

## Book Reviews\*

**Advances in Inorganic Chemistry and Radiochemistry. Volume 28.** Edited by H. J. Emeleus and A. G. Sharpe (Cambridge University). Academic Press, Inc.: Orlando, FL. 1984. ix + 311 pp. \$58.00. ISBN 0-12-023628-1.

By the time the 28th volume of a series appears the format and general area of coverage are familiar, and this volume fits nicely with earlier numbers. However, the specific subjects, the authors, the quality of presentations, and the way the material relates to the current needs of scientists are new with each volume. The most intriguing aspect of this volume is how well it brings to the attention of inorganic chemists some important topics which I suspect many of us do not think about as often as we should. Certainly this is true of the chemistry of berkelium and the chemical effects of nuclear transformations, to which chapters are devoted. The latter field clearly has far more applications and implications than are appreciated commonly. The well-written chapter by G. A. Brinkman should be read widely.

The chapter on Bk is a fascinating presentation by J. R. Peterson and D. E. Hobart. Now that nuclear chemistry, as opposed to the use of isotopes as labels, is done in relatively few universities, sources such as this provide one way academic chemists and their students can learn how this research is performed. While the application of high-pressure vapor-phase reductions, solution thermodynamics, high-pressure metallurgy, and various spectroscopies to tiny amounts of unstable materials are staples of nuclear chemistry and are increasingly important in medicine and geochemistry, they often are not in the standard curriculum these days. This chapter will give students at least a glimpse of the field.

Several chapters should be of interest to materials scientists as well as inorganic specialists. Those studying Se-containing amorphous semiconductors and lanthanum oxide fluoride-based magneto-optic materials, in particular, will find the chapters on homocyclic selenium molecules and the chemistry of oxide fluorides of several metal groups to be very helpful. Several other chapters will provide useful information to biological and agricultural scientists as well as to inorganic chemists. The chapter on compounds of pentacoordinated As(V) falls into this category clearly. The chapter on perchlorate ion complexes does so as well and provides a source for information about the coordinating role of this ion, which commonly is used as a presumably unreactive counterion.

Finally, many chemists will find A. Haas' chapter on The Element Displacement Principle: A New Guide in p-Block Element Chemistry, which is based on the 1982 article A New Classification Principle: The Periodic System of Functional Groups to be quite thought-provoking.

All in all, Volume 28 is a surprisingly lively and interesting addition to the series.

William M. Risen, Jr., *Brown University*

**Solid State Chemical Sensors.** Edited by J. Janata and R. J. Huber (University of Utah). Academic Press: Orlando FL. 1985. ix + 211 pp. \$49.00.

The stated goal of this book is "to review the basic chemical and physical principles—and problems—involved in the construction and operation of [solid state sensors]". The emphasis, however, is on the physical principles with relatively little chemistry.

Three of the four chapters deal with chemically sensitive field effect transistors (CHEMFETS). The potential for using semiconductor fabrication techniques to inexpensively prepare large numbers of miniaturized chemical sensors generated considerable enthusiasm when the concept was first demonstrated. As frequently happens, enthusiasm has waned as problems have been encountered in moving from concept to practical devices. Nevertheless, the potential remains, and it is an appropriate time for a book which reviews the science of these devices in some detail, including the problems that have been encountered.

The first chapter by I. Lundstroem and C. Svensson (Linköping Institute of Technology) deals with gas-sensitive semiconductor devices with palladium gates. In addition to reviewing the physics of metal-oxide-semiconductor (MOS) devices, it includes a good discussion of the surface chemistry and catalytic properties of the palladium gate as they relate to sensor response. The performance of these sensors in selected applications is also considered.

The second chapter by J. Janata (University of Utah) considers CHEMFETS that respond to ions in solution. In theory, it should be possible to make CHEMFETS that are similar to ion-selective electrodes in response characteristics. This chapter considers how CHEMFETS

respond, the difficulties in developing devices similar in performance to ion-selective electrodes, and the electrical engineering aspects of using CHEMFETS.

The third chapter by R. J. Huber (University of Utah) describes the techniques used in preparing CHEMFETS. In addition to considering standard semiconductor fabrication technology, it pays special attention to the special methods such as encapsulation that are required to prepare a device that is intended to work in a solution of electrolyte, an environment which is definitely not semiconductor-friendly.

The fourth chapter by J. Zemel (University of Pennsylvania) deals with piezoelectric and pyroelectric sensors. The physics of piezoelectricity are considered in some detail, while applications to chemical sensing are reviewed rather superficially. Surface acoustic wave sensors, similar to but more sensitive than piezoelectric sensors, are not considered. Pyroelectric sensors are based on materials whose electrical properties change with temperature. The author and his co-workers have recently demonstrated the feasibility of pyroelectric gas sensing.

This book is a highly valuable information source for chemists actively involved in developing the types of solid-state sensors covered in the various chapters. However, because of the in-depth presentation and the amount of background knowledge assumed, it is not a particularly good introduction to the field for the uninitiated (except for chapter 3 on fabrication techniques).

W. Rudolf Seitz, *University of New Hampshire*

**Organic Reactions. Volume 34.** Edited by A. S. Kende. John Wiley & Sons: New York. 1985. xvii + 412 pp. \$49.95. ISBN 0471-80673-0.

The modern state of organic chemistry, in which a much larger amount of research is reported per year than was the case several decades ago, is reflected in the fact that the chapters in "Organic Reactions" have become much longer than in earlier volumes, even though the reactions treated may be of relatively recent origin. Thus it is that this newest volume contains but two chapters: Reductions by Metal Alkoxyl-aluminum Hydrides, by J. Málek, and Fluorination by Sulfur Tetrafluoride, by C.-L. J. Wang.

The first is understandably much the longer, for it deals with a group of reagents of intense interest and widespread use. It is a major service to have the alkoxyaluminum hydride reducing agents critically reviewed and compared, for this chapter will make it much easier for chemists to select the best reagent to meet a given need. The author has been active in the field for at least two decades, and his review of the literature cites no less than 1065 references!

Fluorination is a field in which the breadth of interest is limited, but the pharmaceutical and industrial importance is great. Sulfur tetrafluoride is a vigorous fluorinating agent for replacing oxygen functions by fluorine. Its applications were reviewed in Volume 21 of "Organic Reactions", and the present chapter brings the developments up to date as of 1982. An unusually large fraction of references to the Soviet literature is found in the 110 citations.

A cumulative index of chapters and topics appears at the end, and a volume-by-volume collection of tables of contents is given at the beginning.

**Flame and Combustion. Second Edition.** By J. A. Barnard and J. N. Bradley. Chapman and Hall: London and New York. 1985. xviii + 308 pp. \$27.00. ISBN 0-412-23040-2.

This is a substantially revised edition of the late Professor Bradley's well-known introductory text on combustion phenomena. It is organized along much the same lines as the original edition, in which physical processes of importance in combustion are examined first, followed by chemical processes and finally by discussion of a number of important applications. The new edition incorporates a brief review of thermodynamic and kinetic principles in the introduction, and the relationship between physical and chemical processes in combustion is emphasized early in the text by means of a discussion of explosion limits in closed vessels.

Like the original, the new edition adopts a primarily phenomenological approach. Discussion of experimental techniques and theories of more than elementary complexity are held to a minimum. Adequate references, primarily to the European literature, are provided to enable the interested reader to acquaint himself with more modern theoretical methods. Among texts which treat the subject of combustion in general, this places more emphasis on the chemical aspects than is usually the case. Detailed treatments of the oxidation mechanisms of hydrogen,

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

carbon monoxide, and methane are provided, along with a more general discussion of the pyrolysis and oxidation mechanisms of higher hydrocarbons. The discussions of ion and soot formation presented in the original edition have been substantially revised and enlarged to incorporate the results of a great deal of recent research in these areas. From an engineering viewpoint, the text's treatment of combustion chemistry is one of its strong points.

In the latter part of the text some of the more important applications of combustion are discussed. The text's presentations regarding high explosives and rocket propulsion are little changed from the original edition. The chapter on internal combustion has been expanded to include recent developments in the areas of engine knock, alternate fuels, and engine design. Since the original edition was published, a great deal of effort in the combustion community has been directed toward environmental concerns. Some of the more important results of this effort are described in a new chapter on combustion and the environment.

This book is most likely to be useful as a text in introductory courses in combustion. It would be a good choice for courses at the upper division undergraduate level. The author's presentation should be readily understood by students at the junior or senior level with backgrounds in physical science or engineering. I would not expect it to find much use as a reference among those active in the field, nor is it intended for this purpose. Its breadth and phenomenological approach make it a good choice for scientists and engineers desiring an introduction to combustion science.

O. I. Smith, *University of California, Los Angeles*

**Analytical Profiles of Drug Substances. Volume 14.** Edited by Klaus Florey. Academic Press: Orlando, FL. 1985. ix + 621 pp. \$46.50. ISBN 0-12-260814-3.

This series, which has become annual, has the goal of covering "all substances of medical value". Each substance is treated in a chapter by itself, in which is given general introductory data and much precise physical information, including spectroscopic data, with tables and diagrams. Analytical procedures of various types are always included. In this volume, 16 substances are treated, including warfarin, lidocaine, imipramine, and other recognizably important drugs. In addition, there is supplementary information on acetaminophen and halothane.

**Organic Syntheses. Volume 64.** Edited by G. Saucy. John Wiley & Sons: New York. 1985. xvii + 291 pp. \$27.50. ISBN 0471-82940-4.

This is the second volume in the new format, using camera-ready copy in uniform typescript. It begins with an appreciation of the late Robert V. Stevens, who was the editor for Volume 61. There follow 28 checked synthetic procedures, a list of procedures submitted for checking, and cumulative author and subject indexes for Volumes 60 to 63. Eight of the procedures exemplify the recent advances in enantioselective or asymmetric syntheses. Other procedures illustrate the use of protective groups, the closure of large-ring lactones, the preparation of  $\beta$ -keto esters, homologation of acetylenes to allenes, etc. A commendable feature is the clear and consistent way in which stereochemistry is shown in the many chiral structures. This reliable source of experimental information continues to keep abreast of the times.

**Bioregulators for Pest Control.** Edited by Paul A. Hedin (U.S. Department of Agriculture). American Chemical Society: Washington, D.C. 1985. xii + 540 pp. \$89.95. ISBN 0-8412-0910-3.

This book consists of 35 chapters containing from 4 to 26 pages and is based upon a symposium sponsored by the Division of Pesticide Chemistry at Snowbird, Utah, in June of 1984. It is divided into three sections: (1) Control of Plant Growth, 8 chapters; (2) Control of Insect Growth and Development, 14 chapters; and (3) Control of Pests with Natural Products, 13 chapters. One of the chapters in this last section entitled *Biotechnology in Crop Improvement* is apparently from a fourth section on molecular biology and genetic engineering the rest of which is not included in this publication. A final chapter is based upon the banquet address by John Law entitled "Why are green caterpillars green?" The original name of the conference appears to have been "New Concepts and Trends in Pesticide Chemistry", the title being changed for some reason for this publication.

There is a great deal of information in this book including useful lists of pesticides and their applications, phytochemicals with JH activity, phytoecdysones, and synthetic attractants. However, the book is very uneven in content. Two abstracts are included from a poster section, but the only way the reader finds these is to run across them as they are not listed in the contents.

Some chapters are detailed accounts (including methodology) of current research of varying complexity, others detail work just published (1983 and 1984), while others are strictly a review of published work which has been reviewed before. It is not easy reading as there is no

continuity even within a section.

The book is produced from papers which were in camera ready form and would have benefited from more careful proofreading by the authors. For example, the introduction to Control of Insect Growth and Development indicates that callosobruchic acid, a component of erectin, is (*E*)-3,7-dimethyl-2-octene-1,3-dioic acid, but one needs to go to Yamamoto's chapter to see that it is really a 1,8-dioic acid and not the impossible name given above.

This book will be useful as a reference especially to people outside the area of pesticides. The work is so diverse that it may appeal to chemists working in the area in an effort to broaden their areas of interest.

James W. Wheeler, *Howard University*

**Alkaloids: Chemical and Biological Perspectives. Volume 3.** Edited by S. W. Pelletier (University of Georgia). John Wiley and Sons: New York. 1985. xi + 323 pp. \$69.95. ISBN 0471-89302-1.

Volume 3 of this new series contains seven recent reviews in the areas of alkaloid chemistry and pharmacology. The chapters cover the following topics: pyridine and piperidine alkaloids by G. B. Fodor and B. Colasanti, *Annonaceae* indolosequiterpene alkaloids by P. G. Waterman, cyclopeptide alkaloids by M. M. Joullie and R. F. Nutt, *Cannabis* alkaloids by M. A. El Sohly, *Lycopodium* alkaloids by T. A. Blumenkopf and C. H. Heathcock, indolizidine and quinolizidine alkaloids by R. B. Herbert, and pentacyclic *Aspidosperma* alkaloids by L. E. Overman and M. Sworin. The latter three chapters are devoted solely to recent synthetic advances.

The book makes delightful reading. The chapters are well-written by authorities in the respective fields and are timely considering recently reported research in the chemistry and pharmacology of these natural products. The stress on current work has resulted in different areas of research being the emphasis of the various chapters (e.g., structural elucidation for the indolosequiterpene alkaloid chapter to synthesis for the last three chapters). This reader found the clear writing style and the historical detailing of recent significant advances seen in much of the book not unlike that encountered in some issues of *Accounts of Chemical Research*, albeit in longer form.

David Wenkert, *North Texas State University*

#### Volumes of Proceedings

**Neutron Transmutation Doping of Semiconductor Materials.** Edited by Robert D. Larrabee. Plenum Press: New York. 1984. xiii + 336 pp. \$75.00. ISBN 0-306-41504-6.

Contains the typescript papers presented at the Fourth International Neutron Transmutation Doping Conference, held in Maryland in 1982. Indexed.

**Macromolecules as Drugs and as Carriers for Biologically Active Materials.** Edited by David A. Tirrell, L. Guy Donaruma, and Anne B. Turek. *Annals of the New York Academy of Sciences.* New York. 1985. ix + 458 pp. \$105.00. ISBN 0-89766-286-5.

Contains 35 papers, set in type, from a conference held at the New York Academy of Sciences in 1984; a special issue of the *Annals of the New York Academy of Sciences.* Not indexed.

**New Approaches in Liquid Chromatography.** Edited by H. Kalász. *Analytical Chemistry Symposia Series. Volume 16.* Elsevier Science Publishers: Amsterdam and New York. 1984. x + 291 pp. \$67.25. ISBN 0-444-99642-7.

Contains the typescripts of 23 papers given at the Second Annual American-Eastern European Symposium in Advances in Liquid Chromatography, held in Szeged in 1982. Indexed.

**QSAR and Strategies in the Design of Bioactive Compounds.** Edited by J. K. Seydel. VCH Publishers: Deerfield Beach, FL. 1985. xii + 442 pp. \$62.50. ISBN 0-89573-433-8.

Contains the typescripts of papers and posters from the Fifth European Symposium on Quantitative Structure-Activity Relationships held in Germany in 1984. Indexed.

**Desorption Induced by Electronic Transitions. DIET II.** Edited by W. Brenig and D. Menzel. Springer-Verlag: Berlin, Heidelberg, and New York. 1985. ix + 291 pp. \$32.00. ISBN 3-540-15593-7.

Contains 37 typescript papers from the Second International Workshop, held in Bavaria in 1984. Not indexed.

**Organosilicon and Bioorganosilicon Chemistry: Structure, Bonding, Reactivity and Synthetic Application.** Edited by H. Sakurai. Halsted Press, John Wiley & Sons: New York. 1985. 298 pp. \$46.95. ISBN 0-470-20188-6.

Contains 27 typescript papers from the Seventh International Symposium on Organosilicon Chemistry held in Kyoto in 1984. Indexed.

**Optical Properties and Structure of Tetrapyrroles.** Edited by G. Blauer and H. Sund. Walter de Gruyter, Inc.: Hawthorne, New York, 1985. xiii + 536 pp. \$104.60. ISBN 3-11-010054-1.

Contains 29 typescript papers from an international symposium held at the University of Konstanz in 1984, along with the ensuing discussions. Indexed.

**Directed Drug Delivery: A Multidisciplinary Approach.** Edited by Ronald T. Borchardt, Arnold J. Repta, and Valentino J. Stella. The Humana Press, Inc.: Clifton, New Jersey. 1985. xv + 368 pp. \$59.50. ISBN 0-89603-089-X.

Contains the typescripts of 19 papers given at a symposium held at the University of Kansas in 1984. Indexed.

**Adsorption and Catalysis on Oxide Surfaces.** Edited by M. Che and G. C. Bond. Elsevier Science Publishers: Amsterdam and New York. 1985. xviii + 442 pp. \$94.50. ISBN 0-444-42512-8.

Contains the typescripts of the many papers given at a symposium held at Brunel University in 1984. Not indexed.

**Nuclear Magnetic Resonance of Liquid Crystals.** Edited by J. W. Emsley. NATO Advanced Science Institute Series C: **Mathematical and Physical Sciences 141.** D. Reidel Publishing Company: Dordrecht, Boston, and Lancaster. 1985. xvi + 572 pp. \$76.00. ISBN 90-227-1878-4.

A NATO Advanced Study Institute held in Italy in 1983 gave rise to the 23 chapters in this volume, which contains a good subject index.

**Reverse Osmosis and Ultrafiltration.** Edited by S. Sourirajan and Takeshi Matsuura. ACS Symposium Series 281. American Chemical Society: Washington, D.C. 1985. xi + 508 pp. \$89.75. ISBN 0-8412-0921-9.

The 35 typescript papers given at a symposium sponsored by the Division of Industrial and Engineering Chemistry, held in Philadelphia in 1984, constitute this volume, which has an unusually thorough subject index.

**Reactive Oligomers.** Edited by Frank W. Harris and Harry J. Spinelli. ACS Symposium Series 282. American Chemical Society: Washington, D.C. 1985. ix + 261 pp. \$59.95. ISBN 0-8412-0922-7.

Contains the typescripts of 20 papers derived from a symposium held at the 187th meeting of the American Chemical Society, St. Louis, 1984. Well indexed.

**QSAR in Toxicology and Xenobiochemistry.** Edited by M. Tichý. **Pharmacochimistry Library, 8.** Elsevier Science Publishers: Amsterdam and New York. 1985. x + 474 pp. \$109.25. ISBN 0-444-42483-0.

Consists of a large number of typescript papers from a symposium held in Prague in 1984. Indexed.

**Environmental Inorganic Chemistry.** Edited by Kurt J. Irgolic and Arthur E. Martell. VCH Publishers: Deerfield Beach, FL. 1985. xiv + 654 pp. \$85.00. ISBN 0-89573-145-2.

Contains the typescripts of 35 papers, plus a workshop summary from a U.S.-Italy Joint Seminar and Workshop, held in Italy in 1983. Indexed.

**Proceedings of the 6th International Symposium of Analytical and Applied Pyrolysis, Wiesbaden, September 24-28, 1984.** Edited by Hans-Rolf Schulten. **Special Issue of the Journal of Analytical and Applied Pyrolysis, Volume 8.** Elsevier Science Publishers: Amsterdam and New York. 1985. x + 594 pp. \$140.25. ISBN 0165-2370.

This special issue of the *Journal of Analytical and Applied Pyrolysis* contains the proceedings of a symposium held in Wiesbaden in 1984. Set in type and indexed.

**Multi-Stream 85 Process Engineering Developments: The Subject Groups Symposium. The Institution of Chemical Engineers. Symposium Series No. 94.** The Institution of Chemical Engineers, Pergamon Press (distributors): New York. 1985. 398 pp. \$27.00. ISBN 0-08-031445-7.

The large number of typescript papers and plenary lectures in this volume came from a symposium organized by the Institution of Chemical Engineers and held in the United Kingdom in 1985. Not indexed.

**Mathematical Model and Design Methods in Solid-Liquid Separation.** Edited by A. Rushton. Martinus Nijhoff Publishers: Dordrecht, Boston, and Lancaster. 1985. viii + 399 pp. \$49.50. ISBN 90-247-3140-2.

This volume of 14 typescript papers constitutes the proceedings of a NATO Advanced Study Institute held in Portugal in 1982. Indexed.

**Supercomputer Applications.** Edited by Robert W. Numrich. Plenum Press: New York. 1985. viii + 307 pp. \$52.50. ISBN 0-306-42013-9.

A symposium held at Purdue University in 1984 gave rise to the typescript papers in this volume. A section on Computational Physics and Chemistry consists of five papers. Indexed.

**Methods and Materials in Microelectronic Technology.** Edited by Joachim Bargon. **The IBM Research Symposia Series.** Plenum Press: New York. 1984. viii + 367 pp. \$59.50. ISBN 0-306-41803-7.

Contains 15 typescript papers presented at the International Symposium on the title subject, held in Germany in 1982. Indexed.

**Polymer Wear and Its Control.** Edited by Leng-Huang Lee. ACS Symposium Series 287. American Chemical Society: Washington, D.C. 1985. ix + 421 pp. \$79.95. ISBN 0-8412-0932-4.

This volume was developed from the papers presented at a symposium sponsored by the Division of Polymeric Materials Science and Engineering, held at the National Meeting of the ACS in St. Louis in 1984. The papers fall into the following categories: Mechanisms of Polymer Wear; Controls of Polymer Wear; Tribological Behavior of Polymers; Characterization and Measurement of Polymer Wear; Wear of Biomaterials and Polymer Composites, and Degradation and Wear of Polymeric Films and Filaments. Well indexed.

**Solvent Extraction and Ion Exchange in the Nuclear Fuel Cycle.** Edited by D. H. Logsdail and A. L. Mills. Ellis Horwood Limited: Chichester. 1985. 223 pp. \$62.95. ISBN 0470-20241-6.

Eighteen papers, in a striking variety of typescripts, make up this volume of the proceedings of a meeting organized by the Solvent-Extraction and Ion-Exchange Group of the Society of Chemical Industry, held at an undisclosed date in the United Kingdom. Indexed.

**Water and Ions in Biological Systems.** Edited by Alberte Pullman, V. Vasilescu, and L. Packer. Plenum Press: New York. 1985. xvi + 823 pp. \$110.00. ISBN 0-306-41921-1.

The typescripts of four plenary lectures and the many papers given at the Second International Conference on Water, held in Bucharest in 1982, make up this volume. Indexed.

**Short-Term Bioassays in the Analysis of Complex Environmental Mixtures IV.** Edited by Michael D. Waters, Shahbeg S. Sandhu, Joellen Lewtas, Larry Claxton, Gary Strauss, and Stephen Nesnow. **Environmental Science Research, Volume 32.** Plenum Press: New York. 1985. x + 384 pp. \$59.50. ISBN 0-306-42015-5.

Contains the texts of the keynote address and the 26 papers from a symposium sponsored by the US Environmental Protection Agency in 1984. Indexed.

**Advances in Catalysis Science and Technology.** Edited by T. S. R. Prasad Rao. Halsted Press, John Wiley & Sons: New York. 1985. xix + 771 pp. \$54.95. ISBN 0470-20187-8.

Contains the texts of the five plenary lectures and the large number of papers presented at the Seventh National Symposium on Catalysis, held at Baroda in 1985. The emphasis is on industrial chemistry. Not indexed.

**Catalysis and Surface Science.** Edited by Heiz Heinemann and Gabor A. Somorjai. **Chemical Industries Series, Volume 21.** Marcel Dekker Press: New York. 1985. xi + 435 pp. \$75.00. ISBN 0-8247-7328-4.

Contains the 17 papers given at the Second Berkeley Catalysis and Surface Science Conference held in 1984. The headings include Chemicals from Methanol, Hydrotreating of Hydrocarbons, Catalyst Preparation, Monomers and Polymers, and Photocatalysis and Photovoltaics. Indexed.