

future studies. (In our experience these lines are not difficult to measure and the results are not significantly dependent upon there being no ambiguities following from a choice of background.) Relevant data are given in Table II.

TABLE II
Proportion of the Intensities of the 040 and 020 Meridional Lines as Derived from Data in Table I

	Our work	Mann et al.	Meyer-Misch	Andress
Cellulose I	24.6	18	13	—
Cellulose II	3.4	3.0	—	12.7

This x-ray work was carried out in the Physical Laboratory of the Technical University in Delft.

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Copolymerization Parameters of the System *N,N*-Dimethylacrylamide-Acrylic Acid

In the course of some work on *N*-substituted acrylamides, we investigated the copolymerization behavior of *N,N*-dimethylacrylamide with acrylic acid. The former monomer has been the object of recent investigation concerning the possibility of obtaining tactic polymers by anionic mechanism.¹

The monomers, acrylic acid (AA) from Fluka and *N,N*-dimethylacrylamide (DMAA) prepared from acryloyl chloride by reaction with dimethylamine in benzene at 0°C., were distilled prior to use. Acrylic acid was further crystallized by cooling.

The mixture of weighed amounts of monomers was dissolved in dioxane in order to obtain 10% solutions, and 1% α,α' -azobisisobutyronitrile was added to the system. The liquid was introduced into Pyrex tubes, which were sealed in purified nitrogen atmosphere. Polymerization was performed at 75°C. and stopped at 5–10% conversion (or at lower conversions for mixtures containing one of the monomers in excess). The polymers were then precipitated in ethyl ether and purified by repeated dissolution in methanol and precipitation in ethyl ether.

After drying, the composition of copolymers was analyzed for nitrogen by the micro-Dumas method.

Experimental data are given in Table I, where monomer f_1 and copolymer F_1 compositions are expressed as molar ratios with respect to DMAA. The following monomer reactivity ratios were found: $r_1 = 0.5 \pm 0.1$ and $r_2 = 0.4 \pm 0.05$.

TABLE I
Copolymerization Data of *N,N*-Dimethylacrylamide with Acrylic Acid

f_1	N in copolymer, %	F_1
0.038	1.45	0.09
0.078	2.62	0.141
0.191	5.17	0.295
0.316	6.83	0.396
0.415	7.94	0.482
0.523	8.90	0.553
0.651	9.44	0.592
0.865	11.5	0.76
0.921	11.6	0.77

Calculation of e_1 and Q_1 values for DMAA, based on e_2 and Q_2 data of Chapin and co-workers² (1.0 and 1.58, respectively), gave $e_1 = -0.26$, $Q_1 = 1.12$.

These values can be compared with the data concerning unsubstituted acrylamide. Data for this monomer were given by Bourdais³ and by Smets and Hesbain.⁴ Bourdais found $e = 0.61$, $Q = 0.75$, while the latter authors reported $e = 0.48$, $Q = 0.92$. Bourdais made his calculations on the basis of the data used by us for acrylic acid, while Smets and Hesbain seem to have adopted for acrylic acid somewhat different parameters. In fact, from the r_1 , r_2 values reported by Smets and Hesbain (1.38 and 0.36) and from the above values for e and Q of acrylamide, it may be calculated for AA $e_2 = 1.31$, $Q_2 = 0.98$. Using these values, our data for DMAA would be $e_1 = 0.09$, $Q_1 = 0.49$.

The comparison of e and Q data for acrylamide and DMAA shows the influence of electron-releasing alkyl groups on the e parameter, in agreement with our expectations.

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