

## Book Reviews\*

**Organophosphorus Chemistry. Volumes 15 and 16.** Edited by D. W. Hutchinson and B. J. Walker. The Royal Society of Chemistry: London. 1985 (Volume 15) and 1986 (Volume 16). Volume 15: 335 pp. \$122.00. ISBN 0-85186-136-9. Volume 16: 411 pp. \$130.00. ISBN 0-85186-146-6.

Volumes 15 and 16 of this specialist periodical report contain a review of the major publications in literature appearing between July 1982 and June 1983 and between July 1983 and June 1984, respectively.

In Volume 15, for the first time in 4 years, a chapter on phosphazenes, Cyclic and Polymeric Phosphazenes, is included which consists of 65 pages and 233 references. The publisher intends to have this topic reviewed on a regular basis in the future. Other chapters (number of pages, number of references) presented are as follows: Phosphines and Phosphonium Salts (34, 301), Quinquecovalent Phosphorus Compounds (24, 55), Phosphine Oxides and Related Compounds (20, 56), Tervalent Phosphorus Acids (25, 107), Quinquevalent Phosphorus Acids (40, 165), Phosphates and Phosphonates of Biochemical Interest (13, 77), Nucleotides and Nucleic Acids (61, 347), Ylides and Related Compounds (42, 142), and Physical Methods (29, 349).

This report uses adequate structures and reaction schemes and the print employed is quite legible. The adopting of a less expensive method of producing diagrams has not appeared to detract from their clarity. References are shown at the bottom of each page, and an Author Index is included.

Volume 16 contains the same number of chapters and topics as the previous report. The names of two chapters were changed: Cyclic and Polymeric Phosphazenes to Phosphazenes and Quinquecovalent Phosphorus Compounds to Pentaco-ordinated and Hexaco-ordinated Compounds. For the sake of uniformity the publisher should consider retaining the same nomenclature in future reports.

Two other changes were made in this latest report in this series. In a commendable attempt at reducing cost the publisher has used camera-ready copy. For the most part this has resulted in adequate legibility. The font and pitch used by the reporters was not, however, completely uniform, and the print in two chapters is somewhat light and/or small. The move of references from the bottom of pages to the end of chapters does not detract from their use, and this modification may be preferred by some readers. The structures and schemes continue to have good quality. The reduction in cost of this volume, which contains 76 pages more than the preceding report, justifies the adoption of this means of printing.

Lindley A. Cates, *University of Houston*

**Modern Aspects of Electrochemistry. Volume 16.** Edited by B. E. Conway, Ralph E. White, and J. O'M. Bockris. Plenum Press: New York. 1985. xv + 512 pp. \$75.00. ISBN 0-306-420244.

Volume 16 of this important electrochemical series contains six Chapters which are concerned with a variety of topics, some focussing on fundamental electrochemical problems, some reviewing relatively recent electrochemical and surface methodologies, and some related to areas of applications, emphasizing the current state of knowledge and where further research is required. The book is extremely well referenced and very readable, and the particular topics covered are all of current relevance and difficult to find so concisely covered elsewhere.

In Chapter 1, Antoinette Hamelin has provided a very useful and informative description of the techniques used for single-crystal preparation and characterization and has then shown how the double-layer properties of well-characterized silver and gold single crystals can be elucidated electrochemically. The Chapter also discusses specifically the determination of the potential of zero charge and the variables which influence it, as well as a useful discussion of surface roughness measurements.

In Chapter 2, B. E. Conway has clearly addressed the fundamental problem of the often unusual experimentally observed temperature dependence of the Tafel slope, and hence of the transfer coefficient (or symmetry factor). A thorough summary of the literature, particularly of gas evolution and reduction reactions at numerous metal surfaces, is made in this regard. These various dependencies of the Tafel slope on temperature indicate that electron-transfer processes are not yet fully understood. Possible interpretations include a field-dependent entropy

of activation, specific adsorption of ions, and the temperature and potential dependent coverage of surface intermediates in more complex electrode reactions.

In Chapter 3, Drs. Pleskov and Gurevich provide a summary of the electrochemistry of semiconductors, including the standard topics of band-edge pinning and the determination of flat band potentials, but also adding an interesting discussion of the meaning of the electrochemical potential of electrons in a solution containing a redox couple. Several new fields of study and applications of semiconductors are also discussed, e.g., laser electrochemistry of semiconductors and ISFETS, as well as a number of new fields now in their infancy.

An extremely useful and thorough exposition on the current understanding of the Surface Enhanced Raman Scattering (SERS) phenomenon has been presented in Chapter 4 by S. Efrima. The author has organized an immense body of literature into a very clear and helpful format, with each section containing a concise summary of the principal points. A resonance model for the SERS effect is preferred by the author while all other models are also adequately discussed.

In Chapter 5, a useful summary of the current "state-of-affairs" regarding batteries for vehicular propulsion has been prepared by Halina Wroblowa. Tables comparing all of the current contenders and containing all pertinent data are given. Each battery type is clearly described separately, and the problems still existing which would benefit by further research are clearly defined.

In Chapter 6, a clearly written account of both the technological advantages and the properties of perfluorinated ion-exchange membranes, along with a description of the quest for the fundamental explanations for them, has been presented by Richard Yeo and Howard Yeager. By combining the diffusion data obtained for various ions and molecules through these membranes and sorption and conductivity measurements with various microstructural models involving ion clusters, it appears that some understanding for the amazing properties of these membranes is now being reached. The present and future applications for these membranes appear to be endless.

In summary, this volume contains articles by a selection of authors who are leaders in their fields, and hence it maintains the overall high standard of the series.

Viola I. Birss, *University of Calgary*

**Organometallic Intramolecular-coordination Compounds.** By I. Omae (Teijin, Limited). Elsevier Science Publishers: Amsterdam and New York. 1986. X + 402 pp. \$92.50. ISBN 0-444-42584-5.

This is Volume 18 of the "Journal of Organometallic Chemistry Library". An organometallic intramolecular-coordination compound, according to the author, contains a chelate ring which is attached to the metal through at least one metal-carbon  $\sigma$ - or  $\pi$ -bond. Following this definition, the author has compiled a thorough, well-organized, and up-to-date book on the subject. Over 1500 references covering the literature to the end of 1984 are cited.

The author's main emphasis is synthesis of these compounds and, to a lesser extent, their reactions. The book is amply illustrated; almost every page contains structures helpful in following the synthesis or reaction under discussion.

The first chapter deals mostly with ways to synthesize an organometallic intramolecular-coordination compound, as well as some reactions of these compounds. The following chapters are organized according to the donor atom or group of the chelate ring. Chapter 2 discusses nitrogen compounds, followed by chapters on phosphorus, arsenic, oxygen, sulfur, and halogen compounds. Chapter 8 presents the  $\pi$ -coordination compounds, and it includes alkenes,  $\pi$ -allyl, cyclopentadienyl, and aryl compounds.

The book should be of interest to synthetic organic and organometallic chemists not only as an authoritative source of information on this type of compound but also as a source of ideas for their use in organic synthesis.

Michael F. Faron, *The University of Akron*

**Comprehensive Treatise of Electrochemistry. Volume 10: Bioelectrochemistry.** Edited by S. Srinivasan (Los Alamos National Laboratory), Yu. A. Chizmadzhev (Institute of Electrochemistry, Academy of Sciences of the USSR), J. O'M Bockris (Texas A&M University), B. E.

\*Unsigned book reviews are by the Book Review Editor.

Conway (University of Ottawa), and Earnest Yeager (Case Western Reserve University). Plenum Press: New York. 1985. XV + 558 pp. \$75.00. ISBN 0-306-41541-0.

The series preface to these volumes states that there has been "no attempt to make each article emphasize the most recent situation at the expense of an overall statement of the modern view". This is certainly true for Volume 10, since the constituent articles contain few post-1980 references. This, however, is a criticism not to be taken too seriously since the constituent articles are, for the most part, of very high quality and the volume (as well as the series) is highly recommended for the reference library. The preface to Volume 10 correctly sees the application of electrochemical concepts to biological phenomena as one of the more interesting enterprises in modern science. The volume will be particularly useful for those of us who are considering undertaking electrochemical studies of biologically interesting molecules and phenomena by providing an overview of the field and a vast number of references. A minor disappointment is the absence of a chapter on electrochemical applications to the studies of bioinorganic phenomena. Inorganic chemists generally have been quite active and successful in recent years in applying electroanalytical techniques in the study of bioinorganic systems; their points of view are refreshingly intriguing and informative.

Topics included in this volume of the series are the following: 1. The Origin of Electrical Potential in Biological Systems (Ohki, 317 references); 2. Electrochemistry of Low Molecular Weight Organic Compounds of Biological Interest (Dryhurst, 117 references); 3. Electrochemistry of Biopolymers (Berg, 140 references); 5. Electrochemical Aspects of Bioenergetics (Bowden et al., 185 references); 7. Electrochemistry of the Nervous Impulse (Chizmadzhev et al., 108 references); 8. Electrochemical Approach for the Solution of Cardiovascular Problems (Srinivasan, 68 references); 9. Electrochemical Techniques in the Biological Sciences (Findl et al., 66 references). Chapter 2 contains a discussion of purines (Section 5) that is particularly good. Chapter 6 contains an intriguing discussion (Section 4) on the relationship of electrochemical processes and disease formation due to the aerobic production of superoxide ion (though metabolism might be a topic remote from the experience of most electrochemists). Chapter 8 presents a summary of the evidence for an electrochemical mechanism of thrombosis (Section 1.2). It also contains discussions of the detailed use of experimental methods in bioelectrochemical studies.

R. H. Gibson, *University of North Carolina at Charlotte*

**Solvent-Dependent Flexibility of Proteins and Principles of Their Function. Advances in Inclusion Science Series.** By Alex I. Käiväräinen (Institute of Biology, USSR Academy of Sciences). D. Reidel: Dordrecht, The Netherlands. 1985. xiv + 290 pp. \$58.00. ISBN 90-277-1534-3.

There is a great deal of current interest in the dynamic properties of proteins, the influence of the solvent on protein behavior, and the role of conformational dynamics in protein function. These areas form the subject of this book, although Käiväräinen devotes much of the text to the description of a dynamic model of protein behavior, first outlined by the author in 1975, and its subsequent development and application to protein association processes and enzyme catalysis. Käiväräinen proposes that functionally relevant conformational transitions are linked to the state ("open" or "closed") of a number of cavities in the protein which may accommodate cooperative clusters of water. The intent is "to provide a theoretical basis for the systematic analysis of experimental data and to outline a pathway for future investigations".

The book was originally published in Russian in 1983. I could find only one reference to work published in 1982 and only a handful of references from 1981. As a result, the coverage of some topics is uneven or outdated. The first chapter gives a brief (13-pp) and, given the theme of the book, a rather inadequate description of the properties of water, ice structures, and water-solute interactions. Chapter two introduces the reader to the principles and implications of the dynamic model of proteins. In a field that has advanced so rapidly in recent years, omission

of important new work is almost inevitable in a monograph of this type. This is a major deficiency of this book and is particularly evident in chapters three, four, and five, which describe the conformational motility of proteins and water-protein interactions. For example, topics which are missing, but which would certainly warrant inclusion had the book been written today, include results from molecular dynamics calculations, neutron diffraction, single-proton exchange by NMR, and recent studies of protein hydration and preferential protein-solvent interactions. There is also little discussion of other dynamic models of protein function or of the possible influence of solvent viscosity on protein processes, a subject that has attracted considerable interest in recent years.

The remaining chapters (6-8) of the book describe dynamic models of protein complex formation and enzymic catalysis and the interactions between polymers (polyethyleneglycol and dextrans) and proteins. Much of the evidence to support Käiväräinen's model comes from the author's own EPR studies of spin-labeled proteins. There is little doubt that many aspects of the proposed models of solvent-dependent flexibility will prove to be important for protein function, and the book does succeed in focusing attention on the importance of the protein-solvent interface. However, given the deficiencies noted above, the book cannot be recommended to readers seeking a general, up-to-date survey of protein flexibility and protein-solvent interactions.

Roger B. Gregory, *Kent State University*

### Books on Biological and Medicinal Subjects

**Surface and Interfacial Aspects of Biomedical Polymers. Volume 2: Protein Adsorption.** Edited by J. D. Andrade. Plenum Press: New York. 1985. xvii + 347 pp. \$49.50. ISBN 0-306-41742-1.

This book is "intended to provide a firm basis for the study of proteins at interfaces". There are ten contributed chapters, which deal with principles of protein adsorption, TIRF spectroscopy, interactions ... in shear fields using TIRF, surface-enhanced Raman spectroscopy, X-ray photoelectron spectroscopy, chromatography, electrokinetic studies, microcalorimetry, adsorption hysteresis, and modeling.

**Instrument Evaluation in Biomedical Sciences.** By James L. Driscoll, Benjamin J. Gudzinowicz, and Horace F. Martin. Marcell Dekker: New York and Basel. 1984. vii + 313 pp. \$59.75. ISBN 0-8247-7184-2.

Consists of seven chapters, which deal with justification and selection, reliability, economics, clinical utility, and technical aspects. Curiously, the index has no entries for infrared, ultraviolet, NMR, or HPLC.

**Molecular Biology and Biotechnology.** Edited by J. M. Walker and E. B. Gingold. The Royal Society of Chemistry: London. 1985. iv + 340 pp. \$45.00. ISBN 0-85186-985-8.

Consists of 14 contributed typescript chapters, ranging from Products from Microorganisms to Enzyme Engineering.

**A Dictionary of Genetic Engineering.** By Stephen G. Oliver (University of Manchester) and John M. Ward (University College, London). Cambridge University Press: Cambridge and New York. 1985. v + 153 pp. \$19.95. ISBN 0-521-26080-9.

This dictionary carries no preface to indicate its intended readership but includes a large number of terms used in cellular and biological chemistry. In a few cases, structural formulas are a part of the definition, but for the most part, specific compounds, such as streptomycin, are defined only in general terms. There are several appendices in the form of tables.

**Annual Reports on Fermentation Processes. Volume 8.** Edited by George T. Tsao (Purdue University). Academic Press: Orlando, FL. 1985. ix + 326 pp. \$34.95. ISBN 0-12-040308-0.

The ten contributed typescript chapters in this lie somewhere in between reviews and reports of original research. The topics covered include chromatographic purification, computer aids for teaching, steroid bioconversions, pretreatment of cellulose, etc.