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Editor's Note Added in Comment

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EDITOR'S NOTE ADDED IN COMMENT

The appealingly simple "proof" offered above has been accepted by the Journal with some misgivings. The treatment rests on the assumption of symmetry in free-radical reactions. Since copolymerization composition equations have always assumed symmetry, the question becomes one of how much symmetry. Of course, the special symmetry considerations associated with terpolymerization must be recognized.

It is perhaps illuminating to approach the question in the following way. First, it is desirable to differentiate between occurrence probabilities and generation probabilities in terpolymerization. Occurrence probabilities as used by Sawada (percentage of AB linkages) state with mathematical exactness

$$aP_{ab} = bP_{ba}$$

However, it must be remembered that with few exceptions generation probabilities based on reactivity ratios calculated from copolymerization experiments are employed, rather than occurrence probabilities based on structural analysis of sequence distributions. Occurrence and generation probabilities become identical only when the direction of generation of the given structural sequence within the chain is known. Up to now, structural differentiation, if it exists, has not yielded to scientific analysis.

Accordingly, when one uses generation probabilities obtained from terpolymerization studies and asserts that

$$aP_{ab} = bP_{ba}$$

he states a hypothesis, rather than an axiom. The hypothesis may be fact, but it belongs to the physical, rather than to the mathematic, world.

Finally, this distinction is believed to be inherent in the pioneering copolymerization studies of 20 years ago. Otherwise, the simplified equations of multicomponent polymerization would not have been so long in coming.

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