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Book Reviews

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Book Review

“Aspects of Organic Chemistry-Structure” by Gerhard Quinkert, Ernst Egert, Christian Griesinger; published jointly by Verlag Helvetica Chimica Acta, Basel and VCH, Weinheim, 1996, ISBN 3-906390-15-2; DM 148.00.

Organic chemistry is often conceptually divided into structure, reactions and synthesis for the purpose of graduate courses. The four volume series, *Aspects of Organic Chemistry* is to follow this format. This text for the Structure section of the course is to be followed by three succeeding volumes. The fourth volume is to be entitled *Aspects of Organic Chemistry Volume 4: Methods of Structure Determination*. The authors have provided a comprehensive and sophisticated text suitable for the introductory semester of advanced organic chemistry. The chapter headings reflect the emphasis on stereochemistry and theories of bonding (MO theory): 1, Introduction to Organic Chemistry; 2, The Structure Model of the Classical Organic Chemistry; 3, Optical Activity, Chirality and Symmetry of Molecules; 4, Topicity; 5, Configurational Analysis (Demonstrated on Carbohydrates); 6, Conformational Analysis (Demonstrated on Steroids); 7, Macromolecular and Supramolecular Chemistry; 8, The Qualitative MO Model; 9, Documentation and Retrieval of Chemical Knowledge; 10, The Use of Formulae and Names for the Description of Molecules in the context of the structure Model of the Classical Organic Chemistry; 11, Symmetry Point Groups and Space Groups; 12, Determination of Absolute Configuration; 13, NMR Spectroscopy; 14, Benzene as a Special Case; 15, Hydrogen Bonds; 16, Base Pairing in Biology and Chemistry. The first eight of these chapters (about half of the book) provide a survey while the second eight chapters are described as special topics related to fundamental subjects covered in the first part. While the book is somewhat long for a one semester course, the special topic character of the second part will allow an instructor to cover only those topics he feels are of prime importance.

The tripartite division creates some problems here since chemical problems and research often do not fit into this Procrustean Bed without some stretching or slicing. The treatment of the static aspects of

stereochemistry is extensive reflecting the authors' assertion that "chemistry, in essence, is always stereochemistry". However, the authors have deferred any discussion of dynamic stereochemistry (stereoselectivity) to a subsequent volume. As a result the presentation of Absolute Configuration is necessarily truncated. There is a chapter on configurational correlation in the carbohydrates (Chapter 5) and a very brief chapter (8 pages) on crystallography (Chapter 12). The classical methods for determination of absolute configuration using asymmetric synthesis and kinetic resolution are not presented.

There is a similar deferral in the chapter on molecular orbital theory. The fundamentals are well presented and used to explain a number of phenomena which are otherwise inexplicable. However, the use of correlation diagrams (which are treated) and frontier molecular orbitals (which are not treated) to predict the stereochemistry of electrocyclic reactions is omitted (or deferred to a later volume). I was also surprised at the lack of any discussion of resonance and canonical structures. While MO theory is certainly more useful for quantitative calculations, resonance structures are certainly much better at visualizing charge distributions. As an example of the inadequacy of classical structural theory, the authors point to the planarity (and substantial torsion barrier) of the amide bond as an inexplicable phenomenon. Of course the concept of resonance does quite as well here as qualitative MO theory.

The authors have included a chapter on nmr spectroscopy (a topic which certainly will be covered exhaustively in Vol. 4). In this very abbreviated treatment the concepts of chemical shift and spin-spin coupling are presented, but the methodology is limited to the classical slow passage experiment which has essentially disappeared from modern instrumentation. It is regrettable that pulse methods and carbon nmr spectroscopy are not mentioned at all.

I might have also expected to see some treatment of some other topics in physical organic which are often included in first year courses such as acidity, and linear free energy relationships. These omissions of classical topics are balanced by the inclusion of some new areas of current interest. There is a very extensive treatment of complexation and supramolecular chemistry, as well as topics that bridge the increasingly narrowing gap between organic chemistry and biological chemistry. This is perhaps the best aspect of the book. The words of Emil Fischer ("...the close connexion of chemistry with biology...should be reestablished...") quoted in Chapter 1 certainly must have been a major premise in deciding which topics to cover.

Finally, I would like to commend the authors for including a chapter on literature searching. While this is not a part of chemical theory, it is a subject that should be presented early and often to students and is too often missing in courses and texts.

Morton Raban,
Department of Chemistry,
Wayne State University,
Detroit, Michigan 48202.