

Book Reviews*

Chemical Sensor Technology. Volume 3. Edited by N. Yamazoe (Kyushu University, Fukuoka, Japan). Kodanasha, Ltd., Tokyo/Elsevier: Amsterdam, Oxford, and New York. 1991. xvii + 301 pp. \$194.50. ISBN 0-444-98701-0.

This volume consists of a preface by the Editor and 17 chapters, each by a separate set of authors, in the form of brief (about 15 pages) introductory review articles and bibliographies.

Topics reviewed include various types of solid state sensors for gases (eight chapters), chemical/electrochemical electronic devices (three chapters), electrochemical sensors and microelectrodes (five chapters), and fiber optic sensors (one chapter).

The quality and format of the individual articles are uniformly good. This volume should be of interest to readers desiring a brief introduction and references to sensors belonging to one of the above categories.

Arthur T. Hubbard, *University of Cincinnati*

Surfactant Science Series. Volume 35. Alkylene Oxides and their Polymers. By F. E. Bailey, Jr., and Joseph V. Koleske (Union Carbide Chemicals and Plastics and private consultant). Marcel Dekker: New York. 1991. vi + 261 pp. \$125.00. ISBN 0-8247-8384-0.

The polymers and copolymers of 1,2-alkylene oxides represent an unusual family of materials of major importance for both commercial and research applications. This book gives a good overview on the manufacture, chemistry, and applications of the four major starting monomers (ethylene oxide, propylene oxide, butylene oxide, and epichlorohydrin) as well as the utility of many of the poly(alkylene oxide)s.

However, the synthetic polymer chemist interested in developing new polymeric materials with a broad range of structure-property relationships will find this book useful. The chapter on polymerization of the 1,2-alkylene oxides gives a good review of the great variety of polymerization and copolymerization methods, including the role of initiators in controlling both the head-to-head structures and the stereoregularity in polymerization of 1,2-propylene oxide. This is particularly important since these polymeric materials can be made having relatively simple linear or controlled branched structures over a wide molecular weight range. The chapter on the chemistry of these poly(alkylene oxide)s will give the reader a good feel for radiation, oxidation, and thermal degradation of these intermediates. The potential for incorporating these intermediates into a variety of copolymer syntheses is also discussed.

Major uses for the poly(alkylene oxide)s or for copolymers containing the polyether intermediates are due to the ability of the ether oxygen to interact with inorganic and organic salts, organic solutes, as well as with a variety of polymers. The former complexes are similar to the crown ether complexes while the latter ones are used for pore-forming films or for improved processing. The properties of these complexes and some of their applications are presented in some detail. The synthetic polymer chemist interested in property modification should find this chapter particularly useful.

Although the book is expensive, it is readable and cites a large number of references which would be of help to the user. Thus the book could be a good addition to the users bookshelf.

Donald J. Lyman, *University of Utah*

Carbonylation—Direct Synthesis of Carbonyl Compounds. By H. M. Colquhoun (ICI Chemicals and Polymers Ltd.), D. J. Thompson (ICI Specialty Chemicals), and M. V. Twigg (European Vinyls Corp. International). Plenum Press: New York. 1991. xi + 296 pp. \$65.00. ISBN 0-306-43747-3.

This is a very good book on carbonylation chemistry as well as laboratory techniques associated with synthetic organic, organometallic, and catalysis research. After a concise introductory chapter on reaction mechanisms in carbonylation chemistry, Chapter 3 describes the "Practical Aspects" of this chemistry including the nature of catalysts, set ups for high-pressure experiments with appropriate apparatus, and basic considerations for such experiments. Also, Chapter 12 nicely summarizes "Catalyst Preparations and Recovery of Precious Metals", which is handy and very useful. Appendixes are arranged to show the suppliers of transition metal catalysts and reagents, gas monitors, and suppliers of autoclave equipment. These chapters and appendixes have an "industrial touch", but the information is very useful to faculties, graduate students, and postdoctorals in academic laboratories as well. Main chapters compile recent advances in the syntheses of aldehydes,

ketones, carboxylic acids, esters, amides and other carboxylic acid derivatives, lactones, lactams and related nitrogen heterocycles, as well as decarbonylations. There are minor flaws in both the mechanistic discussions, e.g., "Keulemans' rule" (p 63), which already has exceptions, and Wakamatsu reaction (p 109), which is not updated, and in critical features of the reactions, e.g., Stille's asymmetric hydroformylation (p 67), which is known to suffer from low iso/n ratio as well as very high pressure for a long reaction time. However, overall this is an excellent review of carbonylations directed to organic syntheses. The text is easy to read and schemes are very well organized. A new book on this subject was definitely needed after Wender & Pino's *Organic Syntheses via Metal Carbonyls* (1977) and Falbe's *New Syntheses with Carbon Monoxide* (1980); thus, this book appeared in a very timely fashion. This book may serve as a guide as well as handbook of carbonylations for researchers in both industry and academia.

Iwao Ojima, *State University of New York at Stony Brook*

High Performance Polymers and Composites. Encyclopedia Reprint Series. Edited by Jacqueline I. Kroschwitz. John Wiley & Sons: New York. 1991. 992 pp. \$95.00. ISBN 0-471-54366-7.

This book was compiled with the intention of providing a handy desk-top reference source and a convenient collection of review articles that could be used as a teaching tool for scientists and students interested in the specialized and important field of high performance polymers and composites. It serves that function very well and the price is reasonable for a book of this size.

The articles were selected unchanged from the Second Edition of the *Encyclopedia of Polymer Science and Engineering* and meet the high standards of that acclaimed publication. However, the 17-volume Encyclopedia series was published over the period 1985–1989, and those articles reproduced from earlier volumes do not capture recent advances in materials science and processing technology. This is unfortunate given the important role these specialty materials are playing in major industries such as electronics, aerospace, transport, and communications. Indeed, it is difficult to find references beyond 1986 in most of the articles, so it should be recognized that recent innovations will not be included.

The articles selected for this volume are very appropriate. They are concise and well written and will serve as an extremely useful starting point for those who are seeking information or are interested in learning about the materials and technology of high performance polymers. Collecting all these articles into one book will save the searcher considerable time and effort. One minor but annoying problem encountered by the reviewer was the cross referencing system which is undoubtedly useful in the full multivolume Encyclopedia, but is not always applicable to the articles in this collection. Clearly an editorial decision!

Overall the book provides the reader with an excellent overview of this class of specialty polymers. It will be a valuable and useful addition to the collection of scientific libraries and to members of the scientific and polymer communities interested in using or in remaining aware of high performance polymeric and composite materials.

James M. Pearson, *Eastman Kodak Company*

Vitamin C: Its Chemistry and Biochemistry. By Michael B. Davies, John Austin, and David A. Partridge (Anglia Polytechnic, Cambridge, England). The Royal Society of Chemistry: Cambridge. 1991. x + 154 pp. £13.50 (paperback). ISBN 0-85186-333-7.

In this short book about vitamin C (ascorbic acid, ascorbate) the authors present an interesting review of the history of scurvy and the discovery and determination of the structure of vitamin C followed by a review of the chemistry and biochemistry of this remarkable substance. There is, for example, a rather detailed discussion of some of the many hydroxylation reactions involving vitamin C, reactions in which, at any rate for some, it is known that the substance is used up as hydroxyl groups are inserted. These reactions include the synthesis of collagen from procollagen, the production of one of the components of complement, the conversion of cholesterol to bile acids, which are then eliminated, and the synthesis of noradrenaline, serotonin, homogentisic acid, carnitine, and other substances. In addition, the vitamin helps to protect the human body by the hydroxylation in the liver and subsequent elimination in the urine of toxic substances.

The authors in several places mention the "continuing mystery of whether or not there is one primary biochemical function for this simple molecule". It may be that the answer is its participation in hydroxylation reactions, perhaps numbering in the hundreds, but it may have other

*Unsigned book reviews are by the Book Review Editor.

functions also, such as those involving its action as an antioxidant.

I have noticed only one error (a common one): the repeated statement that when vitamin C is taken at a daily rate greater than about 140 mg the excess over this value is promptly excreted unchanged through the kidneys.

One chapter is devoted to medical aspects of vitamin C. Although references are given in the bibliography up to 1989, the authors seem not to be aware of much work on the value of megadoses of vitamin C that has been published during the last 20 years. The authors conclude that the optimum ideal daily intake seems to be in the range 50–500 mg, depending on the state of health, age, and social habits, whereas many researchers now recommend between 1000 and 20000 mg per day. The authors do not mention C. W. Jungeblut (who in 1935 reported that ascorbate inactivates poliomyelitis virus and protects monkeys injected with this virus against paralysis), Irwin Stone (who published his book *The Healing Factor: Vitamin C Against Disease*, in 1972), or Fred R. Klenner (who made use of megadoses of vitamin C, both orally and by injection, in the treatment of many diseases). They refer to my 1970 book *Vitamin C and the Common Cold*, but not to my three later books on this subject, in which much of the evidence for the value of a high intake of vitamin C in preventing and treating disease is reviewed. They mention that in a recent publication (reference not given) it has been reported that vitamin C supplementation may be beneficial in preventing or curing more than 40 diseases, and refer to the "impressive trial" with 1095 post-surgery patients given 2 g or more of vitamin C per day, with none developing serum hepatitis, whereas the incidence of this infection in 150 controls not given the vitamin was nearly 10%. They do not, however, present the general argument formulated by Irwin Stone in 1965 that the physiologically proper intake of vitamin C for human beings is in the megavitamin range and that essentially all persons are suffering from a deficiency of this vitamin, a genetic disease that he called hyposcorbemia.

Linus Pauling, *Linus Pauling Institute of Science and Medicine*

Large-Scale Molecular Systems. Quantum and Stochastic Aspects—Beyond the Simple Molecular Picture. Edited by Werner Gans (Free University of Berlin), Alexander Blumen (University of Bayreuth), and Anton Amann (ETH-Zürich). Plenum Press: New York and London. 1991. vi + 606 pp. \$135.00. ISBN 0-306-43914-X.

This book is a part of the NATO ASI Series, Series B: Physics, Volume 25. It contains the Proceedings of a NATO Advanced Study Institute on the title subject held in Acquafredda di Maratea, Italy, March 25–April 7, 1990. The subject matter is presented in two sections: (A) The Course (326 pp) and (B) The Seminars, subdivided as follows—(I) Quantum Theory of Large Systems; (II) Localized and Extended States; (III) Transport and Reactions; (IV) Polymers; (V) Disordered and Low-Dimensional Systems; and (VI) A Word of Thanks. There are lists of the lecturers and participants, and there is a subject index.

Structure and Function of Invertebrate Oxygen Carriers. Edited by Serge N. Vinogradov (Wayne State University) and Oscar H. Kapp (University of Chicago). Springer-Verlag: New York. 1991. xxvi + 352 pp. \$49.00. ISBN 0-387-97585-3.

This book is based on lectures and posters presented by the participants of the Satellite Symposium on "Structure and Function of Invertebrate Oxygen-Binding Proteins", held in Whistler, BC, Canada, July 24–27, 1990. Some contributions from non-participants in the symposium are included. The book is dedicated to the memories of Eraldo Antonini, Bernt Linzen, and Robert Terwilliger and includes memorial essays honoring these scientists. The 45 contributions are divided into the following sections: (I) Quaternary and Three-Dimensional Structure; (II) Structure and Function; (III) Amino Acid and cDNA Sequences; and (IV) Gene Structure and Physiological Role. There are author and subject indexes.

Photochemical Processes in Organized Molecular Systems. Edited by Kenichi Honda (Tokyo Institute of Polytechnics). North-Holland: Amsterdam, London, New York, and Tokyo. 1991. xvi + 540 pp. \$114.50. ISBN 0-444-88878-0.

This book contains the Proceedings of the International Conference on the title subject held at the Yokohama International Convention Center September 22–24, 1990. It is dedicated to the late Professor Shigeo Tazuke of the Tokyo Institute of Technology who died on July 11, 1989 at the age of 54. The book contains pictures of Professor Tazuke and of the conference attendees and a brief biography of the honoree. There are 32 articles in typescript form organized under the following headings: (I) Photoinduced Electron and Energy Transfer Processes; (II) Photoredox Reactions in Solution; (III) Photochemistry in Organized Molecular Systems; and (IV) Toward Integrated Molecular Systems. There is an appendix showing the titles of contributed posters, and there are author and subject indexes. Affiliations of the authors are given in the headings of the articles.

Activation Spectrometry in Chemical Analysis. Volume 119. Chemical Analysis: A Series of Monographs on Analytical Chemistry and its Applications. By Susan J. Parry (Imperial College Reactor Centre). John Wiley & Sons: New York. 1991. xii + 243 pp. \$80.00. ISBN 0-471-63844-7.

This book, regardless of its confusing title, concerns the technique of neutron activation analysis. The term "activation spectrometry" defined in the preface as the combination of neutron activation and γ -ray spectrometry is largely abandoned in the text by the author in favor of the more conventional descriptive term. The unfortunate choice of titles is highlighted for the reader in Chapter 6, which is also entitled "Activation Spectrometry" and focuses primarily on γ spectrometry and quantitation methods.

The presentation of the material follows a logical flow for the author's stated purpose: informing potential users from various disciplines as to the capabilities of the technique and how it may be applied in his or her field. After a brief introduction, Dr. Parry describes in Chapters 2–6 the principal tenets of the method. Chapters 7–12 describe specific techniques often employed in the use of the method. Discussions on the preparation of samples and standards for analysis and the use of primary standards and reference materials are followed by sections on irradiation and γ -ray counting. A description of photon detectors and nuclear pulse counting electronics is included. Finally, a wide range of applications are discussed in Chapters 13–16.

The strength of the book lies in the author's skill at describing the implementation of the technique as it is applied on a day-to-day basis. The verbiage is straightforward and much of the standardized phraseology and clichés we often fall into in describing procedures so well known to us is missing. The beginning user of the method, especially one who will not actually do the analytical work themselves, will find the text to be understandable, with sufficient detail to give a thorough background in the principles involved. As a result I believe the reviewed work can be recommended for the more casual user and maybe as general backup information for the activation analysis practitioner.

The book, while being a good introductory text to the methodology, does not provide sufficient detail to be considered a guide for those who would actually employ neutron activation analysis. Many corrections and/or techniques are mentioned without giving specific theoretical detail or formulas for the reader to make use of them. In addition, I found a few comments which I found to be somewhat ambiguous and one or two which were definitely in error. Another book in the same series of monographs, Volume 116 "Radiochemistry and Nuclear Methods of Analysis" by William D. Ehmann and Diane E. Vance provides in a 100 page chapter in a larger work a much more definitive description of these same techniques, albeit much less expansive and perhaps less readable by the novice.

William D. James, *Texas A&M University*