Book Reviews

Organometallics: A Concise Introduction. By Christoph Elschenbroich (Philipps-Universität Marburg) and Albrecht Salzer (Universität Zürich). VCH Publishers: New York. 1989. xi + 479 pp. $38.00. ISBN 0-89573-868-6.

This book is a translation of the second edition of a very popular European text on organometallic chemistry. Excellent coverage is given to both main-group and transition-metal organometallic chemistry. Appropriately, main-group organometallic chemistry is organized according to the periodic table but transition-metal organometallic chemistry is presented according to ligand types. The breadth and depth of coverage are outstanding, and the excitement of synthetic organometallic chemistry comes across very strongly. The presentation of bonding, structures, and reactivity patterns is first rate. A very nice feature of the text is the inclusion of "excursions" offering more in depth discussions of topics such as transition-metal NMR, ESR, and Mössbauer spectroscopy, organometallic photochemistry, and cluster bonding. A list of references to key papers and reviews is presented at the end of the text.

The book has only two shortcomings. The first is the intentional omission of almost all discussion of reaction mechanisms, which could have provided a glue to help organize the reactivity patterns of transition-metal organometallic chemistry. The second is that interesting results in the text are referenced only by senior author and year. This will inhibit the reader from looking up further details without substantial effort.

This is an excellent book that should be considered for the personal library of anyone interested in organometallic chemistry. It should be given strong consideration as a text for advanced undergraduate or graduate courses.

Charles P. Casey, *University of Wisconsin*

Metal Ions and Bacteria. Edited by Terrance J. Beveridge (University of Guelph) and Ronald J. Doyle (University of Louisville). John Wiley and Sons: New York. 1989. x + 461 pp. $59.95. ISBN 0471-62918-9.

This book is the first of its kind to deal with metal–microbe interactions, an area of considerable research interest. The volume is largely devoted to bacteria, although other microorganisms such as molds, yeasts, and algae are included as well. The 14 chapters cover a host of subjects, including toxicity of heavy metals to microorganisms, inorganic ion gradients in methanogenic archaebacteria, siderophore systems of bacteria and fungi, transition-metal enzymes, iron in bacterial virulence, minerals and bacterial spores, interaction of metal ions with cell walls of gram-positive and gram-negative bacteria, interaction of metal ions with capsular polymers, microbial processes in recovery of metal ions from wastewater, manganese redox mechanisms, and mineral formation and decomposition by microorganisms. There are some 1600 references to the original literature. This book is primarily written for microbiologists, but bioinorganic chemists would find it informative as well. The introductory chapter by Beveridge provides much of the needed background for the chemist to read the later chapters. The chapters are generally descriptive accounts of the role of metals in bacteria and contain some very interesting reading. The chapter by L. P. Wackett, W. H. Orme-Johnson, and C. T. Walsh on transition-metal enzymes in bacterial metabolism gives a nice overview of the subject. A chapter devoted to magnetotactic bacteria would have been expected in a volume such as this but none is included. Magnetotactic bacteria are briefly touched upon in the introductory chapter. While the book is not recommended for chemistry libraries, it should definitely be part of the collection of any university library or biological sciences library.

N. Dennis Chasteen, *University of New Hampshire*

Crown Ethers and Analogues. Edited by Saul Patai and Zwi Rappaport (The Hebrew University of Jerusalem). John Wiley and Sons, Inc.: New York. 1989. ix + 558 pp. $195.00. ISBN 0471-91707-9.

This book is a part of a series of topic updates of the well-known *Chemistry of Functional Groups* series edited by S. Patai. The subjects covered within the general topic of crown ether chemistry are extensive, including the following: Chapter 1, Synthesis of crown ethers and analogues (D. A. Laidler and J. F. Stoddart, 57 pp, 194 references); Chapter 2, Organic transformations mediated by macrocyclic multidentate ligands (C. L. Liotta, 18 pp, 78 references); Chapter 3, Modern aspects of host–guest chemistry: molecular modelling and conformationally restricted hosts (J. L. Toner, 129 pp, 228 references); Chapter 4, Crown ethers—complexes and selectivity (F. Vögtle and E. Weber, 98 pp, 263 references); Chapter 5, New developments in crown ether chemistry: lariat, spherand and second-sphere complexes (E. Weber, 53 pp, 115 references); Chapter 6, Geometry of the ether, sulphide and hydroxyl groups and structural chemistry of macrocyclic and noncyclic polyether compounds (I. Goldberg, 40 pp, 111 references); Chapter 7, Structural Chemistry of crown ethers (I. Goldberg, 78 pp, 197 references); Chapters 8 and 9, Complexation of aryldiazonium ions by polyethers (R. A. Bartsch, 27 pp, 68 references and 13 pp, 33 references, respectively).

The individual chapters in this book are generally comprehensive, well-written, amply illustrated, and extensively referenced. Chapters 1, 2, 4, and 6 were published in *Supplement E* to the *Chemistry of Functional Groups* (1980), while Chapter 8 is reprinted from *Supplement C* (1983). Some of the material and references are therefore dated but useful to those starting in the field. Chapters 3, 5, 7, and 9 are updates or new material. Several of the chapters (3 and 4) give thorough coverage of thermodynamic considerations in complexation, and of particular note, the chapter containing a discussion on molecular modeling of crown ether complexes (Chapter 3) is timely. This book will be of interest to those working in the field who may have need of the new material presented or to those looking for a broad overview of the field who do not have access to the Supplements to the *Chemistry of Functional Groups* discussed earlier.

Daniel T. Glatzhofer, *The University of Oklahoma*

High Technology Fibers. Part B. Handbook of Fiber Science and Technology. Volume III. International Fiber Science and Technology Series. Volume 9. Edited by Menachem Lewin (Israel Fiber Institute) and Jack Preston (Research Triangle Institute). Marcel Dekker: New York and Basel. 1989. xx + 332 pp. $150.00. ISBN 0-387-18939-6.

This book is a segment of the *Handbook of Fiber Science and Technology*. This particular text listed as Volume 9 in the series is also part of a larger grouping labeled Volume III.

The book comprises a set of nine contributed papers. Three of these are from academic departments with six from industrial sources. Two companies contributed two chapters each, which means that they accounted for two-thirds of the industrial papers.

The text presents some interesting material, but the unevenness of the chapters detracts overall from the book. The better chapters are well-organized and present solid information. Unfortunately, the lesser chapters are not as well organized and, as such, make it difficult for the reader to both follow the work and obtain information.

The art work and printing are of good quality. However, a more organized approach by the editors would have helped. For example, Chapters 3 and 9, which both deal with thermotropic polymers, are widely separated. It also might have been more appropriate to place Chapters 5 and 6 (dealing with inorganic fibers) at the end of the text (as Chapters 8 and 9) so as to keep the organic fibers in a more natural sequence for the reader.

The double contribution of chapters from the two companies also detracts from the overall text. It would have been better if other sources were sought or if the size of the text were reduced.

The book's value is principally as a reference text. Even here the contents will be of interest to only a very small subset of the industrial fiber technology community and to an even much smaller group of academics. Recognizing that it fits the needs of a limited audience, however, should not preclude its possible acquisition for libraries of companies involved in the fiber industries.

Richard G. Griskey, *Stevens Institute of Technology*

Environmental Chemistry. By Nigel J. Bunce (University of Guelph). Wuerz Publishing Ltd.: Winnipeg. 1990. 328 pp. $33.00. ISBN 0-920063-31-4.

This is an excellent text for its intended audience, having been written as a one-semester course for students who have completed general chemistry and one semester of organic chemistry. It is delightfully up to date and clearly written, consistently maintains a level appropriate for the targeted students, and at least mentions essentially all of the important topics. It includes general chapters on natural waters and the atmosphere, along with individual chapters for stratospheric ozone, indoor air quality, acid rain, drinking water, sewage treatment, chlorinated organic compounds, and metals and a chapter covering both photochemical smog and particulate matter. The greenhouse effect and global warming are covered within the general chapter on the atmosphere.

From the perspective of someone who teaches two quarters of environmental chemistry rather than one semester, easily the main complaint about the text is that it is a little too brief with most topics. The text does not attempt to cover the instrumentation and methodology of environmental analyses. Its coverage of photochemical smog might be a little less thorough than would be optimum in California. It does not discuss problems relating to selenium, cadmium, or tributyltin. The difficult-to-organize topic of pesticides is not tackled. The problems at the ends of chapters also merit comment. They are all mathematical, which is not reflective of much of the coverage in the text. While the textual material consistently is available to the student with minimum preparation, far too many of the problems are a bit of a stretch. In fact, many of them look like excellent material for physical chemistry teachers looking for problems that are applications from their field. An answer guide with more pages than the text has just become available as a supplement.

All things considered, it is an excellent first attempt at a text covering a sprawling and rapidly changing subject at a level that simultaneously is satisfying scientifically but not overwhelming to typical upper division undergraduate students of many different majors.

David L. Keeling, *California Polytechnic State University*

Chemical Thermodynamics: Revision & Worked Examples. By H. P. Stadler (University of Newcastle upon Tyne). The Royal Society of Chemistry: Cambridge. 1990. xiii + 131 pp. $19.50. ISBN 0-85186-273-X.

This slim book from the United Kingdom is advertised as a textbook for undergraduate students studying chemistry, metallurgy, or chemical engineering. It covers approximately half of the materials in an American undergraduate textbook for a one-year course in classical physical chemistry. Stadler's belief in teaching thermodynamics through its application certainly has its adherents here and a full-sized textbook on thermodynamics using such an approach would have its share of the market. The short *revision* or review form in which the thermodynamic theories are presented, however, makes this book less useful as a textbook than as a refresher. Certainly someone who wants to pass a thermodynamic examination given by the (British) Institution for Chemical Engineers should use the book for review, since it covers the ICE's syllabus.

American students and instructors will find the explanations of the theories too skeletal. The numerous worked-out examples, 9 to 10 per chapter, will be welcomed by students using the book as supplementary reading or as a source for worked out examples, but the American instructors will be dismayed that there are no problems for the students to solve as homework.

Stadler uses only mole fraction and molality in the book and dismisses molarity in a footnote on page 45 as less advantageous than molality in thermodynamics. Molarity should not be omitted because it is used extensively in chemical engineering and chemistry, particularly in chemical kinetics, a field intimately related to thermodynamics. Stadler also omits the important area of the thermodynamics of ionic equilibria and activities.

James Y. Tong, *Ohio University*

Biofilms. Edited by William G. Characklis (Montana State University) and Kevin G. Marshall (University of New South Wales). John Wiley and Sons, Inc.: New York. 1990. xiv + 796 pp. $99.95. ISBN 0-471-82663-4.

The significance of interfacial microbial processes in widely ranging areas of science and technology has in recent years brought focus to the study of biofilms. These biological systems arise from the interaction between biotic and abiotic phenomena in ways that can either be beneficial (e.g., pollutant degradation) or destructive (e.g., corrosion, human and animal disease). Analysis of biofilm formation and dynamics requires a breadth of expertise which can range from molecular genetics to physical chemistry to environmental engineering. As such, there are few contributions in the literature that address biofilms in a comprehensive manner.

Characklis and Marshall have taken on this task and produced a volume that incorporates perspectives of a variety of individuals active in this emerging interdisciplinary field. The slant here is clearly engineering and applied science although they make sure to cover the fundamental aspects to some extent. In total, this is a very valuable addition to the literature which can be used as a starting point for gaining sophistication in biological processes at interfaces.

The text is divided into five parts. These range from a treatment of the laboratory and analytical methods for studying biofilms to examples that illustrate the incorporation of these methods to model biolfilm processes. The final section of the text reviews several areas of technology which serve to illustrate the significance of biofilms. There are generous doses of literature references throughout adding to the coverage offered in various chapters.

In general, this book fills an existing void in science and technology in a very effective manner. Despite the fact that numerous researchers contributed to the text, the editors have been able to avoid the discontinuities normally found in efforts of this sort. Perhaps the fact the Characklis was involved in 15 of the 19 chapters and Marshall contributed to three helps explain this success.

One criticism that arises is the decision by the editors to include some very basic aspects of transport phenomena and microbial growth and energetics. While it is understandable that they sought to provide comprehensive coverage of the subject to readers of varied expertise, the less sophisticated in this area of research could have been encouraged to develop background through other references.

"Biofilms" is a worthy contribution to a literature which contains segments of this research area in a somewhat disjointed fashion. There is no doubt that these segments are blended together well in this text. It will allow newcomers to this area to get their bearings and while enabling those more experienced to expand their horizons.

Robert M. Kelly, *The Johns Hopkins University*

Continuous-Flow Fast Atom Bombardment Mass Spectrometry. Edited by Richard M. Caprioli (University of Texas Medical School at Houston). John Wiley & Sons: New York. 1990. 189 pp. $44.95. ISBN 0-471-92863-1.

This book describes the operation and application of continuous-flow fast atom bombardment mass spectrometry and, for the most part, is based on a workshop entitled Continuous-Flow FAB Mass Spectrometry, sponsored by The American Society for Mass Spectrometry, held in November 1989 in Annapolis, Maryland. The chapters of this book are based on presentations made at this meeting.

This book consists of eight chapters each written by an expert in the specific area covered. The editor is also the author of three of the chapters. Chapter 1, Design and Operation, starts with general information about FAB but quickly progresses to design and operational parameters of continuous-flow FAB. It includes three CF-FAB probe designs for Kratos MS 50, Finnigan-MAT 90, and Finnigan TSQ-70 mass spectrometers and their operational parameters. In Chapter 2, Trace Analysis, S. J. Gaskell and R. S. Orkiszewski describe their preliminary studies to optimize detection during CF-FAB with respect to both sensitivity and selectivity of detection using a VG ZAB SEQ instrument. Chapter 3 by S. P. Markey and Ming-Chuen Shih examines quantitation of polar compounds in biological fluids using continuous-flow-liquid secondary ion mass spectrometry by utilizing a Finnigan MAT TSQ-70 triple-stage mass spectrometer equipped with Finnigan MAT prototype BioProbe ion source. Chapter 4, Direct Analysis of Biological Processes by Caprioli, covers batch sample processing, enzyme reaction analysis in real-time, kinetic analysis of enzyme activity, microdialysis/MS for in vivo drug monitoring, and on-line enzyme reaction monitoring. Chapter 5, Liquid Chromatography/Mass Spectrometry by R. M. Caprioli and K. Tomer, deals with coupling of CF-FAB to microbore and capillary bore chromatography and their applications to peptide mapping. Chapter 6, Capillary Zone Electrophoresis/MS by K. Tomer and M. A. Moseley, discusses two different systems for interfacing CZE with CF/FAB, the liquid junction and coaxial column configuration. Chapter 7, Analysis of Low-Polarity Substances by D. L. Smith, discusses the use of CF-FAB MS for the analysis of substances with low to intermediate polarity. The last chapter, Other Applications, is a collection of five articles on application of CF-FAB in biological sciences.

In summary, this is a practical book written for the mass spectrometrist in the fields of analytical chemistry, biochemistry, biotechnology, and pharmacology who has some experience with conventional FAB methods. Mass spectrometrists will find this book very helpful in terms of both design and operational parameters and its application to the analysis of a variety of biological reactions.

Mehdi Moini, *The University of Texas at Austin*