was found eminently desirable for optimum completeness, cross-referencing, and accuracy to rely on the original work, itself."

The introduction includes four interesting and instructive sections: the scope, the historical background, nomenclature, and the general properties of these amines. Following this there are 80 pages on methods. Essentially all methods that have been used in preparing aliphatic tertiary amines are reviewed. Procedures are discussed critically and the scope and limitations given. If proposed structures or yields reported may be in doubt, this is indicated. Many well-organized tables are given as well as detailed typical examples of the more common procedures.

A considerable portion of the remainder of the book is devoted to data on the individual amines. Each compound is identified by its graphic or "stick formula" showing only nitrogen and carbon atoms. Also given are the molecular formula, a systematic name, methods of preparation, physical properties, and derivatives (when available). All data are referenced to the original citations published in the literature. Very naturally the literature on trimethylamine, triethylamine, and a few others is far more voluminous than for most aliphatic tertiary amines. In view of this importance, several pages are devoted to each of these amines. In fact, trimethylamine has been given a critical treatment occupying 13 pages.

The indexing is satisfactory, including a subject index and a formula index. When several amines are under one molecular formula, the "stick" or skeleton formula readily identifies the one sought. A simple and convenient way of indexing references is used in which the first two letters of an author's name and a number are given.

The book will be indispensable to those engaged in research in any way related to amine chemistry, particularly aliphatic amine chemistry.

George H. Coleman

1332 South Lake Shore Drive
Sarasota, Florida 33579

Digital Computer Programs for Physical Chemistry. Volume II. Autoplotter, Expansion, Self-Judgment, Spectral, Polarization, Conductance, Kinetic, and Special Iterative Programs. By PAUL A. D. DE MAINE, Department of Chemistry, University of California at Santa Barbara. The Macmillan Co., 60 Fifth Ave., New York, N. Y. 1965. xxvii + 493 pp. 16 × 24.5 cm. $19.95.

It is difficult to determine for whom this book was written. Certainly no physical chemist with a reasonable amount of computer experience would wade through lengthy sections giving complete printouts of FORTRAN or ALGOL programs designed for handling simple, rather specialized problems in data processing. Nor would an experienced hand be likely to brush aside basic statistical principles and terminology quite so cavalierly as have the authors. On the other hand, the explanations of the programs are not very clear, no flow charts of the programs are given, and no COMMENT cards are included in the programs themselves. Thus, the book is not well adapted for use by the beginner.

Of those people who might be inclined to use this book, many will be put off by its excessively high price.

David J. Wilson

Department of Chemistry, University of Rochester
Rochester, New York

Conformational Analysis. By ERNEST L. ELIEL, University of Notre Dame, NORMAN L. ALLINGER, Wayne State University, STEPHEN J. ANGYAL, the University of New South Wales, and GEORGE A. MORRISON, University of Leeds. Interscience Publishers, John Wiley and Sons, Inc., 605 Third Ave., New York, N. Y. 1965. xiii + 524 pp. $15.00.

The study of relationships between structure and chemical and physical properties of molecules is the essence of research in organic chemistry. Conformational analysis merely focuses attention upon extension of structural theory to flexible molecules. The Westheimer report (see *Chem. Eng. News*, Nov 29, 1965) states, "the structural theory of organic chemistry, one of the great intellectual achievements of man, was introduced in 1858–1865 by Kekulé and others, and stereochemistry (spatial chemistry) was invented by van't Hoff and Le Bel in 1874." Conformational analysis traces its ancestry to this honored source. In the preface of "Conformational Analysis," the authors credit the recent rapid development of the subject to D. H. R. Barton, and consider the subject such an integral part of current structural theory, "that a chemist who does not understand conformational analysis does not understand organic chemistry."

Students of organic chemistry at every level above the elementary will welcome this excellent book. For the novice, the subject requires a good set of molecular models and a background including the fundamentals of stereochemistry, general organic and physical chemistry (especially thermodynamics), and interpretation of physical properties (*e.g.*, nmr spectra). For the expert, the book provides an excellent selective review with good coverage through 1963 and a few 1964 references in most chapters. This book outclasses a smaller one on the same subject (M. Hanack, "Conformational Theory," Academic Press Inc., New York, N. Y., 1965), a work of considerable merit, designed primarily for use as a course text. Although conformational problems arise wherever there are flexible molecules, it is interesting to note that both books devote about 93% of text to cyclic compounds; six-membered rings receive most attention.

The thirty pages on acyclic molecules (Chapter 1) provide an excellent compact review of conformational concepts. Chapter 2, apparently a revision and expansion of Chapter 8 of Eliel's text, "Stereochemistry of Carbon Compounds" (McGraw-Hill Book Co., Inc., New York, N. Y., 1962), presents a detailed application of conformational principles and conformation–reactivity relationships to cyclohexane derivatives.

An excellent survey of the use of physical methods in structure determination is offered in Chapter 3. Each method is illustrated by a few well-chosen examples from studies of configuration and conformation. Clear, concise, and packed with useful information, Chapter 3 is notable for its appraisal of each method. For example, see the incisive evaluation of the interpretation of Kerr constants (Section 3-8).

Rings of all sizes, including fused and heterocyclic rings, are considered in Chapter 4.

Steroids, triterpenoids, and alkaloids are the topics of Chapter 5. However, Chapters 2, 3, 4, and 7 contain much of importance on these topics. Chapter 5 was not designed to stand alone. Conformation (Section 5-2) and conformational transmission (5-9) are discussed for steroids. Intermediate sections consider problems of configuration and synthesis at length with attention to their stereochemical and conformational aspects. This important chapter contains a wealth of information and many excellent illustrations, but is somewhat deficient in selectivity, clarity, and coverage of post-1962 literature. The other chapters set a very high standard which Chapter 5 does not quite match.

Chapter 6, entitled "Conformational Analysis in Carbohydrate Chemistry," is not just an excellent review, but a beautifully written, significant contribution to the field. The hope that this chapter may stimulate interest in research on the conformation of carbohydrates is well founded.

Tabulation of conformational energies of monosubstituted cyclohexanes, including the literature reference for each experimental value, occupies about ten pages of Chapter 7. Several additional entries for this growing list are now available: E. L. Eliel, *Angew. Chem.*, 77, 784 (1965). A superb essay on the calculation of conformational energies is included (Section 7-2). Finally, α-halo ketones and boat forms are discussed for cyclohexane derivatives.

As a review of the field, the book serves with distinction. When supplemented with problems, it should prove to have great value as a course text.

Robert D. Stolow

Department of Chemistry, Tufts University
Medford, Massachusetts 02155

BOOKS RECEIVED, *January 1966*

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