Book Reviews*

Structure and Bonding 64: Metal Complexes with Tetrapyrrole Ligands I. Edited by J. W. Buchler (Darmstadt). Springer-Verlag: New York, Berlin, Heidelberg. 1987. v + 275 pp. $95.00. ISBN 0-387-17531-8

This is the first volume of a series devoted to metallotetrapyrrole complexes. It contains four comprehensive reviews by well-known researchers in the area. The first review, by W. R. Scheidt and Y. J. Lee, covers recent advances in the stereochemistry of metallotetrapyrroles. This review emphasizes interactions of these species in the solid state. A review by T. Kitagawa and Y. Ozaki provides a presentation of the vibrational spectroscopy of metalloporphyrins and related materials, including a detailed discussion of the band assignments. B. Morgan and D. Dolphin review the synthesis and structure of biomimetic porphyrins. These include "capped", "strapped", and otherwise inhibited porphyrins designed to shield one or both of the metal atom coordination sites, as well as porphyrins in which covalent linkage of some functional group to the porphyrin is used to enhance the interaction with the metal atom. A final review, by R. Guilard, C. Lecomte, and K. M. Kadish, discusses the synthesis, electrochemistry, and structural properties of porphyrins with metal–metal bonds and single metal–carbon bonds. Included in this review is a section on the insertion of carbon dioxide and sulfur dioxide into the metal carbon bond. Each of these reviews contains an extensive bibliography.

This volume will clearly be a valuable resource to all researchers in the area of porphyrin chemistry.

Charles E. Strouse, *University of California*

Physical Methods for Inorganic Biochemistry. By John R. Wright, Wayne A. Hendrickson, Shigemasa Osaki, and Gordon T. James. Plenum Press: New York. 1986. xv + 384 pp. $59.50. ISBN 0-306-42049-X

This book aims to present an introduction to the use of physical methods in studies of the biological elements, and it emphasizes primarily the spectroscopic techniques (NMR, ESR, NQR, Mössbauer, electron, Auger, and Raman spectroscopies). Indeed, one-fourth of the book is devoted to just one of these techniques (NMR). A key question is: for whom is this book intended? As a book on methods, it does not cover any of the subjects in a comprehensive or novel manner, and as an introduction to which physical methods should be used in studies of the biological elements, it still leaves it up to the reader to learn such techniques in depth before being able to decide which should be applied to a specific problem in inorganic biochemistry.

Thus, it is not a comprehensive or novel approach to such studies. As an example, although it introduces a chapter on kinetic methods, this chapter only wets the reader's appetite without ever satisfying any hunger. A number of techniques are completely ignored: the only mention of radionuclide techniques is a very elementary chapter on activation analysis, while the role of radiolabeling is never mentioned. This is noteworthy, inasmuch as another key consideration in biological studies, the problem of sensitivity of detection, is not specifically discussed, nor are its important consequences in determining which method(s) can be used to solve a particular problem.

In summary, this is another book that summarizes existing knowledge. While it contains no glaring errors, its main usefulness may be for the CV's of the authors. It can only be recommended to students of spectroscopic techniques who want some cursory knowledge, but who do not plan to use any of such techniques for their research.

Walter Wolf, *University of Southern California*

Neurotoxicants and Neurobiological Function. (Subtitle: Effects of Organoheavymetals). Edited by Hugh A. Tilson and Sheldon B. Sparber (Research Triangle Park and University of Minnesota). John Wiley & Sons: New York. 1987. xii + 368 pp. $79.95. ISBN 0-471-83815-2.

The editors state in the Preface that "the purpose of this book is to provide a critical evaluation of the literature concerning the chemical and biological properties of organic forms of environmentally relevant heavy metals." The title would imply a similar focus. My only criticism of the monograph is, in fact, that the title and stated purpose are too broad in scope. The contents are almost exclusively concerned with the biological aspects of only three organoheavymetal derivatives—those of tin, lead, and mercury. The chemical aspects, while covered quite succinctly in the initial chapter, are rather limited in scope, with frequent references to other compiled sources. The bulk of the material is more comprehensively concerned with the neuropathological, neurophysiological, and behavioral aspects of derivatives of these three metals. This rather minor criticism aside, the book is to be recommended to both experts and novices in the field. It is current through 1985, with a few 1986 references. The first chapter was particularly comprehensive and contained a very interesting historical perspective on the economics and related environmental sources of the materials. The final chapter provided some insight into the development of the associated regulatory polices. Each of the chapters, in my opinion, provides a critical evaluation of existing data in the field, advantages and pitfalls of experimental procedures used, and very lucid comments on relevant concerns for future investigations.

C. LeRoy Blank, *University of Oklahoma*

Inorganic Thermochromism. By Kono Sone and Yutaka Fukuda (Ochanomizu University). Springer-Verlag: New York. 1987. xi + 134 pp. $101.80. ISBN 0-387-17662-4

The overall feeling on reading this book is of authors who love their subject and who are trying to convey a sense of the delights of working in the area. The authors rightly claim that there has been a lack of any book in thermochromism to use as a "benchmark". Therefore, as the first text on thermochromism it is a most welcomed addition for those who want to enter the field. Although the principal aim of the text (134 pages) is to introduce the novice to inorganic thermochromism, the authors have interspersed with great delight other areas of "chromism" (e.g., piezochromism and solvatochromism) which illuminate the considerable depth of understanding and range of interest.

I found the book well presented and organized. However, in a short text like this there are areas of deficiencies for those who want to learn about the topic in total. For instance, it is unfortunate that the more fundamental aspects of thermochromism are given only a cursory description, experimental methods are not addressed, and there is no serious discussion of the application of the technique.

This is a book written in such a way that it is understandable to readers of an undergraduate level, yet it will stimulate researchers who want a general picture of the possibilities offered by thermochromism.

J. A. Capobianco, *Concordia University*

Biotechnology. Volume 4: Microbial Products II. Edited by H. Pape and H.-J. Rehm (Institut fur Mikrobiologie der Universitat). VCH Publishers, Inc.: Weinheim and Deerfield Beach, FL. 1986. xiii + 673 pp. $298.00. ISBN 089573-044-8

Microbial Products II, one of eight volumes in the series on biotechnology, deals with secondary metabolites and a few other naturally isolated complex molecules: nucleotides, vitamins, coenzymes, lipids, and siderophores. Although the 20 chapters of this volume were written by almost 30 authors, they are a collection of comprehensive reviews that present vastly different areas with uniform quality and relatively consistent styles.

The first three chapters give an overview of secondary metabolism, its biochemical and genetic basis, and its regulation. These three chapters are refreshing reading for researchers in the field and a good introduction for those who are not yet familiar with the subject.

The first chapter presents common mechanisms causing overproduction of metabolites. The second chapter gives general characteristics of secondary metabolism. It also discusses the environmental factors as well as intracellular regulatory mechanisms controlling the production of secondary metabolites. The two chapters pave the way for the very well written third chapter which is devoted to genetics and genetic manipulation of secondary metabolism.

Each of the other chapters in the book deals with a group of compounds. They are further divided into two parts: twelve chapters discuss products of secondary metabolism and five deal with other complex molecules which do not fall into the category of secondary metabolites (vitamins, nucleic acids, lipids, coenzymes, and siderophores). The types of secondary metabolites discussed in detail in this book include not only the various types of antibiotics, but also antitumor substances, alkaloids, glycosidase inhibitors, and plant cell culture products.

From each chapter, one can obtain information on the compound's history, sources, and related microbiology as well as the current state of knowledge on its chemical structure, activities, and biosynthesis. In

*Unsigned book reviews are by the Book Review Editor.

addition to this basic information, the processes of production and recovery are briefly described.

Overall, *Microbial Products II*, subtitled "a comprehensive treatise", is a very thorough, informative, and valuable resource on the complex molecules. This volume is clearly not overwhelming in its use of details, which so often makes reading review articles a cumbersome task. All of the chapters in this volume are precise, comprehensive, and concise. Every sentence was worthy of inclusion.

Wei-Shou Hu, *University of Minnesota*

Topics in Current Chemistry. 138. Edited by M. J. S. Dewar, et al. Springer-Verlag: New York, Heidelberg, and Berlin. 1987. 226 pp. $74.50.

This volume contains three reviews.

Some Aspects of the Chemistry of Polylithiated Aliphatic Hydrocarbons, by A. Maercker and M. Theis, focuses on the theory and synthesis of polylithiated aliphatic hydrocarbons which cannot be obtained by simple metalation reactions. The results of theoretical calculations for lithiated compounds containing one to four carbons are discussed. Several methods for synthesizing these compounds are also summarized, including halogen metal exchange, pyrolysis, mercury–lithium exchange, transmetalation, reductive metalation, metalation of acidic hydrocarbons, lithium vapor reactions, and fragmentations. Finally, the reactivity and structure of these compounds is reviewed.

In Heteroatom Directed Aromatic Lithiation Reactions for the Synthesis of Condensed Heterocyclic Compounds, by N. S. Harasimhan and R. S. Mali, general and specific strategies in the synthesis of condensed heterocyclic compounds are discussed. The authors begin by introducing general strategies for preparing disubstituted aromatic rings. These disubstituted aromatic rings are then used as building blocks for preparing 22 different classes of fused aromatic heterocycles. This review is both well organized and highly informative. In particular, this review demonstrates how directed metalation reactions can overcome problems involved in traditional heterocyclic synthesis.

Electrochemistry of Solvated Electrons, by N. M. Alpatova, L. I. Krishtalik, and Y. V. Pleskov, highlights the physical and theoretical aspects of electrochemically generated solvated electrons. A theoretical treatment of how the energy of solvated electrons is measured and the kinetics and mechanisms of the reactions are discussed. These data are reinforced by a discussion of general conditions for the cathodic generation of solvated electrons, primarily in nonaqueous organic solvents. A summary of the anodic oxidation of solvated electrons and their use in batteries is briefly detailed. Finally, the use of electrochemically generated solvated electrons for reducing benzene, toluene, tetralin, and cyclic ketones is discussed.

K. T. Hug, *Parke-Davis*

Some Modern Methods of Organic Synthesis. Third Edition. By W. Carruthers (University of Exeter). Cambridge University Press: Cambridge. 1986. 526 pp. $99.50 (cloth); $27.95 (paper). ISBN 0-521-32234-0

This book is a well-organized, concise compilation of modern synthetic reactions and methods. The author has added a significant amount of new chemistry to this edition, and also has changed the emphasis somewhat, highlighting aspects such as asymmetric reactions, stereoselectivity, and chemoselectivity. As a textbook, this book would serve well in a one-semester graduate synthetic organic course, or as part of a two-semester sequence in which additional material from recent literature reviews is included.

The book consists of seven chapters: (1) Formation of carbon–carbon single bonds; (2) Formation of carbon–carbon double bonds; (3) The Diels–Alder and related reactions; (4) Reactions of unactivated C–H bonds; (5) Synthetic applications of organoboranes and organosilanes; (6) Oxidation; and (7) Reduction. Chapter 1 includes enolate and enamine chemistry, and expanded sections on allylic alkylations via allyl organometallic reagents. The section on aldol condensations has also been expanded significantly to reflect the increasing utility of these reactions, particularly with respect to stereocontrolled synthesis. Only minor changes were made in the section on coupling reactions of organo-Ni and organo-Cu complexes. A discussion of palladium-mediated coupling reactions would have been a worthwhile addition to this section. A new section on free radical-mediated carbon–carbon bond formation was added to Chapter 1, reflecting the growing interest in and utility of this chemistry.

Chapter 2 covers a broad spectrum of alkene-forming reactions. New material added since the second addition includes the Ramberg–Backlund reaction and reductive couplings of carbonyl compounds. Although the section on the Claisen rearrangement was expanded somewhat, no material on the [2,3] Wittig rearrangement, which generates comparable types of products, was included. This would have been a useful addition, since the Wittig rearrangement has become quite popular.

The major additions to Chapter 3 include new sections on asymmetric Diels–Alder reactions and 1,3 dipolar cycloadditions and material on new types of dienes and dienophiles. Few changes or additions were made to Chapter 4.

Chapter 5 includes new material on asymmetric hydroboration with optically active boranes and stereospecific hydroborations of chiral alkene reactants. Separate sections have been written on alkenyl- and trialkylalkynylboranes and on free-radical reactions of organoboranes. Organo-silicon chemistry has been expanded to seven separate sections, including synthetic applications, alkenyl- and allylsilanes, silicon-controlled carbocation rearrangements, α-silyl carbanion chemistry, β-silylcarbonyl chemistry, trimethylsilyl cyanide chemistry, and trimethylsilyl iodide and triflate chemistry.

Chapters 6 and 7 provide a good survey of classical oxidation and reduction methods and include selected newer methods of greatest utility, selectivity, or efficiency.

It is impossible to include all of the new and important chemistry that develops over an eight-year period, but Carruthers has struck a good balance between brevity and completeness. In summary, Carruthers has succeeded at the difficult task of revising an already excellent synthetic organic text.

Grant A. Krafft, *Syracuse University*

Vogel's Qualitative Inorganic Analysis. 6th edition. Revised by G. Svehla. John Wiley and Sons: New York. 1987. x + 310 pp. $34.95. ISBN 0-470-20710-8

To consider this book from a U.S. educational viewpoint may not be appropriate in an international journal, since there are differences in educational systems; the revisor is affiliated with Queen's University, Belfast, North Ireland. For good or bad, inorganic qualitative analysis is a moribund academic subject in the U.S. Accordingly, probably many chemists who have never had a formal course in the subject have only a vague recollection of the classical scheme for the identification of "common ions" which separates cations into primary groups based upon their reactions with precipitating agents such as HCl or H_2S. The cations in the separated groups are then identified by their reactivity with additional test reagents or distinctive flame colors. Tests for anions are conducted separately by observation of gas evolution upon acidification, as well as precipitation reactions. In its prime period, introductory qualitative analysis was a separate, one-semester, required sophomore course and a good selection of texts was available. This book presents a more complete coverage of the techniques and methods of classical qualitative analysis than many of those texts. In addition to the common ions, it includes tests for certain less common ions such as Tl, W, Mo, Au, Pt, Se, Te, V, Ti, Be, Zr, U, Th, Ce, and Li, as well as more anions. It does not include the rare earths. Equations are given for the reactions. The book treats the reactions of the individual ions in their groups and then provides the group separation scheme as a separate chapter near the end of the text. A number of tests are described with organic reagents and spot tests. The laboratory manipulations and equipment are described in detail. Also included is material on the use of the charcoal block and blowpipe, borax, and microcosmic salt-bead tests. If the procedures in the last sentence are unfamiliar, perhaps the book might be of additional interest to a reader from the standpoint of a possible classical foundation. To someone familiar with qualitative analysis, the book really is not unique.

The reviewer found the preface pages to be most interesting, as indicated in the following short excerpts. In the preface to the first edition (1937), A. I. Vogel wrote "It is the author's opinion that the theoretical basis of qualitative analysis, often neglected or very sparsely dealt with in the smaller texts, merits equally detailed treatment with the purely practical side; only in this way can the true spirit of qualitative analysis be acquired." In contrast, the preface to this edition states "The new edition is aimed more to be a laboratory manual than a textbook, concentrating mainly on semi-micro laboratory technique. Even the new title recognizes this fact. With this aim in mind, the text has been rearranged and shortened. The theoretical introduction (taught previously in the classroom) has been omitted, ..."

Fifty years of progress?

Peter F. Lott, *University of Missouri—Kansas City*

Coal Science. By Rita K. Hessley, John W. Reasoner, and John T. Riley (Western Kentucky University). John Wiley & Sons: New York. 1986. xi + 269 pp. $35.00. ISBN 0471-81225-0

The authors have designed a book to be used primarily as a text for an introductory course in coal chemistry. The book is designed to be used with minimal background in chemistry and geology. However, a background in analytical, organic, and physical chemistry would be very useful in fully understanding some of the concepts presented in the text. The book is divided into five chapters covering major topics in coal chemistry. Chapter one is an introduction to coal. A brief history of the the uses of coal is presented. Definitions of common terms such as resource,

reserve, and rank are presented and explained. Chapter two deals with the petrology and petrography of coal. An excellent discussion on the formation of peat and coal is presented. The various coal classification systems are discussed with an emphasis on microscopic analysis. Chapter three deals with the organic structure of coal. Emphasis is placed on the reactivity of coal to various conditions and reagents. Several models for the structure of coal are presented. Chapter four deals with coal conversion. Various techniques of both liquefaction and gasification are discussed. The last chapter deals with the analytical chemistry of coal. Sampling and the problems associated with sampling are discussed in some detail. All of the classical analysis techniques employed by coal scientists are discussed. Several references are made to the ASTM procedures.

The book is well written and easily read, important items for a textbook. The book is well referenced; chapter two, for example, contains over 140 references. The book could be used as a text at either the undergraduate or the graduate level. There is one drawback as a textbook and that is the lack of questions at the end of the chapters. Questions concerning the major points made in each chapter would be a good addition. The book could also be used as a good introduction to coal for the first time researcher in a coal related project. All of the definitions, concepts, and jargon used routinely by coal scientists are explained and discussed.

Chris **W. McGowan**, *Tennessee Technological University*

Physical Organic Chemistry. By Neil S. Isaacs (University of Reading). Longman Scientific and Technical (copublished with John Wiley and Sons, Inc.): New York. 1987. viii + 828 pp. $49.95. ISBN 0-582-00474-8

As the title suggests, Isaacs has written an upper-level undergraduate or first-year graduate level text book dealing with physical organic chemistry. The author has divided his text into two major parts, each of which comprises about half of the book.

The first part, which consists of nine chapters, deals with the principles and techniques used by physical organic chemists to study reaction mechanisms. For example, these chapters contain sections dealing with bonding, kinetics, thermodynamics, linear free-energy relationships, solvent effects, acidity and basicity, kinetic isotope effects, conformational analysis, and catalysis. The second half of this book, which consists of seven chapters, deals with reaction types, including substitution, addition, elimination, pericyclic, radical, and photochemical reactions. The author has very nicely integrated the techniques discussed in the first part of the book in his explanation of the mechanisms of these various reactions.

Included in each chapter are a large number of tables of data which will prove useful not only to students but to practicing organic chemists. In addition, at the end of each chapter, there are between 27 and 240 references to the primary literature and about a dozen problems. Unfortunately, as with most text books, neither references nor solutions are provided for most of the problems.

I can highly recommend this book for use as a text in an advanced organic chemistry course for undergraduate or first-year graduate students.

Allan **R. Pinhas**, *University of Cincinnati*

Cadmium in the Aquatic Environment. Edited by J. O. Nriagu (National Water Research Institute, Ontario) and J. B. Sprague (University of Guelph). John Wiley & Sons: New York. 1987. xii + 272 pp. $65.00. ISBN 0471-85884-6

This is Volume 19 in the series *Advances in Environmental Science and Technology*, J. O. Nriagu being the series editor. In the introduction to the series, the editor outlines several objectives, which include stimulating an interdisciplinary cooperation among environmental scientists, and provides them with periodic overview of environmental developments. Within the framework of the stated goals, the book serves a useful purpose. The subject is presented in terms of general principles rather than being presented in a more involved fashion. It should be a useful book for practicing scientists and will provide uninitiated scientists with a starting point for the research in this area.

The book contains a total of ten chapters, mostly written by Canadian scientists. The first four chapters deal with the sources, behavior, and fate of cadmium in natural waters while the next five chapters discuss the biocycling and toxicity of cadmium to biota. Each is sufficiently well documented. Cadmium pollution from both natural and anthropogenic sources has been presented. However, the sources of anthropogenic pollution have not been dealt with with sufficient clarity and details.

Finally, there is a chapter entitled "Methods of cadmium detection", which actually is the compilation of several methods used for determination of cadmium. Analytical Chemistry (see manuscript requirement published in the first issue of the year) indicates that "elements, ions, and compounds are identified or determined". Sampling and several common techniques of determination of cadmium are included. However, only the summary of each analytical technique is presented. A problem common to many books (including this one) or research articles is that many people attempt to determine a substance without proving its existence. Wherever and whenever possible, qualitative analysis should be performed before determination of anything is done.

In summary, this book contains a wealth of information useful to many different types of scientists. The authors have made efforts to present the material in a simple manner that is understandable to anyone starting to work in this area. In addition, it should prove to be a good reference book.

Shyam **S. Shukla**, *Lamar University*

TrAC. Trends in Analytical Chemistry. Volume 4. Reference Edition. Elsevier Science Publishers: Amsterdam. 1986. viii + 280 pp. $109.25. ISBN 0-444-42635-3

This hard-bound volume is the reference edition of the periodical of the same name. It contains the archival material—reviews and research papers—published in 1985.

Chemistry and Physics of Carbon: A Series of Advances. Volumes 19 and 20. Edited by Peter A. Thrower. Marcel Dekker, Inc.: New York and Basel. Volume 19: 1984. xii + 341 pp. $79.50. ISBN 0-8247-7245-8. Volume 20: 1987. xii + 275 pp. $99.75. ISBN 0-8247-7740-9

This seemingly inexhaustible subject has given us two more volumes of contributed chapters. The topics in them are largely related to that branch of chemistry that is today fashionably referred to as materials science. The four chapters in Volume 19 are Substitutional Solid Solubility in Carbon and Graphite; Kinetics of Pyrolytic Carbon Formation; Etch-Decoration Electron Microscopy Studies of the Gas–Carbon Reactions; and Optical Properties of Anisotropic Carbon. And the three chapters in Volume 20 are Structural Studies of Pan-Based Carbon Fibers; The Electronic Structure of Graphite and its Basic Origins; and Interactions of Carbons, Cokes, and Graphites with Potassium and Sodium. Each volume has a subject index, and each has a list of the contents of earlier volumes.

Metal Ions in Biological Systems. Volume 22. ENDOR, EPR, and Electron Spin Echo for Probing Coordination Spheres. Edited by Helmut Sigel. Marcel Dekker, Inc.: New York. 1987. xxiii + 290 pp. $89.75 (U.S. and Canada); $107.50 (all other countries). ISBN 0-8247-7641-0.

Since the first volume of *Metal Ions in Biological Systems* edited by Professor Sigel was published in 1974, the acclaimed series has been extended to the present issue of Volume 22. The importance of metal ions in the life process has been increasingly recognized over the years. The present volume includes five chapters of studies using highly sophisticated techniques based on paramagnetic species. They are the electron nuclear double resonance (ENDOR), electron paramagnetic resonance (EPR), and electron spin echo (ESE).

Chapter 1, by J. Hüttermann and R. Kappl, describes the potential of ENDOR in probing the coordination environment of metal ions. Chapter 2, by H. R. Kalbitzer, summarizes the line-broadening effect of ^{17}O introduced into nucleotide phosphate groups on the EPR spectrum of Mn^{2+}. The third chapter, by H. Gampp deals with the analysis of line intensities (spin concentrations) and the determination of stability constant. Chapter 4, by M. W. Makinen and G. B. Wells, is concerned with the saturation of paramagnetic spin system with incident microwave power and the article focuses on the structural analysis of paramagnetic metal ion sites in proteins. The last chapter, by Y. D. Tsvetkov and S. A. Dikanov, is on the use of ESE for studying properties and structures of paramagnetic species in biological systems. The ESE method is a special pulse version of ESR, which acts on a spin system in a constant magnetic field by a series of either two or three microwave magnetic fields.

The books in this series are extremely useful for someone in the field of bioinorganic chemistry. Professor Sigel is to be especially commended for continuing this highly successful series of books on metal ions in natural compounds.

Anthony **T. Tu**, *Colorado State University*

Naturally Occurring Carcinogens of Plant Origin—Toxicology, Pathology and Biochemistry. Edited by I. Hirono (Fujita-Gakuen Health University School of Medicine, Toyoake, Aichi, Japan). Kodansha Ltd.: Tokyo. Elsevier Science Publishers B.V.: Amsterdam and New York. 1987. xi + 234 pp. $110.75. ISBN 0-444-98972-2.

This is Volume 2 of a series entitled, *Bioactive Molecules*; Volume 1 treated mycotoxins and phycotoxins. This volume is organized into twelve chapters with separate reference lists followed by a general index. The first ten chapters review the structure and toxicology of individual compounds or classes of compounds. I. Hirono contributes chapters on

cycasin and carrageenan and in collaboration with K. Yamada a chapter on bracken fern. M. Enomoto reviews safrole and tannic acids; S. Natori, mushroom hydrazines; H. Mori, betal nut; Y. Hirata, active principles of Euphobiaceae and Thymelaeceae (diterpenes); S. Natori and I. Ueno, flavonoids; T. Furuya, Y. Asada, and H. Mori, pyrrolizidine alkaloids. Each of these chapters describes the distribution of the plants containing the principles, summarizes data related to toxicology and carcinogenicity, and presents detailed chemical information. For example, in the chapter on bracken fern the isolation scheme for the bracken carcinogen, ptaquiloside, is presented along with its chemical structure, some known reactions, and ^1H and ^{13}C NMR spectral data. The chapter on the promoting (co-carcinogenic) principles of Euphorbiaceae and Thymelaeaceae depicts 29 diterpene skeletons, while that on betel nut lists twelve different ingredients and methods of preparing betal quids used in different areas of Asia. In contrast, the various biochemical activation processes, while described, are not treated in detail.

The chapter on flavanoids stresses the action of this class of compounds as mutagens and potential carcinogens, their pharmacological activities as anti-inflammatory agents, metal chelators, and antioxidants, and their inhibitory effects on aldose and aldehyde reductases, cyclic nucleotide phosphodiesterases, and the arachidonic acid cascade. The frequently reviewed activities of flavanoids as inducers, inhibitors, and stimulators of cytochrome P-450 monooxygenases and as inhibitors of skin tumorigenesis are only referenced.

The authors do not conclude that all the naturally occurring, biologically active compounds reviewed are chemical carcinogens in man. Where appropriate, evidence of carcinogenicity is presented (cycasin, pyrrolizidine alkaloids, mushroom hydrazines, etc.), while for some classes of compounds evidence for their role as promotors rather than genotoxic initiators is stressed (carrageenan, diterpene esters from Euphorbiaceae and Thymelaeaceae), and in other cases the authors conclude that no significant data from animal studies demonstrate carcinogenicity (tannins) or that the data indicate such weak carcinogenicity that an important role as a cause of cancer in humans is improbable (safrole).

Chapter 11 by M. Haga is a short description of some noncarcinogenic plants and plant materials of Japan, and the final chapter by S. Natori is a very general discussion of secondary metabolites as carcinogens. The structures of several carcinogenic mycotoxins and potential carcinogenic secondary metabolites from *Streptomyces* are shown. Except for concluding that carcinogens of plant origin are diverse in both structure and biosynthetic origin, the final chapter provides little new or useful information.

While the value of the final two short chapters appears questionable, overall this well-written volume provides useful reviews of the distribution, chemical structures, toxicology, and potential carcinogenicity of some secondary metabolites of plant origins.

William L. Alworth, *Tulane University*

Selective Gas Chromatographic Detectors, Journal of Chromatography Library, Volume 36. By M. Dressler (Czechoslovak Academy of Sciences). Elsevier Science Publishers: Amsterdam and New York. 1986. xiii + 319 pp. $72.25. ISBN 0-444-42488-1.

This book provides a timely review of the more popular selective detectors employed in gas chromatography. For each detector, the historical background, underlying principles of operation, and the various designs and configurations are presented. The more important experimental parameters affecting detector response are outlined in detail. After a brief introduction, the basic terms relating to detectors in general are defined, including sensitivity, detectability, detection limit, and noise and selectivity. Separate chapters are devoted to alkali flame-ionization detectors and flameless alkali sensitized detectors. For the latter type of detector the design and pertinent parameters of this detector for each major manufacturer is described. The flame-ionization detector (and the hydrogen atmosphere flame-ionization detector) is treated in Chapter 5 while the photoionization detector is discussed in Chapter 6. Detectors whose principles of operation are based on emission spectroscopy are covered in Chapter 7 (flame photometric detectors) and Chapter 8 (chemiluminescence detectors). Key operational aspects and theory of electrolytic conductivity detectors with emphasis on the Hall and Coulson versions are the subject of Chapter 9; coulometric detectors are tokenly addressed in Chapter 10. The oldest of the selective detectors, the electron capture detector, receives deservedly substantial coverage in Chapter 11. In the last two Chapters the ion mobility detector (formerly the original name of this technique was plasma chromatography) and miscellaneous detectors based on plasma emission spectrocopy, atomic absorption, ion-selective electrodes, piezoelectric sorption, and mass and IR spectrometry are described. The author has achieved the stated goal and the book should be well received by workers utilizing gas chromatography in the areas of toxicology, agriculture, as well as environmental and clinical chemistry. This book is highly recommended for purchase by institutions and organizations performing gas chromatography.

Eugene F. Barry, *University of Lowell*

Fundamentals of Organic Chemistry. By John McMurry (Cornell University). Brooks/Cole Publishing Company: Monterey, CA. 1986. xii + 512 pp. $33.75. ISBN 0-534-05280-0.

This text is intended for the short organic chemistry course taken by science, engineering, and allied health majors, such as pre-nursing and nutrition students. It is not written for chemistry majors.

The length of the text and the materials presented are appropriate for a one-semester or two-quarter course. Naturally, the depth, amount, and choice of material to be included in a short course has to be condensed. The author has done a fine job in his selection of topics to be included and excluded, so that the text contains the subjects required for students taking a short organic chemistry course.

The text is written clearly and organized by a functional-group approach. Structure and bonding, including hybridization, and a review of acid–base theory are presented in Chapter 1. Chapter 2 introduces the concept of functional groups starting with the simplest organic compounds, the alkanes. The succeeding chapters (3 through 12) discuss alkenes, alkynes, aromatic compounds, alkyl halides, alcohols, ethers, phenols, aldehydes and ketones, carboxylic acids and derivatives, carbonyl α substitution and condensation reactions, and amines. Chapter 6 discusses stereochemistry. I would have preferred that the author introduce the use of Fischer projection formulas here rather than in Chapter 14 on the carbohydrates. Chapter 8, which discusses the alcohols, ethers, and phenols, is excellent in that the students can see the similarities and differences between these three classes of compounds in relation to their functional groups. Mechanisms are used throughout the text explaining similarities and differences between the various functional groups.

Structure determination by Spectroscopy (IR, UV–vis, and NMR) is discussed in Chapter 13. The author might have included a brief section on mass spectroscopy, particularly because of its increasing use in the separation and identification of organic compounds by coupling a mass spectrometer to a gas chromatograph (especially in forensic chemistry, drug analysis, etc.).

Chapters 14–16 discuss the biochemistry of carbohydrates, proteins, lipids, and nucleic acids. I would have liked to see the biochemistry topics discussed in more depth and detail, particularly since a large number of pre-nursing and nutrition students take a short organic chemistry course where this text may be used. However, this short-coming is compensated by the author relating organic reactions to biochemical applications throughout the text. The use of 21 so-called interludes at appropriate points in the text also illustrates how organic chemistry can be applied to biochemistry and industry. I found this approach to be innovative and quite interesting.

The text contains worked-out sample problems, and over 750 exercises to be performed by the student. The exercises are varied. Some are standard-type questions; others require thought and comprehension of the many aspects of the subject matter. The variety, scope, and level of these exercises is very good. A study guide and solutions manual is available.

The book contains cross-referencing to earlier material and the level of presentation and writing style is clear throughout. An excellent feature is the use of a second color in chemical reactions, clearly illustrating the changes that occur in going from reactants to products. Overall, I woould recommend this text for use in a short organic chemistry course.

Reuben L. Baumgarten, *Lehman College*

Mechanistic Approaches to Interactions of Electric and Electromagnetic Fields with Living Systems. Edited by Martin Blank (Columbia University) and Eugene Findl (Technical Consultants Group). Plenum Press: New York. 1987. ix + 443 pp. $85.00. ISBN 0-306-42684-6.

This book is an impressive up-to-date collection of 26 articles that critically examine the mechanisms proposed to explain the effect of electric and electromagnetic fields on biological systems. The first three chapters (Ions and Membrane Surfaces, Macromolecules, Membrane Matrix) focus on subcellular entities, and the fourth chapter (Integrated Systems) describes the investigation of whole cells and multicellular organisms.

The editors have selected authors who have distilled the best experimental and theoretical results into a set of concise reports. The experimental results offer compelling evidence for the existence of electric, magnetic, and electromagnetic field effects in biological systems. Empirical results are complemented by several papers that develop and describe possible mechanisms. This book is remarkable because this area of research is hampered by conflicting experimental observations that cannot be ascribed to a single simple theoretical model. Scientists unfamiliar with the field will find this book valuable. The primary literature is extensively documented, and most articles include 1987 citations.

Chemists are likely to find topics concerning the effect of electric fields

on the electrochemical potential of ionic processes at membrane surfaces and the effect of oscillating electric and magnetic fields on ion transport and selectivity in membranes of great interest.

Barry B. Corden, *Tufts University*

Stereochemistry of Organometallic and Inorganic Compounds. Volume 1. Edited by Ivan Bernal. Elsevier Science Publishers: New York and Amsterdam. 1986. xii + 451 pp. Dfl. 95.25. ISBN 0-444-42605-1.

The goal of this series is to interpret the relationships between stereochemistry and other properties of organometallic and inorganic compounds. The first volume in this series provides five review articles, including the following: Stereochemistry of 1,3-Diene Complexes and the Steric Course of Their Reactions (A. Nakamura, K. Tatsumi, and H. Yasuda, 43 pp); Stereochemistry of the Phosphates of Divalent Metals (A. G. Nord, 87 pp); Transition Metal Complexes with Carbon Disulfide; Correlations between Stereochemistry and Reactivity (C. Bianchini, C. Mealli, A. Meli, and M. Sabat, 93 pp); Stereochemistry of the Bailar Inversion and Related Metal Ion Substitution Reactions (W. G. Jackson, 120 pp); and Stereochemistry of Acetylenes Coordinated to Cobalt (G. Palyi, G. Varadi, and L. Marko, 41 pp). A useful subject index is provided at the end of this volume for each review article (chapter). The index is based on specific topics as well as specific compounds.

Each of the chapters appears to be generally well written and contains numerous references, with the most recent generally being 1984. The book will be useful for people who are searching for reviews on stereochemical topics. Thus, this series should be included in reference libraries.

O. T. Beachley, Jr., *University at Buffalo*

Books on Applied Subjects

Quality Assurance in Process Plant Manufacture. By J. H. Rogerson. Elsevier: Amsterdam and New York. 1986. vii + 159 pp. $41.25. ISBN 1-85166-003-8

This book is concerned with the specific management protocols for the discipline of quality assurance as applied to manufacturers and suppliers.

Sensors and Actuators: State of the Art of Sensor Research and Development. Edited by S. Middelhoek and J. Van der Spiegel. Elsevier Sequoia S. A.: Lausanne, Switzerland. 1987. viii + 425 pp. ISBN 0-444-75065-7

This is a collection of contributions about detectors for nuclear radiation, gases, magnetic fields, humidity, etc., with special attention to solid-state transducers. The papers are reviews invited by the Editor of the *Journal of Sensors and Actuators.*

Ion Plating Technology: Developments and Applications. By N. A. G. Ahmed. John Wiley & Sons: Chichester and New York. 1987. xi + 171 pp. $51.95. ISBN 0471-91473-8

Ion plating is a technique by which a deposit is made from a plasma having a small flux of high-energy ions and a large quantity of high-energy neutrals. It is offered as an alternative to electroplating, and it can be used to produce coatings of metals, their nitrides, and their oxides.

Coal: The Energy Source of the Past and Future. By Harold H. Schobert. American Chemical Society: Washington, D.C. 1987. xiii + 298 pp. $29.95 (cloth), $19.95 (paperback). ISBN 0-8412-1171-X (cloth); 0-8412-1172-8 (paperback)

This book was written largely to tell "the story of coal to the general public." Nonetheless, it includes an impressive amount of useful information, with an historical perspective not easily found elsewhere. The story begins with what coal is, how it was formed, where it is found, its chemistry and physics, and mining and transportation. There then follows an organized treatment of utilization of coal, from simple burning to manufacture of chemicals and synthetic fuels. It is easily readable, intelligiently written, and well indexed. An appendix of annotated suggestions for further reading is included.

Design Considerations for Toxic Chemicals and Explosives Facilities. Edited by Ralph A. Scott, Jr., and Laurence J. Demeny. American Chemical Society: Washington, D.C. ACS Symposium Series, No. 345. 1987. vii + 318 pp. $64.95. ISBN 0-8412-1405-0

The 21 typewritten symposium papers in this volume are arranged in four categories: Blast Pressure and Fragmentation Effects; Thermal Effects; Chemical Effects; and Other Design Considerations. Indexes of authors, affiliations, and subjects are provided.