the surface tension and A is a constant. Koenhen and Smolders (65) correlated surface tension and two Hansen parameters:

$$\delta_d^2 + \delta_p^2 = 13.8\left(\frac{1}{V_i}\right)^{1/3}\gamma_L \tag{C8}$$

δ_h is probably not related to the liquid–vapor interfacial energy as these interactions do not involve breaking hydrogen bonds. Eq. (C8) does not describe cyclic compound, acetonitrile, carboxylic acids, polyfunctional alcohols, and other polar compounds well. Hildebrand and Scott (59) have proposed a different equation, which has been discussed by Lee (68).

Index of refraction The dispersive Hansen parameter can be related to the index of refraction, n_D (65,105).

$$\delta_d = 9.55\,n_D - 5.55 \tag{C9}$$

The interaction energy between nonpolar molecules should depend on polarizability (London dispersion forces) and, therefore, on the index of refraction.

Dipole moment Hansen and Skaarup (54) related the polar Hansen parameter to the dielectric constant, ε, and the dipole moment, μ:

$$\delta_p^2 = \frac{12108}{V^2}\frac{\varepsilon - 1}{2\varepsilon + n_D^2}(n_D^2 + 2)\mu^2 \tag{C10}$$

Beerbower and Dicky (14) proposed an empirical relationship:

$$\delta_p^2 = 9.5\frac{\mu}{V_i^{1/2}} \tag{C11}$$

Kauri butanol values Proprietary hydrocarbon solvents are usually mixtures with boiling ranges and unknown molecular weights. Solubility parameter values may be estimated from Kauri butanol values (ASTM Method D1133-54T) using the equation

$$\delta = 6.3 + 0.03\,\mathrm{KB} \tag{C12}$$

2. Polymers

Hildebrand parameters cannot be calculated for polymers from heat of vaporization data because of their nonvolatility. Indirect methods are described below. The solubility parameter values in Table 10 may only be representative of a given polymer since variations in compositions can lead to changes in δ.

2.1. Indirect Measurements

Solvency testing (screening procedure) The classic method for determining solubility parameter of a commercial polymer is solvency testing, or the solvency screening procedure. This technique compares polymer solubility in solvent groups with different hydrogen bonding characteristics (poor, moderate and strong). The midpoints of the polymer's solubility range may be used as single-valued quantities for some purposes, but may not agree with values determined by other methods (43). A gram or two of solid polymer is placed in a test tube and an approximate amount of a selected solvent is added such that the final solution would have about the correct solid content for the expected commercial use, e.g., 50% for alkyds, 20% for vinyls, etc. The exact amount is often unimportant, except for poor solvents. A typical phase diagram for binary polymer–solvent systems may show upper and lower critical solution temperatures. The one-phase region expands away from the UCST and LCST points, which often occur in the range of 20–80 wt.% polymer. The usual purpose of these experiments is to find good solvents for commercial product formulation, and this screening procedure will help identify such solvents. The mixture may be warmed and stirred to speed up solution, but it should be cooled and observed at room temperature. The resulting mixture should be a single phase, clear and free of gel particles or cloudiness, otherwise the polymer is judged insoluble. The solvents to be used are selected from Table 1.

This grouping of solvents has been selected so that the Hildebrand parameter values increase by reasonably constant steps within each hydrogen bonding class. The object of using these solvent spectra is to establish a solubility parameter range for a polymer rather than a single-valued number. This range has the advantage of showing the difference, $(\delta_1 - \delta_2)^2$ (see Eqs. B13, B14 and

B18), which can be tolerated between the solubility values of the polymer and solvent for miscibility. Van Dyk et al. (120) have shown that the molar volume improves the correlation between solvency and the solubility parameters. A better measure of solubility might be the group, $V_1(\delta_1 - \delta_2)^2$.

In carrying out the procedure, it is convenient to select the first trials about 1/2 and 2/3 of the way down the column; for example, in the poorly hydrogen bonded group, toluene and nitroethane would be chosen. If the polymer is soluble in both, there is no need to try intermediate solvents because experience has shown that the polymer will be soluble in every case. The solvents at the end of the spectrum should be tried next. If the polymer is soluble in one but not both of the initial trials, the third trial should be half-way between the two. By successive choices, sets of two adjacent solvents will be found, one of which dissolves the polymer and one that does not. The parameter values of the solvents which do dissolve the polymer mark the ends of the range. The procedure is repeated for the other two hydrogen bonding classes.

Osmotic pressure Fedors (35) used the osmotic pressure of polymer solutions to determine solubility parameters.

Swelling values Another method for measuring the solubility parameter of polymers is to prepare a sparsely crosslinked sample and immerse it in a series of liquids of varying δ (166,167). The crosslinked material will swell to varying degrees, with the maximum amount of swelling occurring when the solvent has the same Hildebrand parameter as the polymer. The amount of swelling can be measured by length, weight, or volume changes. By inference, the soluble, uncrosslinked materials has the same value. An example of a crosslinked sample is styrene polymerized with 1% divinyl benzene.

Turbidity Polymer can be precipitated from dilute solution by adding a non-solvent. The cloud point defines the onset of two phases. The enthalpic component of the interaction parameter, χ_H, can be related to the solubility parameter difference between the solvent and the polymer (Eq. B17). Two different non-solvents are used: one having a solubility parameter above that of the solvent, and another having a solubility parameter below that of the solvent. The enthalpic components of the interaction parameter for each phase are equal at the cloud point, which can be used to measure the solubility parameter of the polymer (116). The two expressions for χ_H are

$$\frac{V_{\mathrm{ml}}(\delta_2 - \delta_{\mathrm{ml}})^2}{RT} = \frac{V_{\mathrm{mh}}(\delta_2 - \delta_{\mathrm{mh}})^2}{RT} \tag{C13}$$

where V_{ml} and V_{mh} represent the molar volumes at the cloud points of the solvent-lower solubility parameter nonsolvent and solvent-higher solubility parameter nonsolvent, respectively. δ_{ml} and δ_{mh} are the solubility parameters of the mixed solvents. The mixture properties are calculated using

$$\delta_{\mathrm{m}} = \phi_1\delta_1 + \phi_3\delta_3 \tag{C14}$$

$$V_{\mathrm{m}} = \frac{V_1V_3}{\phi_1V_3 + \phi_3V_1} \tag{C15}$$

where the subscripts, 1 and 3, refer to the solvent and the nonsolvent. Eq. (C13) is simplified to determine the solubility parameter of the polymer:

$$\delta_2 = \frac{(\sqrt{V_{\mathrm{ml}}}\delta_{\mathrm{ml}} + \sqrt{V_{\mathrm{mh}}}\delta_{\mathrm{mh}})}{(\sqrt{V_{\mathrm{ml}}} + \sqrt{V_{\mathrm{mh}}})} \tag{C16}$$

The volume fraction of the nonsolvent at the cloud point is used to compute the solvent mixture solubility parameter and molar volume. Cloud point experiments are done for a series of solvents with the two nonsolvents, generating a set of points, (δ_1, δ_2). The intersection of the line defined by this set of points with the line, $\delta_1 = \delta_2$, determines the polymer's solubility parameter.

Specific volume The specific volume of polymers varies with the solvent. Good solvents give higher values of the specific volume while poor solvents give lower values. A plot of the polymer specific volume as a function of solubility parameter gives a maximum value, which is taken to be the solubility parameter of the polymer. High precision density measurements at carefully controlled temperatures are needed for this method (168). The partial specific volume is defined as

$$\bar{V}_i = \left.\frac{\partial V}{\partial c_i}\right|_{T,\mathrm{p},i\neq j} \tag{C17}$$

The specific volume of a nonideal two-component system is

$$V_{\mathrm{spec}} = \phi_1\bar{V}_1 + \phi_2\bar{V}_2 \tag{C18}$$

where $\bar{V}_2$ is the rate of change in volume of the solution when a very small amount of polymer is added. As the solvent volume fraction goes to one, the partial molar volume of solvent is constant and Eq. (C18) becomes

$$V_{\mathrm{spec}} = \bar{V}_{1(c_2=0)} + \phi_2\bar{V}_2 \tag{C19}$$

The maximum of the polymer partial specific volume is estimated by fitting a quadratic to the data (Ref. 142):

$$\bar{V}_2 = \bar{V}_{2,\mathrm{max}} - A(\delta_1 - \delta_2)^2 \tag{C20}$$

It is possible to estimate the polymer solubility parameter with only two reference solvents (168), but more reliable values are found by using a range of solvents.

Intrinsic viscosity A number of researchers have used intrinsic viscosity to estimate Hildebrand parameters (74).

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Flory (37) related intrinsic viscosity to polymer molecular weight and the chain-expansion factor. The chain-expansion factor can, in turn, be related to the polymer–solvent interaction parameter using the Flory–Huggins theory. Maximum coil extension should occur in solvents near the polymer's solubility parameter. A variety of models can be used to relate the interaction parameter to Hildebrand parameters (19,80,115,167–169). These equations are quadratic (Eq. C21) or take the form of a gaussian curve (Eq. C22):

$$[\eta] = [\eta]_{max} - A(\delta_1 - \delta_2)^2 \quad (C21)$$

$$[\eta] = [\eta]_{max}\exp(-A(\delta_1 - \delta_2)^2) \quad (C22)$$

where $[\eta]$ is the intrinsic viscosity, $[\eta]_{max}$ the maximum intrinsic viscosity, and A the constant. These researchers have shown that Eq. (C14) gives a good correlation between solvency and Hansen parameters for methacrylate polymers.

Inverse phase gas chromatography This method has been used by a number of investigators to measure infinite dilution weight fraction activity coefficients (6,29–31,63,71,72,84,90,91,113). These coefficients can be related to Hildebrand parameters by using a thermodynamic theory for polymer solutions, such as Flory–Huggins theory. The polymer is the stationary phase in a gas chromatography column. Both binary and multicomponent equilibria (46,99,100) can be studied using this method. Chromatographic techniques have the advantage of rapid measurement of thermodynamic values once the columns have been made. The solubility parameter can be related to the specific retention volume of the solvent on the column. Both V_i and ΔH_i^v must be known at the temperature of the column. Molar volumes for the solvents can be determined by using literature density equations or generating equations from density data. Values for the enthalpy of vaporization can be determined at the experimental temperature (71).

The inverse phase gas chromatography method has the advantage of providing values for the infinite dilution solubility parameter, δ_i^∞, over a range of temperatures. This is particularly valuable for the prediction of phase equilibria at elevated temperatures. The value of δ_i^∞ at 25°C can be estimated by using the expected temperature dependence for χ (Eq. B18) of

$$\chi = \alpha + \frac{\beta}{T} \quad (C23)$$

One potential problem with this technique is that χ is known to be a function of concentration and the polymer Hildebrand parameter is determined at infinite dilution of solvent. For a number of binary systems, the change in χ with solvent weight fraction is the largest as $\omega \to 0$. The concentration dependence of the interaction parameter can be modeled using methods given in the chapter on interaction parameters in this Handbook.

2.2. Correlation Methods

Refractive index Koenhen and Smolders (65) have predicted dispersive Hansen parameters from refractive index measurements of polymers. Wu (128) has suggested an effective cross-sectional area to relate the cohesive energy density and surface tension

$$\delta_d^2 = A\left(\frac{n_s}{V_{i,s}}\right)^{1/3}\gamma_s^d \quad (C24)$$

where n_s is the number of atoms in a segment, $V_{i,s}$ the molar volume of a segment, and γ_s^d the dispersion contribution to the free surface energy of the polymer.

Dipole moment Equation (C10) has been applied to polymers by Koenhen and Smolders (65). The dipole moments of polymers are between 70% and 90% of those of the corresponding monomer units.

Hydrogen-bonding parameter Hansen and Beerbower (55) compiled enthalpy data for hydrogen bonding groups. The following values are suggested:

Group	Cohesive energy, E_h, (kJ/mol)	Refs.
Alcohol	20.9	–
Amide	16.3	83
Ester	5.2	54
Nitrile	2.1	54
Ether	2.3	54
Monochloro substituent	0.4	54
Phenylene ring	0.4	54

The hydrogen-bonding parameter is given by

$$\delta_h^2 = \frac{E_h}{V_i} \quad (C25)$$

Group contribution methods These methods have been used to estimate the solubility parameter (17,20,28,33,35,58,60,61,96,112,121,122). van Krevelen (123), Fedors (35), and Barton (12) have reviewed these techniques and given tables of group values. The molar volume of solvents and polymers can also be estimated by group contribution techniques (108).

The sets of group constants of Small (112), Hoy (61) van Krevelen (121) and van Krevelen and Hoftyzer (122) seem to be most comprehensive. Table 2 gives the group molar attraction constants at 25°C. Small's values were derived from measurements of the heat of vaporization. Hoy's values were derived from vapor pressure measurements. The group contribution values of van Krevelen and Hoftyzer are based on cohesive energy data of polymers.

The group contribution techniques are based on the assumption that the contributions of different functional groups to the thermodynamic property are additive. The energy of vaporization of a solvent or polymer is

$$\Delta E_i^v = \sum_j n_j \Delta e_j \quad (C26)$$

where Δe_j is the energy of vaporization contribution of group j, and n_j the number of groups of type j in the molecule. The solubility parameter is obtained by combining Eqs. (B3) and (C26):

$$\delta_i = \left(\frac{\Delta E_i^{\mathrm{v}}}{V_i}\right)^{1/2} = \left(\frac{\sum_j n_j \Delta e_j}{V_i}\right)^{1/2} \tag{C27}$$

Small (112) defined the molar attraction constant as

$$F_j = (\Delta E_{i,j}^{\mathrm{v}} V_{i,j})^{1/2} \tag{C28}$$

that can be used to calculate the solubility parameter by

$$\delta_i = \left(\frac{\Delta E_i^{\mathrm{v}} V_i}{V_i^2}\right)^{1/2} = \frac{\sum_j F_j}{V_i} = \frac{\rho_i \sum_j F_j}{M_i} \tag{C29}$$

where ρ_i is the polymer density and M_i is the polymer molecular weight. δ_i can be evaluated for polymer repeating group by using group contribution calculations for the molar volume and the cohesive energy density or molar attraction constant. Table 2 gives sets of molar attraction constants and the energy of vaporization provided by several different authors. It is preferrable to use parameters from only one set when determining the solubility parameter of a repeating unit. Table 3 gives the cohesive energy densities and group molar volumes determined by Fedors. This set may give less accurate estimates than those in Table 2, but it has value because it is more comprehensive and can be applied to more systems.

Hansen parameters The terms in Eq. (B11) can be estimated by group contribution methods. In general, the resulting factors are known less accurately than the group molar attraction constants or energy of vaporizations. The interaction of structural groups within molecules may not follow simple additive rules. However, the estimate of Hansen parameters can be very useful. Under the method of Hoftyzer and van Krevelen (Table 4), the terms are estimated as

$$\delta_{\mathrm{d}} = \frac{\sum F_{\mathrm{d}i}}{V}$$
$$\delta_{\mathrm{p}} = \frac{\sqrt{\sum F_{\mathrm{p}i}^2}}{V} \tag{C30}$$
$$\delta_{\mathrm{h}} = \sqrt{\frac{\sum E_{\mathrm{h}i}}{V}}$$

The dispersive Hansen parameter treats the molar attraction constants as additive. The polar Hansen parameters also are additive, unless more than one polar group is present. Methods for treating additional polar groups are given in the last three rows of Table 4: additional polar groups do not add linearly to the polar Hansen term. The molar attraction constant is not applied to the hydrogen-bonding Hansen parameter. Rather, a hydrogen bonding energy, $E_{\mathrm{h}i}$, is used.

Hoy (178–179) has an alternative group contribution method (Table 5). It includes a molar attraction function, $F_{t,i}$ a polar component of this function, $F_{\mathrm{p},i}$, the molar volume of the solvent or polymer structural unit, the Lyderson correction for solvent non-ideality, $\Delta_{\mathrm{T},i}$, and a similar correction for polymer non-ideality, $\Delta_{\mathrm{T},i}^{(\mathrm{P})}$.

Bicerano (164) and Porter (165) have developed new group contribution techniques for a wide variety of polymer properties. These approaches consider how the different functional groups are connected in the molecule or in the polymeric repeating unit. Bicerano's method uses Fedor's (35) and van Krevelen's (123,163) group contribution values. Both references provide solubility parameter predictions of a number of polymers.

TABLE 1. SELECTED SOLVENTS FOR USE IN POLYMER SOLVENCY TESTING

Solvent	δ (MPa$^{1/2}$)
POORLY HYDROGEN BONDED	
n-Pentane	14.3
n-Heptane	15.1
Methylcyclohexane	16.0
Solvesso 150	17.4
Toluene	18.2
Tetrahydronaphthalene	19.4
o-Dichlorobenzene	20.5
1-Bromonaphthalene	21.7
Nitroethane	22.7
Acetonitrile	24.1
Nitromethane	26.0
MODERATELY HYDROGEN BONDED	
Diethyl ether	15.2
Diisobutyl ketone	16.0
n-Butyl acetate	17.4
Methyl propionate	18.2
Dibutyl phthalate	19.0
Dioxane	20.3
Dimethyl phthalate	21.9
2,3-Butylene carbonate	24.8
Propylene carbonate	27.2
Ethylene carbonate	30.1
STRONGLY HYDROGEN BONDED	
2-Ethyl hexanol	19.4
Methyl isobutyl carbinol	20.5
2-Ethyl butanol	21.5
n-Pentanol	22.3
n-Butanol	23.3
n-Propanol	24.3
Ethanol	26.0
Methanol	29.7

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TABLE 2. GROUP CONTRIBUTIONS TO COHESIVE ENERGY DENSITY

Group	F [MPa$^{1/2}$ cm^3/mol]		ΔE_i^v(J/mol)	
	Small (112)	van Krevelen (121)	Hoy (61)	van Krevelen and Hoftyzer (163)
2.1. CARBON-CONTAINING GROUPS				
$-CH_3$	437	420	303	9630
$>CH_2$	272	280	269	4190
$>CH-$	57	140	176	420
$>C<$	− 190	0	65	− 5580
$=CH_2$	388	–	259	–
$=CH-$	277	222	249	–
$=C<$	39	82	173	–
$-CH=$(aromatic)	–	–	240	–
$-C=$(aromatic)	–	–	201	–
$-CH(CH_3)-$	495	560	(479)	(10060)
$-C(CH_3)_2-$	685	841	(672)	(13700)
$-CH=CH-$	454	444	497	10200
$-C=CH-$	265	304	421	4860
$CH_3>C=C<H$	(704)	724	(725)	(14500)
$H-C\equiv C-$	583	–	–	–
$-C\equiv C-$	454	–	–	–
Cyclopentyl	–	1380	1300	–
Cyclohexyl	–	1660	1470	–
Phenyl	1500	1520	(1400)	31000
p-Phenylene	1350	1380	(1440)	25140
Naphthyl	2340	–	–	–
2.2. OXYGEN-CONTAINING GROUPS				
$-O-$, ether	143	255	235	6290
$-O-$, epoxide	–	–	360	–
$-OH$	–	754	462	–
$-OH$, aromatic	–	–	350	–
$-(C=O)-$	562	685	538	–
$-(C=O)-O-$	634	511	688	13410
$-(C=O)-OH$	–	651	(998)	–
$-O-(C=O)-O-$	–	767	(904)	–
$-(C=O)-O-(C=O)-$	–	767	1160	–
2.3. NITROGEN-CONTAINING GROUPS				
$-NH_2$	–	–	464	–
$-NH-$	–	–	368	–
$-N<$	–	–	125	–
$-CH-CN$	(896)	1120	(901)	25420
$-CN$	839	982	725	25000
$-(C=O)-NH-$	–	1290	(906)	60760
$-O-(C=O)-NH$	–	1480	(1040)	–
$-N=C=O$	–	–	734	–
2.4. OTHER GROUPS				
$-H$	164–205	140	− 103 (acidic dimer)	–
$-S-$	460	460	428	8800
$-SH$	644	–	–	–
$-F$	(250)	164	84	4470
$-Cl$ (primary)	552	471	420	12990
$-Br$ (primary)	695	614	528	15500
$-I$	870	–	–	–
$-CF_2-$	307	–	–	–
$-CF_3$	561	–	–	–
$-O-N=O$	900	–	–	–
$-NO_2$	900	–	–	–
$-PO_4$	1020	–	–	–
$-Si-$	− 77	–	–	–

TABLE 2. *cont'd*

Group	F [MPa$^{1/2}$ cm^3/mol] Small (112)	van Krevelen (121)	ΔE_i^v(J/mol) Hoy (61)	van Krevelen and Hoftyzer (163)
2.5. STRUCTURAL FEATURES				
Conjugation	41–61	–	48	–
cis	–	–	–15	–
trans	–	–	–28	–
Ring, 4 member	–	–	159	–
5 member	215–235	–	43	–
6 member	194–215	–	–48	–
Subscription, ortho	–	–	20	–
meta	–		14	–

TABLE 3. CONTRIBUTIONS TO E_{coh} AND V^a

Group	E_{coh} (J/mol)	V (cm^3/mol)
$-CH_3$	4710	33.5
$>CH_2$	4940	16.1
$>CH-$	3430	–1.0
$>C<$	1470	–19.2
$=CH_2$	4310	28.5
$=CH-$	4310	13.5
$=C<$	4310	–5.5
$H-C\equiv$	3850	27.4
$-C\equiv$	7070	6.5
Phenyl	31940	71.4
Phenylene: *o*, *m*, *p*	31940	52.4
Phenyl (trisubstituted)	31940	33.4
(tetrasubstituted)	31940	14.4
(pentasubstituted)	31940	–4.6
(hexasubstituted)	31940	–23.6
Ring closure, 5+ atoms	1050	16.0
3 or 4 atoms	3140	18.0
Conjugation in ring for each double bond	1670	–2.2
Halogen attached to carbon atom with double bond	–20% of E_{coh} of halogen	4.0
$-F$	4190	18.0
$-F$, disubstituted	3560	20.0
trisubstituted	2300	22.0
$-CF_2-$, perfluoro compounds	4270	23.0
$-CF_3$, perfluoro compounds	4270	57.5
$-Cl$	11550	24.0
$-Cl$, disubstituted	9630	26.0
trisubstituted	7530	27.3
$-Br$	15490	30.0
$-Br$, disubstituted	12350	31.0
trisubstituted	10670	32.4
$-I$	19050	31.5
$-I$, disubstituted	16740	33.5
trisubstituted	16330	37.0
$-CN$	25530	24.0
$-OH$	29800	10.0
$-OH$, disubstituted or adjacent C atoms	21850	13.0
$-O-$	3350	3.8
$-CHO$, aldehyde	21350	22.3
$-CO-$	17370	10.8
$-COOH$	27630	28.5
$-COO-$	18000	18.0
$-CO_3-$, carbonate	17580	22.0
$-C_2O_3-$, anhydride	30560	30.0

TABLE 3. *cont'd*

Group	E_{coh} (J/mol)	V (cm^3/mol)
HCOO–, formate	18000	32.5
$-CO_2CO_2-$, oxalate	26790	37.3
$-HCO_3$	12560	18.0
$-COF$	13400	29.0
$-COCl$	17580	38.1
$-COBr$	24150	41.6
$-COI$	29300	48.7
$-NH_2$	12560	19.2
$-NH-$	8370	4.5
$-N<$	4190	–9.0
$-N=$	11720	5.0
$-NHNH_2$	21980	–
$-N(NH_2)-$	16740	16.0
	16740	16.0
$-N_2$, diazo	8370	23
$-N=N-$	4190	–
$>C-N=N-C<$	20090	–
$-N=C=N-$	11470	–
$-N\equiv C$	18840	23.1
$-NF_2$	7660	33.1
$-NF-$	5070	24.5
$-CONH_2$	41860	17.5
$-CONH-$	33490	9.5
	29510	–7.7
	27630	11.3
HCONH–	43950	27.0
$-NHCOO-$	26370	18.5
$-NHCONH-$	50230	–
	41860	–
	20930	–14.5
NH_2COO-	37000	–
$-NCO$	28460	35.0
$-ONH_2$	19050	20.0

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TABLE 3. *cont'd*

Group	E_{coh} (J/mol)	V (cm^3/mol)
$>C=N-OH$ (|)	25120	11.3
$-CH=NOH$	25120	24.0
$-NO_2$, aliphatic	29300	24.0
$-NO_2$, aromatic	15360	32.0
$-NO_3$	20930	33.5
$-NO_2$, nitrate	11720	33.5
$-NHNO_2$	39770	28.7
$-NNO-$	27210	10.0
$-SH$	14440	28.0
$-S-$	14150	12.0
$-S_2-$	23860	23.0
$-S_3-$	13400	47.2
$>S=O$	39140	–
SO_3	18840	27.6
SO_4	28460	31.6
$-SO_2Cl$	37070	43.5
$-SCN$	20090	37.0
$-NCS$	25120	40.0
P	9420	– 1.0
PO_3	14230	22.7
PO_4	20930	28.0
PO_3-OH	31810	32.2
Si	3390	0
SiO_4	21770	20.0
B	13810	– 2.0
BO_3	0	20.4
Al	13810	– 2.0
Ga	13810	– 2.0
In	13810	– 2.0
Tl	13810	– 2.0
Ge	8080	– 1.5
Sn	11300	1.5
Pb	17160	2.5
As	12980	7.0
Sb	16330	8.9
Bi	21350	9.5
Se	17160	16.0
Te	20090	17.4
Zn	14480	2.5
Cd	17790	6.5
Hg	22810	7.5

[a] Ref. 35.

TABLE 4. SOLUBILITY PARAMETER I: COMPONENT GROUP CONTRIBUTIONS[a]

Structural Group	F_{di} (J$^{1/2}$ cm$^{3/2}$/mol)	F_{pi} (J$^{1/2}$ cm$^{3/2}$/mol)	E_{hi} (J/mol)
$-CH_3$	420	0	0
$>CH_2$	270	0	0
$>CH-$	80	0	0
$>C<$	– 70	0	0
$=CH_2$	400	0	0
$=CH-$	200	0	0
$=C<$	70	0	0
	1620	0	0
	1430	110	0
(*o, m, p*)	1270	110	0
$-F$	(220)	-	-
$-Cl$	450	550	400
$-Br$	(550)	-	-
$-CN$	430	1100	2500
$-OH$	210	500	20000
$-O-$	100	400	3000
$-COH$	470	800	4500
$-CO-$	290	770	2000
$-COOH$	530	420	10000
$-COO-$	390	490	7000
$HCOO-$	530	–	–
$-NH_2$	280	–	8400
$-NH-$	160	210	3100
$-N<$	20	800	5000
$-NO_2$	500	1070	1500
$-S-$	440	–	–
$=PO_4-$	740	1890	13000
Ring	190	–	–
One plane of symmetry	–	0.50 ×	
Two planes of symmetry	–	0.25 ×	–
More planes of symmetry	–	0 ×	0 ×

[a] Ref. 163.

TABLE 5. SOLUBILITY PARAMETER II: COMPONENT GROUP CONTRIBUTIONS[a]

Group	$F_{t,i}$ ((J cm^3)$^{1/2}$/mol)	$F_{p,i}$ ((J cm^3)$^{1/2}$/mol)	V_i (cm^3/mol)	$\Delta_{T,i}$*	$\Delta_{T,i}^{(P)}$
$-CH_3$	303.5	0	21.55	0.023	0.022
$>CH_2$	269.0	0	15.55	0.020	0.020
$>CH-$	176.0	0	9.56	0.012	0.013
$>C<$	65.5	0	3.56	0	0.04
$=CH_2$	259	67	19.17	0.018	0.019
$=CH-$	249	59.5	13.18	0.018	0.0185
$=C<$	173	63	7.18	0	0.013
$CH_{aromatic}$	241	62.5	13.42	0.011	0.018
$C_{aromatic}$	201	65	7.42	0.011	0.015
$-HC=O$	600	532	23.3	0.048	0.045

TABLE 5. *cont'd*

Group	$F_{t,i}$ ((J cm^3)$^{1/2}$/mol)	$F_{p,i}$ ((J cm^3)$^{1/2}$/mol)	V_i (cm^3/mol)	$\Delta_{T,i}$[a]	$\Delta_{T,i}^{(P)}$
–CO–	538	525	17.3	0.040	0.040
–COOH	565	415	26.1	0.039	0.039
–COO–	640	528	23.7	0.047	0.050
–CO–O–CO–	1160	1160	41.0	0.086	0.086
–CN	725	725	23.1	0.060	0.054
–N=C=O	736	8.2	25.9	0.054	0.054
–N(HCO)–	1020	725	35.8	0.062	0.055
–CONH$_2$	1200	900	34.3	0.071	0.084
–CONH–	1131	895	28.3	0.054	0.073
–OCONH–	1265	890	34.8	0.078	0.094
–OH→H-bonded	485	485	10.65	0.082	0.034
–OH, primary	675	675	12.45	0.082	0.049
secondary	591	591	12.45	0.082	0.049
tertiary	(500)	(500)	12.45	0.082	0.049
phenolic	350	350	12.45	0.031	0.006
–O–, ether	235	216	6.45	0.021	0.018
acetal	236	102	6.45	0.018	0.018
epoxide	361	156	6.45	0.027	0.027
–NH$_2$	464	464	17.0	0.031	0.035
–NH–	368	368	11.0	0.031	0.275
$-N\langle$	125	125	12.6	0.014	0.009
–S–	428	428	18.0	0.015	0.032
–F	845	73.5	11.2	0.018	0.006
–Cl, primary	419.5	307	19.5	0.017	0.031
secondary	426	315	19.5	0.017	0.032
aromatic	330	81.5	19.5	0.017	0.025
$\langle^{Cl}_{Cl}$	705	572	39.0	0.034	0.052
–Br, aliphatic	528	123	25.3	0.010	0.039
aromatic	422	100	25.3	0.010	0.031
Base value, B	277				
Ring, non-aromatic 4-member	159	203	–	0	0.012
5-member	43	85	–	0	0.003
6-member	–48	61	–	0	–0.0035
7-member	92	0	–	0	0.007
Conjugation, isomerism	47.5	–19.8	–	0	0.0035
cis	–14.6	–14.6	–	0	–0.001
trans	–27.6	–27.6	–	0	–0.002
Aromatic substitution, ortho	20.2	–13.3	–	0	0.0015
meta	13.5	–24.3	–	0	0.001
para	83	–34.0	–	0	0.006

[a] Ref. (178–179).

TABLE 6. EQUATIONS TO BE USED FOR HOY'S SYSTEM[a]

Formulae	Solvents	Amorphous polymers
Additive molar functions	$F_t = \sum n_i F_{t,i}$ $F_p = \sum n_i F_{p,i}$ $V = \sum n_i V_i$ $\Delta_T = \sum n_i \Delta_{T,i}$	$F_t = \sum n_i F_{t,i}$ $F_p = \sum n_i F_{p,i}$ $V = \sum n_i V_i$ $\Delta_T^{(P)} = \sum n_i \Delta_{T,i}^{(P)}$
Auxiliary equations	$\log \alpha = 3.39 \frac{T_b}{T_{cr}} - 0.1585 - \log V$, T_b = boiling point, T_{cr} = critical temp.	$\frac{\alpha^{(P)} = 777\Delta_T^{(P)}}{V}$
	$\left(\frac{T_b}{T_{cr}}\right) = 0.567 + \Delta_T - (\Delta_T)^2$, Lyderson equation	$\bar{n} = \frac{0.5}{\Delta_T^{(P)}}$
Expressions for δ and δ-components	$\delta_t = \frac{F_t + B}{V}$; $B = 277$	$\delta_t = \frac{F_t + \frac{B}{\bar{n}}}{V}$; $B = 277$

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TABLE 6. *cont'd*

Formulae	Solvents	Amorphous polymers
	$\delta_p = \delta_t\left(\frac{1}{\alpha}\frac{F_p}{F_t + B}\right)^{1/2}$	$\delta_p = \delta_t\left(\frac{1}{\alpha^{(P)}}\frac{F_p}{F_t + B/\bar{n}}\right)^{1/2}$
	$\delta_h = \delta_t\left(\frac{\alpha - 1}{\alpha}\right)^{1/2}$	$\delta_h = \delta_t\left(\frac{\alpha^{(P)} - 1}{\alpha^{(P)}}\right)^{1/2}$
	$\delta_d = (\delta_t^2 - \delta_p^2 - \delta_h^2)^{1/2}$	$\delta_d = (\delta_t^2 - \delta_p^2 - \delta_h^2)^{1/2}$

[a] In the equations given here, F_t is always combined with a Base value, α is the molecular aggregation number, and $\bar{n}$ the number of repeating units per polymer chain segment.

D. SOLUBILITY PARAMETER TABLES

TABLE 7. SOLUBILITY PARAMETERS OF SOLVENTS IN ALPHABETICAL ORDER

Solvent	CAS number	Solubility parameter δ (MPa$^{1/2}$)	Solubility parameter δ (cal/cm)$^{1/2}$	H-bonding group
Acetaldehyde	75-07-0	21.1	10.3	m
Acetic acid	64-19-7	20.7	10.2	s
Acetic anhydride	108-24-7	21.1	10.3	s
Acetone	67-64-1	20.3	9.9	m
Acetonitrile	75-07-8	24.3	11.9	p
Acetophenone	98-86-2	21.7	10.6	m
Acetyl chloride	75-36-5	19.4	9.5	m
Acetylmorpholine (*N*)	1696-20-4	23.7	11.6	m
Acetylpiperidine (*N*)	618-42-8	22.9	11.2	s
Acetylpyrrolidine (*N*)	1072-83-9	23.3	11.4	s
Acrolein	107-02-8	20.1	9.8	s
Acrylic acid	79-10-7	24.6	12.0	s
Acrylonitrile	107-13-1	21.5	10.5	p
Allyl acetate	591-87-7	18.8	9.2	m
Allyl alcohol	107-18-6	24.1	11.8	s
Allyl chloride	107-05-1	18.0	8.8	m
Ammonia	7664-41-7	33.4	16.3	s
Amyl acetate (iso)	625-16-1	16.0	7.8	m
(normal)	628-63-7	17.4	8.5	m
(secondary)	626-38-0	17.0	8.3	m
Amyl alcohol	75-85-4	20.5	10.0	s
Amyl alcohol (normal)	71-41-0	22.3	10.9	s
Amylamine (normal)	110-58-7	17.8	8.7	s
Amyl bromide (1-bromopentane)	110-53-2	15.6	7.6	m
Amyl chloride (1-chloropentane)	543-59-9	17.0	8.3	m
Amylene (2-methyl-2-butene)	513-35-9	14.1	6.9	p
Amyl ether (pentyl ether)	693-65-2	14.9	7.3	m
Amyl formate (iso)	110-45-2	16.4	8.0	m
(normal)	638-49-3	17.2	8.5	m
Amyl iodide (1-iodopentane)	628-17-1	17.2	8.4	m
Anethole (*para*)	4180-23-8	17.2	8.4	m
Aniline	65-53-3	21.1	10.3	s
Anthracene	120-12-7	20.3	9.9	p
Apco #18 solvent		15.3	7.5	p
Apco #140 solvent		14.9	7.3	p
Apco thinner		16.0	7.8	p
Aroclor 1248	12672-29-6	18.0	8.8	p
Benzaldehyde	100-52-7	19.2	9.4	m
Benzene	71-43-2	18.8	9.2	p
Benzonitrile	100-47-0	17.2	8.4	p
Benzyl alcohol	100-51-6	24.8	12.1	s
Bicyclohexyl	92-51-3	17.4	08.5	p
Bromobenzene	108-86-1	20.3	09.9	p
1-Bromonaphthalene	90-11-9	21.7	10.6	p
Bromostyrene (*ortho*)	2039-88-5	20.1	9.8	p
1,3-Butadiene	106-99-0	14.5	7.1	p

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TABLE 6. *cont'd*

Formulae	Solvents	Amorphous polymers
	$\delta_p = \delta_t\left(\frac{1}{\alpha}\frac{F_p}{F_t + B}\right)^{1/2}$	$\delta_p = \delta_t\left(\frac{1}{\alpha^{(P)}}\frac{F_p}{F_t + B/\bar{n}}\right)^{1/2}$
	$\delta_h = \delta_t\left(\frac{\alpha - 1}{\alpha}\right)^{1/2}$	$\delta_h = \delta_t\left(\frac{\alpha^{(P)} - 1}{\alpha^{(P)}}\right)^{1/2}$
	$\delta_d = (\delta_t^2 - \delta_p^2 - \delta_h^2)^{1/2}$	$\delta_d = (\delta_t^2 - \delta_p^2 - \delta_h^2)^{1/2}$

[a] In the equations given here, F_t is always combined with a Base value, α is the molecular aggregation number, and $\bar{n}$ the number of repeating units per polymer chain segment.

D. SOLUBILITY PARAMETER TABLES

TABLE 7. SOLUBILITY PARAMETERS OF SOLVENTS IN ALPHABETICAL ORDER

Solvent	CAS number	Solubility parameter δ (MPa$^{1/2}$)	Solubility parameter δ (cal/cm)$^{1/2}$	H-bonding group
Acetaldehyde	75-07-0	21.1	10.3	m
Acetic acid	64-19-7	20.7	10.2	s
Acetic anhydride	108-24-7	21.1	10.3	s
Acetone	67-64-1	20.3	9.9	m
Acetonitrile	75-07-8	24.3	11.9	p
Acetophenone	98-86-2	21.7	10.6	m
Acetyl chloride	75-36-5	19.4	9.5	m
Acetylmorpholine (*N*)	1696-20-4	23.7	11.6	m
Acetylpiperidine (*N*)	618-42-8	22.9	11.2	s
Acetylpyrrolidine (*N*)	1072-83-9	23.3	11.4	s
Acrolein	107-02-8	20.1	9.8	s
Acrylic acid	79-10-7	24.6	12.0	s
Acrylonitrile	107-13-1	21.5	10.5	p
Allyl acetate	591-87-7	18.8	9.2	m
Allyl alcohol	107-18-6	24.1	11.8	s
Allyl chloride	107-05-1	18.0	8.8	m
Ammonia	7664-41-7	33.4	16.3	s
Amyl acetate (iso)	625-16-1	16.0	7.8	m
(normal)	628-63-7	17.4	8.5	m
(secondary)	626-38-0	17.0	8.3	m
Amyl alcohol	75-85-4	20.5	10.0	s
Amyl alcohol (normal)	71-41-0	22.3	10.9	s
Amylamine (normal)	110-58-7	17.8	8.7	s
Amyl bromide (1-bromopentane)	110-53-2	15.6	7.6	m
Amyl chloride (1-chloropentane)	543-59-9	17.0	8.3	m
Amylene (2-methyl-2-butene)	513-35-9	14.1	6.9	p
Amyl ether (pentyl ether)	693-65-2	14.9	7.3	m
Amyl formate (iso)	110-45-2	16.4	8.0	m
(normal)	638-49-3	17.2	8.5	m
Amyl iodide (1-iodopentane)	628-17-1	17.2	8.4	m
Anethole (*para*)	4180-23-8	17.2	8.4	m
Aniline	65-53-3	21.1	10.3	s
Anthracene	120-12-7	20.3	9.9	p
Apco #18 solvent		15.3	7.5	p
Apco #140 solvent		14.9	7.3	p
Apco thinner		16.0	7.8	p
Aroclor 1248	12672-29-6	18.0	8.8	p
Benzaldehyde	100-52-7	19.2	9.4	m
Benzene	71-43-2	18.8	9.2	p
Benzonitrile	100-47-0	17.2	8.4	p
Benzyl alcohol	100-51-6	24.8	12.1	s
Bicyclohexyl	92-51-3	17.4	08.5	p
Bromobenzene	108-86-1	20.3	09.9	p
1-Bromonaphthalene	90-11-9	21.7	10.6	p
Bromostyrene (*ortho*)	2039-88-5	20.1	9.8	p
1,3-Butadiene	106-99-0	14.5	7.1	p

TABLE 7. *cont'd*

Solvent	CAS number	Solubility parameter δ (MPa$^{1/2}$)	Solubility parameter δ (cal/cm)$^{1/2}$	H-bonding group
n-Butane	106-97-8	13.9	6.8	p
1,3-Butanediol	107-88-0	23.7	11.6	s
1,4-Butanediol	110-63-4	24.8	12.1	s
2,3-Butanediol	513-85-9	22.7	11.1	s
Butyl acetate (iso)	540-88-5	17.0	8.3	m
n-Butyl acetate	123-86-4	17.4	8.5	m
sec-Butyl acetate	105-46-4	16.8	8.2	m
Butyl acrylate (iso)	1663-39-4	17.4	8.5	m
n-Butyl acrylate	141-32-2	18.0	8.8	m
Butyl alcohol (iso) (2-methyl-1-propanol)	78-83-1	21.5	10.5	s
n-Butyl alcohol (1-butanol)	71-36-3	23.3	11.4	s
sec-Butyl alcohol (2-butanol)	15892-23-6	22.1	10.8	s
tert-Butyl alcohol (2-methyl-2-propanol)	75-65-0	21.7	10.6	s
n-Butylamine	109-73-9	17.8	8.7	s
n-Butyl bromide (1-bromobutane)	109-65-9	17.8	8.7	m
sec-Butyl bromide (2-bromobutane)	78-76-2	17.2	8.4	m
Butyl (iso) butyrate (normal)	539-90-2	16.0	7.8	m
Butyl (normal) butyrate (normal)	109-21-7	16.6	8.1	m
Butyl chloride (iso) (2-chloro-2-methylpropane)	507-20-0	16.6	8.1	m
Butylene-2,3 carbonate	4437-85-9	24.8	12.1	m
Butylene (iso) (2-methylpropene)	115-11-7	13.7	6.7	p
Butyl ether	142-96-1	16.0	7.8	m
Butyl formate (iso)	762-75-4	16.8	8.2	m
(normal)	592-84-7	18.2	8.9	m
Butyl iodide (normal) (1-iodobutane)	542-69-8	17.6	8.6	m
Butyl lactate (normal)	138-22-7	19.2	9.4	m
Butyl methacrylate	97-88-1	16.8	8.2	m
Butyl propionate	590-01-2	18.0	8.8	m
Butyl stearate	123-95-5	15.3	7.5	m
Butyraldehyde	123-72-8	18.4	9.0	m
Butyric acid (iso) (2-methylpropionic acid)	79-31-2	21.1	10.3	s
(normal)	107-92-6	21.5	10.5	s
Butyrolactone, γ	96-48-0	25.8	12.6	m
Butyronitrile (iso)	78-82-0	20.1	9.8	p
(normal)	109-74-0	21.5	10.5	p
Caprolactam, ε	105-60-2	26.0	12.7	m
Caprolactone, ε	502-44-3	20.7	10.1	m
Capronitrile (heptyl cyanide)	124-12-9	19.2	9.4	p
Carbon disulfide	75-15-0	20.5	10.0	p
Carbon tetrachloride	56-23-5	17.6	8.6	p
Celanese solvent 601		18.8	9.2	m
Chloroacetonitrile	920-37-6	25.8	12.6	p
Chlorobenzene	108-90-7	19.4	9.5	p
Chloroethyl acetate (β)	542-58-5	19.8	9.7	m
Chloroform	67-66-3	19.0	9.3	p
Chlorostyrene (*ortho* or *para*)	2039-87-4	19.4	9.5	p
Chlorotoluene (*para*)	106-43-4	18.0	8.8	p
Cresol (meta)	108-39-4	20.9	10.2	s
Cyclobutanedione	14406-53-3	22.5	11.0	m
Cyclohexane	110-82-7	16.8	8.2	p
Cyclohexanol	108-93-0	23.3	11.4	s
Cyclohexanone	108-94-1	20.3	9.9	m
Cyclopentane	287-92-3	17.8	8.7	p
Cyclopentanone	120-92-3	21.3	10.4	m
Cymene (*para*) (2-isopropyl toluene)	99-87-6	16.8	8.2	p
Decahydronaphthalene (*cis* and *trans*) (Decalin)	91-17-8	18.0	8.8	p
Decane (normal)	124-18-5	13.5	6.6	p
Decyl acrylate (iso)	2156-96-9	16.8	8.2	m
Diacetone alcohol (4-hydroxy-4-methyl-2-pentanone)	123-42-2	18.8	9.2	m
Diacetone alcohol methyl ether (Pentoxone)	107-70-0	16.8	8.2	m
Diacetylpiperazine (*N,N*)	18940-57-3	28.0	13.7	m
Diamyl phthalate	131-18-0	18.6	9.1	m
Dibenzyl ether	103-50-4	19.2	9.4	m

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TABLE 7. *cont'd*

Solvent	CAS number	Solubility parameter δ (MPa$^{1/2}$)	Solubility parameter δ (cal/cm)$^{1/2}$	H-bonding group
Dibromoethane-1,2	106-93-4	21.3	10.4	p
Dibromoethylene-1,2 (*cis* and *trans*)	540-49-8	20.7	10.1	p
Dibutoxyethyl phthalate (Kronisol)	117-83-9	16.4	8.0	m
Dibutylamine	111-92-2	16.6	8.1	s
Dibutyl fumarate	105-75-9	18.4	9.0	m
Dibutyl maleate	105-76-0	18.4	9.0	m
Dibutyl phenyl phosphate	2528-36-1	17.8	8.7	m
Dibutyl phthalate	84-74-2	19.0	9.3	m
Dibutyl sebacate	109-43-3	18.0	9.2	m
Dichloroacetic acid	79-43-6	22.5	11.0	s
Dichlorobenzene (*ortho*)	95-50-1	20.5	10.0	p
Dichlorodifluoromethane (Freon 12)	75-71-8	11.3	5.5	p
Dichloroethyl ether	623-46-1	20.1	9.8	m
Dichloroethylene, *cis*-1,2	156-59-2	18.6	9.1	p
trans-1,2	156-60-5	18.4	9.0	p
Dichlorofluoromethane (Freon 21)	75-43-4	17.0	8.3	p
Dichloropropane-1,2	78-87-5	18.4	9.0	p
Dichloropropane-2,2	594-20-7	16.8	8.2	p
Diethylacetamide (*N,N*)	685-91-6	20.3	9.9	m
Diethylamine	109-89-7	16.4	8.0	s
Diethyl carbonate	105-58-8	18.0	8.8	m
Diethylene glycol	111-46-6	24.8	12.1	s
Diethylene glycol monobutyl ether (normal)	112-34-5	19.4	9.5	m
Diethylene glycol monobutyl ether	112-34-5	20.9	10.2	m
Diethylene glycol monobutyl ether acetate	124-17-4	17.4	8.5	m
Diethylene glycol monolaurate	141-20-8	17.8	8.7	m
Diethyl ether	60-29-7	15.1	7.4	m
Diethylformamide (*N,N*)	617-84-5	21.7	10.6	m
Diethyl ketone	96-22-0	18.0	8.8	m
Diethyl maleate	141-05-9	20.3	9.9	m
Diethyl oxalate	95-92-1	17.6	8.6	m
Diethyl phthalate	84-66-2	20.5	10.0	m
Diethyl-2,2-propanediol-1,2 (heptylene glycol)	115-76-4	20.3	9.9	s
Diethyl sulfone	597-35-3	25.4	12.4	m
Difluorotetrachloroethane (Freon 112)	76-11-9	16.0	7.8	p
Diformylpiperazine (*N,N*)	4164-39-0	31.5	15.4	m
Dihexyl ether	112-58-3	16.4	8.0	m
Di-*n*-hexyl phthalate	108-83-8	18.2	8.9	m
Diisobutylene	107-39-1	15.8	7.7	p
Diisobutyl ketone	108-83-8	16.0	7.8	m
Diisodecyl phthalate	26761-40-0	14.7	7.2	m
Diisopropyl ether	108-20-3	14.1	6.9	m
Diisopropyl ketone	565-80-0	16.4	8.0	m
Dimethylacetamide (*N,N*)	127-19-5	22.1	10.8	m
Dimethylaniline	121-69-7	19.8	9.7	m
Dimethyl-2,2-butanediol-1,2 (isobutylene glycol)	558-43-0	22.9	11.2	s
Dimethyl-2,2-butanediol-1,3	76-09-3	20.5	10.0	s
Dimethyl carbonate	616-38-6	20.3	9.9	m
Dimethyl ether	115-10-6	18.0	8.8	m
Dimethylformamide (*N,N*)	68-12-2	24.8	12.1	m
Dimethyl malonate	108-59-8	22.5	11.0	m
Dimethylnitroamine (*N,N*)	62-75-9	26.8	13.1	s
Dimethyl oxalate	553-90-2	22.5	11.0	m
Dimethyl phosphite	868-85-9	25.6	12.5	m
Dimethyl phthalate	131-11-3	21.9	10.7	m
Dimethyl siloxane	9016-00-6	10.0–12.1	4.9–5.9	p
Dimethyl sulfide	75-18-3	19.2	9.4	p
Dimethyl sulfoxide	67-68-5	29.7	14.5	m
Dimethyltetramethylene sulfone	1003-78-7	24.6	12.0	m
Dioctyl adipate	103-23-1	17.8	8.7	m
Dioctyl phthalate	117-81-7	24.8	12.1	m
Dioctyl sebacate	1222-62-3	17.8	8.7	m
Dioxane-1,4	123-91-1	20.5	10.0	m

TABLE 7. *cont'd*

Solvent	CAS number	Solubility parameter δ (MPa $^{1/2}$)	Solubility parameter δ (cal/cm) $^{1/2}$	H-bonding group
Dioxolane-1,3	646-06-0	17.6	8.6	m
Dipentene	138-86-3	20.5	10.0	m
Diphenyl ether	101-84-8	20.9	10.2	m
Diphenyl 2-ethylhexyl phosphate	1241-94-7	17.4	8.5	p
Dipropylene glycol	110-98-5	20.7	10.1	m
Dipropylene glycol monomethyl ether	34590-94-8	17.6	8.6	m
Dipropyl phthalate	131-16-8	20.5	10.0	s
Dipropyl sulfone	598-03-8	23.1	11.3	m
Dodecane	112-40-3	16.2	7.9	p
Dodecanol-1	112-53-8	20–21	9.8	s
Epichlorohydrin	106-89-8	22.5	11.0	s
Ethane	74-84-0	12.3	6.0	p
Ethylacetamide (*N*)	625-50-3	25.2	12.3	s
Ethyl acetate	141-78-6	18.6	9.1	m
Ethyl acrylate	140-88-5	17.6	8.6	m
Ethyl alcohol	64-17-5	26.0	12.7	s
Ethylamine	75-04-7	20.5	10.0	s
Ethyl amyl ketone (3-octanone)	106-68-3	16.8	8.2	m
Ethylbenzene	100-41-4	18.0	8.8	p
Ethyl benzoate	93-89-0	16.8	8.2	m
Ethyl bromide (bromoethane)	74-96-4	19.6	9.6	m
Ethyl-2-butanol-1	97-95-0	21.5	10.5	s
Ethyl *n*-butyrate	105-54-4	17.4	8.5	m
Ethyl caprylate	106-32-1	14.9	7.3	m
Ethyl chloride	75-00-3	18.8	9.2	m
Ethyl cyanoacetate	105-56-6	22.5	11.0	m
Ethylene bromide	593-60-2	19.8	9.7	p
Ethylene carbonate	96-49-1	30.1	14.7	m
Ethylene chlorohydrin (2-chloroethanol)	107-07-3	25.0	12.2	s
Ethylene cyanohydrin (3-hydroxypropionitrile)	109-78-4	31.1	15.2	s
Ethylenediamine	107-15-3	25.2	12.3	s
Ethylene dichloride (1,2-dichloroethane)	107-06-2	20.1	9.8	p
Ethylene glycol	107-21-1	29.9	14.6	s
Ethylene glycol diacetate	111-55-7	20.5	10.0	m
Ethylene glycol diethyl ether	629-14-1	17.0	8.3	m
Ethylene glycol dimethyl ether	110-71-4	17.6	8.6	m
Ethylene glycol methyl ether acetate	110-49-6	18.8	9.2	m
Ethylene glycol monobenzyl ether	622-08-2	22.3	10.9	m
Ethylene glycol monobutyl ether	111-76-2	19.4	9.5	m
Ethylene glycol monoethyl ether (2-ethoxyethanol; Cellusolve)	110-80-5	21.5	10.5	m
Ethylene glycol monomethyl ether (2-methoxyethanol)	109-86-4	23.3	11.4	m
Ethylene glycol monophenyl ether	122-99-6	23.5	11.5	m
Ethylene oxide	75-21-8	22.7	11.1	m
Ethylene formamide (*N*)		28.4	13.9	s
Ethyl formate	109-94-4	19.2	9.4	m
Ethyl-2-hexanediol-1,3 (octylene glycol)	94-96-2	19.2	9.4	s
Ethylhexanol	104-76-7	19.4	9.5	s
Ethyl hexyl acrylate	103-11-7	16.0	7.8	m
Ethylidene chloride	75-34-3	18.2	8.9	p
Ethyl iodide (iodoethane)	75-03-6	19.2	9.4	m
Ethyl isobutyl ether	627-02-1	15.3	7.5	m
Ethyl isobutyrate	97-62-1	16.2	7.9	m
Ethyl lactate	687-47-8	20.5	10.0	m
Ethyl mercaptan (ethane thiol)	75-08-1	18.8	9.2	p
Ethyl methacrylate	97-63-2	17.0	8.3	m
Ethyl morpholine (*N*)	100-74-3	18.2	8.9	s
Ethyl orthoformate (triethyl orthoformate)	122-51-0	17.0	8.3	m
Ethyl propionate	105-37-3	17.2	8.4	m
Fluorocarbons, aliphatic		11.3–12.7	5.5–6.2	p
aromatic		15.3–16.8	7.5–8.2	p
Formamide	75-12-7	39.3	19.2	s
Formic acid	64-18-6	24.8	12.1	s

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TABLE 7. *cont'd*

Solvent	CAS number	Solubility parameter δ MPa$^{1/2}$	Solubility parameter δ (cal/cm)$^{1/2}$	H-Bonding Group
Formylmorpholine (*N*)	4394-85-8	26.6	13.0	m
Formylpiperidine (*N*)	2591-86-8	23.5	11.5	m
Furan	110-00-9	19.2	9.4	m
Furfural (2-furaldehyde)	98-01-1	22.9	11.2	m
Furfuryl alcohol	98-00-0	25.6	12.5	s
Glycerol	56-81-5	33.8	16.5	s
Heptane (normal)	142-82-5	15.1	7.4	p
Heptyl alcohol (normal)	111-70-6	21.7	10.6	s
Hexamethylphosphoramide	680-31-9	21.5	10.5	s
Hexane (normal)	110-54-3	14.9	7.3	p
Hexanediol-2,5	2935-44-6	21.2	10.3	s
Hexene-1	592-41-6	15.1	7.4	p
Hexyl alcohol (normal)	111-27-3	21.9	10.7	s
Hydrazine	302-10-2	37.3	18.1	s
Hydrogen	1333-74-0	6.9	3.0	p
Hydrogenated terphenyl (Monsanto HB-40)		18.4	9.0	p
Hydrogen cyanide	74-90-8	24.8	12.1	s
Iodobenzene	591-50-4	20.7	10.1	p
Isophorone	78-59-1	18.6	9.1	m
Isoprene	78-79-5	15.1	7.4	p
Lauryl alcohol	112-53-8	16.6	8.1	s
Low odor mineral spirits		14.1	6.9	p
Maleic anhydride	108-31-6	27.8	13.6	s
Malononitrile	109-77-3	30.9	15.1	p
Mesitylene	108-67-8	18.0	8.8	p
Mesityl oxide	141-79-7	18.4	9.0	m
Methacrylic acid	79-41-4	22.9	11.2	s
Methane	74-82-8	11.0	5.4	p
Methanol	67-56-1	29.7	14.5	s
Methoxy-4-methyl-4-pentanol-2		17.4	8.5	s
Methoxy-4-methyl-4-pentanone-2	107-70-0	17.0	8.3	m
Methylacetamide	79-16-3	29.9	14.6	s
Methyl acetate	79-20-9	19.6	9.6	m
Methyl acrylate	96-33-3	18.2	8.9	m
Methylamine	74-89-5	22.9	11.2	s
Methyl amyl acetate	108-84-9	16.4	8.0	m
Methyl amyl ketone	110-43-0	17.4	8.5	m
Methyl benzoate	95-58-3	21.5	10.5	m
Methyl bromide	74-83-9	19.6	9.6	m
Methyl *n*-butyl ketone	591-78-6	17.0	8.3	m
Methyl *n*-butyrate	623-42-7	18.2	8.9	m
Methyl caprolactone		18.2	8.9	m
Methyl chloride	74-87-3	19.8	9.7	m
Methylcyclohexane	10120-28-2	16.0	7.8	p
Methylcyclohexanone	589-92-4	19.0	9.3	m
Methylene chloride	75-09-2	19.8	9.7	p
Methylene glycolate	61192-32-3	25.4	12.4	m
Methylene iodide	75-11-6	24.1	11.8	p
Methyl ethyl ketone	78-93-3	19.0	9.3	m
Methyl ethyl sulfone	594-43-4	27.4	13.4	m
Methylformamide (*N*)	123-39-7	32.9	16.1	s
Methyl formate	107-31-3	20.9	10.2	m
Methyl *n*-hexyl ketone	111-13-7	17.0	8.3	m
Methyl iodide	74-88-4	20.9	10.2	m
Methyl isoamyl ketone	110-12-3	17.2	8.4	m
Methyl isobutyl carbinol	108-11-2	20.5	10.0	s
Methyl isobutyl ketone	108-10-1	17.2	8.4	m
Methyl isobutyrate	547-63-7	17.0	8.3	m
Methyl isopropyl ketone	563-80-4	17.4	8.5	m
Methyl isovalerate	624-24-8	16.2	7.9	m
Methyl methacrylate	80-62-6	18.0	8.8	m
Methyl nonyl ketone	112-12-9	16.0	7.8	m
Methyl-2-pentanediol-1,3	149-31-5	21.1	10.3	s

TABLE 7. *cont'd*

Solvent	CAS number	Solubility parameter δ (MPa$^{1/2}$)	Solubility parameter δ (cal/cm)$^{1/2}$	H-bonding group
Methyl-2-pentanediol-2,4	107-41-5	19.8	9.7	s
Methyl-2-pentanediol monoethyl ether (Pentoxol)		17.4	8.5	m
Methyl propionate	554-12-1	18.2	8.9	m
Methyl propyl ketone	107-87-9	17.8	8.7	m
Methyl propyl sulfone	1977-37-3	25.6	12.5	m
Methyl pyrrolidone-2 (1-methyl-2-pyrrolidinone)	872-50-4	23.1	11.3	m
Methyl salicylate	119-36-8	21.7	10.6	m
Methyl styrene (α)	98-83-9	17.4	8.5	p
Methyltetramethylene sulfone		26.4	12.9	m
Methyl *n*-valerate	624-24-8	16.2	7.9	m
Morpholine	110-91-8	22.1	10.8	s
Naphthalene	91-20-3	20.3	9.9	p
Neopentane	463-82-1	12.9	6.3	p
Neopentyl glycol	126-30-7	22.5	11.0	s
Nitrobenzene	98-95-3	20.5	10.0	p
Nitroethane	79-24-3	22.7	11.1	p
Nitromethane	75-52-5	26.0	12.7	p
Nitro-*n*-octane		14.3	7.0	p
Nitro-1-propane	108-03-2	21.1	10.3	p
Nitro-2-propane	79-46-9	20.3	9.9	p
Nonyl phenol	25154-52-3	19.2	9.4	s
Octane (normal)	111-65-9	15.6	7.6	p
Octyl alcohol (normal)	111-87-5	21.1	10.3	s
Pentachloroethane	76-01-7	19.2	9.4	p
Pentane (normal)	109-66-0	14.3	7.0	p
Pentanediol-1,5	111-29-5	23.5	11.5	s
Pentanediol-2,4	625-69-4	22.1	10.8	s
Perchloroethylene	127-18-4	19.0	9.3	p
Perfluoroheptane	335-57-9	11.9	5.8	p
Perfluoromethylcyclohexane	355-02-2	12.3	6.0	p
Phenanthrene	85-01-8	20.1	9.8	p
Phenylhydrazine	100-63-0	25.6	12.5	s
Pine oil		17.6	8.6	p
Piperidine	110-89-4	17.8	8.7	p
Piperidone	675-20-7	27.8	13.6	s
Propane	74-98-6	13.1	6.4	p
Propiolactone	57-57-8	27.2	13.3	m
Propionic acid	79-09-4	20.3	9.9	s
Propionic anhydride	123-62-6	20.5	10.0	s
Propionitrile	107-12-0	22.1	10.8	p
Propyl acetate (iso)	108-21-4	17.2	8.4	m
Propyl acetate (normal)	109-60-4	18.0	8.8	m
Propyl alcohol (2-propanol)	67-63-0	23.5	11.5	s
Propyl alcohol (1-propanol)	71-23-8	24.3	11.9	s
Propylbenzene (normal)	103-65-1	17.6	8.6	p
Propyl bromide (1-bromopropane)	106-94-5	18.2	8.9	m
Propyl butyrate	105-66-8	17.2	8.4	m
Propyl butyrate (iso)	638-11-9	16.2	7.9	m
Propyl chloride (2-chloropropane)	75-29-6	16.6	8.1	m
Propyl chloride (1-chloropropane)	540-54-5	17.4	8.5	m
Propylene-1,2-carbonate	108-32-7	27.2	13.3	m
Propylene glycol (1,2-propanediol)	57-55-6	25.8	12.6	s
Propylene glycol methyl ether (1,2-dimethoxypropane)	7778-85-0	20.7	10.1	m
Propylene oxide	75-56-9	18.8	9.2	m
Propyl ether (di-, normal)	111-43-3	16.0	7.8	m
Propyl ether (iso)	108-20-3	14.5	7.1	m
Propyl formate	110-74-7	18.8	9.2	m
Propyl propionate	106-36-5	17.4	8.5	m
Pyridine	110-86-1	21.9	10.7	s
Pyrone (γ)	504-31-4	27.4	13.4	m
Pyrrolidine (α)	123-75-1	30.1	14.7	s
Quinoline	00-02-2	22.1	10.8	s
Santicizer 8		24.3	11.9	m

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TABLE 7. *cont'd*

Solvent	CAS number	Solubility parameter δ (MPa$^{1/2}$)	Solubility parameter δ (cal/cm)$^{1/2}$	H-bonding group
Shell Sol 72		14.7	7.2	p
Shell TS28 solvent		15.1	7.4	p
Silicon tetrachloride		15.1	7.4	p
Socal solvent No. 1		16.6	8.1	p
Socal solvent No. 2		16.2	7.9	p
Socal solvent No. 3		15.8	7.7	p
Solvesso 100		17.6	8.6	p
Solvesso 150		17.4	8.5	p
Styrene	100-42-5	19.0	9.3	p
Styrene oxide	96-09-3	21.5	10.5	m
Succinic anhydride	108-30-5	31.5	15.4	s
Terpene B		17.2	8.4	p
Tetrachloroethane-1,1,2,2	79-34-5	19.8	9.7	p
Tetrachloroethylene (perchloroethylene)	127-18-4	19.0	9.3	p
Tetraethylene glycol	112-60-7	20.3	9.9	s
Tetrahydrofuran	109-99-9	18.6	9.1	m
Tetrahydronaphthalene (tetralin)	119-64-2	19.4	9.5	p
Tetramethylene sulfone (sulfolane, tetrahydrothiophene 1,1-dioxide)	126-33-0	27.4	13.4	m
Tetramethyloxamide		23.3	11.4	m
Thiophene	110-02-1	20.1	9.8	m
Toluene	108-88-3	18.2	8.9	p
Tolylene diisocyanate (4-methyl-1,3-phenylene diisocyanate)	584-84-9	23.7	11.6	s
Tributylamine	102-82-9	15.8	7.7	s
Trichloroethane-1,1,2	79-00-5	19.6	9.6	p
Trichloroethylene	79-01-6	18.8	9.2	p
Trichlorofluoromethane	75-69-4	15.5	7.6	p
Trichlorotrifluoroethane (1,1,2-trichlorotrifluoroethane)	76-13-1	14.9	7.3	p
Tricresyl phosphate (tritolyl phosphate)	1330-78-5	17.2	8.4	m
Triethylamine	121-44-8	15.1	7.4	s
Triethylene glycol	112-27-6	21.9	10.7	s
Triethylenetetramine	112-24-3	22.7	11.1	s
Trimethyl-3,5,5-hexanol (nonyl alcohol)	3452-97-9	17.2	8.4	s
Triphenyl phosphate	115-86-6	17.6	8.6	m
Triphenyl phosphite	101-02-0	19.0	9.3	m
Tripropylene glycol	24800-44-0	18.8	9.2	s
Tripropylene glycol methyl ether	20324-33-8	17.8	8.7	m
Turpentine	8006-64-2	16.6	8.1	p
Valeric acid (normal)	109-52-4	20.1	9.8	s
Valeronitrile (normal)	110-59-8	19.6	9.6	p
Varnolene (Varsol #2)		15.6	7.6	p
Vinyl acetate	108-05-4	18.4	9.0	m
Vinyl chloride	75-01-4	16.0	7.8	m
Vinyl toluene	622-97-9	18.6	9.1	p
V M & P naphtha		15.6	7.6	p
Water	7732-18-5	47.9	23.4	s
Xylene (*p*-xylene)	106-42-3	18.0	8.8	p

TABLE 8. SOLUBILITY PARAMETERS OF SOLVENTS IN INCREASING ORDER OF δ

Solvent	δ (MPa$^{1/2}$)
Hydrogen	6.9
Dimethyl siloxane	10.0–12.1
Methane	11.0
Dichlorodifluoromethane (Freon 12)	11.3
Fluorocarbons, aliphatic	11.3–12.7
Perfluoroheptane	11.9
Ethane	12.3
Perfluoromethylcyclohexane	12.3
Neopentane	12.9

TABLE 8. *cont'd*

Solvent	δ (MPa$^{1/2}$)
Propane	13.1
Decane (normal)	13.5
Butylene (iso) (2-methylpropene)	13.7
n-Butane	13.9
Amylene (2-methyl-2-butene)	14.1
Diisopropyl ether	14.1
Low odor mineral spirits	14.1
Nitro-*n*-octane	14.3
Pentane (normal)	14.3
1,3-Butadiene	14.5

TABLE 8. *cont'd*

Solvent	δ (MPa$^{1/2}$)
Propyl ether (iso)	14.5
Diisodecyl phthalate	14.7
Shell Sol 72	14.7
Amyl ether (pentyl ether)	14.9
Apco #140 solvent	14.9
Ethyl caprylate	14.9
Hexane (normal)	14.9
Trichlorotrifluoroethane (1,1,2-trichlorotrifluoroethane)	14.9
Diethyl ether	15.1
Heptane (normal)	15.1
Hexene-1	15.1
Isoprene	15.1
Shell TS28 solvent	15.1
Silicon tetrachloride	15.1
Triethylamine	15.1
Apco #18 solvent	15.3
Butyl stearate	15.3
Ethyl isobutyl ether	15.3
Fluorocarbons (aromatic)	15.3–16.8
Trichlorofluoromethane	15.5
Amyl bromide (1-bromopentane)	15.6
Octane (normal)	15.6
Varnolene (varsol #2)	15.6
V M & P naphtha	15.6
Diisobutylene	15.8
Socal solvent No. 3	15.8
Tributylamine	15.8
Amyl acetate (iso)	16.0
Apco thinner	16.0
Butyl (iso) butyrate (normal)	16.0
Butyl ether	16.0
Difluorotetrachloroethane (Freon 112)	16.0
Diisobutyl ketone	16.0
Ethyl hexyl acrylate	16.0
Methylcyclohexane	16.0
Methyl nonyl ketone	16.0
Propyl ether (di-, normal)	16.0
Vinyl chloride	16.0
Dodecane	16.2
Ethyl isobutyrate	16.2
Methyl isovalerate	16.2
Methyl *n*-valerate	16.2
Propyl butyrate (iso)	16.2
Socal solvent No. 2	16.2
Amyl formate (iso)	16.4
Dibutoxyethyl phthalate (Kronisol)	16.4
Diethylamine	16.4
Dihexyl ether	16.4
Diisopropyl ketone	16.4
Methyl amyl acetate	16.4
Butyl (normal) butyrate (normal)	16.6
Butyl chloride (iso) (2-chloro-2-methylpropane)	16.6
Dibutylamine	16.6
Lauryl alcohol	16.6
Propyl chloride (2-chloropropane)	16.6
Socal solvent No. 1	16.6
Turpentine	16.6
sec-Butyl acetate	16.8
Butyl formate (iso)	16.8
Butyl methacrylate	16.8
Cyclohexane	16.8
Cymene (*para*) (2-isopropyl toluene)	16.8
Decyl acrylate (iso)	16.8
Diacetone alcohol methyl ether (Pentoxone)	16.8
Dichloropropane-2,2	16.8

TABLE 8. *cont'd*

Solvent	δ (MPa$^{1/2}$)
Ethyl amyl ketone (3-octanone)	16.8
Ethyl benzoate	16.8
Ethyl benzoate (secondary)	17.0
Amyl chloride (1-chloropentane)	17.0
Butyl acetate (iso)	17.0
Dichlorofluoromethane (Freon 21)	17.0
Ethylene glycol diethyl ether	17.0
Ethyl methacrylate	17.0
Ethyl orthoformate (triethyl orthoformate)	17.0
Methoxy-4-methyl-4-pentanone-2	17.0
Methyl *n*-butyl ketone	17.0
Methyl *n*-hexyl ketone	17.0
Methyl isobutyrate	17.0
Amylformates (normal)	17.2
Methyl isobutyrate (normal)	17.2
Amyl iodide (1-iodopentane)	17.2
Anethole (*para*)	17.2
Benzonitrile	17.2
sec-Butyl bromide (2-bromobutane)	17.2
Ethyl propionate	17.2
Methyl isoamyl ketone	17.2
Methyl isobutyl ketone	17.2
Propyl acetate (iso)	17.2
Propyl butyrate	17.2
Terpene B	17.2
Tricresyl phosphate (tritolyl phosphate)	17.2
Trimethyl-3,5,5-hexanol (nonyl alcohol)	17.2
Trimethyl-3,5,5-hexanol (normal)	17.4
Bicyclohexyl	17.4
n-Butyl acetate	17.4
Butyl acrylate (iso)	17.4
Diethylene glycol monobutyl ether acetate	17.4
Diphenyl 2-ethylhexyl phosphate	17.4
Ethyl *n*-butyrate	17.4
Methoxy-4-methyl-4-pentanol-2	17.4
Methyl amyl ketone	17.4
Methyl isopropyl ketone	17.4
Methyl-2-pentanediol monoethyl ether (Pentoxol)	17.4
Methyl styrene (α)	17.4
Propyl chloride (1-chloropropane)	17.4
Propyl propionate	17.4
Solvesso 150	17.4
Butyl iodide (normal) (1-iodobutane)	17.6
Carbon tetrachloride	17.6
Diethyl oxalate	17.6
Dioxolane-1,3	17.6
Dipropylene glycol monomethyl ether	17.6
Ethyl acrylate	17.6
Ethylene glycol dimethyl ether	17.6
Pine oil	17.6
Propylbenzene (normal)	17.6
Solvesso 100	17.6
Triphenyl phosphate	17.6
Amylamine (normal)	17.8
n-Butylamine	17.8
n-Butyl bromide (1-bromobutane)	17.8
Cyclopentane	17.8
Dibutyl phenyl phosphate	17.8
Diethylene glycol monolaurate	17.8
Dioctyl adipate	17.8
Dioctyl sebacate	17.8
Methyl propyl ketone	17.8
Piperidine	17.8
Tripropylene glycol methyl ether	17.8
Aroclor 1248	18.0

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TABLE 8. *cont'd*

Solvent	δ (MPa$^{1/2}$)
Allyl chloride	18.0
n-Butyl acrylate	18.0
Butyl propionate	18.0
Chlorotoluene (*para*)	18.0
Decahydronaphthalene (*cis* and *trans*) (decalin)	18.0
Dibutyl sebacate	18.0
Diethyl carbonate	18.0
Diethyl ketone	18.0
Dimethyl ether	18.0
Ethylbenzene	18.0
Mesitylene	18.0
Methyl methacrylate	18.0
Propyl acetate (normal)	18.0
Xylene (*p*-xylene)	18.0
Butyl formate(normal)	18.2
Di-*n*-hexyl phthalate	18.2
Ethylidene chloride	18.2
Ethyl morpholine (normal)	18.2
Methyl acrylate	18.2
Methyl *n*-butyrate	18.2
Methyl caprolactone	18.2
Methyl propionate	18.2
Propyl bromide (1-bromopropane)	18.2
Toluene	18.2
Butyraldehyde	18.4
Dibutyl fumarate	18.4
Dibutyl maleate	18.4
Dichloroethylene *trans*-1,2	18.4
Dichloropropane-1,2	18.4
Hydrogenated terphenyl (Monsanto HB-40)	18.4
Mesityl oxide	18.4
Vinyl acetate	18.4
Diamyl phthalate	18.6
Dichloroethylene, *cis*-1,2	18.6
Ethyl acetate	18.6
Isophorone	18.6
Tetrahydrofuran	18.6
Vinyl toluene	18.6
Allyl acetate	18.8
Benzene	18.8
Celanese solvent 601	18.8
Diacetone alcohol (4-hydroxy-4-methyl-2-pentanone)	18.8
Ethyl chloride	18.8
Ethylene glycol methyl ether acetate	18.8
Ethyl mercaptan (ethane thiol)	18.8
Propylene oxide	18.8
Propyl formate	18.8
Trichloroethylene	18.8
Tripropylene glycol	18.8
Chloroform	19.0
Dibutyl phthalate	19.0
Methylcyclohexanone	19.0
Methyl ethyl ketone	19.0
Perchloroethylene	19.0
Styrene	19.0
Tetrachloroethylene (perchloroethylene)	19.0
Triphenyl phosphite	19.0
Benzaldehyde	19.2
Butyl lactate (normal)	19.2
Capronitrile (heptyl cyanide)	19.2
Dibenzyl ether	19.2
Dimethyl sulfide	19.2
Ethyl formate	19.2
Ethyl-2-hexanediol-1,3 (octylene glycol)	19.2
Ethyl iodide (iodoethane)	19.2

TABLE 8. *cont'd*

Solvent	δ (MPa$^{1/2}$)
Furan	19.2
Nonyl phenol	19.2
Pentachloroethane	19.2
Acetyl chloride	19.4
Chlorobenzene	19.4
Chlorostyrene (*ortho* or *para*)	19.4
Diethylene glycol monobutyl ether (normal)	19.4
Ethylene glycol monobutyl ether	19.4
Ethylhexanol	19.4
Tetrahydronaphthalene (tetralin)	19.4
Ethyl bromide (bromoethane)	19.6
Methyl acetate	19.6
Methyl bromide	19.6
Trichloroethane-1,1,2	19.6
Valeronitrile (normal)	19.6
Chloroethyl acetate (β)	19.8
Dimethylaniline	19.8
Ethylene bromide	19.8
Methyl chloride	19.8
Methylene chloride	19.8
Methyl-2-pentanediol-2,4	19.8
Tetrachloroethane-1,1,2,2	19.8
Dodecanol-1	20–21
Acrolein	20.1
Bromostyrene (*ortho*)	20.1
Butyronitrile (iso)	20.1
Dichloroethyl ether	20.1
Ethylene dichloride (1,2-dichloroethane)	20.1
Phenanthrene	20.1
Thiophene	20.1
Valeric acid (normal)	20.1
Acetone	20.3
Anthracene	20.3
Bromobenzene	20.3
Cyclohexanone	20.3
Diethylacetamide (*N,N*)	20.3
Diethyl maleate	20.3
Diethyl-2,2-propanediol-1,2 (heptylene glycol)	20.3
Dimethyl carbonate	20.3
Naphthalene	20.3
Nitro-2-propane	20.3
Propionic acid	20.3
Tetraethylene glycol	20.3
Amyl alcohol	20.5
Carbon disulfide	20.5
Dichlorobenzene (*ortho*)	20.5
Diethyl phthalate	20.5
Dimethyl-2,2-butanediol-1,3	20.5
Dioxane-1,4	20.5
Dipentene	20.5
Dipropyl phthalate	20.5
Ethylamine	20.5
Ethylene glycol diacetate	20.5
Ethyl lactate	20.5
Methyl isobutyl carbinol	20.5
Nitrobenzene	20.5
Propionic anhydride	20.5
Acetic acid	20.7
Caprolactone (ε)	20.7
Dibromoethylene-1,2 (*cis* and *trans*)	20.7
Dipropylene glycol	20.7
Iodobenzene	20.7
Propylene glycol methyl ether (1,2-dimethoxypropane)	20.7
Cresol (*meta*)	20.9
Diethylene glycol monobutyl ether	20.9

TABLE 8. *cont'd*

Solvent	δ (MPa$^{1/2}$)
Diphenyl ether	20.9
Methyl formate	20.9
Methyl iodide	20.9
Acetaldehyde	21.1
Acetic anhydride	21.1
Aniline	21.1
Butyric acid (iso) (2-methylpropionic acid)	21.1
Methyl-2-pentanediol-1,3	21.1
Nitro-1-propane	21.1
Octyl alcohol (normal)	21.1
Hexanediol-2,5	21.2
Cyclopentanone	21.3
Dibromoethane-1,2	21.3
Acrylonitrile	21.5
Butyl alcohol (iso) (2-methyl-1-propanol)	21.5
Butyric acid (normal)	21.5
Butyronitrile (normal)	21.5
Ethyl-2-butanol-1	21.5
Ethylene glycol monoethyl ether (2-ethoxyethanol; Cellusolve)	21.5
Hexamethylphosphoramide	21.5
Methyl benzoate	21.5
Styrene oxide	21.5
Acetophenone	21.7
1-Bromonaphthalene	21.7
tert-Butyl alcohol (2-methyl-2-propanol)	21.7
Diethylformamide (*N,N*)	21.7
Heptyl alcohol (normal)	21.7
Methyl salicylate	21.7
Dimethyl phthalate	21.9
Hexyl alcohol (normal)	21.9
Pyridine	21.9
Triethylene glycol	21.9
sec-Butyl alcohol (2-butanol)	22.1
Dimethylacetamide (*N,N*)	22.1
Morpholine	22.1
Pentanediol-2,4	22.1
Propionitrile	22.1
Quinoline	22.1
Quinoline (normal)	22.3
Ethylene glycol monobenzyl ether	22.3
Cyclobutanedione	22.5
Dichloroacetic acid	22.5
Dimethyl malonate	22.5
Dimethyl oxalate	22.5
Epichlorohydrin	22.5
Ethyl cyanoacetate	22.5
Neopentyl glycol	22.5
2,3-Butanediol	22.7
Ethylene oxide	22.7
Nitroethane	22.7
Triethylenetetramine	22.7
Acetylpiperidine (*N*)	22.9
Dimethyl-2,2-butanediol-1,2 (isobutylene glycol)	22.9
Furfural (2-furaldehyde)	22.9
Methacrylic acid	22.9
Methylamine	22.9
Dipropyl sulfone	23.1
Methyl pyrrolidone-2 (1-methyl-2-pyrrolidinone)	23.1
Acetylpyrrolidine (*N*)	23.3
n-Butyl alcohol (1-butanol)	23.3
Cyclohexanol	23.3
Ethylene glycol monomethyl ether (2-methoxyethanol)	23.3
Tetramethyloxamide	23.3
Ethylene glycol monophenyl ether	23.5
Formylpiperidine (normal)	23.5

TABLE 8. *cont'd*

Solvent	δ (MPa$^{1/2}$)
Pentanediol-1,5	23.5
Propyl alcohol (2-propanol)	23.5
Acetylmorpholine (*N*)	23.7
1,3-Butanediol	23.7
Tolylene diisocyanate (4-methyl-1,3-phenylene diisocyanate)	23.7
Allyl alcohol	24.1
Methylene iodide	24.1
Acetonitrile	24.3
Propyl alcohol (1-propanol)	24.3
Santicizer 8	24.3
Acrylic acid	24.6
Dimethyltetramethylene sulfone	24.6
Benzyl alcohol	24.8
1,4-Butanediol	24.8
Butylene-2,3 carbonate	24.8
Diethylene glycol	24.8
Dimethylformamide (*N,N*)	24.8
Dioctyl phthalate	24.8
Formic acid	24.8
Hydrogen cyanide	24.8
Ethylene chlorohydrin (2-chloroethanol)	25.0
Ethylacetamide (normal)	25.2
Ethylenediamine	25.2
Diethyl sulfone	25.4
Methylene glycolate	25.4
Dimethyl phosphite	25.6
Furfuryl alcohol	25.6
Methyl propyl sulfone	25.6
Phenylhydrazine	25.6
Butyrolactone (γ)	25.8
Chloroacetonitrile	25.8
Propylene glycol (1,2-propanediol)	25.8
Caprolactam (ε)	26.0
Ethyl alcohol	26.0
Nitromethane	26.0
Methyltetramethylene sulfone	26.4
Formylmorpholine (*N*)	26.6
Dimethylnitroamine (*N,N*)	26.8
Propiolactone	27.2
Propylene-1,2-carbonate	27.2
Methyl ethyl sulfone	27.4
Pyrone (γ)	27.4
Tetramethylene sulfone (sulfolane, tetrahydrothiophene 1,1-dioxide)	27.4
Maleic anhydride	27.8
Piperidone	27.8
Diacetylpiperazine (*N,N*)	28.0
Ethylene formamide (*N*)	28.4
Dimethyl sulfoxide	29.7
Methanol	29.7
Ethylene glycol	29.9
Methylacetamide	29.9
Ethylene carbonate	30.1
Pyrrolidine (α)	30.1
Malononitrile	30.9
Ethylene cyanohydrin (3-hydroxypropionitrile)	31.1
Diformylpiperazine (*N,N*)	31.5
Succinic anhydride	31.5
Methylformamide (*N*)	32.9
Ammonia	33.4
Glycerol	33.8
Hydrazine	37.3
Formamide	39.3
Water	47.9

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TABLE 9. HANSEN SOLUBILITY PARAMETERS OF LIQUIDS AT 25°C

Solvent	CAS Number	Molar volume (cm^3/mol)	Solubility parameters ($MPa^{1/2}$)			
			δ_d	δ_p	δ_h	δ
9.1. PARAFFINIC HYDROCARBONS						
n-Butane	106-97-8	101.4	14.1	0	0	14.1
n-Pentane	109-66-0	116.2	14.5	0	0	14.5
Pentane (iso)	78-78-4	117.4	13.7	0	0	13.7
n-Hexane	110-54-3	147.4	14.9	0	0	14.9
n-Heptane	142-82-5	147.4	15.3	0	0	15.3
n-Octane	111-65-9	163.5	15.6	0	0	15.6
2,2,4-Trimethylpentane	540-84-1	166.1	14.3	0	0	14.3
n-Nonane	111-84-2	179.7	15.8	0	0	15.8
n-Decane	124-18-5	195.9	15.8	0	0	15.8
n-Dodecane	112-40-3	228.6	16	0	0	16
n-Hexadecane	544-76-3	294.1	16.4	0	0	16.4
n-Eicosane	112-95-8	359.8	16.6	0	0	16.6
Cyclohexane	110-82-7	108.7	16.8	0	0.2	16.8
Methylcyclohexane	108-87-2	128.3	16	0	1	16
cis-Decahydronaphthalene	493-01-6	156.9	18.8	0	0	18.8
trans-Decahydronaphthalene	493-02-7	159.9	18.8	0	0	18.8
9.2. AROMATIC HYDROCARBONS						
Benzene	71-43-2	89.4	18.4	0 [a]	2	18.6
Toluene	108-88-3	106.8	18	1.4	2	18.2
Naphthalene [b]	91-20-3	111.5	19	2	5.9	20
Styrene	1-42-5	115.6	18.6	1	4.1	19
o-Xylene	95-47-6	121.2	17.8	1	3.1	18
Ethylbenzene	1-41-4	123.1	17.8	0.6	1.4	17.8
1-Methylnaphthalene	90-12-0	138.8	20.6	0.8	4.7	21.2
Mesitylene	108-67-8	139.8	18	0	0.6	18
Tetrahydronaphthalene	119-64-2	136.0 [a]	19.6 [a]	0	2.9	20
Biphenyl	92-52-4	154.1	21.5	1	2	21.7
p-Diethylbenzene	105-05-5	156.9	18	0	0.6	18
9.3. HALOHYDROCARBONS						
Methyl chloride	74-87-3	55.4	15.3	6.1	3.9	17
Methylene dichloride	75-09-2	63.9	18.2	6.3	6.1	20.3
Bromochloromethane	74-97-5	65	17.4	5.7	3.5	18.6
Chlorodifluoromethane	75-45-6	72.9	12.3	6.3	5.7	14.9
Dichlorofluoromethane	75-43-4	75.4	15.8	3	5.7	17
Ethyl bromide	74-96-4	76.9	16.6	8	5.1	19
1,1-Dichloroethylene	75-35-4	79	17	6.8	4.5	18.8
Ethylene dichloride	107-06-2	79.4	19.0 [a]	7.4	4.1	20.9
Methylene diiodide [c]	75-11-6	80.5	17.8	3.9	5.5	19
Chloroform	67-66-3	80.7	17.8	3.1	5.7	19
1,1-Dichloroethane	75-34-3	84.8	16.6	8.2	0.4	18.4
Ethylene dibromide	106-93-4	87	19.6	6.8	12.1	23.9
Bromoform	75-25-2	87.5	21.5 [a]	4.1	6.1 [a]	22.7
n-Propyl chloride	540-54-5	88.1	16	7.8	2	17.8
Trichloroethylene	79-01-6	90.2	18	3.1	5.3	19
Dichlorodifluoromethane	75-71-8	92.3	12.3	2	0	12.5
Trichlorofluoromethane	75-69-4	92.8	15.3	2	0	15.5
Bromotrifluoromethane	75-63-8	97	9.6	2.5	0	10
Carbon tetrachloride	56-23-5	97.1	17.8	0	0.6	17.8
1,1,1-Trichloroethane	71-55-6	1.4	17	4.3	2	17.6
Tetrachloroethylene	127-18-4	101.1	19	6.5 [a]	2.9 [a]	20.3
Chlorobenzene	108-90-7	102.1	19	4.3	2	19.6
n-Butylchloride	109-69-3	104.9	16.4	5.5	2	17.4
1,1,2,2-Tetrachloroethane	79-34-5	105.2 [a]	18.8	5.1	9.4	21.7
Bromobenzene	222-22-2	105.3	20.5	5.5	4.1	21.7
o-Dichlorobenzene	95-50-1	112.8	19.2	6.3	3.3	20.5
Benzyl chloride	100-44-7	115	18.8 [a]	7.2	2.7	20.3
1,1,2,2-Tetrabromoethane [c]	79-27-6	116.8	22.7	5.1	8.2	24.8
1,2-Dichlorotetrafluoroethane [c]	76-14-2	117	12.7	1.8	0	12.9
1,1,2-Trichlorotrifluoroethane	76-13-1	119.2	14.7	1.6	0	14.7
Cyclohexyl chloride	542-18-7	121.3	17.4	5.5	2	18.4

TABLE 9. *cont'd*

Solvent	CAS Number	Molar volume (cm^3/mol)	Solubility parameters ($MPa^{1/2}$) δ_d	δ_p	δ_h	δ
1-Bromonaphthalene	90-11-9	140	20.3	3.1	4.1	20.9
Trichlorobiphenyl[d]	7012-37-5	187	19.2	5.3	4.1	20.5
Perfluoromethylcyclohexane	355-02-2	196	12.5	0	0	12.5
Perfluorodimethylcyclohexane	335-27-3	217.4	12.5	0	0	12.5
Perfluoro-*n*-heptane	335-57-9	227.3	12.1	0	0	12.5
9.4. ETHERS						
Furan	110-00-9	72.5	17.8	1.8	5.3	18.6
Epichlorohydrin	106-89-8	79.9	19	10.2	3.7	21.9
Tetrahydrofuran	109-99-9	81.7	16.8	5.7	8	19.4
1,4-Dioxane	123-91-1	85.7	19	1.8	7.4	20.5
Methylal (dimethoxymethane)	109-87-5	88.8	15.1	1.8	8.6	17.6
Diethyl ether	60-29-7	104.8	14.5	2.9	5.1	15.8
Bis(2-chloroethyl) ether	107-30-2	117.6	18.8	9	5.7	21.7
Anisolec	100-66-3	119.1	17.8	4.1	6.8	19.4
Bis-(2-methoxyethyl) ether	111-96-6	142	15.8	6.1	9.2	19.2
Dibenzyl ether[c]	103-50-4	192.7	17.4	3.7	7.4	19.2
Di-(chloro-iso-propyl) ether	108-60-1	146	19	8.2	5.1	21.3
Bis-(*m*-phenoxyphenyl) ether	748-30-1	373	19.6	3.1	5.1	20.5
9.5. KETONES						
Acetone	67-64-1	74	15.5	10.4	7	20.1
Methyl ethyl ketone (2-butanone)	78-93-3	90.1	16	9	5.1	19
Cyclohexanone	108-94-1	104	17.8	6.3	5.1	19.6
Diethyl ketone (3-pentanone)	96-22-0	106.4	15.8	7.6	4.7	18.2
Mestiyl oxide (4-methyl-3-pentene-2-one)	141-79-7	115.6	16.4	7.2	6.1	18.8
Acetophenone	98-86-2	117.4	19.6[a]	8.6	3.7	21.7
Methyl iso-butyl ketone (2-hexanone)	591-78-6	125.8	15.3	6.1	4.1	17
Methyl iso-amyl ketone		142.8	16	5.7	4.1	17.4
Isophorone	78-59-1	150.5	16.6	8.2	7.4	19.8
Di-iso-butyl ketone (2,6-dimethyl-4-heptanone)	108-83-8	177.1	16	3.7	4.1	16.8
9.6. ALDEHYDES						
Acetaldehyde	75-07-0	57.1	14.7	8	11.3	20.3
2-Furfuraldehyde (furfural)	98-01-1	83.2	18.6	14.9	5.1	24.3
Butyraldehyde	123-72-8	88.5	14.7	5.3	7	17.2
Benzaldehyde	100-52-7	101.5	19.4	7.4	5.3	21.5
9.7. ESTERS						
Ethylene carbonate (1,3-dioxolan-2-one)	96-41-9	66	19.4	21.7	5.1	29.5
γ-Butyrolactone (4-hydroxybutryic acid γ-lactone)	96-48-0	76.8	19	16.6	7.4	26.2
Methyl acetate	79-20-9	79.7	15.5	7.2	7.6	18.8
Ethyl formate	109-94-4	80.2	15.5	8.4	8.4	19.6
Propylene carbonate (1,2-propanediol cyclic carbonate)	108-32-7	85	20.1	18	4.1	27.2
Ethyl chloroformate	541-41-3	95.6	15.5	10	6.8	19.6
Ethyl acetate	141-78-6	98.5	15.8[a]	5.3	7.2[a]	18.2
Trimethyl phosphate	512-56-1	99.9	16.8	16	10.2	25.4
Diethyl carbonate	105-58-8	121	16.6	3.1	6.1	18
Diethyl sulfate	64-67-5	131.5	15.8	14.7	7.2	22.7
n-Butyl acetate	123-86-4	132.5	15.8	3.7	6.3	17.4
Iso-butyl acetate	540-88-5	133.5	15.1	3.7	6.3	16.8
2-Ethoxyethyl acetate (Cellusolve acetate)	111-15-9	136.2	16	4.7	10.6	19.6
Iso-amyl acetate	628-63-7	148.8	15.3	3.1	7	17.2
Iso-butyl iso-butyrate	109-21-7	163	15.1	2.9	5.9	16.6
Dimethyl phthalate	131-11-3	163	18.6[a]	10.8[a]	4.9	22.1
Ethyl *trans*-cinnamate	103-36-6	166.8	18.4	8.2	4.1	20.5
Triethyl phosphate	78-40-0	171	16.8	11.5	9.2	22.3
Diethyl phthalate	84-66-2	198	17.6	9.6	4.5	20.5
Di-*n*-butyl phthalate	84-74-2	266	17.8[a]	8.6	4.1	20.3
n-Butyl benzyl phthalate	85-68-7	306	19	11.3	3.1	22.3
Tricresyl phosphate (tritolyl phosphate)	1330-78-5	613	19	12.3	4.5	23.1
Tri-*n*-butyl phosphate	126-73-8	345	16.4	6.3	4.3	18

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TABLE 9. *cont'd*

Solvent	CAS Number	Molar volume (cm^3/mol)	Solubility parameters ($MPa^{1/2}$) δ_d	δ_p	δ_h	δ
Iso-propyl palmitate[c]	2239-78-3	330	14.3	3.9	3.7	15.3
Di-*n*-butyl sebacate	109-43-3	339	14.5	3.9	3.7	15.5
Methyl oleate[d]	112-62-9	340	14.5	3.9	3.7	15.5
Dioctyl phthalate (bis(2-ethylhexyl) phthalate)	117-81-7	377	16.6	7	3.1	18.2
Di-butyl stearate[c]		382	14.5	3.7	3.5	15.3
9.8. NITROGEN-CONTAINING COMPOUNDS						
Acetonitrile	75-05-8	52.6	15.3	18	6.1	24.6
Acrylonitrile	107-13-1	67.1	16.5	17.4	6.8	24.8
Propionitrile	107-12-0	70.9	15.3	14.3	5.5	21.7
Butyronitrile	109-74-0	87	15.3	12.5	5.1	20.5
Benzonitrile	100-47-0	102.6	17.4	9	3.3	19.8
Nitromethane	75-52-5	54.3	15.8	18.8	5.1	25
Nitroethane	79-24-3	71.5	16	15.5	4.5	22.7
2-Nitropropane	79-46-9	86.9	16.2	12.1	4.1	20.7
Nitrobenzene	98-95-3	102.7	20.1	8.6	4.1	22.1
Ethanolamine (2-aminoethanol)	141-43-5	60.2	17.2	15.5	21.3	31.5
Ethylene diamine	107-15-3	67.3	16.6	8.8	17	25.4
1,1-Dimethylhydrazine[c]	57-14-7	76	15.3	5.9	11	19.8
2-Pyrrolidone (2-pyrrolidinone)	616-45-5	76.4	19.4	17.4	11.3	28.4
Pyridine	110-86-1	80.9	19	8.8	5.9	21.7
n-Propylamine	107-10-8	83	17	4.9	8.6	19.6
Morpholine	110-91-8	87.1	18.8	4.9	9.2	21.5
Aniline	62-53-3	91.5	19.4	5.1	10.2	22.5
N-Methyl-2-pyrrolidone (1-methyl-2-pyrrolidinone)	872-50-4	96.5	18	12.3	7.2	22.9
n-Butylamine	109-73-9	99	16.2[a]	4.5[a]	8	18.6
Diethylamine	109-87-7	103.2	14.9	2.3	6.1	16.4
Diethylenetriamine	111-40-0	108	16.8	13.3	14.3	25.8
Cyclohexylamine	108-91-8	115.2	17.4	3.1	6.5	18.8
Quinoline	91-22-5	118	19.4	7	7.6	22.1
Di-*n*-propylamine	142-84-7	136.9	15.3	1.4	4.1	16
Formamide	75-12-7	39.8	17.2	26.2	19	36.6
Dimethylformamide	68-12-2	77	17.4	13.7	11.3	24.8
N,N-Dimethylacetamide	127-19-5	92.5	16.8	11.5	10.2	22.7
1,1,3,3-Tetramethylurea	632-22-4	120.4	16.8	8.2	11	21.7
Hexamethyl phosporamide[c] (hexamethyl phosphoric triamide)	680-31-9	175.7	18.4	8.6	11.3	23.3
9.9. SULFUR-CONTAINING COMPOUNDS						
Carbon disulfide	75-15-0	60	20.5	0	0.6	20.5
Dimethyl sulfoxide (methyl sulfoxide)	67-68-5	71.3	18.4	16.4	10.2	26.6
Ethanethiol[c] (ethyl mercaptan)	75-08-1	74.3	15.8	6.5	7.2	18.4
Dimethyl sulfone[b] (methyl sulfone)	67-71-0	75	19	19.4	12.3	29.9
Diethyl sulfide (ethyl sulfide)	352-93-2	108.2	17	3.1	2	17.4
9.10. ACID HALIDES AND ANHYDRIDES						
Acetyl chloride	75-36-5	71	15.8	10.6	3.9	19.4
Succinic anhydride[b]	108-30-5	66.8	18.6	19.2	16.6	31.5
Acetic anhydride	108-24-7	94.5	16.0[a]	11.7[a]	10.2[a]	22.3
9.11. ALCOHOLS						
Methanol	67-56-1	40.7	15.1	12.3	22.3	29.7
Ethanol	64-17-5	58.5	15.8	8.8	19.4	26.6
Ethylene cyanohydrin (hydracrylonitrile; 3-hydroxypropionitrile)	109-78-4	68.3	17.2	18.8	17.6	30.9
Allyl alcohol (2-propen-1-ol)	107-18-6	68.4	16.2	10.8	16.8	25.8
1-Propanol	71-23-8	75.2	16	6.8	17.4	24.6
2-Propanol	67-63-0	76.8	15.8	6.1	16.4	23.5
3-Chloropropanol (trimethylene chlorohydrin)	627-30-5	84.2	17.6	5.7	14.7	23.7
Furfuryl alcohol	98-00-0	86.5	17.4	7.6	15.1	24.3
1-Butanol (butyl alcohol)	71-36-3	91.5	16	5.7	15.8	23.1
2-Butanol	4221-99-2	92	15.8	5.7	14.5	22.1

TABLE 9. *cont'd*

Solvent	CAS Number	Molar volume (cm^3/mol)	Solubility parameters ($MPa^{1/2}$)			
			δ_d	δ_p	δ_h	δ
2-Methyl-1-propanol (isobutyl alcohol)	78-83-1	92.8	15.1	5.7	16	22.7
Benzyl alcohol	100-51-6	103.6	18.4	6.3	13.7	23.7
Cyclohexanol	108-93-0	106	17.4	4.1	13.5	22.5
1-Pentanol	71-41-0	109	16	4.5	13.9	21.7
2-Ethyl-1-butanol	97-95-0	123.2	15.8	4.3	13.5	21.3
Diacetone alcohol (4-hydroxy-4-methyl-2-pentanone)	123-42-2	124.2	15.8	8.2	10.8	20.9
1,3-Dimethyl-1-butanol	105-30-6	127.2	15.3	3.3	12.3	19.8
Ethyl lactate	687-47-8	115	16	7.6	12.5	21.7
n-Butyl lactate	138-22-7	149	15.8	6.5	10.2	19.8
Ethylene glycol monomethyl ether (2-methoxyethanol)	109-86-4	79.1	16.2	9.2	16.4	24.8
Ethylene glycol monoethyl ether (2-ethoxyethanol) Cellusolve	111-15-9	97.8	16.2	9.2	14.3	23.5
Diethylene glycol monomethyl ether (2-(2-methoxyethoxy)ethanol)	111-77-3	118	16.2	9.2	12.3	22.3
Diethylene glycol monoethyl ether (2-(2-ethyoxyethyoxy)ethanol)	111-90-0	130.9	16.2	9.2	12.3	21.9
Ethylene glycol mono-*n*-butyl ether (2-butoxyethanol) Butyl Cellusolve	111-76-2	131.6	16	5.1	12.3	22.3
2-Ethyl-1-hexanol	104-76-7	157	16	3.3	11.9	20.1
1-Octanol (capryl alcohol)	111-87-5	157.7	17	3.3	11.9	20.9
2-Octanol	123-96-6	159.1	16.2	4.9	11	20.3
Diethylene glycol mono-*n*-butyl ether (2-(2-butoxyethoxy)ethanol)	112-34-5	170.6	16	7	10.6	20.5
1-Decanol	112-30-1	191.8	17.6	2.7	10	20.5
Tridecyl alcohol[d]	112-70-9	242	14.3	3.1	9	17.2
Nonyl phenoxy ethanol[d]	27986-36-3	275	16.8	10.2	8.4	21.3
Oleyl alcohol[d]	143-28-2	316	14.3	2.7	8	16.6
Triethylene glycol mono-oleyl ether		418.5	13.3	3.1	8.4	16
9.12. ACIDS						
Formic acid	64-18-6	37.8	14.3	11.9	16.6	25
Acetic acid	64-19-7	57.1	14.5	8	13.5	21.3
Benzoic acid[b]	65-85-0	100	18.2	7	9.8	21.9
n-Butyric acid[c]	107-92-6	110	14.9	4.1	10.6	18.8
n-Octanoic acid[c]	124-07-2	159	15.1	3.3	8.2	17.6
Oleic acid	112-80-1	320	14.3	3.1	5.5	15.8
Stearic acid[b]	57-11-4	326	16.4	3.3	5.5	17.6
9.13. PHENOLS						
Phenol	108-95-2	87.5	18	5.9	14.9	24.1
1,3-Benzenediol[b] (resorcinol)	108-46-3	87.5	18	8.4	21.1	28.8
m-Cresol	108-39-4	104.7	18	5.1	12.9	22.7
o-Methoxyphenol (guaiacol)	90-05-1	109.5	18	8.2	13.3	23.7
Methyl salicylate	119-36-8	129	16	8	12.3	21.7
Nonyl phenol[d]	25154-52-3	231	16.6	4.1	9.2	19.4
9.14. WATER						
Water[c]	7732-18-5	18	15.5[a]	16.0[a]	42.4[a]	47.9
9.15. POLYHYDRIC ALCOHOLS						
Ethylene glycol	107-21-1	55.8	17	11	26	32.9
Glycerol	56-81-5	73.8	17.4	12.1	29.3	36.2
Propylene glycol (1,2-propanediol)	57-55-6	73.6	16.8	9.4	23.3	30.3
1,3-Butanediol	107-88-0	89.9	16.6	10	21.5	28.8
Diethylene glycol	111-46-6	95.3	16.2	14.7	20.5	29.9
Triethylene glycol	112-27-6	114	16	12.5	18.6	27.4
Hexylene glycol (2-methyl-2,4-pentanediol)	107-41-5	123	15.8	8.4	17.8	25.2
Dipropylene glycol[d]	110-98-5	131.3	16	20.3	18.4	31.7

[a] Altered from previously published value.
[b] Solid, treated as supercooled liquid.
[c] Values uncertain.
[d] Impure commercial product of this nominal formula.

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TABLE 10. SOLUBILITY PARAMETERS OF POLYMERS

Polymer	Molar volume (cm^3/gmol)	Solubility parameters $(MPa)^{1/2}$ δ_d	δ_p	δ_h	δ	Method	T(°C)	Refs.
10.1. MAIN CHAIN CARBON POLYMERS								
10.1.1. POLY(DIENES)								
Poly(butadiene)					14.65	Calc.		28
					17.19			66
					17.09			110
					17.15	Calc.		112
					17.2–17.6	Obs.		112
					16.6			118
					17.6			72
					16.2 ± 0.2	IPGC	75	70
Emulsion					17.19			79
Sodium					17.6			79
					16.6	Calc.		62
					17.09			104
Hydrogenated					16.6	Swelling		75
					16.47			75
					16.6	Av.		75
		16.98	–[a]	1.02	17.02			98
					16.1	^{129}Xe shift		152
Poly(1,2-butadiene)	58.85				17.06	Calc. HK[b]		3
Poly(3-methyl 1,2-butadiene)	73.88				17.39	Calc. HK		3
Poly(1,3-butadiene)	58.85				17.06	Calc. HK		3
Poly(2,3-dimethyl 1,3 butadiene)	88.91				17.60	Calc. HK		3
Poly(*cis*-butadiene) elastomer (Bunahyls CB10, Chemische Werke Huels)		17.53	2.25	3.42	18			56
Poly(butadiene-*co*-acrylonitrile)								
BUNA N (82/18)					17.90–17.72			19
(82/20)					18.4	Calc.		66
					19.4	Obs.		66
BUNA N (75/25)					18.93	Calc.	25	112
					19.19	Obs.		42
					19.4	Obs.		104
					18.2			118
					19.4			79
(70/30)					20.11–20.26			19
					19.19			43
(61/39)					21.1			19
					21.28–21.38			19
					20.5 ± 0.6	IPGC	75	70
Hycar (BFGoodrich)		18.6	8.8	4.2	21			56
Poly(butadiene-*co*-styrene)								
BUNA S (94/6)					16.45–16.64			19
(90/10)					17.13			110
(87.5/12.5)					16.39–16.57			19
					16.55			43
					17.6			104
(85/15)					17.31			112
					17.19			110
					17.35	Calc.		112
					17.4	Obs.		112
					17.39			79
					17.41	Calc.		66
					17.39	Obs.		66
					17.5			104
(75/25)					17.29			110
					17.47	Calc.		112
					16.55	Obs.		112
					16.49	Obs.		112
					16.6			118
					17.5			79
					17.56	Calc.		66
					17.5	Obs.		66
					17.6			104

TABLE 10. *cont'd*

Polymer	Molar volume (cm^3/gmol)	Solubility parameters $(MPa)^{1/2}$ δ_d	δ_p	δ_h	δ	Method	T(°C)	Refs.
(71.5/28.5)					16.55–16.72			19
					17.51			112
(70/30)					17.35			110
(60/40)					17.5			110
					17.7	Calc.		112
					17.74	Obs.		112
					17.74			79
					17.76	Calc.		66
					17.74	Obs.		66
					17.8			104
Poly(butadiene-*co*-styrene) (Polysar 5630, Polymer Corp.)		17.55	3.36	2.7	18.07			56
Poly(butadiene-*co*-vinylpyridine)					19.13			79
Poly(chloroprene)					18.42		25	110
					16.59	Calc.		28
					19.19	Calc.		112
					16.74	Obs.		42
					18.93	Obs.		104
					17.6			118
					16.8			44
					18.8			72
					16.6			79
					17.6	Swelling		43
					17.54–17.74			19
					15.18			19
					18.0 ± 0.4	IPGC	75	70
					17.6	^{129}Xe shift		152
Poly(1,4-*cis*-isoprene)					15.18	Calc.	25	28
					16.64			42
					16.68		25	74
					16.57		35	74
					20.46	Swelling	35	74
					16.47	Av.	35	74
					16.47	Swelling	35	74
					16.57	Swelling	35	74
					16.68	Calc.	35	74
					16.6	Swelling		75
					16.4			76
					16.47	Av.		76
					16.82		25	110
					16.68	Calc.	25	112
					16.2	Obs.		112
					16.33	Obs.		112
					17.09	Obs.		112
					16.2			72
Poly(isoprene) elastomer (Cariflex IR 305, Shell)		16.57	1.41	−0.82	16.65			56
Natural Rubber					16.2			43
					16.6			19
					16.68			112
					17.09			104
					17			124
					16.6			118
					16.4			19,10
					17.09			79
					16.33			43
					16.6			19
					16.42–16.49			19
					16.2	^{129}Xe shift		152
Gutta percha					16.6	Calc.		73
Chlorinated					19.2			21–24
10.1.2. POLY(ALKENES)								
Poly(2,3-dimethyl 1-butene)	93.15				18.05	Calc.^{HK}		3
Poly(3,3-dimethyl 1-butene)	93.15				18.05	Calc.^{HK}		3

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TABLE 10. *cont'd*

Polymer	Molar volume (cm^3/gmol)	Solubility parameters $(MPa)^{1/2}$ δ_d	δ_p	δ_h	δ	Method	T(°C)	Refs.
Poly(3-methyl 1-butene)	78.12				17.76	Calc.[HK]		3
Poly(2-methyl 1-butene)	78.12				17.92	Calc.[HK]		3
Poly(2-methyl 2-butene)	78.12				17.68	Calc.[HK]		3
Polyethylene					15.76			110
					16.6	Calc.		112
					16			58
					16.2			97
					17.09			8
					16.4	Calc.		124
					16.2			118
					16.2			72
					16.8	Calc.		97
					16.2	Obs.		73
					18.4	^{129}Xe shift		152
					17.99	Calc.		119
Poly(ethylene)	33.03				16.96	Calc.[HK]		3
Poly(1,1-diphenyl ethylene)	166.29				19.93	Calc.[HK]		3
Poly(methylene)					14.3	Extrapol.	20	45
Poly(ethylene-*co*-vinyl acetate)					18.6 ± 0.9	IPGC	25	71
					17.0 ± 0.4	IPGC	75	70
Poly(isobutene)					14.5	Calc.		28
					16.06	Av.	35	74
					16	Swelling		74
					16.47	Swelling		74
					16.25			19,10
					16.06		25	110
					15.76	Calc.		112
					16.47	Obs.		112
					16.4			58
					16.47			104
					16.6			21–24
					16			19
					17	Calc.		124
					16.47			72
					16.47			79
Poly(isobutylene) (Lutonal IC/123, BASF)		14.53	2.52	4.66	15.47			56
					15	^{129}Xe shift		152
Poly(isobutene-*co*-isoprene) butyl rubber					15.9–16.06			19
					16.47			104
					15.76			112
Poly(propylene)					18.8		25	58
					19.2	Calc.		124
Poly(propylene)	48.06				17.49	Calc.[HK]		3
Poly(propylene), isotactic (Profax 6701, Hercules)		17.19	–	–	17.19			81
Poly(propylene), chlorinated (Parlon P10, Hercules)		20.26	6.32	5.4	21.89			56
Poly(2-methyl propene)	63.09				17.72	Calc.[HK]		3
10.1.3. POLY(ACRYLICS) AND POLY(METHACRYLICS)								
Poly(acrylic acid), butyl ester					18		35	75
					18.01	Av.		75
					18.52	Swelling		75
					17.4	Calc.		75
					18.6	Swelling		77
					18.52			77
					19.77	Calc.		119
Poly(acrylic acid), ethyl ester					19.13	Av.		75
					19.2	Swelling		75
					19.8	Calc.		75
					19.2	Swelling		77
					19.13			77
					19.19			45
					18.8	Calc.		62
					20.4	Calc.		119

TABLE 10. *cont'd*

Polymer	Molar volume (cm^3/gmol)	Solubility parameters $(MPa)^{1/2}$ δ_d	δ_p	δ_h	δ	Method	T(°C)	Refs.
Poly(acrylic acid), isobornyl ester					16.8	Calc.		62
Poly(acrylic acid), methyl ester					20.7	Av.		75
					20.77	Swelling		75
					20.1	Calc.		75
					20.77	Swelling		77
					21.3			77
					20.7	Swelling		77
Poly(acrylic acid), propyl ester					18.52			75
					18.42	Av.		75
					18.4	Calc.		75
Poly(α-chloroacrylic acid), methyl ester					20.7	Calc.		112
Poly(methacrylic acid), butyl ester					17.9	Swelling		77
					17.8			77
					18.01	Swelling		77
					17.9			77
					17	Calc.		73
					14.7	IPGC	140	31
Poly(methacrylic acid), isobutyl ester					14.7	IPGC	140	31
Poly(methacrylic acid), *sec*-butyl ester					14.7	IPGC	140	31
Poly(methacrylic acid), ethoxyethyl ester					18.4	Swelling		77
					20.3			77
Poly(methacrylic acid), ethyl ester					18.31	Swelling		77
					18.2			77
					18.6	Calc.		73
Poly(ethyl methacrylate) (Lucite 2042, DuPont)		18.64	10.52	7.51	22.69			56
					20.4	^{129}Xe shift		152
Poly(methacrylic acid), *n*-hexyl ester					17.6	Calc.		73
Poly(methacrylic acid), isobornyl ester					16.6			62
Poly(methacrylic acid), lauryl ester					16.8	Calc.		73
Poly(methacrylic acid), methyl ester					18.58		25	19
					18.52–18.66			19
					19.4	Swelling		77
					19.34			77
					26.27			110
					18.93	Calc.		112
					18.4–19.4			7
					18.58			118
					19.5	Calc.		119
Poly(methyl methacrylate) (Rohm and Haas)		18.64	10.52	7.51	22.69			56
Poly(methacrylic acid), octyl ester					17.2	Calc.		73
Poly(methacrylic acid), propyl ester					18	Calc.		73
Poly(methacrylic acid), stearyl ester					16	Calc.		73
Poly(methacrylonitrile)					21			118
					21.9	Calc.		112
10.1.4. POLY(VINYL ALCOHOLS)								
Poly(vinyl alcohol)					25.78			110
					21.7			139
Poly(4-vinyl phenol)					22.5			139
10.1.5. POLY(VINYL ESTERS)								
Poly(vinyl acetate)					19.62	Calc.	25	28
					19.13		35	78
					20.93	Calc.		119
					19.2	Calc.		78
					18			78
					22.61		25	110
					19.2	Calc.		112
					19.2			118
Poly(vinyl acetate) (Mowilith 50, Hoechst)		20.93	11.27	9.66	25.66			56
Poly(vinyl acetate-*co*-vinyl alcohol)					21.94	Calc.		119
Poly(vinyl butyral) (Butvar B76, Shawinigan)		18.6	4.36	13.03	23.12			56
Poly(vinyl propionate)					18.01		35	78
					18.52	Calc.		78

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TABLE 10. *cont'd*

Polymer	Molar volume (cm^3/gmol)	Solubility parameters $(MPa)^{1/2}$ δ_d	δ_p	δ_h	δ	Method	T(°C)	Refs.
10.1.6. POLY(ALLYL ETHERS) AND POLY(VINYL ETHERS)								
Poly(allyl methyl ether)	70.79				19.44	Calc.[HK]		3
Poly(allyl ethyl ether)	85.82				19.29	Calc.[HK]		3
Poly(allyl propyl ether)	100.85				19.21	Calc.[HK]		3
Poly(allyl isopropyl ether)	100.85				19.21	Calc.[HK]		3
Poly(allyl phenyl ether)	122.39				20.19	Calc.[HK]		3
Poly(allyl 2, tolyl ether)	137.41				20.03	Calc.[HK]		3
Poly(allyl 3, tolyl ether)	137.41				20.03	Calc.[HK]		3
Poly(allyl 4, tolyl ether)	137.41				20.03	Calc.[HK]		3
Poly(diallyl ether)	96.61				18.84	Calc.[HK]		3
Poly(vinyl methyl ether)	55.76				19.66	Calc.[HK]		3
Poly(vinyl ethyl ether)	70.79				19.44	Calc.[HK]		3
Poly(vinyl propyl ether)	85.82				19.29	Calc.[HK]		3
Poly(vinyl butyl ether)	100.85				19.21	Calc.[HK]		3
Poly(vinyl isopropyl ether)	85.82				19.29	Calc.[HK]		3
Poly(vinyl isobutyl ether)	100.85				19.21	Calc.[HK]		3
Poly(vinyl isoamyl ether)	115.88				19.13	Calc.[HK]		3
Poly(vinyl-1-amyl methyl ether)	119.91				20.83	Calc.[HK]		3
Poly(vinyl-2-ethyl hexyl ether)	160.96				18.99	Calc.[HK]		3
Poly(vinyl-2-methoxyethyl ether)	93.52				20.44	Calc.[HK]		3
Poly(vinyl phenyl ether)	107.36				20.19	Calc.[HK]		3
Poly(vinyl-1-phenyl methyl ether)	122.39				20.19	Calc.[HK]		3
Poly(vinyl-1-methyl phenyl ether)	122.39				20.19	Calc.[HK]		3
Poly(vinyl-1-phenyl phenyl ether)	174.01				20.50	Calc.[HK]		3
Poly(1-methyl vinyl ethyl ether)	85.82				19.29	Calc.[HK]		3
Poly(1-ethyl vinyl ethyl ether)	100.85				19.21	Calc.[HK]		3
Poly(1-phenyl vinyl ethyl ether)	137.41				20.03	Calc.[HK]		3
Poly(divinyl ether)	66.55				18.93	Calc.[HK]		3
10.1.7. POLY(VINYL HALIDES) AND POLY(VINYL NITRILES)								
Poly(acrylonitrile)					25.27	Calc.		119
					25.6			66
					26.09	Calc.	25	112
					31.5			118
		18.21	16.16	6.75	25.27			98
Poly(allyl acetonitrile)	81.13				24.18	Calc.[HK]		3
Poly(1-methyl acrylonitrile)	66.09				25.45	Calc.[HK]		3
Poly(2-methyl acrylonitrile)	66.09				25.45	Calc.[HK]		3
Poly(acrylonitrile-*co*-isopropyl methacrylate)					19.84			141
Poly(tetrafluoroethylene)					12.7	Calc.		112
					12.7			118
Poly(vinyl bromide)					19.42			34
					19.6			112
Poly(vinyl chloride)					19.19–19.34			19
					19.28	Calc.		28
					20.67			110
					19.54	Calc.		112
					19.8	Obs.		72
					19.2			19
					19.8			21–24
					22.1			58
					20.1			124
					19.5			118
					19.8			72
					20.32	Calc.		119
Poly(vinyl chloride) (Vipla KR, K = 50, Montecatini)		18.23	7.53	8.35	21.42			56
Poly(vinyl chloride)		18.72	10.03	3.07	21.46			33
		18.82	10.03	3.07	21.54			98
Poly(vinyl chloride), high molecular weight					20.13	Turbidity		162
					20.25	Swelling		162
					20.3	Visc.		162
Poly(vinyl chloride), chlorinated					19	Visc.	25	117

TABLE 10. *cont'd*

Polymer	Molar volume (cm^3/gmol)	Solubility parameters $(MPa)^{1/2}$ δ_d	δ_p	δ_h	δ	Method	T(°C)	Refs.
Poly(vinyl chloride-*co*-vinyl acetate) (87/13)					21.7	Calc.		28
					21.3			21–24
VYHH					20.42	Calc.		119
Poly(vinyl chloride-*co*-vinyl acetate-*co*-maleic acid)					20.44	Calc.		119
Poly(vinyl chloride-*co*-vinyl acetate-*co*-vinyl alcohol)					20.77	Calc.		119
Poly(allyl cyanide)	66.09				25.45	Calc.[HK]		3
Poly(allyl isocyanide)	66.09				25.45	Calc.[HK]		3
Poly(vinylidene chloride)					25			21–24
Poly(vinylidene cyanide-*co*-vinyl acetate)					22.67	Calc.		128
Poly(vinylidene fluoride)		–	–	–	23.2	Visc.		147
		17.2	12.5	9.2	23.2	Obs.		147
		16.6, 17.9				Calc.		147
		16.6				Refract. index		147
		13.7	10.6	8.2	19.2	Contact ang.		149
					24.6, 25.2	Swelling		148
10.1.8. POLY(STYRENES)								
Poly(styrene)					17.52			19
					17.45–17.58			19
					20.16	Calc.		28
					17.86–17.92			48
					17.84–18.56	Visc.		116
					18.6			66
					18.72		35	74
					18.62	Av.		74
					18.62	Swelling		74
					18.66	Calc.		74
					19.09		25	110
					18.66	Calc.		112
					18.6	Obs.		112
					17.6–19.8	Obs.		112
					17.4			18
					17.6			19
					18.4			58
					19.28	Calc.		119
					21.1	Calc.		124
					17.52			118
					17.84			19,97
					18.6			104
					17.6–17.8			72
					18.6			79
					15.6	IPGC	140	31
Poly(styrene) (Polystyrene LG, BASF)		21.28	5.75	4.3	22.47			56
Poly(*o*-methyl styrene)	114.69				19.33	Calc.[HK]		3
Poly(*m*-methyl styrene)	114.69				19.33	Calc.[HK]		3
Poly(*p*-methyl styrene)	114.69				19.33	Calc.[HK]		3
Poly(1-methyl styrene)	114.69				19.33	Calc.[HK]		3
Poly(methoxy styrene)	122.39				20.19	Calc.[HK]		3
Poly(cyano styrene)	124.28				22.36	Calc.[HK]		3
Poly(nitro styrene)	113.29				22.71	Calc.[S']		3
Poly(2-nitro styrene)	113.29				22.20	Calc.[S]		3
Poly(styrene-*co*-divinylbenzene)					18.6	Obs.		112
					17.39			18
5% crosslinking					14.8			137
10% crosslinking					15.7			137
20% crosslinking					17.8			137
Poly(styrene-*co*-*n*-butyl methacrylate)					15.1	IPGC	140	31
Poly(styrene-*co*-isobutyl methacrylate)					15.1	IPGC	140	31
Poly(4-chlorostyrene)		17.6	6.1	4.1	19.02			151
Poly(α-methylstyrene-*co*-acrylonitrile)					16.4	IPGC	140	111
Poly(4-acetoxystyrene)		17.8	9	8.4	21.7			138
Poly(4-hydroxystyrene)		17.6	10	13.7	24.55			138

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TABLE 10. *cont'd*

Polymer	Molar volume (cm^3/gmol)	Solubility parameters $(MPa)^{1/2}$ δ_d	δ_p	δ_h	δ	Method	T(°C)	Refs.
Poly(4-α-acetoxystyrene), $-CH_2-C-(OCOCH_3)-(C_6H_5-OCOR)-$, $R=CH_3$, C_2H_5, n-C_3H_7, OCH_3		15.7	10.2	7.4	21.9			161
Poly(vinylidene cyanide-*co*-4-α-acetoxystyrene), $-CH_2-C(CN)_2-CH_2-C-(OCOCH_3)-(C_6H_5-OCOR)-$, $R=CH_3$		21.5	11.3	7.2	25.3			161
Poly(vinylidene cyanide-*co*-4-α-acetoxystyrene), $R=OCOCH_3$		17	13.5	6.5	23.5			161
Poly(vinylidene cyanide-*co*-4-α-acetoxystyrene), $R=OCOCH_3$		17	12.1	8.2	22.4			161
Poly(vinylidene cyanide-*co*-4-α-acetoxystyrene), $R=OCOCH_3$		17	11.9	7.2	21.9			161
10.2. MAIN CHAIN C–O POLYMERS								
10.2.1. POLY(VINYL ESTERS)								
Poly(vinyl acetate)	74.25				18.21	Calc.[HK]		3
Poly(allyl acetate)	89.28				18.27	Calc.[HK]		3
Poly(diethylaminoethyl acrylate)-palladium ion					20.50			136
Poly(methyl acrylate)	74.25				18.21	Calc.[HK]		3
Poly(ethyl acrylate)	89.28				18.27	Calc.[HK]		3
Poly(allyl acrylate)	100.07				17.94	Calc.[HK]		3
Poly(butyl acrylate)	119.34				20.42	Calc.[HK]		3
Poly(isobutyl acrylate)	119.34				18.37	Calc.[HK]		3
Poly(2-ethyl hexyl acrylate)	179.46				18.45	Calc.[HK]		3
Poly(2-cyanoethyl acrylate)[a]	89.36				31.77	Calc.[HK]		3
Poly(benzyl acrylate)	140.88				19.38	Calc.[HK]		3
Poly(vinyl butyrate)	104.31				18.33	Calc.[HK]		3
Poly(dimethyl citraconate)	130.5				18.58	Calc.[HK]		3
Poly(diethyl citraconate)	160.58				18.58	Calc.[HK]		3
Poly(vinyl crotonate)	100.07				17.94	Calc.[HK]		3
Poly(methyl dimethyl fumarate)	130.5				18.58	Calc.[HK]		3
Poly(methyl diethyl fumarate)	160.56				18.58	Calc.[HK]		3
Poly(dimethyl fumarate)	115.47				18.56	Calc.[HK]		3
Poly(diethyl fumarate)	145.53				18.58	Calc.[HK]		3
Poly(dipropyl fumarate)	165.58				19.72	Calc.[HK]		3
Poly(di-*n*-butyl fumarate)	205.65				18.60	Calc.[HK]		3
Poly(di-*n*-amyl fumarate)	235.71				18.60	Calc.[HK]		3
Poly(di-isopropyl fumarate)	165.58				19.72	Calc.[HK]		3
Poly(di-isobutyl fumarate)	205.65				18.60	Calc.[HK]		3
Poly(di-isoamyl fumarate)	235.71				18.60	Calc.[HK]		3
Poly(dinitrile fumarate)	46.32				48.45	Calc.[HK]		3
Poly(diphenyl fumarate)	217.67				19.91	Calc.[HK]		3
Poly(vinyl-2-ethyl hexoate)	157.83				19.21	Calc.[HK]		3
Poly(dimethyl maleate)	115.47				18.56	Calc.[HK]		3
Poly(diethyl maleate)	145.53				18.58	Calc.[HK]		3
Poly(di-*n*-propyl maleate)	165.58				19.70	Calc.[HK]		3
Poly(di-*n*-butyl maleate)	205.65				18.60	Calc.[HK]		3
Poly(di-*n*-amyl maleate)	235.71				18.60	Calc.[HK]		3
Poly(di-isobutyl maleate)	205.65				18.60	Calc.[HK]		3
Poly(di-isoamyl maleate)	235.71				18.60	Calc.[HK]		3
Poly(diphenyl maleate)	217.67				19.91	Calc.[HK]		3
Poly(3-chloropropyl methacrylate)					19.60			160
Poly(methyl methacrylate)	89.28				18.27	Calc.[HK]		3
Poly(ethyl methacrylate)	110.9				17.25	Calc.[HK]		3
Poly(propyl methacrylate)	119.34				18.37	Calc.[HK]		3
Poly(butyl methacrylate)	134.37				18.41	Calc.[HK]		3
Poly(hexyl methacrylate)	191.91				15.80	Calc.[HK]		3
Poly(allyl methacrylate)	115.1				17.51	Calc.[S]		3
Poly(isopropyl methacrylate)	119.34				18.39	Calc.[HK]		3
Poly(isobutyl methacrylate)	134.37				18.39	Calc.[HK]		3
Poly(vinyl propionate)	89.32				18.27	Calc.[HK]		3

TABLE 10. *cont'd*

Polymer	Molar volume (cm^3/gmol)	Solubility parameters $(MPa)^{1/2}$ δ_d	δ_p	δ_h	δ	Method	T(°C)	Refs.
10.3. MAIN CHAIN C–N POLYMERS								
10.3.1. POLY(AMIDES)								
Poly(lactams)								
Nylon 3					26.2	Calc.		139
Nylon 4					23.9	Calc.		139
		19.44	–[a]	14.12	24.02			81
Nylon 5					22.5	Calc.		139
Nylon 6					21.5	Calc.		139
Nylon 7					20.7	Calc.		139
Nylon 8					20.3	Calc.		139
Nylon 9					19.8	Calc.		139
Nylon 10					19.4	Calc.		139
Nylon 11					19.2	Calc.		139
Nylon 12					19	Calc.		139
Nylon 2-I					27.2	Calc.		139
Nylon 3-I					26	Calc.		139
Nylon 4-I					25	Calc.		139
Nylon 5-I					24.1	Calc.		139
Nylon 6-I					23.5	Calc.		139
Nylon 6I, poly(hexamethylene isophthalamide)					26.3	Calc.[HK]		150
					23.2	Calc.[H']		150
Nylon 7-I					22.9	Calc.		139
Nylon 8-I					22.5	Calc.		139
Nylon 9-I					22.1	Calc.		139
Nylon 10-I					21.7	Calc.		139
Nylon 12-I					21.1	Calc.		139
Nylon 66		18.62	5.11	12.28	22.87			98
Nylon 66 (Zytel, DuPont)		18.62	0	14.12	23.37			56
Poly(iminohexamethylene iminoadipoyl)					27.8			118
Poly(amide), thermoplastics (Versamid 930, General Mills)		17.43	– 1.92	14.89	23.02			56
Poly(*p*-benzamide)		18	11.9	7.9	23	Swelling		143
Poly(*p*-phenylene terephthalamide)		18	11.9	7.9	23	Swelling		143
Poly(*p*-benzanilide terephthalamide)		18	11.9	7.9	23	Swelling		143
Poly(*n*-isopropyl acrylamide)					22.8	Calc.		154
Gel					23.5	Swelling		153
10.3.2. CELLULOSE AND DERIVATIVES								
Benzyl cellulose					25.23			110
Cellulose					32.02			110
		12.69	–[a]	22.3	25.66			81
Cellulose		8.27	8	13.88	18.03			140
Cellulose–alkylketene dimer treatment		8.1	12.35	7.96	16.78			140
Cellulose acetate (56% acetate groups)					27.83			110
(48% acetate groups)					27.19			110
Cellulose acetate (Cellidore A. Bayer)		18.6	12.73	11.01	25.08			56
Cellulose acetate		15.55	–[a]	11.87	19.56			81
Cellulose acetate butyrate		15.75	–[a]	8.59	17.94			81
Cellulose acetate propionate		15.75	–[a]	10.23	18.76			18
Cellulose diacetate					23.22	Calc.		112
					22.3			118
					22.3			72
Cellulose nitrate (11.83% N)					30.39			110
					21.44			112
					21.7			72
					23.5			21–24
(11.4% N)					21.93			72
Cellulose nitrate (1/2 sec; H-23 Hagedon)		15.41	14.73	8.84	23.08			56
Cellulose triacetate		15.55	–[a]	10.64	18.84			81
Cellulose tridecanoate		19.85	–[a]	6.14	20.77			81
Ethyl cellulose					21.1			21–24

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TABLE 10. *cont'd*

Polymer	Molar volume (cm^3/gmol)	Solubility parameters $(MPa)^{1/2}$ δ_d	δ_p	δ_h	δ	Method	T(°C)	Refs.
10.4. OTHER POLYMERS								
Alcohol soluble resin (Pentalyn 255, Hercules)		17.5	9.3	14.3	24.4			56
Alcohol soluble rosin resin (Pentalyn 830, Hercules)		20	5.8	10.9	23.5			56
Alkyd, short oil (coconut oil 34% phthalic anhydride, Plexal C34)		18.5	9.21	4.91	21.24			56
Alkyd resin, medium oil length					19.2			21–24
Alkyd, long oil (66% oil length, Plexal P65, Polyplex)		20.42	3.44	4.56	12.2			56
Coumarone-indene resin (Piccoumarone 450L, Penn. Ind. Chem.)		19.42	5.48	5.77	20.99			56
Epoxy resin					22.3			118
Epoxy (Epikote 1001, Shell)		20.36	12.03	11.48	26.29			56
Epoxy DBEBA–DDMe*	32				22		35	135
DGEBA–DMM	22				22.2		35	135
TGAP–DDMe	22.4				22.5		35	135
TGAP–ANI					23.9		35	135
TGAP–DDM					24.8		35	135
TGAP–DDS					27.1		35	135
Ester gum (ester gum BL, Hercules)		19.64	4.73	7.77	21.65			56
Furfuryl alcohol resin (Durez 14383, Hooker Chemical)		21.16	13.56	12.81	28.21			56
Hexamethoxymethyl melamine (Cymel 300, American Cyanimid)		20.36	8.53	10.64	24.51			56
Pentaerythritol ester of rosin, modified (Cellolyn 102, Hercules)		21.73	0.94	8.53	23.37			56
Petroleum hydrocarbon resin (Piccopale 110, Penn. Ind. Chem.)		17.55	1.19	3.6	17.96			56
Phenolic resin (resole, Phenodur 373U Chemische Werke Albert)		19.74	11.62	14.59	27.15			56
Phenolic resin (Super Beckacite 1001, Reichhold)		23.26	6.56	8.35	25.57			56
Poly(2-acrylamide-2-methyl propane sulphonamide) (tested in formamide/water mixtures)					43.6	Visc.	25	159
Poly(3,3-dimethyl oxetane)		15.35	2.46	4.09	16.16	Visc.		92
Poly(3,3-diethyl oxetane)		15.55	2.05	3.48	16.16	Visc.		92
Poly(1,3-dioxolane)					20.66	Visc.	25	175
Poly(ether urethane)					17.99 ± .02	IPGC	25	158
					17.38 ± 0.16	IPGC	100	158
					17.20 ± 0.15	IPGC	120	158
					17.14 ± 0.14	IPGC	130	158
					17.06 ± 0.15	IPGC	140	158
					16.96 ± 0.15	IPGC	150	158
Poly(DL-lactic acid)					21.0 ± 0.3	Density	25	142
					20.5 ± 0.4	Visc.	25	142
					19.8	Calc.^{S}	25	142
					20.3	Calc.^{H}	25	142
					19.2	Calc.^{HK}	25	142
Poly(oxetane)		17.39	5.12	5.12	19.23			92
Poly(oxydimethylsilylene)					15.04			110
					14.9	Obs.		21–24
					15.45	Swelling		76
					15.6	Av.		76
					14.9			118
					15.59			45
					15.4		25	125
					15	Vapor sorp.		145
					15.1	IPGC		146

* DGEBA – diglycidyl ether of bisphenol A; DDMe – tetraethyl derivative of DDM; DDM – diamino diphenyl methane; TGAP – triglycidyl derivative of amino phenol; ANI – aniline; DDS – diamino diphenylsulfone.

TABLE 10. *cont'd*

Polymer	Molar volume (cm^3/gmol)	Solubility parameters $(MPa)^{1/2}$ δ_d	δ_p	δ_h	δ	Method	T(°C)	Refs.
$\delta_2 = (15.7 - 0.026)t$, t in °C					15.1	IPGC		144
					17.5	^{129}Xe shift		152
Poly(ethylene adipate)		16.3 ± 2	6.1 ± 0.5	9.4 ± 0.1	19.8 ± 2			157
Poly(ethylene oxide)					20.2 ± 2	IPGC	25	31
		17.3 ± 2	3.0 ± 1	9.4 ± 0.5	19.9 ± 2.2			157
					17.8	Calc.		157
					19.64	IPGC	70	176
Poly(oxyethyleneoxyterephthaloyl)					21.9			118
					21.9			112
Poly(oxytrimethylene) polyoxetane					19.2	Visc.	25	31
-3,3 dimethyl					16.2	Visc.	25	92
-3,3 diethyl					16.2	Visc.	25	92
Poly(propylene oxide)					16.3		81	156
					16.2		86	156
					16.1		91	156
		16.3 ± 1	4.7 ± 0.5	7.4 ± 0.5	18.5 ± 1.2			157
					15.9	Calc.		157
Poly(sulfone), Bisphenol A (Udel)		19.03	0	6.96	20.26			81
Poly(thioethylene)					19.23			110
					19.19	Swelling		43
					18.4	Swelling		43
Poly(thiophenylethylene)					19.0 ± 1.0			87
Poly(urethane) (unknown composition)					20.5	Swelling		76
					20.5	Av.		76
Poly(urethane), amorphous					22.9			155
Poly(vinyl ethylene)					16.5	^{129}Xe shift		152
Poly(vinyl pyrrolidone)					25.6	Visc.		177
Poly(vinyl methyl ketone)	66.59				22.92	Calc.^{HK}		3
Poly(vinyl ethyl ketone)	81.58				22.14	Calc.^{HK}		3
Poly(vinyl methyl sulfide)	66.63				19.52	Calc.^{HK}		3
Poly(vinyl phenyl sulfide)	118.35				20.28	Calc.^{HK}		3
Terpene resin (Piccolyte S-1000, Penn. Ind. Chem.)		16.47	0.37	2.84	16.72			56
Urea-formaldehyde resin (Plastopal H, BASF)		20.81	8.29	12.71	25.74			56
Viton		17	10.3	6.1	20.8			130

[a]Altered from previously published value.
[b]Method of van Krevelen and Hoftyzee.
[c]Method of Small.
[d]Method of Hoy.

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Optically Active Polymers

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By definition the optical activity, $[M]_\lambda$, of polymers and their low molecular weight analogs is given by

$$[M]_\lambda = [\alpha]_\lambda \times (\text{mean residue weight})/100$$

A. ABBREVIATIONS USED

AcAc	Acetylacetonate
AIBN	Azobisisobutyronitrile
BPO	Benzoyl peroxide
DBP	Dibenzoyl peroxide
DCA	Dichloroacetic acid
DCM	Dichloromethane
DDB	2,3-Dimethoxy-1,4-bis(dimethylamino)butane
DMAc	Dimethylacetamide
DMF	Dimethylformamide
DMSO	Dimethylsulfoxide
DPEDA-Li	*N,N'*-diphenylethylenediamine monolithium amide
EDC	Ethylene dichloride
M	Monomer
MC	Model compound
NCA	*N*-Carboxylic anhydride
P	Polymer
RT	Room temperature
TMEDA	*N,N,N',N'*-tetramethylethylenediamine
TCA	Trichloroacetic acid
TFA	Trifluoroacetic acid
TFEL	Trifluoroethanol
THF	Tetrahydrofuran

B. OPTICALLY ACTIVE POLYMERS FROM CHIRAL MONOMERS

TABLE 1. MAIN-CHAIN ACYCLIC CARBON POLYMERS

Polymer	Polymerization system		Polymer (P) values		Monomer (M) or model compound (MC) values		Optical activity measured		
Catalyst or initiator	Solvent	T (°C)	$[\alpha]_D$	$[M]_D$	$[\alpha]_D$	$[M]_D$	Solvent	T (°C)	Refs.
1.1. POLY(ALKENES)									
Poly[(*R*)(−)3,7-dimethyl-1-octene]									
$Al(i\text{-}C_4H_9)_3/TiCl_4$				−20 to −120		14.4 (MC)	Toluene	25	4,7
$Al(i\text{-}C_4H_9)_3/TiCl_3$				−35.3 to −144		14.4 (MC)	Toluene	25	
$LiAlH_4/TiCl_4$/monomer	Benzene	30–40	−78.1	−111	6.25	8.88 (MC)	Carbon tetrachloride	25	
Poly[(*S*)(+)5-methyl-1-heptene]									
$Al(i\text{-}C_4H_9)_3/TiCl_3$	Isooctane	RT		27.4–68.1		11.7 (MC)	Benzene		2–6
Poly[(*S*)(+)4-methyl-1-hexene]									
$Al(i\text{-}C_4H_9)_3/TiCl_4$	Isooctane	RT		205–288		21.3 (MC)	Benzene (MC); toluene (P)	25	2–6,9
$Al(i\text{-}C_4H_9)_3/TiCl_3$	Isooctane	RT		149–279		21.3(MC)	Benzene (P)	25	
Poly[(*S*)(+)6-methyl-1-octene]									
$Al(i\text{-}C_4H_9)_3/TiCl_3$	Isooctane	RT		16.0		13.3 (MC)	Benzene	25	4
				20.4		13.3 (MC)			5
Poly[(*S*)(+)3-methyl-1-pentene]									
$Al(i\text{-}C_4H_9)_3/TiCl_4$	–	20–25		29.4–158		−11.4 (MC)	Tetralin (P)	25 (P); 20 (MC)	2–6, 8,9
$Al(i\text{-}C_4H_9)_3/TiCl_3$	–	20–25		75.8–157		−11.4 (MC)	Tetralin (P)	25 (P); 20 (MC)	
				161					5
Poly[(*S*)5-phenyl-1-heptene]									
$Al(i\text{-}C_4H_9)_3/TiCl_3$	2,2,4-Trimethylpentane	25–60	26.6		4.80 (M)		Cyclohexane (P); neat (M)	25	118
Poly[(*R*)4-phenyl-1-hexene]									
$Al(i\text{-}C_4H_9)_3/TiCl_3$	2,2,4-Trimethylpentane	60	−61.6		−8.99 (M)		Chloroform (P); neat (M)	25	118
1.2. POLY(ACRYLICS) AND RELATED POLYMERS									
Poly(acryloyl-L-glutamic acid)									
AIBN	Dioxane	60	−21.0		−21.0 (MC)		Dioxane	25	12
Poly(L-bornyl acrylate)									
AIBN	–	65		−46.1		−56.4 (M)	Toluene	25	10
AIBN	Benzene	60		−47.2		−56.4 (M)	Toluene	25	
AIBN	Toluene	35		−47.4		−56.4 (M)	Toluene	25	
C_6H_5MgBr	Toluene	−70		−43.0		−56.4 (M)	Toluene	25	
UV benzoin	Toluene	−78		−47.2		−56.4 (M)	Toluene	25	
Poly(*d-sec*-butyl α-chloroacrylate)									
BPO	–	50–100		23.4		55.5 (M)	Chloroform (P); neat (M)	21 (P); 22 (M)	13
BPO	Dioxane	RT		17.9		42.2 (M)	Dioxane	25	14
Poly(*d-sec*-butyl α-bromoacrylate)									
BPO	Dioxane	RT		15.3		37.4 (M)	Dioxane	30	13
Poly(L-menthyl acrylate)									
AIBN	–	50	−79.0		−99.3 (M)		Benzene	22	11
AIBN	Benzene	60	−73.9		−88.3 (M)		Chloroform (P); neat (M)	25	215

Poly[(+)*N*-methyl-*N*-α-methylbenzyl-acrylamide]									
AIBN	–	60		278		504 (M)	Benzene	25	29
n-BuLi	Toluene	22		397		504 (M)	Benzene	25	
n-BuLi	Toluene	– 50		366		504 (M)	Benzene	25	
C_6H_5MgBr	Toluene	– 50		337		504 (M)	Benzene	25	
Poly[(–)*N*-propyl-*N*-α-methylbenzyl-acrylamide]									
AIBN	Toluene	70		– 167		– 444 (M)	Benzene	25	29
n-BuLi	Toluene	22		– 318		– 444 (M)	Benzene	25	

1.3. POLY(METHACRYLICS) AND RELATED POLYMERS

Poly(L-bornyl methacrylate)									
AIBN	Benzene	55		– 70.8		– 50.1 (M)	Toluene	20	10
Poly(1,2;5,6-diisopropylidene-D-glucofuranosyl-3-methacrylate)									
BPO	Benzene	80	– 49.0		– 32.2 (M)		EDC (P); ethanol (M)	25	23,24
AIBN	Benzene	40–50	– 48.4		– 28.8 (M)		Benzene	20	25–27
Poly(2,3;4,6-diisopropylidene-L-sorbofuranosyl-1-methacrylate)									
AIBN	Carbon tetrachloride	60	– 84.5		– 8.6 (M)		Benzene	19	26
Poly[(+)1,3-dimethylbutyl methacrylate]									
BPO	–	82–110	18.2	30.9	23.4 (MC)	43.5 (MC)	DCM	20	17,18
Poly[(+)(*S*)-diphenyl(1-methyl-pyrrolidin-2-yl)methyl methacrylate]									
DPEDA-Li/TMEDA	Toluene	– 78	780 ($[\alpha]_{365}$)		– 82.2 (M) ($[\alpha]_{365}$)		Benzene (M); methanol – 0.01% CH_3SO_3H(P)	25	225
			– 410 ($[\alpha]_{365}$)				Methanol – 0.01%CH_3SO_3H after 1 h	25	
			779 ($[\alpha]_{365}$)				Methanol – 13%CH_3SO_3H	25	
Poly(1-menthyl methacrylate)									
AIBN	Benzene	55		– 193		– 202 (M)	Benzene	25	16,11
BPO	–	40–85		– 256.8		– 202 (M)	Chloroform	20	
C_6H_5MgBr	Toluene	RT		– 158.9		– 202 (M)	Chloroform	20	
C_6H_5MgBr	Toluene	– 75		– 177.0		– 202 (M)	Benzene	25	
γ-Ray	–	– 75		– 194.0		– 202 (M)	Benzene	25	
BuLi	THF	– 78	– 96.9				Chloroform	25	205
Poly(methacryloyl-D-alanine)									
AIBN	Dioxane	60	42.0		48.9 (MC)		Dioxane	25	28
Poly(*N*-methacryloyl-L-alanine)									
AIBN	Dioxane		– 42 ($[\alpha]_{546}$)		– 41 (M) ($[\alpha]_{546}$)		Water	20	119
Poly(*N*-methacryloyl-L-asparagine)									
AIBN	Dioxane	60	– 24.4 ($[\alpha]_{546}$)		– 36 (MC) ($[\alpha]_{546}$)		Water	20	215
Poly(methacryloyl-L-glutamic acid)									
AIBN	Dioxane	60	– 23.0		– 26.0 (MC)		Dioxane	25	28
Poly(ε-*N*-methacryloyl-L-lysine]									
Potassium persulfate	Water	65	12.1		7 (M)		Water	20	222
Poly(1-α-methylbenzyl methacrylate)									
UV AIBN	–	35	– 79.5	– 151	– 54.4 (M)	– 103 (M)	Dioxane	25	19–21
UV benzoin	–	– 65	– 72.5	– 138	– 54.4 (M)	– 103 (M)	Dioxane	25	
n-BuLi	Toluene	– 60	– 100	– 190	– 54.4 (M)	– 103 (M)	Dioxane	25	
AIBN	Dioxane	35		– 147		– 78.8 (M)	Dioxane (P); neat (M)	25	
Poly(2-methylbutyl methacrylate)									
BPO	–	100		5.93		6.99 (M)	Chloroform (P); isooctane (M)	20	16,22
C_6H_5MgBr	Toluene	RT		6.84		6.99 (M)	Chloroform (P); isooctane (M)	20	
Poly[(*S*)4-methyl-2-*N*,*N*-dimethylaminopentyl methacrylate]									
AIBN	Benzene	60	2.2		– 2.1 (M)		Benzene		120

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TABLE 1. *cont'd*

Polymer	Polymerization system		Polymer (P) values		Monomer (M) or model compound (MC) values		Optical activity measured		
Catalyst or initiator	Solvent	T (°C)	$[\alpha]_D$	$[M]_D$	$[\alpha]_D$	$[M]_D$	Solvent	T (°C)	Refs.
Poly[(+)phenyl-2-pyridyl-*o*-tolylmethyl methacrylate]									
n-BuLi	THF	−78	395 −321		88.6 (M)		Benzene (M); THF (P) THF	−78 (P); 25 (M) 25 (P)	223
Diisopropyl peroxydicarbonate	Toluene	40	−617 ($[\alpha]_{365}$)		190.1 (M) ($[\alpha]_{365}$)		Chloroform(M); 90% chloroform-10% TFEL (P)	25	185
Poly[(+)phenyl-2-pyridyl-*m*-tolylmethyl methacrylate]									
DPEDA-Li/(−)DDB	Toluene	−78	−845 ($[\alpha]_{365}$) 1481 ($[\alpha]_{365}$)		14.0 (M) ($[\alpha]_{365}$)		Chloroform (P); benzene (M) Chloroform (after heating at 60°C)	25 25	224
DPEDA-Li/TMEDA	Toluene	−78	262 ($[\alpha]_{365}$) 1370 ($[\alpha]_{365}$)		14.0 (M) ($[\alpha]_{365}$)		Chloroform (P); benzene (M) Chloroform (after heating at 60°C)	25 25	224
1.4. POLY(VINYL ETHERS), POLY(VINYL KETONES), POLY(VINYL ESTERS)									
1.4.1. POLY(VINYL ETHERS)									
Poly[(−)(*S*)2,2′-bis(2-vinyloxyethoxy)-1,1′-binaphthyl]									
$SnCl_4$	DCM	0	−131.6		−47.6 (M)		Chloroform	25	121
$BF_3 \cdot OEt_2$	Nitromethane	0	−131.9		−47.6 (M)		Chloroform	25	
Poly[(−)(*S*)2,2′-bis[2-(2-vinyloxyethoxy)ethoxy]-1,1′-binaphthyl]									
$SnCl_4$	DCM	0	−93.9		−37.7 (M)		Chloroform	25	121
$BF_3 \cdot OEt_2$	DCM	0	−95.8		−37.7 (M)		Chloroform	25	
Poly[(−)(*S*)2,2′-bis[2-(2-vinyloxyethoxy)ethoxy]-3,3′-dimethyl-1,1′-binaphthyl]									
$SnCl_4$	DCM	0	44.5		−99.7 (M)		Chloroform	25 (P); 29 (M)	245
Poly(1-bornyloxyethylene)									
$BF_3 \cdot OEt_2$				−142		−122.4 (M)	Benzene	25	31
Poly(1-cholesteryloxyethylene)				−93		−131.4 (M)			31
Poly(1,2:5,6-diisopropylidene-α-D-glucofuranosyl-3-oxyethylene)									
$BF_3 \cdot OEt_2$	*n*-Hexane + DCM	−78		5.7		−77.2	EDC (P); ethanol (M)	25	36,24
Poly(1-menthyloxyethylene)									
C_4H_9MgBr	Toluene	80		−358		−121.9 (M)	Benzene (P); chloroform (M)	25	31
$BF_3 \cdot OEt_2$	*n*-Hexane	−78		−396		−121.9 (M)	Benzene (P)	25	
$SnCl_4$	Petroleum ether	25		−373		−121.9 (M)	Benzene (P)	25	
$Mn-MoO_3-H_2SO_4$	*n*-Hexane	−10		−357		−118.8 (M)	Chloroform (M); benzene (P)	25	33
$Mn-MoO_3-H_2SO_4$	*n*-Hexane	−30		−353		−118.8 (M)	Benzene (P)	25	
$Al(i\text{-}OC_3H_7)_3/H_2SO_4$	*n*-Pentane	−15 to RT	−198		−72.2 (M)		Neat (M); benzene (P)	25	123
$BF_3 \cdot OEt_2$	Toluene	−78	−220		−61.5 (M)		Toluene (M); benzene (P)	25 (P)	124
Poly(1-α-methylbenzyloxyethylene)									
$BF_3 \cdot OEt_2$	Propane	−78		68.6		−71.9 (M)	Benzene	25	35
Poly[(S)2-methylbutyloxyethylene]									
$Al(i\text{-}C_4H_9)Cl_2$	Propylene + Toluene	−78		4.9		1.1 (MC) 7.6 (M)	Toluene (P); neat (M,MC)	25	34
$Al(i\text{-}C_4H_9)_3/H_2SO_4$	Ether	15–20		−5.9		1.1 (MC) 7.6 (M)	Toluene (P)	25	
$Al(i\text{-}OC_3H_7)_3/H_2SO_4$	Ethyl acetate	0–20		6.4		1.1 (MC) 7.6 (M)	Toluene (P)	25	

Poly[(*S*)1-methylpropyloxyethylene]									
$Al(i\text{-}C_4H_9)Cl_2$	Propylene + Toluene	−78		246		13.24 (M)	Toluene (P); neat (M)	25	32
$Al(i\text{-}C_4H_9)_3/H_2SO_4$	Diethyl ether	15–20		206		13.67 (M)	Toluene (P)	25	
$Al(i\text{-}OC_3H_7)_3/H_2SO_4$	*n*-Pentane	−15 to RT	285		13.8 (M)		Benzene (P); neat (M)	25	123
Poly[(*S*)2-phenylvinyl 2-methylbutyl ether]									
$BF_3 \cdot OEt_2$	Toluene	−78	11.4		3 (MC)		DCM	25 (MC)	125
$SnCl_4$	Toluene	−78	12.0		3 (MC)		DCM	25 (MC)	
Poly[(*S*)2-phenylvinyl 3-methylpentyl ether]									
$BF_3 \cdot OEt_2$	Toluene	−78	7.8		7.12 (MC)		DCM	25 (MC)	125
$SnCl_4$	Toluene	−78	7.8		7.12 (MC)		DCM	25 (MC)	
1.4.2. POLY(VINYL KETONES)									
Poly[(*S*)2-methylbutyl vinyl ketone]									
Spontaneous	–	20–25		−10.0		11.5 (MC)	Chloroform (P); neat (MC)	25	30
$LiAlH_4$	Toluene	−16 to 50		−43.0		11.5 (MC)	Chloroform (P)	25	
Poly[(*S*)3-methylpentyl vinyl ketone]									
Spontaneous	–	20–25		15.6		15.2 (MC)	Chloroform (P); neat (MC)	25	30
$LiAlH_4$	Toluene	0		11.7		15.2 (MC)	Chloroform (P)	25	
Poly[(*S*)1-methylpropyl vinyl ketone]									
$LiAlH_4$	Toluene	0		−118		33.4 (MC)	Chloroform (P); neat (MC)	25	30
Spontaneous	–	RT		−42.5		33.4 (MC)	Chloroform (P)	25	
AIBN	Toluene	60		−39.1	44.08 (M)		EDC	25	126
$LiAlH_4$	Toluene	−15		−139.0	44.08 (M)		EDC	25	
1.4.3. POLY(VINYL ESTERS)									
Poly(*d*-*sec*-butyl *p*-vinyl-benzoate)									
BPO	–	40	22.9		24.0 (M)		Benzene	50	40
Poly(vinyl l-2-phenylbutyrate)									
BPO	Dioxane	100	−29.1		−20.4 (M)		Dioxane	25	13
1.5. POLY(STYRENES), POLY(CARBAZOLES)									
Poly(4-*sec*-butoxymethylstyrene)									
BPO	Dioxane	55	10.15		12.07 (M)		Dioxane	25	41
Poly[(*S*)3-*sec*-butyl-9-vinylcarbazole]									
AIBN	Benzene	60	−2.5		3.5 (M)		DCM (P); acetone (M)	25	127
$EtAlCl_2$	Toluene	−78	−6.2		3.5 (M)		DCM (P)	25	
$C_7H_7SbCl_6$	DCM	0	−3.8		3.5 (M)		DCM (P)	25	
Poly[(*S*)9-(2-methylbutyl)-2-vinylcarbazole]									
$EtAlCl_2$	DCM	−78	−13.4		−11.6 (M)		DCM (P); heptane (M)	25	127
n-BuLi	THF	25	−39.4		−11.6 (M)		DCM (P)	25	
AIBN	–	60	−21.4		−11.6 (M)		DCM (P)	25	
Poly[(*S*)9-(2-methylbutyl)-3-vinylcarbazole]									
AIBN	Benzene	60	−14.5		−7.5 (M)		DCM (P); heptane (M)	25	127
$C_7H_7SbCl_6$	DCM	0	−19.6		−7.5 (M)		DCM (P)	25	
–	–	200	−12.2		−7.5 (M)		DCM (P)	25	
Poly[2-(2-thio-3-methylpentyl)styrene]									
AIBN	–	76	9.57		13.97 (M)		Benzene (P); neat (M)	24.7	42
Poly[*p*-(*p*-tolylsulfinyl)styrene]									
AIBN	Benzene	70	−8.5 to −11.0		2.70 (M)		Chloroform	20	128

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TABLE 1. *cont'd*

Polymer	Polymerization system		Polymer (P) values		Monomer (M) or model compound (MC) values		Optical activity measured		
Catalyst or initiator	Solvent	T (°C)	$[\alpha]_D$	$[M]_D$	$[\alpha]_D$	$[M]_D$	Solvent	T (°C)	Refs.
1.6. POLY(DIENES)									
Poly[1-(*d*-bornylammonium carboxylate)-1,3-butadiene]									
AIBN	Methanol	50	14.4		6.8 (M)		Methanol	25	177
Poly[1-((−)1-cyclohexylethylammonium carboxylate)-1,3-butadiene]									
AIBN	Methanol	50	−3.6		−3.7 (M)		Methanol	25	177
Poly[(3*E*)(5*S*)3,5-dimethyl-1,3-heptadiene]									
$K_2S_2O_8$	Aq. emulsion	55		44.0	42.8 (M)		Benzene	20 (P); 25 (M)	129
$Al(i\text{-}C_4H_9)_3/TiCl_4$	Benzene	25		33.2	42.8 (M)		Benzene	20 (P)	
Poly[(3*Z*)(5*S*)3,5-dimethyl-1,3-heptadiene]									
$K_2S_2O_8$	Aq. emulsion	55		41.4	41.6 (M)		Benzene	20 (P); 25 (M)	129
$Al(i\text{-}C_4H_9)_3/TiCl_4$	Benzene	25		31.7	41.6 (M)		Benzene	20 (P)	
Poly[1-((−)menthyloxycarbonyl)-1,3-pentadiene]									
AIBN	Benzene	50	−71.3		−84.5 (M)		THF (P); benzene (M)	25	190
Poly[1-((*S*)(−)α-phenylethylammonium carboxylate)-1,3-butadiene]									
AIBN	Methanol	50	−11.4		−8.0 (M)		Methanol	20	178
Poly[*trans*-(*R*)6-phenyl-1,3-heptadiene]									
$Al(i\text{-}C_4H_9)_3/TiCl_3$	*n*-Heptane	25		−46.87	−16.6 (M)		Benzene	25 (P); 15 (M)	130
$AlEt_3/VCl_3$	*n*-Heptane	25		−45.82	−16.6 (M)		Benzene	25 (P)	
n-BuLi	*n*-Heptane	25		−40.30	−16.6 (M)		Benzene	25 (P)	
Poly[*trans*-(*R*)5-phenyl-1,3-hexadiene]									
$Al(i\text{-}C_4H_9)_3/TiCl_3$	*n*-Heptane	25		−39.84	−18.74 (M)		Benzene	25 (P); 15 (M)	130
$AlEt_3/VCl_3$	*n*-Heptane	25		−42.86	−18.74 (M)		Benzene	25 (P)	
n-BuLi	*n*-Heptane	25		−37.54	−18.74 (M)		Benzene	25 (P)	
1.7. POLY(ISONITRILES)									
Poly[((*S*)(1-(acetoxymethyl)ethyl)imino)methylene]									
$NiCl_2 \cdot 6H_2O$	Methanol	RT	−150 ($[\alpha]_{578}$)	−190 ($[M]_{578}$)	58.3 ($[\alpha]_{578}$)	74.0 (M) ($[M]_{578}$)	Chloroform	20–22	132
Poly[((*S*)(1-(acetoxymethyl)-2-methylpropyl)imino)methylene]									
$NiCl_2 \cdot 6H_2O$	Methanol	RT	−111 ($[\alpha]_{578}$)	−172 ($[M]_{578}$)	46.8 ($[\alpha]_{578}$)	72.5 (M) ($[M]_{578}$)	Chloroform	20–22	132
Poly[((*R*)(2-acetoxy-1-phenylethyl)imino)methylene]									
$NiCl_2 \cdot 6H_2O$	Methanol	RT	−82 ($[\alpha]_{578}$)	−156 ($[M]_{578}$)	−68.5 ($[\alpha]_{578}$)	−129 (M) ($[M]_{578}$)	Chloroform	20–22	132
Poly[(L-alanyl-(*O*-acetyl)L-serine methylester)methylene]									
$NiCl_2 \cdot 6H_2O$	Chloroform		205		−58.1 (M)		Chloroform–methanol (5 : 2) (P); chloroform (M)	20	231
Poly[(L-alanyl-(*O*-acetyl)D-serine methylester)methylene]									
$NiCl_2 \cdot 6H_2O$	Chloroform		−33		−12.0 (M)		Chloroform–methanol	20	231
Poly[(L-alanyl-(*N*(Im)-tosyl)L-histidine methylester)methylene]									
$NiCl_2 \cdot 6H_2O$	Chloroform/Methanol	RT	144 ($[\alpha]_{578}$)		40.6 ($[\alpha]_{578}$)		Chloroform	22	249
Poly[(D-alanyl-(*N*(Im)-tosyl)L-histidine methylester)methylene]									
$NiCl_2 \cdot 6H_2O$	Chloroform/Methanol	RT	−170 ($[\alpha]_{578}$)		18.6 ($[\alpha]_{578}$)		Chloroform	22	249
Poly[(L-alanyl-(*N*(Im)-tosyl) L-histidyl-(*O*-acetyl)L-serine methylester)methylene]									
$NiCl_2 \cdot 6H_2O$	Chloroform		−58.9		−13.5 (M)		Chloroform–methanol (5 : 2) (P); chloroform (M)	20	230

Poly[(L-alanyl-(*N*(Im)-tosyl)L-histidyl-(*O*-acetyl)D-serine methylester)methylene]									
$NiCl_2 \cdot 6H_2O$	Chloroform		−29.3		−2.1 (M)		Chloroform–methanol (5:2) (P); chloroform (M)	20	230
Poly[(D-alanyl-(*N*(Im)-tosyl)L-histidyl-(*O*-acetyl)L-serine methylester)methylene]									
$NiCl_2 \cdot 6H_2O$	Chloroform		−8.0		9.2 (M)		Chloroform–methanol (5:2) (P); chloroform (M)	20	230
Poly[((*S*)(1-benzylethyl)imino)methylene]									
$NiCl_2 \cdot 6H_2O$	Methanol	RT	15 ($[\alpha]_{578}$)	22 ($[M]_{578}$)	48.7 ($[\alpha]_{578}$)	70.6 (M) ($[M]_{578}$)	Chloroform	20–22	132
Poly[(((*S*)1-(*tert*-butoxycarbonyl)-2-methylpropyl)imino)methylene]									
$NiCl_2$	–	45	32.5		29.5 (M)		Chloroform	20	236
Poly[((*S*)(1-carbethoxyethyl)imino)methylene]									
$NiCl_2 \cdot 6H_2O$	–	RT	−280 ($[\alpha]_{578}$)	−355 ($[M]_{578}$)	16.7 ($[\alpha]_{578}$)	21.2 (M) ($[M]_{578}$)	Chloroform	20–22	132
Poly[(((1*S*,2*S*)1-carbomethoxy-2-methylbutyl)imino)methylene]									
$NiCl_2$	–	45	−32.2		35.0 (M)		Chloroform	20	236
Poly[((*S*)(−)α-cyclohexylethylimino)methylene]									
$NiCl_2 \cdot 6H_2O$	Neat	65	−295		27.4 (MC)		THF (P); hexane (MC)	24 (P); 20 (MC)	209
Poly[(((*S*)2,2-dimethyl-1,3-dioxolane-4-yl)methylimino)methylene]									
$NiCl_2 \cdot 6H_2O$	–	RT	68.5 ($[\alpha]_{546}$)		38.5 (M) ($[\alpha]_{546}$)		Dioxane	25	227
Poly[(((*R*)1,2-dimethylpropyl)imino)methylene]									
$NiCl_2 \cdot 6H_2O$	Methanol	RT	16.7 ($[\alpha]_{578}$)		−24.2 (M) ($[\alpha]_{578}$)		Chloroform	22	236
Poly[((*R*)(2-(diphenyl phosphinyl)propyl)imino)methylene]									
$NiCl_2 \cdot 6H_2O$	Methanol	RT	−338 ($[\alpha]_{578}$)	−910 ($[M]_{578}$)	13.1 ($[\alpha]_{578}$)	35.3 (M) ($[M]_{578}$)	Chloroform	20–22	132
Poly[((*S*)(1-ethyl-2-propenyl)imino)methylene]									
$NiCl_2 \cdot 6H_2O$	Methanol	RT	29 ($[\alpha]_{578}$)	27.6 ($[M]_{578}$)	95 ($[\alpha]_{578}$)	90.2 (M) ($[M]_{578}$)	Chloroform (P); neat (M)	20	132
Poly[((*S*)(1-ethyl-2-propynyl)imino)methylene]									
$NiCl_2 \cdot 6H_2O$	Methanol	RT	−110 ($[\alpha]_{578}$)	−102 ($[M]_{578}$)	−12.8 ($[\alpha]_{578}$)	−11.9 (M) ($[M]_{578}$)	Chloroform (P); neat (M)	20–22	132
Poly[(((*S*)1-(isopropyloxycarbonyl)-2-methylpropyl)imino)methylene]									
$NiCl_2$	–	5	−24		32.7 (M)		Chloroform	20	236
Poly[((−)menthylimino)methylene]									
$NiCl_2 \cdot 6H_2O$	Methanol	65	−207		−106.4 (MC)		Hexane	25 (P); 20 (MC)	209
Poly[(((*S*)1-(methoxycarbonyl)-2-methylpropyl)imino)methylene]									
$NiCl_2$	–	RT	−110		5.5 (M)		Chloroform	20	236
Poly[((*R*)3-methyl-2-butyl)imino)methylene]									
$NiCl_2 \cdot 6H_2O$	Methanol	RT	−16.7 ($[\alpha]_{578}$)	−16.2 ($[M]_{578}$)	−24.2 ($[\alpha]_{578}$)	−23.5 (M) ($[M]_{578}$)	Chloroform	22	131
Poly[((*R*)4-methyl-2-pentyl)imino)methylene]									
$NiCl_2 \cdot 6H_2O$		RT	62 ($[\alpha]_{578}$)	68.9 ($[M]_{578}$)	−61.9 ($[\alpha]_{578}$)	−68.8 (M) ($[M]_{578}$)	Chloroform	22	131
Poly[((*R*)2-octylimino)methylene]									
$NiCl_2 \cdot 6H_2O$	Methanol	RT	34 ($[\alpha]_{578}$)	47.3 ($[M]_{578}$)	−47.6 ($[\alpha]_{578}$)	−66.3 (M) ($[M]_{578}$)	Chloroform	22	131
Poly[(*d*-α-phenylethylimino)methylene]									
DBP-O_2	Heptane	60	365		37.2 (M)		Toluene	27	39
Poly[(l-α-phenylethylimino)methylene]									
H_2SO_4-O_2	Heptane	50	−382		−35.8 (M)	−179.7 (M)	Toluene	27	39
$NiCl_2 \cdot 6H_2O$	–	0–5	−350 ($[\alpha]_{578}$)	−458 ($[M]_{578}$)	−40.9	−55.0 (M) ($[M]_{578}$)	Chloroform (P); methanol (M)	20	132

1.8. POLY(ALKYNES)

Poly[(*S*)3,4-dimethyl-1-pentyne]									
$Al(i\text{-}C_4H_9)_3/Fe(AcAc)_3$	*n*-Heptane	20–35		470		42.2 (MC)	*n*-Heptane (P); neat (MC)	25	133
Poly[*p*-(L-(−)-menthoxycarbonyl)phenylacetylene]									
$[Rh(norbornadiene)Cl]_2$	Triethylamine	RT	−605		−68.8 (M)		Chloroform	20	197
Poly[*p*-((+)-2-methylbutoxy)phenylacetylene]									
$[Rh(norbornadiene)Cl]_2$	Triethylamine	RT	19.2		5.90 (M)		Chloroform	20	197

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TABLE 1. *cont'd*

Polymer	Polymerization system		Polymer (P) values		Monomer (M) or model compound (MC) values		Optical activity measured		
Catalyst or initiator	Solvent	T (°C)	$[\alpha]_D$	$[M]_D$	$[\alpha]_D$	$[M]_D$	Solvent	T (°C)	Refs.
Poly[(*S*)4-methyl-1-hexyne]									
Al(i-C_4H_9)$_3$/Fe(AcAc)$_3$	Isooctane	20–30	−22.9		−2.97 (MC)		Isooctane	25	1
Al(i-C_4H_9)$_3$/Fe(AcAc)$_3$	*n*-Heptane	20–35		−10.6		−3.0 (MC)	*n*-Heptane (P); neat (MC)	25	133
Poly[(*S*)5-methyl-1-heptyne]									
Al(i-C_4H_9)$_3$/Fe(AcAc)$_3$	*n*-Heptane	20–35		−146		12.2 (MC)	*n*-Heptane (P); neat (MC)	25	133
Poly[(*S*)6-methyl-1-octyne]									
Al(i-C_4H_9)$_3$/Fe(AcAc)$_3$	*n*-Heptane	20–35		−34		13.7 (MC)	*n*-Heptane (P); neat (MC)	25	133
Poly[(*S*)3-methyl-1-pentyne]									
Al(i-C_4H_9)$_3$/Fe(AcAc)$_3$	*n*-Heptane	20–35		498		32.1 (MC)	*n*-Heptane (P); neat (MC)	25	133

1.9. POLY(MALEIMIDES) AND RELATED POLYMERS

Poly(*N*-bornyl maleimide)									
BPO	THF	50	8.4		−9.6 (M)		THF (P); ethanol (M)	25 (P)	43
AIBN	THF	50	10.1		−9.6 (M)		THF (P)	25 (P)	
n-BuLi	THF	50	−9.1		−9.6 (M)		THF (P)	25 (P)	
Poly[*N*-(cholesteroxycarbonylmethyl)maleimide]									
AIBN	THF	70	−25.9		−26.8 (MC)		THF	RT	203
n-BuLi	THF	0	−37.1		−26.8 (MC)		THF	RT	
Poly(*N*-maleoyl-L-alanine)									
AIBN	THF	60	−42.1		−49.9 (MC)		THF	25	201
Poly(*N*-maleoyl-L-phenylalanine)									
AIBN	THF	60	−144.1		−138.3 (MC)		THF	25	201
Poly[*N*-maleoyl-L-phenylalanine ethyl ester]									
AIBN	Dioxane	60	−120.0		−136.3 (MC)		THF	25	252
BuLi	THF	0	−222.0		−136.3 (MC)		THF	25	
Poly[*N*-((*N'*-((*R*)-α-methylbenzyl)aminocarbonyl)methyl)maleimide]									
AIBN	DCM	70	59.9		115.5 (MC)		THF	25	200
Poly[*N*-(*N'*-((*R*)-α-methylbenzyl)aminocarbonyl-*n*-pentyl) maleimide]									
AIBN	Dioxane	60	50.1		56.6 (MC)		THF	25	183
Poly[*N*-(4-*N'*-((*R*)-α-methylbenzyl)aminocarbonylphenyl)maleimide]									
AIBN	THF	50	−141.4		−26.9 (MC)		THF	25	192
n-BuLi	THF	0	−78.0		−26.9 (MC)		THF	25	
Poly[*N*-(4-*N'*-((*S*)-α-methylbenzyl)aminocarbonylphenyl)maleimide]									
AIBN	THF	50	163.4		28.9 (MC)		THF	25	206
Poly[*N*-(*N'*-((*R*)-α-methylbenzyl)aminocarbonylundecyl)maleimide]									
AIBN	Dioxane	60	44.6		44.8 (MC)		THF	25	183
Poly(*N*-α-methylbenzyl citraconimide)									
AIBN	Benzene	50	56.7		55.3 (MC)		THF	25	233
Poly(*N*-α-methylbenzyl maleimide)									
AIBN	THF	50	11.1–13.0		57.9 (M)		THF	25	137
Poly[*N*-(2-phenyl-1-phenyloxycarbonyl)ethyl maleimide]									
AIBN	Benzene	60	−69.7		−106.8 (MC)		THF	25	187
n-BuLi	Toluene	0	−65.2		−106.8 (MC)		THF	25	

1.10. OTHER COMPOUNDS

Poly[(2,2′-bis(hexyloxy)-1,1′-binaphthyl-6,6′-ylene)-1,4-phenylenevinylene-1,4-phenylenevinylene-1,4-phenylene]									
$Pd(PPh_3)_4$	THF/K_2CO_3(aq.)		−351		35.6 (M)		THF (P); DMSO (M)		166
Poly(bis-2-methylbutyl itaconate)									
–	–	RT	4.92		4.97 (M)				15
BPO	–	40–85	4.75		5.57 (M)		Heptane	20	16
Poly[N^3-(1,2-diethoxycarbonylethyl)ureidoethylene]									
AIBN	Benzene	60	24.3	63.1	43.5 (M)	112.5 (M)	Dioxane	25	38
			31.7	82.0	43.5 (M)	112.5 (M)	Benzene	25	
Poly[N^3-(1,3-diethoxycarbonylpropyl)ureidoethylene]									
AIBN	Benzene	60	7.83	21.3	21.6 (M)	58.9 (M)	Benzene	25	38
Poly[(*R*)3,7-dimethyloctanal divinylacetal]									
AIBN	–	80	3.18	7.19	2.48 (MC)		Chloroform	25	72
$BF_3 \cdot OEt_2$	–	−78	−6.78	−14.32	2.48 (MC)		Chloroform	25	
Poly[N^3-(1-ethoxycarbonyl-3-methylbutyl)ureidoethylene]									
AIBN	Benzene	60	0.5	1.1	20.3 (M)	46.3 (M)	Benzene	25	38
Poly(ethylidene-1-propenylidene) (from (*R*)2,3-pentadiene)									
π-allyl-Ni-iodide		−20	−232.10		−47.39 (M)		Carbon tetrachloride (P); neat (M)	25	243
Poly(L-menthyloxycarbonylaminoethylene)									
AIBN	–	95	−60.4	−136.0	−79.9 (M)	−179.7 (M)	Benzene	25	38
AIBN	Benzene	60	−60.4	−136.0	−79.9 (M)	−179.7 (M)	Benzene	25	
γ-ray	Benzene	22	−58.5	−131.8	−79.9 (M)	−179.7 (M)	Benzene	25	
tert-BuOOH	SO_2	−25	−66.2		−79.9 (M)	−179.7 (M)	Benzene	25	
Poly[*N*-(4-*N*′-((*R*)-α-methylbenzyl)aminocarbonylphenyl)itaconimide]									
AIBN	THF	60	52.1		−23.8 (MC)		THF	25	191
Poly[(−)3-(β-styryloxy)menthane]									
$BF_3 \cdot OEt_2$	DCM	−72	−114		−15.9 (M)		THF	25 (P)	122
Poly[*N*-(*p*-(*p*-tolylsulfinyl)phenyl)-2,5-dioxo-pyrrolidin-3,4-diyl]									
BPO	THF	60	−22.0		−25.9 (M)		Chloroform	20	135
Poly(*m*-tolyl vinyl sulfoxide)									
n-BuLi/(−)-sparteine	Toluene	−78	311		486 (M)				246
Poly(*p*-tolyl vinyl sulfoxide)									
n-BuMgBr	THF	30	194		443 (M)		Acetone	23	134
Poly[(*S*)*N*-vinyl-3-methyl-2-pyrrolidone]									
AIBN	Water	95	28		69.3 (M)		Methanol (P); benzene (M)	25	136

TABLE 2. MAIN-CHAIN ACYCLIC HETROATOM POLYMERS

Polymer	Polymerization system		Polymer (P) values		Monomer (M) or model compound (MC) values		Optical activity measured		
Catalyst or Initiator	Solvent	*T* (°C)	$[\alpha]_D$	$[M]_D$	$[\alpha]_D$	$[M]_D$	Solvent	*T* (°C)	Refs.
2.1. POLY(OXIDES)									
Poly[(*R*)(+)citronellal]									
$Al(i\text{-}C_4H_9)_3$	Ether	−78	−82.7 to −90.1	−127 to −139		11.2 (MC)	Chloroform	25	44
n-BuLi	*n*-Hexane	−78	−91.1	−140		11.2 (MC)	Chloroform	25	
$BF_3 \cdot OEt_2$	Ether	−78	−89.5	−138		11.2 (MC)	Chloroform	25	

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TABLE 2. *cont'd*

Polymer	Polymerization system		Polymer (P) values		Monomer (M) or model compound (MC) values		Optical activity measured		
Catalyst or Initiator	Solvent	T (°C)	$[\alpha]_D$	$[M]_D$	$[\alpha]_D$	$[M]_D$	Solvent	T (°C)	Refs.
Poly(D-oxy-2,3-dimethylethylene)									
$Al(i\text{-}C_4H_9)_3/H_2O$	*n*-Heptane	−78	0		58.8 (M)		Benzene or chloroform (P); neat (M)	25	47
Poly[(*R*)(+)oxy-5-methoxy-3-methyl-hexylidene]									
$ZnEt_2$	*n*-Hexane	−75	36.7	52.8	2.47 (M)	8.24 (MC)	Chloroform	25	45
Poly[(*R*)oxy-2-methylbutylidene]									
$ZnEt_2$	*n*-Hexane	−75	36.7		30.7 (M)		Chloroform	25	45
Poly[(+)oxy-1-methyl-2-carbomethoxyethylene]									
$BF_3 \cdot OEt_3/AlEt_3$	–	25	−36.9		24.6 (M)		DCM (P); neat (M)	25	48
Poly[oxymethylene-(*R,R*)-dibenzo-19-crown-6]									
KOH	DMSO	RT	5.0 ($[\alpha]_{435}$)		1.22 (M) ($[\alpha]_{435}$)		Chloroform	25 (P); 24 (M)	208
Poly[oxymethylene-(*S,S*)-dibenzo-19-crown-6]									
KOH	DMSO	RT	−6.0 ($[\alpha]_{435}$)		−1.07 (M) ($[\alpha]_{435}$)		Chloroform	25 (P); 28 (M)	208
Poly(L-oxypropylene)									
KOH	–	RT	−16 ± 5		15 (M)		Benzene (P); ether (M)	20 (P); 21 (M)	46
			25 ± 5		15 (M)		Chloroform (P)	20 (P)	
$FeCl_3$-monomer	Ether	RT	−20 ± 5		15 (M)		Benzene (P)	20 (P)	
			25 ± 5		15 (M)		Chloroform (P)	20 (P)	
$ZnEt_2/CH_3OH$	Benzene	33	24.9		11.55 (M)		Cyclohexane (P); neat (M)	25	138
			−32.0		11.55 (M)		Benzene (P)	25	
Ferric acetate hydroxide	Heptane	70		−9.50	15.0 (M)		Benzene (P); ethyl ether (M)	25 (P); 27 (M)	139
				7.36	15.0 (M)		Dibutyl ether (P)	25 (P)	
2.2. POLY(ESTERS)									
Poly[L(−)oxycarbonylethylidene]									
$ZnCl_2$	Heptane	175–195	−153.3 ($[\alpha]_{578}$)		−275.8 (M) ($[\alpha]_{578}$)		Chloroform	25	51
Pyridine	Pyridine	20	−140.0		−19.2 (M)		Chloroform	20	175
Poly(L-oxycarbonylisobutylidene)									
ZnO	–	180–190	−20		−50 (MC)		Cyclohexane		52
ZnO	–	180–190	−67		−256 (M)		Chloroform	20 (P); 25 (M)	140
Poly(L-α-oxycarbonylisopentylidene)									
ZnO	–	175	−50		−226 (M)		DCM (P); chloroform (M)	20 (P); 25 (M)	140
Poly[(*R*)(+)oxycarbonyl-3-methylhexamethylene]									
$Sb_2O_3/Zn(CH_3COO)_2$	–	215	8.55		0.94 (M)		TFEL	25	49
Poly[(*R*)(−)oxycarbonyl-3-methylhexamethylene]									
$Sb_2O_3/Zn(CH_3COO)_2$	–	215	3.36		−0.96 (M)		Benzene	25	49
Poly[(*R*)(−)oxycarbonyl-2-methylpentamethylene] (Poly[(*R*)(−)-β-methylcaprolactone])									
$Al(i\text{-}C_4H_9)_3/H_2O$	Benzene	50	32.57 ($[\alpha]_{450}$)		29.78 (MC) ($[\alpha]_{350}$)		TFEL	25	53
Poly[(*R*)oxycarbonyl-3-methylpentamethylene]									
$Al(i\text{-}C_4H_9)_3/H_2O$	Benzene	50	26.95 ($[\alpha]_{450}$)		51.77 (M)		TFEL (P); chloroform (M)	25	53
Poly[(*R*)oxycarbonyl-4-methylpentamethylene]									
$Al(i\text{-}C_4H_9)_3/H_2O$	Benzene	50	8.78 ($[\alpha]_{450}$)		−15.91 (MC) ($[\alpha]_{350}$) −36.11 (M)		TFEL (P,MC); chloroform (M)	25	53
Poly[oxycarbonyl-1,4-phenylene-oxyterephthaloyloxy-1,4-phenylene-carbonyloxy-(*S*)1-methylethylene]									
–	EDC	Reflux		42		22.3 (M)	Fuming sulfuric acid	25	237

Poly[oxycarbonyl-1,4-phenylene-oxyterephthaloyloxy-1,4-phenylene-carbonyloxy-1,2-bis(2,2-dimethyl-1,3-dioxolane-4-yl)ethylene]								
–	DCM	85		228	4.0 (M)	Dioxane (P); methanol (M)	25	226
Poly(D-oxycarbonylpropylene)								
$AlEt_3$	Ether	RT	19 ($[\alpha]_{300}$)			Chloroform		50
Natural polymer			44 ($[\alpha]_{300}$)			Chloroform		
Poly(oxycarbonyl-1,2,3-trimethoxytetramethylene) (Poly(2,3,4-trimethyl-1-arabonolactone))								
CH_3COCl/HCl	–	RT	39 ($[\alpha]_{546}$)		203.5 (M) ($[\alpha]_{546}$)	Benzene	21	54
Poly[oxyisophthaloyloxy-(2-acetamide-1-phenyl)trimethylene]								
–	Chloroform	60	– 30.8		24.9 (M)	DMF (P); methanol (M)	25	167
Poly[oxyterephthaloyloxy-(1*R*,3*R*)-1,3-dimethyltrimethylene]								
–	EDC	82	– 295		– 136 (MC)	Chloroform	25	202
Poly[oxyterephthaloyloxy-(1-methyl-3-oxo)trimethylene-oxyethyleneoxy-(3-methyl-1-oxo)trimethylene-oxycarbonyl]								
–	DCM	Reflux	– 62		– 41.8 (M)	Chloroform	25	189

2.3. POLY(SULFIDES), POLY(THIOESTERS)

Poly(*tert*-butyl thiirane)								
tert-BuOK	DMSO	RT	268		– 39.0 (M)	Benzene (P); neat (M)	25	142
$ZnEt_2$	Toluene	RT	231–240		– 39.0 (M)	Benzene (P); neat (M)	25	
Poly[thio-1-(*N*-(*S*)*sec*-butyl-*N*-methylaminomethyl)ethylene]								
$ZnEt_2$/methanol	–	RT	26.1			Benzene	25	232
Poly[(*S*)thio(carbonyl)-1-(*p*-chlorobenzenesulfonamide)ethylene]								
$PhCH_2SH$	DMF	25	– 85.52		– 11.08 (M)	DMF	24 (M)	143
Poly[(*R*)thio(carbonyl)-1-methyl-1-ethylethylene]								
Tetrabutylammonium versatate	–	100	151.7		56.9 (M)	Benzene	23 (P); 26 (M)	141
Poly[(*S*)thio(carbonyl)-1-(*p*-methyloxybenzenesulfonamide)ethylene]								
$PhCH_2SH$	DMF	25	– 92.44		25.25 (M)	DMF	20 (M)	143
Poly[(*R*)(–)thiocarbonyl-3-methylpentamethylene]								
n-BuLi	–	RT	– 5.39		– 3.21 (M)	Dioxane	25	57
Poly[(*R*)(+)thiocarbonyl-2-methylpentamethylene]								
n-BuLi	–	190	15.66		9.03 (M)	Dioxane	25	57
			18.62			THF	25	
Poly[(*S*)thio(carbonyl)-1-(*p*-nitrobenzenesulfonamide)ethylene]								
$PhCH_2SH$	DMF	25	– 100.25		– 46.01 (M)	DMF	28 (M)	143
Poly[thio(carbonyl)-1-tosylaminoethylene]								
$PhCH_2SH$	DMF	25	– 90.6		19.87 (M)	DMF		143
–	–	112	– 80.6		19.87 (M)	DMF		
Poly[(–)thiopropylene]								
$BF_3 \cdot OEt_2$	DCM		– 62.8		– 32.6 (M)	DCM	22	55
			– 126.9		32.6 (M)	Chloroform	22	
KOH	–	15	– 189		– 35 (MC)	Chloroform	18 (P); 20 (MC)	56
			– 159		– 35 (MC)	Benzene (P)	18 (P)	

2.4. POLY(URETHANES), POLY(UREAS)

2.4.1. POLY(URETHANES)

Poly[oxycarbonylimino-(1-ethoxycarbonyl)pentamethyleneiminocarbonyloxyethylene]								
–	Neat	140–160	– 12			DMSO		174
Poly[oxycarbonylimino-(L)2-isobutylethylene-ureylene-(L)1-isobutylethylene)]								
Na_2CO_3	H_2O/THF	<0	– 48.2			Methanol	20	63
Poly[oxycarbonylimino-(L)2-isobutylethylene-ureylene-(L)1-isopropylethylene)]								
Na_2CO_3	H_2O/THF	<0	– 27.2			Methanol	20	63
Poly[oxycarbonylimino-(L)2-isobutylethylene-ureylene-(L)1-methylethylene)]								
Na_2CO_3	H_2O/THF	<0	– 19.2			Methanol	20	63

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TABLE 2. *cont'd*

Polymer	Polymerization system		Polymer (P) values		Monomer (M) or model compound (MC) values		Optical activity measured		
Catalyst or Initiator	Solvent	T (°C)	$[\alpha]_D$	$[M]_D$	$[\alpha]_D$	$[M]_D$	Solvent	T (°C)	Refs.
Poly[oxycarbonyliminomethylene-1,3-phenylenemethylene-ureylene-(1-(methoxymethyl)-2-phenyl)ethylene]									
Dibutyltin dilaurate	DMSO	80	20.48		15.20 (MC)		DMSO	25	168
Poly[oxycarbonyliminomethylene-1,3-(1,5,5-trimethyl)cyclohexylene-iminocarbonyloxy-2,3-bornanediyl]									
–	Methyl ethyl ketone	80	−7.4		−11.67 (MC)		DMF	30	216
Poly[oxycarbonylimino-(D)2-methylethylene-ureylene-(L)1-isobutylethylene)]									
Na_2CO_3	H_2O/THF	<0	−54.7				Methanol	20	63
Poly[oxycarbonylimino-(L)2-methylethylene-ureylene-(L)1-isobutylethylene)]									
Na_2CO_3	H_2O/THF	<0	−47.9				Methanol	20	63
Poly[oxycarbonylimino-(D)2-methylethylene-ureylene-(L)1-isopropylethylene)]									
Na_2CO_3	H_2O/THF	<0	−53.2				Methanol	20	63
Poly[oxycarbonylimino-(L)2-methylethylene-ureylene-(L)1-isopropylethylene)]									
Na_2CO_3	H_2O/THF	<0	−26.0				Methanol	20	63
Poly[oxycarbonylimino-(D)2-methylethylene-ureylene-(L)1-methylethylene)]									
Na_2CO_3	H_2O/THF	<0	−16.0				*m*-Cresol	20	63
Poly[oxycarbonylimino-(L)2-methylethylene-ureylene-(L)1-methylethylene)]									
Na_2CO_3	H_2O/THF	<0	−50.0				*m*-Cresol	20	63
Poly[oxycarbonylimino-1,4-phenylenemethylene-1,4-phenylene-ureylene-(1-(methoxymethyl)-2-phenyl)ethylene]									
Dibutyltin dilaurate	DMSO	80	−14.40		−8.72 (MC)		DMSO	25	168
Poly[oxycarbonylimino-2,4-toluyleneiminocarbonyloxy-(2-acetamide-1-phenyl)trimethylene]									
–	Chloroform	75	−20.6		−38.6 (MC)		DMF	25	167
Poly[oxycarbonylimino-2,4-toluyleneiminocarbonyloxy-2,3-bornanediyl]									
–	Methyl ethyl ketone	80	−27.6		−14.8 (MC)		DMF	30	216
2.4.2. POLY(UREAS)									
Poly[((*R*)5-ethyl-1,3-diazolidin-2-one-1,3-diyl)ethyleneoxyethylene]									
Methyl iodide	Benzonitrile	150	−19.4		39.4 (M)		Chloroform	24	250
Poly[((*R*)5-ethyl-1,3-diazolidin-2-one-1,3-diyl)methylene-1,2-phenylenemethylene]									
Methyl iodide	Benzonitrile	150	−28.0		32.1 (M)		Chloroform	24	250
Poly[((*R*)5-ethyl-1,3-diazolidin-2-one-1,3-diyl)tetramethylene]									
Methyl iodide	Benzonitrile	150	−54.0		38.8 (M)		Chloroform	24	250
Poly[((*S*)5-isopropyl-1,3-diazolidin-2-one-1,3-diyl)tetramethylene]									
Methyl iodide	Benzonitrile	150	−40.5		−34.4 (M)		Chloroform	24	250
Poly[((*S*)5-phenylmethyl-1,3-diazolidin-2-one-1,3-diyl)tetramethylene]									
Methyl iodide	Benzonitrile	150	−71.4		32.0 (M)		Chloroform	24	250
2.5. POLY(AMIDES)									
Poly[iminocarbonyl-1,2-(3,4-bis(2-hydroxyphenyl))cyclobutylenecarbonyliminohexamethylene]									
–	DMAc	80		−241		−295 (MC)	DMAc		235
Poly[iminocarbonyl-1,2-(3,4-bis(2-hydroxyphenyl))cyclobutylenecarbonylimino-1,4-phenylene]									
–	DMAc	80		−358		−456 (MC)	DMAc		235
Poly[iminocarbonyl-1,2-(3,4-bis(2-methoxyphenyl))cyclobutylenecarbonyliminohexamethylene]									
Benzyltriethylammonium chloride	1.0M NaOH/chloroform	RT	−70.3		−81.0 (MC)		*m*-Cresol	20	218
Poly[iminocarbonyl-1,2-(3,4-bis(2-methoxyphenyl))cyclobutylenecarbonylimino-1,4-phenylene]									
Benzyltriethylammonium chloride	1.0M NaOH/chloroform	RT	5.7		−32.7 (MC)		DMAc	20	218
Poly(*trans*-iminocarbonyl-1,2-cyclohexylene)									
Triethylamine	DMF	60	75.2–84.8		−60.0 (MC)		DCA (P); ethanol (M)	20	144

Poly[iminocarbonyl-(1*S*,2*S*)1,2-*trans*-cyclohexylene-carbonyliminoethylene]								
–	DMAc		56.5		19.4 (M)		DCA (P); acetone (M)	25 (P); 20 (M)	221
Poly[iminocarbonyl-(1*S*,2*S*)1,2-*trans*-cyclohexylene-carbonylimino-1,4-phenylene]									
–	DMAc		239		19.4 (M)		DCA (P); acetone (M)	25 (P); 20 (M)	221
Poly[imino-((2*S*,3*S*)-2,3-dimethoxytetramethylene)-imino-(1,4-dioxotetramethylene)]									
–	Chloroform	50	– 14.1		– 8.2 (M)		Formic acid (P); chloroform (M)	23	184
Poly[imino-(1,5-dioxohexamethylene)imino-(1*R*,2*R*)1,2-*trans*-cyclohexylene]									
–	DMAc		65.4		– 33.4 (M)		DCA (P); water (M)	25 (P); 20 (M)	221
Poly[iminoethylideneimino-(2,3-dimethoxy-1,4-dioxo)tetramethylene]									
–	Chloroform	RT	175.2		– 38.25 (M)		Formic acid (P); chloroform (M)	23	199
Poly[threo-imino-(1-oxo-2,3-dimethyltrimethylene)]									
K-Pyrrolidone	DMSO	25	– 25.0		– 50.6 (M)		TFA (P); neat (M)	25	62
Poly[(*S*)imino-(1-oxo-3-ethyltrimethylene)] (Poly[(*S*)β-aminovalerate])									
K-Pyrrolidone	DMSO	25	– 32.7		– 2.4 (M)		DCA (P); neat (M)	25	62
Poly[(–)imino-(1-oxo-3-methylhexamethylene)]									
H_2O	–	200	39.7		– 36.15 (M)		Cresol (P); water (M)	25	59,60
NaH	–	160	43.07		– 36.15 (M)		Cresol (P); water (M)	25	61
Poly[(+)imino-(1-oxo-4-methylhexamethylene)]									
NaH	–	150	19.24				TFEL	25	61
Poly[(+)imino-(1-oxo-5-methylhexamethylene)]									
NaH	–	194	25.15				TFEL	25	61
Poly[(+)imino-(1-oxo-3-methyl-6-isopropylhexamethylene)]									
K-C_6H_5COCl	–	150	9.5		– 53.6 (M)		Formic acid	19	58
Poly[(*S*)imino-(1-oxo-3-methyltrimethylene)] (Poly[(*S*)-β-aminobutyrate])									
K-Pyrrolidone	DMSO	25	– 9.3		– 8.3 (M)		TCA (P); neat (M)	25	62
			– 26.1		– 8.3 (M)		DCA (P)	25	
			– 33.5		– 8.3 (M)		TCA–chlorobenzene (P)	25	
Poly[(*R*)imino-(1-oxo-3-vinyltrimethylene)]									
K-Pyrrolidone	DMSO	25	– 19.5		25 (M)		DCA (P); neat (M)	25	62
Poly[iminoterephthaloylimino-(1*R*,2*R*)1,2-*trans*-cyclohexylene]									
	DMAc		– 211		– 33.4 (M)		DCA (P); water (M)	25 (P); 20 (M)	221
Poly[(+)iminoterephthaloylimino-2,8-naphthylene-8,2-naphthylene]									
			– 15 ($[\alpha]_{578}$)		66.6 (MC) ($[\alpha]_{578}$)		THF	21	71
Poly[methyliminocarbonyl-1,2-(3,4-bis(2-hydroxyphenyl))cyclobutylenecarbonyl-methylimino-hexamethylene]									
–	DMAc	80		– 437		– 474 (MC)	DMAc		235
Poly[*N*-(phenylethylidene)iminoethylene-*N*-(phenylethylidene)iminoterephthaloyl]									
			– 74 ($[\alpha]_{289}$)	– 294 ($[\alpha]_{289}$)				20	70
Poly[*N*-(phenylethylidene)iminohexamethylene-*N*-(phenylethylidene)iminodipicolinoyl]									
			– 139 ($[\alpha]_{289}$)	– 610 ($[\alpha]_{289}$)				20	70
Poly[1,4-piperazinediylcarbonyl-1,2-(3,4-bis(2-hydroxyphenyl))cyclobutylenecarbonyl]									
–	DMAc	80		116		– 391 (MC)	DMAc		235
Poly[1,4-piperazinediylcarbonyl-1,2-(3,4-bis(2-methoxyphenyl))cyclobutylenecarbonyl]									
Benzyltriethylammonium chloride 1.0 M NaOH/chloroform		RT	– 40.7		– 83.0 (MC)		DMAc	20	218

(–) R = 1,2-phenylene			– 4.94				5% LiCl–DMF	20	73
(+) R = 1,3-phenylene			– 0.50				5% LiCl–DMF	20	73
(+) R = 1,4-phenylene			6.53				5% LiCl–DMF	20	73

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TABLE 2. *cont'd*

Polymer	Polymerization system		Polymer (P) values		Monomer (M) or model compound (MC) values		Optical activity measured		
Catalyst or Initiator	Solvent	T (°C)	$[\alpha]_D$	$[M]_D$	$[\alpha]_D$	$[M]_D$	Solvent	T (°C)	Refs.
(−) R = 1,2-pyrazolidene			5.4				TFEL	20	73
(−) R = 2,5-dimethyl-1,4-piperazinediyl			28.0				TFEL	20	73
(−) R = 1,2-phenylene			−19.6				5% LiCl–DMF	20	73
(−) R = 1,3-phenylene			−19.4				5% LiCl–DMF	20	73
( ) R = 1,4-phenylene			−18.2				5% LiCl–DMF	20	73
(−) R = 1,2-piperazinediyl			−6.7				TFEL	20	73
(−) R = 1,4-piperazinediyl			−10.0				TFEL	20	73
(−) R = 2,5-dimethyl-1,4-piperazinediyl			−6.7				TFEL	20	73
2.6. POLY(ISOCYANATES)									
Poly[((*R*)1-deuterio-1-hexyl)iminocarbonyl]									
NaCN	DMF	−58	−367		0.65 (M)		Chloroform (P); neat (M)	25	229
Poly[(((*S*)2,2-dimethyl-1,3-dioxolane-4-yl)methyl)iminocarbonyl]									
NaCN	DMF	−65	−311 ($[\alpha]_{546}$)		−21.1 (M) ($[\alpha]_{546}$)		Chloroform(P); ethylether (M)	25	228
Poly[(*S*)(+)*N*-(2-methylbutyl)iminocarbonyl]									
NaCN	DMF	−75	160	180.8	3.08 (M) −6 (MC)	 −10.3 (MC)	Chloroform	25	64
Poly[*N*-(3-methyl-1-carbomethoxybutyl)iminocarbonyl]									
Methyllithium	DMF	−50	62				TFA	25	182
Poly[*d*-*N*-(phenylpropyl)iminocarbonyl]									
NaCN	DMF	RT	−468.0	−754.8	35 (M) 114.4 (MC)	44.8 (M)	Chloroform	25	65
2.7. POLY(IMINES)									
Poly(D-conidine)									
$BF_3 \cdot OEt_2$	Ether	RT	−140.8		71.7 (M)		Chloroform		69
Poly(L-conidine)									
$BF_3 \cdot OEt_2$	Ether	RT	140.8		−71.0 (M)		Chloroform		69
Poly[(*S*)decyliminoisobutylethylene]									
$BF_3 \cdot OEt_2$	Neat	−78	−68.6		17.9 (M)		Benzene (P); ethanol (M)	19–21	173
Poly[(*R*)ethyliminoethylethylene]									
$BF_3 \cdot OEt_2$	Neat	−78	155.13		−41.80 (M)		Dioxane (P); methanol (M)	25	234
Poly[imino-1-butyl-(*R*)2-ethylethylene]									
$BF_3 \cdot OEt_2$	–	98–100	137.66		2.73 (M)		Benzene (P); ethanol (M)		145
Poly[imino-1-(*R*)2-diethylethylene]									
$BF_3 \cdot OEt_2$	–	98–100	155.13		−20.33 (M)		Dioxane (P); ethanol (M)	25	145
Poly[(*R*)imino-2-ethylethylene]									
$BF_3 \cdot OEt_2$	–	100	−127.4		17.6 (M)		Benzene (P); neat (M)	23 (P); 18 (M)	67

$AlCl_3$	–	100	– 108.9	17.6 (M)	Benzene (P)	16 (P)	
From (*R*)-2-amino-1-bromobutane			– 109.2		Benzene	16	
Poly[imino-(*R*)2-ethyl-1-pentylethylene]							
$BF_3 \cdot OEt_2$	–	98–100	132.39	4.16 (M)	Benzene (P); ethanol (M)		145
Poly(imino-*N*-formyl-isopropylethylene)							
Methyl triflate	Acetonitrile	80	199.3	– 130.5 (M)	Chloroform (P); ethanol (M)	25	146
$BF_3 \cdot OEt_2$	Acetonitrile	80	86.8	– 130.5 (M)	Chloroform (P)	25	
Poly(imino-*N*-formyl-propylene)							
Ethyl trifluoromethane-sulfonate	Acetonitrile	80	130	– 148 (M)	Methanol (P); ethanol (M)	25 (P); 30 (M)	148
Dimethyl sulfate	–	120	107	14.4 (M)	H_2O (P); neat (M)	20	149
Poly[(*S*)iminoisobutylethylene]							
$BF_3 \cdot OEt_2$	–	80–100	66.7	– 24.6 (M)	Benzene	20 (P); 32 (M)	68
Poly(iminoisopropylethylene)							
$BF_3 \cdot OEt_2$	–	80	82.8	– 27.1 (M)	Ethanol	24	146
Poly[imino-(*S*)*N*-1-methylbenzylethylene]							
$BF_3 \cdot OEt_2$	–	0–60	7.09	– 81.8 (M)	Benzene (P); neat (M)	20	147
			– 8.15	– 81.8 (M)	Chloroform (P)	20	
Poly(D-iminopropylene)							
$BF_3 \cdot OEt_2$	–	80	– 101.5	12.4 (M)		22	66
Poly(L-iminopropylene)							
$BF_3 \cdot OEt_2$	–	80	109.3	– 12.8 (M)		22	66
Poly[(*S*)methyliminoisobutylethylene]							
$BF_3 \cdot OEt_2$	Neat	– 78	– 163.5	33.7 (M)	Benzene (P); ethanol (M)	19–21	173

2.8. POLY(AMINO ACIDS)

Poly(*O*-acetyl-L-hydroxyproline)							
NCA	Pyridine		25 (Form I)		90% HCOOH	25	110
			– 175 (Form II)		90% HCOOH after 6 h	25	
Poly(*O*-acetyl-L-serine)							
NCA, triethylamine	Nitrobenzene		31 ($[\alpha]_{546}$)		DCA	25	114
			159 ($[\alpha]_{546}$)		10% DCA–90% EDC	25	
Poly(L-alanine)							
NCA, tributylamine	Benzene–dioxane			21 ($[m']_D$)	99% $CHCl_3$–1% DCA		81,84
				– 90 ($[m']_D$)	TFA		
Poly(D-α-amino-*n*-butyric acid)							
NCA, benzylamine	Nitrobenzene			– 19 ($[m']_D$)	90% $CHCl_3$–10% DCA		81,84
				107 ($[m']_D$)	TFA		
Poly(L-arginine·HCl)							
From poly(L-nitroarginine)			– 21.3		H_2O	20	85
Poly(α-L-aspartic acid)							
From poly(β-benzyl-L-aspartate) (NCA, 120°C in vac.)			6.2		*c* =31 N NaOH		87
			– 11.2		*c* =51 N NaOH		88
Poly(β-L-aspartic acid)							
Active ester method		140	– 14 ($[\alpha]_{546}$)		0.2 M NaCl, pH 2	25	89
			– 23 ($[\alpha]_{546}$)		0.1 M NaCl, pH 4	25	
Poly(β-benzyl-D-aspartate)							
NCA, NaOMe	Chloroform		174 ($[\alpha]_{546}$)		Chloroform	22	86
			19 ($[\alpha]_{546}$)		DCA	22	
Poly(β-benzyl-L-aspartate)							
NCA, NaOMe	Chloroform		– 168 ($[\alpha]_{546}$)		Chloroform	22	86
			– 18 ($[\alpha]_{546}$)		DCA	22	

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TABLE 2. *cont'd*

Polymer	Polymerization system		Polymer (P) values		Monomer (M) or model compound (MC) values		Optical activity measured		
Catalyst or Initiator	Solvent	T (°C)	$[\alpha]_D$	$[M]_D$	$[\alpha]_D$	$[M]_D$	Solvent	T (°C)	Refs.
Poly(γ-benzyl-D-glutamate)									
NCA, NaOMe	Chloroform		−18 ($[\alpha]_{546}$)				Chloroform	22	86
	Chloroform		17 ($[\alpha]_{546}$)				DCA	22	
Poly(γ-benzyl-L-glutamate)									
NCA			−30				Hydrazine	20	96
			−46				TFA	20	
NCA, NaOMe	Chloroform		14 ($[\alpha]_{546}$)				Chloroform	22	86,98
	Chloroform		−15 ($[\alpha]_{546}$)				DCA	22	86
NCA, NaOMe	Chloroform		15				Chloroform	25	97
	Chloroform		−14				DCA	25	
NCA, Ni-dl-2-methyl-butyrate-n-Bu_3P	Dioxane	30	−17.0		−17.1 (NCA)		DCA (P); ethylacetate (NCA)	20	151
			15.3		−17.1 (NCA)		Chloroform (P)	20	
NCA, benzylamine	Dioxane	30	−17.0		−17.1 (NCA)		DCA (P); ethylacetate (NCA)	20	
			16.0		−17.1 (NCA)		Chloroform (P)	20	
NCA, benzylamine	THF	30	−15.3		−17.6 (NCA)		DCA (P); ethylacetate (NCA)	25	152
Poly(1-benzyl-L-histidine)									
NCA, triethylamine	Dioxane		11 ($[\alpha]_{546}$)				Chloroform	25	101
Triethylamine			−208 ($[\alpha]_{546}$)				DCA–$CHCl_3$	25	
NCA, triethylamine	Dioxane		−21.1				Acetic acid	20	102
Poly(ε-N-carbobenzoxy-L-lysine)									
NCA, NaOMe	Dioxane		5 ($[\alpha]_{546}$)				Chloroform	25	84,103
			−25 ($[\alpha]_{546}$)				50% $CHCl_3$–50% DCA	25	
Poly(S-carbobenzoxymethyl-L-cysteine)									
NCA, NaOMe	Nitrobenzene		−128 ($[\alpha]_{546}$)				0.2 M NaCl, pH 7	25	90
			−125 ($[\alpha]_{546}$)				0.2 M NaCl, pH 5	25	
			−33 ($[\alpha]_{546}$)				0.2 M NaCl, pH 3	25	
Poly(3,4-dehydro-L-proline)									
NCA	Pyridine		−500				99% formic acid	25	109
			−1250				TFA	25	
Poly(L-glutamic acid)									
From poly(γ-benzyl-L-glutamate) (NCA, aliphatic amine, DMF)			3				Dioxane–H_2O, 0.2 M NaCl, pH 4.7	22	84,92
			−77				Dioxane–H_2O, 0.2 M NaCl, pH 6.5	22	
			7				2-Chloroethanol–H_2O, 0.1 M RbCl, pH 5		84,93
			−75				2-Chloroethanol–H_2O, 0.1 M RbCl, pH 7.5		
From poly(γ-benzyl-L-glutamate) (NCA, NaOMe)			−6				0.2 M NaCl, pH 4.5	20	84,94
			−102				0.2 M NaCl, pH 8.0	20	
Poly(γ-D-glutamic acid)									
Active ester method			23.6				H_2O	23	95
Poly(γ-L-glutamic acid)									
Active ester method			−23.6				H_2O	23	95

Poly(L-histidine)						
From poly(1-benzyl-L-histidine)						
(NCA, triethylamine, dioxane)		−65 ($[\alpha]_{546}$)		0.2 M NaCl, pH 2.4	25	101
		−210 ($[\alpha]_{546}$)		0.2 M NaCl, pH 5.85	25	
		−67 ($[\alpha]_{546}$)		0.2 M NaCl, pH 6.00	25	
		28 ($[\alpha]_{546}$)		DCA	25	
		−20		Acetic acid	22	102
Poly(δ-hydroxy-*O*-acetyl-L-α-aminovaleric acid)						
NCA, triethylamine	Nitrobenzene	10.1 ($[\alpha]_{546}$)		DMF	25	83
		−26.5 ($[\alpha]_{546}$)		TFEL	25	
		−31.4 ($[\alpha]_{546}$)		DCA	25	
Poly(L-hydroxyproline)						
From poly(*O*-acetyl hydroxy-L-proline)		−400		H_2O	25	110
Poly(L-leucine)						
NCA, tributylamine	Benzene		−12 ($[m']_D$)	Benzene		81,84
			−111 ($[m']_D$)	TFA		81
Poly(L-lysine)						
From poly(ε-*N*-carbobenzoxy-L-lysine)		−144		H_2O, pH 7		105
		−35		H_2O, pH 12		
		−51		H_2O, pH 10.10	21.4	
		−77		H_2O, pH 9.98	23.2	
		−108		H_2O, pH 9.72	25.6	
Poly(L-lysine hydrochloride)						
From poly(ε-*N*-carbobenzoxy-L-lysine)		−78.8		6 N HCl	25	106
Poly(L-methionine)						
NCA, NaOMe	Nitrobenzene	24.4 ($[\alpha]_{546}$)		90% $CHCl_3$–10% DCA	25	107
		16.8 ($[\alpha]_{546}$)		DCA	25	
		−115.3 ($[\alpha]_{546}$)		TFA	25	
		22 ($[\alpha]_{546}$)		Chloroform		108
		−107 ($[\alpha]_{546}$)		80% TFA – 20% DCA		
Poly(L-methionine-*S*-carboxymethylthetin)						
From poly(L-methionine)		−44 ($[\alpha]_{546}$)		HCl, H_2O (pH 1.1–2.0)	25	107
Poly(L-methionine-*S*-methylsulfonium bromide)						
From poly(L-methionine)		−74.3 ($[\alpha]_{546}$)		H_2O	24	107
		−38.6($[\alpha]_{546}$)		10M LiBr	24	
Poly(*N*-methyl-L-alanine)						
NCA, benzylamine	Dioxane	−3.04		TFEL	24	82
Poly(γ-methyl-L-glutamate)						
NCA		−31.3		DCA	25	99
		−76.1		TFA	25	
		10		DMF	25	100
Poly(L-nitroarginine)						
NCA	DMF	−16.6		DMF	30	85
Poly(γ-phthalimidomethyl-L-glutamate)						
NCA, triethylamine		12.5		DMF	25	91
Poly(L-pipecolic acid)						
NCA, diethylamine	Benzene or dioxane	−325 (Form I)		Acetic acid	25	109
		−50 (Form II)		Acetic acid after 2 h	25	

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TABLE 2. *cont'd*

Polymer	Polymerization system		Polymer (P) values		Monomer (M) or model compound (MC) values		Optical activity measured		
Catalyst or Initiator	Solvent	T (°C)	$[\alpha]_D$	$[M]_D$	$[\alpha]_D$	$[M]_D$	Solvent	T (°C)	Refs.
Poly(L-proline)									
			50 (Form I)				Acetic acid		111
			−540 (Form II)				Acetic acid		
NCA, pyridine			48 (Form I)				10% Pyridine 90% H_2O	25	112
			−420 (Form II)				10% Pyridine after 50 h	25	
			33 (Form I)				H_2O		113
			−540 (Form II)				0.1 M KCl		
Poly(β-proline)									
Triethylamine	DMF	30	−10 to −11		7.6 (MC)		Chloroform	25	150
Poly(L-serine)									
From poly(*O*-acetyl-L-serine)			−22 $[\alpha]_{546}$				H_2O	25	114
			−7.3 $[\alpha]_{546}$				10 M LiBr	25	
			−25.2 $[\alpha]_{546}$				8 M urea	25	
			−9.3 $[\alpha]_{546}$				Hydrazine	25	
			−9.7 $[\alpha]_{546}$				DCA	25	
Poly(*O*-*p*-tolylsulfonyloxy-L-proline)									
NCA	Pyridine		0 (Form I)				Acetic acid	25	110
			−120 (Form II)				Acetic acid after 3 h		
Poly(ε-*N*-trifluoroacetyl-L-lysine)									
NCA, diethylamine	DMF		−6.8 ($[\alpha]_{546}$)				Methanol	20	104
			−36.8 ($[\alpha]_{546}$)				DCA	20	
Poly(L-tryptophan)									
NCA, diethylamine	Dioxane		218 ($[\alpha]_{546}$)				DMF	20	115
			343 ($[\alpha]_{546}$)				40% DMF − 60% DCA	20	
Poly(L-tyrosine)									
From poly(*O*-carbobenzoxy-L-tyrosine) (NCA, 110°C in vac.)									
			184				DMF		116
			73				20% DMF–80% DCA		
			150				0.15 M NaCl, pH 10.85		
			28				0.15 M NaCl, pH 12.27		
			8.7				1 N NaOH	20	117

TABLE 3. POLY(SACCHARIDES)

Polymer	Polymerization system		Polymer (P) values		Monomer (M) or model compound (MC) values		Optical activity measured		
Catalyst or initiator	Solvent	T (°C)	$[\alpha]_D$	$[M]_D$	$[\alpha]_D$	$[M]_D$	Solvent	T (°C)	Refs.
Poly[(1→6)-2,5-anhydro-3,4-di-*O*-decyl-D-glucitol]									
$BF_3 \cdot OEt_2$	DCM	0	16.0		6.8 (M)		Chloroform	22	211
tert-BuOK	THF	60	23.7		6.8 (M)		Chloroform	22	
Poly[(1→6)-2,5-anhydro-3,4-di-*O*-ethyl-D-glucitol]									
$BF_3 \cdot OEt_2$	DCM	−30	32.7		54.1 (MC); −5.2 (M)		Chloroform	22	210

Poly[(1→6)-2,5-anhydro-3,4-di-*O*-methyl-D-glucitol]							
tert-BuOK	Toluene	60	84.5 ($[\alpha]_{546}$)		Chloroform	23	212
KOH	Toluene	60	75.5 ($[\alpha]_{546}$)		Chloroform	23	
$BF_3 \cdot OEt_2$ (from D-mannitol)	DCM	0	41.3 ($[\alpha]_{546}$)	−12.3 (M) ($[\alpha]_{546}$)	Chloroform	22	213
$BF_3 \cdot OEt_2$ (from L-iditol)	DCM	0	43.1 ($[\alpha]_{546}$)	−9.8 (M) ($[\alpha]_{546}$)	Chloroform	22	
Poly(2,5-anhydro-3,4-di-*O*-methyl-D-mannitol)							
$BF_3 \cdot OEt_2$	DCM	0	50.2 ($[\alpha]_{546}$)	−9.6 (M) ($[\alpha]_{546}$); 44.1 (MC)	Chloroform	22 (P, M); 23 (MC)	214
Poly[(1→6)-2,5-anhydro-3,4-di-*O*-pentyl-D-glucitol]							
$BF_3 \cdot OEt_2$	DCM	0	25.8	9.3 (M)	Chloroform	22	211
tert-BuOK	THF	60	32.8	9.3 (M)	Chloroform	22	
Poly[α-(1→6′)-anhydro-D-galactopyranose]							
From 2,3,4-tri-*O*-benzyl derivative			207.1		10% LiOH − 0.5% borate	25	75
Poly(1,6-anhydro-β-D-glucopyranose)							
Chloroacetic acid	–	21–127	91		H_2O	22	77
Poly(α-1,6-anhydro-D-mannopyranose)							
From 2,3,4-tri-*O*-benzyl derivative			122.8		1% DMSO	30	80
Poly(α-1,6-anhydro-2,3,4-tri-*O*-acetyl-β-D-mannopyranose)							
PF_5	DCM	0	96		DMSO	30	80
Poly[α(1→6′)-anhydro-2,3,4-tri-*O*-benzyl-β-D-galactopyranose]							
PF_5	DCM	−78	105.1	−46.1 (M)	Chloroform	25	75
Poly[α-1,6-anhydro-2,3,4-tri-*O*-benzyl-β-D-mannopyranose]							
PF_5	DCM	−78	57.5	−32 (M)	Chloroform	30 (P); 25 (M)	80
Poly[1,6-anhydro-2,3,4-tri-*O*-methyl-β-D-glycopyranose]							
$BF_3 \cdot OEt_2$	Toluene	RT	199	−63.7 (M)	Chloroform	25 (P); 20 (M)	78
$BF_3 \cdot OEt_2$	Toluene	RT	204	−63.7 (M)	Chloroform	25 (P); 20 (M)	
Poly(D-galactose)							
HCl	DMSO	40	79.1		H_2O	20	74
Poly(D-glucose)							
HCl	DMSO	40	90.3		H_2O	20	74
Polyphosphate formamide		50–60	16				76
Poly(D-mannose)							
HCl	DMSO	40	102.9		H_2O	20	74
Poly(2,3,6-tri-*O*-methyl-D-glucose)							
HBr–HCl–P_2O_5	DMSO	RT	136.6		Chloroform	20	79
Poly(D-xylose)							
HCl	DMSO	40	96.1		H_2O	20	74

C. OPTICALLY ACTIVE POLYMERS FROM ACHIRAL MONOMERS

TABLE 4. MAIN-CHAIN ACYCLIC CARBON POLYMERS

Polymer	Polymerization system		Polymer (P) Values			Optical activity measured		
Catalyst or initiator	Solvent	*T* (°C)	$[\alpha]_D$	$[M]_D$	Origin of optical activity	Solvent	*T* (°C)	Refs.
4.1. POLY(ACRYLICS) AND RELATED POLYMERS								
Poly(*N*-acryloylcarbazole)								
Fluorenyllithium/(−)-sparteine	Toluene	−97	57.4		Helix-sense asymmetry	Chloroform	25	188
Poly(*N*-acryloyliminodibenzyl)								
Fluorenyllithium/(−)-sparteine	Toluene	−97	−0.5		Helix-sense asymmetry	Chloroform	25	188

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TABLE 4. *cont'd*

Polymer	Polymerization system		Polymer (P) Values			Optical activity measured		
Catalyst or initiator	Solvent	T (°C)	$[\alpha]_D$	$[M]_D$	Origin of optical activity	Solvent	T (°C)	Refs.
Poly(*N*-acryloylphenothiazine)								
Fluorenyllithium/(−)-sparteine	Toluene	−97	8.2		Helix-sense asymmetry	Chloroform	25	188
Poly(*N*,*N*-diphenylacrylamide)								
BuLi/(−)-sparteine	Toluene	−96	−44.2 to −50.9		Helix-sense asymmetry	THF	25	153
Fluorenyllithium/(−)-sparteine	Toluene	−97	−101			Chloroform	25	188
Poly[*N*,*N*-di(2-pyridyl)-acrylamide]								
Fluorenyllithium/(−)-sparteine	Toluene	−97	−23.7		Helix-sense asymmetry	Chloroform/DCA (22/1)	25	188
Poly[*N*-methyl-*N*-triphenylmethyl-acrylamide]								
n-BuLi/(−)-sparteine	Toluene	−78	−2.4		Helix-sense asymmetry	THF	25	188
Poly(1-phenyldibenzosuberyl acrylate)								
DPEDA-Li/(+)-DBB	Toluene	−40	−129		Helix-sense asymmetry	Chloroform	25	219
Poly(*N*-phenyl-*N*-1-naphthylacrylamide)								
BuLi/(−)-sparteine	Toluene	−78	8.7		Helix-sense asymmetry	Toluene	25	153,188
Poly(*N*-phenyl-*N*-2-naphthylacrylamide)								
BuLi/(−)-sparteine	Toluene	−78	81.7		Helix-sense asymmetry	Toluene	25	153,188
Poly[*N*-phenyl-*N*-(1-phenylethyl)-acrylamide]								
Fluorenyllithium/(−)-sparteine	Toluene	−97	−0.3		Helix-sense asymmetry	THF	25	188
Poly(triphenylmethyl acrylate)								
DPEDA-Li/(+)1-(2-pyrrolidinylmethyl)pyrrolidine	Toluene	−78	102 ($[\alpha]_{365}$)		Helix-sense asymmetry	Chloroform	25	186
4.2. POLY(METHACRYLICS) AND RELATED POLYMERS								
Poly(benzyl methacrylate)								
(*S*)2,3 : 4,5-bis[1,2-(3-methylnaphtho)]-1,6,9,12,15,18-hexaoxacycloeicosa-2,4-diene-*KO-tert*-Bu	95% Toluene–5% THF	−78	350 ($[\alpha]_{578}$)		Miscellaneous	THF	25	164
Poly(*tert*-butyl methacrylate)								
(*S*)2,3 : 4,5-bis[1,2-(3-methylnaphtho)]-1,6,9,12,15,18-hexaoxacycloeicosa-2,4-diene-*KO-tert*-Bu	95% Toluene–5% THF	−78	117 ($[\alpha]_{578}$)		Miscellaneous	THF	25	164
Poly(*m*-chlorophenyldiphenylmethyl methacrylate)								
DPEDA-Li/(+)-DDB	Toluene	−78	314		Helix-sense asymmetry	THF	25	220
Poly(cyclohexyldiphenylmethyl methacrylate)								
DPEDA-Li/(+)1-(2-pyrrolidinylmethyl)pyrrolidine	Toluene	−78	758 ($[\alpha]_{365}$)		Helix-sense asymmetry	Chloroform	25	240
			770 ($[\alpha]_{365}$)			Chloroform	60	
			−480 ($[\alpha]_{365}$)			Chloroform after 1 h	60	
Poly(cyclopropyldiphenylmethyl methacrylate)								
DPEDA-Li/(+)-DDB	Toluene	−78	−44 ($[\alpha]_{365}$)		Helix-sense asymmetry	Chloroform	25	240
Poly(diphenyl-*m*-fluorophenylmethyl methacrylate)								
DPEDA-Li/(+)-DDB	Toluene	−78	297		Helix-sense asymmetry	THF	25	220
Poly(diphenyl-2-pyridylmethyl methacrylate)								
DPEDA-Li/(−)-DDB	Toluene	−78	−1403 ($[\alpha]_{365}$)		Helix-sense asymmetry	90% Chloroform – 10% TFEL	25	155
Poly(diphenyl-4-pyridylmethyl methacrylate)								
BuLi/(−)-sparteine	Toluene	−78	−40 ($[\alpha]_{546}$)		Helix-sense asymmetry	90% Chloroform – 10% TFEL	25	154
Poly(methyl methacrylate)								
From poly(methacrylic acid) (potassium persulfate/dextrin, water, 0°C)			6.4 ($[\alpha]_{350}$)		Induced asymmetry	Benzene	25	162

From poly(methacrylic acid) (potassium persulfate/chitosan, water, 30°C)							
			16.6	Induced asymmetry	Chloroform	21	163
(*S*)2,3 : 4,5-bis[1,2-(3-methylnaphtho)]-1,6,9,12,15,18-hexaoxacycloeicosa-2,4-diene-*KO*-*tert*-Bu							
	95% Toluene–5% THF	−78	250 ($[\alpha]_{578}$)	Miscellaneous	THF	25	164
From poly(2,3-*O*-isopropylidene-1,4-di-*O*-methacryloyl-L-threitol) (AIBN, toluene, 60°C)							
			−4.3 ($[\alpha]_{405}$)	Induced asymmetry	Chloroform	20	244
Poly(1-phenyldibenzosuberyl methacrylate)							
Diisopropyl peroxydicarbonate	(+)Menthol/toluene	50	−200 ($[\alpha]_{365}$)	Helix-sense asymmetry	THF	25	196
Diisopropyl peroxydicarbonate	(−)Menthol/toluene	50	180 ($[\alpha]_{365}$)		THF	25	196
Diisopropyl peroxydicarbonate/ (+)neomenthanethiol	Toluene	40	−140 ($[\alpha]_{365}$)		THF	25	253
(−)Dimethyl peroxydicarbonate	Toluene	50	40 ($[\alpha]_{365}$)		THF	25	253
DPEDA-Li/(−)-sparteine	Toluene	−78	1670 ($[\alpha]_{365}$)		Chloroform	25	196
Poly[1-(2-pyridyl)dibenzosuberyl methacrylate]							
DPEDA-Li/(−)-sparteine	Toluene	−78	1290 ($[\alpha]_{365}$)	Helix-sense asymmetry	Chloroform	25	251
Poly(triphenylmethyl methacrylate)							
Li(R)-*N*-(1-phenylethyl)anilide	THF	−78	−104	Helix-sense asymmetry	Toluene	20	156
BuLi/(−)-sparteine	Toluene	−78	363		Toluene	20	
(*S*)-6-(2-dimethylaminoethyl)-1,11-dimethyl-6,7-dihydro-5H-dibenz[c,e]azepine							
	Toluene	−78	373		THF	25	157
Poly[tris(*m*-chlorophenyl)methyl methacrylate]							
DPEDA-Li/(−)-DDB	Toluene	−78	−251	Helix-sense asymmetry	THF	25	220
Poly[tris(*m*-tolyl)methyl methacrylate]							
DPEDA-Li/(−)-DDB	Toluene	−78	−234 ($[\alpha]_{546}$)	Helix-sense asymmetry	Chloroform	25	220

4.3. POLY(VINYL ETHERS)

Poly(benzofuran)							
$AlCl_3$/phenylalanine	Toluene	−75	24–56.7	Induced asymmetry	Benzene		169
$AlCl_3/Et_3SnCl$/(−)menthoxy-triethyltin	Toluene	−75	73.8		Benzene	18	242
Poly(α-naphthofuran)							
$2AlCl_3$/(−)-β-phenylalanine	Toluene	−75	41	Induced asymmetry	Chloroform	20	170
Poly(β-naphthofuran)							
$2AlCl_3$/(−)-β-phenylalanine	Toluene	−75	−145	Induced asymmetry	Chloroform	20	170
Poly(2-phenyl-1,3-dioxane-4,6-diyl) (Poly(benzaldehyde divinyl acetal))							
$ZnCl_2 \cdot OEt_2$/(+)-10-camphor-sulfonic acid	Toluene	0	−17.1 ($[\alpha]_{435}$)	Induced asymmetry	Chloroform	20	198
$ZnCl_2 \cdot OEt_2$/(−)-10-camphor-sulfonic acid	Toluene	0	13.7 ($[\alpha]_{435}$)		Chloroform	20	198

4.4. POLY(STYRENES)

Poly(4-iodostyrene)							
From copolymer of 3,4-*O*-cyclohexylidene-D-mannitol-1,2 : 5,6-bis-*O*-[(4-vinylphenyl)boronate] and styrene (AIBN, toluene, 60–70°C)							
			0 to −4.5 ($[\alpha]_{436}$)	Induced asymmetry	THF	30	179,180
Polystyrene							
From copolymer of 3,4-*O*-cyclohexylidene-D-mannitol-1,2 : 5,6-bis-*O*-[(4-vinylphenyl)boronate] and styrene (AIBN, toluene, 60–70°C)							
			−0.5 to −3.5 ($[\alpha]_{365}$)	Induced asymmetry	THF	30	179,180

4.5. POLY(DIENES)

Poly(3-carboxy-1-butenylene)							
From poly[1-(*d*-bornylammonium carboxylate)-1,3-butadiene] (AIBN, methanol, 50°C. See Section B. Table 1, 1.6)							
			0.2	Induced asymmetry	Methanol	25	177

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TABLE 4. *cont'd*

Polymer	Polymerization system		Polymer (P) Values			Optical activity measured		
Catalyst or initiator	Solvent	T (°C)	$[\alpha]_D$	$[M]_D$	Origin of optical activity	Solvent	T (°C)	Refs.
From poly[1-(*S*(−)α-phenylethylammonium carboxylate)-1,3-butadiene] (AIBN, methanol, 50°C. See Section B. Table 1, 1.6)								
			−4.8	−4.7		Methanol	20	178
Poly(3-carboxy-4-methyl-1-butenylene) (Poly(sorbic acid))								
Potassium persulfate/chitosan	Water	50	2.32		Induced asymmetry	Methanol	20	161
From poly[1-((−)menthyloxycarbonyl)-1,3-pentadiene] (AIBN, benzene, 50°C. See Section B. Table 1, 1.6)								
			−58.3			THF	25	190
Poly[3-(ethoxycarbonyl)-1-butenylene]								
n-BuLi/sodium 1-menthoxide	Toluene	−78	−14.0		Induced asymmetry	Benzene	RT	176
n-BuLi/sodium *d*-bornoxide	Toluene	−78	6.0			Benzene	RT	
Poly[3-(methoxycarbonyl)-1-butenylene]								
n-BuLi/sodium 1-menthoxide	Toluene	−78	−2.4		Induced asymmetry	Benzene	RT	176
n-BuLi/sodium *d*-bornoxide	Toluene	−78	2.7			Benzene	RT	
Poly(*trans*-2-methyl-1,3-pentadiene)								
γ-ray/apocholic acid	–	50	−106		Induced asymmetry	Carbon tetrachloride	20	159
γ-ray/deoxycholic acid	–	50	90			Carbon tetrachloride	20	160
Poly(*cis*-2-methyl-1,3-pentadiene)								
γ-ray/apocholic acid	–	50	−66		Induced asymmetry	Carbon tetrachloride	20	159
γ-ray/deoxycholic acid	–	50	320			Carbon tetrachloride	20	160
Poly(1,3-pentadiene)								
$Al(C_2H_5)$/(−)titanium tetramenthoxide	Benzene	0	−22.8		Induced asymmetry	Hexane	18	171
Poly(*trans*-1,3-pentadiene)								
γ-ray/apocholic acid	–	50	−6.5		Induced asymmetry	Carbon tetrachloride	20	159
γ-ray/deoxycholic acid	–	RT	0.3			Chloroform	26	158
γ-ray/*trans*,anti,*trans*,anti,*trans*-perhydrotriphenylene								
Poly(*cis*-1,3-pentadiene)	–		2.5			Chloroform	25	172
γ-ray/apocholic acid	–	50	−3.7		Induced asymmetry	Carbon tetrachloride	20	159
γ-ray/deoxycholic acid	–	RT	−21			Chloroform	26	158
4.6. POLY(ISONITRILES)								
Poly[(*tert*-butylimino)methylene]								
tris(*tert*-butyl isocyanide)[(*S*)(−)-(1-phenylethyl)amino(*tert*-butylamino)carbene]-nickel(II) perchlorate								
	Neat	RT	−28.7		Helix-sense asymmetry	Chloroform	20	207
Poly[5,8-dimethyl-6,7-bis(propoxymethyl)-quinoxaline-2,3-diyl] (Poly[1,2-diisocyano-3,6-dimethyl-4,5-bis(propoxymethyl)benzene])								
(+)oligo(5,8-di-*p*-tolylquinoxaline-2,3-diyl)/Pd(II)								
	THF	RT	−171		Helix-sense asymmetry			204
4.7. POLY(MALEIMIDES)								
Poly(*N*-benzyl maleimide)								
n-BuLi/(−)-sparteine	Toluene	0	11.3		Induced asymmetry	Chloroform or THF		181
Poly(*N*-*n*-butyl maleimide)								
n-BuLi/(−)-sparteine	Toluene	0	−7.1		Induced asymmetry	Chloroform or THF		181
Poly(*N*-sec-butyl maleimide)								
n-BuLi/(−)-sparteine	Toluene	6	−21.0		Induced asymmetry	Chloroform or THF		181

Poly(*N-tert*-butyl maleimide)							
n-BuLi/(−)-sparteine	Toluene	0	2.8	Induced asymmetry	Chloroform or THF		181
Poly(*N*-cyclohexyl maleimide)							
n-BuLi/(−)-sparteine	Toluene	0	−39.5	Induced asymmetry	Chloroform or THF		181
Poly(*N*-2-fluorenyl maleimide)							
n-BuLi/(−)-sparteine	Toluene	0	−0.4	Induced asymmetry	Chloroform or THF		181
Poly(*N*-isobutyl maleimide)							
n-BuLi/(−)-sparteine	Toluene	0	−13.4	Induced asymmetry	Chloroform or THF		181
Poly(*N*-isopropyl maleimide)							
n-BuLi/(−)-sparteine	Toluene	0	−18.7	Induced asymmetry	Chloroform or THF		181
Poly(*N*-1-naphthyl maleimide)							
n-BuLi/(−)-sparteine	Toluene	0	0.9	Induced asymmetry	Chloroform or THF		181
Poly(*N*-phenyl maleimide)							
n-BuLi/(−)-sparteine	Toluene	0	−15.4	Induced asymmetry	Chloroform or THF		181
n-BuLi/(−)-sparteine/CuI	Toluene	0	−23.7 ($[\alpha]_{435}$)		Chloroform	25	241
Poly(*N-n*-propyl maleimide)							
n-BuLi/(−)-sparteine	Toluene	0	−4.9	Induced asymmetry	Chloroform or THF		181

4.8. OTHER COMPOUNDS

Poly(methylene-1,3-cyclopentylene) (from 1,5-hexadiene)							
(+)(*S,S*)ethylene-1,2-bis(η^5-4,5,6,7-tetrahydro-1-indenyl)zirconium-1,1′-bi-2-naphtholate/methylaluminoxane							
	Toluene	RT	51.0 ($[M]_{405}$)	Induced asymmetry	Chloroform	28	239
Poly[1-(*m*-tolylsulfonyl)ethylene]							
From poly(*m*-tolyl vinyl sulfoxide) (*n*-BuLi/(−)-sparteine, toluene, −78°C. See Section B, Table 1, 1.10)							
			42	Miscellaneous			246

TABLE 5. MAIN-CHAIN ACYCLIC HETROATOM POLYMERS

Polymer	Polymerization system		Polymer (P) values			Optical activity measured		
Catalyst or initiator	Solvent	*T* (°C)	$[\alpha]_D$	$[M]_D$	Origin of optical activity	Solvent	*T* (°C)	Refs.
5.1. POLY(OXIDES) AND POLY(SULFIDES)								
Poly(chloral)								
Tetramethylammonium (−) acetyl mandelate								
	–	0–75	242–668		Helix-sense asymmetry	Film (soaked in diphenyl ether)	25	165
Lithium coprostan-3β-oxide	Hexane	<58	2970			Film (soaked in diphenyl ether)	RT	247
Poly(oxy-1,2-cyclohexylidene)								
$ZnEt_2$/(1*S*,2*R*)-ephedrine	–	80	−9.1 to 12.3		Induced asymmetry	Benzene	25	194
Poly(oxy-1,2-dimethylethylene)								
$ZnEt_2$/(1*S*,2*R*)-ephedrine	–	80	15		Induced asymmetry	Benzene	25	238
Poly(thio-1,2-cyclohexylidene)								
$ZnEt_2$/(*R,R*)-1,2-diphenyl-1,2-ethandiol								
	Toluene	RT	59		Induced asymmetry	Trichlorobenzene	25	238
Poly(thio-1,2-dimethylethylene)								
$ZnEt_2$/(*R,R*)-1,2-diphenyl-1,2-ethandiol								
	–	RT	154		Induced asymmetry	Chloroform	25	238

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TABLE 5. *cont'd*

Polymer	Polymerization system		Polymer (P) values			Optical activity measured		
Catalyst or initiator	Solvent	T (°C)	$[\alpha]_D$	$[M]_D$	Origin of optical activity	Solvent	T (°C)	Refs.
5.2. POLY(ISOCYANATES)								
Poly[(butyl)iminocarbonyl]								
(*R*)*N*-benzyl-1-phenylethylamine lithium amide	Toluene	−78	−40 ($[\alpha]_{365}$)		Helix-sense asymmetry	Chloroform	25	248
Poly[*N*-(*p*-chlorophenyl)iminocarbonyl]								
tert-BuLi/(*S*)(-)-(2-methyoxymethyl)pyrrolidine	THF	−98	377 ($[\alpha]_{365}$)		Helix-sense asymmetry	THF	25	193
Poly[*N*-(3,4-dimethylphenyl)iminocarbonyl]								
tert-BuLi/(*S*)(−)-(2-methyoxymethyl)pyrrolidine	THF	−98	569 ($[\alpha]_{365}$)		Helix-sense asymmetry	DCM	25	193
Poly[*N*-(*p*-methoxyphenyl)iminocarbonyl]								
tert-BuLi/(*S*)(−)-(2-methyoxymethyl)pyrrolidine	THF	−98	588 ($[\alpha]_{365}$)		Helix-sense asymmetry	Chloroform	25	193
Poly[*N*-(*m*-methylphenyl)iminocarbonyl]								
tert-BuLi/(*S*)(−)-(2-methyoxymethyl)pyrrolidine	THF	−98	819 ($[\alpha]_{365}$)		Helix-sense asymmetry	THF	25	193
Poly[*N*-(*p*-methylphenyl)iminocarbonyl]								
tert-BuLi/(*S*)(−)-(2-methyoxymethyl)pyrrolidine	THF	−98	748 ($[\alpha]_{365}$)		Helix-sense asymmetry	Chloroform	25	193
Poly[*N*-(1-naphthyl)iminocarbonyl]								
tert-BuLi/(*S*)(−)-(2-methyoxymethyl)pyrrolidine	THF	−98	529 ($[\alpha]_{365}$)		Helix-sense asymmetry	DCM	25	193
Poly[(4-phenylbutyl)iminocarbonyl]								
(*R*)*N*-benzyl-1-phenylethylamine lithium amide	Toluene	−78	−17 ($[\alpha]_{365}$)		Helix-sense asymmetry	Chloroform	25	248

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Anisotropy of Segments and Monomer Units of Polymer Molecules

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A. INTRODUCTION

Segmental anisotropy $(\alpha_1 - \alpha_2)^*$ of a chain molecule may be determined experimentally from measurements of flow birefringence in the solution of a polymer with a sufficiently high molecular weight, so that the conformation of its molecules would correspond to that of a Gaussian coil.

For calculating $(\alpha_1 - \alpha_2)^*$, Kuhn's equation was used (Ref. 1):

$$\frac{\Delta n}{\Delta \tau} = \left[\frac{\Delta n}{g(\eta - \eta_0)}\right]_{\substack{g \to 0 \\ c \to 0}} \equiv \frac{[n]}{[\eta]} = \frac{4\pi}{45kT} \times \frac{(n^2+2)^2}{n}(\alpha_1 - \alpha_2)^* \tag{A1}$$

where $\Delta\tau$ is the tangential flow stress (shearing stress), Δn is the observed flow birefringence of the solution, g is the velocity gradient, c and η are the concentration and the viscosity of the solution, respectively, $[\eta]$ and $[n]$ are intrinsic values of viscosity and flow birefringence of the solution, and η_0 and n are the viscosity and the refractive index of the solvent. The value $\Delta n/\Delta\tau = [n]/[\eta]$ may be called the shear optical coefficient.

Another method of determining segmental anisotropy (which is seldom used) is through the measurement of stress birefringence in swollen polymers (74). The stress optical coefficient $\varepsilon = \Delta n/\Delta p$ (where Δp is the normal stress in the sample) determined experimentally is equal to $\Delta n/2\Delta\tau$ (2), where $\Delta n/\Delta\tau$ is also related to $(\alpha_1 - \alpha_2)^*$ according to Eq. (A1). Data obtained by this method are marked in the table with the symbol sw. p. (swollen polymer).

If the refractive indices of the polymer and the solvent are not equal, the experimental value of $(\alpha_1 - \alpha_2)^*$ includes not only the intrinsic segmental $(\alpha_1 - \alpha_2)$, but also a part produced by the form effect (3,4). In this case the value $\alpha_1 - \alpha_2$ may be calculated using $(\alpha_1 - \alpha_2)^*$ and the theoretical equation for macro- and micro-form effects (3,4).

For determining $\alpha_1 - \alpha_2$, it is preferable to use the "matching" solvent in which the increment of index of the polymer, dn/dc, is equal to zero

The tables give the intrinsic segmental anisotropy, $\alpha_1 - \alpha_2$, obtained directly from measurements in the "matching" solvent, as well as the $(\alpha_1 - \alpha_2)^*$ values including the form effect. The corresponding figures are marked with the symbol *.

In some of the reviewed works in which measurements were carried out in "nonmatching" solvents, the segmental anisotropy was calculated on the basis of the theory of the form effect (3,4). In these cases the figures are marked with the symbol **.

Intrinsic segmental anisotropy of the polymer chain in various solvents, even in the absence of the form effect, may differ owing to a "specific" effect of the solvent (see, e.g., poly(vinyl acetate)) (5–11). "Specific" effect may probably includes phenomena such as a change in the type of rotation of the side groups (5,6,8,12), a change in the polarizability of its bonds, and the short-range ordering of the solvent molecules (11).

Principal values which effect the intrinsic segmental anisotropy of the chain are the anisotropy of the monomer unit and the equilibrium rigidity of the chain.

The Kuhn segment with the length A is the measure of the equilibrium rigidity of the chain. If the chain adopts the conformation of the Gaussian coil, then we have $A = \langle r^2 \rangle / L$, where L is the complete length of the extended chain and $\langle r^2 \rangle$ is the mean square end-to-end distance.

Also, $a_\parallel - a_\perp$ is the difference between the polarizabilities of the monomer unit in the parallel and perpendicular directions of the chain. Values of $a_\parallel - a_\perp$ presented in the table were calculated from

$$a_\parallel - a_\perp = (\alpha_1 - \alpha_2)\lambda / A \qquad \text{(A2)}$$

where λ is the length of the monomer unit in the chain direction. For cellulose esters, $a_\parallel - a_\perp$ and correspondingly, $\alpha_1 - \alpha_2$ depend on the degrees of substitution (DS), which are also given in the table.

For heterocyclic polycondensation polymers, the term "monomer unit" means the repeat unit of the polymer chain.

Many rigid-chain polymers have been investigated in the molecular-weight range in which their molecules exhibit a conformation intermediate between the rodlike conformation and the Gaussian coil. The best model for these polymers is the wormlike chain. Under these conditions the shear optical coefficient $\Delta n / \Delta \tau$ varies with the molecular weight M of the polymer and is given by the equation (100)

$$\Delta n / \Delta \tau = B \langle \gamma_1 - \gamma_2 \rangle \langle h^4 \rangle / \langle h^2 \rangle^2 \qquad \text{(A3)}$$

where $B = (4\pi/45kT)(n^2 + 2)^2/n$, $\langle \gamma_1 - \gamma_2 \rangle$ is the mean value of the wormlike chain optical anisotropy, $\langle h^2 \rangle$ and $\langle h^4 \rangle$ are the mean square and fourth degree end-to-end distance of the wormlike chain.

For the wormlike chain, the value of $\langle \gamma_1 - \gamma_2 \rangle$ as a function of the reduced chain length $x = 2L/A$ is given by the equations

$$\langle \gamma_1 - \gamma_2 \rangle = \frac{3}{5}(\alpha_1 - \alpha_2)\frac{f_1(x)}{1 - 0.8 f_1(x)/x} \qquad \text{(A4)}$$
$$f_1(x) = 1 - (1 - e^{-x})/x$$

According to Eqs. (A3) and (A4) the limit values of $\Delta n / \Delta \tau$ for wormlike chains are as follows: at $x \to 0$, $(\Delta n/\Delta \tau)_0 = B\langle \gamma_1 - \gamma_1 \rangle x \to 0$ as for a thin rod, and at $x \to \infty$, $(\Delta n/\Delta \tau)_\infty = B(\alpha_1 - \alpha_2)$ as for a kinetically flexible Gaussian coil.

The dependence of $\Delta n / \Delta \tau$ on M for the wormlike chains given by the Eqs. (A3) and (A4) may be approximated (100,101) by a linear relationship (A5) between the inverse values $(\Delta n/\Delta \tau)^{-1}$ and M^{-1}:

$$\frac{4\pi}{45kT} \times \frac{(n^2+2)^2}{n}(\Delta n/\Delta \tau)^{-1} = (\alpha_1 - \alpha_2)^{-1} + (M_0/\Delta a) \times M^{-1} \qquad \text{(A5)}$$

where M_0 is the molecular weight of the repeat unit of the chain. If the experimental dependence of $(\Delta n/\Delta \tau)^{-1}$ on $1/M$ is plotted, the slope of the straight line obtained makes it possible to calculate $\Delta a = a_\parallel - a_\perp$, and its intercept with the ordinate gives $\alpha_1 - \alpha_2$.

B. TABLES OF ANISOTROPY OF SEGMENTS AND MONOMER UNITS OF POLYMER MOLECULES

TABLE 1. MAIN-CHAIN ACYCLIC CARBON POLYMERS

Polymer	Solvent	$(\alpha_\parallel - \alpha_\perp) \times 10^{25}$ cm^3	$(a_\parallel - a_\perp) \times 10^{25}$ cm^3	Refs.
1.1. POLY(DIENES)				
Poly(butadiene) 1,4-*cis*	Benzene, sw. p.	61.3–63	30.8	52–54
	Carbon tetrachloride, sw. p.	53.5*	31.7*	53
	sw. p.	55.2*		54
	Cyclohexane, sw. p.	57.3	33.9	53
	Toluene, sw. p.	72	42.6	53
	p-Xylene, sw. p.	86.9	51.4	53

TABLE 1. *cont'd*

Polymer	Solvent	$(\alpha_{\parallel} - \alpha_{\perp}) \times 10^{25}$ cm^3	$(a_{\parallel} - a_{\perp}) \times 10^{25}$ cm^3	Refs.
Poly(butadiene) 1,4-*trans*	Benzene	71	37.4	52
	sw. p.	70.4		53
	Carbon tetrachloride, sw. p.	58.1*		55
	sw. p.	61.1*	36.3*	53
	Cyclohexane, sw. p.	57.3	33.1*	53
	Toluene, sw. p.	81.6	48.6	53
	p-Xylene, sw. p.	101	60.2	53
Poly(chloroprene)	α-Bromonaphthalene	110*		11
	Carbon tetrachloride	33		11
	Chlorobenzene	64		11
	Dichloroethane	39		11
	α-Methylnaphthalene	99*		11
	Tetrachloroethylene	46		11
	Toluene	67		11
	p-Xylene	88		11
Poly(isoprene) *cis*	Benzene	48	30.5	52
	Squalene, sw. p.	53.1		56
trans	Benzene	49	31	52
1.2. POLY(ALKENES)				
Poly(1-butene) atactic	Toluene	33.4		13
isotactic	Toluene	25.2		13
Poly(1-decene) isotactic	Toluene	−82.5		13
Poly(1-dodecene)	Toluene	−120		13
Poly(ethylene)	Tetralin, xylene	60		14
	Decalin	30		14
Poly(1-heptene) isotactic	Toluene	−24.5		13
Poly(1-hexadecene) isotactic	Toluene	−205 to −213		13
Poly(1-hexene) atactic	Toluene	12.1		13
isotactic	Toluene	−6.5		13
Poly(isobutene)	Benzene, chlorobenzene, tetrachloroethylene, *m*-xylene	45–59		11,14,15
	Carbon tetrachloride	35		11
	Decalin	30		14
	p-Xylene	69		11
Poly(1-octadecene) isotactic	Toluene	−257		13
Poly(1-octene) isotactic	Toluene	−39		13
Poly(1-pentene) isotactic	Toluene	8.0		13
		9.3		13
Poly(diphenylpropylene)	Bromoform	80		16
Poly(propylene) atactic	Benzene, xylene	45		14
	Carbon tetrachloride	30	3.5	17
	Decalin	30		14
	Toluene	55		13
isotactic	Carbon tetrachloride	30	3.5	17
Poly(1-tetradecene) isotactic	Toluene	−176		13
		−171		13
1.3. POLY(ACRYLIC ACID) AND DERIVATIVES				
Poly(acrylic acid)	Dioxane	~−0.5**	~−0.1**	18
–, sodium salt	0.0012 M Nacl, pH 7	20**		
	Water, pH 6.1	−4** to +10**		19
Poly(*n*-butyl acrylate)	Benzene	−11	−1.5	20
	Decalin	−17.8	−1.9	21
	Toluene	−10.1	−1.1	21
		−6.5	−0.9	20
Poly(cetyl acrylate)	Decalin	−141	−6.5	22
	Toluene	−164	−7.5	21
Poly(cholesteryl acrylate)	Benzene	−360	−16	23

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TABLE 1. *cont'd*

Polymer	Solvent	$(\alpha_{\parallel} - \alpha_{\perp}) \times 10^{25}$ cm^3	$(a_{\parallel} - a_{\perp}) \times 10^{25}$ cm^3	Refs.
Poly(decyl acrylate)	Decalin	−74	−3.7	21
	Toluene	−95	−4.7	21
Poly(ethyl acrylate)	Benzene, sw. p.	3.0	0.36	24
	Bromobenzene, sw. p.	10 **	1.2**	24
	Bromoform, sw. p.	−37 **	4.5**	24
	Dibromoethane, sw. p.	−14 **	−1.7**	24
	Dimethylformamide, sw. p.	−11 **	−1.7**	24
Poly(methyl acrylate)	Benzene	17	2.5	20
	Toluene	16	1.9	21
		26	3.6	20
Poly(octadecyl acrylate)	Decalin	−190	−6.6	21
	Toluene	−232	−8.0	21
Poly(octyl acrylate)	Decalin	−57.4	−4.3	21
	Toluene	−47.9	−3.6	21

1.4. POLY(METHACRYLIC ACID) AND DERIVATIVES

Poly(*n*-butyl methacrylate) atactic	Benzene	−14	−2.1	25
isotactic	Benzene	−2.0	−0.3	26
Poly(*tert*-butyl methacrylate) atactic	Benzene	2.1	0.3	20
isotactic	Benzene	19.3	3.0	20
Poly(*p*-*tert*-butylphenyl methacrylate)	Bromobenzene	−90	−7.5	22,28
Poly(*p*-carbethoxy-*N*-phenylmethacrylamide)	*o*-Toluidine	−230	−23	40
Poly(*p*-carboxyphenyl methacrylate)	Dioxane	180 *	8.0*	35
	0.1 M NaCl	370 *		35
Poly(cetyl methacrylate)	Benzene	−160	−8.9	29
Poly(*p*-chloro-*N*-phenylmethacrylamide)	*o*-Toluidine	−160	−20	40
Poly(glycol methacrylate)	Dimethylformamide	1.0	0.18	30
	Ethyl alcohol	−6.0**	−1.1**	30
	Water	−6.0**	−1.1**	30
Poly(hexyl methacrylate)	Benzene	−40	−4.6	31
	Carbon tetrachloride	−9.7	−1.1	31
Poly(methacrylic acid)	Methanol	50 *		32
	0.002 M HCl	150 *		32
–, sodium salt	0.012 M NaCl, pH 7	150 *		33
	0.0012 M NaCl, pH 7	400		33
	Water	56 *–300 *		34
Poly(*p*-methylcarboxy-phenyl methacrylate)	Dibromoethane	−77	−7	35
Poly(methyl methacrylate) atactic	Benzene	2.0	0.3	38
isotactic	Benzene	25	3.5	38
Poly(β-naphthyl methacrylate)	Tetrabromoethane	−60	−8.5	4
Poly(octyl methacrylate)	Benzene	−47	−5.9	31
	Carbon tetrachloride	−12.5	−1.6	31
Poly(*N*-phenylmethacrylamide)	*o*-Toluidine	−103	−13	40
Poly(phenyl methacrylate)	Bromobenzene	−10.5	−1.5	4

1.5. POLY(ACRYLIC ACID) DERIVATIVES WITH MESOGENIC SIDE GROUPS

R =	Tetrachloroethane	−520*	100
	Tetrachloroethane	−520*	100

TABLE 1. *cont'd*

Polymer	Solvent	$(\alpha_{\parallel} - \alpha_{\perp}) \times 10^{25}$ cm^3	$(a_{\parallel} - a_{\perp}) \times 10^{25}$ cm^3	Refs.
	Tetrachloroethane	−630*		100
	Tetrachloroethane	−810*		100
	Tetrachloroethane	−800*		100
	Tetrachloroethane	−450*	−19*	100,102
	Tetrachloroethane	−510*	−21	100,102
	Benzene	−300*	−15*	100,103

1.6. POLY(METHACRYLIC ACID) DERIVATIVES WITH MESOGENIC SIDE GROUPS

R =	Carbon tetrachloride	−445*	−18*	100,105
	Dimethylformamide	−240*		100,106
	Tetrachloroethane	−500*		100
	Dimethylformamide/ toluene (1/1)	−320*		36,100
	Benzene	−370*		100,107
	Dioxane	−1200*		100,106
	Carbon tetrachloride	−600*	−40*	100,108
	Carbon tetrachloride	−2700*	−110*	100,109
	Carbon tetrachloride	−2350*		100

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TABLE 1. *cont'd*

Polymer	Solvent	$(\alpha_{\parallel} - \alpha_{\perp}) \times 10^{25}$ cm^3	$(a_{\parallel} - a_{\perp})$ 10^{25} cm^3	Refs.
	Benzene	−1600*		36
	Bromoform	−1000*	−40*	36
	Chloroform	−1400*		36
	Carbon tetrachloride	−2700*	−110*	37,100
	Tetrahydrofuran	−890*		36
	Benzene/heptene (52/48), (66/34)	−4200*		36
Copolymer with cetylmethacrylate				
mol% 70/30	Carbon tetrachloride	−1050*	−44*	100,93
50/50	Carbon tetrachloride	−680*	−28*	100,93
	Benzene	−3000*	−150*	100,111
	Chloroform	−4900*	−100*	100,111
	Carbon tetrachloride	−117*		100,109
	Dioxane	−90*		100,109
	Tetrachloromethane	−180*		153
		−250*		153

1.7. VINYL POLYMERS

Poly(acrylonitrile)	Dimethylformamide	−23	−1.8	4
Poly(*p*-chlorostyrene)	Bromoform	−230	−35	41
Poly(2,5-dichlorostyrene)	Bromoform	−265	−30	41
Poly(3,4-dichlorostyrene)	Tetrabromoethane	−300	−25	15
Poly(α-methylstyrene)	Tetrabromoethane	−133	−17	128
Poly(*p*-methylstyrene) atactic	Bromoform	−147	−20	42
isotactic	Bromoform	−140	−19	42
Poly(2,5-dimethylstyrene)	Bromoform	−180	−25	41
Poly(2-methyl-5-vinyl-*N*-butylpyridinium bromide)	0.01 M NaCl	−900*		43
	0.1 M NaCl	−270*		43
Poly(2-methyl-5-vinyl-pyridine)	Bromoform	−260	−29	44
Poly(2-methyl-5-vinyl-pyridinium chloride)	0.1 M HCl	−300*		45
Poly(styrene) atactic	Bromoform	−145	−18	46,41
isotactic	Bromoform	−224	−23	46
Poly(vinyl acetate)	Acetone	−20**	−5.3**	7
	sw. p.	−37**	−5.3**	10
	Benzene	4.0–5.9	0.5 to 0.8	6,8,9,11
	sw. p.	5.1**	0.75**	10
	Bromobenzene, sw. p.	9.4**	1.3**	10
	Bromoform	−20**		7
	sw. p.	−18.7**	−2.7**	10
	Carbon tetrachloride	−16	−2.0	9,11
		−26		6
	sw. p.	−25.2	−3.6	10
	Chlorobenzene	14**	1.75**	11
	Chloroform	−34.9**	−2.6**	6
		−24	−3.0	9,11
	sw. p.	−17.9		10
	Cyclohexanone	−23	−2.9	9,11
	Dichloroethane	−36	−4.5	11
		−39	−4.9	11

TABLE 1. *cont'd*

Polymer	Solvent	$(\alpha_{\parallel} - \alpha_{\perp}) \times 10^{25}$ cm^3	$(a_{\parallel} - a_{\perp}) \times 10^{25}$ cm^3	Refs.
	Tetrabromoethane	−25 **	−3.1 **	11
		−33 **		7
	sw. p.	−46.4 **	−6.6 **	10
	Toluene	10	1.25	9,11
		13.5	2.0	8
		19		6
	sw. p.	9.4 **	1.3 **	10
	o-Xylene	2.0	0.25	9,11
	sw. p.	9.8 **	1.4 **	10
Poly(vinyl butyral)	Chloroform	81		11,47
	Toluene/phenol (79/21)	173		11,47
Poly(vinyl butyrate)	Benzene	−8.0		11,47
	Carbon tetrachloride	−36		11,47
	Chloroform	−48		11,47
Poly(vinyl chloride)	Tetrahydrofuran	40		48
Poly(vinyl cinnamate)	Bromoform	−420	−35	49
Poly(β-vinylnaphthalene)	Tetrabromoethane	−430	−30	4
	Bromoform	−440	−20 to −30	39
Poly(vinyl propionate)	Benzene	−4.4		11,47
	Carbon tetrachloride	−31		11,47
	Chloroform	−40		11,47
	Toluene	1.3		11,47
Poly(4-vinylpyridine)	Bromoform	−240	−22	50
Poly(4-vinylpyridinium chloride)	0.1 M HCl	−260 *		50
	0.05 M HCl	−440 *		50
Poly(vinylpyrrolidone)	Benzyl alcohol	−75	−10	4
Poly(vinyl stearate)	Carbon tetrachloride	−130	−4.7	51

1.8. POLY(VINYL) DERIVATIVES WITH MESOGENIC SIDE GROUPS

Poly[4-(4-nonyloxy-benzamido)styrene]	Benzene	−2500 *	−100 *	100,104

1.9. COPOLYMERS, GRAFT AND BLOCK COPOLYMERS

Poly(acryl amide-*co*-methacrylic acid ether)

$R = -C_2H_5$; $X^- = -Cl^-$

n mol% = 0	0.001 M NaCl	2.5 *	157
6		15	
30		35 *	
69		90 *	
80		80 *	
100	Water	40 *	
Poly(*p*-(4-cetoxybenzoxy)-phenyl methacrylate-*co*-cetyl methacrylate)	Carbon tetrachloride		93
mol% 81/19		−2000 *	
60/40		−920 *	
59/41		540 *	
22/78		−400 *	
15/85		−277 *	
8/92		−180 *	
4/96		−16 *	

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TABLE 1. *cont'd*

Polymer	Solvent	$(\alpha_{\parallel} - \alpha_{\perp})$ $\times 10^{25}$ cm^3	$(a_{\parallel} - a_{\perp})$ $\times 10^{25}$ cm^3	Refs.
Poly(methyl methacrylate-*co*-*p*-*tert*-butylphenyl methacrylate) mol% 91/9	Chlorobenzene	1.5		94
80/29		−7.4		
50/50		−30.4		
25/75		−44		
Poly(phenylbutyl isocyanate-*co*-chloral) mol% 50/50	Carbon tetrachloride	12 *		60
Poly(styrene-*co*-chlorostyrene) mol% 89.7/10.3	Bromoform	−165		95
83.2/16.8		−172		
68.7/31.3		−198		
55/45		−202		
39.5/60.5		−226		
Poly(styrene-*co*-*N*-methylcitraconimide) mol% 54/46	Bromoform	−26		63
48/52		−34		
Poly(styrene-*co*-methyl methacrylate) mol% 70/30	Bromobenzene	−88		96
50/50		−68		
30/70	Chlorobenzene	−34		
Poly(styrene-*block*-propylene), atactic mol% 64/36	Chlorobenzene	−8		97
Poly(*n*-butyl methacrylate-*graft*-styrene) mol% 8/92	Bromoform	1190		98
Poly(*tert*-butyl methacrylate-*graft*-styrene) mol% 8/92	Bromoform	540		98
Poly(methyl methacrylate-graft-styrene) mol% 10/90	Bromoform	700–7000		98,99
87/13		30		98
(70–90)/(30–10)		100–1100		16
Poly(propylene-*graft*-atactic styrene) mol% 30/70	Chlorobenzene	22		93
Poly(vinyl chloride-*graft*-styrene) wt.% 5.2/94.8	Benzene	330		48
5.6/94.4		180		
12.1/87.9		155		
30.7/69.3		110		

TABLE 2. MAIN-CHAIN CARBOCYCLIC POLYMERS

Polymer	Solvent	$(\alpha_{\parallel} - \alpha_{\perp})$ $\times 10^{25}$ cm^3	$(a_{\parallel} - a_{\perp})$ $\times 10^{25}$ cm^3	Refs.
Poly(acenaphthylene) helix 4_1	Bromoform	−300 **	−13.6 **	39
trans	Bromoform	−300 **	−20 **	39
Poly(1,2,3-trimethyl-2,3-dihydro-1,6-indendiyl)	Bromoform	78		92
Poly(1,2,3-trimethyl-2,3-dihydro-1,6-indendiyl-1,4-phenylene-ethylene)	Bromoform	142		92

TABLE 3. MAIN-CHAIN HETEROATOM POLYMERS

Polymer	Solvent	$(\alpha_{\parallel} - \alpha_{\perp})$ $\times 10^{25}$ cm^3	$(a_{\parallel} - a_{\perp})$ $\times 10^{25}$ cm^3	Refs.
3.1. POLY(OXIDES)				
Poly(oxypropylene)	Cyclohexanone	18	6	57
3.2. POLY(ESTERS)				
Poly(oxycarbonyloxy-1,4-phenylene-cyclohexylidene-1,4-phenylene)	Bromoform	−114	−76	58
Poly(oxyethyleneoxyterephthaloyl)	Dichloroethane/phenol (1/1)	70		59
	Dichloroacetic acid	48.7 *	33.7 *	89

TABLE 3. *cont'd*

Polymer	Solvent	$(\alpha_{\parallel} - \alpha_{\perp}) \times 10^{25}$ cm^3	$(a_{\parallel} - a_{\perp}) \times 10^{25}$ cm^3	Refs.
Poly(oxy-*n*-methyleneoxycarbonyl-1,4-phenylene-oxyterephthaloyloxy-1,4-phenylene-carbonyl)				
$n = 4$	Dichloroacetic acid	280 *		89
$n = 5$	Dichloroacetic acid	250 *		89
$n = 10$	Dichloroacetic acid	200 *	132*–165*	89
Poly[1,4-phenylene (phenylterephthalate)]				
	Dichloroacetic acid	1800 *		158
	Tetrachloroethane	1800 *		158
Poly[(phenyl(1,4-phenylene)-terephthalate]				
	Dichloroacetic acid	3000 *		159
	Dichloroacetic acid	1600 *		160
	Dioxane	1600 *		160
	Dichloroacetic acid	600 *		161
	Dichloroacetic acid	18.2*		162
R =	Dioxane	375*		163
—$(CH_2)_6$—	Dioxane	185*		163
	Tetrachloroethane	153*	315 *	164
$m = 2$, R =	Tetrachloroethane	150*	136 *	165
$m = 6$, R =	Tetrachloroethane	200*	365	166

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TABLE 3. *cont'd*

Polymer	Solvent	$(\alpha_{\parallel}-\alpha_{\perp})$ $\times 10^{25}$ cm^3	$(a_{\parallel}-a_{\perp})$ $\times 10^{25}$ cm^3	Refs.
$m = 6$, R =	Dioxane	260*	513*	167
$n = 2$	Tetrachloroethane	186*		168
$n = 9$	Chloroform	270*		168
	Dioxane	254*		168
	Tetrachloroethane	256*		168
$n =$ 3	Dichloroacetic acid	268*		169
4	Trifluoroacetic acid	594*		
5	Tetrachloroethane	221*		
	Trifluoroacetic acid	396*		
6	Tetrachloroethane	249*		
7	Tetrachloroethane	187*		
8	Tetrachloroethane	179*		
9	Tetrachloroethane	188*		
10	Tetrachloroethane	196*		
R =	Tetrachloroethane	380*		170
	Tetrachloroethane	228*		170
	Tetrachloroethane	57.5*		170
	Tetrachloroethane	259*	144*	171
	Tetrachloroethane	139*	146*	171
	Tetrachloroethane	353*	196*	171
	Dichloroacetic acid	2120*		172

TABLE 3. *cont'd*

Polymer	Solvent	$(\alpha_{\parallel} - \alpha_{\perp}) \times 10^{25}$ cm^3	$(a_{\parallel} - a_{\perp}) \times 10^{25}$ cm^3	Refs.
N T D				
N : T : D (mol%) = 0 : 1 : 1	Tetrachloroethane	229*		91
0.1 : 1 : 0.9		250*		
0.2 : 1 : 0.8		335*		
0.3 : 1 : 0.7		410*		
0.4 : 1 : 0.6		510*		
0.5 : 1 : 0.5		630*		
0.6 : 1 : 0.4		740*		
0.7 : 1 : 0.3		1100*	280*	91
3.3. POLY(AMIDES)				
Poly(*n*-butyliminocarbonyl) (Poly(butylisocyanate))	Carbon tetrachloride	4100	11	60,100
	Carbon tetrachloride/ pentafluorophenol (0.9/0.1)	800	11	100
Poly(chlorohexyliminocarbonyl)	Carbon tetrachloride	3000		60
Poly(hydrazocarbonyl-1,4-phenylene iminoterephthaloyl)	Dimethylsulfoxide	3630*	85*	100,123
Poly(iminocarbonyl-cyclohexylene)	Sulfuric acid	390*		100,115
Poly(iminocarbonyl-1,4-phenylene)	Sulfuric acid	10500*	103*	100,117,118
Poly[imino-(4,6-dicarboxyisophthaloyl -imino) biphenyl-4,4′-diyl]	Dimethylacetamide	75*		100
Poly[imino (1-oxohexamethylene)] (Poly(ε-caprolactam))	Sulfuric acid	63*		100,115
Poly[imino-1,4-phenyleneimino-(4,6-dicarboxyisophthaloylimino)-1,4-phenyleneimino-terephthaloyl]	Dimethylacetamide	88*		100
Poly(imino-1,3-phenyleneiminoisophthaloyl)	Sulfuric acid	360*	100*	100,121,122
Poly(imino-1,4-phenyleneiminoterephthaloyl)	Sulfuric acid	5250*	206*	100,119,120
Poly(imino-1,4-phenyleneimino-terephthaloyl), copolymer with poly(iminocarbonyl-1,4-phenylene) (ratio 1/9)	Sulfuric acid	4380*		110,119
Poly(iminio-terephthaloylimino-1,4-phenylenediphenylmethyl-1,4-phenylene)	Sulfuric acid	130*		100,127
Poly(*n*-tolyliminocarbonyl)	Bromoform	−39	−5	60,100
3.4. POLY(PEPTIDES) AND NUCLEIC ACIDS				
Poly(γ-benzyl-L-glutamate) helix	Dichloroethane	25000*	25*	86,87,100
coil	Dichloroacetic acid	230*	25*	88,100
Poly(*S*-carbobenzoxymethyl-L-cystein)	Dichloroacetic acid	22*		86
Poly(ε,*N*-carbobenzoxy-L-lysine) helix	Dimethylformamide	3600*	12*	86
coil	Dichloroacetic acid	<+		86
Poly(L-glutamic acid)	Phosphate buffer			
helix	0.1 M, pH 4.2	1900*		86
coil	0.1 M, pH 12.5	136*		86
DNA	aqueous 0.2 M NaCl	−30000*	−67*	100
	<2 M NaCl	−33000*		154,157
	>3 M NaCl	−41000*		154,157
3.5. POLY(PHOSPHAZENES)				
Poly(fluoroalkoxy phosphazene)				
$-PR_2=N-$				
R = $-OCH_2-CF_3$	Ethyl acetate	160		155
$-OCH_2-(CF_2)_2-H$	Ethyl acetate	145		156
$-OCH_2-(CF_2)_4-H$	Ethyl acetate	106		156

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TABLE 3. *cont'd*

Polymer	Solvent	$(\alpha_{\parallel} - \alpha_{\perp}) \times 10^{25}$ cm^3	$(a_{\parallel} - a_{\perp}) \times 10^{25}$ cm^3	Refs.
3.6. POLY(SILOXANES)				
Poly(oxydimethylsilylene)	Petroleum ether	4.7	0.96	77
Poly(oxyethylphenylsilylene) 14 : 86	Benzene	– 230 *	– 29.5	173
Poly(oxymethylphenylsilylene) 90 : 10	Petroleum ether	– 2.3	– 0.47	77
87.5 : 12.5	Decalin	– 10	– 2.0	78
75 : 25	Benzene	– 13.6	– 2.7	79
	Decalin	– 21	– 4.0	78
62.5 : 37.5	Decalin	– 36 **	– 7.2**	78
50 : 50 atactic	Benzene	– 25.5	– 5.1	79
	Decalin, tetralin	– 52 **	– 10 **	78
isotactic	Decalin, tetralin	– 82 **	– 16 **	78
Poly(oxyphenylsilylene)	Benzene	– 85	– 17	79
LADDER POLYMERS				
Poly(isobutylphenyl-silsesquioxane) (1 : 1)	Benzene	– 840	– 22	80,100
Poly(isohexylphenyl-silsesquioxane) (1 : 1)	Benzene	– 980	– 19.5	80,100
Poly(*m*-chlorophenyl-silsesquioxane)	Carbon tetrachloride	– 4700 *	– 40 *	100,80
Poly(dichlorophenyl-silsesquioxane)	Bromoform	– 4450	– 50	100,112
	Tetrabromoethane	– 4700	– 53	100,112
Poly(3-methyl-1-butene-silsesquioxane)	Benzene	– 570 *	– 6.5*	81,100
	Butylacetate	– 400 *	– 4.2*	81,82,100
Poly(phenyl-silsesquioxane)	Bromoform	– 1060 to – 1800	– 23 to – 31	83–85, 100

TABLE 4. MAIN-CHAIN HETEROCYCLIC POLYMERS

Polymer	Solvent	$(\alpha_{\parallel} - \alpha_{\perp}) \times 10^{25}$ cm^3	$a_{\parallel} - a_{\perp} \times 10^{25}$ cm^3	Refs.
4.1. POLY(IMIDES)				
Poly(*N*-2,4-dimethylphenylmaleimide)	Bromoform	– 200	– 12.5	61,100
Poly(*N*-isobutylmaleimide)	Chlorobenzene	160	10	62,100
Poly(*N*-methylcitraconimide)	Bromoform	150	16.7	63
Poly(*N*,*N*-piperazindiyl-2,5-diketo-1,3-pyrrolidindiyl-	Benzyl alcohol	56	31	64
hexamethylene-2,5-diketo-1,3-pyrrolidindiyl)	Bromoform/cyclohexanol (60 : 40)	30		64
Poly(*p*-tolylmaleimide)	Bromoform	– 160	– 10	65
	H_2SO_4, 101%	500 *	50 *	110
4.2. POLY(PYRROMELLITIMIDES)				
Poly[1,3,5,7-tetraoxo-2,3,6,7-tetrahydro-1H,5H-benzo-[1,2-c,4,5-c′ dipyrrol-2,6-diyl)-1,4-phenylene]	H_2SO_4	2500*–4400*		100
Poly[(1,3,5,7-tetraoxo-2,3,6,7-tetrahydro-1H,5H-benzo [1,2-c,4,5-c′ dipyrrol-2,6-diyl)-1,4-phenyleneimino-terephthaloyl-imino-1,4-phenylene]				
	H_2SO_4	3400 *		100

TABLE 4. *cont'd*

Polymer	Solvent	$(\alpha_{\parallel} - \alpha_{\perp}) \times 10^{25}$ cm^3	$(a_{\parallel} - a_{\perp}) \times 10^{25}$ cm^3	Refs.
4.3. POLY(QUINOXALINES)				
R_1 = nought, R_2 =	Tetrachloroethane, chloroform	1750*		100,116
R_1 = nought, R_2 =	Tetrachloroethane, chloroform	1060*		100,116
R_1 = —O—, R_2 =	Tetrachloroethane, chloroform	650*		100,116
4.4. POLY(BENZIMIDAZOLES), POLY(BENZOXAZOLES)				
Poly(benzimidazole-2,6-diyl-iminoterephthaloylimino-1,4-phenylene)				
	H_2SO_4	5080*	360*	100,124
R_1 = , R_2 =	H_2SO_4 H_2SO_4	4900* 3625*		100 150
R_1 = , R_2 =	H_2SO_4	1250*		150
R_1 = , R_2 =	H_2SO_4	1250*		150
R_1 = , R_2 =	H_2SO_4	750*		150
Poly(benzoxazole-2,6-diyl-iminoterephthaloyliminio-1,4-phenylene)				
	H_2SO_4	5940*	360*	100,125
Poly(benzoxazole-2,6-diyl-iminoterephthaloylimino-1,4-(3-hydroxyphenylene))				
	H_2SO_4	5940*	320*	100,126
Poly(benzoxazole-2,4-diyl-iminoterephtaloylimino-1,3-(4-hydroxyphenylene))	H_2SO_4	2340*	300*	100,126
Poly(benzoxazole-2,6-diyl-iminocarboxy-1,4-phenylene-iminoterephthaloylimino-1,4-phenylene-carboxyimino-1,4-phenylene)				
	H_2SO_4	4100*		152
Poly(oxadiazole-2,5-diyl-1,4-phenylene)				
	H_2SO_4	1750*	80*	100,114

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TABLE 4. *cont'd*

Polymer	Solvent	$(\alpha_{\parallel} - \alpha_{\perp}) \times 10^{25}$ cm^3	$(a_{\parallel} - a_{\perp}) \times 10^{25}$ cm^3	Refs.
4.5. POLY(SACCHARIDES)				
CELLULOSE ESTERS				
Benzyl cellulose, DS = 2.5	Dioxane	294*	5*	67,100
Carboxymethyl cellulose, DS = 0.9	Cadoxene	310*		147
	2 M NaOH	450*		147
	0.5 M NaOH	560*		147
Cellulose acetate, DS = 2.4	Aniline	260*	5.3*	136
	Dioxane	39*	0.78*	136
	Pyridine	0	0	100
	Trichloromethane	−8.4*	−0.21*	136
	Tetrachloroethane	−57*	−1.6*	136
Cellulose acetate benzoate, DS = 55/245	Dioxane	−1330*	−26.6*	137
Cellulose acetate benzhydroxamate, DS = 15/285	Dioxane	−870*	−17.4*	137
60/240	Dioxane	−575*	−11.5*	137
90/170	Dioxane	−350*	−7*	137
Cellulose acetate cinnamate, DS = 60/200	Dioxane	−1900*	−38*	137,138
160/140	Dioxane	−1300*	−26*	137,138
250/50	Dioxane	−450*	−9*	137,138
Cellulose acetate diphenylacetate, DS = 10/290	Dioxane	1280*	25.6*	137,138
40/150	Dioxane	1200*	24.0*	137,138
20/130	Dioxane	1345*	26.9*	137,138
130/115	Dioxane	1020*	20.4*	137,138
270/30	Dioxane	405*	8.1*	137,138
Cellulose acetate myristate, DS = 10/290	Benzene	−110*	−2.2*	137
	o-Dichlorobenzene	−164*	−3.1*	136
	Dichloromethane	−190*	−3.8*	136
	Trichloromethane	−210*	−4.2*	136
	Tetrachloromethane	−223*	−4.5*	136
	Pentachloroethane	−194*	−4.5*	136
	para-Chlorotoluene	−171*	−3.6*	136
	α-Bromonapthaline	142*	3.6*	136
DS = 25/275	Tetrachloromethane	−228*	−4.6*	136
50/250	Tetrachloromethane	−217*	−4.3*	136
100/200	Tetrachloromethane	−240*	−4.8*	136
150/150	Dioxane	−72*	−1.4*	136
	Tetrachloroethane	−150*	−4.3*	136
200/100	Tetrachloroethane	−100*	−3.0*	136
245/55	Tetrachloroethane	−66*	−1.8*	136
290/10	Tetrachloroethane	−25*	−0.6*	136
Cellulose acetate monophenylacetate, DS = 40/260	Dioxane	365*	7.3*	137
100/150	Dioxane	250*	5.0*	137
200/70	Dioxane	90*	1.8*	137
246/32	Dioxane	50*	1.0*	137
285/5	Dioxane	65*	1.3*	137
Cellulose acetate α-naphthylacetate, DS = 250/50	Dioxane	70*	1.4*	137
275/25	Dioxane	70*	1.4*	137
290/10	Dioxane	55*	1.1*	137
Cellulose acetate nitrobenzoate, DS = 275/25	Dioxane	−115*	−2.3*	137
Cellulose acetate triphenylmethylate, DS = 110/145	Dioxane	1100*	22*	137
Cellulose benzoate, DS = 3.0	Dimethylformamide	−617*	−10.4*	66,100
	Chloroform	−763*	−16.4*	66,100
	Bromobenzene	−914*	−19.6*	66,100
	Dimethylphthalate	−830*	−17.8*	66,100
	Dioxane	−447*	67	
2.16	Dioxane	−1350*	−27*	137
Cellulose butyrate, DS = 3.0	Tetrachloroethane	−34	−2.6	72,100
	Bromoform	35*	2.7*	72,100
	Dioxane	61*	1.0*	67
	Methyl ethyl ketone	144*	5.6*	72,100
2.75	Dioxane	90*	1.8*	136
	Trichloromethane	<|1|*	<|0.03|	136
	Tetrachloroethane	−47.3*	−1.6*	136

TABLE 4. *cont'd*

Polymer	Solvent	$(\alpha_{\parallel} - \alpha_{\perp}) \times 10^{25}$ cm^3	$(a_{\parallel} - a_{\perp}) \times 10^{25}$ cm^3	Refs.
Cellulose dimethylphosphonocarbamate	0.01 M NaCl	710 *	16 *	68
DS = 2.0	0.2 M NaCl	640 *	16 *	68
Cellulose diphenylacetate	Acetophenone	1360	22	69
	Dioxane	1030 *	22 *	67
DS = 2.9	Dioxane	1760 *	35.2*	137,138
Cellulose diphenylphosphonocarbamate DS = 2.2	Dioxane	626 *–640	10*– 13.7*	100,129
Cellulose hydroxypropylacetate, DS = 3.3, 2.3	Tetrachloroethane	400	12	144,145
Cellulose hydroxypropylbutyrate, DS = 3.3, 2.2	Tetrachloroethane	270	8.3	145,146
DS = 3.3, 0.6	Tetrachloroethane	490	12	145,146
Cellulose hydroxypropylcaprinate, DS = 3.3, 2.0	Tetrachloroethane	230		145
Cellulose hydroxypropylstearate, DS = 3.3, 0.9	Tetrachloroethane	230		145
Cellulose monophenylacetate	Bromobenzene	600	13	100,129
DS = 2.8	Bromoform	478	10.3	100,129
Cellulose nitrate, DS = 2.8	Cyclohexanone	– 820	– 14	70,100
2.7	Cyclohexanone	– 540	– 9.0	100,130
	Amyl acetate	– 320 *	– 5.4*	100,130
	Acetone	– 115 *	– 1.9*	100,130
	Butyl acetate	– 300 *	– 5.0*	100,130
	Ethyl acetate	– 140 *	– 2.3*	100,130
2.3	Cyclohexanone	– 330	– 8.4	100,131
1.9	Cyclohexanone	– 62	– 2.0	100,132
	Dioxane	149	4.8	100,132
Cellulose phenylcarbamate	Acetophenone	– 1100	– 18	69
DS = 3.0	Benzophenone 55°	– 742		71
	80°	– 572		71
	Dioxane 21°	– 1830 *	– 45.8*	100,134
	65°	– 872 *		100,134
	Ethyl acetate	– 560 *	– 15.2*	100,134
2.2	Dioxane	– 1880 *	– 47.0*	100,133
2.3	Dioxane	– 1700 *	– 34 *	140
	Ethyl acetate/dioxane (0.017/1)	– 1440 *	– 45 *	140
	(0.034/1)	– 1664 *	– 52 *	140
	(0.063/1)	– 1440 *	– 45 *	140
	(0.091/1)	– 1360 *	– 40 *	140
	(0.224/1)	– 1260 *	– 35 *	140
	(0.469/1)	– 962 *	– 26 *	140
2.7	Dioxane	– 2030 *	– 40 *	141
	Ethyl acetate	– 1216 *	– 32 *	141
	Cyclohexanone	– 1254 *	– 38 *	141
	Dimethylacetamide	– 1280 *	– 40 *	141
Cellulose stearate DS = 2.0	Tetrachloroethane	– 500		72
Cyanoethyl cellulose DS = 2.6	Cyclohexanone	900	17.8	100,135
2.66	Cyclohexanone	970 *		139
2.37	Cyclohexanone	715 *		139
Cyanoethylacetyl cellulose	Cyclohexanone, sw. p.	+ 15	0.4	73,74
	Acetone	390 *	17.0*	73,100
	Dimethylformamide	90	3.9	73,100
Cyanoethyl hydroxyethyl cellulose DS = 1.8	Cyclohexanone	900		148
Cyanoethyl hydroxypropyl cellulose DS = 2.4	Cyclohexanone	660		148
Cyanoethyltrityl cellulose	Cyclohexanone, sw. p.	220		74
Cyanoethyl nitrate cellulose DS = 248/26	Cyclohexanone	855 *		139,151
233/52	Cyclohexanone	890 *		139,151
181/79	Cyclohexanone	470 *		139,151
100/117	Cyclohexanone	165 *		139,151
62/192	Cyclohexanone	35 *		139,151
36/213	Cyclohexanone	– 190 *		139,151
34/226	Cyclohexanone	– 115 *		139,151
19/242	Cyclohexanone	– 190 *		139,151
Ethyl cellulose	Carbon tetrachloride	430	11	75
DS = 2.5	Dioxane	512	4.6	100,129
Hydroxypropyl cellulose, DS = 2.5–3.8	Dimethylacetamide	450 *	9.9*	142,143
	Tetrachloroethane	505	11.3	142,143
	Water		12.4*	143

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TABLE 4. *cont'd*

Polymer	Solvent	$(\alpha_{\parallel} - \alpha_{\perp})$ $\times 10^{25}$ cm^3	$(a_{\parallel} - a_{-})$ $\times 10^{25}$ cm^3	Refs.
Polymaltotriose	Dimethylsulfoxide	33 to 39	7	149
	Water	109*		149
Sulfate cellulose, sodium salt	Aqueous NaCl 0.2 M	634*	16*	76, 100
DS = 0.4	0.15 M	645*	17*	76,100
	0.10 M	680*	16*	76,100
	0.01 M	980*	16*	76,100
	0.005 M	1300*	16*	76,100
	0.001 M	1750*	16*	76,100
CHITINS				
Chitozane	Acetic acid + NaCl, IS = 0.1 to 0.5	670*		174

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Gelation Properties of Polymer Solutions

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Some polymer solutions show the phenomenon of gelation. The polymeric chains form association complexes at widely separated points at a certain reduced solvent power of the medium. This leads to the formation of a continuous physical network structure extending throughout the volume of the system. The association producing quasi-crosslinkages is a reversible process, so that the gel may be liquified and reset many times. The nature of the linkages is rather imperfectly understood, but the phenomenon is usually encountered with more or less crystalline polymers. Sometimes, sharp X-ray diffraction patterns are observed which disappear at the melting point of the gel.

The table contains data for a selected number of synthetic polymers which are capable of forming physical, thermoreversible gels with various solvents. Since no standard definition or standard measurement methods have been established for physical polymer gels, the gelation properties are taken from the references cited.

EXPLANATION OF ABBREVIATIONS USED

M_w The molecular weight of polymer refers to the weight average molecular weight unless otherwise stated.

λ The branch density of branched polymer.

S The syndiotacticity diad content in %.

T_{gel} The temperature (in degrees centigrade) at which the gel forms when the solution is cooled; the sol–gel transition temperature.

T_m The melting temperature (in degrees centigrade); the gel–sol transition temperature.

ΔH_m When DSC was used, this is the enthalpy associated with the endotherm. When other methods are used, ΔH is obtained from the van't Hoff plot.

Methods Used for the Measurement of Melting Temperature of the Gel

1. *Flow:* A U-tube in which the two limbs are joined by a capillary section is used. The gel is allowed to set with different heights in the two links and the melting point is the temperature at which flow starts from one limb to the other.
2. *Ball drop:* A steel ball with a known diameter or weight is placed on the gel and the gel warmed at a certain heating rate. The ball drops at the gel melting temperature.
3. *DSC:* Differential scanning calorimetry.
4. *Tilting:* The gel is warmed in the test tube and the melting point is observed when the gel begins to flow under its own weight when the upright test tube is tilted.

Polymer	Solvent	M_w	Conc. (g/l)	T_{gel} (°C)	T_m (°C)	ΔH_m (kJ/mol)	Method	Refs.
Poly(ethylene), low density								
$\lambda = 2.9$	Decalin	74000	50–140		54–72		Ball drop	6
$\lambda = 6.8$	Decalin	161000	40–140		58–72			
$\lambda = 5.6$	Decalin	137000	50–140		60–74			
$\lambda = 8.9$	Decalin	175000	50–140		50–67			
$\lambda = 6.8$	Toluene	161000	60–150		68–76			
$\lambda = 6.8$	*o*-Xylene	161000	50–140		67–76			
$\lambda = 6.8$		161000	50–150		68–75			
$\lambda = 6.8$	Tetralin	161000	60–140		72–78			
$\lambda = 3.1$	Cyclohexane-CS	30000	40–75		30–41			
$\lambda = 4.7$	(1/1, v/v)	65000	40–75		36–43			
$\lambda = 12.2$		222000	30–75		34–44			
$\lambda = 7.18$	Cyclohexane-CS_2	30000	65–95		40–55		Ball drop	8
$\lambda = 0$	(1/1, v/v)	10100	30–65		73–75			
$\lambda = 4.07$		15100	50–95		55–65			

Polymer	Solvent	M_w	Conc. (g/l)	T_{gel} (°C)	T_m (°C)	ΔH_m (kJ/mol)	Method	Refs.
Poly(ethylene), high density								26
	o-Dichlorobenzene	220000	120	89		129	Tilting	23
Poly(ethylene-*co*-butene-1)	Decalin	113000	50–140		86–91			
		104000	60–140		87–90.5			
		71000	50–140		83–88			
		55000	60–140		82–89			
Poly(ethylene-*co*-4-methylpentene-1)		80000	60–140		88.5–92.5			
		84000	50–120		89.5–93			
		87000	60–120		89–93			
Poly(ethylene-*co*-octene-1)		83000	50–120		91–94.5			
		119000	50–100		92–95			
		80000	60–120		91–94			
		90000	50–115		90.5–94			
Poly(propylene)	Decahydronaphthalene		50	10	97.7			10
Poly(4-methylpentene-1)	Cyclopentane		100		80		Visual observation	22
	Cyclohexane		5–100		45			
Poly(acrylonitrile)	Dimethyl sulfoxide		72		35			15
Poly(acrylonitrile-*co*-vinyl acetate)	Dimethylacetamide	200000	240–280		42–75		Flow	18
	Dimethyl sulfoxide	200000	270–320		34–46			
	Dimethylformamide	200000	290–310		56–66			
	Ethylene carbonate	200000	230–300		41–72			
	γ-Butyrolactone	200000	250–270		66–73			
Poly(cetyl acrylate)	*n*-Aliphatic alcohols							
	C = 7				28		DSC	24
	C = 8				28			
	C = 9				27			
	C = 10				26			
	C = 12				25			
	Hydrocarbons							
	C = 10				12			
	C = 12				15			
	C = 14				24			
	C = 16				26			
	n-Decane		100		17		DSC	24
			200		18			
			400		18			
			500		20			
			700		25			
			800		26			
			900		30			
	Cetane		300		30	35 (J/g)		
			500		31			
			700		32	79		
			900		34	96		
	Alcohols		100		29	8		
			200		29	12		
			300		28	21		
			400		27	29		
			500		27	38		
			600		27	46		
			700		27	50		
			800		28	59		
			900		29			
Poly(docosyl acrylate)	*n*-Aliphatic alcohols							
	C = 7				57		DSC	24
	C = 8				57			
	C = 10				56			
	C = 12				56			
Poly(octadecyl acrylate)	*n*-Aliphatic alcohols							
	C = 7				38		DSC	24
	C = 8				38			
	C = 10				37			
	C = 12				37			
	Hydrocarbons							
	C = 6				18			
	C = 8				20			
	C = 12				28			

Polymer	Solvent	M_w	Conc. (g/l)	T_{gel} (°C)	T_m (°C)	ΔH_m (kJ/mol)	Method	Refs.
Poly(methyl methacrylate)	Dimethylformamide		A very special case of gelation is observed in cosolutions of isotactic and syndiotactic PMMA.					14
Poly(vinyl acetate)	Glycerin/water (40/60)	60000	50		77	55		19
			100		89			
			200		101			
	(60/40)	60000	20		82	54		
			50		94			
			100		99			
			200		106			
	(80/20)	60000	20		96	71		
			50		101			
			100		112			
			200		123			
	Methanol/water (40/60)	60000	100		35	15		
			151		58			
			200		73			
			250		78			
	N-Methylpyrrolidone	60000	50		87.5	54		
			100		101			
			200		120			
	Formamide	60000	20		62	48		
			50		68			
			100		98			
			200		106			
Poly(vinyl alcohol)	Water		90	7			Tilting	27
			140	20				
			200	47				
			300	58				
highly syndiotactic	Phenol/water		0.6		75	58	DSC	20
$S = 65\%$			0.8		82			
			1		86			
			2		102			
			3		105			
			5		118			
57%			0.4		42	51		
			0.8		59			
			1		60			
			2		72			
			3		79			
			4		88			
			5		93			
45%		4		19	28			
			5		20			
			6.5		29			
			10		37			
			12.5		42			
Poly(vinyl chloride)	Bromobenzene	34000	100		27.3		Ball drop	2
		59000	100		48.0			
		145000	100		88.3			
		235000	100		116			
	Dichloroethane	98000	100		44			2
		145000	100		73			
		154000	80–120		42–72	13.0		
	Dimethyl phthalate	34000	100		85.5			2
		62000	100		99.0			
		145000	100		116			
		135000	100		133			
		154000	10–100		52.0–104.0	50.6		
	Dioxane	200000	100 (w/w)		50–67[a]	–		3,4
		154000	50–120		42.0–84.0	50.6		2
		56000	50–140		45–70	36		1
		103000	40–100		50–75	35		
		114200	30–100		50–80	37		
		133000	20–80		60–85	45		
		62000	100		43.5		Ball drop	2
		145000	100		79.8			
		235000	100		96.9			

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Polymer	Solvent	M_w	Conc. (g/l)	T_{gel} (°C)	T_m (°C)	ΔH_m (kJ/mol)	Method	Refs.
	Bromobenzene	154000	40–120		38.0–82.5	21.0		2
		200000	100 (w/w)		40–63[a]	90–110[b]	DSC	3,4
		56000	92		76.2	34.0		1
	1,2-Dichlorobenzene	200000	100 (w/w)		44–68[a]	87–103[b]		3,4
			100 (w/w)		55–90[a]	90–137[b]		3,4
	Nitrobenzene	200000	100 (w/w)		40–55[a]	57–75[b]		3,4
		56000	92		32.7	23.1		1
	Butanone	200000	100 (w/w)		56–76[a]	98–102[b]		3,4
		56000	92		51.0	17.2		1
	Tritolyl phosphate	200000	100 (w/w)		58–87[a]	96–142[b]		3,4
	Di-isopropyl ketone	200000	100 (w/w)		54–89[a]	89–120[b]		3,4
	Dimethyl phthalate	200000	100 (w/w)		54–74[a]	100–150[b]		3,4
	Nitrochlorobenzene		100 (w/w)		43–75[a]	116–139[b]		3,4
	Dibutyl phthalate	148000	40–70		90–105		Flow	25
		56000	92		93.7	22.3	Flow	1
	Dipentyl phthalate	148000	40–70		97–112			25
	Dihexyl phthalate	148000	40–70		101–119			
	Diheptyl phthalate	148000	40–70		107–123			
	Dinonyl phthalate	148000	50		126			
	Pentan-3-one	56000	92		46.7	10.9		1
	Dimethylformamide	56000	92		20.0			1
	Tetrachloroethane	56000	92		69.1	35.7		1
	Chlorobenzene	56000	92		78.4	61.7		1
	Methoxybenzene	56000	92		85.1	43.1		1
Poly(styrene), atactic	Carbon disulfide	2000000	5–135		−53–7	31	Tilting	13
		670000	10–140		−63–0	27		
		410000	17–170		−56 to −10	26		
		200000	20–150		−70 to −20	24		
		30000	70–190		−76 to −12	10		
		20000	90–170		−72 to −22	6		
		4000	120–180		−55 to −23	5		
	n-Amyl acetate	670000	166		−52	11.7		
	Isoamyl acetate	670000	166		−56	11.4		
	n-Butyl acetate	670000	166		−65	10.6		
	n-Propyl acetate	670000	166		−68	10.6		
	1-Chloropentane	670000	166		−76	12.2		
	1-Chlorobutane	670000	166		−79	8.0		
	1-Chloropropane	670000	166		−86	5.8		
Poly(styrene), isotactic	Decalin	190000	50		670	62	DSC	11
		670000	10	12	63		Tilting	12
	1-Chlorodecane	670000	10	25	88			
	Nitrobenzene	670000	10	−2	52			
	Aniline	670000	10	−20	5			
	Benzaldehyde	670000	10	−35	20			
Poly(oxy-2,6-dimethyl-phenylene)	1-Bromonaphthalene	25000 (M_v)		25	110		Tilting	12
	1-Chloronaphthalene	25000 (M_v)		25	86			
	Carbon disulfide	25000 (M_v)			0			
Poly(γ-benzyl L-glutamate)	Benzyl alcohol	50000 (M_v)	30		50		Ball drop	21
		80000	30		55			
		150000	30		58			
		300000	30		58			
		150000	50		55			
		150000	100		56			
		150000	200		58			
		150000	300		58.5			
		150000	400		59			
		150000	500		60			

[a] T_1 endotherm.
[b] T_2 endotherm.

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SECTION VIII

ABBREVIATIONS OF POLYMER NAMES

Abbreviations for Thermoplastics, Thermosets, Fibers, Elastomers, and Additives

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A. INTRODUCTION

Abbreviations and acronyms for the names of thermoplastics, thermosets, fibers, elastomers, and additives have been proposed by many national and international organizations. Some of these abbreviations were introduced by law, others are trademarks in certain countries. As a result, the same abbreviation is often used for different polymers. The same polymer may also have different abbreviations or acronyms. Furthermore, some abbreviations refer to chemical compounds (IUPAC) whereas abbreviations recommended by ASTM, BS, DIN, and ISO usually refer to plastics, fibers, elastomers, etc., that are *based* on the corresponding polymers, i.e., polymers plus additives, modifiers, fillers, etc.

The following tables report abbreviations either found in the scientific or technical literature or recommended or proposed by the organizations listed below. Note that * and ** are part of the recommended ASTM abbreviations and acronyms and *not* symbols for footnotes.

ANSI/ASTM	American National Standards Institute (ASTM D 1600–75; D 1600–86a; D 1418–77)
ASTM	American Society for Testing of Materials (ASTM D 1600–64; D 1600–86a; D 1418–67; D 4020–81)
BS	British Standards (Standard 3502–1862)
DIN	German Industrial Standard (DIN 7723, 7728, 16913, 55950, 60001)
EDV	Data processing key of the European Textile Characterization Law
EC	European Community
ISO	International Organization for Standardization (ISO 1043–1980, 1629–1980)
IUPAC	International Union for Pure and Applied Chemistry [*Pure Appl. Chem.*, **18**, 583 (1969); **40**, 473 (1974); **59**, 691 (1987)]
WTR	Working Group Toxicology of Rubber Auxiliaries

Section B lists, in alphabetical order, the abbreviations and acronyms for thermoplastics, thermosets, fibers, elastomers, and additives. Sections C and D list the abbreviations for polymers, based on their monomeric units and characteristic groups, respectively. Section E contains abbreviations and acronyms for polymers obtained by chemical transformation of base polymers. Section F contains special abbreviations for blends, reinforced polymers, etc., and Section G the ISO and DIN codes for plastics. Section H lists the special abbreviations connected with the recycling of plastics. Recommended abbreviations and acronyms for elastomers and fibers are given in Sections I and J, respectively.

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B. ABBREVIATIONS IN ALPHABETICAL ORDER

AB	Manila hemp fibers (Abaca) (EDV); see also Ma
ABR	Acrylate–butadiene rubber; elastomeric copolymer from an acrylic ester and butadiene (ANSI/ASTM, IUPAC); see also AR
ABS	Acrylonitrile–butadiene–styrene; a thermoplastic from acrylonitrile, butadiene and styrene (ASTM, DIN, ISO, IUPAC)
AC	Fiber from deacetylated cellulose acetate (EDV)
ACM	Elastic copolymer from an acrylic ester and a small proportion of a vulcanizable monomer, e.g., 2-chlorovinyl ether (ANSI, ASTM)
ACS	Thermoplastic blend of a copolymer from acrylonitrile and styrene with chlorinated poly(ethylene)
ACSP	Acetyl cyclohexylsulfonyl peroxide
ADA	Adipic acid
ADC	Azodicarbonamide (WTR), see also ADEC
ADCK	Activated azodicarbonamide (WTR)
ADEC	Ammonium diethyl dithiocarbamate (WTR); see also ADC
ADPA	Condensation product from acetone and diphenylamine (WTR)
AE	Aminoethyl (with cellulosics)
AES	Thermoplastic quaterpolymer from acrylonitrile, ethylene, propylene, and styrene
AF	Other fibers (i.e., those not specified by the EDV system)
AFK	Asbestos fiber reinforced plastic
AFMU	Elastomeric terpolymer from tetrafluoroethylene, trifluoronitrosomethane, and a small amount of nitrosoperfluorobutyric acid; nitroso rubber (ANSI/ASTM); see also CNR
AG	Alginate fiber (EDV)
Ag	1. Silver (IUPAC) 2. Esparto grass fiber (DIN)
AI	Amide-imide polymers
AIBN	*N,N*-Azobisisobutyronitrile
Ak	Angora wool (DIN)
AL	1. Alfalfa fibers (EDV) 2. Alginate fibers (DIN); see also AG
AMMA	Thermoplastic copolymer from acrylonitrile and methyl methacrylate (ASTM); see also A/MMA
A/MMA	See AMMA
An	Calatropis fiber (DIN)
AN	Acrylonitrile
An–AE	Elastomeric copolymer from acrylonitrile and acrylic ester; see also ANM
ANM	See AN–AE
AO	Antioxidant
Ap	Alpaca wool (DIN)
AP	Elastic copolymer from ethylene and propylene; see also APR, E/P, EPM, and EPR (older German literature)
APH	Alkylated phenol
APR	See AP
APT	Elastomeric copolymer from ethylene, propylene, and an unsaturated termonomer; see also APTK, EPD, EPDM, EPT, EPTR
APTK	Elastomeric copolymer from ethylene, propylene, and an unsaturated termonomer; see also APT, EPD, EPDM, EPT, EPTR
Aq	Anthraquinone
AR	1. Elastomeric copolymer from acrylic esters and olefins; see also ABR 2. Ardein fibers (DIN)
As	1. Arsenic (IUPAC). 2. Asbestos (DIN); see also AS
AS	Asbestos fiber (EDV); see also As
ASA	Thermoplastic copolymer from acrylonitrile, styrene, and acrylic esters (ASTM); see also A/S/A
A/S/A	Thermoplastic copolymer from acrylonitrile, styrene, and acrylic esters (DIN, ISO); see also ASA
ASE	Alkylsulfonic acid ester (ISO)
ASR	Alkylene sulfide rubber
ATE	Aluminium triethyl
ATH	Alumina trihydrate
ATO	Antimony trioxide
AU	1. Elastomeric polyurethane with polyester segments (ANSI/ASTM, ISO) 2. Polyester rubbers with carbon, oxygen, and nitrogen in the chain. Both classifications probably refer to the same type of elastomer
AU-I	AU, cross-linkable with isocyanates
AU-P	AU, cross-linkable with peroxides
BA	Condensation product of butyraldehyde and aniline (WTR)
BAA	Condensation product of butyraldehyde and aniline
BBP	Benzylbutyl phthalate (DIN, ISO)
BD	1. 1,4-Butanediol 2. Derivative of benzofuran
BDMA	Butanediol 1,4-dimethacrylate (WTR)
BDP	Butyldecyl phthalate (WTR)
BDSH	Benzene-1,3-disulfonyl hydrazide (WTR)
BFE	Bromotrifluoroethylene polymers

BFK	Boron fiber reinforced plastic (German technical literature)
BHA	Butylated hydroxyanisole; *t*-butyl-4-methoxyphenol
BHET	Bis(2-hydroxyethyl) terephthalate
BHT	Butylated hydroxytoluene; 2,6-di(*t*-butyl)-*p*-cresol
BiDMC	Bismuth dimethyl dithiocarbamate (WTR); see also BMDC
BIIR	Brominated elastomer from isobutene and isoprene; bromobutyl rubber (ANSI/ASTM)
BMC	Bulk molding compound
BMDC	Bismuth dimethyl dithiocarbamate (WTR)
BOA	Benzyl octyl adipate (= benzyl 2-ethylhexyl adipate) (ISO)
BOP	Benzyl octyl phthalate (= benzyl 2-ethylhexyl phthalate)
BOPP	Biaxially oriented poly(propylene) film; balanced oriented poly(propylene) film
BP	Poly(butadiene) rubber; see also BR and CBR
BPH	2,2′-Methylene-bis(4-methyl-6-*t*-butylphenol) (WTR)
BPO	Dibenzoyl peroxide
BR	Elastomeric poly(butadiene); butadiene rubber (ANSI/ASTM, IUPAC); see also BP and CBR
BSH	Benzene sulfonyl hydrazide (WTR)
BT	Thermoplastic poly(1-butene); see also Pb, PBT
BTDA	3,3′,4,4′-Benzophenonetetracarboxylic dianhydride
BTX	Benzene, toluene, and xylenes
Buna	Butadiene elastomers (old German literature). The first types were synthesized by sodium ("*Na*trium") initiated *bu*tadiene polymerizations, hence the name "Buna"; the various grades were differentiated by numbers (hence "number Buna"). Later Buna types were copolymers from the free-radical copolymerization of butadiene with various comonomers. These types were called "letter Buna" (Buna S = copolymer of butadiene and styrene, Buna N = copolymer of butadiene and acrylonitrile, etc.).
Butyl	Elastomeric copolymer from isobutene and isoprene; butyl rubber (BS); see also GR-I, IIR, PIBI
BVE	Butyl vinyl ether (WTR)
Bw	Cotton ("Baumwolle") (DIN); see also CO
C	1. Carbon (IUPAC) 2. Channel black 3. Cellophane (ASTM); "Cellophan®" is a registered trademark in Germany
C*	Saran coated cellophane (ASTM)
CA	1. Cellulose acetate (ASTM, DIN, ISO, IUPAC); see also AC 2. Hemp fibers (EDV)
CAB	Cellulose acetate–butyrate (ASTM, DIN, ISO, IUPAC)
CAP	Cellulose acetate–propionate (ASTM, DIN, ISO, IUPAC)
CAR	Carbon fiber
CBA	Chemical blowing agent
CBR	Butadiene rubber; 1,4-*cis*-poly(butadiene); see also BP and BR
CBS	*N*-Cyclohexyl-2-benzothiazolesulfene amide
CC	1. Cocos fiber (EDV) 2. Cupro (regenerated cellulose fibers *via* the copper/ammonia process (DIN); see also CU
CDB	Conjugated diene butyl elastomer
CdDEC	Cadmium diethyl dithiocarbamate (WTR); also Cd-DEDC
CDP	Cresyl diphenyl phosphate
CdPDC	Cadmium pentamethylene dithiocarbamate (WTR)
CE	Cellulose plastics in general (ASTM)
CEM	Poly(chlorotrifluoroethylene) (ASTM); see also CFM, CTFE, PCTFE
CF	Thermoset from cresol and formaldehyde; cresol–formaldehyde resin (ASTM, DIN, ISO, IUPAC)
CFK	1. Man-made fiber reinforced plastic (German technical literature: "*Chemie*faser-verstärkter *K*unststoff") 2. Carbon fiber reinforced plastic (German technical literature); see also CRP
CFM	1. Poly(chlorotrifluoroethylene) (ANSI/ASTM); see also CEM, CTFE, PCTFE 2. Copolymer from chlorotrifluoroethylene and vinylidene fluoride
CFRP	Carbon fiber reinforced plastics
CHC	Elastomeric copolymer from epichlorohydrin and ethylene oxide; see also ECO
CHDM	1,4-Cyclohexanedimethylol
CHR	Elastomeric poly(epichlorohydrin) (ISO); see also CO
CIIR	Postchlorinated elastomeric copolymer from isobutene and isoprene (ANSI/ASTM)
CL	Poly(vinyl chloride) fiber (EWG; EDV); see also PVC
CM	Postchlorinated poly(ethylene) (ANSI/ASTM); see also CPE
CMBT	Copper mercaptobenzothiazole, see also CuMBT
CMC	1. Carboxymethylcellulose (ASTM, DIN, ISO, IUPAC) 2. Critical micelle concentration

CMHEC	(Carboxymethyl/hydroxyethyl) cellulose
CMF	Classified mineral filler
CN	Cellulose nitrate (ASTM, DIN, ISO, IUPAC); see also NC, C/N
C/N	Cellulose nitrate, see also CN, NC
CNR	Elastomeric terpolymer from tetrafluoroethylene, trifluoronitrosomethane, and a small amount of an unsaturated termonomer, e.g., nitrosoperfluorobutyric acid; nitroso rubber, carboxynitroso rubber; see also AFMU
CO	1. Elastomeric poly(chloromethyl)oxirane; poly(epichlorohydrin) (ANSI/ASTM; ISO); see also CHR 2. Cotton (EDV); see also Bw
COX	Carboxylic rubber
CP	Cellulose propionate (ASTM, DIN, ISO, IUPAC)
C.P.	Chemically pure
CP2	Alternating copolymer from vinyl ether and maleic acid
CP4	Copolymer from acrylic acid and maleic acid
CPE	Chlorinated poly(ethylene) (ASTM); see also CM
CPET	Crystallizable poly(ethylene terephthalate) (i.e., a PET with fast-acting nucleating agents) (trade journals)
CPI	*cis*-Poly(isoprene); see also IR, PIP
CPP	Spinning paper (small cut strips from sodium cellulose or sulfite cellulose paper) or cellulon (wet strips from cellulose pulp) (DIN)
CPVC	1. Postchlorinated poly(vinyl chloride) (ASTM); see also PC, PeCe, PVCC 2. Critical pigment concentration
CR	Poly(chloroprene) (ANSI/ASTM, BS, IUPAC)
CRP	Carbon fiber reinforced plastics; see also CFK
CS	Casein (ASTM, DIN, ISO, IUPAC)
CSM	Chlorosulfonated poly(ethylene) (ANSI/ASTM); see also CSPR, CSR
CSPR	Chlorosulfonated poly(ethylene) (BS); see also CSM, CSR
CSR	Chlorosulfonated poly(ethylene); see also CM, CSPR
CT	1. Cellulose triacetate (DIN); see also CTA, TA 2. Continuous thread
CTA	Cellulose triacetate (ASTM); see also CT, TA
CTFE	Poly(chlorotrifluoroethylene) (ASTM); see also CEM, CFM, PCTFE
CTP	*N*-Cyclohexylthiophthalimide (WTR)
CTS	Compact tension specimen
CU	Copper silk ("cupro silk" = regenerated cellulose fibers) (EDV); see also CC
CuDEC	Copper diethyl dithiocarbamate (WTR); also CDC, CuDC
CuDMC	Copper dimethyl dithiocarbamate (WTR); see also CuDMDC
CuMBT	Copper mercaptobenzothiazole; see also CMBT
Culhp	Copper laminated hard paper (German technical literature)
CV	Viscose (rayon) (DIN); see also VI
DABCO®	Triethylenediamine = Diazabicyclo [2.2.2] octane
DAC	Diallyl chlorendate; diallyl 1,4,5,6,7,7-hexachlorobicyclo[2.2.2]hept-5-ene-2,3-dicarboxylate (ASTM)
DADI	Dianisidine diisocyanate (WTR)
DAF	Diallyl fumarate (ASTM)
DAIP	Diallyl isophthalate resin (ASTM)
DAM	Diallyl isophthalate resin (ASTM)
DAP	Diallyl phthalate resin (ASTM, DIN); see also FDAP
DATBP	Diallyl tetrabromophthalate
DBDPO	Decabromodiphenyl oxide
DBEEA	Dibutoxyethoxyethyl adipate (WTR)
DBEP	Bis(2-butoxyethyl) phthalate
DBF	Dibutyl fumarate
DBNPG	Dibromoneopentyl glycol
DBP	Dibutyl phthalate (ASTM, DIN, ISO, IUPAC)
DBPPD	*N*,*N*′-Di(*s*-butyl)-*p*-phenylenediamine (WTR)
DBS	Dibutyl sebacate
DBTDL	Dibutyltin dilaurate
DBTU	Dibutyl urea (WTR)
DCBS	Benzothiazyl-2-dicyclohexylsulfene amide (WTR)
DCHP	Dicyclohexyl phthalate
DCP	Dicapryl phthalate (ASTM, DIN, ISO, IUPAC)
DDP	Didecyl phthalate
DE	Diatomaceous earth
DEA	*N*,*N*-Diethylaniline
DEAE	(Diethylamino)ethyl- (with cellulose)
DEG	Diethylene glycol
DEHP	Bis(2-ethylhexyl) phthalate; see also DOP
DEP	Diethyl phthalate (ISO)
DETA	Diethylenetriamine (WTR)
DETU	Diethyl thiourea (WTR)
DGEBA	Diglycidyl ethers of bisphenol A
DHA	Dehydroacetic acid, acetic anhydride
DHBP	2,4-Dihydroxy benzophenone (WTR)
DHP	Diheptyl phthalate (ISO)
DHS	Dihexyl sebacate (WTR)
DHXP	Dihexyl phthalate (ISO)
DIBA	Diisobutyl adipate
DIBP	Diisobutyl phthalate (DIN, ISO)
DIDA	Diisodecyl adipate (ASTM, DIN, ISO, IUPAC)

DIDG	Diisodecyl glutarate
DIDP	Diisodecyl phthalate (ASTM, DIN, ISO, IUPAC)
DINA	Diisononyl adipate (ISO)
DINP	Diisononyl phthalate (DIN, ISO)
DIOA	Diisooctyl adipate (ASTM, DIN, ISO, IUPAC)
DIOF	Diisooctyl fumarate
DIOM	Diisooctyl maleate (WTR)
DIOP	Diisooctyl phthalate (ASTM, DIN, ISO, IUPAC)
DIOS	Diisooctyl sebacate
DIOZ	Diisooctyl azelate
DIPP	Diisopentyl phthalate
DITDP	Diisotridecyl phthalate (DIN, ISO); see also DITP
DITP	Diisotridecyl phthalate (DIN); see also DITDP
DLTDP	Dilauryl 3,3′-thiodipropionate
DMA	*N,N*-Dimethylacetamide
DMAA	*N,N*-Dimethylacetoacetamide
DMAC	*N,N*-Dimethylacetamide
DMBPPD	*N*-(1,3-Dimethylbutyl)-*N*′-phenyl-*p*-phenylenediamine (WTR)
DMBS	Dimethylbenzothiazylsulfeneamide (WTR)
DMC	Dough molding compound (UP resin) (DIN)
DME	1. Dimethylethanolamine, 2-(dimethylamino)ethanol
DMEP	Bis(2-methoxyethyl) phthalate
DMF	1. *N,N*-Dimethyl phthalate (ISO); 2. *N,N*-dimethyl formamide
DMG	Dimethyl glutarate
DMHPPD	*N,N*′-Di(3-methylheptyl)-*p*-phenylenediamine (WTR)
DMP	Dimethyl phthalate (ISO)
DMPTD	Dimethylphenyl thiuram disulfide (WTR)
DMSO	Dimethyl sulfoxide
DMT	Dimethyl terephthalate
DMTD	2,5-Dimercapto-1,3,4-thiadiazole (WTR)
DMTDP	Dimyristyl-3,3′-thiodipropionate
DMTDS	2,5-Dimercapto-1,3,4-thiadiazole disulfide (WTR)
DNA	1. Deoxyribonucleic acid 2. Dinonyl adipate
DNHZ	Di(*n*-hexyl) azelate
DNODA	Di(*n*-octadecyl) adipate
DNPDP	Di(*n*-octadecyl) phthalate (ASTM)
DNP	Dinonyl phthalate (ASTM, ISO, IUPAC)
DNPT	*N,N*-Dinitrosopentamethylene tetramine
DNS	1. Di(3,5,5-trimethylhexyl) sebacate (WTR) 2. Deoxyribonucleic acid (German: Desoxyribonukleinsäure)
DOA	Dioctyl adipate, bis(2-ethylhexyl)adipate (ASTM, DIN, ISO, IUPAC)
DODP	Di(octadecyl) phthalate (ISO)
DOF	Dioctyl fumarate
DOIP	Dioctyl isophthalate, bis(2-ethylhexyl) isophthalate (DIN, ISO)
DOM	Dioctyl maleate, bis(2-ethylhexyl) maleate (WTR)
DOP	Dioctyl phthalate, bis(2-ethylhexyl) phthalate (ASTM, DIN, ISO, IUPAC)
DOS	Dioctyl sebacate, bis(2-ethylhexyl) sebacate (ASTM, DIN, ISO, IUPAC)
DOTG	*N,N*′-Di(*o*-tolyl)guanidine (WTR)
DOTP	Dioctyl terephthalate, bis(2-ethylhexyl) terephthalate (DIN, ISO)
DOZ	Dioctyl azelate, bis(2-ethylhexyl) azelate (ASTM, DIN, ISO, IUPAC)
DPA	Diphenylamine
DPCF	Diphenyl cresyl phosphate (ASTM, ISO); see also DPCP
DPCP	Diphenyl cresyl phosphate (ASTM, ISO); see also DPCF
DPG	*N,N*′-Diphenylguanidine (WTR)
DPOF	Diphenyl 2-ethylhexyl phosphate (ASTM, ISO); see also EHDPP
DPOP	Diphenyl octyl phosphate
DPP	1. Diphenyl phthalate 2. Dipropyl phthalate
DPPD	*N,N*′-Diphenyl-*p*-phenylene diamine (WTR)
DPQD	Dibenzoyl-*p*-quinone dioxime
DPTD	Di(pentamethylene)thiuram hexasulfide, see also DPTH
DPTH	Di(pentamethylene)thiuram hexasulfide (WTR), see also DPTD
DPDM	Di(pentamethylene)thiuram monosulfide (WTR)
DPTT	Di(pentamethylene)thiuram tetrasulfide (WTR)
DPTU	Diphenyl thiourea (WTR)
DR	Degree of reaction
DRC	Dry rubber content
DS	Degree of substitution
DSTDP	Distearyl 3,3′-dithiopropionate
DTBP	Di(*t*-butyl) peroxide (WTR)
DTDC	Dithiodicaprolactam (WTR)
DTDM	4,4-Dithiodimorpholine (WTR)
DTDP	Di(tridecyl) phthalate
DTPD	1. Di(tridecyl) phthalate 2. *N,N*′-Ditolyl-*p*-phenylenediamine (WTR)
DUP	Di(undecyl) phthalate
DVB	Divinyl benzene
EA	Segmented polyurethane fiber (Elasthan fiber) (EDV); see also PUE
EAA	Ethylene acrylic acid copolymers
EAM	Elastomeric copolymer of ethylene and vinyl acetate (ANSI/ASTM)
EBM	Extrusion blow molding

EC	Ethyl cellulose (ASTM, DIN, ISO, IUPAC)
ECB	Blends from ethylene copolymers with bitumen
ECO	Elastomeric copolymer from ethylene oxide and epichlorohydrin, chloromethyloxirane (ANSI/ASTM); see also CHC
ECTFE	Poly(ethylene-*co*-chlorotrifluoroethylene); see also E-CTFE
E-CTFE	Poly(ethylene-*co*-chlorotrifluoroethylene); see also ECTFE
EDA	Ethylene diamine (WTR)
EDC	Ethylene dichloride, 1,2-dichloroethane
EDMA	Ethylene glycol dimethacrylate
EDTA	Ethylenediaminetetraacetic acid
EEA	Elastomeric copolymer from ethylene and ethyl acrylate (ASTM); see also E/EA
E/EA	Elastomeric copolymer from ethylene and ethyl acrylate (ISO); see also EEA
EG	Ethylene glycol
EHDPP	2-Ethylhexyldiphenyl phosphate; see also DPOF
EHEC	Hydroxyethylcellulose
EL	Elastodiene fiber (EDV); see also EU, LA
ELO	Epoxidized linseed oil (DIN, ISO)
EMA	1. Copolymer from ethylene and methacrylic acid (ASTM) 2. Alternating copolymer from ethylene and maleic anhydride
EOT	Ethylene oxide polysulfide
EP	Epoxy resin (ASTM, DIN, ISO, IUPAC)
E/P	Copolymer from ethylene and propylene (ISO); see also AP, APR, EPM, EPR
EPC	Easy processing channel black
EPD	Elastomeric terpolymer from ethylene, propylene, and a nonconjugated diene (ASTM); see also APT, EPDM, EPT, EPTR
EPDM	Elastomeric terpolymer from ethylene, propylene, and a nonconjugated diene (ASTM); see also, APT, APTK, EPD, EPT, EPTR
EPE	Ester of an epoxy resin (DIN)
EP-G-G	Prepreg from an epoxy resin and a textile glass fabric (German technical literature)
EP-K-L	Prepreg from an epoxy resin and a carbon fiber fabric (German technical literature)
EPM	Elastomeric copolymer of ethylene and propylene (ANSI/ASTM, ISO); see also AP, APR, E/P, EPM, EPR
EPR	Elastomeric copolymer of ethylene and propylene (BS); see also AP, APR, E/P, EPM
EPS	Expanded poly(styrene) [poly(styrene) foam]
EPT	Elastomeric terpolymer from ethylene, propylene and a diene; see also APT, APTK, EPD, EPDM, EPTR
EPTD	Diethyl diphenyl thiuram disulfide (WTR)
EPTM	Diethyl diphenyl thiuram monosulfide (WTR)
EPTR	Elastomeric terpolymer from ethylene, propylene and a diene (BS); see also APT, APTK, EPD, EPDM, EPT
E-PVC	Emulsion-polymerized poly(vinyl chloride)
ERM	Elastin reservoir molding
E-SBR	Copolymer from styrene and butadiene, polymerized in emulsion
ESC	Environmental stress cracking
ESCR	Environmental stress cracking resistance
ESO	Epoxidized soy bean oil (DIN, ISO)
ET	Ethylene polysulfide
ETCH	Ethylene chlorohydrine; 2-chloroethanol
ETFE	Copolymer of ethylene and tetrafluoroethylene (ASTM)
E/TFE	Copolymer of ethylene and tetrafluoroethylene
ETG	Ethylene triglycol
ETMQ	2,2,4-Trimethyl-1,2-dihydro-6-ethoxy quinoline (WTR)
EU	1. Elastomeric polyurethane with polyether segments (ANSI/ASTM) 2. Polyether rubber with carbon, oxygen, and nitrogen in the polymer chain (ISO) 3. Elastodiene fibers (ASTM); see also EL, LA Classifications 1 and 2 probably refer to the same polymer
EVA	Copolymer from ethylene and vinyl acetate (ASTM, DIN, ISO); see also E/VAC, EVM, VAE
E/VAC	Copolymer from ethylene and vinyl acetate (ASTM, DIN); see also E/VAC, EVM, VAE
EVAL®	Copolymer of ethylene and vinyl alcohol
E/VAL	Copolymer of ethylene and vinyl alcohol
EVE	Ethylene vinyl ether
EVOH®	Copolymer with ethylene and vinyl alcohol units
EVM	Elastomer from ethylene and vinyl acetate; see also EVA, E/VAC, VAE
F	1. Fluorine (IUPAC) 2. Furnace black
FC	Fluorocarbon
FDAP	Diallyl phthalate or resins therefrom, see also DAP
FE	Fluorine containing elastomer
FEF	Fast extruding furnace black
FEP	Copolymer from tetrafluoroethylene and hexafluoropropylene (ASTM, DIN, ISO, IUPAC); see also PFEP
FF	1. Resin from furan and formaldehyde (ASTM) 2. Fine furnace black

Fi	Fique (DIN)
FK	Fiber reinforced plastic ("faserverstärkter Kunststoff"; German technical literature)
FKM	Elastomer with saturated main chain and fluoro, perfluoroalkyl, or perfluoroalkoxy substituents (ANSI/ASTM); see also FPM
FL	Fluorofiber (EDV); probably fibers from poly(tetrafluoroethylene)
Fl	Flax (DIN)
FMQ	Methyl fluorosilicone rubber; see also MFQ
FPM	1. Elastomeric copolymer from vinylidene fluoride and hexafluoropropylene (ASTM) 2. Fluoroelastomers in general 3. Rubbers having fluoro and fluoroalkyl or fluoroalkoxy substituent groups at the polymer chain (ISO)
FPVC	Flexible PVC film
FQ	Elastomeric silicone with fluorine containing substituents (ASTM); see also FSI
FR	Flame retardant
FRP	Glass fiber reinforced polyester
FSI	Fluorinated silicone (ASTM); see also FQ
FT	Fine thermal black
FVMQ	Silicone rubber with fluorine, vinyl, and methyl substituents (ANSI/ASTM)
FVSI	Fluorosilicone
GC	Glass coupled
GEP	Glass fiber reinforced epoxy resin
GF	Glass fiber reinforced plastic; see also GFK
GF-EP	Glass fiber reinforced epoxy resin
GFK	Glass fiber reinforced plastic (German technical literature)
GF-PF	Glass fiber reinforced phenolic resin
GF-UP	Glass fiber reinforced unsaturated polyester (German technical literature)
GI	Broom (fibers from) (EDV)
GL	Glass fiber (DIN, EDV)
GP	1. Gutta percha 2. General purpose (ASTM)
GPF	General purpose furnace black
GPO	Elastomeric copolymer from propylene oxide and allyl glycidyl ether (ANSI/ASTM)
GR	1. Glass fiber reinforced 2. Former US symbol for "government rubber"
GR-A	Former US symbol for nitrile rubber; see also GR-N
GRAS	Generally recognized as safe
GR-I	Former US symbol for butyl rubber
GR-N	Former US symbol for nitrile rubber; see also GR-A
GRP	Glass fiber reinforced plastic
GR-P	Glass fiber reinforced plastic
GR-S	Former US symbol for styrene–butadiene rubber
Gu	Guanaco wool (DIN)
GU	Fibers from diene rubbers (old German technical literature)
GUP	Glass fiber reinforced unsaturated polyester resins (German technical literature)
GUR	Ultrahigh molecular weight poly(ethylene); see also UHMPE
GV	Glass fiber reinforced thermoplastics
HA	Human hair (EDV)
HAF	High abrasion furnace black
HBPA	2,2-bis(4-hydroxycyclohexyl)propane
HDI	Hexamethylene-1,6-diisocyanate (WTR)
HDPE	High-density poly(ethylene) (ASTM); in the older German technical literature, HDPE was sometimes used for poly(ethylene) from high pressure polymerizations ("Hochdruck"), i.e., for poly(ethylene)s with mostly *low* densities; see also PEH
He	1. Helium 2. Henequen (DIN); see also HE
HE	Henequen (EDV); see also He
HEC	Hydroxyethylcellulose
HEMA	2-Hydroxyethyl methacrylate
HEXA	Hexamethylene tetramine (WTR); see also HMT
HF	Half linen (EDV)
HFIP	Hexafluoroisopropanol; 1,1,1,3,3,3-hexafluoro-2-propanol; see also HFP
HFP	1. Hexafluoroisopropanol; see also HFIP 2. Hexafluoropropene
Hgw	Hard fabric ("Hartgewebe", German technical literature)
HIPS	High impact poly(styrene)
Hm	Hard mat (German technical literature)
HM	Hot melt adhesive
HMC	Sheet molding compound with high glass fiber content (UP resin) (DIN)
HMDAC	Hexamethylene diamine carbamate (WTR)
HMDI	Hydrogenated diphenylmethane diisocyanate
HMF	High-modulus furnace black
HMPT	Hexamethylphosphoric acid triamide; see also HPT
HMT	Hexamethylene tetramine
HMWPE	Poly(ethylene) with very high molar mass (molecular weight)
H-NBR	Hydrogenated nitrile rubber
HP	Hard paper (German technical literature)
HPA	Hydroxypropyl acrylate
HPC	1. Hydroxypropyl cellulose 2. Hard processing channel black
HPMC	(Hydroxypropyl)methyl cellulose
HPT	Hexamethyl phosphorotriamide; see also HMPT

HR	High resiliency foam
Hs	Hare hair (DIN)
HS	1. Heat stabilized 2. High percent solids
HTBA	High temperature blowing agent
HTE	Hydroxyl terminated polyether
HTST	High-temperature, short-term processing
Hz	Goat hair ("Haar von der Ziege"; DIN)
ICR	Initial concentration rubber (from undiluted natural rubber latex)
IEN	Interpenetrating elastomeric network
IFR	Intumescent flame retardant
IHPN	Interpenetrating homopolymer network
IIR	Elastomeric copolymer from isobutene and isoprene (ANSI/ASTM, IUPAC); see also Butyl, GR-I, PIBI
IM	Poly(isobutylene); see also PIB
IMW	Intermediate molecular weight
IPA	Isophthalic acid
IPDI	3-Isophorone diisocyanate (WTR)
IPN	Interpenetrating polymer network
IPO	Isopropyl oleate
IPP	Isopropyl percarbonate; diisopropyl peroxydicarbonate
IPPD	*N*-Isopropyl-*N'*-phenyl-*p*-phenylenediamine (WTR)
IR	Synthetic *cis*-1,4-poly(isoprene) (ANSI/ASTM, BS, IUPAC); see also CPI, PIP
IRT	Insect resistant treated
IS	Insoluble sulfur (WTR)
IT	Interrupted or split thread
IVE	Isobutyl vinyl ether
Ju	Jute (DIN); see also JU
JU	Jute (EDV); see also Ju
KA	Casein fibers (DIN)
KE	Kenaf (EDV); see also Kf
KEK	Carbon fiber reinforced plastic (DIN)
Kf	Kenaf (DIN); see also KE
KFA	Potassium fatty acid soap
Km	Camel hair (DIN)
Kn	Rabbit hair (DIN)
Ko	Coir (DIN)
Kp	Kapok (DIN); see also KP
KP	Kapok (EDV); see also Kp
Kz	Cashmere goat wool (DIN)
LA	Fibers from diene rubbers (DIN); see also EL, EU
LDPE	Low-density poly(ethylene) (ASTM); in the older German technical literature, LDPE was sometimes used for poly(ethylene) from low pressure polymerizations, i.e., for poly(ethylene)s with mostly *high* densities; see also NDPE
LI	Linen, flax (EDV)
LIM	Liquid impingement molding (now RIM)
LIPN	Latex interpenetrating polymer network
LLDPE	Linear low-density poly(ethylene) (ASTM)
Lm	Llama wool (DIN)
LRM	Liquid reaction molding (now RIM)
LRMR	Reinforced liquid reaction molding
L-SBR	Solution polymerized SBR
M	Medium thermal carbon black
Ma	Manila hemp fibers (Abaca) (DIN)
MA	1. Modacrylic fiber (EDV); see also PAM 2. Maleic anhydride
MABS	Copolymer from methyl methacrylate, acrylonitrile, butadiene, and styrene
MAN	Methacrylonitrile
MBI	Mercaptobenzimidazole; 2-benzimidazolethiol
MBS	1. Copolymer from methyl methacrylate, butadiene, and styrene 2. Benzthiazyl-2-sulfene morpholide (WTR)
MBSS	2-(4-Morpholinyldithio)benzothiazole (WTR)
MBT	Mercaptobenzothiazole; 2-benzthiazolethiol
MBTS	2-Benzthiazolyl disulfide
MC	Methyl cellulose
MCB	Monochlorobenzene
MD	Modal fiber (EDV)
MDA	1. Methylenediamine 2. 4,4'-Diaminodiphenylmethane
MDAC	4-Methyl-7-(diethylamino)coumarine
MDI	4,4'-Diphenylmethane diisocyanate; methylene di-*p*-phenylene diisocyanate
MDPE	Poly(ethylene) with medium density ($\approx 0.93-0.94\ g/cm^3$) (ASTM)
ME	Metal fiber (EDV)
MEK	Methyl ethyl ketone; 2-butanone
MEKP	Methyl ethyl ketone peroxide
MF	Melamine–formaldehyde resin (ASTM, DIN, ISO, IUPAC)
MFK	Metal fiber reinforced plastic (German technical literature)
MFQ	Silicone rubber having both methyl and fluorine substituent groups on the polymer chain (ISO); see also FMQ
MG	Maguey (EDV)
MMA	Methyl methacrylate (ASTM)
Mo	1. Molybdenum (IUPAC) 2. Mohair wool (DIN)
MOCA	4,4'-Methylenebis(2-chloroaniline); 3,3'-dichloro-4,4'-diaminodiphenylmethane
MOD	Modacryl fiber (EWG)
MP	Melamine–phenol–formaldehyde resin; see also MPF
MPE	Metallized polyester film

MPF	Melamine–phenol–formaldehyde resin (ISO); see also MP
MPPPD	*N*-Methyl-2-pentyl-*N'*-phenyl-*p*-phenylene diamine (WTR)
MPQ	Silicone rubbers having both methyl and phenyl substituent groups on the polymer chain (ISO); see also PMQ
MPTD	Dimethyl diphenyl thiuram disulfide (WTR)
M-PVC	PVC, polymerized in bulk (mass) (German technical literature)
MPVQ	Silicone rubbers having methyl, phenyl, and vinyl substituent groups on the polymer chain (ISO); see also PVMQ
MQ	Elastomeric silicones with methyl substituents (ANSI/ASTM)
MR	Mold resistant
Ms	Silk from the silkworm (mulberry spinner; *Bombyx mori L.*) (DIN)
MSA	Maleic anhydride (German technical literature)
MT	Metal fibers (DIN); see also ME
MTI	Methylene tri(*p*-phenylene isocyanate)
MTM	Mixed tertiary mercaptans
MVQ	Silicone rubbers having both methyl and vinyl substituent groups on the polymer chain (ISO); see also VMQ
MWR	Molding with rotation
NBR	Elastomeric copolymer from butadiene and acrylonitrile; nitrile rubber (ANSI/ASTM, BS, IUPAC); see also GR-N, PBAN
NC	Cellulose nitrate; see also SN
NCR	Elastomeric copolymer from acrylonitrile and chloroprene (ANSI/ASTM, IUPAC)
NDBC	Nickel dibutyl dithiocarbamate (WTR)
NDGA	Nordihydroguaiaretic acid
NDI	1,5-Diisocyanatonaphthalene (WTR)
NDOP	*n*-Decyl-*n*-octyl phthalate; see also ODP
NDPA	*N*-Nitrosodiphenylamine (WTR)
NDPE	Low-density poly(ethylene); see also LDPE
NEM	*N*-Ethylmorpholine
Nf	Phormium (DIN)
NHDP	*n*-Hexyl-*n*-decyl phthalate
NIR	Elastomeric copolymer from acrylonitrile and isoprene (ANSI/ASTM)
NK	Natural rubber; see also NR
NMP	*N*-Methylpyrrolidone
NODA	*n*-Octyl-*n*-decyl adipate
NODP	*n*-Octyl-*n*-decyl phthalate; see also ODP
NPG	Neopentyl glycol
NPP	*n*-Propyl percarbonate; dipropyl peroxydicarbonate
NR	Natural rubber (ANSI/ASTM, IUPAC); see also NK
OBSH	*p,p'*-Oxybis(benzenesulfonyl hydrazide)
ODP	Octadecyl phthalate (ISO); see also NODP
ODPA	Octylated diphenylamine (WTR)
ODPP	Octyldiphenyl phthalate
OER	Oil-extended rubber
OPET	Oriented poly(ethylene terephthalate)
OPP	Oriented poly(propylene) film or bottles; see also PP
OPR	Elastomeric polymer from propylene oxide
OPS	Oriented poly(styrene) film
OPVC	Oriented poly(vinyl chloride)
OT	Polysulfide rubber
OTBG	*o*-Tolyl biguanide (WTR)
OTOS	*N*-Oxydiethylenedithiocarbamyl-*N'*-oxydiethylenesulfamide (WTR)
P3FE	Poly(trifluoroethylene) (IUPAC)
PA	1. Polyamide (ASTM, DIN, ISO, IUPAC); the acronym PA is normally followed by a number, a combination of numbers, a letter, or a combination of letters and numbers. A single number *i* refers to a polyamide from an α,ω-amino acid or its lactam with *i* carbon atoms in the aliphatic chain of the monomeric unit. A combination of two numbers indicates polyamides from the polycondensation of a diamine and a dicarboxylic acid; the first number gives the number of methylene groups of aliphatic diamines, the second number the number of carbon atoms of straight-chain aliphatic dicarboxylic acids. Both numbers are sometimes separated by a period. "I" stands for isphthalic acid, "T" for terephthalic acid. 2. Phthalic anhydride
PA*	Saran coated polyamide (ASTM)
PA**	Metal coated polyamide (ASTM)
PAA	Poly(acrylic acid) (ASTM)
PAB	*p*-Aminobiphenyl
PABM	Polyaminobismaleimide
PAC	Poly(acrylonitrile) fiber (DIN, IUPAC); see also PAN, PC
PAE	Phthalate ester plasticizer
PAI	Polyamide-imide (ASTM)
PAM	Modacryl fiber (DIN); see also MA
PAMS	Poly(α-methyl styrene)
PAN	1. Poly(acrylonitrile) fiber (ASTM, IUPAC, EDV); see also PAC, PC. PAN'R is also a German trademark. 2. Phenyl-α-naphthylamine (WTR)
PAPA	Polyazelaic polyanhydride
PAPDC	Pentamethylene ammonium *N*-pentamethylene dithiocarbamate (WTR)
PAPI	Polymethylenepolyphenylene isocyanate; see also PMPPI

PARA	Polyarylamide (ASTM)
PAS	1. Polyaryl sulfone 2. Poly(acrylic acid) (German technical literature)
PAT	Polyaminotriazole
PB	1. Poly(1-butene) (ASTM, DIN, ISO); see also BT, PBT 2. Polyurea fiber (EDV); see also PUA 3. Elastic polydiene fiber (German technical literature)
PBA	Physical blowing agent
PBAN	Copolymer from butadiene and acrylonitrile (ASTM); see also GR-N, NBR
PBB	Polybrominated biphenyl
PBI	Polybenzimidazole
PBMA	Poly(*n*-butyl methacrylate)
PBNA	Phenyl-β-naphthylamine; *N*-phenyl-2-naphthylamine
PBR	Copolymer from butadiene and vinylpyridine (ANSI/ASTM, IUPAC)
PBS	Copolymer from butadiene and styrene (ASTM); see also SB, GR-S, SBR
PBT	1. Poly(butylene terephthalate) (ASTM); see also PBTP, PTMT 2. Poly(1-butene), see also BT, PB 3. Poly(*p*-phenylenebenzobisthiazole)
PBTP	Poly(butylene terephthalate) (DIN, ISO); see also PTMT
PC	1. Polycarbonate (ASTM, DIN, ISO, IUPAC); see also PCO 2. Poly(acrylonitrile) fiber (EWG, EDV); see also PAC, PAN 3. Formerly: chlorinated PVC; see also CPVC, PeCe, PVCC
PCB	Polychlorinated biphenyl
PCD	Polycarbodiimide
PCDT	Poly(1,4-cyclohexylenedimethylene terephthalate)
PCF	Poly(chlorotrifluoroethylene) fiber (DIN)
PCO	Polycarbonate; see also PC
PCTFE	Poly(chlorotrifluoroethylene) (ASTM, DIN, ISO, IUPAC); see also CEM, CFM, CTFE
PCU	Unchlorinated poly(vinyl chloride) (old German technical literature)
PDAP	Poly(diallyl phthalate) (ASTM, DIN, ISO, IUPAC); see also DAP, FDAP
PDMS	Poly(dimethyl siloxane)
PE	1. Poly(ethylene) (ASTM, DIN, ISO, IUPAC); see also PL 2. Polyester fiber (EWG) 3. Pentaerythritol
PEA	Poly(ethyl acrylate)
PEC	Chlorinated poly(ethylene) (DIN, ISO); see also CPE
PeCe	Chlorinated PVC; see also CPVC, PC, PVCC
PEE	Polyester ether fibers (containing diol and *p*-hydroxybenzoate units) (DIN)
PEEK	Polyether ether ketone = Poly(oxy-1,4-phenylene-oxy-1,4-phenylene-carbonyl-1,4-phenylene)
PEEKK	Polyether ether ketone ketone
PEG	Poly(ethylene glycol)
PEH	Poly(ethylene) with high density; see also HDPE
PEHA	Pentaethylenehexamine (WTR)
PE-HD	Poly(ethylene) with high density (DIN, ISO); see also HDPE, PEH
PEK	Polyether ketone
PEKEKK	Polyether ketone ether ketone ketone
PEKK	Polyether ketone ketone
PEL	Poly(ethylene) with low density; see also LDPE, PE-LD
PEM	Poly(ethylene) with medium density; see also MDPE
PEO	Poly(ethylene oxide) (ASTM, IUPAC); see also PEOX
PEOX	Poly(ethylene oxide) (DIN, ISO); see also PEO
PEP	Thermoplastic copolymer from ethylene and propylene
PES	1. Polyester fiber (DIN); see also PET, PL 2. Polyether sulfone (ASTM); see also PSU
PESU	Polyether sulfone (ASTM); see also PES
PET	Poly(ethylene terephthalate) (ASTM); see also PETP, PE, PES
PET*	Saran coated PET (ASTM)
PETP	Poly(ethylene terephthalate) (ASTM, DIN, ISO, IUPAC); see also PET, PE, PES
PETS	Pentaerythryl tetrastearate (WTR)
PF	Phenol–formaldehyde resin (ASTM, DIN, ISO, IUPAC)
PFA	Perfluoroalkoxy resins, copolymers of tetrafluoroethylene and perfluorinated alkyl vinyl ethers
PFEP	Copolymer from tetrafluoroethylene and hexafluoropropylene; see also FEP
PF-P-B	Phenolic resin–paper prepreg
PG	Propylene glycol
PHAS	Poly(α-hydroxy acrylic acid)
PHA	Poly(hydroxyalkanoate)
PHB	1. Poly(*p*-hydroxybenzoate); see also POB 2. Poly(α-hydroxybutyrate)
PHEMA	Poly(2-hydroxyethyl methacrylate)
PHP	Physiological hydrophilic polymers
PI	1. *trans*-1,4-Poly(isoprene), gutta percha (BS) 2. Polyimide (ASTM) 3. Paper (EDV)
PIB	Poly(isobutene) (ASTM, BS, DIN, ISO, IUPAC)

PIBI	Elastomeric copolymer from isobutene and isoprene (butyl rubber); see also Butyl, GR-I, IIR
PIBO	Poly(isobutylene oxide)
PIP	Synthetic *cis*-1,4-poly(isoprene); see also CPI, IR
PIR	Poly(isocyanurate) (DIN)
PIS	Poly(isobutylene)
PL	1. Poly(ethylene) (EWG); see also PE 2. Polyester fiber (EDV); see also PES, PET
PMA	1. Pyromellitic acid 2. Pyromellitic dianhydride 3. Poly(methyl acrylate)
PMAC	Polymethoxy acetal
PMCA	Poly(methyl α-chloromethacrylate) (ASTM)
PMF	Processed mineral fiber
PMI	Poly(methacrylimide)
PMMA	(Poly(methyl methacrylate) (ASTM, DIN, ISO, IUPAC)
PMMI	Poly(pyromellitimide)
PMP	Poly(4-methyl-1-pentene) (ASTM, DIN, ISO); see also TPX
PMPPI	Polymethylenepolyphenylene isocyanate; see also PAPI
PMQ	Silicon rubbers with methyl and phenyl substituents (ANSI/ASTM)
PMTT	3-Phenyl-5-mercapto-1,3,4-thiadiazole-2-thione (WTR)
PNA	Polynuclear aromatics
PNAH	Polynuclear aromatic hydrocarbons
PNF	Phosphorus nitrile fluoroelastomer
PNR	Poly(norbornene) rubber
PO	1. Elastomeric poly(propylene oxide) (ASTM) 2. Poly(olefin) 3. Phenoxy resin
POB	Poly(*p*-hydroxybenzoate); see also PHB
POM	Poly(oxymethylene), poly(formaldehyde) (ASTM, DIN, ISO, IUPAC)
POP	Poly(1,4-phenylene oxide) (ASTM); see also PPO
POR	Elastomeric copolymer from propylene oxide and allyl glycidyl ether
PP	Poly(propylene) (ASTM, DIN, EDV, ISO, IUPAC)
PP*	Metallized poly(propylene) (ASTM)
PPA	1. Poly(parabanic acid) 2. Poly(propylene adipate)
PPC	Chlorinated poly(propylene) (DIN)
PPI	Polymeric polyisocyanate
PPO[R]	Poly(oxy-1,4-phenylene) = "poly(phenylene oxide)"; see also POP
PPOX	Poly(propylene oxide) (ASTM, DIN, ISO)
PPP	Poly(*p*-phenylene)
PPS	Poly(*p*-phenylene sulfide) (ASTM)
PPSU	Poly(phenylene sulfone) (ASTM, DIN, ISO); see also PSU
PPT	Poly(propylene terephthalate)
PQ	Elastomeric silicone with phenyl substituents (ASTM)
PQD	*p*-Quinone dioxime (WTR)
PR	Regenerated protein fiber (EDV)
PS	Poly(styrene) (ASTM, DIN, ISO, IUPAC)
P-S	Pressure-sensitive adhesive
PSA	Pressure-sensitive adhesive
PSAB	Thermoplastic copolymer from styrene, acrylic ester and butadiene (DIN); see also SBV, S/B
PSAN	Thermoplastic copolymer from styrene and acrylonitrile (DIN), see also SAN
PSBR	Elastomeric terpolymer from vinylpyridine, styrene, and butadiene (ANSI/ASTM)
PSF	Polysulfone; see also PSO
PSI	Poly(methyl phenyl siloxane) (ASTM)
PSO	Polysulfone; see also PSF
PST	Poly(styrene) fiber with at least 85% styrene units (DIN)
PS-TSG	Poly(styrene) foam, processed by thermoplastic injection (German technical literature)
PSU	Poly(phenylene sulfone); see also PPSU
PSUL	Polysulfone (ASTM)
PTA	1. Purified terephthalic acid 2. Phthalic anhydride
PTF	Pole(tetrafluoroethylene) fiber
PTFE	Poly(tetrafluoroethylene) (ASTM, DIN, ISO, IUPAC)
PTMA	Poly(tetramethylene adipate)
PTMEG	Poly(tetramethylene ether glycol)
PTMG	Poly(oxytetramethylene glycol)
PTMT	Poly(tetramethylene terephthalate) = poly(butylene terephthalate) see also PBTP
PU	1. Polyurethane elastomer (BS) 2. Polyurethane fiber (EDV)
PUA	Polyurea fiber (DIN); see also PB
PUE	Segmented polyurethane fiber (DIN); see also EA
PUR	Polyurethane (ASTM, DIN, ISO, IUPAC); see also PU
PVA	1. Poly(vinyl acetate); see also PVAC 2. Poly(vinyl alcohol) (ASTM); see also PVAL, PVOH 3. Poly(vinyl alcohol) fiber with at least 85% vinyl alcohol units (DIN); see also VY 4. Poly(vinyl ether) (old German technical literature); see also PVOM, PVME
PVAC	Poly(vinyl acetate) (ASTM, DIN, ISO, IUPAC); see also PVA
PVAL	Poly(vinyl alcohol) (ASTM, DIN, ISO, IUPAC)

PVC	1. Poly(vinyl chloride) (ASTM, DIN, ISO, IUPAC); see also CL 2. Poly(vinyl chloride) fiber with at least 50 wt.% vinyl chloride units (DIN) 3. Pigment volume concentration
PVCA	Copolymer from vinyl chloride and vinyl acetate (ASTM, DIN, IUPAC); see also PVCAC
PVCAC	Copolymer from vinyl chloride and vinyl acetate (ASTM); see also PVCA
PVCC	Chlorinated PVC (DIN, ISO); see also CPVC, PC, PeCe
PVD	Poly(vinylidene chloride) fiber with at least 50 wt.% vinylidene chloride units (DIN); see also PVDC
PVDC	Poly(vinylidene chloride) (ASTM, DIN, ISO, IUPAC); see also PVD
PVDF	Poly(vinylidene fluoride) (ASTM, DIN, ISO, IUPAC); see also PVF
PVF	1. Poly(vinyl fluoride) (ASTM, DIN, ISO, IUPAC) 2. Poly(vinylidene fluoride); see also PVDF
PVFM	Poly(vinyl formal) (ASTM, DIN, ISO, IUPAC); see also PVFO
PVFO	Poly(vinyl formal) (DIN); see also PVFM
PVI	Poly(vinyl isobutyl ether)
PVID	Poly(vinylidene cyanide)
PVK	Poly(*N*-vinylcarbazole) (ASTM, DIN, ISO)
PVM	1. Copolymer from vinyl chloride and vinyl methyl ether 2. Fiber from the copolymer of vinyl and/or vinylidene compounds with a main component of at least 85 wt.% (DIN)
PVME	Poly(vinyl methyl ether)
PVMQ	Silicone rubber with methyl, phenyl, and vinyl substituents (ANSI/ASTM)
PVOH	Poly(vinyl alcohol); see also PVA, PVAL
PVP	Poly(*N*-vinylpyrrolidone) (ASTM, DIN, ISO)
PVSI	Poly(dimethyl siloxane) with phenyl and vinyl substituents (ASTM)
PY	Unsaturated polyester resins (BS)
QMC	Quick molding change
Ra	Ramie (DIN)
RA	Ramie (EDV)
RAM	Restricted area molding
RAN	Residual acrylonitrile (monomer in polymer)
RF	Resorcine–formaldehyde resin
Rh	1. Rhenium (IUPAC) 2. Horse hair ("Rosshaar") (DIN)
RHB	Reheat blow molding
RHC	Rubber hydrocarbon content
Ri	Cow hair ("Rind") (DIN)
RIM	Reaction injection molding
Ro	Rosella (DIN)
RP	Reinforced plastics
RP/C	Reinforced plastics (composite)
RP/M	Reinforced polyester (mortar)
RPVC	Rigid PVC film
RRIM	Reinforced reaction injection molding
RTP	Reinforced thermoplastic
RTV	Room temperature vulcanization
RVCM	Residual vinyl chloride monomer
RUC	Chlorinated isoprene rubber (DIN)
S	Styrene
SAF	Super abrasion furnace black
SAF-HS	High structure SAF
SAF-LS	Low-structure SAF
SAIB	Sucrose acetate isobutyrate
SAL	Salicylic acid
SAN	Thermoplastic copolymer from styrene and acrylonitrile (ASTM, DIN, ISO, IUPAC); see also PSAN
SB	Thermoplastic copolymer from styrene and butadiene (ASTM); see also S/B
S/B	Thermoplastic copolymer from styrene and butadiene (ANSI/ASTM, ISO, IUPAC); see also SB
SBP	1. *s*-Butyl percarbonate; di-*s*-butyl peroxydicarbonate 2. Styrene–butadiene resin
SBR	Elastomeric copolymer from styrene and butadiene (ASTM, BS, IUPAC); see also GR-S
SBS	1. Solid bleached sulfate 2. Styrene–butadiene–styrene triblock copolymer
SCR	Elastomeric copolymer from styrene and chloroprene (ANSI/ASTM, IUPAC)
SDD	Sodium dimethyldithiocarbamate
SDPA	Aralkylated diphenylamines (WTR)
SE	1. Sulfoethyl- (with cellulose) 2. Silk ("Seide") (EDV)
SEBS	Styrene–ethylene/butylene–styrene triblock copolymer (= hydrogenated styrene–isoprene–styrene triblock copolymer)
SEDC	Selenium diethyl dithiocarbamate (WTR)
S-EPDM	Sulfonated ethylene–propylene–diene terpolymer
SF	Structural foam
SFK	Synthetic fiber reinforced plastic (German technical literature)
SFP	Scrapless forming process
SHIPS	Super-high impact poly(styrene)
Si	1. Silicon (IUPAC) 2. Sisal (DIN); see also SI
SI	1. Silicones in general (ASTM, DIN, ISO) 2. Poly(dimethyl siloxane) (ASTM) 3. Thermoplastic silicone (IUPAC) 4. Sisal (EDV); see also SI

SIN	1. Simultaneous interpenetrating network 2. Semi-interpenetrating network
SIPN	Sequential interpenetrating polymer network
SIR	1. Elastomeric copolymer from styrene and isoprene (ANSI/ASTM, IUPAC) 2. Standardized Indonesian rubber
SIS	Styrene–isoprene–styrene triblock copolymer
SL	Slag wool (DIN)
SM	Styrene monomer
SMA	Copolymer from styrene and maleic anhydride (ASTM)
SMC	Sheet molding compound (UP resin)
SMR	Standardized Malaysian rubber
SMS	Copolymer from styrene and α-methylstyrene (ASTM, DIN); see also S/MS
S/MS	Copolymer from styrene and α-methylstyrene (DIN, ISO); see also SMS
Sn	1. Tin (IUPAC) 2. Sunn hemp fibers (DIN); see also SN
SN	Sunn hemp fibers (EDV)
SP	Superior processing rubber (a grade of natural rubber)
SPF	Superior processing furnace black
SPH	Styrenated phenol (WTR)
SPPF	Solid-phase pressure forming
SPSF	Solid-phase stretch forming
S-PVC	Poly(vinyl chloride), polymerized in suspension
SR	Synthetic rubber
SRF	Semi-reinforcing furnace black
SRF-HM	High-modulus SRF
SRF-HM-NS	Nonstaining high-modulus SRF
SRF-LM	Low-modulus SRF
SRF-LM-NS	Nonstaining low-modulus SRF
SRP	Rubber reinforced poly(styrene) (ASTM)
SS	1. Single stage (ASTM) 2. Steam-stripped (to remove residual monomer)
ST	Stone wool (DIN)
SWP	1. Solvent-welded plastics pipe 2. Synthetic wood pulp
T	1. Polysulfide rubber; see also OT, TR 2. Thermal black
TA	Cellulose triacetate (EDV); see also CT, CTA
TAC	Triallyl cyanurate (ASTM)
TATM	Triallyl trimellitate (WTR)
TBBS	Benzothiazyl-2-*t*-butyl sulfenamide (WTR)
TBC	Total Broadhurst Lee process
TBP	*t*-Butyl perbenzoate; see also TBPB
TBPA	Tetrabromophthalic anhydride
TBPB	*t*-Butyl perbenzoate; see also TBP
TBS	*t*-Butylstyrene
TBT	Tetrabutyl titanate
TBTD	Tetrabutyl thiuram disulfide (WTR); see also TBUT
TBTU	Tributyl thiourea (WTR)
TBUT	Tetrabutyl thiuram disulfide (WTR)
TC	Technically classified natural rubber
TCE	Trichloroethylene
TCEF	Trichloroethyl phosphate (ASTM, ISO); see also TCEP
TCF	Tricresyl phosphate, tritolyl phosphate (ASTM, DIN, ISO); see also TCP, TKP, TTP
TCM	Trichloromelamine (WTR)
TCP	Tricresyl phosphate (IUPAC); TCP® is a registered trademark in the United Kingdom; see also TCF, TKP, TTP
TDEC	Tellurium diethyl dithiocarbamate (WTR)
TDI	Tolylene diisocyanate; tolylene isocyanate; methylphenylene diisocyanate; usually an 80:20 mixture of the 2,4- and 2,6-isomers
TDID	Dimeric tolylene diisocyanate
TDM	*t*-Dodecyl mercaptan (WTR)
TEAE	Triethylaminoethyl- (with cellulose)
TEDMA	Triethylene glycol dimethacrylate (WTR)
TEGDA	Triethylene glycol diacetate (WTR)
TEP	Triethyl phosphate
TEPA	Tetraethylene pentamine (WTR)
TETA	Triethylene tetramine
TETD	Tetraethyl thiuram disulfide (WTR)
TFE	Tetrafluoroethylene (ASTM)
THBP	2,4,5-Trihydroxybutyrophenone
THF	Tetrahydrofuran
THT	Tetrahydrothiophene (WTR)
TIOTM	Triisooctyl trimellitate (DIN, ISO)
TKP	Tricresyl phosphate; see also TCE, TCP, TTP
Tl	1. Thallium (IUPAC) 2. American moss (DIN)
TM	Thioplastics
TMA	Trimellitic anhydride
TMC	Thick molding compound
TMETD	Tetramethyl tetraethyl thiuram disulfide (WTR)
TMP	1. Thermal mechanical pulp 2. Trimethylol propane (WTR)
TMPT	Trimethylol propane trimethacrylate (WTR)
TMQ	2,2,4-Trimethyl-1,2-dihydroquinone (WTR)
TMS	Tetramethylsilane
TMTD	Tetramethyl thiuram disulfide (WTR)
TMTS	Tetramethyl thiuram monosulfide (WTR)
TMTT	Tetramethyl thiuram tetrasulfide (WTR)
TMTU	Tetramethyl urea (WTR); see also TMU
TMU	Tetramethyl urea; see also TMTU
TNPP	Trinonyl phenyl phosphate (WTR)
TOF	Trioctyl phosphate = tris(2-ethylhexyl) phosphate (ASTM, DIN, ISO); see also TOP

TOP	Trioctyl phosphate = tris(2-ethylhexyl) phosphate (ASTM, DIN, ISO); see also TOF
TOPM	Tetraoctyl pyromellitate, i.e., tetrakis(2-ethylhexyl) pyromellitate (DIN, ISO)
TOR	*trans*-Poly(octenamer)
TOTM	Trioctyl mellitate = tris(2-ethylhexyl) pyromellitate (DIN, ISO)
TPA	1. 1,4-*trans*-Poly(pentenamer); see also TPR 2. Terephthalic acid
TPE	Thermoplastic elastomer
TPEL	Thermoplastic rubber or elastomer (ASTM)
TPES	Thermoplastic polyester in general (ASTM)
TPF	Triphenyl phosphate (DIN, ISO); see also TPP
TPI	Thermoplastoid (WTR)
TPO	Thermoplastic olefin elastomer
TPP	Triphenyl phosphate (ASTM, IUPAC); see also TPF
TPR	1. 1,5-*trans*-Poly(pentenamer); see also TPA 2. Thermoplastic elastomer; see also TR, TPE
TPS	Toughened poly(styrene) (in the UK for HIPS)
TPTD	Tetraisopropyl thiuram disulfide (WTR)
TPU	Thermoplastic polyurethanes
TPUR	Thermoplastic urethane (ASTM)
TPX	Poly(4-methyl-1-pentene); see also PMP
TR	1. Thermoplastic elastomer 2. Thio rubber (in the UK for polysulfide) 3. Textile residues or fiber or fabric of unknown composition (EDV)
TRIM	Trimethylolpropane trimethacrylate
Ts	Tussah silk (DIN)
TSH	Toluene sulfonyl hydrazide (WTR)
TSUR	Thermoset polyurethane (ASTM)
TTP	Tricresyl phosphate, tritolyl phosphate (ISO); see also TCE, TCP, TKP
TTT	Triethyltrimethylenetriamine (WTR)
TU	Thiourea
TV	Trivinyl fiber (EDV)
Tz	Tibet goat hair (goat = "Ziege") (DIN)
UE	Polyurethane elastomer (ASTM); see also UR
UF	Urea–formaldehyde resin (ASTM, DIN, ISO, IUPAC)
UFS	Urea–formaldehyde foam
UHMPE	Poly(ethylene) with ultrahigh molar mass
UHMW-PE	Poly(ethylene) with ultrahigh molar mass (molar mass over 3 100 000 g/mol) (ASTM)
UP	Unsaturated polyester (ASTM, DIN, ISO, IUPAC)
UP-G-G	Prepreg from unsaturated polyesters and textile glass fibers
UP-G-M	Prepreg from unsaturated polyesters and textile glass mats
UP-G-R	Prepreg from unsaturated polyesters and textile glass rovings
Ur	Urena (DIN)
UR	Polyurethane elastomers (BS); see also UP
VA	Vinyl acetate
VAC	Vinyl acetate
VAE	Vinyl acetate–ethylene copolymers; see also EVA, E/VAC
VC	Vinyl chloride
VC/E	Copolymer from ethylene and vinyl chloride (ISO)
VC/E/MA	Copolymer from ethylene, vinyl chloride, and maleic anhydride (ISO)
VC/E/VAC	Copolymer from ethylene, vinyl chloride, and vinyl acetate (ISO)
VCI	Volatile corrosion inhibitor
VCM	Vinyl chloride (monomer); see also VC
VC/MA	Copolymer from vinyl chloride and methyl acrylate (ISO)
VC/MMA	Copolymer from vinyl chloride and methyl methacrylate (ISO)
VC/OA	Copolymer from vinyl chloride and octyl acrylate (ISO)
VC/VAC	Copolymer from vinyl chloride and vinyl acetate (ISO)
VC/VDC	Copolymer from vinyl chloride and vinylidene chloride (ISO)
VDC	Vinylidene chloride
Vf	1. Vulcan fiber 2. Vinyl fluoride
VF/HFP	Copolymer from vinylidene fluoride and hexafluoropropylene
Vi	Vicuna wool (DIN)
VI	Viscose (rayon) (EDV); see also CV
VMQ	Silicone rubber with methyl and phenyl substituents (ANSI/ASTM)
VPE	Cross-linked poly(ethylene) (DIN)
VQ	Elastomeric silicone with vinyl substituents (ASTM)
VRI	Volatile rust inhibitor
VSI	Poly(dimethyl siloxane) with vinyl groups (ASTM)
VT	Vinyl toluene
VVO	Vulcanized vegetable oil = factice (WTR)
VY	Vinal (= poly(vinyl alcohol) fiber) (ASTM, EDV)
WA	Angora (rabbit) wool (EDV)
WB	Beaver wool (EDV)
WFK	Whisker reinforced plastic (German technical literature)
WG	Vicuna wool (EDV)

WK	Camel wool (EDV)
WL	Llama wool (EDV)
WM	1. Plasticizer (German technical literature: "Weichmacher") 2. Mohair wool (EDV)
Wo	1. Tungsten (IUPAC) 2. Sheep's wool (DIN); see also WO
WO	Sheep's wool (EDV); see also Wo
WP	Alpaca wool (EDV)
WS	Cashmere goat wool (EDV)
WT	Otter wool (EDV)
WU	Guanaco wool (EDV)
WV	Virgin sheep wool (EDV)
WY	Yak wool (EDV)
XABS	Elastomeric copolymer from acrylonitrile, butadiene, styrene, and a carboxylic group containing monomer (ASTM)
XLPE	Crosslinked poly(ethylene)
XNBR	Elastomeric copolymer from acrylonitrile, butadiene, and a carboxylic group containing monomer (ANSI/ASTM)
XPS	Expandable (or expanded) poly(styrene)
XSBR	Elastomeric copolymer from butadiene, styrene, and a carboxylic group containing monomer (ANSI/ASTM)
YSBR	Thermoplastic triblock copolymer from styrene and butadiene (ANSI/ASTM); see also SBS
YXSBR	Thermoplastic block copolymer from styrene and butadiene containing carboxylic groups (ANSI/ASTM)
Z5MC	Zinc pentamethylene dithiocarbamate (WTR)
ZBDC	Zinc dibenzyl dithiocarbamate (WTR)
ZBPD	Zinc dibutyl dithiophosphate (WTR)
ZBX	Zinc dibutyl xanthate (WTR)
ZDBC	Zinc dibutyl dithiocarbamate (WTR)
ZDEC	Zinc diethyl dithiocarbamate (WTR)
ZDMC	Zinc dimethyl dithiocarbamate (WTR)
ZE	Zein fibers (DIN)
ZEH	Zinc ethylhexanoate (WTR)
ZEPC	Zinc ethylphenyl dithiocarbamate (WTR)
ZIX	Zinc isopropyl xanthate (WTR)
ZMBI	Zinc 2-mercaptobenzimidazole
ZMBT	Zinc-2-mercaptobenzthiazole

C. ABBREVIATIONS AND ACRONYMS BASED ON POLY(MONOMER) NAMES

The following table contains the abbreviations and acronyms of names of polymeric materials whose base polymers were obtained by chain polymerization (addition polymerization), copolymerization, polycondensation (condensation polymerization), and polyaddition. Note that these abbreviations and acronyms do not apply in industry to polymers *per se* but to polymeric materials, i.e. polymers with or without additives, fillers, plasticizers, etc.

Abbreviations and acronyms are in part based on the poly(monomer) nomenclature, i.e., on the names of the monomers used in the manufacture of polymers, sometimes however, without a prefix "P" for "poly". The names of monomers for copolymers are given in alphabetical order without regard to their prevalence.

Registered trademarks: a) SAN in Japan and the USA; b) PAN in Europe.

Polymers of	ASTM	DIN	ISO	IUPAC	Other
Acrylic ester + acrylonitrile + butadiene	ABA	A/B/A	A/B/A		
Acrylic ester + acrylonitrile + styrene	ASA	A/S/A	A/S/A		
Acrylic ester + ethylene	EEA		E/EA		
Acrylic acid	PAA				PAS
Acrylonitrile	PAN	PAC		PAN	
Acrylonitrile + butadiene	PBAN				
Acrylonitrile + butadiene + methyl methacrylate + styrene					MABS
Acrylonitrile + butadiene + styrene	ABS	ABS	ABS	ABS	
Acrylonitrile + chlorinated poly(ethylene) + styrene		A/PE-C/S	A/CPE/S		ACS
Acrylonitrile + ethylene–propylene–diene + styrene		A/EPDM/S	A/EPDM/S		
Acrylonitrile + methyl methacrylate	AMMA	A/MMA	A/MMA		
Acrylonitrile + styrene	SAN	SAN	SAN	SAN	AS
Adipic acid + hexamethylenediamine	PA 6.6	PA 66	PA 66	PA 6.6	
Adipic acid + hexamethylenediamine + sebacic acid			PA 66/610		
Adipic acid + tetramethylene glycol					PTMA
Allyl diglycol carbonate	ADC				
p-Aminobenzoic acid					PAB

Polymers of	ASTM	DIN	ISO	IUPAC	Other
Aminotriazol					PAT
Aminoundecanoic acid, 11-		PA 11	PA 11		
Azelaic acid anhydride					PAPA
Bisphenol A + phosgene	PC	PC	PC	PC	
Bitumen + ethylene				ECB	
Butadiene + methyl methacrylate + styrene		MBS	MBS		
Butadiene + styrene (thermoplastic)	PBS	S/B	S/B	S/B	SB
Butene-1	PB	PB	PB		BT
Butyl acrylate		PBA	PBA	PBA	
Butylene glycol + terephthalic acid	PBT	PBTP	PBTP		PTMT
Butyl methacrylate					PBMA
ε-Caprolactam	PA 6	PA 6	PA 6	PA 6	
ε-Caprolactam + ω-dodecanolactam			PA 6/12		
Chlorotrifluoroethylene	PCTFE	PCTFE	PCTFE	PCTFE	
Chlorotrifluoroethylene + ethylene					ECTFE
Cresol + formaldehyde	CF	CF	CF	CF	
1,4-Cyclohexanedimethylol + terephthalic acid					PCDT
Diallyl chloroendate (= diallyl ester of 4,5,6,7,7-hexachlorobicyclo-[2,2,1]-5-heptane-2,3-dicarbonic acid)	PDAC				
Diallyl fumarate	PDAF				
Diallyl isophthalate	PDAIP				
Diallyl maleate	PDAM				
Diallyl phthalate	PDAP	PDAP	PDAP	PDAP	DAP
1,4-Dichlorobenzene + disodium sulfide	PPS	PPS			
2,6-Dimethylphenol + oxygen	POP				PPO™
ω-Dodecanolactam (laurolactam)	PA 12	PA 12	PA 12	PA 12	
Ethyl acrylate					PEA
Ethyl acrylate + ethylene	EEA	E/EA	E/EA		
Ethylene	PE	PE	PE	PE	PL
–, chlorinated polymer	CPE	PE-C	PE-C		
–, cross-linked polymer			PE-X		VPE
–, high-density polymer	HDPE	PE-HD	PE-HD		
–, high impact polymer			PE-HI		
–, linear low-density polymer	LLDPE		PE-LLD		
–, low density polymer	LDPE	PE-LD	PE-LD		
–, medium density polymer	MDPE		PE-MD		
–, very low density linear polymer					VLDPE
–, ultra-high molar mass polymer	UHMW-PE		PE-UHMW		
Ethylene + methacrylic acid	EMA				
Ethylene + maleic anhydride + vinyl chloride		VC/E/MA	VC/E/MA		
Ethylene + methyl methacrylate		E/MMA	E/MMA		
Ethylene + propylene		E/P	E/P		PEP
Ethylene + propylene (+ diene)	EPDM	EPDM	EPDM		
Ethylene + tetrafluoroethylene	ETFE	E/TFE	E/TFE		
Ethylene + vinyl acetate	EVA	E/VA	E/VAC		EVAC
Ethylene + vinyl acetate + vinyl chloride		VC/E/VAC		VC/E/VAC	
Ethylene + vinyl chloride		VC/E	VC/E		
Ethylene glycol					PEG
Ethylene glycol + maleic anhydride	UP	UP	UP	UP	
Ethylene glycol + terephthalic acid(ester)	PET	PET	PET	PETP	PETE
–, with glycol comonomer	PETG				
–, fast crystallizing polymer					CPET
–, oriented polymer					OPET
Ethylene oxide	PEO	PEOX	PEOX	PEO	
Formaldehyde (or trioxane)	POM	POM	POM	POM	
Formaldehyde + furan	FF		FF		
Formaldehyde + melamine	MF	MF	MF	MF	
Formaldehyde + melamine + phenol		MPF			
Formaldehyde + phenol	PF	PF	PF	PF	
Formaldehyde + urea	UF	UF	UF	UF	
Furfural + phenol	PFF				
Hexafluoropropylene + tetrafluoroethylene	FEP	FEP	FEP		
Hexamethylenediamine + sebacic acid	PA 6.10	PA 610	PA 610		PA 6.10

Polymers of	ASTM	DIN	ISO	IUPAC	Other
p-Hydroxybenzoic acid	POB				PHB
3-Hydroxybutyric acid					PHB
2-Hydroxyethylmethacrylate					PHEMA
Isobutene (isobutylene)	PIB	PIB	PIB	PIB	IM
Isocyanurates		PIR	PIR		
Laurolactam (dodecanolactam)	PA 12	PA 12	PA 12	PA 12	
Linseed oil, epoxidized		ELO	ELO		
Maleic anhydride + styrene	SMA	S/MA	SMA		
Methacrylimide		PMI	PMI		
Methyl acrylate					PMA
Methyl acrylate + vinyl chloride		VC/MA	VC/MA		
Methyl α-chloromethacrylate	PMCA				
Methyl methacrylate	PMMA	PMMA	PMMA	PMMA	
Methyl methacrylate + vinyl chloride			VC/MMA		
4-Methylpentene-1	PMP	PMP	PMP		TPX
α-Methylstyrene		PMS	PMS		PAMS
α-Methylstyrene + styrene	SMS	S/MS	S/MS		
Octyl acrylate + vinyl chloride		VC/OA	VC/OA		
Perfluoro alkoxy alkane	PFA	PFA	PFA		
Phosphoric acid (polymer)					PPA
Propylene	PP	PP	PP	PP	
–, oriented polymer					OPP
–, biaxially oriented polymer					BOPP
Propylene + tetrafluoroethylene (*alt.*)					TFE-P
Propylene oxide	PPOX	PPOX	PPOX		
Soybean oil, epoxidized		ESO	ESO		
Styrene	PS	PS	PS	PS	
–, expanded (foamed) polymer					EPS
–, high-impact polymer			PS-HI		HIPS
–, impact resistant polymer	SRP	IPS			
–, oriented polymer					OPS
–, biaxially oriented polymer					BPS
Tetrafluoroethylene	PTFE	PTFE	PTFE	PTFE	
Tetrahydrofuran					PTHF
–, polymer with hydroxy endgroups					PTMEG
Triallyl cyanurate	PTAC				
Trifluoroethylene				P3FE	
Trioxane (+ co-monomers)	POM	POM	POM	POM	
Vinyl acetate	PVAC	PVAC	PVAC	PVAC	PVA
Vinyl acetate + vinyl chloride	PVCA	VC/VAC	VC/VAC		
N-Vinylcarbazole	PVK	PVK	PVK		
Vinyl chloride	PVC	PVC	PVC	PVC	PCU;V
–, polymerized in bulk					M-PVC
–, polymerized in emulsion					E-PVC
–, polymerized in suspension					S-PVC
–, polymer as flexible film					FPVC
–, polymer as oriented film					OPVC
–, polymer as rigid film					RPVC
Vinyl chloride + vinylidene chloride		VC/VDC	VC/VDC		
Vinyl fluoride	PVF	PVF	PVF	PVF	
Vinylidene chloride	PVDC	PVDC	PVDC	PVDC	
Vinylidene fluoride	PVDF	PVDF	PVDF	PVDF	
Vinyl methyl ether					PVME
N-Vinylpyrrolidone	PVP	PVP	PVP		

D. ABBREVIATIONS FOR POLYMERS NAMED AFTER A CHARACTERISTIC POLYMER GROUP

Characteristic polymer group	ASTM	DIN	ISO	IUPAC	Other
Amide	PA	PA	PA		
Amide, aromatic (aryl amide)	PARA				PAR
–, metal coated films	PA**				
–, saran coated films	PA*				
Amide-imide	PAI	PAI	PAI		

Characteristic polymer group	ASTM	DIN	ISO	IUPAC	Other
Arylene sulfone					PAS
Benzimidazole					PBI
Bisphenol A-sulfone					PSF
Carbodiimide					PCD
Carbonate, aromatic	PC	PC	PC	PC	
Epoxide (epoxy)	EP	EP	EP	EP	
–, glass fiber reinforced					GEP
Ester, saturated (polyester)		SP	SP		
–, thermoplastic	TPES				
–,–, metallized polymer film					MPE
Ester, unsaturated (polyester)	UP	UP	UP	UP	
–,–, glass fiber reinforced					FRP
Ester–alkyd	PAK				
Ester–ether (thermoplastic elastomer)	TEEE				
Ester–imide	PEI		PEI		
Ester–urethane			PEUR		
Ether–*block*–amide	PEBA	PEBA	PEBA		
Ether ether ketone	PEEK		PEEK		
Ether–imide		PEI			
Ether–sulfone	PES	PES	PES		PES
	PESU				
Imide	PI	PI	PI		
Parabanic acid					PPA
Phenylene ether	PPE	PPE	PPE		PPO™
Phenylene sulfide	PPS		PPS		
Phenylene sulfone	PPSU	PPSU	PPSU		PSU
Silicone (plastics)	SI	SI	SI		
Sulfone	PSU	PSU	PSU		PSU
Urethane	PUR	PUR	PUR	PUR	
–, thermoplastic	TPUR				TPU
–, thermoset	TSUR				

E. ABBREVIATIONS FOR POLYMERS PRODUCED BY CHEMICAL TRANSFORMATION OF OTHER POLYMERS

Resulting polymer	ASTM	DIN	ISO	IUPAC	Other
Carboxymethyl cellulose	CMC	CMC	CMC	CMC	
Carboxymethyl hydroxyethyl cellulose					CMHEC
Casein, crosslinked with formaldehyde	CS	CS	CS	CS	
Cellulose, as Cellophan®	C				
–, coated with Saran	C*				
Cellulose acetate	CA	CA	CA	CA	
Cellulose acetobutyrate	CAB	CAB	CAB	CAB	
Cellulose acetopropionate	CAP	CAP	CAP	CAP	
Cellulose nitrate	CN	CN	CN	CN	NC
Cellulose plastics, unspecified	CE				
Cellulose propionate	CP	CP	CP	CP	
Cellulose triacetate	CTA	CTA	CTA		TA
Ethyl cellulose	EC	EC	EC	EC	
Hydroxyethyl cellulose					HEC
Hydroxypropyl cellulose					HPC
Hydroxypropyl methyl cellulose					HPMC
Methyl cellulose		MC	MC		
Poly(ethylene), chlorinated	CPE	PE-C	PE-C		
–, chlorosulfonated	CSM				CSR
Poly(ethylene-*co*-vinyl alcohol)		E/VAL	E/VAL		
	EVAL™				
					EVOH
Poly(propylene), chlorinated		PPC			
Poly(vinyl alcohol)	PVAL	PVAL	PVAL	PVAL	PVOH
Poly(vinyl butyral)	PVB	PVB	PVB		
Poly(vinyl chloride), chlorinated	CPVC	PVC-C	PVC-C		PC, PeCe
Poly(vinyl formal)	PVFM	PVFM	PVFM	PVFM	

F. ABBREVIATIONS FOR BLENDS, REINFORCED POLYMERS, ETC.

For mixtures of polymers, ISO recommends that the symbols for the parent polymers be put in parentheses, separated by a plus sign; for example, (PMMA + ABS) for a physical blend of poly(methyl methacrylate) and ABS.

ASTM recommends GP for "general purpose" and SS for "single stage".

Resulting polymer	ASTM	DIN	ISO	IUPAC	Other
Bulk molding compound					BMC
Elastomers, thermoplastic					
–,–, containing ester and ether groups	TEEE				
–,–, olefin-based	TEO				
–,–, styrene-based	TES				
Epoxide, glass fiber reinforced			EP-G		GEP
Plastic, carbon fiber reinforced		KEK			CFP
–, glass fiber reinforced					GFK
–, man-made fiber reinforced					CFK
–, metal fiber reinforced					MFK
Poly(acrylonitrile-co-styrene) + chlorinated poly(ethylene)					ACS[a]
Poly(styrene), rubber-modified	SRP	IPS			HIPS
Sheet molding compound					SMC
–, with high glass fiber content		HMC			

G. ISO CODES FOR THERMOPLASTIC MATERIALS

The standard designation of a thermoplastic material consists of

- a *description block* (giving the type of material),
- a *standard number block* (consisting of the number of the ISO standard or a national standard such as DIN), followed by a hyphen, and
- an *individual item block* (with five data blocks).

An example is

Molding material DIN 7744-PA 12, XF, 22-030, GF 30

The code letters are arranged after the symbol for the base polymer according to ISO and DIN; in the technical literature, however, they are commonly placed in front of the base symbol, following ASTM, which uses similar code letters and asterisks.

A designation system similar to the above ISO/DIN system has been recommended by ASTM. A typical ASTM designation, for example, would read

Molding material ASTM D-4000 PI000G42360

This molding material is a polyimide (PI), whose properties have been specified via cell table G of the ASTM standard D-4000. This particular cell table identifies five different properties by designating cell limits to the five digits following the letter G. According to cell table G, the "4" indicates a tensile strength of at least 85 MPa. The measured flexural modulus is characterized by "2", the Izod impact strength of 50 J/m by "3", and the heat deflection temperature of 300°C by "6". The fifth digit is undetermined; the "0" indicates an unspecified property.

1. Codes for ISO Data Blocks 1–5

1.1. ISO and DIN Codes for Data Block 1 *Data block* 1 of the individual item block contains the abbreviation of the chemical name of the material, e.g., PA 12 (see example). This abbreviation may be followed by analytical data with respect to the composition of the material; an example is the content of vinyl acetate units in ethylene–vinyl acetate copolymers. Such chemical structure data may be composition, such as content of vinyl acetate (VAC) or acrylonitrile units (AN), configuration as measured by isotacticity ("isotaxy") (IT), branching as revealed by density (D).

These analytical data are, however, not the exact analytical data but rather code numbers for the range (called "cell") which will permit this material to substitute for a similar one. Separated by a hyphen, other supplementary may be given too, e.g., H = homopolymer, P = plasticized, E = polymerized in emulsion, Q = mixture of different polymers, etc. (see ISO and DIN codes for data block 1).

Furthermore, ASTM uses * for saran coated polymer films and ** for metallized polymer films. The technical literature indicates biaxially oriented films by BO and oriented films by O (see Abbreviations in alphabetical order).

Code	ISO data block 1	DIN data block 1
A	–	–
B	Block copolymer	–
C	Chlorinated	Chlorinated
D	–	Density
E	Polymerization in emulsion	Expanded or expandable
F	–	Flexible or fluid (liquid state)
G	–	–
H	Homopolymer	High

Code	ISO data block 1	DIN data block 1
I	–	Impact resistant
J	–	–
K	–	–
L	–	Linear or low
M	Bulk polymerization	Medium or molecular
N	–	Normal or novolac
O	–	–
P	Plasticized	Plasticized
Q	Mixtures of different polymers	–
R	Random copolymer	Resol; formerly also: raised (enhanced)
S	Polymerization in suspension	–
T	–	–
U	Unplasticized	Ultra or unplasticized
V	–	Very
W	–	Weight (mass)
X	No indication	Crosslinked or crosslinkable
Y	–	–
Z	–	–

1.2. ISO Codes for Items in Data Block 2 *Data block* 2 may comprise up to four letters which give qualitative information. The first letter denotes the intended application, e.g., B = blow molding, G = general purpose, X = no indication (see example). The following letters 2, 3, and 4 can code up to three essential additives or supplementary information, for example, D = powder (dry blend), F = special burning characteristics (see example), L = light and weather stabilizer, etc.

Code	Position 1	Code	Positions 2–4
A	Adhesives	A	Antioxidant for processing
B	Blow molding	B	Antiblocking agent
C	Calendering	C	Colored
D	Disc manufacture	D	Powder (dry blend)
E	Extrusion (pipes, profiles, sheets)	E	Additive for expansion
F	Extrusion (films, foils)	F	Special burning characteristics
G	General purpose	G	Granules (pellets)
H	Coating	H	Heat aging stabilizer
K	Cable and wire insulation	K	–
L	Extrusion (monofilament)	L	Light and weather stabilizer
M	Injection molding	M	–
N	–	N	Natural (not colored)
P	Paste resin	P	Polymer modifier
Q	Compression molding	Q	–
R	Rotational molding	R	Mold release agent
S	Powder spray sintering	S	Slip agent, lubricant
T	Tape manufacture	T	Improved transparency
W	–	W	Stabilized against hydrolysis
X	No indication	X	–
Y	Textile yarn	Y	–
Z	–	Z	Antistatic agent

1.3. ISO Codes for Items in Data Block 3 *Data block* 3 contains quantitative information about the designated properties. Such properties include

Molar mass indicators	Intrinsic viscosity ("viscosity number")	IV
	Fikentscher's K value (viscosity-based quantity for PVC)	FK
Macrostructure data	Bulk density	BD
Rheological data	Melt flow rate (melt flow index)	MFR
Thermal data	Vicat temperature	VST
	Torsional stiffness temperature	TST
Mechanical properties	Modulus of elasticity	E
	Tensile stress at 100% strain	TS
	Shore hardness	SH
	Impact strength (notched)	ISN

Each material is characterized by one or more than one property. The following leading criteria are used for the various polymers:

Poly(ethylene)	D, MFR
Poly(propylene)	I, MFR
Poly(styrene) and acrylonitrile–styrene copolymer	VST, MFR
Styrene–acrylonitrile copolymer	VST, MFR, AN
Styrene–butadiene copolymer	VST, MFR, ISN
Acrylonitrile–butadiene–styrene, and acrylonitrile–styrene–acrylic acid copolymers	VST, MFR, ISN, AN
Ethylene–vinyl acetate copolymer	VAC, MFR
Poly(vinyl chloride)	IV, (FK), BD
Poly(vinyl chloride), unplasticized	VST, E, ISN
Poly(vinyl chloride), plasticized	TS, SH, TST
Polyamide	IV, E
Polycarbonate	IV, MFR, E
Poly(methyl methacrylate)	IV, VST
Poly(ethylene terephthalate)	IV

In the example for a polyamide 12, the code "22-030" of data block 3 indicates a polymer with an intrinsic viscosity of 210 ml/g ("cell 22"), and a modulus of elasticity of 280 MPa ("cell 030"). On the other hand, "20-D050" in data block 3 for a poly(ethylene) tested according to DIN 16776 means a material with a density within cell "020" (e.g., 0.918 g/cm^3) and a melt flow rate within the cell "050" (e.g., 4.2 g/min), measured under condition D (a temperature of 190°C under a load of 2.16 kg). The definition of cells for each material and testing procedure can be found in special tables.

1.4. ISO Codes for Extending and Reinforcing Fillers (Data Block 4) *Data block* 4 gives information about the type and content of fillers or reinforcing materials. The first

letter gives the type of filler: C = carbon, G = glass, etc. The second letter indicates the shape of the filler: F = fiber, S = spheres, etc. The third position is a code for the weight content of the filler, e.g., "30" for the "cell" (range) 27.5–32.5 wt.%.

Code	Position 1 (material)	Code	Position 2 (form or structure)
B	Boron	B	Balls, beads, spheres
C	Carbon	C	Chips, cuttings
D	–	D	Powder (dry blend)
E	Clay	E	–
F	–	F	Fiber
G	Glass	G	Ground, grinding stock
H	–	H	Whisker
K	Calcium carbonate	K	Knitted fabric
L	Cellulose	L	Layer
M	Mineral, metal	M	Mat (thick)
N	–	N	Non-woven (fabric, thin)
P	Mica	P	Paper
Q	Silicon	Q	–
R	Aramid	R	Roving
S	Synthetic, organic	S	Scale, flake (spheres: now B)
T	Talcum	T	Cord
V	–	V	Veneer
W	Wood	W	Woven fabric
X	Not specified	X	Not specified
Z	Others	Z	Others

1.5. ISO Codes for Data Block 5 *Data block* 5 is reserved for specifications based on individual agreements between supplier and customer. It may code additional requirements, restrictions, or supplemental information.

H. SPI CODES FOR THE RECYCLING OF PLASTICS

Number code	Letter code	Polymer
1	PETE	Poly(ethylene terephthalate)
2	HDPE	High-density poly(ethylene)
3	V	Vinyl chloride polymers
4	LDPE	Low-density poly(ethylene)
5	PP	Poly(propylene)
6	PS	Poly(styrene)
7	–	All other plastics, including multilayered materials

I. RECOMMENDED ABBREVIATIONS AND ACRONYMS FOR NAMES OF ELASTOMERS

Names of elastomers are listed in alphabetical order of the names of their monomers, regardless of their proportions. A "PM" indicates an after-treatment of the polymer; "Other" refers to old or often used "unofficial" abbreviations; # indicates that the abbreviation is recommended by IUPAC.

Monomers (incl. after-treatment of PM)	ASTM	BS	ISO	Other
Acrylic ester + acrylonitrile	ANM			
Acrylic ester + butadiene	ABR#			AR
Acrylester (+ saturated vulcanizable comonomer)	ACM			
Acrylonitrile + butadiene	NBR#			GR-N
–, PM contains carboxylic groups	XNBR			
–, PM is hydrogenated				H-NBR
Acrylonitrile + butadiene + styrene, PM contains COOH groups	XABS			
Butadiene	BR#			BP, CBR
Butadiene + styrene	SBR#	SBR		GR-S
Butadiene + styrene, PM contains COOH groups	XSBR			
Butadiene + styrene, elastomeric triblock copolymers	YSBR			SBS
Butadiene + styrene, elastomeric block copolymers with COOH groups	YXSBR			
Butadiene + 2-vinylpyridine	PBR#			
Butadiene + 2-vinylpyridine + styrene	PSBR			
Chloroprene	CR#	CR		
Chloroprene + acrylonitrile	NCR#			
Chloroprene + styrene	SCR#			
Cyclooctene (*trans* polymer)				TOR
Cyclopentene (*trans* polymer)				TPA, TPR
Epichlorohydrine	CO#		CO	CHR
Epichlorohydrine + ethylene oxide	ECO			CHC
Ethylene (PM postchlorinated)	CM			
Ethylene (PM perchlorosulfonated)	CSM	CSPR		CSR
Ethylene + acrylic ester	EAM			
Ethylene + ethyl acrylate	EEA		E/EA	
Ethylene + propylene	EPM	EPR	EPM	AP
Ethylene + propylene + non-conjugated diene	EPDM	EPTR		APT, EPT
Ethylene + vinyl acetate	EVM			
Ethylene + tetrafluoroethylene				ETFE
Fluorinated carbon chains (substituents: fluoroperfluoroalkyl-, perfluoroalkoxy-)	FKM		FPM	
Hexafluoropropylene + tetrafluoroethylene				FEP
Hexafluoropropylene + vinylidenefluoride	FPM			
Isobutylene	PIB#	PIB	PIB	PIS

Monomers (incl. after-treatment of PM)	ASTM	BS	ISO	Other
Isobutylene + isoprene	IIR#	Butyl		GR-I, PIBI
Isobutylene + isoprene (postbrominated PM)	BIIR			
Isobutylene + isoprene (postchlorinated PM)	CIIR			
Isoprene (natural rubber)	NR#			NK
Isoprene (natural rubber, easy-processing)				SP
Isoprene (natural rubber, standardized Indonesian)				SIR
Isoprene (natural rubber, standardized Malaysian)				SMR
Isoprene (natural rubber, technical classification)				TC
Isoprene (synthetic rubbers)	IR#	IR		CPI, PIP
Isoprene (chlorinated PM)				RUC
Isoprene + acrylonitrile	NIR			
Isoprene + styrene	SIR#			
Isoprene + styrene (triblock copolymer)				SIS
Isoprene + styrene (hydrogenated triblock copolymer)				SEBS
Norbornene				PNR
Phosphonitrile dichloride, with fluorine-containing substituents				PNF
Propylene oxide	PO			OPR
Propylene oxide + allylglycidyl ether	GPO			POR
Silicone with fluoro substituents	FQ			
Silicone with fluoro + methyl substituents	FMQ		MFQ	
Silicone with fluoro + methyl + vinyl substituents	FVMQ			
Silicone with methyl substituents	MQ			
Silicone with phenyl substituents	PQ			
Silicone with phenyl + methyl substituents	PMQ		MPQ	
Silicone with phenyl + vinyl + methyl substituents	PVMQ		MPVQ	
Silicone with vinyl substituents	VQ			
Silicone with vinyl + methyl substituents	VMQ		MVQ	
Sulfides (thioplastics)				T, TR, OT
Tetrafluoroethylene + trifluoronitrosomethane + nitrosoperfluorobutyric acid (nitroso rubber)	AFMU			CNR
Urethane elastomers	UE	UR		
Urethane elastomers with polyester segments	AU		AU	
Urethane elastomers with polyether segments	EU		EU	
Urethane–polyester elastomers, crosslinkable by isocyanates	AU-I			
Urethane–polyester elastomers, crosslinkable by peroxides	AU-P			
Vinylidenefluoride + hexafluoropropylene	FPM		FPM	
Tetrafluoroethylene + perfluoralkylvinyl ether				PFA
Thermoplastic elastomers, in general	TPEL			TPE, TPR
Thermoplastic olefin elastomers				TPE-O, TPO
Thermoplastic elastomers on basis styrene–diene				TPE-S
Thermoplastic elastomers on basis ester				TPE-E
Thermoplastic elastomers on basis ether–amide				TPE-A

The following abbreviations are also used. ICR: rubber from undiluted latex of natural rubber (initial concentration rubber); OER: oil-extended rubber; RTV: room temperature vulcanization.

J. ABBREVIATIONS FOR TEXTILE FIBERS*

	Short Name		Abbreviation		
Name	ISO	FTC	DIN	ASTM	ETG
NATURAL PROTEIN FIBERS (SILK)					
Mulberry spinner (*Bombyx mori L.*)			Ms		SE
Tussah					Ts
NATURAL PROTEIN FIBERS (WOOL)					
Alpaca (*Llama pacos*)			Ap		WP
Angora rabbit ("Angorakaninchen")			Ak		WA
Beaver					"'B

* ISO: International Standardization Organization; FTC: US Federal Trade Commission; DIN: German Standards (Deutsches Institut für Normung), DIN 60001; "..." indicates the German word from which the abbreviation or acronym was derived; ASTM: American Society for Testing and Materials; ETG: European Textile Characterization Law.

Name	Short Name ISO	Short Name FTC	Abbreviation DIN	Abbreviation ASTM	Abbreviation ETG
Cashmere goat ("Kaschmir-Ziege")			Kz		WS
Guanaco					WU
Llama			Lm		WL
Mohair			Mo		WM
Otter					WT
Sheep			Wo		WO
–, virgin wool					WV
Vicuna			Vi		WG
Yak					WY
NATURAL PROTEIN FIBERS (HAIRS)					
Camel ("Kamel")			Km		WK
Cow ("Rind")			Ri		
Goat ("Haar der Ziege")					Hz
Hare ("Hase")					Hs
Horse ("Rosshaar")			Rh		
Human ("Haar")					HA
Rabbit ("Kaninchen")			Kn		
Tibetan goat ("Tibetziege")					Tz
NATURAL CELLULOSE FIBERS (TEXTILE FIBERS)					
Cotton ("Baumwolle")			Bw		CO
Flax			Fl		LI
–, linen					LI
–, half-linen					HF
Ramie			Ra		RA
NATURAL CELLULOSE FIBERS (HARD FIBERS AND OTHERS)					
Alfalfa					AL
Broom ("Ginster")					GI
Calatropis			An		
Coir ("Kokos")			Ko		CC
Esparto grass (*alfa*)			Ag		
Hemp (*Cannabis*)					CA
–, Bombay (Sunn hemp)			Su		SN
–, Manila (Abaca)			Ma		AB
Henequen (Agave)			He		
Jute			Ju		JU
Kapok			Kp		KP
Kenaf			Kf		KE
Maguey					MG
Mauritius fiber (Fique)			Fi		
Moss, American			Tl		
Phormium (New Zealand flax)			Nf		
Rosella			Ro		
Sisal			Si		SI
Urena			Ur		
REGENERATED POLYSACCHARIDE FIBERS					
Alginate			AL		AG
Cellulose	Cupro	Cupra (rayon)	CC		CU
	Viscose	Rayon	CV		VI
	Modal	Rayon			MD
	Deacetylated Acetate	Rayon			
Cellulose 2 1/2 acetate	Acetate	Acetate	CA	CA	AC
Cellulose triacetate	triacetate	triacetate	CT	CTA	TA
REGENERATED PROTEIN FIBERS					
Ardein fibers			AR		
Casein fibers			KR		CS
Regenerated protein fibers, in general	Protein	Azlon			PR
Zein fibers			ZE		

	Short Name		Abbreviation		
Name	**ISO**	**FTC**	**DIN**	**ASTM**	**ETG**
SYNTHETIC FIBERS					
Elastodiene fibers			LA	EU	EL
Fluoro fiber					FL
Poly(acrylonitrile)	Acrylic	Acrylic	PAC	PAN	PAN
Poly(acrylonitrile), copolymeric	Modacrylic	Modacrylic	PAM		MA
Polyamide, aliphatic	Nylon, Polyamide	Nylon, Polyamide	PA	PA	PA
Polyamide, aromatic	Aramide	Aramide			
Polyester [poly(ethylene terephthalate]	Polyester	Polyester	PES	PET	PL
–, [from ethylene glycol, terephthalic acid and *p*-hydroxybenzoic acid]			PEE		
Poly(ethylene)	Polyethylene	Olefin	PE	PE	PE
Poly(propylene)	Polypropylene	Olefin	PP	PP	PP
Poly(styrene) (>88% sty)			PST		
Polyurea			PUA		PB
Polyurethane			PUR	PUR	PU
–, segmented	Elastan	Spandex	PUE		EA
Poly(vinyl alcohol)	Vinylal	Vinal	PVA		VY
Poly(vinyl chloride) (>85% VC)	Chlorofiber		PVC		
Poly(vinyl chloride), copolymeric	Chlorofiber	Vinyon	PVM		
Poly(vinylidene chloride), copolymeric	Chlorofiber	Saran	PVD		
Trivinyl fiber					TV
INORGANIC FIBERS					
Asbestos			As		AS
Glass	Glass	Glass	GL		GL
Metal			MT		ME
Mineral (rock wool)			ST		
Slag wool			SL		
OTHER FIBERS					
Unspecified fibers					AF
Unknown fibers					TR

Chemical Abstract Registry Numbers and Online Database Searching for Polymer Literature

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The advent of computerized database searching for polymer literature has made locating technical information both easier and harder. While computers greatly increase the speed and completeness of a search, the algorithms and conventions used are often quite different from those used for hardcopy (paper) indexes. The following discussion and tables give basic information needed to start identifying and searching the most common polymers in the most used databases and paper indexes.

A. NOMENCLATURE

The *Common Name* is the name used by many scientists and engineers, and is used for listing polymers in catalogs such as Aldrich, and engineering indexes such as Engineering Index. Various other common *Synonyms* or *Trade Names* are also listed in the table and used in the literature. The *Chemical Abstracts (CA) Index Name* is the most recent name used by Chemical Abstracts Service (CAS). In general, Chemical Abstracts follows IUPAC guidelines when naming polymers. The *CAS Registry Number* (CAS Reg. No.) is a unique identifying number given to each of the 18 million chemical compounds CAS has indexed. The *Molecular Formula* is the formula for the smallest repeating unit of the polymer. In some cases, such as cellulose, the exact molecular formula is not known.

B. CAS REGISTRY NUMBERS

CAS Registry Numbers provide a consistent method of identifying and searching for polymers in literature databases, and have been used to develop the table in this section. CAS indexes the chemical and chemical engineering literature from about 80000 worldwide journals, conference papers, books, and patent literature.

The way that CAS (or IUPAC) names a compound is often very different from that used in scientific journals or the popular press. Polyethylene provides an excellent example of this problem. The name in CA is currently Ethene, homopolymer. CAS used to index it under Ethylene, polymers. Over 2000 synonyms or trade names are listed for polyethylene compounds, ranging from Alathon (registered trademark of the Lyondell Petrochemical Company) to Suzulon (a tradename used by Aicello Chemical Corporation, but not trademarked). As CAS understates in its publication, "Polymer Searching", "Unfortunately, naming conventions for polymers have not achieved widespread understanding, and molecular formulas are not unique search terms." CAS Registry Numbers are used not only by CAS in their database indexing but by the US Federal Government in their Toxic Substances Inventory, by the US Department of Transportation for regulating transport of chemicals, and by other indexes such as Merck and Aldrich. They are the most precise and unique compound identification.

Authors of polymer literature may not always be able to report the precise structure of their materials. However, they usually do report the monomers used in the polymerization. Thus, while polymers are represented in two ways, as monomers and by final structure (Structural Repeating Unit or SRU), the primary registration of a polymer is by its component monomers. The Registry Number for most

polymers in the table can be used to find the component Registry Numbers for their corresponding monomers. Similarly, the Registry Number for copolymers will lead to the monomer registry numbers. Searching just by the SRU, the homopolymer, or the copolymer number will not retrieve a complete citation list.

C. INDEXING AND CAS REGISTRY NUMBER ASSIGNMENT

Chemical Abstracts assigns Registry Numbers to polymers based on both their monomers and their final structure. The table here usually lists the Registry Number for the homopolymer or copolymer. However, searches that use only one Registry Number for a polymer are often incomplete. Polymers based on more than one monomer should be searched using all the component monomers. All the copolymer references of a specific monomer can be found by searching the monomer's Registry Number. The polymers having the same final structure can be found by searching the final structure's Registry Number.

Some compounds are so well characterized that they do not follow the rules and are indexed only under their structural repeating unit (SRU). These are marked (R) in the table and include common polymers such as Nylon 6 or PET. Some polymers are not indexed by registry numbers at all but only by subject. These include tung oil, cellulose, and linseed oil, which are marked (S) in the table. These materials are exceptions and, in most searching, registry numbers must be used in the CAS online files. Some registry numbers in the Registry File are marked with an asterisk (*). STN gives the message on-line that these "represent substances of unknown or variable composition, complex reaction products, or biological substances that do not meet the criteria for Chemical Abstracts indexing". These substances generally have been registered for regulatory agencies and receive a CA Index Name. Searching these substances in STN files can be done by using the Registry Number(s) from the record, terms derived from the name, terms that are more or less specific than those in the name (which may include other CAS Registry Numbers), or associated trade names. Every likely term should be tried, and additional help should be sought if other references seem likely.

Section E gives the common names and CA Registry Numbers for a number of important polymers. A list of Registry Numbers in numerical order with their corresponding names is available from the authors. Additional synonyms and trade names are provided, as are the CA Index names. Molecular formulae are provided, and can be helpful in searching with structural-related databases. The Search Guide indices have the following meanings:

S search by CA Index names as a subject in the citation file
* search using every likely term – Registry Numbers, name, synonyms, etc.
R search by Registry Numbers for components, copolymers, SRU's
U search using the single Registry Number provided.

The CAS database system is available commercially, most commonly through STN (1-800-848-6538) and Dialog (1-800-334-2564). Most academic and industrial libraries have ready access to these systems and may be consulted for assistance. For illustrative purposes, searches from each system are demonstrated here. The logic of searching each system is the same, but commands and features can vary. For more information about online searching, consult a librarian or the database vendors. The Chemical Abstracts Service book, "Searching for Polymer Information in CAS Online", American Chemical Society, Chemical Abstracts Service, 1990, p. 173, is the best starting source for polymer information within Chemical Abstracts. It may be ordered by calling the STN toll-free number or using the web page.

D. EXAMPLE SEARCHES

1. Example of a Search Using the Polymer CAS Registry Number

The first step in a CA search is to identify the registry numbers. Section E lists registry numbers for many common polymers. The Registry Number for poly-(acrylamide) is 9003-05-8. Leading zeros should be disregarded when searching online, for example, search 009003-05-8 as 9003-05-8. Using the CA Registry Number to search the chemical compound registry file would return the following information (Fig. 1) from the Dialog database. The Dialog File number at the beginning of each output refers to a specific work session for the user. This particular database provides the molecular formula, related CAS Registry Numbers, the CA name, a list of synonyms including tradenames, the CA Registry Number for the monomer, and the number of literature references over the specified time interval.

2. Example of a Search Using the Monomer CAS Registry Number

The CAS Registry Number for the monomer from the previous example, acrylamide, is 79-06-1. Searching by the component Registry Number in the Registry File gives the following record (Fig. 2).

3. Example of a Combined Search

The results of both searches (polymer and monomer CAS Registry Numbers) would be combined to generate a more complete listing of the literature. The following answers (Fig. 3) are found by searching the abstracts file for CA (399 on Dialog) with the monomer and polymer Registry Numbers.

Searching by the homopolymer Registry Number (RN), 9003-05-8, produced most citations. However, over 6000 additional articles containing information about the monomer would have been missed if the monomer Registry Number, 79-06-1, had not been used. Some of these may contain needed information about the polymer. Only 539 articles were indexed using both Registry Numbers.

(Dialog File 398)
CAS REGISTRY NUMBER: 9003-05-8 (POLYMER)
MOLECULAR FORMULA: (C3H5NO)x
REPLACED CAS REGISTRY NUMBER(S): 9082-06-8 12624-24-7 25038-45-3 27754-57-0 33338-03-3 39355-07-2 39387-77-4 51312-40-4 57679-11-5 68247-81-4 72270-86-1 79079-15-5 104981-89-7 114265-35-9 143180-09-0 143180-13-6 143180-22-7
CA NAME(S):
HP = 2-Propenamide (9CI)
NM = homopolymer
HP = Acrylamide (8CI)
NM = polymers
SYNONYMS: Acrylamide homopolymer; Acrylamide polymer; Alcoflood 1175; Alcoflood 935; American Cyanamid KPAM; American Cyanamid P 250; AMF; Aminogen PA; AP 273; Aron F 40; BanDrift; Boze Floc N 46BT; Calgon 470; Calgon 800; Cogum 20P; Cogum 25H; Cyanamer N 300LMW; Cyanamer P 250; Cyanamer P 35; Cytame 5; Diaclear MA 3000H; Diaclear MN 3000H; DK Dry Capsule ESP; Dow ET 597; Dow J 100; Dow 164; DP 1916; DP 9-6193; Drew Floc 41; E 936; ET 597; Flygtol GB; Formula 358; Gelamide 250; Get-Down ; GPA-u; Himoloc OK 507; Himoloc SS 200; Hiset P 700; Hyset P 700SN; Instar NS; J 100; J 100(polymer); K 4; K 4(acrylic polymer); K-PAM; KAL 13; KW 677; Magnifloc 900N; Maquat 100; Migunon NS; Mirbane 301; Nalco Lp 3033; Nalco 7871; Nalco 8871; NL; P 250; P 250(polymer); P 300; P 300(polyacrylamide); PAA 1; PAA 70L; PAM; PAM 50; PAM(homopolymer); Pamid; PC 305; Percol 333; Plex 4847D; Polias 320; Polyacron KR 143; Polyacrylamide; Polyacrylamide resin; Polyhall 2J; Polyhall 5J; Polymerset C 305; Polysic; Polystron 117; Polystron 145; Polystron 191; Polystron 194-7; Pomosist 117; Praestol 2800; Praestol 2810/73; Praestol 6000; Sanpoly A 520; Santac SP 66; Santac SP 67; Seabetter AD; Sedipur TF; Sedipur TF 514; Sepaflux CE 5174; Solidokoll K; Solvitose 433; Stargum AD-S; Stokopol D 2624; Sumifloc FN 10H; Sumirez A 17; Sumirez A 27; Sursolan P 5; Texapret AM; Tulsepar PNS 1; TY 007; Versicol W 11; Versicol W 17; Versicol W 25; Versicol WN 15; Viterra II ; X-Coat P 130C; X-Coat P 180S; Zonen A; 2J; 3330s; 38F
COMPONENT CAS REGISTRY NUMBER(S):
(79-06-1)

Component RN	Component Molecular Formula
1) 79-06-1	C3H5NO

SUBFILE: CHEMNAME 13873 LITERATURE REFERENCE(S) IN FILE 399.
LAST UPDATE: 199611

Figure 1. Dialog database output from searching CAS Registry No. 9003-05-8.

CAS REGISTRY NUMBER: 79-06-1
MOLECULAR FORMULA: C3H5NO
CA NAME(S):
HP = 2-Propenamide (9CI)
HP = Acrylamide (8CI)
SYNONYMS: Acrylic amide; Ethylenecarboxamide; Propenamide; Vinyl amide
SUBFILE: CHEMNAME 6574 LITERATURE REFERENCE(S) IN FILE 399.
LAST UPDATE: 199608

Figure 2. Dialog database output from searching CAS Registry No. 79-06-1.

```
Set Items Description
.... ..... .........
?s rn=9003-05-8
  S1   14051 RN=9003-05-8
?s rn=79-06-1
  S2   6622 RN=79.06-1
?s s1 or s2
     14051 S1
     6622 S2
  S3   20134 S1 OR S2
?s s1 and s2
     14051 S1
     6622 S2
  S4   539 S1 AND S2
```

Figure 3. Dialog database output from combining the polymer and monomer searches.

4. Example of a Copolymer Search

Poly(acrylonitrile-*co*-butadiene) is a common commercial product. The STN database was searched for this copolymer, using its CAS Registry Number along with those of the monomers. The search method is similar to that for homopolymers; the copolymer and the two monomers are searched separately, and the results are combined. Some records have been edited for clarity and conciseness. In Fig. 4, component 1 is acrylonitrile and component 2 is butadiene.

```
(STN Registry File)

L1 ANSWER 1 OF 1 REGISTRY COPYRIGHT 1997 ACS
RN ***9003-18-3*** REGISTRY
CN 2-Propenenitrile, polymer with 1,3-butadiene (9CI) (CA INDEX NAME)
OTHER CA INDEX NAMES:
CN 1,3-Butadiene, polymer with 2-propenenitrile (9CI)
CN 1,3-Butadiene, polymer with acrylonitrile (8CI)
CN Acrylonitrile, polymer with 1,3-butadiene (8CI)
OTHER NAMES:
CN 1,3-Butadiene-acrylonitrile copolymer
CN 1,3-Butadiene-acrylonitrile polymer
CN Acrylonitrile-1,3-butadiene copolymer
(30 other chemical names or synonyms or trade names are listed)
MF (C4 H6 . C3 H3 N)x

  CM 1 (Component One)

  CRN 107-13-1 (Component Registry Number)
  CMF C3 H3 N (Component Molecular Formula)

  CM 2 (Component Two)

  CRN 106-99-0 (Component Registry Number)
  CMF C4 H6 (Component Molecular Formula)
```

Figure 4. STN database output from a copolymer search.

Searching by the two component Registry Numbers given above, (107-13-1, acrylonitrile; 106-99-0, butadiene), gives the following records in the Registry File (Fig. 5).

Figure 6 shows the output when all the separate searches (Figs. 4 and 5) are combined. Search strings for each command are shown.

In this case, there are fewer articles for the copolymer (9003-18-3) than for either of the component monomers individually. On the other hand, 550 citations have the two components together, with very little overlap between that set and the copolymer. This once again illustrates the importance of including the monomers to get a complete search in CA files online.

A similar search in the paper version of CA could be done by finding the latest CA name for the homopolymer or copolymer and all related monomers in the Chemical Substance Index, and then referring to the abstracts. The Chemical Substance Index also lists the Registry Numbers for all compounds indexed, and should be checked prior to online work.

Additional search methods include using the trade name, chemical name, and molecular formula in the Registry File to start the search for a polymer Registry Number. The table gives a starting point for common polymers, but with over 700000 polymeric entries, it is impossible to list them all.

```
L2 ANSWER 1 OF 2 REGISTRY COPYRIGHT 1997 ACS
RN ***107-13-1*** REGISTRY
CN 2-Propenenitrile (9CI) (CA INDEX NAME)
OTHER CA INDEX NAMES:
CN Acrylonitrile (8CI)
OTHER NAMES:
CN Acrylon
CN Carbacryl
CN Cyanoethene
CN Cyanoethylene
CN Fumigrain
CN Propenenitrile
CN VCN
CN Ventox
CN Vinyl cyanide

L2 ANSWER 2 OF 2 REGISTRY COPYRIGHT 1997 ACS
RN ***106-99-0*** REGISTRY
CN 1,3-Butadiene (8CI, 9CI) (CA INDEX NAME)
OTHER NAMES:
CN .alpha.,.gamma.-Butadiene
CN Biethylene
CN Bivinyl
CN Butadiene
CN Butadiene-1,3
CN Divinyl
CN Erythrene
CN Vinylethylene
MF C4 H6
```

Figure 5. STN database output of comonomer searches.

```
(File CA on STN)

=> s 9003-18-3
L3   7648 9003-18-3
=> s 107-13-1
L4   16353 107-13-1
=> s 106-99-0
L5   12917 106-99-0
=> s l4 and l5
L6   550 L4 AND L5
=> s l3 and l6
L7   19 L3 AND L6
```

Figure 6. STN database output from a combined search for a coplymer and its monomers.

5. Example of an Engineering Database Search

Searching the engineering databases is a less formidable task. In most cases, the searches for polymers are started using the common names of the compound. The indexing of the answer set is then evaluated for other terms to use. The following search is from the Engineering Index (file 8) on Dialog (Fig. 7).

```
  Set Items Description
  ... ..... .........
?s polyoxymethylene (compound entered as one word)
  S1   396 POLYOXYMETHYLENE
?s poly()oxymethylene (compound entered as two words)
     39391 POLY
       155 OXYMETHYLENE
  S2   87 POLY()OXYMETHYLENE
?s s1 or s2
     396 S1
      87 S2
  S3   459 S1 OR S2
?t 1/8/1

1/8/1
DIALOG(R)File 8:(c) 1997 Engineering Info. Inc. All rts. reserv.

04628455
Title: Hybrid effects on mechanical properties of polyoxymethylene
Descriptors: *Polymers; Fracture toughness; Strain rate; Tensile strength;
Bending strength; Impact resistance; Elastic moduli
Identifiers: Polyoxymethylene; Hybrid strength; Impact strength;
Flexural modulus

2/8/2
DIALOG(R)File 8:(c) 1997 Engineering Info. Inc. All rts. reserv.

04572617
Title: Spatially resolved in situ analysis of polymer additives by
two-step laser mass spectrometry
  Descriptors: *Additives; Polyvinyl chlorides; Polypropylenes;
Polyethylene terephthalates; Composition effects; Desorption; Stabilizers
(agents); Carbon dioxide lasers; Laser ablation; Antioxidants
  Identifiers: Polyoxymethylene; Hydroxyphenylbenzotriazole; Polymer
additives
```

Figure 7. Engineering Index output for poly(oxymethylene).

In this case, poly(oxymethylene) is indexed as one word so the search term was appropriate to this database. The two-word search (S2 and S3) was taken from the authors' abstracts, which are searched automatically in this database (unlike in CAS files).

6. Example of a Search with Punctuation in the Polymer Name

Poly(L-proline) is a more difficult search because most databases do not index punctuation. In this case, the compound is entered as if it were three words. In the first search, each word is specified to be in that specific order (adjacent to each other). This search yielded 26 hits (Fig. 8), but the specific records show that the term was found just in the abstract, not in the indexing. Searching by the broader term "polypeptides" would get a larger, less specific, answer set since any polypeptide could be included. The database also shows that "polypeptides" has been an index term since 1977.

Searching poly(L-proline) as three separate words would pull the terms from anywhere in the database record. This method gives more answers than the first search strategy (Fig. 9) but less than the broad polypeptide search.

7. Example of an Engineering Materials Abstracts Search

Similar strategies of searching chemical names and checking indexing should be used for other engineering databases such as Engineering Materials Abstracts. A search of the word, nylon, retrieves a larger answer set than the search of the sequence, nylon 6 (Fig. 10). A check of the indexing determines that nylon 6 is a valid term and would be a more specific, focused search on the topic.

Chemical Abstracts, Engineered Materials, Engineering Index, and other indexes such as Current Contents or the National Technical Information Service are available online through many vendors, on CDROM, at libraries, and over the Internet, via accounts with security and passwords. They are still available in paper copy at many libraries. Before doing any kind of literature search, the researcher must first decide how much information is needed, for what time period, what limits such as language or type of material are to be applied, and how much time is to be devoted to the search. Then each resource can be evaluated for what is covered and how it is indexed so that the proper tools will be used. Finding information is a lot like doing an experiment. Many paths can be explored and different techniques are tried until the researcher is satisfied.

8. Example of a Polymer Trademark Search

A trademark is either a word, phrase, symbol or design, or combination of words, phrases, symbols or designs, which identifies and distinguishes the source of the goods or services of one party from those of others. US trademark rights arise from either (a) actual use of the mark, or (b) the filing of a proper application to register a mark in the Patent

```
?s poly()l()proline
     39391 POLY
     71166 L
       259 PROLINE
  S7   26 POLY()L()PROLINE
?t 7/5

7/5/1
DIALOG(R)File 8:Ei Compendex(R)
(c) 1997 Engineering Info. Inc. All rts. reserv.

03979891 E.I. No: EIP94112411957
Title: Optical activity measurements in solids 7. Polylactides and poly (
beta -hydroxybutyrates)
   Author: Bartus, Jan; Weng, Dexi; Vogl, Otto
   Corporate Source: Polytechnic Univ, Brooklyn, NY, USA
   Source: Polymer International v 34 n 4 Aug 1994. p 433-442
   Publication Year: 1994
   CODEN: PLYIEI ISSN: 0959-8103
   Language: English
   Document Type: JA; (Journal Article) Treatment: X; (Experimental)
   Journal Announcement: 9412W4
   Abstract: The optical activities of poly-(R)-lactide, poly-(S)-lactide,
poly(beta -hydroxybutyrate) and two beta -hydroxyvalerate copolymers were
measured in solution, as solid powders in suspension, and where possible,
as films. Poly-(plus)-3-methyl-1-pentene was also reinvestigated. In some
cases the specific rotation values of powder samples showed significant
differences from the values of the solution measurements. The discrepancies
of the data observed seem to reflect the local environment of the polymer
chains in supermolecular assemblies and consequently the solid state
structure (morphology) of the polymers. The circular dichroism (CD) spectra
of the polymers were also measured in solution and in the form of their
films. For comparison, the CD spectra of the naturally occurring protein
casein and of the synthetic polypeptide poly-(L)-proline were also
measured. (Author abstract) 21 Refs.
   Descriptors: *Polymers; Optical variables measurement; Powders; Plastic
films; Molecular structure; Morphology; Proteins; Casein; Polypeptides;
Sodium compounds
   Identifiers: Polylactides; Polyhydroxybutyrates; Circular dichroism

?s polypeptides
  S1   1783 POLYPEPTIDES (January 1977)
```

Figure 8. Engineering Index output for an adjacent word search.

```
?s poly and l and proline
     39391 POLY
     71166 L
       259 PROLINE
  S8   39 POLY AND L AND PROLINE

Title: Synthesis of crosslinked poly(vinyl alcohol) with L- proline
pendant as the chiral stationary phase for resolution of amino acid
enantiomers
   Abstract: The porous crosslinked poly (vinyl alcohol) beads with the L
-proline pendant was synthesized as the chiral stationary phase (CSP) for
ligand-exchange chromatography of amino...

...and triallyl isocyanurate as a crosslinker, methanolysis of the
copolymer, glycidylation of the formed crosslinked poly (vinyl alcohol),
and final functionalization with L-proline. After the polymer with the
chiral ligand was complexed with copper(II) cations, it was...
```

Figure 9. Engineering Index output for a general word search.

```
?s nylon
  S7   3241 NYLON
?s nylon()6
     3241 NYLON
     18621 6
  S8   1615 NYLON()6

t 8/8/1
   Engineering composites with nylon 6 matrix.
   Descriptors: Conference Paper; Nylon 6- Composite materials;
Styrene
butadiene resins- Composite materials; Thermoplastic elasto-
mers-
   Mechanical properties; Tensile strength; Impact strength
   Section Headings: D2 Materials Development
   Subfile: P Polymers
```

Figure 10. Engineering Materials Abstracts output.

ALATHON Stylized Letters
INTL CLASS: 1 (Chemicals)
U.S. CLASS: 6 (Chemicals and Chemical Compositions)
STATUS: Renewed
SERIAL NO.: 71-569,356
REG. NO.: 543,580
REGISTERED: June 12, 1951
PUBLISHED: March 13, 1951
ORIGINAL REGISTRANT: E.I. DU PONT DE NEMOURS AND COMPANY (Delaware Corporation), 1007 MARKET STREET, WILMINGTON, DE (Delaware), USA (United States of America)
3RD NEW OWNER ENTERED AFTER REGISTRATION: OCCIDENTAL CHEMICAL 2400, HOUSTON, TX (Texas), 77046, USA (United States of America)
RENEWAL OWNER: (New Samek Corporation), 5 GREENWAY PLAZA, SUITE
Renewed: June 12, 1971^RENEWAL OWNER: OCCIDENTAL CHEMICAL CORPORATION (New York Corporation), 5 GREENWAY PLAZA, SUITE 2400, HOUSTON, TX (Texas), 77046, USA (United States of America)
Renewed: June 12, 1991
ASSIGNEE(S): CHASE MANHATTAN BANK, THE (NATIONAL ASSOCIATION)
AS
AGENT FOR THE BANKS
Assignor(s): CAIN CHEMICAL INC. (Delaware Corporation)
Reel/Frame: 0564/0786
Recorded: June 8, 1987
Brief: SECURITY INTEREST
ASSIGNEE(S): CAIN CHEMICAL INC. (Delaware Corporation), ELEVEN GREENWAY PLAZA, SUITE 2700, HOUSTON, TX (Texas), USA (United States of America)
Assignor(s): E. I. DU PONT DE MEMOURS AND COMPANY (Delaware Corporation), 1007 MARKET ST., WILMINGTON, DE (Delaware).
USA
(United States of America)
Reel/Frame: 0574/0432
Acknowledged: June 9, 1987
Recorded: August 24, 1987
Brief: ASSIGNS THE ENTIRE INTEREST AND GOOD WILL
ASSIGNEE(S): CAIN CHEMICAL INC. (Delaware Corporation)
Assignor(s): CHASE MANHATTAN BANK, THE (NATIONAL
ASSOCIATION),
AS AGENT
Reel/Frame: 0648/0279
Recorded: December 19, 1988
Brief: RELEASE BY SECURED PARTY OF THE SECURITY AGREEMENT RECORDED ON JUNE 8, 1987, AT REEL 0564, FRAME 786.
ASSIGNEE(S): OXY PETROCHEMICALS INC.
Assignor(s): CAIN CHEMICAL INC. (Delaware Corporation)
Reel/Frame: 0738/0721
Recorded: June 14, 1990
Brief: CHANGE OF NAME EFFECTIVE SEP. 21, 1989
ASSIGNEE(S): OCCIDENTAL CHEMICAL CORPORATION (New York Corporation), FIVE GREENWAY PLAZA, SUITE 2400, HOUSTON, TX (Texas), USA (United States of America)
Assignor(s): OXY PETROCHEMICALS INC. (Delaware Corporation), FIVE GREENWAY PLAZA, SUITE 2500, HOUSTON, TX (Texas), USA (United States of America)
Reel/Frame: 0738/0728
Recorded: June 14, 1990
Brief: ASSIGNS THE ENTIRE INTEREST AND GOOD WILL
ASSIGNEE(S): LYONDELL PETROCHEMICAL COMPANY (New York Corporation), 1221 MCKINNEY ST., SUITE 1600, HOUSTON, TX (Texas), 77010, USA (United States of America)
Assignor(s): OCCIDENTAL CHEMICAL CORPORATION (New York Corporation)
Reel/Frame: 1434/0830
Recorded: February 13, 1996
Brief: ASSIGNS THE ENTIRE INTEREST AND GOOD WILL

Figure 11. Trademark database search for Alathon.

and Trademark Office (PTO) stating that the applicant has a bonafide intention to use the mark in commerce regulated by the US Congress. Federal registration is not required to establish rights in a mark, nor is it required to begin use of a mark. However, federal registration can secure benefits beyond the rights acquired by merely using a mark. For example, the owner of a federal registration is presumed to be the owner of the mark for the goods and services specified in the registration, and to be entitled to use the mark nationwide. There are two related but distinct types of rights in a mark: the right to register and the right to use. Generally, the first party who either uses a mark in commerce or files an application in the PTO has the ultimate right to register that mark. The PTO's authority is limited to determining the right to register. The right to use a mark can be more complicated to determine.

Information on polymer trademarks can be found by searching in trademark databases on Dialog. The search is complicated because a name may be trademarked in one country, and yet not in another. Trademarks may be sold, or they may be assigned by one business to another.

A search for Alathon, a registered trademark for polyethylene, is given as an example (Fig. 11). Dialog's trademark scan software provides a description of the goods or services the trademark describes, gives the trademark status, the application number, the registration number and type, and the dates of the action. Previous owners or assignees of the trademark can be identified.

Usually, the trademark database of each country of interest must be checked to determine whether the name is registered.

E. LIST OF CAS REGISTRY NUMBERS OF COMMON POLYMERS

Common name	Synonyms	CAS Registry No.	CA name	Search method	Molecular formula
Alginic acid		9005-32-7	Alginic acid	R	Unk*
Alginic acid, sodium salt		9005-38-3	Alginic acid, sodium salt	R	Unk
Bayberry wax	Myrtle wax	8038-77-5	Fats and Glyceridic oils, bayberry	S*	Unk
Beeswax, refined, yellow		8012-89-3	Beeswax	S*	Unk
Boron nitride		10043-11-5	Boron nitride	R	BN
Candelilla wax, natural		8006-44-8	Beeswax	S*	Unk
Carboxymethyl cellulose	Carboxymethylated cellulose sodium salt; cellulose glycolate	9004-32-4	Cellulose, carboxymethyl ether, sodium salt	R	$(C_2H_4O_3)_x$ Na_x; Unk
Carboxymethyl cellulose, sodium salt	Ambergum, carboxymethylcellulose; sodium carboxylmethyl cellulose	9004-32-4	Cellulose, carboxymethyl ether, sodium salt	R	$(C_2H_4O_3)_x$ Na_x; Unk
Carnauba wax, refined, No. 1, yellow		8015-86-9		S*	Unk
Carrageenan, type I (κ-carrageenan)		9000-07-1	Carrageenan	R	Unk
Carrageenan, type II (ι-carrageenan)		9062-07-1	*i*-Carrageenan	R	Unk
Cellulose		9004-34-6	Cellulose	R	Unk
Cellulose acetate	Acetic acid, cellulose ester	9004-35-7	Cellulose, acetate	R	$(C_2H_4O_2)_x$; Unk
Cellulose acetate butyrate	Acetobutyrate cellulose; cellulose acetobutyrate	9004-36-8	Cellulose, acetate butanoate	R	$(C_4H_8O_2)_x$ $(C_2H_4O_2)_x$; Unk
Cellulose acetate butyrate, acrylamidomethyl		91313-01-8	Cellulose, acetate butanoate, ((1-oxo-2-propenyl)amino)-methyl ether	R	$(C_4H_8O_2)_x$ $(C_4H_7NO_2)_x$ $(C_2H_4O_2)_x$; Unk
Cellulose acetate hydrogen phthalate	Acetyl phthalyl cellulose; cellulose acetate phthalate	9004-38-0	Cellulose, acetate hydrogen 1,2-benzene dicarboxylate	R	$(C_8H_6O_4)_x$ $(C_2H_4O_2)_x$; Unk
Cellulose acetate propionate	Acetylpropionyl cellulose	9004-39-1	Cellulose, acetate propanoate	R	$(C_3H_6O_2)_x$ $(C_2H_4O_2)_x$; Unk
Cellulose acetate propionate, acrylamidomethyl		97635-64-8	Cellulose, acetate propanoate, ((1-oxo-2-propenyl)amino)-methyl ether	R	$(C_4H_7NO_2)_x$ $(C_3H_6O_2)_x$ $(C_2H_4O_2)_x$; Unk
Cellulose acetate trimellitate		52907-01-4	Cellulose, acetate 1,2,4-benzene-tricarboxylate	R	$(C_9H_6O_6)_x$ $(C_2H_4O_2)_x$; Unk
Cellulose diacetate	Diacetyl cellulose	9035-69-2	Cellulose, diacetate	R	$(C_2H_4O_2)_{1/2}$; Unk

* Indicates that the precise molecular formula is unknown.

Common name	Synonyms	CAS Registry No.	CA name	Search method	Molecular formula
Cellulose nitrate	Collodion; soluble gun cotton	9004-70-0	Cellulose, nitrate	R	$(HNO_3)_x$; Unk
Cellulose propionate		9004-48-2	Cellulose, propanoate	R	$(C_3H_6O_2)_x$; Unk
Cellulose sulfate	Sodium cellulose sulfate	9005-22-5	Cellulose, hydrogen sulfate, sodium salt	R	$(H_2O_4S)_x$ Na_x; Unk
Cellulose triacetate	Poroplastic; triacetylcellulose	9012-09-3	Cellulose, triacetate	R	$(C_2H_4O_2)_{1/3}$; Unk
Cellulose tributyrate		39320-16-6	Cellulose, tributanoate	R	$(C_4H_8O_2)_{1/3}$; Unk
Cellulose tricarbanilate		9047-07-8	Cellulose, tris (phenylcarbamate)	R	$(C_7H_7NO_2)_{1/3}$; Unk
Cellulose xanthate	Cellulose carbonodithioate; cellulose hydrogen dithiocarbonate	9032-37-5	Cellulose, hydrogen carbonodithioate	R	$(CH_2OS_2)_x$; Unk
Cellulose, cyanoethylated	Cellulose cyanoethyl ether; cellulose ethylcyanide	9004-41-5	Cellulose, 2-cyanoethyl ether	R	$(C_3H_5NO)_x$; Unk
Cellulose, microcrystalline, colloidal		51395-75-6	Cellulose, mixt. with cellulose carboxymethyl ether sodium salt	R	$(C_2H_4O_3)_x$ Na_x; Unk
Chitin, crab shells		1398-61-4	Chitin	S*	Unk
Chitosan		9012-76-4	Chitosan	R	Unk
Chlorinated poly(vinyl chloride)		68648-82-8	Ethene, chloro-, homopolymer, chlorinated	*	Unk
Chlorinated polyethylene		63231-66-3	Rubber, synthetic, chlorinated polyethylene	S	Unk
Coconut oil	Fats and glyceridic oils	8001-31-8	Coconut oil	S*	Unk
Ethyl cellulose	Cellulose ethyl ether; cellulose ethylate; ethocel, ethyl cellulose ether	9004-57-3	Cellulose, ethyl ether	R	$(C_2H_6O)_x$; Unk
Graphite, fluorinated, polymer		51311-17-2	Carbon fluoride	R	Unk
Guar gum carboxymethyl 2-hydroxypropyl ether, sodium salt	Sodium carboxymethyl hydroxypropyl guar	68130-15-4	Guar gum, carboxymethyl 2-hydroxypropyl ether, sodium salt	R	Unk
Hydroxybutyl methyl cellulose		9041-56-9	Cellulose, hydroxybutyl methyl ether	R	$(C_4H_{10}O_2)_x$ $(CH_4O)_x$; Unk
Hydroxyethyl cellulose (2-hydroxyethyl cellulose)	Cellosize; cellulose hydroxyethyl ether; cellulose hydroxyethylate; glycol cellulose	9004-62-0	Cellulose, 2-hydroxyethyl ether	R	$(C_2H_6O_2)_x$; Unk
Hydroxypropyl cellulose	Cellulose hydroxypropyl ether; hydropropyl cellulose; hydroxypropyl cellulose	9004-64-2	Cellulose, 2-hydroxypropyl ether	R	$(C_3H_8O_2)_x$; Unk
Hydroxypropyl methyl cellulose	Cellulose hydroxypropyl methyl ether	9004-65-3	Cellulose, 2-hydroxypropyl methyl ether	R	$(C_3H_8O_2)_x$ $(CH_4O)_x$; Unk
Hydroxypropyl methyl cellulose phthalate	Cellulose phthalate hydroxypropyl methyl ether	9050-31-1	Cellulose, hydrogen 1,2-benzenedicarboxylate, 2-hydroxypropyl methyl ether	R	$(C_8H_6O_4)_x$ $(C_3H_8O_2)_x$ $(CH_4O)_x$; Unk
Lignin, alkali	Indulin A	8068-05-1	Lignin, alkali	R	Unk
Lignin, alkali, 2-hydroxypropyl ether		88402-77-1	Lignin, alkali, 2-hydroxypropyl ether	R	$(C_3H_8O_2)_x$; Unk
Lignin, alkali, carboxymethyl ether	Kraft lignin carboxymethyl ether	102962-28-7	Lignin, alkali, carboxymethyl ether	R	$(C_2H_4O_3)_x$; Unk
Lignin, hydrolytic		8072-93-3	Lignin, hydrolytic	R	Unk
Lignin, organosolv	Dioxane lignin	8068-03-9	Lignin, organosolv	R	Unk
Lignin, organosolv, 2-hydroxyethyl ether		90881-34-8	Lignin, organosolv, 2-hydroxyethyl ether	R	$(C_2H_6O_2)_x$; Unk
Lignosulfonic acid, sodium salt		8061-51-6	Lignosulfonic acid, sodium salt	R	Unk
Linseed oil	Fats and glyceridic oils	8001-26-1	Linseed oil	S*	Unk
Maltodextrin		9050-36-6	Maltodextrin	R	Unk
Merrifield's peptide resin, cross-linked	Chloromethylstyrene-*p*-divinylbenzene-styrene copolymer; A221481; chloromethylstyrene-styrene-divinylbenzene copolymer	55844-94-5	Benzene, (chloromethyl)ethenyl-, polymer with diethenylbenzene and ethenylbenzene	R	$(C_{10}H_{10} \cdot C_9H_9Cl \cdot C_8H_8)_x$
Methyl 2-hydroxyethyl cellulose	Hydroxyethyl methyl cellulose	9032-42-2	Cellulose, 2-hydroxyethyl methyl ether	R	$(C_2H_6O_2)_x$ $(CH_4O)_x$; Unk
Methyl cellulose	Methyl ether cellulose	9004-67-5	Cellulose, methyl ether	R	$(CH_4O)_x$; Unk

Common name	Synonyms	CAS Registry No.	CA name	Search method	Molecular formula
Net-Poly(acrylic acid)-inter-net-poly(siloxane)		143106-82-5	2-Propenoic acid, 2-methyl-, 3-(dimethoxymethylsilyl)propyl ester, polymer with butyl 2-propenoate, decamethylcyclopentasiloxane, etc.	R	$(C_{10}H_{30}O_5Si_5 \cdot C_{10}H_{20}O_4Si \cdot C_8H_{24}O_4Si_4 \cdot C_7H_{12}O_2 \cdot C_7H_{10}O_2 \cdot C_6H_{18}O_3Si_3 \cdot C_5H_8O_2)_x$
Nylon 6	Polyamide 6	25038-54-4	Poly(imino(1-oxo-1,6-hexanediyl))	U	$(C_6H_{11}NO)_n$
Nylon 9	Polynonanamide; poly(imino-1-oxononamethylene)	25748-72-5	Nonanoic acid, 9-amino-, homopolymer	R	$(C_9H_{17}NO)_x$
Nylon 11	Poly(imino-1-oxoundecamethylene)	25035-04-5	Poly(imino(1-oxo-1,11-undecanediyl))	R	$(C_{11}H_{21}NO)$
Nylon 12	Polydodecanamide; poly(imino-carbonylundecamethylene); poly(imino-1-oxododecamethylene)	24937-16-4	Poly(imino(1-oxo-1,12-dodecanediyl))	R	$(C_{12}H_{23}NO)_n$
Nylon 46	Adipic acid-1,4-butanediamine copolymer, SRU; poly(tetramethylene adipamide)	50327-22-5	Poly(imino-1,4-butanediylimino (1,6-dioxo-1,6-hexanediyl))	R	$(C_{10}H_{18}N_2O_2)_n$
Nylon 46, monomer-based		50327-77-0	Hexanedioic acid, polymer with 1,4-butanediamine	R	$(C_6H_{10}O_4 \cdot C_4H_{12}N_2)_x$
Nylon 6, 6	Adipic acid-1, 6-hexanediamine copolymer; adipoyl dichloride-hexamethylenediamine polymer, SRU; polyamides, nylon 66; poly(hexamethylene adipamide); poly(iminoadipoyl iminohexamethylene)	32131-17-2	Poly(imino(1,6-dioxo-1,6-hexanediyl)imino-1,6-hexanediyl)	U	$(C_{12}H_{22}N_2O_2)_n$
Nylon 6, 9	Azelaic acid-1,6-hexanediamine salt polymer, SRU	28757-63-3	Poly(imino-1,6-hexanediylimino (1,9-dioxo-1,9-nonanediyl))	R	$(C_{15}H_{28}N_2O_2)_n$
Nylon 6/66	Adipic acid-ε-caprolactam-1,6-hexanediamine copolymer; nylon 6-nylon 66 copolyamide; nylon 6-nylon 66 copolymer; poly(hexamethyleneadipamide)	24993-04-2	Hexanedioic acid, polymer with hexahydro-2H-azepin-2-one and 1,6-hexanediamine	R	$(C_6H_{16}N_2 \cdot C_6H_{11}NO \cdot C_6H_{10}O_4)_x$
Nylon 610	Poly(iminohexamethylene iminosebacoyl); poly(hexamethylenesebacamide)	9008-66-6	Poly(imino-1,6-hexanediylimino-1,10-dioxo-1,10-decanediyl))	R	$(C_{16}H_{30}N_2O_2)_n$
Nylon 612		24936-74-1	Poly(imino-1,6-hexanediylimino (1,12-dioxo-1,12-dodecanediyl))	R	$(C_{18}H_{34}N_2O_2)_n$
Nylon 6/T, poly(hexamethylene terephthalamide)	Hexamethylenediamine–terephthalic acid polymer	24938-03-2	1,4-Benzenedicarboxylic acid, polymer with 1,6-hexanediamine	R	$(C_8H_6O_4 \cdot C_6H_{16}N_2)_x$
Paraffin wax, chunks		8002-74-2	Paraffin waxes and hydrocarbon waxes	S*	Unk
Paraformaldehyde	Paraform	30525-89-4	Paraformaldehyde	R	$(CH_2O)_x$
Phenol–formaldehyde resin	Formaldehyde–phenol polymer	9003-35-4	Phenol, polymer with formaldehyde	R	$(C_6H_6O \cdot CH_2O)_x$
Poly(D-alanine)	Poly-D-alanine	26701-36-0	D-Alanine, homopolymer	R	$(C_3H_7NO_2)_x$
Poly(L-alanine)	Polyalanine	25191-17-7	L-Alanine, homopolymer	R	$(C_3H_7NO_2)_x$
Poly(D,L-alanine)		25281-63-4	DL-Alanine, homopolymer	R	$(C_3H_7NO_2)_x$
Poly(γ-aminobutyric acid)	Poly(4-aminobutyric acid)	53504-43-1	Butanoic acid, 4-amino-, homopolymer	R	$(C_4H_9NO_2)_x$
Poly(L-aspartic acid), sodium salt	Poly(aspartic acid) sodium salt	34345-47-6	L-Aspartic acid, homopolymer, sodium salt	R	$(C_4H_7NO_4)_x \cdot xNa$
Poly(acenaphthylene)	Oligoacenaphthylene	25036-01-5	Acenaphthylene, homopolymer	R	$(C_{12}H_8)_x$
Poly(acrylamide)	Acrylamide polymer	9003-05-8	2-Propenamide, homopolymer	R	$(C_3H_5NO)x$
Poly(acrylamide-*co*-acrylic acid)	Acrylamide–acrylate polymer; acrylamide–acrylic acid polymer; poly(acrylic acid-acrylamide)	9003-06-9	2-Propenoic acid, polymer with 2-propenamide	R	$(C_3H_5NO \cdot C_3H_4O_2)_x$
Poly(acrylamide-*co*-diallyl dimethyl ammonium chloride)	Acrylamide–diallyldimethylammonium chloride polymer	26590-05-6	2-Propen-1-aminium, *N,N*-dimethyl-*N*-2-propenyl-, chloride, polymer with 2-propenamide	R	$(C_8H_{16}N \cdot C_3H_5NO \cdot Cl)_x$

Common name	Synonyms	CAS Registry No.	CA name	Search method	Molecular formula
Poly(2-acrylamido, 2-methyl, 1-propane sulfonic acid-*co*-acrylonitrile)		54640-82-3	1-Propanesulfonic acid, 2-methyl-2-((1-oxo-2-propenyl)amino)-, polymer with 2-propenenitrile	R	$(C_7H_{13}NO_4S \cdot C_3H_3N)_x$
Poly(2-acrylamido-2-methyl-1-propane sulfonic acid)		27119-07-9	1-Propanesulfonic acid, 2-methyl-2-((1-oxo-2-propenyl)amino)-, homopolymer	R	$(C_7H_{13}NO_4S)_x$
Poly(2-acrylamido-2-methyl-1-propane sulfone acid-*co*-styrene)		51121-85-8	1-Propanesulfonic acid, 2-methyl-2-((1-oxo-2-propenyl)amino)-, polymer with ethenylbenzene	R	$(C_8H_8 \cdot C_7H_{13}NO_4S)_x$
Poly(acrylic acid)	Acrylic acid polymer	9003-01-4	2-Propenoic acid, homopolymer	R	$(C_3H_4O_2)_x$
Poly(acrylic acid), ammonium salt	Ammonium polyacrylate; ammonium polyacrylic acid	9003-03-6	2-Propenoic acid, homopolymer, ammonium salt	R	$(C_3H_4O_2)_x \cdot xH_3N$
Poly(acrylic acid), potassium salt, crosslinked	Potassium polyacrylate	25608-12-2	2-Propenoic acid, homopolymer, potassium salt	R	$(C_3H_4O_2)_x \cdot xK$
Poly(acrylic acid), sodium salt	Acrylic acid polymer, sodium salt	9003-04-7	2-Propenoic acid, homopolymer, sodium salt	R	$(C_3H_4O_2)_x \cdot xNa$
Poly(acrylic acid-*co*-trimethylolpropane), sodium salt	Acrylic acid–sodium acrylate–trimethylolpropane triacrylate copolymer	76774-25-9	2-Propenoic acid, polymer with 2-ethyl-2-(((1-oxo-2-propenyl)-oxy)methyl)-1,3-propanediyl di-2-propenoate and sodium 2-propenoate	R	$(C_{15}H_{20}O_6 \cdot C_3H_4O_2 \cdot C_3H_4O_2 \cdot Na)_x$
Poly(acrylic acid, sodium salt-*graft*-poly(ethylene oxide)), crosslinked	Acrylic acid–vinyl alcohol polymer, sodium salt	27599-56-0	2-Propenoic acid, polymer with ethenol, sodium salt	R	$(C_3H_4O_2 \cdot C_2H_4O)_x \cdot xNa$
Poly(acrylic acid-*co*-acrylamide), potassium salt, crosslinked	Acrylamide–potassium acrylate copolymer	31212-13-2	2-Propenoic acid, potassium salt, polymer with 2-propenamide	R	$(C_3H_5NO \cdot C_3H_4O_2 \cdot K)_x$
Poly(acrylic acid-*co*-maleic acid)		29132-58-9	2-Butenedioic acid (Z)-, polymer with 2-propenoic acid	R	$(C_4H_4O_4 \cdot C_3H_4O_2)_x$
Poly(acrylic acid-*co*-maleic acid), sodium salt	Acrylic acid–maleic anhydride copolymer, sodium salt	52255-49-9	2-Propenoic acid, polymer with 2,5-furandione, sodium salt	R	$(C_4H_2O_3 \cdot C_3H_4O_2)_x \cdot xNa$
Poly(acrylonitrile)	Acrylonitrile polymer; poly(1-cyanoethylene)	25014-41-9	2-Propenenitrile, homopolymer	R	$(C_3H_3N)_x$
Poly(acrylonitrile-*co*-butadiene)	Acrylonitrile–butadiene polymer	9003-18-3	2-Propenenitrile, polymer with 1,3-butadiene	R	$(C_4H_6 \cdot C_3H_3N)_x$
Poly(acrylonitrile-*co*-butadiene), amine terminated		68683-29-4	2-Propenenitrile, polymer with 1,3-butadiene, 1-cyano-1-methyl-4-oxo-4-((2-(1-piperazinyl)ethyl)-amino)butyl-terminated	R	$(C_4H_6 \cdot C_3H_3N)_x$
Poly(acrylonitrile-*co*-butadiene), hydrogenated		88254-10-8	2-Propenenitrile, polymer with 1,3-butadiene, hydrogenated	*	$(C_4H_6 \cdot C_3H_3N)_x$
Poly(acrylonitrile-*co*-butadiene-*co*-acrylic acid), dicarboxy terminated		68891-50-9	2-Propenoic acid, polymer with 1,3-butadiene and 2-propenenitrile, 3-carboxy-1-cyano-1-methylpropyl-terminated	*	$(C_4H_6 \cdot C_3H_4O_2 \cdot C_3H_3N)_x$
Poly(acrylonitrile-*co*-butadiene-*co*-styrene)	Acrylonitrile–butadiene–styrene polymer; cycolac; styrene–acrylonitrile–butadiene polymer	9003-56-9	2-Propenenitrile, polymer with 1,3-butadiene and ethenylbenzene	R	$(C_8H_8 \cdot C_4H_6 \cdot C_3H_3N)_x$
Poly(acrylonitrile-*co*-vinylidene chloride-*co*-methyl methacrylate)	Acrylonitrile–methyl methacrylate–vinylidene chloride polymer	25214-39-5	2-Propenoic acid, 2-methyl-, methyl ester, polymer with 1,1-dichloroethene and 2-propenenitrile	R	$(C_5H_8O_2 \cdot C_3H_3N \cdot C_2H_2C_2)_x$
Poly(allyl amine hydrochloride)	Allylamine hydrochloride	71550-12-4	2-Propen-1-amine, hydrochloride, homopolymer	R	$(C_3H_7N \cdot ClH)_x$
Poly(*p*-aminobenzaldehyde)	Poly(4-aminobenzaldehyde)	28107-09-7	Benzaldehyde, 4-amino-, homopolymer	R	$(C_7H_7NO)_x$
Poly(anethole sulfonic acid), sodium salt	Polyanethole sulfonate; sodium polyanetholesulfonate	52993-95-0	Benzene, 1-methoxy-4-(1-propenyl)-, (E)-, homopolymer, sulfonated, sodium salt	R	Unk
Poly((α,β)-D,L-aspartic acid), sodium salt		94525-01-6	DL-Aspartic acid, homopolymer, sodium salt	R	$(C_4H_7NO_4)_x \cdot xNa$
Poly(azelaic anhydride)	Azelaic acid polymer	26776-28-3	Nonanedioic acid, homopolymer	R	$(C_9H_{16}O_4)_x$
Poly(1,4-benzene dicarboxy-*alt*-bis(4-phenoxyphenyl) methanone)		55088-54-5	1,4-Benzenedicarbonyl dichloride, polymer with bis(4-phenoxy-phenyl)methanone	R	$(C_{25}H_{18}O_3 \cdot C_8H_4Cl_2O_2)_x$

Common name	Synonyms	CAS Registry No.	CA name	Search method	Molecular formula
Poly(benzimidazole)	Diphenyl isophthalate-3,3′,4,4′-tetraaminodiphenyl polymer	25928-81-8	1,3-Benzenedicarboxylic acid, diphenyl ester, polymer with (1,1′-biphenyl)-3,3′,4,4′-tetramine	R	$(C_{20}H_{14}O_4 \cdot C_{12}H_{14}N_4)_x$
Poly(benzoguanamine-*co*-formaldehyde), methylated/ethylated		68037-08-1	Formaldehyde, polymer with 6-phenyl-1,3,5-triazine-2,4-diamine, ethylated/methylated	*	Unk
Poly(benzophenone tetracarboxylic dianhydride-*co*-phenylene diamine)	Benzophenonetetracarboxylic dianhydride-4,4′-oxydianiline-*m*-phenylenediamine copolymer	31942-21-9	1,3-Isobenzofurandione, 5,5′-carbonylbis-, polymer with 1,3-benzenediamine and 4,4′-oxybis(benzenamine)	R	$(C_{17}H_6O_7 \cdot C_{12}H_{12}N_2O \cdot C_6H_8N_2)_x$
Poly(2-(4-benzoyl-3-hydroxyphenoxy) ethyl acrylate)	2-Hydroxy-4-acryloxyethoxybenzophenone polymer	29963-76-6	2-Propenoic acid, 2-(4-benzoyl-3-hydroxyphenoxy)ethyl ester, homopolymer	R	$(C_{18}H_{16}O_5)_x$
Poly(benzyl methacrylate)	Benzyl methacrylate polymer	25085-83-0	2-Propenoic acid, 2-methyl-, phenylmethyl ester, homopolymer	R	$(C_{11}H_{12}O_2)_x$
Poly(β-cyclodextrin-*co*-epichlorohydrin)		25655-42-9	β-Cyclodextrin, polymer with (chloromethyl)oxirane	R	$(C_{42}H_{70}O_{35} \cdot C_3H_5ClO)_x$
Poly(bis(2-chloroethyl)ether-*co*-1,3-bis(3-(dimethylamino)-propyl)urea), quaternary salt		68555-36-2	Urea, *N*,*N*′-bis(3-(dimethylamino)-propyl)-, polymer with 1,1′-oxybis(2-chloroethane)	R	$(C_{11}H_{26}N_4O \cdot C_4H_8Cl_2O)_x$
Poly(bis(benzyl thio)acetylene)		93975-09-8	Benzene, 1,1′-(1,2-ethynediylbis-(thiomethylene))bis-, homopolymer	R	$(C_{16}H_{14}S_2)_x$
Poly(bis(ethyl thio)acetylene)		93975-08-7	Ethyne, bis(ethylthio)-, homopolymer	R	$(C_6H_{10}S_2)_x$
Poly(bis(methyl thio)acetylene)		93975-07-6	Ethyne, bis(methylthio)-, homopolymer	R	$(C_4H_6S_2)_x$
Poly(bisphenol A-*co*-4-nitrophthalic anhydride-*co*-1,3-phenylene diamine)	2,2-Bis(4-(3,4-dicarboxyphenoxy)-phenyl)propane dianhydride-*m*-phenylenediamine copolymer	61128-46-9	1,3-Isobenzofurandione, 5,5′-((1-methylethylidene) bis(4,1-phenyleneoxy)) bis- polymer with 1,3-benzenediamine	R	$(C_{31}H_{20}O_8 \cdot C_6H_8N_2)_x$
Poly(bisphenol A-*co*-epichlorohydrin)		25036-25-3	Phenol, 4,4′-(1-methylethylidene)-bis-, polymer with 2,2′-((1-ethylethylidene) bis(4,1-phenyleneoxymethylene))-bis(oxirane)	R	$(C_{21}H_{24}O_4 \cdot C_{15}H_{16}O_2)_x$
Poly(bisphenol A-*co*-epichlorohydrin)	Bisphenol A epoxy resin; phenoxy resin	25068-38-6	Phenol, 4,4′-(1-methylethylidene)-bis-, polymer with (chloromethyl)oxirane	R	
Poly(bisphenyl tetracarboxylic dianhydride-*co*-phenylene diamine)	Biphenyl dianhydride-*p*-phenylenediamine copolymer	29319-22-0	(5,5′-Biisobenzofuran)-1,1′,3,3′-tetrone, polymer with 1,4-benzenediamine	R	$(C_{16}H_6O_6 \cdot C_6H_8N_2)_x$
Poly(4-bromostyrene)	*p*-Bromostyrene polymer	24936-50-3	Benzene, 1-bromo-4-ethenyl-, homopolymer	R	$(C_8H_7Br)_x$
Poly(butadiene)	Poly(1-butenylene); butadiene homopolymer	9003-17-2	1,3-Butadiene, homopolymer	R	$(C_4H_6)_x$
Poly(butadiene); *cis* and *trans*	Poly(1-butenylene)	25038-44-2	Poly(1-butene-1,4-diyl)	R	$(C_4H_6)_n$
Poly(butadiene), *cis*		40022-03-5	Poly(1-butene-1,4-diyl),	R	$(C_4H_6)_n$
Poly(butadiene), dicarboxy terminated		68891-79-2	1,3-Butadiene, homopolymer, 3-carboxy-1-cyano-1-methylpropyl-terminated	*	Unk
Poly(butadiene), hydroxyl functionalized		69102-90-5	1,3-Butadiene, homopolymer, hydroxy-terminated	*	Unk
Poly(1,4-butanediol bis(4-aminobenzoate))		54667-43-5	Poly(oxy-1,4-butanediyl), α-(4-aminobenzoyl)-ω-((4-aminobenzoyl)oxy)-	R	$(C_4H_8O)_n C_{14}H_{12}N_2O_3$
Poly(1,4-butanediol/neopentyl glycol-*alt*-adipic acid)		36609-31-1	Hexanedioic acid, polymer with 1,4-butanediol and 2,2-dimethyl-1,3-propanediol	R	$(C_6H_{10}O_4 \cdot C_5H_{12}O_2 \cdot C_4H_{10}O_2)_x$
Poly(butene)	Polybutene; polybutylene	9003-29-6	Butene, homopolymer	R	$(C_4H_8)_x$
Poly(1-butene)	Polybutene	9003-28-5	1-Butene, homopolymer	R	$(C_4H_8)_x$

Common name	Synonyms	CAS Registry No.	CA name	Search method	Molecular formula
Poly(butenes), hydrogenated		68937-10-0	Butene, homopolymer, hydrogenated	*	Unk
Poly(butenes), monoepoxide		119275-53-5	1-Butene, polymer with 2-butene and 2-methyl-1-propene, epoxidized	*	$(C_4H_8 \cdot C_4H_8 \cdot C_4H_8)_x$
Poly(butyl acrylate)	Butyl acrylate polymer	9003-49-0	2-Propenoic acid, butyl ester, homopolymer	R	$(C_7H_{12}O_2)_x$
Poly(4-*tert*-butylcyclohexyl methacrylate)		34903-89-4	2-Propenoic acid, 2-methyl-, 4-(1,1-dimethylethyl)cyclohexyl ester, homopolymer	R	$(C_{14}H_{24}O_2)_x$
Poly(butyl methacrylate)	Butyl methacrylate polymer	9003-63-8	2-Propenoic acid, 2-methyl, butyl ester, homopolymer	R	$(C_8H_{14}O_2)_x$
Poly(butyl methacrylate-*co*-isobutyl methacrylate)	Butyl methacrylate – isobutyl methacrylate polymer	9011-53-4	2-Propenoic acid, 2-methyl, butyl ester, polymer with 2-methylpropyl 2-methyl-2-propenoate	R	$(C_8H_{14}O_2 \cdot C_8H_{14}O_2)_x$
Poly(butyl methacrylate-*co*-methyl methacrylate)	Methyl methacrylate – butyl methacrylate polymer	25608-33-7	2-Propenoic acid, 2-methyl-, butyl ester, polymer with methyl 2-methyl-2-propenoate	R	$(C_8H_{14}O_2 \cdot C_5H_8O_2)_x$
Poly(4-*tert*-butylphenyl methacrylate)	*p*-*tert*-Butylphenyl methacrylate polymer	29696-27-3	2-Propenoic acid, 2-methyl-, 4-(1,1-dimethylethyl)phenyl ester, homopolymer	R	$(C_{14}H_{18}O_2)_x$
Poly(4-*tert*-butylstyrene)	*p*-*tert*-Butylstyrene polymer	26009-55-2	Benzene, 1-(1,1-dimethylethyl)-4-ethenyl-, homopolymer	R	$(C_{12}H_{16})_x$
Poly(1,4-butylene adipate)	Adipic acid–butylene glycol copolymer; adipic acid-butylene glycol polymer; PBAG; poly(butylene adipate); poly-(tetramethylene adipate)	25103-87-1	Hexanedioic acid, polymer with 1,4-butanediol	R	$(C_6H_{10}O_4 \cdot C_4H_{10}O_2)_x$
Poly(1,4-butylene adipate-*co*-1,4-butylene succinate)	Adipic acid-1,4-butanediol-HMDI-succinic acid copolymer	119553-67-2	Hexanedioic acid, polymer with butanedioic acid, 1,4-butanediol and 1,6-diisocyanatohexane	R	$(C_8H_{12}N_2O_2 \cdot C_6H_{10}O_4 \cdot C_4H_{10}O_2 \cdot C_4H_6O_4)$
Poly(1,2-butylene glycol)	1,2-Epoxybutane–propylene glycol polymer	31923-86-1	1,2-Propanediol, polymer with ethyloxirane	R	$(C_4H_8O \cdot C_3H_8O_2)_x$
Poly(1,2-butylene glycol), monobutyl ether		144437-84-3	Oxirane, ethyl-, homopolymer, mono(2-butoxy-1-methylethyl) ether	R	$(C_7H_{16}O_2 \cdot C_4H_8O)_x$
Poly(1,4-butylene glutarate), hydroxy terminated	1,4-Butanediol–glutaric acid copolymer	52256-54-9	Pentanedioic acid, polymer with 1,4-butanediol	R	$(C_5H_8O_4 \cdot C_4H_{10}O_2)_x$
Poly(1,4-butylene succinate)	Butylene glycol–succinic acid copolymer; poly(tetramethylene succinate)	25777-14-4	Butanedioic acid, polymer with 1,4-butanediol	R	$(C_4H_{10}O_2 \cdot C_4H_6O_4)_x$
Poly(1,4-butylene succinate-*co* HMDI)	1,4-Butanediol-HMDI-succinic acid copolymer	143606-53-5	Butanedioic acid, polymer with 1,4-butanediol and 1,6-diisocyanatohexane	R	$(C_8H_{12}N_2O_2 \cdot C_4H_{10}O_2 \cdot C_4H_6O_4)_x$
Poly(1,4-butylene terephthalate)	Butanediol–terephthalic acid copolymer; poly(oxytetra-methyleneoxy-terephthalic acid–terephthaloyl); tetramethylene glycol polymer, SRU	24968-12-5	Poly(oxy-1,4-butanediyloxycar-bonyl-1,4-phenylenecarbonyl)	R	$(C_{12}H_{12}O_4)_n$
Poly(caprolactone diol)	Caprolactone – diethylene glycol polymer	36890-68-3	2-Oxepanone, polymer with 2,2′-oxybis(ethanol)	R	$(C_6H_{10}O_2 \cdot C_4H_{10}O_3)_x$
Poly(caprolactone triol)	ε-Caprolactone – trimethylolpropane polymer	37625-56-2	2-Oxepanone, polymer with 2-ethyl-2-(hydroxymethyl)-1,3-propanediol	R	$(C_6H_{14}O_3 \cdot C_6H_{10}O_2)_x$
Poly(caprolactone triol)		54735-63-6	Poly(oxy(1-oxo-1,6-hexanediyl)), α-hydro-ω-hydroxy-, ester with 2-ethyl-2-(hydroxymethyl)-1,3-propanediol (3 : 1)	R	$(C_6H_{10}O_2)_n (C_6H_{10}O_2)_n (C_6H_{10}O_2)_n C_6H_{14}O_3$
Poly(caprolactone)		24980-41-4	2-Oxepanone, homopolymer	R	$(C_6H_{10}O_2)_x$
Poly(chloroprene)	Chlorobutadiene polymer	9010-98-4	1,3-Butadiene, 2-chloro-, homopolymer	R	$(C_4H_5Cl)_x$

Common name	Synonyms	CAS Registry No.	CA name	Search method	Molecular formula
Poly(chlorostyrene)	Chlorostyrene polymer	9022-52-0	Benzene, chloroethenyl-, homopolymer	R	$(C_8H_7Cl)_x$
Poly(4-chlorostyrene)	*p*-Chlorostyrene polymer 4-Chlorostyrene polymer	24991-47-7	Benzene, 1-chloro-4-ethenyl-, homopolymer	R	$(C_8H_7Cl)_x$
Poly(chlorotrifluoroethylene)	Halocarbon oil	9002-83-9	Ethene, chlorotrifluoro-, homopolymer	R	$(C_2ClF_3)_x$
Poly(chlorotrifluoroethylene-*co*-vinylidene fluoride)	Chlorotrifluoroethylene–vinylidene fluoride polymer; trifluorochloroethylene–vinylidene fluoride polymer	9010-75-7	Ethene, chlorotrifluoro-, polymer with 1,1-difluoroethene	R	$(C_2H_2F_2 \cdot C_2ClF_3)_x$
Poly(coumarone-*co*-indene)		35343-70-5	Benzofuran, polymer with 1H-indene	R	$(C_9H_8 \cdot C_8H_6O)_x$
Poly(*o*-cresol glycidyl ether-*co*-formaldehyde)		29690-82-2	Formaldehyde, polymer with (chloromethyl)oxirane and 2-methylphenol	R	$(C_7H_8O \cdot C_3H_5ClO \cdot CH_2O)_x$
Poly(*o*-cresyl glycidyl ether-*co*-formaldehyde)	Cresol–epichlorohydrin–formaldehyde polymer	37382-79-9	Formaldehyde, polymer with (chloromethyl)oxirane and methylphenol	R	$(C_7H_8O \cdot C_3H_5ClO \cdot CH_2O)_x$
Poly(2-cyanobutyl acrylate)	Butyl 2-cyanoacrylate polymer; poly(butyl cyanoacrylate)	25154-80-7	2-Propenoic acid, 2-cyano-, butyl ester, homopolymer	R	$(C_8H_{11}NO_2)_x$
Poly(2-cyanoethyl acrylate)	Poly(ethyl cyanoacrylate);	25067-30-5	2-Propenoic acid, 2-cyano-, ethyl ester, homopolymer	R	$(C_6H_7NO_2)_x$
Poly(2-cyanoheptyl acrylate)		26936-29-8	2-Propenoic acid, 2-cyano-, heptyl ester, homopolymer	R	$(C_{11}H_{17}NO_2)_x$
Poly(2-cyanohexyl acrylate)	Poly(hexyl cyanoacrylate)	26877-39-4	2-Propenoic acid, 2-cyano-, hexyl ester, homopolymer	R	$(C_{10}H_{15}NO_2)_x$
Poly(2-cyanoisobutyl acrylate)	Isobutyl 2-cyanoacrylate polymer	26809-38-1	2-Propenoic acid, 2-cyano-	R	$(C_8H_{11}NO_2)_x$
Poly(2-cyanoisopropyl acrylate)	Poly(isopropyl cyanoacrylate)	25931-02-6	2-Propenoic acid, 2-cyano-, 1-methylethyl ester, homopolymer	R	$(C_7H_9NO_2)_x$
Poly(cyclododecyl acrylate)		56710-66-8	2-Propenoic acid, cyclododecyl ester, homopolymer	R	$(C_{15}H_{26}O_2)_x$
Poly(1,4-cyclohexane dimethylene terephthalate-*co*-ethylene terephthalate)	Dimethyl terephthalate-ethylene glycol-1,4-bis(hydroxymethyl)-cyclohexane copolymer	25640-14-6	1,4-Benzenedicarboxylic acid, dimethyl ester, polymer with 1,4-cyclohexanedimethanol and 2-ethanediol	R	$(C_{10}H_{10}O_4 \cdot C_8H_{16}O_2 \cdot C_2H_6O_2)$
Poly(cyclohexyl methacrylate)		25768-50-7	2-Propenoic acid, 2-methyl-, cyclohexyl ester, homopolymer	R	$(C_{10}H_{16}O_2)_x$
Poly(di(ethylene glycol) glycerol-*alt*-adipic acid)	Diethylene glycol–glycerol–adipic acid copolymer	26760-54-3	Hexanedioic acid, polymer with 2,2′-oxybis(ethanol) and 1,2,3-propanetriol	R	$(C_6H_{10}O_4 \cdot C_4H_{10}O_3 \cdot C_3H_8O_3)$
Poly(diallyl dimethyl ammonium chloride)	Diallyldimethylammonium chloride polymer	26062-79-3	2-Propen-1-aminium, *N,N*-dimethyl-*N*-2-propenyl-, chloride, homopolymer	R	$(C_8H_{16}N \cdot Cl)_x$
Poly(diallyl isophthalate)	Diallyl isophthalate polymer	25035-78-3	1,3-Benzenedicarboxylic acid, di-2-propenyl ester, homopolymer	R	$(C_{14}H_{14}O_4)_x$
Poly(diallyl phthalate)	Diallyl phthalate polymer	25053-15-0	1,2-Benzenedicarboxylic acid, di-2-propenyl ester, homopolymer	R	$(C_{14}H_{14}O_4)_x$
Poly(diaminobenzophenone-*co*-benzophenone tetracarboxylic dianhydride)	Benzophenone tetracarboxylic acid dianhydride-*m,m′*-diaminobenzophenone polymer, SRU	51518-44-6	Poly((1,3-dihydro-1,3-dioxo-2H-isoindole-2,5-diyl)carbonyl-(1,3-dihydro-1,3-dioxo-2H-isoindole-5,2-diyl)-1,3-phenylene-carbonyl-1,3-phenylene)	R	$(C_{30}H_{14}N_2O_6)_n$
Poly((dibenzo-18-crown-6)-*co*-formaldehyde)		53660-42-7	Formaldehyde, polymer with 6,7,9,10,17,18,20,21-octahydro-dibenzo(b,k)(1,4,7,10,13,16) hexaoxacyclooctadecin	R	$(C_{20}H_{24}O_6 \cdot CH_2O)_x$
Poly(dibromostyrene)		62354-98-7	Benzene, dibromoethenyl-, homopolymer	R	$(C_8H_6Br_2)_x$
Poly(dichlorophosphazene)	Dichlorophosphazine polymer; Poly(nitrile(dichlorophosphoranylidyne))	26085-02-9	Poly(nitrilo(dichlorophosphoranylidyne))	R	$(Cl_2NP)_n$

Common name	Synonyms	CAS Registry No.	CA name	Search method	Molecular formula
Poly(diethyl fumarate)		2698-06-6	2-Butenedioic acid (E)-, diethyl ester, homopolymer	R	$(C_8H_{12}O_4)_x$
Poly(diethylene glycol adipate)	Adipic acid–diethylene glycol polymer	9010-89-3	Hexanedioic acid, polymer with 2,2′-oxybis(ethanol)	R	$(C_6H_{10}O_4 \cdot C_4H_{10}O_3)_x$
Poly(diethylene glycol/trimethylol propane-*alt*-adipic acid), polyol	Adipic acid–diethylene glycol–trimethylolpropane polymer	28183-09-7	Hexanedioic acid, polymer with 2-ethyl-2-(hydroxymethyl)-1,3-propanediol and 2,2′-oxybis(ethanol)	R	$(C_6H_{14}O_3 \cdot C_6H_{10}O_4 \cdot C_4H_{10}O_3)_x$
Poly(1,2-dihydro-2,2,4-trimethyl quinoline)	Antioxidant HS; trimethyldihydroquinoline polymer	26780-96-1	Quinoline, 1,2-dihydro-2,2,4-trimethyl-, homopolymer	R	$(C_{12}H_{15}N)_x$
Poly(dimer acid-*co*-ethylene glycol), hydrogenated		68855-78-7	Fatty acids, C18-unsatd., dimers, hydrogenated, polymers with ethylene glycol	S	Unk
Poly(*N,N*-dimethylacrylamide)	*N,N*-Dimethylacrylamide polymer	26793-34-0	2-Propenamide, *N,N*-dimethyl-, homopolymer	R	$(C_5H_9NO)_x$
Poly(1,1-dimethyl 3,5-dimethylene piperidinium chloride)		32168-43-7	Poly((1,1-dimethylpiperidinium-3,5-diyl)methylene chloride)	R	$(C_8H_{16}N)_n \cdot Cl$
Poly(2,6-dimethyl-1,4-phenylene oxide)	Poly(2,6-xylenol)	25134-01-4	Phenol, 2,6-dimethyl-, homopolymer	R	$(C_8H_{10}O)_x$
Poly(2,2-dimethyl-1,3-propylene)	Polyneopentyl glycol succinate	28776-65-0	Poly(oxy(2,2-dimethyl-1,3-propanediyl)oxy(1,4-dioxo-1,4-butanediyl))	R	$(C_9H_{14}O_4)_n$
Poly(dimethyl siloxane), distearate terminated		130169-63-0	Siloxanes and silicones, di-Me, ((1-oxooctadecyl)oxy)-terminated	S	Unk
Poly(dimethyl siloxane), hydride terminated	Hydrogen-terminated di-Me silicones	70900-21-9	Siloxanes and silicones, di-Me, hydrogen-terminated	S	Unk
Poly(dimethyl siloxane), methoxy terminated		68951-97-3	Siloxanes and silicones, di-Me, methoxy-terminated	S	Unk
Poly(dimethyl siloxane), vinyl terminated		68951-99-5	Siloxanes and silicones, di-Me, Me vinyl, mono(vinyl group)-terminated	S	Unk
Poly(dimethyl siloxane-*co*-(3-hydroxypropyl)-methyl siloxane), ethoxylated/propoxylated		68937-55-3	Siloxanes and silicones, di-Me, 3-hydroxypropyl Me, ethoxylated propoxylated	S	Unk
Poly(dimethyl siloxane-*co*-methyl(3-OH-propyl) siloxane)-γ-PEG 3-aminopropyl ether)		133779-15-4	Siloxanes and silicones, di-Me, 3-hydroxypropyl Me, ethers with polyethylene glycol mono(3-aminopropyl) ether	S	Unk
Poly(dimethyl siloxane), hydroxy terminated	Silanol-terminated di-Me siloxanes	70131-67-8	Siloxanes and silicones, di-Me, hydroxy-terminated	S	Unk
Poly(dimethylamine-*co*-epichlorohydrin)	Epichlorohydrin–dimethylamine copolymer	25988-97-0	Methanamine, *N*-methyl-, polymer with (chloromethyl)oxirane	R	$(C_3H_5ClO \cdot C_2H_7N)_x$
Poly(dimethylamine-*co*-epichlorohydrin-*co*-ethylene diamine)		42751-79-1	1,2-Ethanediamine, polymer with (chloromethyl)oxirane and *N*-methylmethanamine	R	$(C_3H_5ClO \cdot C_2H_8N_2 \cdot C_2H_7N)_x$
Poly(dimethylsiloxane)	Dimethyl silicone; dimethylsilanediol polymer	9016-00-6	Poly(oxy(dimethylsilylene))	R	$(C_2H_6OSi)_n$
Poly(dimethylsiloxane), vinyl terminated	Dimethylsiloxanes, dimethylvinylsilyl-terminated	68083-19-2	Siloxanes and Silicones, di-Me, vinyl group-terminated	*	Unk
Poly(dimethylsiloxane-*co*-methylphenyl siloxane)	Methylphenylsiloxane polymer	9005-12-3	Poly(oxy(methylphenylsilylene))	R	$(C_7H_8OSi)_n$
Poly(dipropylene glycol), phenyl phosphite		116265-68-0	Phosphorous acid, triphenyl ester, reaction products with dipropylene glycol	R	$C_{18}H_{15}O_3P \cdot C_6H_{14}O_3$
Poly(3-dodecyl thiophene), regioregular	3-Dodecylthiophene homopolymer	104934-53-4	Thiophene, 3-dodecyl-, homopolymer	R	$(C_{16}H_{28}S)_x$
Poly(epichlorohydrin)	Poly(chloromethyl)ethylene oxide	24969-06-0	Oxirane, (chloromethyl)-, homopolymer	R	$(C_3H_5ClO)_x$
Poly(ethyl acrylate)	Ethyl acrylate polymer	9003-32-1	2-Propenoic acid, ethyl ester, homopolymer	R	$(C_5H_8O_2)_x$
Poly(ethyl methacrylate)	Ethyl methacrylate polymer	9003-42-3	2-Propenoic acid, 2-methyl-, ethyl ester, homopolymer	R	$(C_6H_{10}O_2)_x$

Common name	Synonyms	CAS Registry No.	CA name	Search method	Molecular formula
Poly(ethyl methacrylate-*co*-methyl acrylate)	Acrylic acid methyl ester, polymer with ethyl methacrylate	26572-20-3	2-Propenoic acid, 2-methyl-	R	$(C_6H_{10}O_2 \cdot C_4H_6O_2)_x$
Poly(ethylene adipate)	Adipic acid-ethylene glycol polymer; PEGA; poly(ethylene glycol adipate)	24938-37-2	Hexanedioic acid, polymer with 1,2-ethanediol	R	$(C_6H_{10}O_4 \cdot C_2H_6O_2)_x$
Poly(ethylene adipate), tolylene 2,4-diisocyanate terminated	Adipic acid–ethylene glycol–toluene diisocyanate copolymer	9019-92-5	Hexanedioic acid, polymer with 1,3-diisocyanatomethylbenzene and 1,2-ethanediol	R	$(C_9H_6N_2O_2 \cdot C_6H_{10}O_4 \cdot C_2H_6O_2)_x$
Poly(ethylene azelate)	Azelaic acid–ethylene glycol polymer	26760-99-6	Nonanedioic acid, polymer with 1,2-ethanediol	R	$(C_9H_{16}O_4 \cdot C_2H_6O_2)_x$
Poly(ethylene glycol methyl ether methacrylate)	Methoxypolyethylene glycol monomethacrylate	26915-72-0	HP = Poly(oxy-1,2-ethanediyl), α-(2-methyl-1-oxo-2-propenyl)-ω-methoxy-	R	$(C_2H_4O)_n$ $C_5H_8O_2$
Poly(ethylene glycol)	Carbowax; oxirane polymer; PEG, poly(ethylene oxide), poly(oxyethylene); poly(vinyl oxide)	25322-68-3	Poly(oxy-1,2-ethanediyl), α-hydro-ω-hydroxy-	U	$(C_2H_4O)_nH_2O$
Poly(ethylene glycol), allyl methyl ether		27252-80-8	Poly(oxy-1,2-ethanediyl), α-methyl-ω-(2-propenyloxy)-	R	$(C_2H_4O)_n$ C_4H_8O
Poly(ethylene glycol), bis-2-ethyl-hexanoate		9004-93-7	Poly(oxy-1,2-ethanediyl), α-(2-ethyl-1-oxohexyl)-ω-((2-ethyl-1-oxohexyl)oxy)-	R	$(C_2H_4O)_n$ $C_{16}H_{30}O_3$
Poly(ethylene glycol), butyl ether	Polyoxyethylene butyl alcohol ether	9004-77-7	Poly(oxy-1,2-ethanediyl), α-butyl-ω-hydroxy-	R	$(C_2H_4O)_n$ $C_4H_{10}O$
Poly(ethylene glycol), diacrylate		26570-48-9	Poly(oxy-1,2-ethanediyl), α-(1-oxo-2-propenyl)-ω-((1-oxo-2-propenyl)oxy)-	R	$(C_2H_4O)n$ $C_6H_6O_3$
Poly(ethylene glycol), dibenzoate	Polyoxyethylene dibenzoate	9004-86-8	Poly(oxy-1,2-ethanediyl), α-benzoyl-ω-(benzoyloxy)-	R	$(C_2H_4O)_n$ $C_{14}H_{10}O_3$
Poly(ethylene glycol), dimethacrylate	Polyethylene glycol methacrylate	25852-47-5	Poly(oxy-1,2-ethanediyl), α-(2-methyl-1-oxo-2-propenyl)-ω-((2-methyl-1-oxo-2-propenyl)oxy)-	R	$(C_2H_4O)_n$ $C_8H_{10}O_3$
Poly(ethylene glycol), dimethyl ether	Polyoxyethylene dimethyl ether	24991-55-7	Poly(oxy-1,2-ethanediyl), α-methyl-ω-methoxy-	R	$(C_2H_4O)_n$ C_2H_6O
Poly(ethylene glycol), distearate	Polyethylene oxide distearate	9005-08-7	Poly(oxy-1,2-ethanediyl), α-(1-oxooctadecyl)-ω-((1-oxooctadecyl)oxy)-	R	$(C_2H_4O)_n$ $C_{36}H_{70}O_3$
Poly(ethylene glycol), methyl ether	Carbowax; methoxypoly(ethylene glycol); methyl polyglycol; monomethoxy poly(ethylene oxide)	9004-74-4	Poly(oxy-1,2-ethanediyl), α-methyl-ω-hydroxy-	R	$(C_2H_4O)_nCH_4O$
Poly(ethylene glycol), methyl ether acrylate	Acrylic acid-methoxy(polyethylene glycol) ester	32171-39-4	Poly(oxy-1,2-ethanediyl), α-(1-oxo-2-propenyl)-ω-methoxy-	R	$(C_2H_4O)_n$ $C_4H_6O_2$
Poly(ethylene glycol), 4-nonylphenyl ether acrylate	Tetraethylene glycol nonylphenyl ether acrylate	87079-63-8	2-Propenoic acid, 2-(2-(2-(2-(nonylphenoxy)ethoxy)ethoxy)-ethoxy)ethyl ester	R	$C_{26}H_{42}O_6$
Poly(ethylene glycol), bis carboxymethyl ether	Carboxymethylpolyethylene glycol	39927-08-7	Poly(oxy-1,2-ethanediyl), α-(carboxymethyl)-ω-(carboxymethoxy)-	R	$(C_2H_4O)_n$ $C_4H_6O_5$
Poly(ethylene glycol), bis(3-aminopropyl) terminated		34901-14-9	Poly(oxy-1,2-ethanediyl), α-(3-aminopropyl)-ω-(3-aminopropoxy)-	R	$(C_2H_4O)_n$ $C_6H_{16}N_2O$
Poly(ethylene glycol), divinyl ether		50856-26-3	Poly(oxy-1,2-ethanediyl), α-ethenyl-ω-(ethenyloxy)-	R	$(C_2H_4O)_n$ C_4H_6O
Poly(ethylene glycol), ethyl ether methacrylate		35625-93-5	Poly(oxy-1,2-ethanediyl), α-(2-methyl-1-oxo-2-propenyl)-ω-ethoxy-	R	$(C_2H_4O)_n$ $C_6H_{10}O_2$
Poly(ethylene glycol), methyl glutarate		79934-70-6	Poly(oxy-1,2-ethanediyl), α-(4-carboxy-1-oxobutyl)-ω-methoxy-	R	$(C_2H_4O)_n$ $C_6H_{10}O_4$
Poly(ethylene glycol), phenyl ether acrylate	Phenol ethoxylate acrylate, polyethylene glycol monophenyl ether acrylate	56641-05-5	Poly(oxy-1,2-ethanediyl), α-(1-oxo-2-propenyl)-ω-phenoxy-	R	$(C_2H_4O)_n$ $C_9H_8O_2$

Common name	Synonyms	CAS Registry No.	CA name	Search method	Molecular formula
Poly(ethylene glycol), reacted with bisphenol A diglycidyl ether	Bisphenol A diglycidyl ether–polyethylene glycol polymer	37225-26-6	Oxirane, 2,2′-((1-methylethylidene) bis(4,1-phenyleneoxymethylene))bis-polymer with α-hydro-ω-hydroxypoly (oxy-1,2-ethanediyl)	R	$(C_{21}H_{24}O_4 \cdot (C_2H_4O)_n H_2O)_x$
Poly(ethylene glycol), tetrahydrofurfuryl ether	Glycofurol; tetrahydrofurfuryl alcohol polyethylene glycol	31692-85-0	Poly(oxy-1,2-ethanediyl), α-((tetrahydro-2-furanyl)methyl)-ω-hydroxy-	R	$(C_2H_4O)_n C_5H_{10}O_2$
Poly(ethylene glycol), methacrylate		25736-86-1	Poly(oxy-1,2-ethanediyl), α-(2-methyl-1-oxo-2-propenyl)-ω-hydroxy-	R	$(C_2H_4O)_n C_4H_6O_2$
Poly(ethylene glycol-*co*-propylene glycol)	Polyethylene-polypropylene glycol monobutyl ether	9038-95-3	Oxirane, methyl-, polymer with oxirane, monobutyl ether	R	$C_4H_{10}O \cdot (C_3H_6O \cdot C_2H_4O)_x$
Poly(ethylene imine)	Polyaziridine, polyethenimide	9002-98-6	Aziridine, homopolymer	R	$(C_2H_5N)_x$
Poly(ethylene imine)	Ethylenediamine-ethylenimine polymer	25987-06-8	1,2-Ethanediamine, polymer with aziridine	R	$(C_2H_8N_2 \cdot C_2H_5N)_x$
Poly(ethylene imine), ethoxylated	Aziridine–ethylene oxide copolymer	26658-46-8	Aziridine, polymer with oxirane	R	$(C_2H_5N \cdot C_2H_4O)_x$
Poly(ethylene monoalcohol)		71750-71-5	Alcohols, c > 14	S	Unk
Poly(ethylene succinate)	Ethylene glycol–succinic acid polymer	25569-53-3	Butanedioic acid, polymer with 1,2-ethanediol	R	$(C_4H_6O_4 \cdot C_2H_6O_2)_x$
Poly(ethylene terephthalate)	Dimethyl terephthalate–ethylene glycol polymer; PET; poly-(oxyethylene oxyterephthaloyl)	25038-59-9	Poly(oxy-1,2-ethanediyloxy-carbonyl-1,4-phenylenecarbonyl)	U	$(C_{10}H_8O_4)_n$
Poly(ethylene)	Poly(methylene)	9002-88-4	Ethene, homopolymer	R	$(C_2H_4)_x$
Poly(ethylene), chlorinated		63231-66-3	Rubber, synthetic, chlorinated polyethylene	S	Unk
Poly(ethylene), chlorosulfonated		68037-39-8	Ethene, homopolymer, chlorinated, chlorosulfonated	*	Unk
Poly(ethylene), oxidized		68441-17-8	Ethene, homopolymer, oxidized	*	Unk
Poly(ethylene-*alt*-chlorotrifluoroethylene)	Chlorotrifluoroethene–ethene copolymer; ethylene–trifluoro-chloroethylene copolymer	25101-45-5	Ethene, chlorotrifluoro-, polymer with ethene	R	$(C_2H_4 \cdot C_2ClF_3)_x$
Poly(ethylene-*alt*-maleic anhydride)	Maleic anhydride–ethylene polymer	9006-26-2	2,5-Furandione, polymer with ethene	R	$(C_4H_2O_3 \cdot C_2H_4)_x$
Poly(ethylene-*block*-poly (ethylene glycol))		97953-22-5	Alcohols, C > 30, ethoxylated	S	Unk
Poly(ethylene-*co*-1-butene)	Butene–ethylene polymer; ethylene–1-butene copolymer; 1-butene-ethene polymer	25087-34-7	1-Butene, polymer with ethene	R	$(C_4H_8 \cdot C_2H_4)_x$
Poly(ethylene-*co*-1-butene-*co*-1-hexene)	Butene–ethene–hexene-1 copolymer	60785-11-7	1-Hexene, polymer with 1-butene and ethene	R	$(C_6H_{12} \cdot C_4H_8 \cdot C_2H_4)_x$
Poly(ethylene-*co*-1-octene)	Ethylene–1-octene polymer	26221-73-8	1-Octene, polymer with ethene	R	$(C_8H_{16} \cdot C_2H_4)_x$
Poly(ethylene-*co*-acrylic acid)	Acrylic acid–ethylene polymer; ethylene–acrylic acid polymers; primacor	9010-77-9	2-Propenoic acid, polymer with ethene	R	$(C_3H_4O_2 \cdot C_2H_4)_x$
Poly(ethylene-*co*-acrylic acid), sodium salt	Ethylene–acrylic acid polymer, sodium salt	25750-82-7	2-Propenoic acid, polymer with ethene, sodium salt	R	$(C_3H_4O_2 \cdot C_2H_4)_x \cdot xNa$
Poly(ethylene-*co*-acrylic acid), zinc salt		28208-80-2	2-Propenoic acid, polymer with ethene, zinc salt	R	$(C_3H_4O_2 \cdot C_2H_4)_x \cdot xZn$
Poly(ethylene-*co*-butyl acrylate)	Butyl acrylate–ethylene copolymer	25750-84-9	2-Propenoic acid, butyl ester, polymer with ethene	R	$(C_7H_{12}O_2 \cdot C_2H_4)_x$
Poly(ethylene-*co*-butyl acrylate-*co*-maleic anhydride)		64652-60-4	2-Propenoic acid, butyl ester, polymer with ethene and 2,5-furandione	R	$(C_7H_{12}O_2 \cdot C_4H_2O_3 \cdot C_2H_4)_x$
Poly(ethylene-*co*-carbon monoxide)	Carbon monoxide–ethylene copolymer	25052-62-4	Ethene, polymer with carbon monoxide	R	$(C_2H_4 \cdot CO)_x$
Poly(ethylene-*co*-ethyl acrylate)	Ethyl acrylate–ethylene polymer	9010-86-0	2-Propenoic acid, ethyl ester, polymer with ethene	R	$(C_5H_8O_2 \cdot C_2H_4)_x$
Poly(ethylene-*co*-ethyl acrylate-*co*-maleic anhydride)		41171-14-6	2-Propenoic acid, ethyl ester, polymer with ethene and 2,5-furandione	R	$(C_5H_8O_2 \cdot C_4H_2O_3 \cdot C_2H_4)_x$
Poly(ethylene-*co*-glycidyl methacrylate)	2,3-Epoxypropyl methacrylate–ethylene copolymer	26061-90-5	2-Propenoic acid, 2-methyl-, oxiranylmethyl ester, polymer with ethene	R	$(C_7H_{10}O_3 \cdot C_2H_4)_x$

Common name	Synonyms	CAS Registry No.	CA name	Search method	Molecular formula
Poly(ethylene-*co*-methacrylic acid)	Ethylene–methacrylic acid copolymers; Poly(ethylene-methacrylic acid)	25053-53-6	2-Propenoic acid, 2-methyl-, polymer with ethene	R	$(C_4H_6O_2 \cdot C_2H_4)_x$
Poly(ethylene-*co*-methacrylic acid), sodium salt	Ethylene–methacrylic acid polymer, sodium salt	25608-26-8	2-Propenoic acid, 2-methyl, polymer with ethene, sodium salt	R	$(C_4H_6O_2 \cdot C_2H_4)_x \cdot xNa$
Poly(ethylene-*co*-methacrylic acid), zinc salt		28516-43-0	2-Propenoic acid, 2-methyl-, polymer with ethene, zinc salt	R	$(C_4H_6O_2 \cdot C_2H_4)_x \cdot xZn$
Poly(ethylene-*co*-methyl acrylate)	Ethylene–methyl acrylate polymer	25103-74-6	2-Propenoic acid, methyl ester, polymer with ethene	R	$(C_4H_6O_2 \cdot C_2H_4)_x$
Poly(ethylene-*co*-methyl acrylate-*co*-acrylic acid)		41525-41-1	2-Propenoic acid, polymer with ethene and methyl 2-propenoate	R	$(C_4H_6O_2 \cdot C_3H_4O_2 \cdot C_2H_4)_x$
Poly(ethylene-*co*-methyl acrylate-*co*-glycidyl methacrylate)		51541-08-3	2-Propenoic acid, 2-methyl-, oxiranylmethyl ester, polymer with ethene and methyl 2-propenoate	R	$(C_7H_{10}O_3 \cdot C_4H_6O_2 \cdot C_2H_4)_x$
Poly(ethylene-*co*-propylene)	Ethylene–propene copolymer; poly(ethylene-propylene); polypro, polypropylene–polyethylene copolymer	9010-79-1	1-Propene, polymer with ethene	R	$(C_3H_6 \cdot C_2H_4)_x$
Poly(ethylene-*co*-propylene-*co*-5-methylene-2-norbornene)	Ethylene–ethylidenebicycloheptene–propene copolymer; ethylene–ethylidenenorbornene–propylene polymer	25038-36-2	Bicyclo(2.2.1)hept-2-ene, 5-ethylidene-, polymer with ethene and 1-propene	R	$(C_9H_{12} \cdot C_3H_6 \cdot C_2H_4)_x$
Poly(ethylene-*co*-tetrafluoroethylene)	Ethylene copolymer with tetrafluoroethylene	25038-71-5	Ethene, tetrafluoro-, polymer with ethene	R	$(C_2H_4 \cdot C_2F_4)_x$
Poly(ethylene-*co*-vinyl acetate)	Vinyl acetate–ethylene polymer	24937-78-8	Acetic acid ethenyl ester, polymer with ethene	R	$(C_4H_6O_2 \cdot C_2H_4)_x$
Poly(ethylene-*co*-vinyl acetate-*co*-carbon monoxide)	Carbon monoxide–ethylene–vinyl acetate polymer	26337-35-9	Acetic acid ethenyl ester, polymer with carbon monoxide and ethene	R	$(C_4H_6O_2 \cdot C_2H_4 \cdot CO)_x$
Poly(ethylene-*graft*-maleic anhydride)		106343-08-2	2,5-Furandione, polymer with ethene, graft	R	$(C_4H_2O_3 \cdot C_2H_4)_x$
Poly(ethylene-*ran*-butylene), mono-ol		68954-09-6	1,3-Butadiene, homopolymer, hydrogenated	*	Unk
Poly(2-ethylhexyl acrylate)	2-Ethylhexyl acrylate polymer	9003-77-4	2-Propenoic acid, 2-ethylhexyl ester, homopolymer	R	$(C_{11}H_{20}O_2)_x$
Poly(2-ethylhexyl methacrylate)		25719-51-1	2-Propenoic acid, 2-methyl-, 2-ethylhexyl ester, homopolymer	R	$(C_{12}H_{22}O_2)_x$
Poly(2-ethyl-2-oxazoline)	2-Ethyl-2-oxazoline polymer; 2-ethyloxazoline homopolymer	25805-17-8	Oxazole, 2-ethyl-4,5-dihydro-, homopolymer	R	$(C_5H_9NO)_x$
Poly(4-ethylstyrene-*co*-divinylbenzene)	Divinylbenzene–ethylstyrene polymer	9043-77-0	Benzene, diethenyl-polymer with ethenylethylbenzene	R	$(C_{10}H_{12} \cdot C_{10}H_{10})_x$
Poly(furfuryl alcohol)		25212-86-6	2-Furanmethanol, homopolymer	R	$(C_5H_6O_2)_x$
Poly(D-glutamic acid), sodium salt		30811-79-1	D-Glutamic acid, homopolymer, sodium salt	R	$(C_5H_9NO_4)_x \cdot xNa$
Poly(L-glutamic acid), sodium salt	Poly(glutamic acid) sodium salt	26247-79-0	L-Glutamic acid, homopolymer, sodium salt	R	$(C_5H_9NO_4)_x \cdot xNa$
Poly(glycine)	Nylon 2, poly(imino(1-oxoethylene))	25718-94-9	Glycine, homopolymer	R	$(C_2H_5NO_2)_x$
Poly(glycolide)	Hydroxyacetic acid polymer; poly(glycolic acid)	26124-68-5	Acetic acid, hydroxy-, homopolymer	R	$(C_2H_4O_3)_x$
Poly(hexadecyl methacrylate)	Poly(cetyl methacrylate)	25986-80-5	2-Propenoic acid, 2-methyl-, hexadecyl ester, homopolymer	R	$(C_{20}H_{38}O_2)_x$
Poly(hexafluoroisopropylidene diphthalic anhydride-*co*-oxydianiline)	Hexafluoroisopropylidenebis-(phthalic anhydride)-oxydianiline copolymer	032240-73-6	1,3-Isobenzofurandione, 5,5′-(2,2,2-trifluoro-1-(trifluoromethyl)-ethylidene)bis-, polymer with 4,4′-oxybis(benzenamine)	R	$(C_{19}H_6F_6O_6 \cdot C_{12}H_{12}N_2O)_x$
Poly(1,6-hexamethylene adipate)	Adipic acid–hexanediol polymer	25212-06-0	Hexanedioic acid, polymer with 1,6-hexanediol	R	$(C_6H_{14}O_2 \cdot C_6H_{10}O_4)_x$
Poly(1,6-hexanediol/neopentyl glycol/di(ethylene glycol)-*alt*-adipic acid) diol		68492-71-7	Hexanedioic acid, polymer with 2,2-dimethyl-1,3-propanediol, 2-ethyl-2-(hydroxymethyl)-1,3-propanediol, 1,6-hexanediol and 2,2′-oxybis(ethanol)	R	$(C_6H_{14}O_3 \cdot C_6H_{14}O_2 \cdot C_6H_{10}O_4 \cdot C_5H_{12}O_2 \cdot C_4H_{10}O_3)_x$

Common name	Synonyms	CAS Registry No.	CA name	Search method	Molecular formula
Poly(1,6-hexanediol/neopentyl glycol-*alt*-adipic acid)	Adipic acid–hexamethylene glycol–neopentyl glycol polymer	25214-14-6	Hexanedioic acid, polymer with 2,2-dimethyl-1,3-propanediol and 1,6-hexanediol	R	$(C_6H_{14}O_2 \cdot C_6H_{10}O_4 \cdot C_5H_{12}O_2)_x$
Poly(hexamethylene diisocyanate)	HMDI homopolymer	28182-81-2	Hexane, 1,6-diisocyanato-, homopolymer	R	$(C_8H_{12}N_2O_2)_x$
Poly(hexyl methacrylate)	Hexyl methacrylate polymer	25087-17-6	2-Propenoic acid, 2-methyl-, hexyl ester, homopolymer	R	$(C_{10}H_{18}O_2)_x$
Poly(1-hexene)		25067-06-5	1-Hexene, homopolymer	R	$(C_6H_{12})_x$
Poly(3-hexyl thiophene), regioregular		140934-50-1	Thiophene, 3-hexyl-, homopolymer	R	$(C_{10}H_{16}S)_x$
Poly(L-histidine)	Polyhistidine	26062-48-6	L-Histidine, homopolymer	R	$(C_6H_7N_3O)_x$
Poly(L-histidine hydrochloride)	Polyhirtidine hydrochloride	61857-39-4	L-Histidine, homopolymer, hydrochloride	R	$(C_6H_9N_3O_2)_x \cdot xClH$
Poly(4-hydroxybenzoate)	Poly(*p*-acetoxybenzoic acid)	26099-71-8	Poly(oxy-1,4-phenylenecarbonyl)	R	$(C_7H_4O_2)_n$
Poly(4-hydroxy benzoic acid-*co*-6-hydroxy-2-naphthoic acid)	*p*-Acetoxybenzoic acid-6-acetoxy-2-naphthoic acid polymer	70679-92-4	2-Naphthalenecarboxylic acid, 6-(acetyloxy)-, polymer with 4-(acetyloxy)benzoic acid	R	$(C_{13}H_{10}O_4 \cdot C_9H_8O_4)_x$
Poly(3-hydroxybutyric acid)	Poly(β-hydroxybutyric acid)	26063-00-3	Butanoic acid, 3-hydroxy-, homopolymer	R	$(C_4H_8O_3)_x$
Poly(3-hydroxybutyric acid-*co*-3-hydroxy valeric acid)	Bipol PHBV; 3-hydroxy butanoic acid-3-hydroxy valeric acid copolymer	80181-31-3	Pentanoic acid, 3-hydroxy-, polymer with 3-hydroxybutanoic acid	R	$(C_5H_{10}O_3 \cdot C_4H_8O_3)_x$
Poly(2-hydroxyethyl methacrylate)	Ethylene glycol monomethacrylate polymer	25249-16-5	2-Propenoic acid, 2-methyl-, 2-hydroxyethyl ester, homopolymer	R	$(C_6H_{10}O_3)_x$
Poly(2-hydroxypropyl methacrylate)		25703-79-1	2-Propenoic acid, 2-methyl, 2-hydroxypropyl ester, homopolymer	R	$(C_7H_{12}O_3)_x$
Poly(imino(tetrachloroterephthaloyl)-iminohexamethylene)	Hexamethylenediamine-perchloroterephthaloyl dichloride copolymer, SRU	071164-49-3	Poly(iminocarbonyl(2,3,5,6-tetrachloro-1,4-phenylene)-carbonylimino-1,6-hexanediyl)	R	$(C_{14}H_{14}Cl_4N_2O_2)_n$
Poly(isobornyl methacrylate)	Methacrylic acid, isobornyl ester, polymers	64114-51-8	2-Propenoic acid, 2-methyl-, 1,7,7-trimethylbicyclo(2.2.1) hept-2-yl ester, exo-, homopolymer	R	$(C_{14}H_{22}O_2)_x$
Poly(isobutyl methacrylate)	Isobutyl methacrylate polymer	9011-15-8	2-Propenoic acid, 2-methyl-, 2-methylpropylester, homopolymer	R	$(C_8H_{14}O_2)_x$
Poly(isobutylene)	Poly(1,1-dimethylethylene); isobutene polymer; isobutylene polymer; polyisobutene	9003-27-4	1-Propene, 2-methyl, homopolymer	R	$(C_4H_8)_x$
Poly(isobutylene-*alt*-maleic anhydride)		26426-80-2	2,5-Furandione, polymer with 2-methyl-1-propene	R	$(C_4H_8 \cdot C_4H_2O_3)_x$
Poly(isobutylene-*co*-isoprene)	Isobutylene–isoprene polymer	9010-85-9	1,3-Butadiene, 2-methyl, polymer with 2-methyl-1-propene	R	$(C_5H_8 \cdot C_4H_8)_x$
Poly(isobutylene-*co*-isoprene)		68081-82-3	1,3-Butadiene, 2-methyl-, polymer with 2-methyl-1-propene, chlorinated	*	$(C_5H_8 \cdot C_4H_8)_x$
Poly(isobutylene-*co*-isoprene), brominated		68441-14-5	1,3-Butadiene, 2-methyl-, polymer with 2-methyl-1-propene, brominated	*	$(C_5H_8 \cdot C_4H_8)_x$
Poly(isodecyl methacrylate)		27300-12-7	2-Propenoic acid, 2-methyl-, isodecyl ester, homopolymer	R	$(C_{14}H_{26}O_2)_x$
Poly(isophorone diisocyanate)		53880-05-0	Cyclohexane, 5-isocyanato-1-(isocyanatomethyl)-1,3,3-trimethyl-, homopolymer	R	$(C_{12}H_{18}N_2O_2)_x$
Poly(isophorone diisocyanate-*co*-poly(propylene glycol))	Isophorone diisocyanate–polypropylene ether glycol polymer; polypropylene glycol–isophorone diisocyanate copolymer	039323-37-0	Poly(oxy(methyl-1,2-ethanediyl)), α-hydro-ω-hydroxy-, polymer with	R	$(C_{12}H_{18}N_2O_2 \cdot (C_3H_6O)_n H_2O)_x$
Poly(isoprene), *cis*	Poly(1-methyl-1-butenylene)	9003-31-0	1,3-Butadiene, 2-methyl-, homopolymer	R	$(C_5H_8)_x$
Poly(isoprene), *trans*		104389-32-4	Poly(1-methyl-1-butene-1,4-diyl), (E)-	R	$(C_5H_8)n$

Common name	Synonyms	CAS Registry No.	CA name	Search method	Molecular formula
Poly(isoprene)-*block*-poly(butadiene)	Butadiene–isoprene polymer; 1,3-Butadiene–isoprene polymer	25102-52-7	1,3-Butadiene, 2-methyl-, polymer with 1,3-butadiene	R	$(C_5H_8 \cdot C_4H_6)_x$
Poly(isoprene-*graft*-maleic acid monomethyl ester)		128000-08-8	1,3-Butadiene, 2-methyl-, homopolymer, maleated, mono-methyl esters	*	Unk
Poly(2-isopropenyl-2-oxazoline-*co*-methyl methacrylate)		27341-60-2	2-Propenoic acid, 2-methyl-, methyl ester, polymer	R	$(C_6H_9NO \cdot C_5H_8O_2)_x$
Poly(isopropyl methacrylate)		26655-94-7	2-Propenoic acid, 2-methyl-, 1-methylethyl ester, homopolymer	R	$(C_7H_{12}O_2)_x$
Poly(isopropyl vinyl ether)	Isopropyl vinyl ether polymer	25585-49-3	Propane, 2-(ethenyloxy)-, homopolymer	R	$(C_5H_{10}O)_x$
Poly(itaconic acid)	Poly(2-methylenesuccinic acid)	25119-64-6	Butanedioic acid, methylene, homopolymer	R	$(C_5H_6O_4)_x$
Poly(lactide)	Lactide polymer; poly(DL-lactide)	26680-10-4	1,4-Dioxane-2,5-dione, 3,6-dimethyl-homopolymer	R	$(C_6H_8O_4)_x$
Poly(D,L-lactide-*co*-glycolide)	Glycolide-DL-lactide polymer; polyglactin	26780-50-7	1,4-Dioxane-2,5-dione, 3,6-dimethylpolymer with 1,4-dioxane-2,5-dione	R	$(C_6H_8O_4 \cdot C_4H_4O_4)_x$
Poly(lauryl lactam)-*block*-poly(tetrahydrofuran)	Maleic anhydride-1-tetradecene polymer	31473-53-7	2,5-Furandione, polymer with 1-tetradecene	R	$(C_{14}H_{28} \cdot C_4H_2O_3)_x$
Poly(lauryl methacrylate)	Poly(dodecyl methacrylate)	25719-52-2	2-Propenoic acid, 2-methyl-, dodecyl ester, homopolymer	R	$(C_{16}H_{30}O_2)_x$
Poly(lauryl methacrylate-*co*-ethylene glycol dimethacrylate)	Ethylene glycol dimethacrylate–lauryl methacrylate copolymer	61181-29-1	2-Propenoic acid, 2-methyl-, 1,2-ethanediyl ester, polymer with dodecyl 2-methyl-2-propenoate	R	$(C_{16}H_{30}O_2 \cdot C_{10}H_{14}O_4)_x$
Poly(D,L-lysine hydrobromide)		73565-55-6	DL-Lysine, homopolymer, hydrobromide	R	$(C_6H_{14}N_2O_2)_x \cdot xBrH$
Poly(L-leucine)	Polyleucine	25248-98-0	L-Leucine, homopolymer	R	$(C_6H_{13}NO_2)_x$
Poly(L-leucine hydrobromide)	Poly-L-lysine hydrogen bromide; polylysine hydrobromide	25988-63-0	L-Lysine, homopolymer, hydrobromide	R	$(C_6H_{14}N_2O_2)_x \cdot xBrH$
Poly(D-lysine hydrobromide)		27964-99-4	D-Lysine, homopolymer, hydrobromide	R	$(C_6H_{14}N_2O_2)_x \cdot xBrH$
Poly(L-lysine hydrochloride)	Lysine homopolymer hydrochloride	28826-16-6	L-Lysine, homopolymer, hydrochloride	R	$(C_6H_{14}N_2O_2)_x \cdot xClH$
Poly(L-lysine)	Lysine homopolymer	25104-18-1	L-Lysine, homopolymer	R	$(C_6H_{14}N_2O_2)_x$
Poly(maleic anhydride-*alt*-1-octadecene)	1-Octadecene–maleic anhydride polymer	25266-02-8	2,5-Furandione, polymer with 1-octadecene	R	$(C_{18}H_{36} \cdot C_4H_2O_3)_x$
Poly(maleic anhydride-*alt*-α-olefin)		68036-97-5	1,3,5-Triazine-2,4,6-triamine, polymer with formaldehyde, butylated methylated	*	$(C_3H_6N_6 \cdot CH_2O)_x$
Poly(melamine-*co*-formaldehyde), butylated		68002-25-5	1,3,5-Triazine-2,4,6-triamine, polymer with formaldehyde, butylated	*	$(C_3H_6N_6 \cdot CH_2O)_x$
Poly(melamine-*co*-formaldehyde), butylated		68459-79-0	Alkenes, C24-28 α-, polymers with maleic anhydride	S	Unk
Poly(melamine-*co*-formaldehyde), butylated/methylated		70750-53-7	Terpenes and terpenoids, limonene fraction, polymd.	S	Unk
Poly(melamine-*co*-formaldehyde), methylated	Laurolactam–polytetramethylene glycol copolymer	84732-38-7	Azacyclotridecan-2-one, polymer with α-hydro-ω-hydroxypoly-(oxy-1,4-butanediyl)	R	$(C_{12}H_{23}NO \cdot (C_4H_8O)_n H_2O)_x$
Poly(melamine-*co*-formaldehyde), isobutylated		68002-21-1	1,3,5-Triazine-2,4,6-triamine, polymer with formaldehyde, isobutylated	*	$(C_3H_6N_6 \cdot CH_2O)_x$
Poly(methacrylic acid), sodium salt		54193-36-1	2-Propenoic acid, 2-methyl-, homopolymer, sodium salt	R	$(C_4H_6O_2)_x \cdot xNa$
Poly(L-methionine)	Methionine homopolymer	26242-79-0	L-Methionine, homopolymer	R	$(C_5H_{11}NO_2S)_x$
Poly(4-methoxystyrene)	Poly(*p*-methoxystyrene); poly(4-vinylanisole)	24936-44-5	Benzene, 1-ethenyl-4-methoxy-, homopolymer	R	$(C_9H_{10}O)_x$
Polymethylene polyphenylene isocyanate	Poly(phenyl isocyanate-*co*-formaldehyde), poly(methylene poly(phenyl isocyanate))	9016-87-9	Isocyanic acid, polymethylene-polyphenylene ester	R	Unk

Common name	Synonyms	CAS Registry No.	CA name	Search method	Molecular formula
Poly(methyl acrylate)	Methyl acrylate polymer	9003-21-8	2-Propenoic acid, methyl ester, homopolymer	R	$(C_4H_6O_2)_x$
Poly(4,4′-methylene bis(phenyl isocyanate)-*alt*-butanediol/di-PG/polycaprolactone))		68084-39-9	2-Oxepanone, polymer with 1,4-butanediol, 1,1′-methylenebis(isocyanatobenzene) and oxybis(propanol)	R	$(C_{15}H_{10}N_2O_2 \cdot C_6H_{14}O_3 \cdot C_6H_{10}O_2 \cdot C_4H_{10}O_2)_x$
Poly(4,4′-methylene bisphenyl isocyanate)	1,4-Butanediol-methylenedi-*p*-phenylene isocyanate-polytetramethylene–ether glycol copolymer	9018-04-6	1,4-Butanediol, polymer with α-hydro-ω-hydroxypoly(oxy-1,4-butanediyl) and 1,1′-methylenebis(4-isocyanatobenzene)	R	$(C_{15}H_{10}N_2O_2 \cdot C_4H_{10}O_2 \cdot (C_4H_8O)_n H_2O)_x$
Poly(methyl methacrylate)	Methacrylic acid methyl ester; methyl methacrylate polymer	9011-14-7	2-Propenoic acid, 2-methyl, methyl ester, homopolymer	R	$(C_5H_8O_2)_x$
Poly(methyl methacrylate-*co*-butadiene-*co*-styrene)	Butadiene–methyl methacrylate–styrene polymer	25053-09-2	2-Propenoic acid,2-methyl-, methyl ester, polymer with 1,3-butadiene and ethenylbenzene	R	$(C_8H_8 \cdot C_5H_8O_2 \cdot C_4H_6)_x$
Poly(methyl methacrylate-*co*-ethyl acrylate)	Methyl methacrylate–ethyl acrylate polymer	9010-88-2	2-Propenoic acid, 2-methyl-, methyl ester, polymer with ethyl 2-propenoate	R	$(C_5H_8O_2 \cdot C_5H_8O_2)_x$
Poly(3-methyl 1,5-pentanediol adipate)	Adipic acid-3-methyl-1,5-pentanediol copolymer	39751-34-3	Hexanedioic acid, polymer with 3-methyl-1,5-pentanediol	R	$(C_6H_{14}O_2 \cdot C_6H_{10}O_4)_x$
Poly(4-methyl-1-pentene)	Methylpentene polymer; 4-methylpentene homopolymer	25068-26-2	1-Pentene, 4-methyl-, homopolymer	R	$(C_6H_{12})x$
Poly(methyl sorbate)		30813-48-0	2,4-Hexadienoic acid, methyl ester, (E,E)-, homopolymer	R	$(C_7H_{10}O_2)_x$
Poly(4-methyl styrene)	*p*-Methylstyrene polymer; 4-methylstyrene homopolymer	24936-41-2	Benzene, 1-ethenyl-4-methyl-, homopolymer	R	$(C_9H_{10})_x$
Poly(α-methyl styrene)	α-Methylstyrene polymer	25014-31-7	Benzene, (1-methylethenyl)-, homopolymer	R	$(C_9H_{10})_x$
Poly(methyl styrene-*co*-indene), hydrogenated		69430-35-9	Hydrocarbons, C6–C20, polymers, hydrogenated	S	Unk
Poly(methyl vinyl ether-*alt*-maleic acid monoethyl ester)	Ethyl maleate–methyl vinyl ether polymer; maleic acid monoethyl ester–methyl vinyl ether polymer; monoethyl maleate–methyl vinyl ether polymer	25087-06-3	2-Butenedioic acid (Z)-, monoethyl ester, polymer with methoxyethene	R	$(C_6H_8O_4 \cdot C_3H_6O)_x$
Poly(methyl vinyl ether-*alt*-maleic acid monoisopropyl ester)		31307-95-6	2-Butenedioic acid (Z)-, mono(1-methylethyl) ester, polymer with methoxyethene	R	$(C_7H_{10}O_4 \cdot C_3H_6O)_x$
Poly(methyl vinyl ether-*alt*-maleic acid)	Maleic acid–methyl vinyl ether copolymer; maleic acid–methyl vinyl ether polymer	25153-40-6	2-Butenedioic acid (Z)-, polymer with methoxyethene	R	$(C_4H_4O_4 \cdot C_3H_6O)_x$
Poly(methyl vinyl ether-*alt*-maleic anhydride)	Maleic anhydride–methyl vinyl ether polymer	9011-16-9	2,5-Furandione, polymer with methoxyethene	R	$(C_4H_2O_3 \cdot C_3H_6O)_x$
Poly(methyl vinyl ether-*alt*-maleic anhydride)	1,9-Decadiene–maleic anhydride–methyl vinyl ether copolymer	136392-67-1	2,5-Furandione, polymer with 1,9-decadiene and methoxyethene	R	$(C_{10}H_{18} \cdot C_4H_2O_3 \cdot C_3H_6O)_x$
Poly(methylhydrosiloxane)	Methyl hydrogen siloxane	9004-73-3	Poly(oxy(methylsilylene))	R	$(CH_4OSi)_n$
Poly(neopentyl glycol adipate)	Adipic acid–neopentyl glycol copolymer	27925-07-1	Hexanedioic acid, polymer with 2,2-dimethyl-1,3-propanediol	R	$(C_6H_{10}O_4 \cdot C_5H_{12}O_2)_x$
Poly(neopentyl glycol sebacate)		28759-54-8	Poly(oxy(2,2-dimethyl-1,3-propanediyl)oxy(1,10-dioxo-1,10-decanediyl))	R	$(C_{15}H_{26}O_4)_n$
Poly(neopentyl methacrylate)		34903-87-2	2-Propenoic acid, 2-methyl-, 2,2-dimethylpropyl ester, homopolymer	R	$(C_9H_{16}O_2)_x$
Poly(norbornene)	Poly(2-norbornene); polynorbornenylene	25038-76-0	Bicyclo(2.2.1)hept-2-ene, homopolymer	R	$(C_7H_{10})_x$
Poly(octadecyl methacrylate)	Stearyl methacrylate homopolymer	25639-21-8	2-Propenoic acid, 2-methyl-, octadecyl ester, homopolymer	R	$(C_{22}H_{42}O_2)_x$
Poly(octadecyl vinyl ether-*co*-maleic anhydride)	Maleic anhydride–octadecyl vinyl ether polymer	28214-64-4	2,5-Furandione, polymer with 1-(ethenyloxy)octadecane	R	$(C_{20}H_{40}O \cdot C_4H_2O_3)_x$
Poly(octyl acrylate)	Octyl acrylate polymer	25266-13-1	2-Propenoic acid, octyl ester, homopolymer	R	$(C_{11}H_{20}O_2)_x$

Common name	Synonyms	CAS Registry No.	CA name	Search method	Molecular formula
Poly(3-octyl thiophene), regioregular		104934-51-2	Thiophene, 3-octyl-, homopolymer	R	$(C_{12}H_{20}S)_x$
Poly(L-ornithine)	Polyornithine	25104-12-5	L-Ornithine, homopolymer	R	$(C_5H_{12}N_2O_2)_x$
Poly(L-ornithine hydrobromide)	Polyorthine hydrobromide	27378-49-0	L-Ornithine, homopolymer, hydrobromide	R	$(C_5H_{12}N_2O_2)_x \cdot xBrH$
Poly(D,L-ornithine hydrobromide)		82682-33-5	DL-Ornithine, homopolymer, hydrobromide	R	$(C_5H_{12}N_2O_2)_x \cdot xBrH$
Poly(L-ornithine hydrochloride)	Poly-L-ornithine-hydrochloride	26982-21-8	L-Ornithine, homopolymer, hydrochloride	R	$(C_5H_{12}N_2O_2)_x \cdot xClH$
Poly[oxy(2,6-dimethyl-1,4-phenylene)]	Poly(2,6-dimethyl-*p*-phenylene ether); poly(2,6-dimethyl-1,4-phenylene oxide), SRU	24938-67-8	Poly(oxy(2,6-dimethyl-1,4-phenylene))	R	
Poly(oxy-1,4-phenylene oxy-1,4-phenylene carbonyl 1,4-phenylene)	4,4′-Difluorobenzophenone–hydroquinone copolymer, SRU; PEEK	31694-16-3	Poly(oxy-1,4-phenyleneoxy-1,4-phenylenecarbonyl-1,4-phenylene)	R	$(C_{19}H_{12}O_3)_n$
Poly(oxycarbonyloxy-1,4-phenyleneisopropylidene-1,4-phenylene)	Bisphenol A polycarbonate; poly(4,4′-isopropylidenediphenyl carbonate)	24936-68-3	Poly(oxycarbonyloxy-1,4-phenylene(1-methylethylidene)-1,4-phenylene)	R	$(C_{16}H_{14}O_3)_n$
Poly(oxymethylene)	Poly(formaldehyde); formaldehyde polymer	9002-81-7	Poly(oxymethylene)	R	$(CH_2O)_n$
Poly(oxymethylene), acetate end-capped	Poly(oxymethylene) diacetate	25231-38-3	Poly(oxymethylene), α-acetyl-ω-(acetyloxy)-	R	$(CH_2O)_n$ $C_4H_6O_3$
Poly(oxymethylene-*co*-1,3-dioxepane)	Butanediol formal–trioxane copolymer; formaldehyde tetramethylene acetal–trioxane copolymer; 1,3-dioxepane-trioxane polymer	25214-85-1	1,3-Dioxepane, polymer with 1,3,5-trioxane	R	$(C_5H_{10}O_2 \cdot C_3H_6O_3)_x$
Poly(PAMAM), starburst dendrimer	Starburst 2nd generation	93376-66-0	4,7,11,14,18,21,25,28,32,35-Decaazaoctatriacontane-diamide, etc	R	$C_{142}H_{288}N_{58}O_{28}$
Poly(perfluoropropylene oxide-*co*-perfluoro formaldehyde)		69991-67-9	1-Propene, 1,1,2,3,3,3-hexafluoro-, oxidized, polymd.	*	Unk
Poly(*n*,*n*′-1,4-phenylene-3,3′,4,4′-benzophenone tetracarboxylic imid/amic acid	Benzophenonetetracarboxylic dianhydride-*p*-phenylenediamine polymer, SRU	26023-21-2	Poly((1,3-dihydro-1,3-dioxo-2H-isoindole-2,5-diyl)carbonyl-(1,3-dihydro-1,3-dioxo-2H-isoindole-5,2-diyl)-1,4-phenylene)	U	$(C_{23}H_{10}N_2O_5)_n$
Poly(*n*,*n*′-1,3-phenylene isophthalamide)	Isophthaloyl chloride-1,3-phenylenediamine polymer	25765-47-3	1,3-Benzenedicarbonyl dichloride, polymer with 1,3- benzene-diamine	R	$(C_8H_4Cl_2O_2 \cdot C_6H_8N_2)_x$
Poly(*n*,*n*-1,4-phenylene terephthalamide)	*p*-Phenylenediamine–terephthaloyl chloride copolymer	26125-61-1	1,4-Benzenedicarbonyl dichloride, polymer with 1,4-benzene-diamine	R	$(C_8H_4Cl_2O_2 \cdot C_6H_8N_2)_x$
Poly((phenyl glycidyl ether)-*co*-dicyclopentadiene)		119345-05-0	Phenol, polymer with 3a,4,7,7a-tetrahydro-4,7-methano-1H-indene, glycidyl ether	*	$(C_{10}H_{12} \cdot C_6H_6O)_x$
Poly(phenyl glycidyl ether-*co*-formaldehyde)		28064-14-4	Phenol, polymer with formaldehyde, glycidyl ether	R	$(C_6H_6O \cdot CH_2O)_x$
Poly(phenyl vinyl ketone)	Poly(acrylophenone)	26742-84-7	2-Propen-1-one, 1-phenyl-, homopolymer	R	$(C_9H_8O)_x$
Poly(1,4-phenylene diisocyanate-*co*-poly(1,4-butanediol))		89339-41-3	Poly(oxy-1,4-butanediyl),α-hydro-ω-hydroxy-, polymer with 1,4-diisocyanatobenzene	R	$(C_8H_4N_2O_2 \cdot (C_4H_8O)_n H_2O)_x$
Poly(1,4-phenylene ether ether sulfone)		28212-68-2	Poly(oxy-1,4-phenyleneoxy-1,4-phenylenesulfonyl-1,4-phenylene)	R	$(C_{18}H_{12}O_4S)_n$
Poly(1,4-phenylene ether sulfone)		25667-42-9	Poly(oxy-1,4-phenylenesulfonyl-1,4-phenylene)	U	$(C_{12}H_8O_3S)_n$
Poly(phenylene oxide)	Poly(phenylene ether)	9041-80-9	Poly(oxyphenylene)	R	$(C_6H_4O)_n$
Poly(1,4-phenylene sulfide)	*p*-Dichlorobenzene-sodium sulfide polymer; poly(*p*-phenylene sulfide)	25212-74-2	Poly(thio-1,4-phenylene)	U	$(C_6H_4S)_n$
Poly(*p*-phenylene terephthalamide)	PPTA	24938-64-5	Poly(imino-1,4-phenyleneimino-carbonyl-1,4-phenylene-carbonyl)	U	$(C_{14}H_{10}N_2O_2)_n$

Common name	Synonyms	CAS Registry No.	CA name	Search method	Molecular formula
Poly(α-pinene)		70750-57-1	Terpenes and terpenoids, turpentine-oil, α-pinene fraction, polymd.	S	Unk
Poly(poly(tetrahydrofuran) carbonate), diol		92538-66-4	Carbonic acid, diethyl ester, polymer with α-hydro-ω-hydroxypoly(oxy-1,4-butanediyl)	R	$(C_5H_{10}O_3 \cdot (C_4H_8O)_n H_2O)_x$
Poly(L-proline)	Polyproline; proline homopolymer	25191-13-3	L-Proline, homopolymer	R	$(C_5H_9NO_2)_x$
Poly(1,3-propylene adipate)	Ethyl acrylate–ethylene–glycidyl methacrylate polymer	35830-43-4	2-Propenoic acid, 2-methyl-, oxiranylmethyl ester, polymer with ethene and ethyl 2-propenoate	R	$(C_7H_{10}O_3 \cdot C_5H_8O_2 \cdot C_2H_4)_x$
Poly(propylene carbonate)	Carbon dioxide–propylene oxide polymer	25511-85-7	Oxirane, methyl-, polymer with carbon dioxide	R	$(C_3H_6O \cdot CO_2)_x$
Poly(1,3-propylene glutarate)	Poly(trimethylene glutarate)	52256-48-1	Pentanedioic acid, polymer with 1,3-propanediol	R	$(C_5H_8O_4 \cdot C_3H_8O_2)_x$
Poly(propylene glycol bis(2-aminopropyl ether))	Poly(oxypropylene)diamine	9046-10-0	Poly(oxy(methyl-1,2-ethanediyl)), α-(2-aminomethylethyl)-ω-(2-aminomethylethoxy)-	R	$(C_3H_6O)_n C_6H_{16}N_2O$
Poly(propylene glycol)	Oxirane, methyl-, homopolymer; poly(propylene oxide); PPG: propylene glycol–propylene oxide polymer	25322-69-4	Poly(oxy(methyl-1,2-ethanediyl)), α-hydro-ω-hydroxy-	U	$(C_3H_6O)_n H_2O$
Poly(propylene glycol), 4-nonyl phenol ether acrylate		71926-19-7	Poly(oxy(methyl-1,2-ethanediyl)), α-(1-oxo-2-propenyl)-ω-(nonylphenoxy)-	R	$(C_3H_6O)_n C_{18}H_{26}O_2$
Poly(propylene glycol), diacrylate		52496-08-9	Poly(oxy(methyl-1,2-ethanediyl)), α-(1-oxo-2-propenyl)-ω-((1-oxo-2-propenyl)oxy)-	R	$(C_3H_6O)_n C_6H_6O_3$
Poly(propylene glycol), dimethacrylate		25852-49-7	Poly(oxy(methyl-1,2-ethanediyl)), α-(2-methyl-1-oxo-2-propenyl)-ω-((2-methyl-1-oxo-2-propenyl)oxy)-	R	$(C_3H_6O)_n C_8H_{10}O_3$
Poly(propylene glycol), methacrylate		39420-45-6	Poly(oxy(methyl-1,2-ethanediyl)), α-(2-methyl-1-oxo-2-propenyl)-ω-hydroxy-	R	$(C_3H_6O)_n C_4H_6O_2$
Poly(propylene glycol), dibenzoate		72245-46-6	Poly(oxy(methyl-1,2-ethanediyl)), α-benzoyl-ω-(benzoyloxy)-	R	$(C_3H_6O)_n C_{14}H_{10}O_3$
Poly(propylene glycol), diglycidyl ether		26142-30-3	Poly(oxy(methyl-1,2-ethanediyl)), α-(oxiranylmethyl)-ω-(oxiranylmethoxy)-	R	$(C_3H_6O)_n C_6H_{10}O_3$
Poly(propylene glycol), monobutyl ether	Butoxypolypropylene glycol; polyoxypropylene monobutyl ether	9003-13-8	Poly(oxy(methyl-1,2-ethanediyl)), α-butyl-ω-hydroxy-	R	$(C_3H_6O)_n C_4H_{10}O$
Poly(propylene glycol)-*co*-poly(ethylene glycol)	Ethylene glycol–propylene glycol copolymer; ethylene glycol–propylene oxide copolymer; ethylene oxide–propylene oxide copolymer ethylene glycol ether; methyloxirane–oxirane copolymer	9003-11-6	Oxirane methyl, polymer with oxirane	R	$(C_3H_6O \cdot C_2H_4O)_x$
Poly(propylene glycol-*block*-PEG-*block*-PPG bis (2-aminopropyl ether))	Ethylene oxide–propylene oxide copolymer bis(2-aminopropyl)-ether	65605-36-9	Oxirane, methyl-, polymer with oxirane, bis(2-aminopropyl) ether	R	$(C_3H_9NO)_{1/2} (C_3H_6O \cdot C_2H_4O)_x$
Poly(1,3-propylene succinate)	Poly(trimethylene succinate)	28158-21-6	Butanedioic acid, polymer with 1,3-propanediol	R	$(C_4H_6O_4 \cdot C_3H_8O_2)_x$
Poly(propylene)	Poly(propene); propene polymer	9003-07-0	1-Propene, homopolymer	R	$(C_3H_6)_x$
Poly(propylene), chlorinated		68442-33-1	1-Propene, homopolymer, chlorinated	*	Unk
Poly(propylene), isotactic	Isotactic propylene polymer; polypro	25085-53-4	1-Propene, homopolymer isotactic	R	$(C_3H_6)_x$
Poly(propylene-*alt*-ethylene, multiarm		127883-08-3	Benzene, diethenyl-, polymer with 2-methyl-1,3-butadiene, hydrogenated	*	$(C_{10}H_{10} \cdot C_5H_8)_x$
Poly(propylene-*co*-1-butene)		29160-13-2	1-Butene, polymer with 1-propene	R	$(C_4H_8 \cdot C_3H_6)_x$
Poly(propylene-*co*-tetrafluoroethylene)	Propene–tetrafluoroethene polymer	27029-05-6	1-Propene, polymer with tetrafluoroethene	R	$(C_3H_6 \cdot C_2F_4)_x$

Common name	Synonyms	CAS Registry No.	CA name	Search method	Molecular formula
Poly(propylene-*graft*-maleic anhydride)	Maleic anhydride–PN 240 graft copolymer	107001-49-0	2,5-Furandione, polymer with 1-propene, graft	R	$(C_4H_2O_3 \cdot C_3H_6)_x$
Poly(pyromellitic dianhydride-*co*-4,4′-oxydianiline)	Diaminodiphenyl ether–pyromellitic dianhydride polymer; oxydianiline–pyromellitic dianhydride polymer	25038-81-7	1H, 3H-Benzo(1,2-c:4,5-c′)-difuran-1,3,5,7-tetrone, polymer with 4,4′-oxybis(benzenamine)	R	$(C_{12}H_{12}N_2O \cdot C_{10}H_2O_6)_x$
Poly(sebacic anhydride)	Sebacic acid polyanhydride	26776-29-4	Decanedioic acid, homopolymer	R	$(C_{10}H_{18}O_4)_x$
Poly(L-serine)	Polyserine	25821-52-7	L-Serine, homopolymer	R	$(C_3H_7NO_3)_x$
Poly(sodium 4-styrene sulfonate)	Poly(sodium *p*-styrenesulfonate); poly(sodium *p*-vinylbenzene-sulfonate)	25704-18-1	Benzenesulfonic acid, 4-ethenyl-, sodium salt, homopolymer	R	$(C_8H_8O_3S \cdot Na)_x$
Poly(styrene)	Poly(1-phenylethylene); poly-(vinylbenzene)	9003-53-6	Benzene, ethenyl-, homopolymer	R	$(C_8H_8)_x$
Poly(styrene-*alt*-maleic acid), sodium salt	Maleic acid anhydride–styrene polymer, sodium salt; 2,5-furandione–styrene copolymer, sodium salt	25736-61-2	2,5-Furandione, polymer with ethenylbenzene, sodium salt	R	$(C_8H_8 \cdot C_4H_2O_3)_x \cdot xNa$
Poly(styrene-*b*-butadiene)	Butadiene–styrene polymer, polybutadiene–polystyrene copolymer, styrene–butadiene polymer	9003-55-8	Benzene, ethenyl-, polymer with 1,3-butadiene	R	$(C_8H_8 \cdot C_4H_6)x$
Poly(styrene-*b*-poly(ethylene-*ran*-butylene)-*b*-poly(styrene))		66070-58-4	Benzene, ethenyl-, polymer with 1,3-butadiene, hydrogenated	*	Unk
Poly(styrene-*block*-poly-(oxyethylene))	Ethylene oxide–styrene polymer	25267-79-2	Oxirane, polymer with ethenylbenzene	R	$(C_8H_8 \cdot C_2H_4O)_x$
Poly(styrene-*block*-polyisoprene-*block*-polystyrene)	Isoprene–styrene polymer	25038-32-8	Benzene, ethenyl-, polymer with 2-methyl-1,3-butadiene	R	$(C_8H_8 \cdot C_5H_8)_x$
Poly(styrene-*co*-acrylonitrile)	Acrylonitrile–styrene polymer; polystyrene–acrylonitrile; styrene–acrylonitrile polymer	9003-54-7	2-Propenenitrile, polymer with ethenylbenzene	R	$(C_8H_8 \cdot C_3H_3N)_x$
Poly(styrene-*co*-allyl alcohol)	Allyl alcohol–styrene polymer	25119-62-4	2-Propen-1-ol, polymer with ethenylbenzene	R	$(C_8H_8 \cdot C_3H_6O)_x$
Poly(styrene-*co*-α-methyl-styrene)	Styrene-α–methylstyrene polymer	9011-11-4	Benzene, ethenyl-, polymer with (1-methylethenyl)benzene	R	$(C_9H_{10} \cdot C_8H_8)_x$
Poly(styrene-*co*-divinyl benzene)		69011-14-9	Benzene, diethenyl-, polymer with ethenylbenzene and ethenylethylbenzene, chloromethylated	*	$(C_{10}H_{12} \cdot C_{10}H_{10} \cdot C_8H_8)_x$
Poly(styrene-*co*-divinyl benzene), amine functionalized		69011-17-2	Methanamine, *N*-methyl-, reaction products with chloromethylated divinylbenzene–ethenylethylbenzene-styrene polymer	*	$(C_{10}H_{12} \cdot C_{10}H_{10} \cdot C_8H_8 \cdot C_2H_7N)_x$
Poly(styrene-*co*-maleic acid), isobutyl/methyl mixed ester		63528-92-7	2-Butenedioic acid (Z)-, monomethyl ester, polymer with ethenylbenzene, 2,5-furandione and (Z)-2-methylpropyl hydrogen 2-butenedioate	R	$(C_8H_{12}O_4 \cdot C_8H_8 \cdot C_5H_6O_4 \cdot C_4H_2O_3)_x$
Poly(styrene-*co*-maleic acid), partial 2-butoxyethyl ester		68890-84-6	2,5-Furandione, polymer with ethenylbenzene, 2-butoxyethyl ester	R	Unk
Poly(styrene-*co*-maleic acid), partial 2-butoxyethyl ester, cumene terminated		160611-50-7	2,5-Furandione, telomer with ethenylbenzene and (1-methylethyl)benzene, 2-butoxyethyl ester	R	$C_9H_{12} \cdot (C_8H_8 \cdot C_4H_2O_3)_x \cdot xC_6H_{14}O_2$
Poly(styrene-*co*-maleic acid), partial cyclohexyl/1-PR ester, cumene terminated		160611-51-8	2,5-Furandione, telomer with ethenylbenzene and (1-methylethyl)benzene, cyclohexyl 1-methylethyl ester	R	$C_9H_{12} \cdot (C_8H_8 \cdot C_4H_2O_3)_x \cdot xC_6H_{12}O \cdot xC_3H_8O$
Poly(styrene-*co*-maleic acid), partial cyclohexyl/isopropyl ester		68890-82-4	2,5-Furandione, polymer with ethenylbenzene, cyclohexyl 1-methylethyl ester	R	Unk
Poly(styrene-*co*-maleic acid), partial isobutyl ester	Hydrogen isobutyl maleate–styrene copolymer	28571-95-1	2-Butenedioic acid (Z)-, mono (2-methylpropyl) ester, polymer with ethenylbenzene	R	$(C_8H_{12}O_4 \cdot C_8H_8)_x$
Poly(styrene-*co*-maleic acid), partial isooctyl ester		68441-87-2	2,5-Furandione, polymer with ethenylbenzene, isooctyl ester	R	Unk

Common name	Synonyms	CAS Registry No.	CA name	Search method	Molecular formula
Poly(styrene-*co*-maleic acid), partial propyl ester	Maleic anhydride–styrene polymer, propyl ester	68890-81-3	2,5-Furandione, polymer with ethenylbenzene, propyl ester	R	Unk
Poly(styrene-*co*-maleic acid), partial propyl ester, cumene terminated		160611-48-3	2,5-Furandione, telomer with ethenylbenzene and (1-methyl ethyl)benzene, propyl ester	R	$C_9H_{12} \cdot (C_8H_8 \cdot C_4H_2O_3)_x \cdot xC_3H_8O$
Poly(styrene-*co*-maleic acid), *sec*-butyl/methyl mixed ester		65652-36-0	2-Butenedioic acid (Z)-, monomethyl ester, polymer with ethenylbenzene, 2,5-furandione and (Z)-1-methyl-propyl hydrogen 2-butenedioate	R	$(C_8H_{12}O_4 \cdot C_8H_8 \cdot C_5H_6O_4 \cdot C_4H_2O_3)_x$
Poly(styrene-*co*-maleic anhydride)	Maleic anhydride–styrene polymers	9011-13-6	2,5-Furandione, polymer with ethenylbenzene	R	$(C_8H_8 \cdot C_4H_2O_3)_x$
Poly(styrene-*co*-maleic anhydride), cumene terminated		26762-29-8	2,5-Furandione, telomer with ethenylbenzene and (1-methyl-ethyl)benzene	R	$C_9H_{12} \cdot (C_8H_8 \cdot C_4H_2O_3)$
Poly(styrene sulfonic acid-*co*-maleic acid), sodium salt		68037-40-1	2,5-Furandione, polymer with ethenylbenzene, sulfonated, sodium salt	*	$(C_8H_8 \cdot C_4H_2O_3 \cdot Na)_x$
Poly(sulfone)	Bisphenol A–bis(chlorophenyl) sulfone copolymer, SRU	25135-51-7	Poly(oxy-1,4-phenylenesulfonyl-1,4-phenyleneoxy-1,4-phenylene(1-methylethylidene)-1,4-phenylene)	U	$(C_{27}H_{22}O_4S)_n$
Poly(*tert*-butyl methacrylate)		25189-00-8	2-Propenoic acid, 2-methyl-, 1,1-dimethylethyl ester, homopolymer	R	$(C_8H_{14}O_2)_x$
Poly(tetrafluoroethylene)	Poly(difluoromethylene); fluoro-polymers; perfluoroethylene polymer	9002-84-0	Ethene, tetrafluoro-homopolymer	R	$(C_2F_4)_x$
Poly(tetrahydrofuran)	Poly(butylene oxide); tetrahy-drofuran homopolymer, SRU; THF polymer, SRU	25190-06-1	Poly(oxy-1,4-butanediyl), α-hydro-ω-hydroxy-	R	$(C_4H_8O)_nH_2O$
Poly(tetrahydrofuran), bis(3-aminopropyl) terminated	Polytetramethylene glycol bis(3-aminopropyl) ether	72088-96-1	Poly(oxy-1,4-butanediyl), α-(3-aminopropyl)-ω-(3-aminopropoxy)-	R	$(C_4H_8O)_n C_6H_{16}N_2O$
Poly(tetrahydrofuran), linear	Oxirane–THF copolymer; polyethylene-poly(tetramethylene) glycol	27637-03-2	Furan, tetrahydro-, polymer with oxirane	R	$(C_4H_8O \cdot C_2H_4O)_x$
Poly(thioisobutylene)	Isobutylene sulfide polymer	26373-01-3	Thirane, 2,2-dimethyl-, homopolymer	R	$(C_4H_8S)_x$
Poly(thiophenylene)	Poly(phenylene sulfide)	9016-75-5	Poly(thiophenylene)	U	$(C_6H_4S)_x$
Poly(*p*-toluene sulfonamide-*co*-formaldehyde)	Formaldehyde-*p*-toluenesulfonamide polymer	25035-71-6	Benzenesulfonamide, 4-methyl-, polymer with formaldehyde	R	$(C_7H_9NO_2S \cdot CH_2O)_x$
Poly(tolylene 2,4-diisocyanate)	2,4-Toluene diisocyanate polymer	26006-20-2	Benzene, 2,4-diisocyanato-1-methyl- homopolymer	R	$(C_9H_6N_2O_2)_x$
Poly(tolylene 2,4-diisocyanate-*co*-poly(1,4-butanediol))	Poly(tetramethylene ether glycol)–TDI copolymer; polytetra-methylene glycol–tolylene isocyanate polymer	9069-50-5	Poly(oxy-1,4-butanediyl), α-hydro-ω-hydroxy-, polymer with 1,3-diisocyanatomethyl-benzene	R	$(C_9H_6N_2O_2 \cdot (C_4H_8O)_n H_2O)_x$
Poly(tolylene 2,4-diisocyanate-*co*-poly(propylene glycol))	Polyoxypropylene glycol–tolylene diisocyanate polymer; polypro-pylene glycol–TDI polymer	9057-91-4	Poly(oxy(methyl-1,2-ethanediyl)), α-hydro-ω-hydroxy-, polymer with 1,3-diisocyanatomethyl-benzene	R	$(C_9H_6N_2O_2 \cdot (C_3H_6O)_n H_2O)_x$
Poly(trimethylolpropane/di(propylene glycol)-*alt*-adipic acid/phthalic anhydride))		68133-07-3	Hexanedioic acid, polymer with 2-ethyl-2-(hydroxymethyl)-1,3-propanediol, 1,3-isobenzo-furandione and 1,1′-oxybis-(2-propanol)	R	$(C_8H_4O_3 \cdot C_6H_{14}O_3 \cdot C_6H_{14}O_3 \cdot C_6H_{10}O_4)_x$
Poly(L-tyrosine)	Polytyrosine	25619-78-7	L-Tyrosine, homopolymer	R	$(C_9H_{11}NO_3)_x$
Poly(L-tyrosine hydrobromide)		27378-49-0	L-Tyrosine, homopolymer, hydrobromide	R	$(C_5H_{12}N_2O_2)_x \cdot xBrH$
Poly(urea-*co*-formaldehyde), butylated		68002-19-7	Urea, polymer with formaldehyde, butylated	*	Unk
Poly(urea-*co*-formaldehyde), methylated		68071-45-4	Urea, polymer with formaldehyde, methylated	*	$(CH_4N_2O \cdot CH_2O)_x$

Common name	Synonyms	CAS Registry No.	CA name	Search method	Molecular formula
Poly(vinyl acetate)	Poly(1-acetoxyethylene); PVAC	9003-20-7	Acetic acid ethenyl ester, homopolymer	R	$(C_4H_6O_2)_x$
Poly(vinyl acetate-*co*-butyl maleate-*co*-isobornyl acrylate)		136392-68-2	2-Butenedioic acid (Z)-, dibutyl ester, polymer with ethenyl acetate and exo-1,7,7-trimethyl-bicyclo(2.2.1)hept-2-yl 2-propenoate	R	$(C_{13}H_{20}O_2 \cdot C_{12}H_{20}O_4 \cdot C_4H_6O_2)_x$
Poly(vinyl acetate-*co*-crotonic acid)	Crotonic acid–vinyl acetate polymer	25609-89-6	2-Butenoic acid, polymer with ethenyl acetate	R	$(C_4H_6O_2 \cdot C_4H_6O_2)_x$
Poly(vinyl alcohol)	Poly(1-hydroxyethylene); gohsenal; lemol; polyvinol; polyviol	9002-89-5	Ethenol, homopolymer	R	$(C_2H_4O)_x$
Poly(vinyl alcohol-*co*-ethylene)	Ethylene–vinyl alcohol polymer	25067-34-9	Ethenol, polymer with ethene	R	$(C_2H_4O \cdot C_2H_4)_x$
Poly(vinyl alcohol-*co*-vinyl acetate)	Vinyl alcohol–vinyl acetate polymer	25213-24-5	Acetic acid ethenyl ester, polymer with ethenol	R	$(C_4H_6O_2 \cdot C_2H_4O)_x$
Poly(4-vinyl biphenyl)		25232-08-0	1,1′-Biphenyl, 4-ethenyl-homopolymer	R	$(C_{14}H_{12})_x$
Poly(vinyl bromide)	Bromoethylene polymer	25951-54-6	Ethene, bromo-, homopolymer	R	$(C_2H_3Br)_x$
Poly(vinyl butyral)		63148-65-2	Vinyl acetal polymers, butyrals	S	Unk
Poly(vinyl butyral-*co*-vinyl alcohol-*co*-vinyl acetate)		27360-07-2	Acetic acid ethenyl ester, polymer with 1,1-bis(ethenyloxy)butane and ethenol	R	$(C_8H_{14}O_2 \cdot C_4H_6O_2 \cdot C_2H_4O)_x$
Poly(vinyl butyrate)		24991-31-9	Butanoic acid, ethenyl ester, homopolymer	R	$(C_6H_{10}O_2)_x$
Poly(vinyl chloride)	Poly(1-chloroethylene)	9002-86-2	Ethane, chloro-homopolymer	R	$(C_2H_3Cl)_x$
Poly(vinyl chloride-*co*-vinyl acetate)	Vinyl chloride–vinyl acetate polymer	9003-22-9	Acetic acid ethenyl ester, polymer with chloroethene	R	$(C_4H_6O_2 \cdot C_2H_3Cl)_x$
Poly(vinyl chloride-*co*-vinyl acetate-*co*-2-hydroxypropyl acrylate)		41618-91-1	2-Propenoic acid, 2-hydroxypropyl ester, polymer with chloroethene and ethenyl acetate	R	$(C_6H_{10}O_3 \cdot C_4H_6O_2 \cdot C_2H_3Cl)_x$
Poly(vinyl chloride-*co*-vinyl acetate-*co*-maleic acid)	Maleic acid–vinyl acetate–vinyl; vinyl acetate–vinyl chloride–maleic acid polymer	9005-09-8	2-Butenedioic acid (Z)-, 2-Butenedioic acid (Z)-	R	$(C_4H_6O_2 \cdot C_4H_4O_4 \cdot C_2H_3Cl)_x$
Poly(vinyl chloride-*co*-vinyl acetate-vinyl alcohol)	Vinyl acetate–vinyl alcohol–vinyl chloride polymer; vinyl chloride–vinyl acetate–vinyl alcohol copolymer	25086-48-0	Acetic acid ethenyl ester, polymer with chloroethene and ethenol	R	$(C_4H_6O_2 \cdot C_2H_4O \cdot C_2H_3Cl)_x$
Poly(vinyl cinnamate)		24968-99-8	2-Propenoic acid,3-phenyl-, ethenyl ester, homopolymer	R	$(C_{11}H_{10}O_2)_x$
Poly(vinyl ethyl ether)	Poly(ethyl vinyl ether)	25104-37-4	Ethene, ethoxy-, homopolymer	R	$(C_4H_8O)_x$
Poly(vinyl fluoride)	Monofluoroethylene polymer	24981-14-4	Ethene, fluoro-, homopolymer	R	$(C_2H_3F)_x$
Poly(vinyl formal)	Poly(divinyl formal)	9003-33-2	1,1′-(methylenebis(oxy))bis-, homopolymer	R	$(C_5H_8O_2)_x$
Poly(*N*-vinyl-methylacetamide)	Poly(*N*-methyl-*N*-vinylacetamide)	26616-03-5	Acetamide, *N*-ethenyl-*N*-methyl-, homopolymer	R	$(C_5H_9NO)_x$
Poly(vinyl methyl ether)	Methyl vinyl ether homopolymer	9003-09-2	Ethene methoxy, homopolymer	R	$(C_3H_6O)_x$
Poly(vinyl methyl ketone)	Methyl vinyl ketone polymer	25038-87-3	3-Buten-2-one, homopolymer	R	$(C_4H_6O)_x$
Poly(2-vinyl naphthalene)		28406-56-6	Naphthalene, 2-ethenyl-, homopolymer	R	$(C_{12}H_{10})_x$
Poly(vinyl *n*-octodecylcarbamate)		36671-85-9	Carbamic acid, octadecyl-, ethenyl ester, homopolymer	R	$(C_{21}H_{41}NO_2)_x$
Poly(4-vinyl phenol)	*p*-Vinylphenol polymer; *p*-vinylphenol polymer	24979-70-2	Phenol, 4-ethenyl-, homopolymer	R	$(C_8H_8O)_x$
Poly(vinyl propionate)	Vinyl propionate polymer	25035-84-1	Propanoic acid, ethenyl ester, homopolymer	R	$(C_5H_8O_2)_x$
Poly(2-vinyl pyridine)	2-Vinylpyridine polymer	25014-15-7	Pyridine, 2-ethenyl-, homopolymer	R	$(C_7H_7N)_x$
Poly(2-vinyl pyridine-*co*-styrene)	2-Vinylpyridine-styrene polymer	24980-54-9	Pyridine, 2-ethenyl-, polymer with styrene	R	$(C_8H_8 \cdot C_7H_7N)_x$
Poly(vinyl pyrrolidone)	Poly(*n*-pyrrolidinylethylene); poly(vinylpyrrolidone); vinylpyrrolidone polymer	9003-39-8	2-Pyrrolidinone, 1-ethenyl-, homopolymer	R	$(C_6H_9NO)_x$
Poly(vinyl pyrrolidone), iodine complex		25655-41-8	2-Pyrrolidinone, 1-ethenyl-, homopolymer, compd. with iodine	R	$(C_6H_9NO)_x \cdot xI_2$

Common name	Synonyms	CAS Registry No.	CA name	Search method	Molecular formula
Poly(1-vinyl pyrrolidone-*co*-acrylic acid)	Acrylic acid–vinylpyrrolidone polymer	28062-44-4	2-Propenoic acid, polymer with 1-ethenyl-2-pyrrolidinone	R	$(C_6H_9NO \cdot C_3H_4O_2)_x$
Poly(1-vinyl pyrrolidone-*co*-2-dimethylamino-ethyl methacrylate)		30581-59-0	2-Propenoic acid, 2-methyl-, 2-(dimethylamino)ethyl ester, polymer with 1-ethenyl-2-pyrrolidinone	R	$(C_8H_{15}NO_2 \cdot C_6H_9NO)_x$
Poly(1-vinyl pyrrolidone-*co*-styrene)	Styrene-*N*-vinylpyrrolidone polymer; vinylpyrrolidinone–styrene polymer	25086-29-7	2-Pyrrolidinone, 1-ethenyl-, polymer with ethenylbenzene	R	$(C_8H_8 \cdot C_6H_9NO)_x$
Poly(1-vinyl pyrrolidone-*co*-vinyl acetate)	*N*-Vinyl-2-pyrrolidone–vinyl acetate copolymer; poly(vinyl acetate–vinylpyrrolidinone); vinyl acetate–vinylpyrrolidone copolymer	25086-89-9	Acetic acid ethenyl ester, polymer with 1-ethenyl-2-pyrrolidinone	R	$(C_6H_9NO \cdot C_4H_6O_2)_x$
Poly(1-vinyl pyrrolidone-γ-(1-triacontene))		136445-69-7	Alkenes, C > 10 α-, polymers with vinylpyrrolidone	S	Unk
Poly(1-vinyl pyrrolidone-γ-1-hexadecene)		63231-81-2	2-Pyrrolidinone, 1-ethenyl-hexadecyl-, homopolymer	R	$(C_{22}H_{41}NO)_x$
Poly(vinyl stearate)	Vinyl stearate polymer	9003-95-6	Octadecanoic acid, ethenyl ester, homopolymer	R	$(C_{20}H_{38}O_2)_x$
Poly(vinyl sulfate), potassium salt		26182-60-5	Sulfuric acid, monoethenyl ester, potassium salt, homopolymer	R	$(C_2H_4O_4S \cdot K)_x$
Poly(vinyl sulfonic acid), sodium salt	Ethenesulfonic acid polymer sodium salt; ethenesulfonic acid polymer sodium salt	25053-27-4	Ethenesulfonic acid, homopolymer, sodium salt	R	$(C_2H_4O_3S)_x \cdot x$Na
Poly(vinyl toluene)	Poly(methylstyrene); vinyltoluene polymer	9017-21-4	Benzene, ethenylmethyl-homopolymer	R	$(C_9H_{10})x$
Poly(vinyl toluene-*co*-alpha-methylstyrene)	α-Methylstyrene–vinyltoluene polymer	9017-27-0	Benzene, ethenylmethyl-, polymer with (1-methylethenyl)benzene	R	$(C_9H_{10} \cdot C_9H_{10})_x$
Poly(vinylcarbazole); Poly(9-vinyl carbazole)	Poly(*n*-carbazolylethylene); poly(*N*-vinylcarbazole)	25067-59-8	9H-Carbazole, 9-ethenyl-, homopolymer	R	$(C_{14}H_{11}N)_x$
Poly(vinylcyclohexane)		25498-06-0	Cyclohexane, ethenyl-, homopolymer	R	$(C_8H_{14})_x$
Poly(vinylferrocene)		34801-99-5	Ferrocene, ethenyl-, homopolymer	R	$(C_{12}H_{12}Fe)_x$
Poly(vinylidene chloride)	Poly(1,1-dichloroethylene)	9002-85-1	Ethene,1,1-dichloro-, homopolymer	R	$(C_2H_2Cl_2)_x$
Poly(vinylidene chloride-*co*-acrylonitrile)	Acrylonitrile–vinylidene chloride polymer	9010-76-8	2-Propenenitrile, polymer with 1,1-dichloroethene	R	$(C_3H_3N \cdot C_2H_2Cl_2)_x$
Poly(vinylidene chloride-*co*-methyl acrylate)	Methyl acrylate–vinylidene chloride polymer	25038-72-6	2-Propenoic acid, methyl ester, polymer with 1,1-dichloro ethene	R	$(C_4H_6O_2 \cdot C_2H_2Cl_2)_x$
Poly(vinylidene chloride-*co*-vinyl chloride)	Vinyl chloride–vinylidene chloride polymer	9011-06-7	Ethene, 1,1-dichloro-, polymer with chloroethylene	R	$(C_2H_3Cl \cdot C_2H_2Cl_2)_x$
Poly(vinylidene fluoride)	Poly(1,1-difluoroethylene); PVDF	24937-79-9	Ethene, 1,1-difluoro-, homopolymer	R	$(C_2H_2F_2)_x$
Poly(vinylidene fluoride-*co*-hexafluoropropylene)	Hexafluoropropene–vinylidene fluoride polymer	9011-17-0	1-Propene, 1,1,2,3,3,3-hexafluoro-, polymer with 1,1-difluoroethene	R	$(C_3F_6 \cdot C_2H_2F_2)_x$
Poly(vinylidene fluoride-*co*-hexafluoropropylene-*co*-tetrafluoroethylene)	Hexafluoropropene–tetrafluoroethylene–vinylidene fluoride polymer; vinylidene fluoride–tetrafluoroethylene–perfluoropropylene copolymer	25190-89-0	1-Propene, 1,1,2,3,3,3-hexafluoro-, polymer with 1,1-difluoroethene and tetrafluoroethene	R	$(C_3F_6 \cdot C_2H_2F_2 \cdot C_2F_4)_x$
Poly(vinylidene fluoride-*co*-tetrafluoroethylene-*co*-propylene)	Propene–tetrafluoroethylene–vinylidene fluoride copolymer	54675-89-7	1-Propene, polymer with 1,1-difluoroethene and tetrafluoroethene	R	$(C_3H_6 \cdot C_2H_2F_2 \cdot C_2F_4)_x$
Poly(vinylisobutyl ether)	Isobutyl vinyl ether polymer	9003-44-5	Propane, 1-(ethenyloxy)-2-methyl-, homopolymer	R	$(C_6H_{12}O)_x$
Poly(4-vinyl pyridine)	4-Vinylpyridine homopolymer	25232-41-1	Pyridine, 4-ethenyl-, homopolymer	R	$(C_7H_7N)_x$
Poly(4-vinyl pyridine-*co*-butyl methacrylate)	Butyl methacrylate-4-vinylpyridine polymer	53761-76-5	2-Propenoic acid, 2-methyl-, butyl ester, polymer with 4-ethenylpyridine	R	$(C_8H_{14}O_2 \cdot C_7H_7N)_x$
Poly(4-vinyl pyridene-*co*-styrene)		26222-40-2	Pyridine, 4-ethenyl-, polymer with ethenylbenzene	R	$(C_8H_8 \cdot C_7H_7N)_x$
Poly(4-vinyl pyridine hydrochloride), crosslinked		29323-87-3	Pyridine, 4-ethenyl-, hydrochloride, homopolymer	R	$(C_7H_7N \cdot ClH)_x$
Poly(4-vinyl pyridine), crosslinked	Divinylbenzene-4-vinylpyridine polymer	9017-40-7	Pyridine, 4-ethenyl-, polymer with diethenylbenzene	R	$(C_{10}H_{10} \cdot C_7H_7N)_x$

Common name	Synonyms	CAS Registry No.	CA name	Search method	Molecular formula
Poly(4-vinyl pyridinium dichromate)		82246-45-5	Chromic acid ($H_2Cr_2O_7$), salt with diethenylbenzene polymer with 4-ethenylpyridine	R	$(C_{10}H_{10} \cdot C_7H_7N)_x \cdot xCr_2H_2O_7$
Poly(4-vinyl pyridinium tribromide)		91650-35-0	Hydrogen tribromide, compd. with 4-ethenylpyridine (1 : 1), homopolymer	R	$(C_7H_7N \cdot Br_3H)_x$
Poly(*p*-xylylene)		25951-90-0	Benzene, 1,4-dimethyl-, homopolymer	R	$(C_8H_{10})_x$
Rosin, ester with glycerol		8050-31-5	Resin acids and rosin acids, esters with glycerol	S*	Unk
Rosin, ester with pentaerythritol		8050-26-8	Resin acids and rosin acids, esters with pentaerythritol	S*	Unk
Rubber, chlorinated		9006-03-5	Rubber, chlorinated	R	Unk
Safflower seed oil		8001-23-8	Safflower oil	S*	Unk
Silicone oil	Methyl phenyl silicones	63148-58-3	Siloxanes and Silicones, Me Ph	S	Unk
Soybean oil	Fats and glyceridic oils	8001-22-7	Soybean oil	S*	Unk
Starch	Arrowroot starch; potato starch; rice starch; tapioca starch	9005-25-8	Starch	R	Unk
Starch, soluble		9005-84-9	Amylodextrin	R	Unk
Starch-*graft*-poly(acrylic acid), sodium salt	Acrylic acid–starch polymer sodium salt	60323-79-7	Starch, polymer with 2-propenoic acid, sodium salt	R	$(C_3H_4O_2 \cdot Unk)_x \cdot xNa$
Tri-*o*-benzyl cellulose		91104-69-7	Cellulose, tris(phenylmethyl) ether	R	$(C_7H_8O)_{1/3}$; Unk
Tung oil	Fats and glyceridic oils	8001-20-5	Tung oil	S*	Unk
Zein		9010-66-6	Zeins	S*	Unk

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