

Book Reviews*

Perspectives in Biochemistry. Volume 1. Edited by Hans Neurath (University of Washington). American Chemical Society: Washington, DC. 1989. xi + 259 pp. \$14.95. ISBN 0-8412-1621-5.

This soft-bound volume is a collection of the reviews published in the journal *Biochemistry* in 1987 and 1988. The 36 reviews are grouped under the headings: Structure and Function of Proteins, Enzyme Catalysis, Polysaccharides, Signal Transduction, Biological Regulation, Biochemical Genetics, Transmembrane Phenomena, and Cellular Functions. Author, affiliation, and subject indexes are provided.

An Introduction to Liquid Helium. Second Edition. By J. Wilks (University of Oxford) and D. S. Betts (University of Sussex). Oxford: Oxford and New York. 1987. ix + 187 pp. \$53.50. ISBN 0-19-851471-9.

The first edition of this book was published in 1970 under the sole authorship of John Wilks. The new edition has been completely reset, with some rearrangement of topics, a few removals, and the addition of a completely new chapter on the superfluid phases of ^3He , discovered in 1972. The preface is dated August 1986, and the references seem to run through 1985.

Advances in Polymer Science 88 and 89. Volume 88: Speciality Polymers/Polymer Physics. Edited by H. Benoit (Centre National de la Recherche Scientifique) et al. Springer-Verlag: New York and Berlin. 1989. 197 pp. \$79.00. ISBN 0-387-50472-9. **Volume 89: Polymer Characterization/Polymer Solutions.** Edited by H. Benoit (Centre National de la Recherche Scientifique) et al. Springer-Verlag: New York and Berlin. 1989. 177 pp. \$69.50. ISBN 0-387-50473-7.

Volume 88 of this hard-bound serial contains four papers. The topics are epoxy molding compounds for encapsulation, synthesis and structure of macromolecular topological compounds, reactions and photodynamics in solid polymers, and thermotropic mesophases in siloxanes and phosphazenes.

Volume 89 contains two papers; one is on drag reduction in polymer solutions, and the other is on NMR of cross-linked polymers. Each volume has its own index.

Applied Heterogeneous Catalysis: Design, Manufacture and Use of Solid Catalysts. By J. F. LePage (Institute Francais du Petrole) et al. Editions Technip: Paris. 1987. xxiv + 515 pp. ISBN 2-7108-0531-6.

Heterogeneous catalysis is a very complex subject encompassing both the chemical and chemical engineering disciplines. To my knowledge there are no introductory books that address the subject adequately for both scientists and engineers.

This book contains a wealth of practical and fundamental information obtained by the authors in an industrial setting. The organization and selection of subjects is ideal for someone being initiated to the field.

In the preface it was suggested that the book could be used by teachers to train students. Although the book would be an excellent reference source, it is not a good instructional textbook in its present form. The text is often difficult to follow and many subjects are not discussed in adequate detail for the beginning student. The figures and titles are very well done but not discussed in the text in sufficient detail. In general, the book focuses more on engineering rather than chemical aspects. For example, many valuable surface characterization techniques, such as XDS and Auger, are omitted. Very little information about known surface mechanisms is provided. The literature cited is not sufficiently current for use in the classroom.

In summary, the book is well organized and well illustrated, and contains a valuable collection of knowledge gained by the authors. It is an excellent reference book, but I would not recommend it for classroom use.

S. W. Cowley, *Colorado School of Mines*

Metabolic Maps of Pesticides Volume 2. By Hiroyasu Aizawa (Mitsubishi Kasei Corporation). Academic Press: San Diego and New York. 1989. xii + 272 pp. \$65.00. ISBN 0-12-046481-0.

This is a useful volume of charts, which summarize the metabolic fates of a large number of compounds. The title is somewhat inaccurate in that it purports to be about the metabolic fate of pesticides, but of the almost 200 charts, some 32 are not pesticides and the paucity of text does

not make it clear why they or a so-called pesticide candidate are included. Some 10 pages are devoted to back references to Volume 1, and although the references may be useful, the format is decidedly wasteful of space.

Thus, this monograph is not just about the metabolism of pesticides; other compounds are included. It is not just about metabolism; physicochemical reactions such as hydrolysis, photolysis, and thermolysis are also discussed together with some model studies. All of these are useful but no literature study would retrieve them nor would the title alert you to their presence.

Some of the charts are horrendously complicated, e.g., page 187 on fenvalerate which incorporates three metabolic studies, one photochemical study, and two soil system studies originally reported in 11 papers! The symbols used for transformations, e.g., L for light, M for mammal, and m for microsome, etc., are also confusing to the neophyte and explained nowhere in the text. The Pesticide Activity Index is merely a pesticide index and has nothing, as far as I can tell, to do with activity. A more useful addition would have been the Chemical Abstract Registry Numbers.

To summarize, the text is a useful addition to the literature of metabolic and environmental transformations, and any group working in these areas should ensure that their library has a copy. The utility of the monograph would be enhanced with additional textual commentary—there does seem to be a fair amount of unutilized space in the text!

R. G. Sutherland, *University of Saskatchewan*

Vapor-Liquid Equilibrium Data. By Shuzo Ohe (Tokai University). Elsevier: Amsterdam and New York. 1989. xxviii + 742 pp. \$260.50. ISBN 0-444-98876-9.

This is volume 37 of the Elsevier Physical Sciences Data Series. It contains 1466 vapor-liquid equilibrium data sheets that span a wide variety of binary systems. It is primarily intended for the use of those who are involved in the design and operation of distillation processes.

Each data sheet provides the reader with the source and a plot of the published isothermal or isobaric data. Smoothed versions of the original data are tabulated at rounded liquid mole fractions. Superimposed upon the plots of the original data are the predictions based upon optimized versions of Wilson's equation. The optimal values of the two parameters of Wilson's equation are furnished. For the isobaric data sets, values are given for the three Antoine constants.

The introduction contains a useful discussion of the various strategies that can be adopted in estimating the Wilson parameters. It also provides a listing of a program that estimates vapor compositions and boiling temperatures for isotropic multicomponent mixtures, from Antoine constants for the pure components and Wilson parameters for each pair of components.

The book is impressive in terms of the effort and skill which have gone into its authorship. It is doubtless a reference work that its intended readership will find to be a worthwhile acquisition.

Others working in the area of the thermodynamic properties of liquid mixtures might well find the extensive bibliography and the associated data plots to be useful.

Michael I. Davis, *University of Texas at El Paso*

Subcellular Biochemistry. Volume 13. Fluorescence Studies on Biological Membranes. Edited by H. J. Hilderson (University of Antwerp). Plenum: New York and London. 1988. xxiii + 465 pp. \$85.00. ISBN 0-306-42940-3.

Fluorescence spectroscopy has been one of the most useful techniques to study biochemical and biological problems on a molecular level. Volume 13 of *Subcellular Biochemistry* provides an eclectic mix of physical and mathematical background (123 pages) and biological applications (342 pages) of fluorescence spectroscopy. The three background chapters focus on fluorescence anisotropy, both time domain and frequency domain; additional background is provided on energy transfer, fluorescence recovery after photobleaching, quenching, and time-resolved spectra. Of the 10 application chapters, six deal with biological membranes. These include the use of fluorescence anisotropy to measure membrane fluidity in model membranes, thyroid plasma membranes, and prokaryotic membranes; the use of anisotropy to monitor physiological control of fluidity in normal and tumor cells; and the use of "dequenching" to study fusion of viral membranes with cell membranes. Other application chapters discuss the use of fluorescence energy transfer as a "crystallographic" tool in bacteriorhodopsin, a review of the use of

*Unsigned book reviews are by the Book Review Editor.

fluorescence to study cytoskeletal interactions, a description of various fluorescent probes for the acetylcholine receptor, and protein structure and dynamics in microsomal monooxygenase. This book will probably find most use as a reference work to survey literature through early 1988, and as a source of ideas on how to apply fluorescence spectroscopy to cellular and subcellular systems.

James A. Dix, *State University of New York, Binghamton*

A Guide to Materials Characterization and Chemical Analysis. Edited by John P. Sibilis (Allied Corporation). VCH: Weinheim and New York. 1988. x + 318 pp. \$34.50. ISBN 0-89573-269-6.

This book, in brief encyclopedic form, describes the methodologies used to characterize and analyze materials in a large, modern, industrial analytical laboratory. Only limited subsets of the techniques would normally be encountered in an academic setting. The descriptions of the methods and applications are too brief to be of much use to experienced practitioners in the particular area involved, but would serve a useful purpose in making researchers aware of the many analytical tools that are available, their general applicability, and their limitations.

The format used to describe each method is uniform and covers the use, sample requirements, principles of operation, applications (including specific examples), and limitations. Selected references are provided for each method. The first chapter gives a general introduction to problem-solving methods. The style is clear, concise, and very readable. The descriptions are aimed at the novice and assume no specialized background.

The examples chosen to illustrate analytical methods are heavily slanted toward industrial problem solving. Little information is given about the use of the methods for fundamental research; rather, the emphasis is on analysis and trouble-shooting. Yet, enough information is given in each case to encourage the interested reader to explore the method in more detail through the references.

The book is up-to-date in its coverage of instrumental methods. It will be most useful to students who want to know the essentials of analysis techniques, researchers who want to explore the advantages and disadvantages of various methods, and managers who want to screen various instrumental methods before making a decision to purchase instrumentation. In summary, this book is, as implied by its title, a brief guide to more than 100 analytical methods rather than comprehensive treatise for the users of the methods.

James L. Dye, *Michigan State University*

Photochemistry. Volume 19. Specialist Periodical Report. Edited by D. Bryce-Smith and A. Gilbert (University of Reading). The Royal Society of Chemistry: London. 1988. xii + 580 pp. \$220.00. ISBN 0-85186-175-X.

The Review of the year makes a welcome reappearance in the 19th volume of *Photochemistry*, which continues the tradition of thorough reporting on the literature of photochemical processes and of photophysical processes in condensed phases. Polymeric and biologically important molecules are of increasing interest in photochemistry. Reports of the photochemistry and the photophysics of such systems are found scattered throughout the book as well as under the headings devoted to such subjects. The format of the reports, especially those dealing with the photochemistry of organic compounds, with structural formulas illustrating the more unusual of the transformations, makes for intriguing browsing. A detailed table of contents and an author index also help to make accessible the contents of the book.

Seyhan N. Ege, *University of Michigan*

Studies in Natural Products Chemistry. Volume 2: Structure Elucidation (Part A). Edited by Atta-ur-Rahman (University of Karachi). Elsevier: Amsterdam and New York. 1988. xi + 469 pp. \$155.25. ISBN 0-444-43038-5.

This volume is the second in a series which brings together information from the multidisciplinary fields that contribute to natural products chemistry. The first volume of the series dealt with stereoselective synthesis of complex natural products. This volume examines application of modern spectroscopic methods to structure elucidation of natural products, isolation of new natural products, polysaccharides from protozoa, discovery of new drugs, and plant-tissue culture. The volume consists of 17 chapters by an international group of authors representing 11 countries. Most chapters are well documented; three have more than 90 literature citations, but two have no citations at all! Most cover the literature through 1986; several include 1988 citations. A useful 16-page subject index is included.

Three chapters on mass spectroscopy discuss applications of nitric oxide chemical ionization, fast-atom bombardment, and other surface-ionization techniques to the solution of structure elucidation of natural products. Four chapters detail application of modern NMR techniques to the determination of complex structures. These chapters assume a

familiarity with the techniques discussed. A chapter on chiroptical properties reviews CD, ORD, and ellipticity. Four chapters discuss the isolation of alkaloids, novel quinones, diterpenoids, and tetranortriterpenoids from higher plants. A combination of established and modern spectral techniques is used in the structure determination of these newly described compounds. The remaining five chapters deviate from the theme of the first twelve. Included are biologically active substances from bryophytes, polysaccharides from protozoa, structure and use of the glucoamylase enzyme, a review of plant-tissue culture, and development of new antifungal and antimycobacterial drugs. Although these latter chapters are well-written, thoroughly documented treatises, they seem out of place in a text that emphasizes modern methods of spectral elucidation of structure.

The book's coverage of the application of modern MS and NMR techniques and chiroptical properties to natural products chemistry makes it a useful addition to researchers in these areas. Those unfamiliar with plant-tissue culture will benefit from the lucid review presented. The high cost of the book will probably dissuade many potential readers.

Stella D. Elakovich, *University of Southern Mississippi*

Solid Materials. Structure and Bonding. Volume 69. Edited by M. J. Clarke (Boston College) et al. Springer-Verlag: Berlin and New York. 1988. x + 134 pp. \$69.50. ISBN 0-387-18790-1.

The first article, by J. Augustynski, is entitled Aspects of Photo-Electrochemical and Surface Behavior of Titanium(IV) Oxide. The theme of this article is that titanium(IV) oxide is the photosensitizer for a large variety of photocatalytic reactions, but the mechanisms of the photoreactions at this semiconductor are still poorly understood. Experimental studies are summarized which provide evidence for surface hydroxylation in the reaction of TiO₂ with water. This is then followed by a discussion of the interaction of TiO₂ and aqueous solutions. In the most interesting part of this article, experimental evidence is analyzed concerning the nature and role of intermediates in the light-induced charge-transfer reactions at TiO₂. Finally, possible pathways are considered for photooxidation reactions which are consistent with available experimental data.

The second article, by R. Reisfeld and C. K. Jorgensen, is entitled Excited States of Chromium(III) in Translucent Glass-Ceramics as Prospective Laser Materials. It is pointed out that glass ceramics containing Cr(III) may show high efficiency of the ⁴T₂ state at room temperature contrary to most other materials in which the ³E excited state is at less energy than the ⁴T₂ excited state. The emission spectra of Cr(III) are discussed in terms of crystal field theory and Tanabe-Sugano diagrams. Band emission widths and Stokes shifts are interpreted in terms of excited-state Jahn-Teller effects and a Franck-Condon picture. This article is interesting because it indicates quite nicely for chemists how glass-ceramic emission results are related to solar research and to classical crystal field theory models.

H. D. Lutz is the author of the third article, Bonding and Structure of Water Molecules in Solid Hydrates. Correlation of Spectroscopic and Structural Data. The experimental techniques which have been used to probe the bonding and structure of hydrates are discussed. The different structures of solid hydrates are given. Finally, vibrational mode frequencies, intensities, and half-widths are correlated with the bonding and structure of different hydrate cases. Comparisons are made between infrared and Raman experiments and the different results these two complementary techniques can provide. This is a quite useful article for solid state chemists.

Howard H. Patterson, *University of Maine*

Inorganic Syntheses. Volume 25. Edited by Harry R. Allcock (Pennsylvania State University). John Wiley and Sons: New York. 1989. xx + 300 pp. \$45.00. ISBN 0471-61874-8.

This latest edition maintains the tradition of earlier volumes by compiling recently developed procedures for the synthesis of inorganic and organometallic compounds of current interest. Each of the 47 contributions includes a brief introduction that is followed by a concise description of the synthetic procedure and a summary of appropriate physical properties for each compound. Specific safety precautions emphasizing hazards associated with these independently checked syntheses are highlighted within the text. Separate cumulative contributor, subject, and formula indexes for Volumes 21-25 of this series are provided.

This volume is subdivided into five chapters. Chapter one (preparations 1-13) is devoted to main-group chemistry and includes an extensive selection of syntheses of neutral and anionic systems containing phosphorus-nitrogen or sulfur-nitrogen rings. Chapter two (14-17) illustrates the use of main-group compounds as precursors in the synthesis of inorganic polymers, such as polyorganosilanes and polyphosphazenes. Chapter three (18-20) focuses on several compounds of pharmacological interest, including boron analogues of amino acids, amino-substituted cyclophosphazenes, and α -pyridone Pt blues. Chapter four (21-35) offers

preparations of a diverse assortment of transition metal coordination compounds and polydentate ligands, such as crown thioethers and methylene-bridged diphosphines. Chapter five (36-47) is of primary interest to organometallic chemists and features the syntheses of several useful starting materials, including bis(phosphine) complexes of iron carbonyl and cyclopentadienyl Rh(I) and Co(I) fragments, and the recipes for several dinuclear phosphido-bridged complexes of Mo, Co, Rh, and Ni, dinuclear Os and Ru carbonyl compounds, and mixed-metal tetranuclear carbonyl clusters.

Jeffrey L. Petersen, *West Virginia University*

Energy Recovery from Lignin, Peat and Lower Rank Coals. Coal Science and Technology 13. Edited by Debra J. Trantolo and Donald L. Wise (Northeastern University). Elsevier: New York and Amsterdam. 1989. viii + 418 pp. \$155.25. ISBN 0-444-87335-X.

This is a curious book, for the Foreword by the editors states it is to be a "reference text", but the chapters make up a mixed bag of contributions, mostly in typescript, but two are set in type. These two are identified as "Reprinted from *Resources and Conservation*", 5 (1980) and 8 (1983), hardly up to date. Some chapters are clearly reports of original research, and some have the format of journal articles, even to the extent of having an abstract and summary.

The general theme is conversion of biomass, low-rank coal, and peat to useful fuels by means of "gentle" processes, such as fermentation and hydrolysis. There is a fair amount of organic chemistry in some of the chapters (the structural formulas, however, have a number of serious drafting mistakes). A large amount of information is presented in tables. The index is substantial, although it includes some enigmatic entries, such as "Substrate", standing alone, and a number of entries are redundant, such as "Lignite, structure of" and "Structure of lignite".

Organic Colorants. A Handbook of Data of Selected Dyes for Electro-Optical Applications. Physical Sciences Data 35. By Makoto Okawara (OK Lab. Ltd.) et al. Elsevier: Amsterdam and New York. 1988. xv + 487 pp. \$236.75. ISBN 0-444-98884-X.

The authors' preface points out the often-forgotten fact that dye chemistry is the root of organic chemistry and was of major importance in the nineteenth century. The subject has gradually slipped into near obscurity, and introductory textbooks, which at the time invariably featured the subject, usually in a special chapter, now rarely mention it. However dye chemistry has assumed new importance because of modern developments in display, recording, and storage of information in energy conversion, medicine, etc.

In this book are to be found data on 2700 dyes. Structures, names, UV-vis absorption maxima, some properties, uses, and references are given in tables. There is no discursive text. Indexes of names, molecular formulas, absorption maxima, and end uses occupy 91 pages.

Structure and Bonding 71. Stereochemistry and Bonding. Edited by Michael J. Clarke (Boston College) et al. Springer-Verlag: New York and Berlin. 1989. 198 pp. \$79.50. ISBN 0-387-50775-2.

This volume contains five chapters, two of which are concerned with vibronic effects, one with nonbonding orbitals in coordination and cluster compounds, one on the epikernel principle, and one on prediction of bond lengths in crystals.

Herbicides: Chemistry, Degradation, and Mode of Action. Second Edition. Volume 3. Edited by Philip C. Kearney and Donald D. Kaufman (U.S. Department of Agriculture). Marcel Dekker: New York and Basel. 1988. xiii + 403 pp. \$99.75. ISBN 0-8247-7804-9.

This is the third volume in a series that was initiated in 1969 under the title *Degradation of Herbicides*. The title was changed to the current one for the publication of the second volume in 1975. The format of the present volume is also similar to the second volume. Separate chapters are devoted to specific herbicides or groups of herbicides. Most chapters are divided into an introductory section that describes the history, chemical and toxicological properties, and formulations of the herbicide; a section on degradation pathways in soil, water, plants, and animals; a discussion about what is known about modes of action; a concluding summary of the present importance, future prospects, and limitations regarding the uses of the herbicide; and an extensive list of references. The herbicides covered in the current volume include glyphosphate, polycyclic alkanic acids, sulfonylureas, metribuzin, carbamothioates, alachlor, and metolachlor.

Herbicides are the most rapidly growing sector of the pesticide industry, currently accounting for more than 70% of total pesticide sales in the United States. The increasing popularity of minimum tillage agriculture is likely to promote even more extensive use of these chemicals. In view of these facts, the contribution of this volume to updating the readily available information on the properties, uses, and environ-

mental effects of the most important classes of commercial herbicides is most welcome. Anyone seeking an assessment of the pros and cons of the trend toward increased reliance on chemical herbicides for weed control will however have to look elsewhere. In the Preface the editors state that the most serious problem facing the herbicide industry is the detection of herbicide residues in groundwater. Although there is some discussion of persistence and transport in water in some of the chapters, it is disappointing that the text does not include a more extensive and explicit discussion of the groundwater contamination issue.

Most of the chapters were written by academic or government agricultural scientists. There are three chapters, however, authored by scientists affiliated with the development and manufacture of the herbicides they are discussing. It is probably not coincidental that two of these latter chapters (sulfonylureas and metolachlor) are the only ones that contain such superlatives as "exciting breakthroughs", "unprecedented", and "most valuable" that detract from the desirable goal of persuading the reader of the author's objectivity. A more serious failing is the absence in two of these same chapters (alachlor and metolachlor) of any discussion of the herbicide's toxicological properties.

Theodore D. Goldfarb, *State University of New York at Stony Brook*

Xenobiosis. Foods, Drugs and Poisons in the Human Body. By A. Albert (Australian National University, Canberra). Chapman and Hall: New York and London. 1987. x + 367 pp. \$35.00. ISBN 0-412-28810-9.

This book is a splendidly written, though somewhat elementary, introduction to the concept of xenobiosis. The volume is divided into three parts, entitled Food, Drugs, and Poisons, respectively. Each part begins with an introduction concerning the nature of the title materials as foreign substances. Chapters on metabolism of foods and hidden dangers of naturally occurring toxicants common to a number of foods follow. Part two, concerning drugs, contains three additional chapters covering the qualitative aspects of the distribution and metabolism of drugs, their activity and selectivity. Part three, on poisons, discusses the basic principles of toxicology, mechanisms of absorption, and poisons introduced through the food chain. A final chapter covers substances which have particularly profound consequences for public policy, namely, carcinogens and substances of abuse. There are two appendices, one containing lipid/water partitioning coefficients of some common xenobiotics and another particularly well-conceived one on searching the literature.

Although this book is of perhaps limited use to the practicing chemist or biochemist, it is nonetheless a good general introduction to the impact of xenobiotics on human health. An interesting historical perspective is given to most topics which is most valuable in understanding the development of our current attitudes toward chemistry, medicine, and society. The author is neither shrill nor cavalier in his assessment of issues relating to the medical, social, or economic impact of drugs, chemicals, and foods on mankind. Indeed, it is a well-balanced primer for the scientist interested in a survey of the fascinating study of the interactions of food, drugs, and poisons with the human body.

Richard N. Armstrong, *University of Maryland*

Neurotoxins in Neurochemistry. Edited by J. Oliver Dolly (Imperial College of Science and Technology). John Wiley & Sons: Chichester and New York. 1988. vi + 251 pp. \$89.95. ISBN 0470-21259-4.

This book consists of a series of chapters dealing with the effects of a broad range of neurotoxins on nervous tissue. It presents findings from both classical and newly described toxins. The limitations of this book involve very loose organization; no introductory chapter or synopsis is available, and more seriously, there is no author or subject index. This latter shortcoming makes finding a specific topic very difficult. Sections overlap considerably, two major ones each dealing with the effect of toxins on ion channels. One section concerns a neurotoxic agent rather than a biological toxin, namely, MPTP. A significant omission is any mention of plant-derived excitation, which is the subject of much interest recently, such as the unusual amino acid thought to be responsible for lathyrism. The broad range of fungal neurotoxins is also not touched upon. The chapters are of high quality but have not been edited into the coherent framework that would make this a useful reference work. Rather, this book is most suitable for specialist reading by those already involved with high-potency venoms from both vertebrates and invertebrates. There is a detailed presentation of both the amino acid sequence and the tertiary structure of several toxins. A considerable amount of state-of-the-art information concerning underlying mechanisms is described.

A good deal of space is also given to illustration as to how these toxins can enhance understanding of mammalian neural mechanisms. Such mechanisms include the nature of neurotransmitter receptors such as the acetylcholine receptor, the process of neurotransmitter release, and the molecular basis of ion-channel function. Ion-channel subclassification owes much to these biological tools. Tetanus toxin has also yielded

valuable information on the trophic signals transmitted by retrograde axoplasmic transport.

In summary, while this volume is not intended to represent a comprehensive overview or an introduction to the subject, it contains many presentations potentially of great value to scientists working in this exciting and expanding area.

S. C. Bondy, *University of California, Irvine*

Electrochemical Detection Techniques in the Applied Biosciences. Volume 1: Analysis and Clinical Applications. Edited by G.-A. Junter (University of Rouen). John Wiley & Sons: New York and Chichester. 1988. 306 pp. \$79.95. ISBN 0-470-21179-2.

This multiauthored work is the first volume of a two-volume series. The book has been structured to meet the needs of an audience in the biosciences, and therefore, following the introduction, there are only two chapters: one entitled *In Vitro* Determinations and the other *In Vivo* Determinations. The former is divided into five subsections, each with different authors, which cover electrochemical detection techniques in clinical analysis, HPLC with electrochemical detection, ion-selective electrodes in clinical chemistry, electrochemical biosensors in clinical analysis, and electrochemical detection techniques in clinical microbiology. Chapter 2 has three subsections: carbon-fiber electrodes, ion-selective microelectrodes, and HPLC with electrochemical detection. At first glance the arrangement of the book would seem to guarantee overlap of material from one chapter to the other. The focus of the chapters is so different that this is true only to a minor extent. Ion-selective electrodes are discussed for clinical analyzers in Chapter 1 and for intracellular measurements in Chapter 2. Similarly, the HPLC sections of the two chapters focus on clinical applications and perfusion techniques, respectively. This division of the material is logical and effective but does require a reader to look in more than one part of the book to find all that it contains on a given subject.

In total there are 1098 references listed, most of which are prior to 1987. The literature coverage is of high quality, and the authors have provided critical examinations of the material along with projections for future developments. A book of this nature is difficult to put together since it cuts across many disciplines. In general, the editor and authors have succeeded quite well, and scientists ranging from analytical chemists to microbiologists will find interesting material in it. There is enough tutorial information for the uninitiated and enough advanced material for the well-informed. While this reviewer experienced no difficulties in moving from section to section (i.e., author to author), the book does suffer in the English translation.

D. J. Curran, *University of Massachusetts*

Gas Phase Ion-Molecule Reaction Rate Constants through 1986. By Yasumasa Ikezoe (Japan Atomic Energy Research Institute) et al. Maruzen: Tokyo. 1987. viii + 224 pp. \$150.00.

This book is a compilation of ion-molecule rate constants through September 1986. It consists of four tables: (1) Bimolecular Reaction Rate Constants between Positive Ions and Neutrals, pp 1-143, (2) Termolecular Reaction Rate Constants between Positive Ions and Neutrals, pp 144-156, (3) Bimolecular Reaction Rate Constants between Negative Ions and Neutrals, pp 157-199, and (4) Termolecular Reaction Rate Constants between Negative Ions and Neutrals, pp 200-203. The rate constants given have been obtained from several sources: (1) previous compilations which are referenced, (2) a Chemical Abstract search of "ion-molecule" through September 1986, and (3) responses to requests to over 50 workers in the ion-molecule community. Although the authors make no attempt to critically evaluate the compiled rate constants, this is still a very useful collection of data. It will be an important resource for those working in the field of ion-molecule chemistry.

Robert Damrauer, *University of Colorado*

Principles and Applications of Photochemistry. By Richard P. Wayne (University of Oxford). Oxford University: New York and Oxford. 1988. viii + 268 pp. \$55.00. ISBN 0-19-855234-3.

This book is an extensive revision of an earlier book, *Photochemistry*, published in 1970 by the author. It is intended to be an introduction to the field for undergraduate and beginning graduate students. The book is not a textbook, however, in the sense that it does not include exercises for the students. The emphasis in much of the book is on the photo-physical processes that underlie photochemical transformations, but examples are drawn from both simple inorganic and more complex organic systems. A chapter on techniques in photochemistry includes sections on time-resolved photochemistry and high-resolution photochemistry. The longest chapter is entitled Photochemistry in Action and includes topics such as atmospheric photochemistry, photosynthesis, vision, photomicroscopy, photography, photochromism, and photomedicine.

Each chapter is augmented by a bibliography, broken down by the

sections of the chapter, thus giving readers access to more information about the topics covered. This compact book thus serves as an entry into a much wider literature. A subject index completes the book.

Seyhan N. Ege, *University of Michigan*

Chemistry of Diazirines, Volumes I and II. Edited by Michael T. H. Liu (University of Prince Edward Island). CRC: Boca Raton, FL. 1987. Volume I: iv + 168 pp. Volume II: iv + 127 pp. \$220.00 for 2-volume set. ISBN 0-8493-5047-6.

Diazirines have had a relatively short history as chemical species go. Their chemistry started in 1960. A panel of chemists who have contributed much to our knowledge of diazirines have reviewed the present state of that knowledge in these two volumes. The books offer a wealth of synthetic, theoretical, spectroscopic, and mechanistic information, much of it summarized in tables. The discussions are detailed and practical enough to be immediately useful to anyone considering some diazirine chemistry of their own.

Volume I contains chapters on Theoretical Aspects of Diazirines by N. C. Baird; The Microwave, Infrared, and Ultraviolet Spectra of Diazirines: Interpretation and Physical Aspects by M. Winnewisser, K. Möller, and A. Gambi; Synthesis and Reactions of Diazirines by E. Schmitz; Exchange Reactions of Halodiazirines by R. A. Moss; and Thermolysis and Photolysis of Diazirines by M. T. H. Liu and I. D. R. Stevens.

Volume II continues with Diazirine-Diazoalkane Interconversions by H. Meier; Dissociation Energetics of Simple Diazirines by Photon and Electron Impact by H. Okabe; Selectivity of Carbenes Generated from Diazirines by M. P. Doyle; Diazirines as Photoactivatable Reagents in Biochemistry by H. Bayley; Transition Metal Carbonyl Complexes from Diazirines by H. Kisch; and Electrochemistry of Diazirines and Diaziridines by G. M. Elson and M. T. H. Liu.

Each volume has a subject index. The bibliographies include references through 1986.

Seyhan N. Ege, *University of Michigan*

The Handbook of Environmental Chemistry. Volume 2, Part D: Reactions and Processes. Edited by O. Hutzinger (University of Bayreuth). Springer-Verlag: New York and Heidelberg. 1988. viii + 210 pp. \$99.50. ISBN 0-387-15547-3.

This slim volume contains six review chapters, all related to aspects of reactions and processes pertinent to environmental chemistry. The topics of the reviews span global chemical fluxes between the atmosphere and the ocean to molecular scale characterization of contaminant hydrolysis. Some chapters are written for a technically trained general audience, whereas others are written for a more specialized readership. This contrast in both thematic continuity and degree of detail reflects the intent of publisher and editor to produce a continuously updated review series, in which available chapters are published rapidly. Although this approach may have its proponents, it presents difficulties for the reader, who is more likely to be interested in and find use for a collection of more closely related subdiscipline reviews. The lack of a series index in each volume (an integral component of many other such series) also is a serious flaw because the reader cannot identify chapters of interest in other volumes without having the whole series at hand.

I found most of the chapters in this volume well written and informative. For example, the chapter Hydrology by Reimer Herrman concisely explains the fundamental processes of both surface and groundwater flow, closing with a summary of mass transport modeling and its use in understanding transport of chemical contaminants. This chapter also identifies sources of more detailed information on both theoretical and practical aspects of hydrological measurement and modeling, which were particularly useful for me as a non-hydrologist.

Other chapters reflect the "publish as produced" concept used in this series. The last chapter, Reaction Types in the Environment, consists of an extended table delineating different chemical reactions, compound classes, reaction products, and one or two pertinent references. In the paragraph introducing the chapter, the author indicates that further information can be found in a separate chapter in this series, published earlier. The reader would be far better served had these two chapters been published together.

As noted in the beginning of the review, this is the fourth published part of a volume which is itself a single component in an open-ended series, currently planned at six volumes, each with multiple, separately published parts. Its conception as an ongoing, continuously updated collection of reviews makes the series title misleading, since a "handbook" (at least as defined in *Webster's Seventh New Collegiate Dictionary*) is "a concise reference book covering a particular subject". This is not a nuts and bolts sourcebook for the chemist who has interest or need for a condensed description of the principles and techniques most commonly used in environmental chemistry. Instead, this volume and its parent

collection will find most use as a library reference source where the graduate student or researcher willing to expend the time and effort can go to find general reviews on environmentally related topics, as well as specific environmental chemistry subdiscipline reviews.

Edward T. Furlong, *U.S. Geological Survey*

Raw Materials for Industrial Polymers. By Henri Ulrich (Dow Chemical Co.). Oxford University: New York and Oxford, 1988. 219 pp. \$49.95. ISBN 0-19-520762-9.

The present state of monomer production and future trends are discussed in this book, which is intended to be a companion volume to the earlier book *Introduction to Industrial Polymers* by the same author. In the book under review here, the industrial methods of synthesizing important polymer raw materials and new technical developments are outlined. The connection between major polymers and basic feedstocks like syngas, methanol, ethylene, propylene, benzene, toluene, and xylenes is outlined. To emphasize this approach, the book is organized around the number of carbon atoms in the feedstock. The initial four chapters deal with aliphatic building blocks, up to five carbon atoms. Two chapters outline the aromatic building blocks as well as aliphatic monomers available from the benzene-toluene-xylene fraction available from oil refineries, known as the BTX fraction in the catalytic reforming of naphtha, which is the chief raw material for major aromatic chemicals and polymers. The remaining chapters detail the monomers for high-performance polymers, and monomers and polymers which can be derived from renewable sources. The final chapter discusses future trends in the development of specialty monomers for the development of polymers as viable structural materials and as functional materials. The book makes no pretences about going into the basic science on which the technology of monomer production is based. The book is basically a collection of facts concerning industrial monomer synthesis and would supplement the knowledge of a chemist or technologist interested in polymers by providing information on the commercial sources of monomers. It should also provide students of engineering with a description of the basic chemical processes used in modern chemical plants. On the whole, the book provides useful reference material for chemists and engineers.

Kenneth E. Gonsalves, *Stevens Institute of Technology*

Pharmaceutical Preformulations: The Physicochemical Properties of Drug Substances. By James I. Wells. John Wiley & Sons: New York and Chichester, 1988. 227 pp. \$59.95. ISBN 0-470-21114-8.

In this text the author attempts to develop a logical and pragmatic approach to the preformulation of pharmaceutical drug candidates. This ambitious attempt to provide a road map through the complexities of pharmaceutical preformulation is based upon the author's extensive experience in the field, and overall, his tour is a good one. Medicinal chemists should pay particular attention to the topics of salt selection and rational substituent modification of a pharmaceutically active moiety found in Chapter 2. In addition, development chemists should consider the short treatise on the alteration of crystal morphology of pharmaceutical compounds in chapter 6. Lastly, the author provides side trips for readers with discussions on a variety of purity assays as well as important bulk properties which must be considered for large-scale drug production. Overall, then, the author provides a general guide through the area of pharmaceutical preformulation while not allowing the reader to become lost in the mathematics of the underlying physical chemistry theory often presented. As the author states, this will provide useful information to all scientists involved in pharmaceutical research.

K. T. Hug, *Parke-Davis*

Inorganic Crystal Structures. By B. G. Hyde (Australian National University) and S. Andersson (Lund University). John Wiley & Sons: New York and Chichester, 1989. xviii + 430 pp. \$65.00. ISBN 0-471-62897-2.

Hyde and Andersson have produced a book that should be owned by any chemist interested in the structure of inorganic solids. If only for its fine illustrations the book will be consulted repeatedly by its owners for many years.

As stated by the authors in the Preface, presentation of crystal structures follows "a system". Structures are always depicted using polyhedra, in projection along a unit cell axis. Early chapters treat structures based on close packings, viewed in many projections. Structural interrelationships are nicely presented as is the subject of crystallographic shear of ReO_3 and TiO_2 parent structures. These chapters heavily emphasize oxide structures with some reference to chalcogenides and halides. There are chapters that deal with structures based on primitive cubic arrays and primitive hexagonal arrays, the latter being largely trigonal prismatic borides, silicides, and phosphides. Later chapters cover structures which show the effects of stereochemically active lone pairs, noncommensurate structures, some alloy structures, and

framework silicates. There is also an engaging chapter hinting of the dynamic effects on topological transformations.

There are features which will limit the book's appeal to some extent. The brief first chapter is uncharacteristically obscure. Also, no "ball and stick" illustrations are used to ease the reader more comfortable with "seeing the bonds" into the authors' viewpoint. There is little introductory material to help the inexperienced interpret the projections used throughout. The rather strict use of geometry rather than chemistry as an organizing principle may not be to everyone's taste. References to the literature of the past decade are thinner than one might expect. Much of the recent work on reduced oxides, chalcogenides, and halides could have been nicely accommodated within the polyhedral model of structure.

Whatever the drawbacks of the book, what is presented is impressive. There are few readers who will not find fresh insights in poring through the book. We suspect that there will be few teachers of structural solid-state chemistry who will not be extensively borrowing from this book in preparing lectures.

Timothy Hughbanks, *Texas A&M University*

Volumes of Proceedings

Advances in Neuroimmunology. Annals of the New York Academy of Sciences Volume 540. Edited by Cedric S. Raine (Albert Einstein College of Medicine). The New York Academy of Sciences: New York, 1988. xxiv + 745 pp. \$185.00. ISBN 0-89766-476-0.

Neuroimmunology was advanced substantially by the Second International Congress, held in Philadelphia in 1987, judging by the large number of papers presented. A 17-page Table of Contents is required to list them; most papers are short (2-3 pages). A group of 21 papers are longer and are subdivided into four categories: Basic Immunology and Immune Regulation, Nervous System Differentiation, Clinical Neuroimmunology, and Virus-Induced Disease and Autoimmunity. The mass of 740 pages cries out for an index!

Enzyme Engineering 9. Annals of the New York Academy of Sciences Volume 542. Edited by Harvey W. Blanch (University of California) and Alexander M. Klibanov (Massachusetts Institute of Technology). The New York Academy of Sciences: New York, 1988. xiv + 535 pp. \$134.00. ISBN 0-89766-480-9.

The Ninth International Enzyme Engineering Conference, held in Santa Barbara in 1987, was evidently a busy occasion, for the papers from it required 6 pages to list. They fall into six categories: Enzyme Structure and Function; Enzyme Production, Recovery, Purification, and Immobilization; Enzymes in Nonaqueous and Extreme Environments; Redesign of Enzymes; Biocatalytic Production of Chemicals; and Analytical and Medical Applications of Enzymes. They are mostly brief, without full experimental details. A subject index would have been helpful.

Zeolites As Catalysts, Sorbents and Detergent Builders. Applications and Innovations. Studies in Surface Science Catalysis 46. Edited by H. G. Karge (Fritz-Haber-Institut der Max-Planck-Gesellschaft) and J. Weitkamp (University of Stuttgart). Elsevier: Amsterdam and New York, 1989. xvi + 871 pp. \$184.25. ISBN 0-444-87383-X.

The large number of typescript papers that make up this volume constitute the proceedings of an international symposium held in Würzburg in 1988. They are grouped into four categories: Catalysis and Catalysis-Related Properties, Sorption, Ion Exchange and Detergent Building, and Modification and Characterization. A 5-page subject index is included.

The Structure of Small Molecules and Ions. Edited by Ron Naaman and Zeev Vager (Weizmann Institute of Science). Plenum: New York and London, 1988. xi + 351 pp. \$75.00. ISBN 0-306-43016-9.

The typescript papers in this volume come from a "workshop" on the title subject held in memory of the late Professor Itzhak Plesser in Jerusalem in 1987. The papers are concerned with vibrational dynamics, structure of van der Waals molecules, and of ions, Coulomb explosions, photoionization, electronic structural theory, mass and electric spectroscopy. The subject index, just over 4 pages long, is largely composed of formulas, such as Ar_2^+ , BS^- , CS_2^- , $(\text{D}_2\text{O})_2^-$, N_2HF ; these give an idea of what is meant by "small molecules and ions".

Dispersed Systems. Progress in Colloid & Polymer Science. Volume 77 (1988). Edited by K. Hummel and J. Schurz (Graz). Springer-Verlag: New York and Berlin, 1988. viii + 244 pp. \$89.00. ISBN 0-387-91337-8.

The papers that make up this typeset volume were selected from the presentations at the 33rd meeting of the Kolloid-Gesellschaft held in Graz in 1987. They are arranged under the headings Surfactant Aggregation, Emulsions and Microemulsions, Dispersed Systems, and Polymer Solutions and Polymers.

Relationships of Polymeric Structure and Properties. Progress in Colloid & Polymer Science. Volume 78 (1988). Edited by I. Chudáček (Charles University). Springer-Verlag: New York and Berlin. 1988. viii + 204 pp. \$79.00. ISBN 0-387-91338-6.

A large number of papers given at the Fifth International Seminar on Polymer Physics, held in Prague in 1987, are largely focused on the superstructure of polymer systems and on the electronic properties of thin polymer films.

Chemistry and Biology of Naturally-Occurring Acetylenes and Related Compounds (NOARC). Bioactive Molecules 7. Edited by J. Lam (University of Aarhus) et al. Elsevier: Amsterdam and New York. 1988. xvii + 366 pp. \$102.75. ISBN 0-444-87115-2.

The first international conference on the title subject was held at the University of Aarhus in 1987, a date cunningly hidden in this book. The 24 typescript papers are arranged according to Chemical Aspects, Botanical Aspects, and Applied Aspects. Some are general reviews, and many are reports of original research. Transcripts of the discussions after each paper, as well as at the conclusion of each group, are included. There is no index.

Industrial Crystallization 87. Process Technology Proceedings, 6. Edited by J. Nývít and S. Žáček (Institute of Inorganic Chemistry of the Czechoslovak Academy of Sciences). Elsevier: Amsterdam and New York. 1988. xxiii + 673 pp. \$189.50. ISBN 0-444-42382.

The 10th symposium on the title subject was held in Czechoslovakia in 1987. This book of well-illustrated typescript papers contains the texts of eight invited papers and a great many shorter communications on subjects ranging from thermodynamics and hydrodynamics to apparatus and technology. A subject index of over 10 pages is a helpful feature.

Heparin and Related Polysaccharides. Structure and Activities. Annals of The New York Academy of Sciences Volume 556. Edited by Fredrick A. Ofofu (McMaster University) et al. New York Academy of Sciences: New York. 1989. xi + 501 pp. \$125.00. ISBN 0-89766-488-4.

A 1987 conference, held in New York, is the source of the large number of papers in this volume. Some are as long as 17 pages, but most are about 10 pages long; a substantial group of poster presentations are also included. The papers are arranged under six headings: Structure of Heparin & Related Polysaccharides, Anticoagulant Mechanisms: Interactions of Glycosaminoglycans with Heparin Cofactors, Interactions of Glycosaminoglycans with Other Macromolecules, Interactions of Glycosaminoglycans with Cells, Animal Studies, and Clinical Studies.

The importance of the conference is connected with the value of heparin in preventing thrombosis after surgery, and the perception "that the antithrombotic, anticoagulant, and hemorrhagic properties of heparin are not necessarily related". Interest is therefore now turning toward other polysaccharides and glycosaminoglycans. There is no subject index.

Regulation of the Acute Phase and Immune Responses: Interleukin-6. Annals of The New York Academy of Sciences Volume 557. Edited by Pravinkumar B. Sehgal (The Rockefeller University) et al. New York Academy of Sciences: New York. 1989. xvi + 583 pp. \$146.00. ISBN 0-89766-531-7.

The condition or composition of the blood has been recognized for millenia as having an important connection to disease; today, it is somewhat more understood and is considered to be intimately related to the sedimentation of erythrocytes, which in turn is strongly determined by the composition of the plasma protein. Interleukin-6 (also known by

many other names) is intimately involved in the synthesis of fibrinogen and other proteins, and its study is of major significance in blood chemistry.

The 1988 conference that produced the content of this volume consisted of oral and poster presentations; both are reproduced. The former are arranged in six groups: Hepatocyte Stimulating Factor, Interferon- β_2 /26-kDa Protein, B-Cell Differentiation Factor-2/Interleukin-6, Regulation of Acute Phase Liver Gene Expression, Genetics and Regulation of Expression of IL-6, and Immunobiology of IL-6. There is no subject index.

Books on Applied Subjects

Immobilization of Cells. Biotechnology Monographs Volume 5. By C. R. Phillips and Y. C. Poon (University of Toronto). Springer-Verlag: New York and Berlin. 1988. viii + 167 pp. \$99.00. ISBN 0-387-18637-9.

The use of bacterial and fungal cells immobilized by attachment to a surface for carrying out chemical transformations reaches far back in history to methods for making vinegar and heap-leaching of ores. It may be an economical alternative to the use of immobilized enzymes. This book presents the subject in five chapters, devoted to methods, applications, properties, and design of reactors. It is described as both a research monograph and a reference for a graduate course of study.

Drug Carrier Systems. Horizons in Biochemistry and Biophysics. Volume 9. Edited by F. H. Roerdink and A. M. Kroon (University of Groningen). John Wiley & Sons: Chichester and New York. 1989. xii + 330 pp. \$74.95. ISBN 0-471-92317-6.

This is a book of typescript reviews covering the main developments of the past 20 years. The general theme is the targeting and controlled release of drugs, with particular attention to chemotherapy of cancer. Liposomes, degradable polymers, antibodies, and implanted infusion pumps are among the topics covered.

Ecological Assessment of Environmental Degradation, Pollution and Recovery. Edited by O. Ravera (Joint Research Centre, Ispra). Elsevier: Amsterdam and New York. 1989. xiv + 370 pp. \$155.25. ISBN 0-444-87361-9.

A course of 15 lectures was given at the Joint Research Centre in Ispra, Italy, in 1987. The typescripts of the lectures make up this volume. Most of the lectures are concerned with the forms of stress on terrestrial, aquatic, and atmospheric ecosystems, and their interrelations. The persistence of contaminants and their removal by biological processes are taken up, and much attention is paid to the effects of heavy metals, which may be generated by industrial or consumer activity or by mining. Well indexed.

Electrochemical Reactors. Their Science and Technology. Part A: Fundamentals, Electrolysers, Batteries and Fuel Cells. Edited by M. I. Ismail (CanReactor Materials, Inc.). Elsevier: Amsterdam and New York. 1989. xviii + 548 pp. \$139.50. ISBN 0-444-87139-X.

This book of contributed typescript chapters "was written to provide a guide for professionals interested in energy-transfer and electrochemical technology systems". The 14 chapters range from general fundamentals (electrochemical reactors, electrode kinetics, heat and mass transfer) through control systems to specific applications (batteries, fuel cells). A group of six appendixes gives data on economic and environmental impact, recent patents, organizations, and power supplies. There are also a glossary, biographies of contributors, and author and subject indexes.