

Additions and Corrections

Preparation of *tert*-Butyl-Capped Polyenes Containing up to 15 Double Bonds [*J. Am. Chem. Soc.* 1989, 111, 7989]. KONRAD KNOLL and RICHARD R. SCHROCK*

Page 7996: In Table II, row 6t₆ should read, in column 4, 131.12 (6.18); in column 5, 132.37 (6.21); in column 6, 132.91 (6.22).

Book Reviews*

Chromatography/Fourier Transform Infrared Spectroscopy and Its Applications. By Robert White (University of Oklahoma). Marcel Dekker: New York and Basel, 1990. vi + 344 pp. \$99.75. ISBN 0-8247-8191-0.

By simply noting the title of this book the first question that might come to mind is: Does the world need another book on the interface of chromatography to Fourier transform infrared (FTIR) spectroscopy? This reviewer believes the answer is yes, but it will best serve a select audience. This book will be a useful guide to those interested in a broad-scale introduction to chromatography/FTIR. In addition, for those who are more thoroughly versed in chromatography/FTIR, Chapter 6 remains a good description of the numerous possible applications of the technique.

The author describes Chapter 1 as an introduction of general characteristics that are common to all chromatography/FTIR interfaces. In actuality, Chapter 1 describes in a very basic way the operation of an FTIR. Next, the variables that control the performance of a typical FTIR are discussed. The criteria for chromatographic separations for column and planar chromatography are also described in an even more elementary fashion.

Chapters 2-4 describe from an historical perspective the attributes of the GC, HPLC, and TLC interfaces of FTIR. The presentation in each chapter is reasonably thorough and the information is also current.

Chapter 5, which is entitled Structure Elucidation Methods, provides a very clear description of the different algorithms that are presently used by library search routines to identify compounds. The progress on newer structure elucidation strategies such as the use of expert systems is also well described. Finally a very interesting enumeration of the causes of mismatch between matrix isolation spectra with gas-phase library spectra was discussed.

Chapter 6 is a survey of the characterization of mixtures by chromatography/Fourier transform infrared spectroscopy. In this chapter select applications are used to illustrate the advantages and disadvantages of the use of chromatography/FTIR. This is a well-written chapter with good examples of sample composition, sensitivity, and analysis time requirements.

Susan V. Olesik, *The Ohio State University*

Iron Carriers and Iron Proteins. Physical Bioinorganic Chemistry. Volume 5. By Thomas M. Lochr (Oregon Graduate Center). VCH Publishers, Inc.: New York, NY, 1989. xvi + 533 pp. \$150.00. ISBN 0895-73298-X.

This is an excellent book which admirably fulfills the stated goals of the senior editors, Harry B. Gray and A. B. P. Lever, in presenting a thorough and well-balanced description of iron carriers and proteins from the perspective of "bioinorganic chemistry". Iron is an element essential to most living systems. The book makes an important contribution to the literature in providing not only the scientific findings related to iron but also background on the instrumentation and techniques used to acquire these findings. The authors of the different chapters attempt to point out the strengths and weaknesses of the various approaches and to explain why, in certain cases, discrepancies exist. It is difficult to imagine a better selection of authors. The book is impressive in both scope and detail.

The first chapter by Drs. Berthold F. Matzanke, Gertraud Müller-Matzanke, and Kenneth N. Raymond contains a masterful description of siderophores: iron chelators synthesized by microorganisms to allow

iron solubilization and utilization. The variety of compounds is fascinating, if somewhat daunting to the uninitiated. Detailed descriptions of how the structures of the various chelators were determined are included, as well as mechanisms by which cells acquire the siderophores. In addition, the rationale for studying these compounds is clearly presented. This chapter is certainly the definitive treatise on the subject of siderophore mediated iron transport in the literature today.

In Chapter 2 Drs. Pauline M. Harrison and Terence H. Lilley ably summarize the data on the structure and the structure functional behavior of ferritin as elucidated by application of electron microscopy, X-ray diffraction, Mössbauer, electronic absorption, and X-ray absorption spectroscopy. There are sections on reconstitution of ferritin iron-cores, the 3-dimensional structure of apoferritin, metal-ion binding to ferritin and apoferritin, mobilization of ferritin iron, and a description of bacteroferritin. The presentation is clear and well-organized.

Chapter 3 by Drs. Daniel C. Harris and Philip Aisen contains a thorough and lucid description of the physical biochemistry of the transferrins. The chapter is especially valuable in providing balanced discussions on discrepancies which exist in the literature. Chapter 4 by Dr. Aisen reports the exciting breakthroughs in transferrin research which occurred between 1984 and 1988, namely the publication of the 3-dimensional structure of two transferrins allowing positive identification of the iron binding ligands. The author describes the successes and failures of the physical chemical techniques in predicting these ligands. Other important findings include the amino acid sequence of the human transferrin receptor and a description of the transferrin to cell cycle.

In Chapter 5, Dr. Joann Sanders-Loehr describes binuclear iron proteins, in particular those which contain iron atoms bridged by oxo groups. Included in this group are hemerythrin, ribonucleotide reductase, purple acid phosphatases, methane monooxygenase, and possibly ferritin. There is a thorough delineation of the spectral and magnetic properties of these compounds which are responsible for oxygen transport and activation.

The final chapter covers catechol dioxygenases which are succinctly reviewed by Dr. Lawrence Que, who is responsible for many of the findings. The catechol dioxygenases effect aromatic ring cleavage by insertion of dioxygen into the substrate. More information is available for intradiol dioxygenases, those that result in the generation of muconic acids, than for the other major category extradiol dioxygenous (those that result in muconic semialdehydes). The evidence for the structure and mechanism of action is clearly presented.

The book is a valuable resource to scientists at all levels of familiarity with the field of iron. The details on instrumentation and technique will be especially appreciated by anyone with a limited background in modern physical techniques.

Anne B. Mason, *University of Vermont, College of Medicine*

Reviews of Environmental Contamination and Toxicology. Volumes 105-109. Edited by George W. Ware. Springer-Verlag: New York, 1988 and 1989. Volume 105: 152 pp. \$37.00. ISBN 0-387-90723-0. Volume 106: 233 pp. \$45.00. ISBN 0-387-96830-X. Volume 107: 184 pp. \$38.00. ISBN 0-387-96874-1. Volume 108: 184 pp. \$42.00. ISBN 0-387-96902-0. Volume 109: 144 pp. \$49.50. ISBN 0-387-96952-7.

Volume 105 of this series of hardbound books contains reviews on toxicology and contamination of Aldicarb and Methyl Isocyanate. Volume 106 is a collection of "health advisories" from the U.S. EPA, Office of Drinking Water, on various organic contaminants ranging from benzene, *p*-dioxene, and many chlorinated hydrocarbons, to xylenes. Volume 107 contains advisories on a further group of contaminants, most of which are inorganic, such as chromium, mercury, and nitrite. Volume

*Unsigned book reviews are by the Book Review Editor.

108 returns to the review format with articles on pesticide-binding in soils, cobalt, toxicology of pyrethroids, and foliar penetration. Volume 109 reviews microbial metabolism of pesticides and prediction of pesticide residues in crops. It also contains a review of the activities of the Association of Official Analytical Chemists for the period 1964–1988.

Art in Organic Synthesis. Second Edition. By Nitya Anand (Central Drug Research Institute, Lucknow, India), Jasjit S. Bindra (Pfizer Central Research), and Subramania Ranganathan (Indian Institute of Technology). John Wiley and Sons, Inc.: New York. 1988. xix + 427 pp. \$39.95. ISBN 0471-88738-2.

This book describes the total synthesis of some 96 organic molecules presented in flow-chart form. The graphical presentation and minimal use of text is intended to emphasize the strategy and art involved in bond connection/disconnection toward synthesis of the product.

The molecules are organized alphabetically and each work is supplemented with original and background literature references. The book contains brief subject, author, reagent, and reaction type indices. There is no clear preference for a particular class of compounds. Natural products, biologically important molecules, and compounds of pharmaceutical and theoretical interest are all well-represented.

The authors' intent with the 2nd edition is to employ the original graphic presentation to highlight the numerous advances made in organic synthesis since the publication of the first edition (1970). The well-conceived choice of target molecules successfully features representative advances including new reactions and reagents, the use of chiral synthons, and the development of highly selective transformations.

The shorthand presentation enhances the art and strategy involved with each synthesis. The disadvantage of this style, however, is that numerous interesting details are not discussed, leaving the reader to pursue this in the literature. The text, when present, is excellent, introducing the subject and giving valuable background information. A limited number of footnotes are included to describe details considered noteworthy, although this is done inconsistently. I feel that additional text and discussions could have improved the book without sacrificing the emphasis on art and strategy.

Numerous typographical and structural errors detract somewhat from the presentation.

The book is reasonably priced, provides interesting reading for the chemist knowledgeable in synthetic chemistry, and is potentially useful as a teaching tool.

Thomas A. Mulhern, *Parke-Davis/Warner-Lambert*

How to Conquer Air Pollution: A Japanese Experience. Edited by Hajime Nishimura (University of Tokyo). Elsevier Science Publishers: New York. 1989. x + 300 pp. \$95.00. ISBN 0-444-88537-4.

One of the joys for residents and visitors to Tokyo is a glimpse of snow-covered Fujiyama several tens of miles into the distance. This view was occasionally available in 1950, disappeared completely in an automobile-induced smog in the 1960s, and has once again been occasionally seen during the 1980s. The environmental science and regulatory activity underlying this success story is described in detail in this English-language version of a volume written entirely by Japanese authors. The editor, Professor Hajime Nishimura of the University of Tokyo, has both technical and political knowledge on the firing line of environmental regulation of local pollution. Two other authors, Dr. Michio Hashimoto and Professor Hitoshi Kasuga, are each former Directors General of the Bureau of Air Quality of the Japan Environmental Agency and bring this first-hand knowledge to their articles.

Dr. Hashimoto's opening chapter on the History of Air Pollution Control presents a valuable detailed account of the early Japanese occurrences of industrial and then automotive urban pollution, the media/populace response to these problems, the legal cases, and then the relatively rapid application of ameliorative steps. Readers from the U.S. will find interesting the regulatory importance attached to the 1947 decentralization of authority from the Imperial Constitution to local government at the direction of the Supreme Commander of the Allied Powers. The authors attribute many of the regulatory gains to the much greater sensitivity of local government to the problems of citizens whose environment has rapidly and severely deteriorated. The quick pace of effective action, once action is agreed upon, is also heavily dependent upon the sociological factors summarized in Dr. Hashimoto's statement "Japan is a society where harmony and consensus are valued, and industries wanted good relations with the local communities." The cooperation of the Japanese government on global pollution problems also exhibits the same characteristics—if an international consensus is in the air, then harmonious international citizenship dictates Japanese agreement with the new policy. Judgment, however, of whether consensus is approaching will usually lie with the 800-pound gorilla of the Ministry of International Trade and Industry (MITI) rather than with the En-

vironment Agency, whose members have on occasion pointedly noted that Protection is part of E.P.A.'s title but is not mentioned in their own.

Subsequent chapters cover the Health Effects of [Urban] Air Pollution, Emission Control Technology, Monitoring and Simulation, the System for Regulation, and the Pollution-Related Health Damage Compensation Law. An informative segment of the U.S.–Japanese experience is the 1960s introduction of emission controls on the export models only of Japanese automobiles because of new regulations adopted in California and New York; the domestic furor which followed in Japan; and then the rapidity with which national controls were adopted and put into practice well ahead of any U.S. federal action. As we moved out in front in 1970 with the passage of the Clean Air Act, President Nixon criticized Japan for taking an unfair trade advantage by neglecting the environment, thereby avoiding the costs of domestic pollution controls. By 1975–76, however, Japanese standards for CO, NO_x, and hydrocarbons had been promulgated and were already in effect at a level not reached in the U.S. until the early 1980s.

One disadvantage to this book, which carries an August 1989 sign-off date in the preface, is that its information cut-off is with very minor exceptions 1985 or even earlier. Anyone who has visited Tokyo regularly over the past two or three decades can attest to the phenomenal ability of the Japanese to pack ever more traffic into the city and will wonder how the environmental gains of the early 1980s are faring in 1990. A limitation to its coverage is that the Air Pollution "conquered" here is essentially limited to urban ground-level conditions caused by automotive and industrial NO_x, SO₂, soot, and hydrocarbons. Regional problems such as acid rain and global problems such as the greenhouse effect and ozone depletion are not covered (perhaps because they have not yet been conquered). Those interested in urban air pollution will find the similarities and differences between the Japanese and U.S. experiences quite informative and potentially useful as the world confronts other air-pollution problems in the 1990s.

F. Sherwood Rowland, *University of California, Irvine*

Handbook of Electrolyte Solutions. Parts A and B. By V. M. M. Lobo (University of Coimbra). Elsevier Science Publications: Amsterdam and New York. 1990. xxiv + 2354 pp. \$718.00. ISBN 0-444-98847-5.

This pair of fat volumes consists mostly of tabulations of density, viscosity, conductance, transport numbers, diffusion coefficients, and activity and osmotic coefficients. Such data are of obvious importance in fundamental chemistry, but their significance reaches much more widely, into biochemistry and physiology, food technology, pollution control and monitoring, corrosion and its prevention, etc.

The data for each compound, from AgClO₄ to ZnSeO₄, are collected in one place (chapter) in which they are then subdivided according to temperature. The references to the sources of the data are cited in full form, including the titles of the papers.

Five appendices give an alphabetical listing of electrolytes by name, literature citations to basic concepts, conversion formulas, density of water from –30 to 150 °C, and viscosity of water from 0 to 100 °C. An index of authors gives not the page number where they are cited but the full title and source of the papers, with the formula of the electrolyte(s) reported. Another index, called a Data Index, is a subdivided formula index.

This assembly of data has the useful feature of presenting all the data about a given electrolyte in one place.

Reviews of Environmental Contamination and Toxicology. Volumes 111–115. Edited by George W. Ware. Springer Verlag: Heidelberg and New York. 1990. Volume 111: viii + 147 pp. \$45.00. ISBN 0-387-97159-9. Volume 112: viii + 154 pp. \$45.00. ISBN 0-387-97160-2. Volume 113: viii + 145 pp. \$45.00. ISBN 0-387-97206-4. Volume 114: viii + 171 pp. \$45.00. ISBN 0-387-97207-2. Volume 115: viii + 156 pp. \$49.00. ISBN 0-387-97289-7.

Volume 111 consists of two reviews: Indoor Air Radon, by C. F. Cochern, and Ecological Toxicology and Human Health Effects of Heptachlor, by E. A. Fendick et al. Volume 112 contains three reviews: Environmental Chemistry of Ethylene Dibromide in Soil and Groundwater, by J. J. Peginatello and S. Z. Cohen; Ethylene Dibromide: Toxicology and Risk Assessment, by Alexeef, Kilgore, and Li; and Organic and Inorganic Components in Estuarine Colloids, by A. C. Sigleo and J. C. Means. Volume 113 consists of Nitrification in Forest Soils, by P. Gundersen and L. Rasmussen, and Natural Pesticides and Bioactive Components in Foods, by R. C. Beier. Volume 114 consists of four reviews: Cadmium Inhalation and Reproductive Toxicity, by H. A. Ragan and T. V. Mast; Pesticide Management in Food and Water Safety, by G. Ekstroem and M. Akerblom; Illnesses, Injuries, and Deaths from Pesticide Exposures in California, by Maddy, Edmiston, and Richmond; and Fate of Xenobiotics in Foliar Pesticide Deposits, by K. P. Bentson. Volume 115 contains four reviews: Ethylenethourea in

Relation to Use of Ethylene-bisdithiocarbonate Fungicides, by Ch. Lentz-Rizos; Embryotoxicity and Teratogenicity of Environmental Contaminants in Bird Eggs, by D. J. Hoffman; Lead Exposure in Early Life: Health Consequences, by P. B. Hammond and K. N. Dietrich; and Effects of Oral and Parenteral Selenium Supplements on Residues in Meat, Milk, and Eggs, by Beale, Fasulo, and Craigmill.

Inorganic Chemistry. By D. F. Shriver (Northwestern University), P. W. Atkins (Oxford University), and C. H. Langford (Concordia University). W. H. Freeman: New York. 1990. xiii + 706 pp. \$50.95. ISBN 0-7167-2079-5.

This is an important addition to the small group of textbooks available for the senior-beginning graduate student level course in inorganic chemistry. It is not a reference book, such as "Advanced Inorganic Chemistry" by Cotton and Wilkinson, but it is intended for hands-on student use. Homework problems come with each chapter, and there is a separate "Guide to Solutions" answer book.

The organization consists of five sections. The first is on atomic, molecular, and solid structures; the second is on acid-base and oxidation-reduction reactions and coordination compounds; the third is on main group chemistry including organometallic compounds; the fourth is on transition-metal chemistry, bonding and spectra, reaction mechanisms, and organometallics; the fifth consists of three special topics: catalysis, structure and properties of solids including defects and nonstoichiometry, and bioinorganic chemistry.

The coverage of the material is reasonably comprehensive, though what is neglected and what receives emphasis sometimes seems surprising. For example, gallium compounds get at least as much attention as do those of aluminum, and the discussion of tin chemistry is remarkably sketchy. Some especially strong points of the text are its discussions of symmetry groups and character tables, molecular orbitals of polyatomic molecules and solids, isolobal analogies, polycations and polyanions, semi- and superconduction, and Frost diagrams. Much of the theoretical material developed early in the text is then used repeatedly in subsequent discussions. However, I suspect the introductions to such standard topics as Madlung constants and ligand field splitting of spectroscopic terms will be confusing to many students.

A major problem is that there is too much material, and the instructor will have to decide which topics to skip. If a student has already had courses in general, organic, analytical, and physical chemistry, many of the topics in this book are totally unnecessary. Random examples include atomic orbitals and the aufbau principle, Lewis structures, resonance, hybridization, very elementary thermodynamics, equilibrium constants, electrode potentials and the Nernst equation, Beer's law, elementary NMR spectroscopy, and the phase rule.

The book is full of errors. The number of typographical errors is inexcusable. Some are trivial, but many will confuse the serious student trying to understand new material and work the problems. There are many incorrect names, formulas, point groups, oxidation numbers, ion charges, and electron counts. The index is highly inaccurate. There are also errors of factual content. To give just a few examples, in what compound is neon the most electronegative of all elements? The potential of the reaction $\text{Fe}^{3+}(\text{aq}) + \text{e}^- = \text{Fe}^{2+}(\text{aq})$ is not independent of pH as claimed, since $\text{Fe}(\text{H}_2\text{O})_6^{3+}$ is extensively involved in hydrolysis. Protolysis of a metal alkyl gives the alkane, not H_2 . Ethanolysis of PCl_3 (in the absence of a base such as *N,N*-dimethylaniline) gives $\text{HP}(\text{O})(\text{OEt})_2$, not $\text{P}(\text{OEt})_3$. CrCl_2 (d^4) is isostructural with CuCl_2 (d^9). $\text{Pd}(0)$, an insoluble noble metal, is an unlikely species in the catalytic cycle for the Wacker process; a soluble complex such as $\text{PdH}(\text{H}_2\text{O})_2\text{Cl}$ is more likely. In Li_2O -doped NiO , only one Ni^{2+} must be oxidized to Ni^{3+} for each Li^+ .

I am very favorably impressed by this book, and would certainly choose it as a course textbook. However, I would wait for the second edition.

John T. Yoke, *Oregon State University*

Rodd's Chemistry of Carbon Compounds. Second Edition. Supplements to Volume IV, Parts E and K. Edited by M. F. Ansell. Elsevier: Amsterdam and New York. 1989 (Part K), 1990 (Part E). Part E: xvi + 640 pp. \$294.75. ISBN 0-444-88611-7. Part K: xxii + 626 pp. \$294.75. ISBN 0-444-87399-6.

These two volumes contain typescript chapters bringing their subjects up to date (unspecified). Part E treats six-membered monoheterocyclic compounds having O, S, Se, Te, Si, Ge, Sn, Pb, or I in the ring. Part K treats six-membered heterocyclic compounds having two or more heteroatoms, one of which is from groups II, IV, V, or VII of the Periodic Table, and heterocyclic compounds having seven or more atoms in the ring. The chapters vary in appearance somewhat jarringly, and some are single-spaced and some double-spaced. Structural formulas are generally clearly and neatly presented, although many of them suffer from "floating" substituents (i.e., not clearly attached to the rings by bonds). The lack of running headings to the papers is a minor inconvenience. Each volume has a thorough subject index.

Nitrones, Nitronates and Nitroxides. By E. Breuer (The Hebrew University, Jerusalem), H. G. Aurich (Phillips-Universität, Marburg), and A. Nielsen (Michelson Laboratory, California). John Wiley & Sons: New York. 1989. ix + 435 pp. \$139.00. ISBN 0-481-91709-5.

This is an "update" volume for the series *The Chemistry of Functional Groups*, edited by S. Patai and Z. Rappoport. It consists of chapters from earlier volumes of the series, augmented by new chapters to bring them up to date (apparently into 1987). The original 1969 chapter on Nitronic Acids and Esters by A. J. Nielsen and the 1982 chapter by E. Breuer on Nitrones and Nitronic Acid Derivatives are brought up to date in a separate chapter by Breuer. A 1982 chapter on Nitroxides by H. G. Aurich is brought up to date in an appendix chapter by the original author. This method of bringing the coverage of active subjects abreast of recent developments is not as satisfactory as an integrated revision, but it is much less laborious, and the alternative might well be no publication at all, or publication in a review journal. The latter would have the disadvantage of separating the new information from the old. The subject index (7 pages) is integrated, however, and helps to tie the material together.

Phosphorus: An Outline of Its Chemistry, Biochemistry, and Technology. Fourth Edition. By D. C. C. Corbridge. Elsevier: Amsterdam and New York. 1990. x + 1093 pp. \$333.25. ISBN 0-444-1750-8.

This considerably expanded edition follows by only 5 years the previous one. The aim remains the same: to "deal with basic material and to highlight more recent advances." It is reproduced from camera-ready typescript, unfortunately without running headings. The references include citations into 1989. Apart from the large amount of added material, improvements have been made in the treatment of older topics. Among these may be mentioned a brave attempt to present the perplexing nomenclature of organic phosphorus compounds in an easily understood manner. Literature references include many useful secondary sources (books and reviews) as well as primary reports. The index, which includes authors if they are mentioned in the text, is extensive. In a future edition, it would be useful to have a formula index, however, simply because so many readers do not have the command of phosphorus nomenclature to know what to look up in the index.

There appears to be no other book that so comprehensively surveys the current state of inorganic, organic, and biological chemistry of phosphorus.