BOOK REVIEWS

Introductory Organic Quantum Chemistry. By GEORG KARAGOUNIS, Professor of Physical Chemistry, University of Freiburg, Germany. Translated and Edited by F. C. Nachod, Sterling-Winthrop Research Institute, Rensselaer, New York. Academic Press Inc., 111 Fifth Avenue, New York 3, N. Y. 1962. viii + 204 pp. 16 × 23.5 cm. Price, $6.50.

This book is intended as an introduction to quantum theory for organic chemists with a limited knowledge of mathematics. A good book of this kind could be useful, although there are already several excellent texts available, but unfortunately this is not a good book. On the contrary it is one of the poorest books I have ever read on any chemical topic. It is so badly written and so badly constructed that it would be quite unintelligible to anyone not already acquainted with the subject while it is far too superficial and inaccurate to be of any value to anyone else.

The parts of the book dealing with quantum theory consist largely of mathematical expressions given without any derivation or adequate explanation, while the accompanying text serves only to pile obscurity on obscurity. Even the symbols appearing in the equations are often left entirely undefined.

A good example typical of the whole book is provided by the section on the molecular orbital method on pp. 62–64. After a brief introduction, in which the term molecular orbital is not defined, the method is applied to benzene. First, an equation $\psi = C_1\psi_1 + C_2\psi_2 + \ldots + C_6\psi_6$ appears without any definition of the C_1 and ψ_1, followed by the sentence: "The coefficients C_1, $C_2 \ldots C_6$ are given by six secular equations as shown above." No secular equations are shown above. Next, without any explanation of any kind, comes the secular determinant for benzene, in which one symbol (Q) is left undefined. Next: "A determinant of this type does not apply to benzene alone but quite generally for molecules with more than two π-electrons in that its rows are adopted to the number of π-electrons. A general solution leads to:

$$Q - E = -2\beta \cos (2\pi j/n)$$

where n is the number of π-electrons, and j a series of numbers from 1, 2, 3, . . . to n." Now apart from the typical obscurity of the writing this sentence contains two strange errors. First, a system with two π-electrons (*e.g.*, ethylene) is no different from any other. Secondly, the "general solution" applies only to cyclic polyenes. One cannot believe that the authors do not know this; yet on the other hand errors of this kind abound throughout the book. Some of the errors are even more disturbing, *e.g.*, the incorrect form of the overlap integral on p. 35. It is difficult to see how this could be a typographical error.

Even the historical sections of the book are inaccurate; thus on p. 2 the Wien radiation law is ascribed to Planck and on p. 9 the Sommerfeld quantization condition to Bohr.

The style of the book is poor, even by the lowest chemical standards. The following excerpt (p. 13) is typical: "In 1924 de Broglie recognized that a wave nature had to be ascribed to the moving electrons if one wanted to impart physical significance to moving mass particles as compared to the motion of light in media of variable refractive index." One can only hope that the original German version of the book was equally illiterate and that the translator has merely carried out his task too conscientiously.

Many books are in parts like the curate's egg and many are uniformly mediocre; this book however, is uniformly bad from cover to cover.[1]

(1) Except for the index which appears to be quite accurate.

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Stereochemistry of Carbon Compounds. By ERNEST L. ELIEL, Professor of Chemistry, University of Notre Dame. McGraw-Hill Book Company, Inc., 330 West 42nd Street, New York 36, N. Y. 1962. xv + 486 pp. 16 × 23.5 cm. Price, $15.00.

This is an excellent book which can be warmly recommended to all organic chemists and biochemists, for advanced undergraduate work, for graduate studies and as background reading for research workers. It is the first comprehensive book dealing with organic stereochemistry since Freudenberg's classic treatise ("Stereochemie," Deuticke, Leipzig, 1933). Dr. Eliel is to be congratulated on doing the near-impossible in such an outstandingly able manner.

The interest devoted to steric problems has increased dramatically during the last 10 years. It may fairly be said of almost every problem in carbon chemistry that the chemist can gain a better understanding of it by looking at it in three dimensions. This is equally true for problems of structure determination, of synthesis, and of reaction mechanism and kinetics.

The scope of Dr. Eliel's book is indicated by the following list of chapters: (1) Introduction. (2) Optical Isomerism. (3) Optical Isomerism Due to Asymmetric Carbon Atoms. (4) Racemic Modifications. (5) Configuration. (6) Conformation and Reactivity in Acyclic Compounds. (7) Some Aspects of the Stereochemistry of Ring Systems. (8) The Actual Shape of Six-membered Rings and Its Relation to Properties and Reactivity. (9) The Shape of Rings Other Than Six-membered Ones. (10) Fused Rings and Bridged Rings. (11) The Stereoisomerism of Allenes and Related Compounds. (12) Geometrical Isomerism and the Stereochemistry of Olefins. (13) The Stereochemistry of Tricovalent Carbon. (14) Optical Rotation and Optical Rotatory Dispersion. (15) Stereoselective Synthesis and Stereoregulated Polymerization. Everyone of these topics is a subject in which the organic chemist should be aware of the latest ideas—and in each case he will find in Eliel's book a clear account, which strikes the right balance between too-easy and inadequate generalization on the one hand, and too much detail on the other hand. Detail can be found in the many good specialized reviews which are available; Eliel gives full references to these and to a well-chosen selection of the more important original papers.

Dr. Eliel modestly points out that the selection of topics is partly a reflection of his own interests; however, as these are wide-ranging, the reader need feel no disquiet on this account. Eliel draws attention to the great importance of conformational analysis as a major part of the organic chemist's "new thinking"; to the interest in absolute configurations (an important growing point for both organic chemistry and biochemistry); and to the rapid growth of instrumental techniques (U.V., I.R., N.M.R., O.R.D.), powerful new arms which have added so much to the range and speed of the organic chemist's operations.

References are up-to-date (to the end of 1960 and some in 1961; the book appeared in the Summer of 1962). The production is excellent and the numerous structural formulas and perspective diagrams, vital for a book of this kind, are as good as they ought to be.

The book is, in short, an invitation to three-dimensional thinking. If more organic chemists acquire the taste for this as an everyday habit, Dr. Eliel's book will deserve to be numbered among the outstanding organic texts. The reviewer is confident that it will.

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Traité de physique théorique et de physique mathématique. XIV. Structure electronique des molécules, petites molécules, hydrocarbures saturés, molécules conjuguées, molécules, d'intérêt biochimique. By RAYMOND DAUDEL, Professeur à la Sorbonne, Directeur du Centre de mécanique ondulatoire appliquée du C. N. R. S. Gauthier - Villars et Cie., 55, Quai des Grands-Augustins, Paris VI, France. 1962. 283 pp. 15.5 × 24 cm. Price, 48 N.F. ($10.00).

This is the second in a series of three volumes on quantum chemistry, more precisely on the study of the structure and properties of molecules by the methods of wave mechanics. The first volume, published in 1956, contained the fundamental principles. Application of these to numerous actual cases make up this second volume; the third one will deal with chemical reactivity.

The book opens with two brief chapters on the simplest possible systems, the one-electron (H_2^+ molecule-ion) and the two-electron systems (He atom and H_2 molecule). In fact these are supplements to topics covered in volume I. Diatomics, both homo- and heteropolar, are studied in chapter 3. The rest of the book is devoted to polynuclear molecules. After a long chapter (40 pages) on general aspects of the problem the author considers in turn classes of molecules of increasing complexity: Ch. 5, molecules with single bonds only, and no lone pairs, *e.g.* CH_4; Ch. 6, small molecules with single bonds and lone electron pairs, *e.g.* H_2O and NH_3; Ch. 7, ethylene; Ch. 8, conjugated