

## Book Reviews

**The Determination and Interpretation of Molecular Wave Functions.** By ERICH STEINER (University of Exeter). Cambridge University Press, New York, N.Y. 1976. viii + 205 pp. \$27.00.

This is a quite lucid exposition of *ab initio* computational techniques in quantum chemistry with emphasis on qualitative and interpretational aspects. The main coverage is of methods on the extended basis-LCAO-SCF-CI track, with little or no mention of many-body perturbation theory, density functionals, or other more novel approaches to molecular computation. The theoretical bases of quantum chemistry are outlined rather succinctly but with, at most, rudimentary proofs. Steiner's monograph covers much of the same ground as H. F. Schaefer's treatise ("The Electronic Structure of Atoms and Molecules", Addison-Wesley, 1972) but with fewer technical details and examples. It contains, in addition, some recent developments which are just now finding their way into textbooks, including the theory and applications of localized orbitals, ESCA spectra, and Ruedenberg's analysis of the origin of the chemical bond.

S. M. Blinder, *University of Michigan*

**Inorganic Reaction Mechanisms, Volume 4. (Specialist Periodical Reports).** Senior Reporter: A. MCAULEY (University of Victoria, Canada). The Chemical Society, London. 1976. xviii + 398 pp. \$63.25.

This volume of the series, which reviews the literature for the 18-month period from July 1973 through December 1974, retains the classification of subject matter used in the earlier volumes: electron-transfer processes (87 pp, about 360 references), substitution and related reactions (155 pp, about 760 references), reactions of biochemical interest (21 pp, about 150 references), and organometallic compounds (111 pp, about 320 references). It is approximately 100 pages shorter and cites approximately 200 fewer references than Volume 3, a welcome trend. Nevertheless, four more reporters, J. S. Coe (King's College, London), P. Moore (University of Warwick), K. L. Scott (Ross Foods, Grimsby), and G. Stedman (University College, Swansea), have been added to the five reporters: J. Burgess (University of Leicester), D. N. Hague (University of Kent), R. D. W. Kemmitt (University of Leicester), A. McAuley and M. A. R. Smith (Bruker-Physik AG, West Germany), responsible for the preceding volume. Emphasis is on papers in which kinetics and mechanisms in solution form the principal interest. The presentation continues to be excellent, with judicious use of tables to summarize data. There is no subject index, but this deficiency is partially overcome by a rather detailed table of contents. The general aim of the Specialist Periodical Reports, "to provide systematic and comprehensive coverage of the progress in the major areas of chemical research", continues to be well met for the study of inorganic reaction mechanisms in solution by this latest member of the series.

B. P. Block, *Pennwalt Corporation*

**Annual Reports on NMR Spectroscopy, Volume 6B.** Edited by E. F. MOONEY (Anacon Instruments Ltd., Bourne End, Buckinghamshire, England). Academic Press Inc., New York & London. 1976. vii + 239 pp. \$23.75.

This series of volumes, despite its value in past years, must necessarily begin to raise some serious doubts in the minds of readers and potential purchasers. The present volume, appearing in late 1976, contains two reviews: "NMR and Conformations of Amino Acids, Peptides, and Proteins", by W. A. Thomas and "Fluorine-19 NMR Spectroscopy" by L. Cavalli. The first is 41 pages long and contains only nine references (out of 253) to 1972 papers, the rest being to earlier work. An appendix has been added to update the discussion somewhat, but this is quite brief. The discussion is quite satisfactory within these limits, but is only one of many reviews of this topic that have appeared in recent years, some with much more recent coverage.

Similar difficulties plague the  $^{19}\text{F}$  NMR review, which is stated at the outset to cover only 1971, supplementing earlier reviews in Vol-

umes 1, 3, 4, and 5 of the series. Again, much valuable data has been brought together, and the article is a useful resource.

It is clear that in the production of this volume, mechanical difficulties have intervened to cause unconscionable delays which vitiate the hard work of the authors and do a disservice to them and readers alike. The book, even at the price, can be recommended for the soundness of the discussions, but purchasers should not suppose that they are acquiring up-to-date reviews.

F. A. Bovey, *Bell Laboratories*

**Membranes and Their Cellular Functions.** By J. B. FINEAN, R. COLEMAN, and R. H. MITCHELL (University of Birmingham). Halsted Press/John Wiley & Sons, New York, N.Y. 1974. vii + 123 pp. \$8.95.

Interest in the structure and function of biological membranes has stimulated the production of an ever-increasing number of reviews and review volumes on the many phases of membrane biology, biochemistry, and biophysics. To a novice in this field, the scope and content of this literature, to say nothing of the source research papers on these subjects, are sufficiently broad and technically complex so as to be intimidating indeed. This is especially troublesome in view of the many new techniques in membrane research which have introduced scientists from disparate backgrounds to this area. For these individuals, as well as for students in the biological sciences, a brief introductory text could ease the passage into the study of membranes while maintaining the reader's interest and excitement.

It is to this type of audience that "Membranes and Their Cellular Functions" has been directed. The volume condenses an incredibly vast amount of information into a thin book, progressing from a general introduction to membrane structure, location, function, and study to the more detailed aspects of membrane science: permeation, diffusion, and transport through membranes; cell surface features; exocytosis and endocytosis; metabolic aspects of membranes; and membrane structure and dynamics. The emphasis in each of the six chapters is on presenting a summary of current knowledge on the topic without excessive attention to details of experimental technique, mathematical analysis, or theoretical problems. One has the overall effect of an extremely well-written set of lecture notes in membrane biophysics presented to upper level undergraduates or beginning graduate students. At the same time the presentation is sufficiently detailed to achieve the volume's purpose and to introduce the reader to a broad spectrum of current research topics. The bibliographies following each chapter are concise, running perhaps 15 entries each, but the selections have been made with obvious care to provide representative and thorough coverage.

It is clear from the volume's content that the authors presume a reasonable familiarity with molecular biology and especially biochemistry and, to a lesser degree, cell biology and physical chemistry or thermodynamics. The level of understanding should be well within the capacity of undergraduates in the life sciences, graduate students from the physical and engineering sciences, and research workers from these and other fields. The friendly manner of the text's presentation should be refreshingly welcome to all.

The brevity of this book has obvious drawbacks. Many topics, especially in the later chapters, are presented in brief, summarizing statements which do not fully indicate the physical, chemical, and biological basis for these assertions. In Chapter 3, for example, a reader totally unfamiliar with electrophysiology in general and action potentials, voltage clamping and electrical impulse propagation in particular may well find the three-and one-half page presentation of bioelectric phenomena to be difficult. The emphasis on breadth and compactness also has led to the minimization of discussion of the techniques employed in membrane research. Electron spin resonance spectroscopy of spin-label membrane probes is not mentioned. It is apparently presumed that the reader will have a sufficient understanding of such biophysical techniques as x-ray diffraction, nuclear magnetic resonance, differential scanning calorimetry, and freeze-

fracture electron microscopy to make an explanation of these methods unnecessary. In view of the book's probable audience, the authors might consider expanding the text beyond its present size to include a chapter on modern experimental techniques and the particular virtues and shortcomings of each, should a second edition of this book be contemplated. This chapter could refer the reader to more detailed sources, such as the recent volumes of "Methods in Enzymology" devoted to biomembranes. In view of the rapid progress in membrane research, occasional re-editions of this book which update the coverage and the references would be most welcome.

As a general introduction to the current understanding of membranes, this book should be highly valuable for a course in introductory biochemistry or biophysics. It could also be employed for self-study with great success. "Membranes and Their Cellular Functions" fills a unique gap in the membrane molecular biology literature and should prove to be a most welcome addition.

Gerald E. Cohn, *Illinois Institute of Technology*

**Lipid Chromatographic Analysis, Volume 2.** Edited by GUIDO V. MARINETTI, Marcel Dekker, Inc., New York, N.Y. 1976. 400 pp. \$34.50.

This book is the second in a three-volume series which first appeared in 1967. It includes Chapters 7 through 11 with Chapters 7 and 8 covering two-thirds of the book. Chapter 7 deals with the concepts and methods employed in the qualitative and quantitative thin-layer chromatography of sterols and steroids. A variety of procedures have been critically reviewed and the coverage is extensive. Chapter 8 describes the principles and practice of separation of bile acids by gas chromatography with particular emphasis on clinical samples. Chapter 9 deals with the TLC, GC, and column chromatography of prostaglandins. It also includes a discussion of the extraction, detection, and estimation of prostaglandins in biological samples.

The last two chapters discuss the isolation and estimation of carbohydrates and long-chain nitrogen bases of sphingolipids by the technique of gas chromatography. This book is an excellent compilation of comprehensive up-to-date reviews on the topics covered which the interested researchers would find of considerable use.

O. P. Goel, *Parke, Davis and Company*

**Organic Photochemical Syntheses, Volume 2.** Edited by R. SRINIVASAN, T. D. ROBERTS, and J. CORNELISSE, John Wiley & Sons, New York—London—Sydney—Toronto. 1976. 109 pp. \$19.95.

This volume offers 41 procedures in which a photochemical reaction is the key synthetic step. The compounds synthesized range in complexity from the weird and wonderful cage structures achievable only by photochemical routes to small ring compounds and dioxetanes to as simple a compound as methylenecyclopentane. In the tradition of "Organic Syntheses", most of the synthetic procedures have been checked. A useful feature of the volume is the inclusion of a number of diagrams of apparatus necessary for the procedures. The volume is attractively printed but does have some typographical errors, especially in the chemical structures that are given at the beginning of each experiment.

Seyhan N. Ege, *University of Michigan*

**Stereochemistry.** By G. NATTA and M. FARINA. Harper and Row Publishers, Inc., New York, N.Y. 1973. 250 pp. \$6.95.

"Stereochemistry" by G. Natta and M. Farina and translated from the Italian by A. Demster is a vivid and compact description of some three-dimensional properties of organic molecules with emphasis on compounds of biological interest and on macromolecules. Since the latter represent the authors' field of research (Natta won the 1963 Nobel Prize in chemistry for his work on stereochemistry of polymerization), there are many chapters that make fascinating reading. This book does not claim to be a comprehensive treatise of the subject. Though it discusses stereochemistry in the broadest sense from electron distribution in atoms to enzyme specificity, it should not be compared to books such as Eliel's "Stereochemistry of Organic Compounds". According to the authors, it addresses itself not to the chemist but to the wider scientifically inclined public.

In spite of the discussion of many principles, a basic organic chemical background is required. Hence, it would be suitable reading material for sophomore-junior chemistry majors at American universities and for science graduate students.

The strength of the monograph lies in the historical perspective that the authors are trying to convey and successfully so. Of course, in-

cluded is the discovery of the polymerization catalysts by Ziegler and Natta which led to the first crystalline polypropylene polymer. It is a pity that more emphasis had not been placed on these and other more advanced aspects of stereochemistry and less on beginning chemistry. For instance, nearly as much space is devoted to explain what heavy water ( $D_2O$ ) is, as to the description of the fluxional state of bullvalene. Also missing are examples of the many recent cases in which stereochemical control was applied to the synthesis of natural products.

In some ways the scope is much too ambitious, including brief coverage of topics such as atomic orbitals, the periodic system, resonance, symmetry elements, conformational analysis, asymmetric synthesis, kinetic vs. thermodynamic control, orbital symmetry. More than one-third of the book is devoted to stereoproperties of polymers including synthetic ones, proteins, and nucleic acids. Even topics like enzyme reactions and the origin of optical activity are found within the 250 pages of this volume.

Symmetry elements are very well treated, and there are a clear explanation and an illustration of prochirality. I found it particularly interesting to read about such rarely discussed concepts as Curie's principle (1894) of symmetry conservation, which explains why a planosymmetric transition state can yield only a racemic mixture, "A physical event cannot have a symmetry lower than that of the event which caused it."

This book should stimulate students toward gaining further insight into more advanced chemistry.

Alfred Hassner, *State University of New York—Binghamton*

**Introduction to Combustion Phenomena.** By A. MURTY KANURY (Stanford Research Institute). Gordon and Breach Publishers, New York, N.Y. 1975. xvii + 411 pp. \$34.50.

"Introduction to Combustion Phenomena" is a well-written introductory text. It is designed for senior-level mechanical, chemical, and aeronautical engineering students in a semester or year course. In eight chapters it discusses the physical-chemical and physical aspects of combustion processes. The author discusses in turn the physical chemistry of the combustion process, the physics of combustion, kinetically controlled combustion, diffusion flames from liquid fuels, combustion of solids, gaseous fuel jets, and premixed flames. The appendices provide a review of the thermodynamics of gases, thermochemistry, and equilibria. There are also illustrative problems for the student.

If criticism is necessary, it would be that the chapter on solids is only 20 pages. Perhaps an even greater departure from tradition is called for. Since a great deal of research effort is currently being devoted to flammability of polymeric material, some discussion of the organic chemical aspects of material combustion might have been in order as well as a discussion of soot or smoke formation from an organic source. A discussion of flame inhibition would also have been particularly useful.

Despite these criticisms, the book should be a most useful addition for engineering students as an introduction to combustion physical chemistry and physics and for researchers seeking an overview of combustion phenomena.

Gordon L. Nelson, *General Electric Company*

**The Catharanthus Alkaloids.** Edited by W. I. TAYLOR (International Flavors and Fragrances) and N. R. FARNSWORTH (University of Illinois Medical Center, Chicago). Marcel Dekker, New York, N.Y. 1975. vii + 312 pp. \$29.50.

This small book, consisting of eight chapters by various experts, presents a brief overview of the *Catharanthus* alkaloids. These indole alkaloids are of interest because of their complex structures and the clinical usefulness of vinblastine and vincristine, isolated from *Catharanthus roseus*.

Emphasis in the book is primarily in biological rather than chemical areas. Only one chapter (16 pages) is devoted to the structural and chemical aspects, and the latest reference here is to a 1969 publication. Biosynthetic considerations are more substantial (two chapters, 68 pages), and the major portion (five chapters, 186 pages) is concerned with botanical and pharmacological aspects.

What is presented is presented well, and chemists will possibly find it of value as an introduction; however, there is little advantage in having one's personal copy.

Henry Rapoport, *University of California, Berkeley*