



PHYSICAL ORGANIC CHEMISTRY

Jack Hine, Georgia Institute of Technology. McGraw-Hill Book Co., Inc., New York, 1956. xiv + 497 pp. 16 × 24 cm. \$9.

PROFESSOR Hine's text is divided into four main sections. The first of these deals with a brief review of the tools available for the study of reaction mechanisms. The first chapter covers chemical structure and includes an excellent summary of resonance and the rules for writing resonance structures. The treatment is entirely non-mathematical, in fact the whole text is obviously written for the non-mathematical breed of organic chemist. The author's clarity of expression is well illustrated in this first chapter. Subsequent chapters of Part 1 deal with modern concepts of acids and bases with considerable emphasis on the Hammett equation, a very brief review of kinetics, and finally a short chapter on definitions and the general classification of organic reactions. It is noteworthy that in discussing the terms "nucleophilicity" and "basicity" Hine chooses to use the definitions described earlier by Swain, in which the former refers to rate and the latter to equilibrium. This seems to be unfortunate and unnecessary as the terms have been well defined earlier by Ingold, i.e., basicity is simply a special case of nucleophilicity where the nucleus concerned happens to be a proton.

Part 2, the largest section in the text, contains chapters discussing the different types of ionic organic reactions—nucleophilic and electrophilic substitution, addition reactions, elimination reactions, acid and base catalysis, esterification and hydrolysis, reactions of carboxylic acids, and rearrangement reactions. No one can quarrel seriously with the content of this section. Where controversy exists as to the mechanism of a particular reaction, as for example in nucleophilic aliphatic substitution or in elimination, both views have been presented with occasional comments stating the author's own opinions. This is an up-to-date, scholarly and much needed presentation for which the author is to be congratulated. However, one is left with the feeling that if the term molecularity had been carefully defined early in this section, the reader who is unfamiliar with some of the past, and current, controversy might find the discussion more meaningful.

The remaining two sections, dealing with free-radical and with four-center reactions, continue with the same degree of clarity and scholarship.

In the preface Hine states that "the book is written primarily for graduate students and advanced undergraduates,"

and that "the unpublished manuscript has been used by the author as lecture notes for a one-year graduate course." The content of the text is so large that this can only be construed as a great compliment to the quality of the graduate students at the Georgia Institute of Technology. If taken in smaller doses it should serve as a truly excellent text for advanced undergraduates, although the teacher should be prepared to expand somewhat on some sections of Part 1.

It is perhaps, only natural to compare this book with the one by Ingold. In general, the latter is more detailed and conclusions are supported by a greater wealth of experimental detail. Both books are beautifully written but Hine has given more attention to certain aspects of the field which some chemists believe to have been slighted in Ingold's text, and for this reason is, perhaps, a better book for the novice to read first. However, a glance at the author index will quickly reveal the debt that chemists owe to the English school.

ERIC S. GRAHAM

KENYON COLLEGE
GAMBIER, OHIO

TRACER APPLICATIONS FOR THE STUDY OF ORGANIC REACTIONS

John G. Burr, Jr., Atomics International Division, North American Aviation, Inc. Interscience Publishers, Inc., New York, 1957. x + 291 pp. 16 × 23 cm. \$7.50.

THIS book is primarily a detailed review of the organic reactions in which isotopes have been used to elucidate the mechanisms. In each example considered, evidence from other sources has been given. In addition, isotope exchange reactions and structural studies in which isotopes have been used as tracers are discussed, and general considerations for the use of tracer methods are given.

The first chapter is devoted to generalizations regarding the use of isotopic tracers methods and the remaining 13 chapters are devoted to applications. Three appendixes are included: Appendix A lists textbooks and other general reference sources concerning the various phases of using isotopes; Appendix B lists texts on organic reaction mechanisms; and Appendix C lists literature references which appeared in the years 1953–55 and earlier literature which was missed in the initial survey.

The literature coverage of the material discussed in the body of the text is complete only through 1952. Since the use of isotopes is growing at an ever in-

creasing rate, it is likely that the number of articles which have appeared since the text was written, approach or surpass the number which are discussed in the text. As a practical matter, a new book can never be completely up to date; however, in this case, the literature coverage seems unnecessarily out of date. The reviewer believes that the main value of a book of this type is as a reference source, and in this regard it is unfortunate that the literature coverage is not more recent.

The book is written for the organic chemist with emphasis on the reaction rather than the isotopes or isotope effect. The discussions are given from an advanced viewpoint, and therefore the book will be of value primarily to those versed in the field.

The author has made an excellent case for the use of isotopic methods while at the same time pointing out the dangers and pitfalls which accompany the method. Because the technique often gives results unobtainable by other methods, the author has formidable arguments. One purpose of the book cited by the author is to stimulate the use of isotopes. In this respect he has succeeded and the reader is left convinced of the value and frequent uniqueness of the method.

The material is well organized and the text is clearly written. There are errors and important omissions. For the beginning student the main value of the book will be as a source of knowledge concerning the methods and principles of tracer applications, but this value is diminished by the fact that the text is written for the student with a background in theoretical organic chemistry. For the research worker the main value of the book will be as a reference source for the literature prior to 1952.

FREDERICK R. JENSEN

UNIVERSITY OF CALIFORNIA
BERKELEY, CALIFORNIA

ELEMENTARY PRACTICAL ORGANIC CHEMISTRY. PART 2: QUALITATIVE ORGANIC ANALYSIS

Arthur I. Vogel, Woolwich Polytechnic. Longmans, Green and Co., New York, 1957. x + 320 + xxiv pp. Many figs. and tables. 14.5 × 22 cm. \$4.50.

THIS is the second in a series of textbooks entitled "Elementary Organic Chemistry." The first of these excellent texts dealt with Small Scale Preparations of Organic Compounds. Part 2: Qualitative Organic Analysis also reflects the author's many years of experience as a teacher. The text is a suitable one as a reference for more advanced students as well as a good textbook for beginners.

The first chapter (6) deals with the determination of melting points, boiling points, refractive index, optical rotatory power, and the determination of molecular weights. Chapter 7 presents reaction and the characterization of classes of organic compounds, such as: saturated, unsaturated, and aromatic hydrocarbons, aliphatic aromatic alcohols, phenols, enols, carbohydrates, halogenated aliphatic and aromatic compounds, ethers, aldehydes, ketones, amines, etc. Specific clear directions are given for the preparation of derivatives of each class of compounds. The qualitative analysis of the elements is discussed in Chapter 8. Chapter 9 stresses the relationships between structure and solubility and Chapter 10 deals with the detection of various characteristic functional groups. Chapter 11 is a general discussion on the preparation of derivatives of the various classes of compounds. Methods for the qualitative analysis of unknown mixtures of organic compounds are discussed in an excellent manner in Chapter 12. The reviewer was particularly impressed by the extensive tables of derivatives and their physical properties in Chapter 13. For example, in Table 12-11 the author lists the melting points, boiling points, and refractive indexes of the anilides, α -naphthalides, alkylmercuric halides, S-alkyl-iso-thiuronium pirates, and the pirates of the β -naphthyl ether for the aliphatic halogen compounds.

The text should be widely accepted by many who offer a course in elementary qualitative analysis and should be included in every library as a reference text.

G. VAN ZYL

HOPE COLLEGE
HOLLAND, MICHIGAN

REACTIONS OF ORGANIC COMPOUNDS

Wilfred John Hickinbottom, Queen Mary College, University of London. Third edition. Longmans, Green & Co., Inc., New York, 1957. xi + 608 pp. 14.5 × 21.5 cm. \$8.75.

This popular book which appears as a third edition and has had seven reprintings, presents organic reactions of typical groups from a laboratory point of view. The numerous new citations included since the second edition (see J. CHEM. EDUC., 25, 405 (1948)), attest to the extensive rewriting. Among the additional material is "the use of new techniques and new reagents for reduction, oxidation, and condensation as well as improvements and modern applications of older methods of synthesis." To bring the book more into line with the objective of presenting "the facts of organic chemistry in terms of the reactions of typical groups," the material on the identification of organic compounds, with the accompanying tables of physical constants, has been omitted.

The book is again warmly recommended.

HENRY GILMAN

IOWA STATE COLLEGE
AMES, IOWA

CHEMISTRY OF ORGANIC COMPOUNDS

Carl R. Noller, Professor of Chemistry, Stanford University. Second edition. W. B. Saunders Co., Philadelphia, 1957. x + 978 pp. 106 figs. 28 tables 17 × 24.5 cm. \$9.00

The second edition of Noller is better than the first and the first was excellent. It is the "best of breed" in several respects: best digested application of molecular orbital theory to reaction mechanisms, particularly in aromatic substitution; best selection of interesting details on industrial processes; best array of chemical formulas of current interest to chemists and premedical students (alkaloids, steroids, tranquilizers, *et al.*); and best correlation of physical properties of organic molecules with structures.

Stanford University functions on the quarter system and Noller's book caters to this in that many premed students take two quarters rather than three of organic chemistry. Noller considers the arrangement of subject matter admirable for chemists as well. There are 415 pages on aliphatic compounds, proteins, amino acids, stereoisomerism, and carbohydrates, then 190 pages on aromatic compounds, 50 pages on heterocyclics, and finally 300 pages on absorption spectra, dyes, rubber, polyfunctional compounds (both aromatic and aliphatic now), terpenes, steroids, peroxides, organometallics, phosphorus, and silicon compounds. I do not find this arrangement appealing—dienes after aromatic compounds, carbohydrates and amino acids separated distinctly from other polyfunctional compounds, etc. To me it would not be teachable, but that is mostly a judgment based on taste.

The second edition is a revision in truth and not just corrections and additions. Every chapter is rewritten and about 100 pages added to the total. The chapter on mechanisms (in the first edition, Chapter 7) is scattered throughout the text because the author feels that it is now an integral part of the organic course. There is a new feature in the problems—duplicate sets of four problems of equal difficulty are included so that sections of the same class may have different assignments. Review questions and problems are separated.

Books printed in two sizes of type are subject to having students interpret the smaller type as less important or unimportant or conversely as hiding some important theory that will make everything else easier. The present book runs this hazard. What gets into fine print is always a matter of choice, and I would argue with the author that theories might well be put in larger type and some of the details of processes and production be subbed in small type. For example, the discussions of esterification, pages 166 ff., aldol addition, pages 205 ff., metal reductions, page 218, general acid-base theory, page 235, and bonds involving sulfur, page 273, which are excellent, might well be bold-face rather than subbed. Incidentally, the bold-face type in this book is not very bold.

It is time that organic chemists adopted Stock nomenclature for inorganic compounds.

One item that some teachers may consider an omission is the chemistry of biological processes. The author rejected this topic to keep the size of the book in reasonable bounds.

The size of the book seems likely to discourage the beginner who is faced with the decision of what he must read and what he may choose to read. For those who think a text may also be a reference book, this one is excellent.

LEALLYN B. CLAPP

BROWN UNIVERSITY
PROVIDENCE, RHODE ISLAND

OXINE AND ITS DERIVATIVES. VOLUMES 1 AND 2: OXINE.

R. G. W. Hollingshead. Butterworths Scientific Publications, London, 1954. Part 1: x + 322 pp. + (10) pp. 16 × 23.5 cm. \$8.50. Part 2: v + 323-616 + (19) pp. 16 × 23.5 cm. \$8.50.

OXINE AND ITS DERIVATIVES. VOLUMES 3 AND 4: DERIVATIVES OF OXINE.

R. G. W. Hollingshead. Butterworths Scientific Publications, London, 1956. Part 1: v + 617-895 + (16) pp. 16 × 23.5 cm. Part 2: v + 897-1121 + (41) pp. 16 × 23.5 cm.

The first two volumes of this series appeared in 1954, the last two in 1956. The author has undertaken a survey of all reported references to oxine (8-quinolinol) and its derivatives. After a description of the preparation and properties of oxine and a well-written chapter on general analytical uses, Volumes 1 and 2 take up, individually, the chemistry of the metal oxinates. Equilibrium constants and physical properties of the complex, pH range for precipitation, interference by and separation from other elements, and an extended treatment of methods of determination are given for each metal. These methods are not merely listed or summarized, but given as complete and detailed experimental directions. This series is intended to be complete in itself, and the user will rarely need to consult the references cited.

Also discussed are determinations of phosphate and silica, and fungicidal and bactericidal applications. Useful appendices list tables of drying temperatures of oxinates, pH ranges for precipitation and extraction, and ultraviolet absorption maxima. In spite of the noncritical compilation of material and some repetition, Volumes 1 and 2 will be useful to the analyst in providing a single source of analytical uses of oxine. Many difficultly accessible references have been included.

Volumes 3 and 4 treat all known derivatives of oxine. The preparation (again, detailed experimental directions), properties, reactions, and complete descriptions of determinations are discussed under each group of substituents. An interesting discussion of structure-stability re-