Book Review

Conformational Theory of Large Molecules, by Wayne L. Mattice and Ulrich W. Suter

Wiley–Interscience, New York; 1994; 449 pp.; $74.95; ISBN 0471-843-385

Conformational Theory of Large Molecules, by Mattice and Suter, succeeds admirably as a comprehensive overview of the "state of the art" rotational isomeric state (RIS) treatment of polymers. The reader is guided along the path from the microstructure of polymers to their properties, which must be averaged over the myriad of conformations available to these long chain molecules with flexible bonds. The conformational averaging procedures are carefully developed and, by means of examples, the power of the resultant matrix multiplication techniques is illustrated in the calculation of polymer properties. The authors construct RIS models for several polymers to reveal the connections between the local covalent structures and the presence of the local bond conformations. This information is packaged into matrices (one for each backbone bond) that are multiplied sequentially to yield the statistical mechanical average of various polymer chain properties with rigorous account taken of all polymer chain conformations. A very comprehensive list of polymers and properties treated by the RIS model is presented and discussed, including many more and new applications not found in Flory's earlier book. The newcomer to the RIS-matrix multiplication treatment of polymer conformation properties will find the study problems (many with solutions) at the end of each chapter a great aid in testing their understanding of the material presented.

Overall, Mattice and Suter have successfully extended Flory's earlier treatise in a way that should increase accessibility to and use of the powerful RIS treatment of polymers that provides the only means to understand their properties in terms of their real covalent structures.

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