Book Reviews*

Aliphatic Chemistry. Volume 2. Edited by W. PARKER. The Chemical Society, London. 1974. ix + 323 pp. £11.00.

This is a volume of the familiar and valuable Specialist Periodical Reports, and represents a continuation of the volume published as Volume 1, Part 1, of "Aliphatic, Alicyclic, and Saturated Heterocyclic Chemistry" published in 1972. It covers the literature published in the calendar year 1972. Its four chapters are devoted to: acetylenes, alkanes, allenes, and alkenes; other functional groups; naturally occurring polyolefinic and polyacetylenic compounds; and prostaglandins. The last subject has grown to be such an important one that separate sections are included on metabolism of prostaglandins, biosynthesis, physiological effects, and analysis, although the major section is synthesis. This subject has developed faster than its systematic nomenclature, and the authors have chosen to use the cryptic "PG" system, explained in a brief introduction, which leads to such odd names as "15-epi-$PGF_{2\alpha}$." One wonders, however, if such names are really so odd after all, after reading in another chapter a succession of such arcane names as tolypomycins, nonadrides, cytochalasins, and abscissic acid.

Chemical Spectroscopy and Photochemistry in the Vacuum Ultraviolet. Edited by C. SANDORFY, P. J. AUSLOOS, and M. B. ROBIN. D. Reidel Publishing Co., Boston, Mass. 1974. xx + 598 pp.

This volume contains the proceedings of the NATO Advanced Study Institute held in Canada in August, 1973. The purpose of the Institute, according to the Preface, was "to bring together spectroscopists, photochemists, and theoretical chemists and make them work together on excited states, on ions, on radicals." The papers are photoreproduced from the authors' typescripts. They seem to be a mixture of review papers and accounts of original research. There is a substantial index, a useful feature too often missing from published proceedings.

Consumer Health and Production Hazards—Chemicals, Electronic Products, Radiation. Edited by S. S. EPSTEIN and R. D. GRUNDY. The MIT Press, Cambridge, Mass. 1974. xiii + 347 pp. $15.00.

This is Volume 1 of "The Legislation of Product Safety," and consists of five chapters, to four of which the editors contributed. Chemists will be particularly interested in two of them: "Public Health Hazards from Chemicals in Consumer Products" and "Toxic Substances." The authors' emphasis is on the interface of chemical toxicity with practical, moral, and legal aspects of toxicity. Two sentences from the Foreword merit quoting: "These examples suggest that the *consistent absence* of a chemical constituent from natural biological systems is an extraordinarily meaningful fact. It can be regarded as prima facie evidence that, with a considerable probability, the substance may be incompatible with the successful operation of the elaborately involved, exceedingly complex network of reactions which constitutes the biochemical systems of living things."

Organic Reactions. Volume 21. Edited by W. G. DAUBEN. John Wiley & Sons, New York, N.Y. 1974. vii + 417 pp. $22.50.

This is a "fluorine volume," and consists of two chapters: "Fluorination by Sulfur Tetrafluoride," by Boswell, Ripka, Scribner, and Tullock, and "Modern Methods to Prepare Monofluoroaliphatic Compounds," by Sharts and Sheppard. Five of the six authors are associated with the Central Research Department of the Du Pont Experimental Station. These two chapters are characterized by an unusually large selection of experimental procedures (there are no less than 23 preparations given in Chapter 1). In Chapter 2, a variety of methods is presented, using halogen fluorides, fluoroalkylamines, hydrogen fluoride, various other fluorides, perchloryl fluoride, nitrosyl fluoride, and hypofluorites. Separate tabular surveys and groups of experimental procedures are given for each.

It is interesting to note the growth of this field, for it is just thirty years since the subject of aliphatic fluorine compounds was treated in "Organic Reactions," in Volume 2, by Albert Henne. At that time, the subject was covered in one short chapter, out of the ten chapters in the volume.

Volume 21 is completed with a Chapter and Topic Index to Volumes 1 to 21, and a brief subject index. It is a worthy addition to this remarkably useful series.

Organometallics in Organic Synthesis. By J. M. SWAN and D. St. C. BLACK (Monash University). Wiley/Halsted, New York, N.Y. 1974. 6 unnumbered + 158 pp. $7.25.

At one time, the only significant organometallic reagent that a chemist concerned with synthesis was likely to think of was the Grignard reagent, and that time was not so very long ago. The postwar years have seen the introduction of a somewhat bewildering array of new organometallic reagents, a large number of which appear to have useful applications in synthesis. Most reviews on such substances have emphasized the particular reagent, or a particular metal, rather than the type of product or structural change.

The authors of this softbound volume have written a review organized according to types of change, such as dimerization of alkynes, formation of carbon–nitrogen bonds, etc. They have done this with conciseness but in a readable way, and have thereby provided an orienting survey useful to graduate students and to older chemists with pre-organometallic education. The approach is descriptive, with constrained allusions to mechanism, and deals largely with general equations rather than specific compounds. There are thus no tables, and yields are only rarely given (a regrettable aspect). There are 250 references, some as late as 1973, to lead the interested chemist further into a specific subject, and a good subject index provides easy access to the contents.

Pyridine and Its Derivatives. Supplement Part Three. Edited by R. A. ABRAMOVITCH (University of Alabama). Wiley/Interscience, New York, N.Y. 1974. xvi + 1249 pp. $75.00.

This touchingly dedicated volume is the third part of four to supplement the four original volumes on pyridine edited by Erwin Klingsberg in the Weissberger–Taylor series "The Chemistry of Heterocyclic Compounds." It contains five chapters: Nitropyridines and Reduction Products; Aminopyridines; Pyridinecarboxylic Acids; Pyridine Side-chain Carboxylic Acids; and Pyridinols and Pyridones. The chapters conform to the high standard of organization and completeness characteristic of the series, and contain tables and lists of references of staggering magnitude. Two especially commendable features deserve mention: the period of coverage of the literature is clearly stated (1959 to 1970, with some material up to 1972), and there is a good subject index for this particular volume, so that one does not need to seek out Part Four in order to use this or earlier parts efficiently.

Residue Reviews. Volumes 50 and 52. Edited by F. A. GUNTHER and J. D. GUNTHER. Springer Verlag, New York, N.Y. 1974. Vol. 50: xi + 179 pp. $18.80. Vol. 52: ix + 156 pp. $15.80.

Volume 50 contains chapters on "Evaluation of the safety of chlorpyrifos to birds in areas treated for insect control," "Analysis of pesticides by the thin-layer chromatographic-enzyme inhibition technique. Part II," and "Pesticide interactions in higher plants." Nearly one-third of this volume is made up of cumulative indexes covering Volumes 41–50 or 1–50.

Volume 52 contains six chapters on various aspects of the occurrence of pesticide residues. Four of them are concerned with specific substances, and two are more general: "The presence and cycling of pesticides in the ecosphere," and "Behavior of pesticides in the environment: 'Environmental chemodynamics'."

Technological Aspects of the Mechanical Behavior of Polymers. Edited by R. F. BOYER. Wiley/Interscience, New York, N.Y. 1974. vii + 107 pp. $7.95.

This softbound volume contains the papers presented at the Witco Award Symposium in May, 1973, and is No. 24 of "Applied Polymer Symposia." Ten papers are included; they deal with such

* Unsigned book reviews are by the Book Review Editor.

subjects as the glassy and crystalline states, relaxation phenomena, and deformation.

Particle Size Analysis. By Z. K. JELINEK (Organic Synthesis Research Institute). John Wiley & Sons, Inc., New York, N.Y. 1974. 178 pp. $16.50.

The translation of this work now provides, for English-speaking readers, a convenient survey of the classical methods of particle size analysis. This brief introduction should be quite useful to the nonexpert who wishes to know what established methods are available and most often used. The reader will not find much discussion of some of the more recently developing techniques such as impact methods or holographic imaging. Modern developments in light scattering, image analysis, and conductometry are treated only very briefly.

The style and format of the book are excellent, which make it very clear and readable. References are somewhat limited, especially where certain theory and methods of calculation are described, but, in general, they are quite adequate. The practical examples given frequently throughout the book enhance its usefulness to the newcomer to the field. For those not well versed in particle handling, an expanded discussion of the problems and techniques of particle sampling would have been a valuable addition.

With respect to its intended use as an introduction for the chemist, chemical engineer, or others who may be faced for the first time with the need to undertake particle size analysis, this book fills a recognized need. It also should be useful reading for undergraduate students in the physical sciences and engineering.

Wayne A. Cassatt, *National Bureau of Standards*

Oxide Semiconductors. By Z. M. JARZEBSKI. Translated by B. GRZYBOWSKA-SWIERKOSZ. Pergamon Press, Oxford. 1973. xi + 285 pp. $18.00.

The volume is a translation of a book published in Polish; despite the time lapse involved in the translation the material is reasonably up-to-date. Though the style is on occasion rather unidiomatic, the meaning and scientific content of such passages is never ambiguous.

Readers and potential purchasers of the book should be aware of several features: As is implied by the title, there is no discussion of the large classes of oxides that are metallic or that undergo metal-insulator transitions. Furthermore, the discussion is limited to a few selected systems: The cases of NiO, CoO, TiO_2, ZnO, and Al_2O_3 are treated in considerable detail, whereas properties of the oxides FeO, MnO, Cu_2O, CdO, SnO_2, and SiO_2 are reviewed in rather cursory fashion. Many oxides that are semiconductors of scientific or of commercial interest are not treated at all. Examples that come to mind are the vast class of perovskites such as $LiNbO_3$ or $KTaO_3$, oxides of transition metals such as V_2O_5 or Nb_2O_5, or oxides of alkaline earths such as BaO and CaO. The coverage in this book of materials falling under the category of semiconducting oxides is thus rather incomplete.

Similar remarks may be made as regards the discussion of physical properties of the oxides. Most of the space in the latter third of the book is devoted to a discussion of the electrical resistivity and ionic diffusion coefficients of oxides. A compendium of this type is certainly very useful. However, many physical properties which provide information on the electronic states such as optical measurements, thermodynamic and galvanic studies, magnetic properties, thermoelectric and thermal characteristics, Mössbauer, esr, and nmr investigations are either not treated at all or else receive only very brief mention.

The first third of the book is devoted to a review of preparative techniques, analysis, and methods of single crystal or film growth. The coverage is quite good, but at least two prominent methods for single crystal fabrication are not discussed, namely the arc transfer and arc melting methods, both of which are now extensively used.

The middle third is taken up with a discussion of the various theories dealing with semiconductor statistics and with defect equilibria and transport mechanisms in oxides. In many cases only the final results are provided, without careful discussion of the models and the various restrictive assumptions under which the formulas apply. While the semiconductor band model is adequately treated, it is regrettable that insufficient attention has been given to the small polaron model, since the latter is very important in cases where oxides have been shown to be of the hopping type.

In summary, the book is very useful as a compendium of results in certain specific areas and for many specific oxides. However, as noted above, coverage of many other topics and materials is either incomplete or totally lacking, and this fact would seem to limit the utility and general appeal of the book.

J. M. Honig, *Purdue University*

Progress in Analytical Chemistry. Volume 6. Applications of the Newer Techniques of Analysis. Edited by I. L. SIMMONS (M & T Chemicals) and G. W. EWING (Seton Hall University). Plenum Press, New York, N.Y. 1973. viii + 383 pp. $22.50.

The present volume consists of the texts of 19 invited lectures from the 1972 Eastern Analytical Symposium. The topics covered include Raman spectrometry (one chapter), emission spectrometry (two chapters), X-ray diffraction (four chapters), nonproton nmr (two chapters), liquid chromatography (five chapters), pyrolysis gas chromatography (two chapters), gas chromatography-mass spectrometry (two chapters), and chemical ionization mass spectrometry (two chapters). The length of individual essays ranges from 15 to 30 pages.

This book shares the faults common to such efforts. In some cases the essays are broad reviews of their topics (*e.g.*, the magnetic resonance chapters). In other cases they are detailed descriptions of specific procedures used in the authors' laboratories (some of the liquid chromatographic and emission spectrometric chapters). Moreover, the areas of application covered by the book seem almost randomly chosen. The chromatographic and mass spectrometric chapters are largely aimed at workers in clinical or pharmaceutical laboratories. The emission spectrometric work is addressed to an audience of geologists and industrial hygienists. A few chapters review their topics without reference to any particular areas of application.

While the individual symposia may have been coherent and timely at a large meeting, they do not come together into a good book. The short chapters do not give authors time to develop their topics fully. The juxtaposition of detailed information from unrelated fields makes the book inefficient to the specialist. More complete general reviews and broader introduction to experimental procedures are available elsewhere for all of the topics covered in this volume. We cannot recommend purchase of this book.

Michael D. Morris, *University of Michigan*

Environment and Pollutions. By F. K. V. LEH (University of California, Riverside) and R. K. C. LAK (The Shell Co., of Hong Kong, Ltd.). Charles C. Thomas Publishers, Springfield, Ill., 1974. xx + 288 pp. $14.75.

The primary goal of "Environment and Pollutants" was to provide college students and research workers with a guide to available information on environmental studies. To obtain this goal, the authors scanned, evaluated, and condensed the information to which they had access. The various aspects of global environmental problems are then presented in a form which would permit ready retrieval. Information specific to individual pollutants which have related chemical reactivity and pose similar health hazards has been divided into two parts—air pollution and water pollution.

The first part of this book presents a modestly well-referenced guide to relevant air pollution problems. Pollutants are divided into six chemical classes (*i.e.*, nitrogen oxides, ozone, peroxyacetyl nitrate, hydrocarbons, carbon monoxide, and sulfur compounds). Each class is briefly discussed along with pertinent atmospheric chemical reactions, sources, and other characteristics. Additional chapters in this part provide insight into biological effects of these pollutants, economic aspects and global effects of air pollution, and analytical chemistry of air pollutants, concluding with a section on air pollution control. Dr. Leh's background in air pollution studies, particularly in the study of the chemistry and effects of atmospheric ozone, enabled the authors to present an informative and clearly stated presentation on air pollutants.

Unfortunately, the second part of the book provides an incomplete, much less organized presentation of water pollution problems. The topics include trace metals, pesticides, nutrients, analytical chemistry of water pollutants, and wastewater treatment. No reference is made to Public Law 92-500, the Federal Water Pollution Control Act of 1972. This is the most important and comprehensive water legislation ever enacted in this country. This law and the rules and regulations which have been issued under Title 40 of

the "Code of Federal Regulations" would have provided the authors with a better base for their discussion. In many of the water sections, there are significant omissions, frequent air pollution citings, and a scarcity of references. The only readers who would benefit from this presentation are students and researchers who wish to have only a minimal knowledge of the aquatic environment.

Despite its shortcomings, "Environment and Pollutions" is still a valid attempt to provide an introductory textbook for students and scientists participating in multidisciplinary environmental efforts. However, it would have been more beneficial to the intended audience, if the pages spent on water pollution had been used for an extension of the very well-written air pollution section.

Robert B. Pojasek, *QLM Laboratories, Inc., Nyack, New York*

Basic Principles in Nucleic Acid Chemistry. Volume I. Edited by PAUL O. P. TS'O (The Johns Hopkins University). Academic Press, New York, N.Y. 1974. xi + 636 pp. $37.50.

This volume is the first in a projected series of four volumes on the chemistry of the nucleic acids. Dr. Ts'o and his colleagues have prepared this multivolume treatise in honor of the centennial anniversary of the discovery of nucleic acid. Volume 1 covers chemical syntheses and transformations of nucleosides, mass spectrometry, excited states of nucleic acids, infrared and Raman spectroscopy, and the structure, configuration, and conformation of bases, nucleosides, and nucleotides. Each chapter has been written and reviewed by scholars who are experts in a particular area of nucleic acid chemistry. The topics are covered in a thorough manner and include the major recent advances. It is a text which will serve excellently as a reference source for more advanced students and for investigators in the area of nucleic acid research.

Chapter 1, written by the editor, is a retrospective and prospective view of nucleic acid research starting with Friedrich Miescher's report of his discovery of "nuclein" in 1871. The work of other early and more modern pioneers in nucleic acid research is summarized. Biological evolution is traced from the origins of simple chemical entities formed during the prebiotic era to the synthesis of more complex macromolecules and the organization of living cells. The appearance of advanced multicellular organisms is depicted as a continuation of the evolutionary progression of the genetic apparatus of the cell. The chapter ends with a section on the role of nucleic acid research in the future development of man's potential. Such issues as "genetic engineering," eugenics, and the influence of environment *vis-à-vis* genetic makeup as determinants of man's behavior are discussed. A topic which is noticeably missing from this discussion is the role of factors created by man on the evolution of genetic material. For example, what are the potential effects of the widespread use of chemicals which may interact with DNA and how might the escape of microorganisms infected with nucleic acids created artificially by the use of restriction enzymes affect the evolutionary process? All in all, however, this initial chapter is a magnificent introduction to the study of nucleic acid chemistry.

R. W. Ruddon, *University of Michigan*

Surface and Colloid Chemistry. Volume 6. Edited by E. MATIJEVIC (Clarkson College of Technology). John Wiley & Sons, New York, N.Y. 1974. 311 pp. $24.75.

Although my own areas of interest are peripheral to many of the subjects subsumed under the heading of surface and colloid science, I now feel this was an attribute for a review of "Surface and Colloid Science," Volume 6. The articles were well chosen to cover a broad range of topics and, for the most part, were written to give both the specialist and nonspecialist an overview of the fields.

The four reviews range from Colloidal Silica by R. K. Iler to Biopolymers at Interfaces by I. R. Miller and D. Bach. The review on colloidal silica is quite extensive. A section on commercial uses of colloidal silica was quite interesting. The second review, Radioactive Tracers in Surface and Colloid Science by M. Muramatsu, tends toward a strict review of the field and may not prove as interesting to nonspecialists.

The third review on biopolymers at interfaces provided an excellent overview of a broad range of relevant topics. Although the article is interesting and well written, the topics themselves cover such a wide range of material that it might have been better to explore the material in several reviews. For example, the very short section on membranes could have been deleted since it expanded minimally the material reviewed by Tien in Volume 4 of the series.

The final review, Lipid Multilayers by Kare Larsson, reviews multilayers with an emphasis on their formation to minimize overlap with the Tien review.

In summary, I believe the volume strikes a good balance in both the range of topics and the depth of coverage. For this reason, it will be worthwhile reading for both specialists and nonspecialists with a moderate interest in the topics reviewed.

Michael E. Starzak, *State University of New York at Binghamton*

Photochemistry. Volume 5. Edited by D. BRYCE-SMITH (The University, Reading). The Chemical Society, London. 1974. xi + 789 pp. £20.00.

Volume 5 covers the literature from July 1972 to July 1973. The organization of this volume is essentially unchanged from previous numbers. The literature coverage remains excellent, and comments made by this reviewer regarding Volume 3 can be reiterated [*J. Amer. Chem. Soc.*, **95,** 1354 (1973)]. The only change is the inclusion of a new section in the chapter covering polymer photochemistry: "Review of Patent Literature." Mainly British patents are reviewed in the areas of uv stabilizers, prodegradants, uv sensitizers, and optical brighteners. This is an interesting and welcome addition. Expanding the coverage by including a few key patents in other areas would perhaps be worthwhile.

One surprise is the considerable decrease in the length of Volume 5. The price unfortunately has not followed suit.

This volume has maintained the high standards set previously and remains an indispensable aid to anyone with an interest in photochemistry.

David S. Weiss, *University of Michigan*