Book Reviews*

Environmental Quality and Safety. Volume 3. Edited by F. COULSTON and F. KORTE. Academic Press, New York, N.Y. 1974. viii + 245 pp. $22.50.

This is a curious publication, for its editors seem to treat it as a periodical, but its publishers treat it as a book. There are twenty-three papers, by a variety of contributors, on a wide spectrum of subjects ranging from "How Safe is Safe? A Consumer's Viewpoint" to "Residues in Animals During Chronic Exposure to Dieldrin." Some papers are thus very general reviews, whereas others are accounts of original research. A page at the end is headed "Information for Authors," and its contents closely resemble similar directions in primary journals. It is stated that manuscripts must be submitted ready for press, and that page proofs are submitted for information only, no corrections being permitted. Refereeing is not implied, but a worldwide editorial board larger than the list of contributors is presented. Looked at as an issue of a journal, the price is exorbitant. The whole thing makes one wonder.

Residue Reviews. Volume 53. Edited by F. A. GUNTHER and J. D. GUNTHER. Springer-Verlag, New York, N.Y. 1974. ix + 157 pp. $18.20.

This is an organophosphorus volume, which contains eight chapters under the rubric "New aspects of organophosphorus pesticides," by thirteen contributors. A final chapter, dealing with dalapon, 2,2-dichloropropanoic acid, a commercial grass killer, seems out of place. The articles are serious reviews of the chemistry and metabolism of these substances, and in some cases appear to contain previously unpublished material.

Transport at the Cellular Level. Edited by M. A. SLEIGH and D. H. JENNINGS. Cambridge University Press, New York, N.Y. 1974. viii + 581 pp. $29.50.

This book contains the papers presented at the twenty-eighth symposium of the Society for Experimental Biology. The papers are strongly oriented toward membrane biochemistry, and appear to contain much original research. They are, mercifully, typeset, and very well illustrated. An unusually detailed index is a significant asset.

Concise Chemical and Technical Dictionary. Third Edition. Edited by H. BENNETT. The Chemical Publishing Co., Inc., New York, N.Y. 1974, xxxix + 1175 pp. $35.00.

This is a much enlarged edition that is notable for a rich content of trade names in addition to a comprehensive listing of ordinary chemical and technical terms. The definitions are quite concise, yet for the most part are sufficiently illuminating. There are some unfortunate circular definitions, such as benzal: "see benzylidene"; benzylidene: "see benzal". Wrong definitions are rare, but there are far too many typographical errors of a type that can be confusing. For example, leuco malachite green is defined as "see *p,p'*-benzol-bis-N,N-dimethylaniline", but that name cannot be found, for, of course, it should be "benz*a*l".

A large fraction of the dictionary consists of names of organic compounds. It is thus astonishing to find the admission in the forepages that the nomenclature used is that of the IUC Commission Report of *1930,* which was long ago superseded. The neglect of updating exemplified by the nomenclature also shows up in the omission of large numbers of important, widely used terms introduced in the last one or two decades, such as suprafacial, Hammett equation, H_0, imidogen, DMF, DMSO, CIDNP, optical rotatory dispersion, Florisil, nuclear quadrupole resonance. Other terms are given without one of their important meanings; for example, TMS (sic!) is defined as "thermomechanical analyzer," and synthon is defined as "artificial fiber," omitting its meaning in organic synthesis. Orthography of chemical names is very sloppy; spaces are put in where they are not allowed, or omitted where they are essential. Punctuation of abbreviations is equally sloppy; e.g., "T.N.T.," but "TNX."

This is a useful book, with the foregoing caveats, and reasonably priced, but it leaves the field as wide open as ever for a really good chemical and technical dictionary.

Using the Chemical Literature. A Practical Guide. By HENRY M. WOODBURN (SUNY Buffalo). Marcel Dekker, Inc., New York, N.Y., 1974. viii + 302 pp. $14.50.

This soft-bound volume is photoreproduced from typescript. It is indeed a practical guide, and is devoid of the pendanticism that one often encounters in works on chemical literature. Its emphasis is on what is useful today, rather than on what used to be important. Innovations of recent years, such as collections of spectra (ir, nmr, uv), newer information services, line notation systems, the registry number index, Science Citation Index, alerting services, microform publication, translation services, and computer-readable material, are described in useful detail, yet concisely. There is a glossary of acronyms as well as a subject index. This book should find wide use by practicing chemists as well as students.

The Practice of NMR Spectroscopy. By N. F. CHAMBERLAIN (Exxon Research & Engineering Co.). Plenum Press, New York, N.Y. 1974. xxiv + 424 pp. $29.50.

The author states that "this volume is intended as a handbook to be used in the laboratory or office rather than as a reference book for the library." It is indeed oriented to practice rather than theory, and after a 14-page introduction, it is concerned almost entirely with how to do it.

One chapter is devoted to "Producing NMR Data", and is concerned with sample preparation (solvent, temperature, concentration, etc.) and data production (recording, resolution, sidebands, exchange, etc.). Separate chapters deal with analytical procedures, chemical shift correlations, and coupling constant correlations. These chapters go into much more detail than in most other work and are full of charts and tables and useful generalizations. A chapter entitled "Typical NMR Spectra" consists of short discussions of a selected group of spectra, arranged according to structural type; the spectra themselves are reproduced in an Appendix. They are very clearly printed and are helpfully labeled with keys to the couplings involved.

Somewhat over half the book is devoted to correlation charts. These charts cover far more structural situations than are usually seen in such compendia. A welcome feature is that, in addition to the usual bars to show graphically the place and range of a particular type of chemical shift, the range is also given numerically, and the number of compounds on which the ranges are based is given. The variety of functional groups included is remarkable and includes such exotic ones as pentafluorophenyl, SR_2^+, $P(O)Cl_2$, isocyano, and guanylhydrazone. It looks as though it will have the sort of use the author intended for it, and it looks very usable indeed.

Reagents for Organic Synthesis. Volume 4. By MARY FIESER and LOUIS F. FIESER (Harvard University). Wiley/Interscience, New York, N.Y. 1974. 660 pp. $24.95.

Reagents covered in the literature of 1970–1972 are the subject of this volume, and there are 297 new ones together with new information on 350 reagents previously discussed. The format is that used in previous volumes—alphabetical listing of reagents, with equations, brief description, and references. Many reagents and reactions are of necessity included that have not been widely examined; it is to be expected that not all will stand the test of time. Reviews are listed where they exist. In the interests of brevity, there are no tables of examples of a given reaction, so that only a range of yields is stated in those cases where a considerable number of examples have been reported. Presumably also in the interests of economy, this work for the first time appears without a cat picture; however, the authors hasten to absolve themselves of any accusation of feline affront by dedicating this volume "to the many cats that we have had the pleasure of knowing."

As with previous volumes, browsing in this one can be rewarding, and one is likely to find that potentially useful information

* Unsigned book reviews are by the Book Review Editor.

that might otherwise have been overlooked. An author index and a subject index that includes products and types of transformation make access relatively easy.

Ring Transformations of Heterocycles. Volume 1. By H. C. VAN DER PLAS (Landbouwhogeschool, Wageningen). Academic Press, New York, N.Y. 1973. xvi + 484 pp. $34.00.

This two-volume work is about conversions of one heterocyclic ring into another, a process which the author believes to be of increasing importance for synthesis as compared to the conventional methods of using a precursor with the required ring system, or an acyclic system. In Volume 1, three-, four-, and five-membered heterocycles are treated; larger rings are treated in Volume 2. The reactions are subdivided into those involving contraction, retention, or expansion of ring size. The large subject of conversion of heterocyclic into homocyclic rings is not treated. The literature has been surveyed through 1970.

The amount of work that has been published on these processes is amazing, considering how little the average chemist is aware of it. The classical Dimroth rearrangement of 5-aminotriazoles, which does not itself convert the ring to a different one, has become recognized as an example of a more general process in which an exocyclic and an endocyclic heteroatom exchange places, but such reactions are only a small part of the scope of this book.

The coverage is close to encyclopedic, and the number of references for one chapter alone is 850. Both synthetic value and mechanism are discussed, although yields are not quoted as extensively as one interested in synthesis might like. There are no tables, for the nature of the subject does not lend itself to such presentation, but structural formulas and charts of reaction schemes abound. An author index and a moderately detailed subject index complete this volume, which is a most welcome addition to the literature.

Fundamental Measures and Constants for Science and Technology. By FREDERICK D. ROSSINI (Rice University). CRC Press Inc., Cleveland, Ohio. 1974. 132 pp. $29.95.

This book is the outcome of a series of lectures given by Professor Rossini in 1972 and 1973. In the fourteen chapters, a concise history of the development of each topic is given, together with a succinct but critical discussion of the experimental methods on which the values are based. The best values available today are given for most important constants in such fields as temperature, pressure, atomic weights, heat, etc. What distinguishes this work from an ordinary compilation is that everything is documented in such a way that the user can evaluate the reliability of the figures given, and is given the key to more extensive compilations, not only those contemporary but those that were used at various times in the past. The lucid explanations of the interrelations of units and the compelling reasons for the many redefinitions of units and quantities are also an outstanding feature and make good reading for any chemist. This is a book that gives both useful data and insight into their significance.

Basic Principles in Nucleic Acid Chemistry. Volume 2. Edited by PAUL O. P. TS'O (The Johns Hopkins University). Academic Press, New York and London. 1974. xi + 519 pp. $34.50.

It is fitting to commemorate the centennial anniversary of the discovery of nucleic acid by Friedrich Miescher with the publication of Paul O. P. Ts'o's multi-authored treatise on the physicochemical aspects of nucleic acids, poly- and oligonucleotides, and the monomers. By interrelating physicochemical and biological aspects of the nucleic acids, the editor addresses an audience trained in a variety of disciplines. Extensive references and author and subject indexes are included. Although there is some overlap of topics between the chapters, the points of view represented in the chapters are quite different.

This second volume of the series is of value to teachers of advanced, specialized courses and researchers in biological, biomedical, biochemical, and chemical fields who are interested in the chemical reactions and optical, hydrodynamic, and thermodynamic aspects of nucleic acids, circular DNA, and the conformations and interactions of dinucleotides and oligonucleotides.

D. M. Brown reviews the chemistry of the nucleic acid nitrogenous bases, of some of the natural modified bases, and of nucleosides, nucleotides, and suitable analogs in the first part of the opening chapter. The discussion is restricted to chemical reactions having significance either from a biological point of view or importance in terms of polynucleotide structure elucidation. The chemical reactions leading to the cleavage of the internucleotide linkage and the effect of polymer conformation on the reactivity of residues in a polymeric system are considered in the latter part of this chapter.

The second chapter, prepared by C. Allen Bush, is concerned with the optical properties (ultraviolet spectroscopy, circular dichroism, and optical rotatory dispersion) of nucleic acids, poly- and oligonucleotides, and their monomers. The author begins with a theoretical introduction to optical properties at the level of an advanced biochemistry text and then briefly considers nucleotide chromophores. The second half of the chapter deals with a description and interpretation of the ultraviolet absorption spectra and the optical activity of nucleosides, nucleotides, oligo- and polynucleotides, RNA, DNA, and nucleoprotein complexes.

In the third chapter, Henry K. Eisenberg provides an in-depth analysis of a limited number of specific topics within the framework of hydrodynamic and thermodynamic studies of nucleic acids rather than an encyclopedic overview of that whole subject. The basic theoretical aspects of polymers and of nucleic acids in solution are considered in detail in the first part of the chapter (macromolecular, thermodynamic, and polyelectrolyte aspects; equilibrium properties; transport phenomena). The remainder of the chapter is concerned with the following specific topics: molecular weight of DNA and relations to hydrodynamic parameters, the flexibility of DNA, the interaction of nucleic acids with small ions, hydrocarbons, and dyes, and the conformation of polynucleotides.

The focus of the fourth chapter, written by William Bauer and Jerome Vinograd, is the physicochemical aspects of circular DNA and, more specifically, of closed double-stranded DNA. In brief, to-the-point sections, the authors examine topological and thermodynamic aspects, tertiary structure, the helix-coil transition, reactions with intercalating substances (the reaction with ethidium bromide is treated in detail), superhelix density, and finally some biological aspects. A glossary of terms used in the description of closed circular DNA is included in the chapter.

The fifth and final chapter, written by the editor himself, examines the conformation of dinucleoside monophosphates and oligonucleotides and the interactions between dinucleotides and oligonucleotides and between oligonucleotides and polynucleotides. In the first section on dinucleoside monophosphate conformation, the stereochemistry, the methods of investigation of conformation, conformational models and dynamics, and backbone influence on conformation are considered. The second section deals with the interaction of dimers in organic solvents, the association of homooligonucleotides, the self-association of oligonucleotides containing two complementary bases in alternating sequence, and the association of complementary oligonucleotides. In the third section, oligomer-polymer interactions are examined. In each of the three sections, a number of specific examples are analyzed in considerable detail.

A. Wohlpart, *Kenyon College*

Organometallic Chemistry of Titanium, Zirconium, and Hafnium. By P. C. WAILES, R. S. P. COUTTS, and H. WEIGOLD (CSIRO Applied Chemistry Laboratories). Academic Press, New York and London. 1974. x + 302 pp. $29.50.

As part of the Academic series of monographs on organometallic chemistry, this book represents a critical and comprehensive review of the organometallic chemistry of titanium, zirconium, and hafnium. A brief introductory chapter is followed by six chapters which discuss various organometallic compounds of the title elements and a final chapter which specifically covers the reactions of dinitrogen with organotitanium compounds. The majority of the book deals with cyclopentadienyl derivatives of Ti(IV), Ti(III), Ti(II), and Zr(IV), since these have been by far the most extensively studied. The field of Ziegler-Natta olefin polymerization is covered briefly, but in sufficient depth to underline the role of the organotitanium compounds in the process.

This book is intended for those engaged in research. As such the authors' viewpoint is classically descriptive, and each compound is discussed according to its synthesis, color and form, stability, melting point, and spectroscopic properties. This information is well organized in a number of comprehensive tables which are extremely useful. The accumulation of a very comprehensive list of refer-

ences, numbering nearly 800, is probably the most important contribution made by this work. No publication during the period 1962-1972 appears to have been overlooked. A short Appendix outlines the major advances of 1973. As the first truly complete review of titanium, zirconium, and hafnium, this book is surely a worthwhile contribution to organotransition-metal chemistry.

John E. Bercaw, *Contribution No. 5023*
A. A. Noyes Laboratory of Chemical Physics
California Institute of Technology

Solid State Chemistry. Edited by C. N. R. RAO (Indian Institute of Technology). Marcel Dekker, Inc., New York, N.Y. 1974. x + 918 pp. $59.50.

This volume derives from lectures given at the Winter School in Solid State Chemistry conducted at the Indian Institute of Technology in Kanpur, India, during December of 1971. Editor Rao carries impressive credentials which certainly qualify him to edit this collection of articles. In his preface, Professor Rao states, "... it is my sincere hope that this volume will serve as a good introduction to some of the important aspects of solid state chemistry and materials science." It is my own belief that the book will serve well in that capacity.

The book begins with several chapters concerning some important aspects of crystal chemistry. These include discussions of structural chemistry in solids, reaction mechanisms in solids, and laboratory methods. Following these chapters, several others are devoted to more specific discussions of lanthanide and actinide oxides and transition metal fluorides, oxides, and sulfides. The remainder of the book deals with a topical area I will classify as practical applications of physical phenomena and methods in solid state chemistry, including discussions of NMR, the Mössbauer effect, optical spectroscopy, thermodynamics, electrochemistry, and ferroelectric behavior.

While, individually, each of these topical areas is already well represented by numerous texts, their combination in a single volume has created the kind of interesting and fairly comprehensive introductory text which is often difficult to find for such an interdisciplinary field. Scattered, brief discussions of various applications of solid state technology (principally electronic) provide additional interesting reading and serve to focus attention of the practical importance of this field of science.

As is essential for an introductory volume, contributors have been able to present their material in a manner which is very readable and presumes on the part of the reader only a moderate familiarity with specialized terminology. Theoretical sections, the usual bane of chemists and material scientists, are appropriately brief, present interesting material and require only a casual acquaintance with the language of quantum and statistical mechanics to be understood. The contributors have also provided extensive references following each chapter, and the text, as a whole, is well indexed.

The book appears to be an excellent introductory text for the graduate level and, at the same time, should prove to be an interesting and informative reference book for a variety of practitioners working in the area of solid state science.

R. M. Panos, *Air Force Materials Laboratory*

Laser Light Scattering. By B. CHU (SUNY, Stony Brook). Academic Press, New York, N.Y. 1974. xii + 317 pp. $31.50.

As with many fields of optics, light scattering has been revolutionized by the introduction of the laser. Through use of coherent monochromatic light, extremely accurate measurement of the frequency spectrum of scattering has become possible which has lent a new dimension to the application of scattering techniques to problems in chemistry and physics. This book is an excellent review of the fundamentals of these techniques with a good survey of recent applications. The author presumes (perhaps somewhat optimistically) a level of sophistication of the reader as that of a physical chemistry graduate student. Electromagnetic theory is reviewed extensively utilizing vector and tensor notations. The emphasis is on quasielastic laser scattering, and the approach follows classical rather than quantal theory. There is a good discussion of theoretical and experimental techniques of light mixing spectroscopy followed by a chapter on interferometric methods. The author expresses the opinion that these two techniques will develop so as to effectively complement each other, enabling the study of the entire time domain ranging from seconds to 10^{-12} seconds. He also indicates that digital counting techniques will supersede analog methods, leading to increased importance of his discussion of photon counting fluctuations. While the chapter on experimental methods does not emphasize the standard conventional light scattering techniques, it should be very useful to experimentalists entering the laser light scattering field. There is a good review of the applications of laser light scattering to macromolecular science with an excellent discussion of its use for molecular weight and diffusion coefficient determination with some discussion of its ability to resolve rotational diffusion coefficients and internal motions of macromolecules. There is also an interesting chapter on the application of these techniques to the study of reaction kinetics. The potential of this approach is still somewhat uncertain, and its applications have so far been rather specialized. An application of especial interest to engineers is that discussed in the chapter on anemometry in which the Doppler shift produced by motion in a fluid may be studied. This approach has much potential for use by rheologists and for the study of turbulent flow. The book is concluded with a chapter on critical opalescence which is rather brief and is a compact survey of some applications to this field.

Richard S. Stein, *University of Massachusetts*

Higher Excited States of Polyatomic Molecules. Volume 1. By M. B. ROBIN (Bell Telephone). Academic Press, New York, N.Y. 1974. xi + 374 pp. $31.00.

This book focuses on the spectra in the vacuum ultraviolet region between 50,000 and 100,000 cm^{-1}. The author has collected and correlated data of electronic spectra of both organic and inorganic polyatomic molecules. The accent in the book is strongly experimental and is written specially for a researcher engaged in vacuum ultraviolet research. This book presents a comprehensive up-to-date account of current research on higher excited states of molecules in the gas and liquid phase up to mid-1973.

The book is divided into three chapters. A brief discussion of theoretical aspects is presented in Chapter I. Chapter II describes experimental techniques, both old and new, including photoelectric and electron impact spectroscopy. A section on general instrumentation is also included. A large collection of electronic spectra from various classes of saturated molecules is displayed in Chapter III.

This book should serve as a useful guide and reference source to those engaged in research on electronic structure of molecules.

R. R. Alfano, *City College of New York*

Electronic Structure and Magnetism of Inorganic Compounds. Volume 3. Senior Reporter: P. DAY (University of Oxford). The Chemical Society, London. 1974. xi + 433 pp. £ 14.00.

Volume 3 of "Electronic Structure and Magnetism of Inorganic Compounds" provides a comprehensive (more than 2100 literature citations) and systematic coverage of the relevant literature published during 1972 and early 1973. This volume is divided into four chapters: (1) Electronic Spectra (by P. Day); (2) Natural and Magnetic Optical Activity (by R. G. Denning); (3) Magnetic Susceptibility Measurements (by A. K. Gregson); and (4) Photoelectron Spectroscopy (by A. Hamnett and A. F. Orchard). The subjects of electronic spectra (124 pp) and photoelectron spectroscopy (197 pp) occupy most of the volume.

The reporters are to be congratulated on their success in condensing the extensive literature in these areas into an organized and succinct survey. The treatments of magnetic susceptibility and photoelectron spectroscopy are exceptionally well written, and approach admirably the goal of the Specialist Periodical Reports, which is to provide "critical in-depth accounts ... less than twelve months after the period of literature coverage." The availability of such high-caliber reports is invaluable to scientists who wish to keep abreast of recent developments lying outside their areas of special interest.

William S. Glaunsinger, *Arizona State University*

Polymer Synthesis. Volume 1. By STANLEY R. SANDLER (Borden Chemical Co.) and WOLF KARO (Lactona Corp.). Volume 29 of "Organic Chemistry," Alfred T. Blomquist and Harry Wasserman, Ed. Academic Press, New York, N.Y. 1974. ix + 572 pp. $39.50.

This volume presents a variety of organic polymer syntheses for

major classes of monomers. The scope is indicated by the list of chapter titles: Polymerization of Olefinic and Diolefinic Hydrocarbons; Polyesters; Polycarbonates; Polyamides; Polymerization of Aldehydes; Polymerization of Epoxides and Cyclic Ethers; Polyureas; Polyurethanes; Thermally Stable Polymers; Polymerization of Acrylate and Methacrylate Esters; Polymerization of Nitrile Monomers; Polyacrylamide and Related Amides; Organophosphorus Polymers; Free-Radical Initiators: Diacyl Peroxides; Free-Radical Initiators: Hydroperoxides.

It is described as "a useful guide to polymer synthesis and design for the industrial research workers and for graduate and advanced undergraduate students in polymer, organic, and medicinal chemistry." It is listed as Volume 1 without explanation about Volume 2.

The various chapters present comprehensive and useful experimental directions for the indicated classes of polymers. These are taken directly from the literature, but without confirmation. The coverage is much more in-depth for these classes than is provided by Sorenson and Campbell, "Preparative Methods of Polymer Chemistry" (1968), or Braun, Cherdron, and Kern, "Techniques of Polymer Syntheses and Characterization." Those books present useful chapters on polymer characterization and fabrication and orientation of shaped articles, which the present volume does not cover. Also, Sorenson and Campbell describe preparations of a wider variety of polymers (1-nylons, polyacetylenes, polymerization of β-lactones, p-xylylenes, silicones, olefin metatheses) than this book. However, this book presents a unique chapter on phosphorus-containing monomers. The chapter on recent high-temperature polymer synthesis is also very useful. Perhaps Volume 2 will embrace the other types of monomers.

Safety aspects are strongly and appropriately stressed. Some useful infrared spectra of polymers and oligomers are presented.

This book is the result of careful digestion of a vast amount of literature. In view of the great amount of information it presents on the topics with which it concerns itself, it is reasonably priced and is a welcome addition to the armory of the synthetic organic polymer chemist.

H. K. Hall, Jr., *University of Arizona*

Topics in Current Chemistry. Silicon Chemistry. II. Properties and Preparations of Si-Si Linkages. EDWIN HENGGE (Institut fur Anorganische Chemie der Technischen Hochschule). Springer-Verlag, Berlin-Heidelberg-New York. 1974. 127 pp. $17.30.

"Properties and Preparations of Si-Si Linkages" is authored by Professor E. Hengge of the Institut fur Anorganische Chemie der Technischen Hochschule in the beautiful City of Graz. Professor Hengge has made many contributions to the literature describing Si-Si compounds and therefore is well qualified to review this subject.

The literature through 1972 has been skillfully presented in a manner which is logical and easily understood. The subject is well covered except that the solid state chemistry of elemental silicon has evidently been intentionally omitted. Professor Hengge has made valuable interpretive comments (such as with the Wohler compound, page 100) and still averages seven references per page which lead the reader to a more detailed study of the subject. Areas which may be expected to yield interesting developments in the future are often indicated, such as in the areas of the chemistry of SiO, higher silicon halides, and polymeric Si-Si systems. In general, the author has remained impartial and has restrained interpretive comments when the evidence is not clear, such as with the case of the solid state structure of SiO (page 70). The author has included his personal interpretation of one area, and rightly so, since he has made substantial personal contributions to our knowledge of the color of polymeric silicon compounds.

In conclusion, this small book (127 pp) is a valuable source of information on Si-Si linkages and provides a general understanding and ready access to the relevant literature prior to 1973.

Ronald E. Highsmith, *The Carborundum Company*

Analytical Chemistry of the Elements: Transplutonium Elements. B. F. MYASOEDOV, L. I. GUSEVA, L. A. LEBEDEV, M. S. MILYUKOVA, and M. K. CHMUTOVA (Vernadskii Institute, USSR). Translated by N. KANER. Israel Program for Scientific Translations. John Wiley & Sons, New York, N.Y. 1974. x + 399 pp. $30.00.

This volume has an uneven treatment of the topics chosen for its five chapters. Chapter I (20 pages) describes the discovery of the transplutonium elements (Z = 95 to 104) and discusses their place in the periodic table in a routine fashion; Chapter II (64 pages) has an excellent description of the chemistry of the ions of these elements; Chapter III (66 pages) covers (inadequately) the Detection and Determination of Transplutonium Elements. Chapter IV (164 pages) is about half the book, a real crusher devoted to an uncritical, exhausting, and probably exhaustive compilation of literature on the Isolation and Separation of Transplutonium Elements—42 pages of which are on ion-exchange methods, and 92 pages on solvent extraction. Chapter V, Determination of Impurities in Preparations of Transplutonium Elements, is only six pages long.

The radioactive properties of the transplutonium isotopes are universally used for identification, analysis, and detection of impurities—and are indeed often the only concentration measurement available to the researcher. The absence of a good chapter on detection instruments, their applications and limitations, seriously detracts from the value of this book.

D. G. Karraker, *Savannah River Laboratory—Du Pont*

Fortschritte der Chemie Organischer Naturstoffe/Progress in the Chemistry of Organic Natural Products. Volume 31. Edited by W. HERZ (Florida State University), H. GRISEBACH (University of Freiburg), and G. W. KIRBY (University of Glasgow). Springer-Verlag, Vienna-New York. 1974. ix + 693 pp. $94.30.

This volume continues to embody the features which have made the members of the series benchmarks of the progress of organic natural products chemistry since before the Second World War. The chapters are written by distinguished authorities in their fields, and, whether a specialized or a broad topic is dealt with, the coverage is spacious, authoritative, and personal. D. N. McGregor's chapter, on recent developments in the chemistry of penicillins, summarizes in detail the spate of recent modifications of the penicillin structure, as well as work on the chemistry of the penicillanic acid nucleus itself. A full summary of the chemistry of the verrucarins and roridins, by Ch. Tamm, follows. Aflatoxins, sterigmatocystins, and some related toxins also of current interest are reviewed by J. C. Roberts, and recent advances in the chemistry of flavonoid glycosides (H. Wagner) are shown by some novel structures which have been found in recent years. A very full review of spiro[4.5]decane sesquiterpenes (J. A. Marshall, St. F. Brady, and N. H. Andersen) is oriented strongly toward synthesis; synthetic viewpoints are also addressed by E. Winterfeldt, who considers approaches to stereoselectivity in recent total syntheses of indole alkaloids. Experimental, biomimetic investigations of polyketide chemistry are then discussed by Th. M. Harris, C. M. Harris, and K. B. Hindley. The isolation, structure determination, chemistry, and partial synthesis of the phorbol esters of *Croton tiglium* oil are reviewed in detail by E. Hecker and R. Schmidt. The isolation work here is monumental and very well described. Finally, two important bioorganic topics are covered: the melanins, by G. A. Swan, and mechanisms of corrin-dependent enzymatic reactions, by G. N. Schrauzer. The reviews here look very much to present problems in these fields and to approaches to their solution.

As usual in this series, the editing is thorough, and the reference lists and author and subject indexes are full and complete.

This masterly book will have a wealth of interest for organic chemists interested in natural products, synthesis, and bioorganic chemistry. It is an unfortunate sign of the times that its price will put it beyond the reach of almost all private owners.

P. W. Le Quesne, *Northeastern University*

Fluorocarbon and Related Chemistry. Volume 2. Senior Reporters: R. E. BANKS and M. G. BARLOW (University of Manchester). The Chemical Society, London. 1974. viii + 491 pp. £ 16.00.

This is the latest volume to appear as part of the Chemical Society's Specialist Periodical Reports. It is a valuable and useful review of the literature of fluoro-organic, organometallic, and organometalloidal compounds published in 1971 and 1972. The first six chapters deal with specific classes of compounds and appear to be exhaustive in their coverage of the literature, while the seventh chapter is not a review, but rather a report of progress in ^{19}F nmr. The book is amply illustrated with charts and figures and is extensively referenced. There are frequent and desirable cross references between chapters. Several chapters have supplemental bibliogra-

phies which contain material that while important was not included in the main text. There is an author index; however, the lack of a subject index is not a serious deficiency. It is fairly easy to locate references of reaction types, for example, by reading the appropriate sections. The researcher in organofluorine chemistry should find this book a valuable reference source.

Douglas G. Naae, *University of Kentucky*

Chemically Induced Magnetic Polarization. Edited by A. R. LEPLEY (Marshall University) and G. L. CLOSS (University of Chicago). Wiley-Interscience, New York, N.Y. 1973. ix + 416 pp. $19.95.

Chemically induced magnetic polarization may be observed for electron spins (CIDEP) or for nuclear spins (CIDNP). CIDEP was first observed, but the extensive development from the state of a puzzling phenomenon to that of a powerful analytical tool was stimulated by the first reports of nuclear spin polarization in 1967. In the last few years several accounts, review articles, and chapters concerned with various aspects of magnetic polarization have appeared. The monograph reviewed here is the first book devoted solely to this subject.

The book contains eight chapters by eleven of the early contributors to the field. It is best characterized as a collection of research accounts. This approach is very suitable for a book on a growing field, but it results in somewhat uneven coverage. Some areas are treated thoroughly, for example, the observation of CIDNP in peroxide decompositions (two chapters), during the reactions of metalloorganic agents with allkyl halides (two chapters), and during molecular rearrangements. In other areas, the coverage is less thorough. Thus, the book contains neither a separate chapter on CIDNP in photoreactions nor a detailed and balanced presentation of the radical pair theory. Chapter 1, which might have been intended to provide such a discussion, apparently was completed in mid-1970, considerably before most of the other chapters, and too early, to include several important developments. In collaborative ventures, such as this book, authors who fulfill their commitments promptly take the risk that their contribution may be outdated, when the collection is ready for publication.

On the positive side, the experimental observations throughout the book (over 100 figures) are interpreted on the sound basis of the radical pair theory, in some cases extending significantly the interpretations offered in the original publication. At the same time, various facets of this theory are illustrated with the help of well-chosen chemical systems. In addition, the book provides guidelines for the application of CIDNP techniques and does not fail to mention their limitations. Finally, more than 500 references provide ready access to the original literature.

In summary, "Chemically Induced Magnetic Polarization" is a useful and timely book that will stimulate advanced students and researchers in organic and physical chemistry as well as in fields related to these areas. The book is recommended particularly to those who are more interested in the application of these useful techniques than in the underlying theory.

Heinz D. Roth, *Bell Laboratories*

Characteristic Raman Frequencies of Organic Compounds. By FRANCIS R. DOLLISH (Carnegie-Mellon University), WILLIAM G. FATELEY (Kansas State University), and FREEMAN F. BENTLEY (Wright-Patterson Air Force Base). John Wiley & Sons, New York, N.Y. 1974. xviii + 443 pp. $22.50.

The authors are in the enviable position of having produced a very useful reference work which is the only modern one of its kind. The book is primarily a compendium, organized by molecular structure and functional group, of Raman frequencies of organic molecules.

The individual chapters deal with classes of compounds by structure and bonding (aliphatic compounds, alkenes, aromatic and nonaromatic cyclic compounds, etc.) substituents (haloalkanes, organosulfur compounds, heterocyclic compounds, etc.), functional group (alcohols, aldehydes, amines, carboxylic acids, etc.), and ring size. Within the chapters, Raman frequencies and their assignments to particular molecular vibrations are extensively tabulated. The tabulated data are elucidated by discussion in the text where appropriate. For some classes of compounds, particularly benzene and its derivatives, the authors employ helpful diagrammatic representations of the various vibrational modes. Secondary effects upon the Raman spectra, such as dimerization of carboxylic acids and rotational isomerism, are discussed. Appendices include a cross-indexed summary of characteristic Raman frequencies and a collection of Raman spectra of over 100 representative compounds (many of which are common solvents). Literature references are cited as late as 1972.

This book is highly recommended to the investigator who is interested in phenomenological applications of Raman spectroscopy to problems of structure in organic or biological systems, as well as to the quantitative spectroscopist as a comprehensive source and bibliography for vibrational assignments.

William H. Woodruff, *Syracuse University*

The History of Quantum Theory. By FRIEDRICH HUND (University of Göttingen). Translated from the German by GORDON REECE. Barnes and Noble, New York, N.Y. 1974. 260 pp. $20.00.

Friedrich Hund made notable contributions to the quantum theory of atomic and molecular structure during the late 1920's. He discovered the systematic behavior of atomic multiplets now known as Hund's rules. His idea that the states of diatomic molecules could be correlated with those of both the separated and united atoms was subsequently exploited in the development of molecular orbital theory by Mulliken and others. Professor Hund worked at Göttingen during this period and had first-hand acquaintance with the likes of Heisenberg, Schrödinger, Born, and Pauli. Yet his account is, disappointingly, almost totally devoid of personal reminiscence. About two-thirds of the book is, in fact, concerned with the old quantum theory. The tortuous progress of ideas on the nature of light quanta, quantization of periodic motions, and the correspondence principle during the period 1900–1925 is enumerated in agonizing detail. The remaining third covers the beginnings of matrix and wave mechanics, their unification, and some early applications. The last chapter of the text gives a quite readable account of relativistic quantum mechanics and field theory. There is, in addition, a 32-page Appendix: "An Outline of Quantum Mechanics". The writing overall is not particularly lucid—at least in English translation—but there are enough interesting tidbits to make it worthwhile for those reasonably well versed in quantum mechanics. It would probably be almost totally incomprehensible, however, to readers otherwise innocent of the subject. Some of the fault must rest with the translator, obviously not himself in touch with the field. We find thus instances of quaint usage such as "biatomic molecule", "earth alkali atom" "event" for complexion, "simple" for singlet, "amount" for magnitude, "path" for orbital, etc. Still, Hund's book has much to recommend it. Those trained in modern quantum mechanics are unlikely to have much familiarity with the correspondence principle or with the relationship of matrix mechanics to dispersion theory. And some of these older viewpoints do indeed add a dimension to one's understanding of quantum behavior. The extensive bibliography serves as a useful catalog of the original papers in quantum theory. One has also a quite authoritative source on "who did what first". For example, it emerges that Heisenberg used antisymmetrized many-electron functions in 1926, some three years before Slater. For the history of quantum theory, per se, I should, however, direct the reader to any of several excellent accounts in the writings of Bohr, Heisenberg, and Born.

S. M. Blinder, *University of Michigan*

Analytical Profiles of Drug Substances. By KLAUS FLOREY (The Squibb Institute for Medical Research). Academic Press, New York and London. 1974. ix + 581 pp. $19.50.

The editor and the contributing authors have compiled a large volume of useful analytical material on compendia drug substances into a very practical reference handbook. In all, seventeen substances are considered according to a general outline which includes (1) description, (2) physical properties, (3) molecular complexes, (4) synthesis and purification, (5) stability, (6) analytical chemistry, (7) metabolic transformations, (8) drug availability, (9) toxicity, and copious references.

Well-documented charts, graphs, curves, diagrams, and tables, all with excellent references to the original data, are present in the discussion of each drug substance. The latest analytical techniques applicable to these substances are also discussed.

It is the reviewer's opinion that this book will be very useful to persons involved with the analysis of compendial drugs. Also, the

copious references provide a rich bibliography for persons seeking information in depth on any of the techniques mentioned in this book.

Prince Eugene Bosley, *National Center for Drug Analysis FDA/DHEW*

Molecular Spectroscopy. Volume 2. Senior Reporters: R. F. BARROW (University of Oxford), D. A. LONG (University of Bradford), and D. J. MILLEN (University College, London). The Chemical Society, London. 1974. xii + 579 pp. £18.00.

This second volume of "Molecular Spectroscopy" in the Specialist Periodical Report series maintains the high standards set in the first volume. The nine chapters are: "Microwave Spectroscopy" (Legon and Millen), "Theories of Resonance Raman Scattering" (Behringer), "Infrared and Raman Studies of Molecular Motion" (Bailey), "Infrared Fluorescence Studies" (Bailey and Cruickshank), "Infrared Intensities" (Person and Steele), "Raman Intensities" (Hester), "Diatomic Predissociation Linewidths" (Child), "Rotational Structure in the Rydberg Series of Diatomic Molecules" (Johns), and "Molecular Spectra in Stars" (Mallia). Emphasis in the current volume is on intensities and lineshapes, areas which have enjoyed a renaissance in the last few years due to both theoretical and experimental advances. Only the first chapter on microwave spectroscopy is actually an *annual* review. None of the other chapters is a sequel to one of those in the first volume. Thus, the announced editorial policy of selecting areas that are "timely and interesting" and giving them "detailed and critical analysis" has been admirably fulfilled. The annual review function is to be achieved over a cycle of several years.

As a vibrational spectroscopist in need of deepening his knowledge of Raman theory, this reviewer found Volume 2 most timely. He also found reading in chapters outside his specialty to be rewarding. Indeed, all the authors have succeeded in writing for a reasonably large audience of physical chemists. Many chemical examples have been cited, of course, but emphasis in these volumes is on high sensitivity, detailed spectroscopy, and the accompanying theory. Chemists interested in surveys of spectroscopic applications to series of compounds should consult other titles in the Specialist series.

It is regrettable that the price of Volume 2 of "Molecular Spectroscopy" is so high. While the volume is a must for good libraries, one wonders if many individuals will decide to purchase it.

Norman C. Craig, *Oberlin College*

Annual Reports on NMR Spectroscopy. Volume 5B. Edited by E. F. MOONEY (Anacon Instruments). Academic Press, New York, N.Y. 1973. xi + 441 pp. $31.50.

This book is a catalog of almost 200 pages of nmr data on compounds containing phosphorus, which is not to say that it is a book exclusively on ^{31}P nmr; resonance data on ^{1}H, ^{19}F, ^{13}C, ^{11}B, and other nuclei in phosphorus-containing compounds are also tabulated. Some 90 pages of text constitutes a review of emerging theories and empirical trends in both chemical shift and coupling constant data. Here again a general view is taken; for example, spin–spin coupling *through* as well as to phosphorus is treated. The sign and dihedral angle dependence of coupling constants is discussed; these characteristics are receiving frequent application in recent papers. Finally, applications of all types of nmr to the structure and dynamics of inorganic and organic phosphorus compounds are reviewed.

This book may appeal to those fascinated by the occult, for it clearly demonstrates that arbitrary conventions are the work of the devil. The particular arbitrariness in this instance is the sign convention for the ^{31}P chemical shift. Professor Mavel is caught between the real world, which has operated with one convention, and this series of Annual Reports, which has championed the opposite convention. Curiously, Mavel has opted for *both* conventions in this single book; one is employed in the text and the other in the data table!

Metal–phosphorus compounds receive limited attention. Biological problems suffer an even worse fate: they are "beyond the scope of this review." Since these areas probably command the widest audience, these are unfortunate editorial decisions. With the advent of Fourier transform methods, these areas will probably dominate any comparable review for the years after 1969. One annoying feature of the book is the placement of structural formulas not in the text, where they are needed, but as a group in an appendix. Nevertheless, this is the sort of book that an institutional library should contain.

K. G. Caulton, *Indiana University*

Experimental Electrochemistry for Chemists. By DONALD T. SAWYER (University of California, Riverside) and JULIAN L. ROBERTS, JR. (University of Redlands). John Wiley & Sons, New York, N.Y. 1974. x + 435 pp. $18.50.

The authors are to be commended for gathering considerable amounts of data and information on apparatus and techniques within a limited sized book. It will find use in almost any research or analytical laboratory. The nine chapters cover introduction, reference and working electrodes, cells, solvents and electrolytes, measurement and control equipment, potentiometric measurements, controlled potential methods (Cottrell, Ilkovic, and Levich equations, voltametry, polarography), controlled current methods (Sand equation, chronopotentiometry), and electrochemical titrations. Some of the application chapters are short but in most cases cover the subject adequately.

The bulk of the book relates to hardware and solutions with only about 125 pages devoted to applications, and about 24 of these consist of a long table covering polarographic conditions. The application chapters seem to be directed mainly to those interested in electroanalytical chemistry and superficially to kinetics and diagnosis. The apparatus and techniques would be of background interest to those interested in corrosion, batteries, and electrodeposition, but the book is far from being directed to them. Greene's cell for corrosion and adapted by ASTM Committees is not mentioned.

Because of the interconnection between apparatus and their application any author would have difficulty deciding which subject to cover first. The authors have chosen to first describe apparatus. This necessarily causes some apparent poor organization, repetition, and confusion when applications without adequate description or definition are discussed in chapters on apparatus.

The expertise of the authors in the field of electroanalytical chemistry is quite evident. This, however, may account for their frequent but mistaken assumption that the reader also understands. There is a lack of definition of terms, and several symbols used in the text are not given in a list of symbols which is "buried" in the middle of Chapter 1.

At the beginning of the book and near its end there are a few paragraphs on which techniques to use for chemical characterization and diagnosis of kinetic parameters. This could have been a valuable addition to the book if expanded somewhat and set apart as a separate chapter or discussed at the beginning of each application chapter. More examples would have been useful. This would have been time saving to the "chemist" seeking an answer by electrochemical means.

The text while supplying many drawings of equipment leaves something to be desired in that the drawings and/or discussions are in several instances not detailed enough to be clearly understood, e.g., thin-layer electrode, Clarke electrode, cracked glass bead junction. Semiinfinite linear diffusion is not defined, which is not unusual, but confusing here when Figure 7-1 indicates a diffusion layer thickness of 10 mm. The Levich equation is given but not identified nor is "Levich" in the index. In the section on potentiometric titration the discussion relating to H_3PO_3 is confused by an abbreviated explanation referred to an incorrectly identified titration curve.

References, mostly of the review type, seem adequate and date through 1973, although Paunovic's review (1967) on chronopotentiometry is not included.

In summary, the authors have assembled a great amount of valuable information. It is regrettable they did not critically read portions of the text to be sure it would be clear to the nonexpert in this field.

K. S. Willson, A. H. DuRose, *Harshaw Chemical Company*

Ions and Ion Pairs in Organic Reactions. Volume 2. Role of Ions and Ion Pairs in Chemical Reactions. Edited by M. SZWARC (State University College of Environmental Science and Forestry). John Wiley & Sons, New York, N.Y. 1974. xii + 566 pp. $28.50.

This book consists of five large chapters. The first by M. Szwarc and J. Jagur-Godorski entitled "Ions and Ion Pairs in Electron Transfer Reactions of Radical Anions, Carbanions, and Solvated Electrons" is a massive up-to-date recount of one-electron transfer

reactions occurring in solution between organic species. After a critical presentation of methods by which electron affinity data are acquired (~40 pp), the kinetics of various electron exchanges (~70 pp), and the status of our understanding of solvated electrons (~40 pp) are presented. The second chapter by M. Szwarc, A. Streitwieser, and P. C. Mowery on "Ions and Ion Pairs in Proton Transfer Reactions Involving Carbon Acids and Radical Anions" is an interesting, critical, up-to-date presentation of the thermodynamics (~30 pp) and kinetics (~60 pp) of proton transfer involving carbon acids and carbanions in nonaqueous solvents. Chapter Three by D. J. Raber, J. M. Harris, and P. v. R. Schleyer on "Ions and Ion Pairs in Solvolysis Reactions" (~120 pp) is an interesting, critical evaluation of some of Winstein's ideas concerning the presence and significance of various kinds of ions in solvolyses, and the considerable quantity of research spawned by the work of this pioneer to whose memory this whole volume is dedicated. The fourth chapter by M. Szwarc on "Ions and Ion Pairs in Ionic Polymerization" includes a concise review of research conducted over the last decade mainly by Szwarc and his coworkers on the kinetics of anionic polymerizations. The author presents the subject of "growing anions chaperoned by cations" in a vigorous and refreshing manner, and is able to develop some new insight and points of view in this often-reviewed field. The main parts of the review on anionic polymerizations consider propagation and initiation by free ions, various ion pairs and living polymers, the role of tight and loose ion pairs, complexing agents, vinyl stereoregular polymerizations, and copolymerizations. The chapter ends with a few pages on cationic polymerizations mainly dealing with ionizing radiation and aspects of cyclic ether polymerizations. The last chapter by E. Grunwald, S. Highsmith, and Ting-Po I on "Electric Permittivity, Dipole Moments, and Structure in Solutions and Ion Pairs" is an authoritative treatment of dipolar properties of ions and ion pairs as a means to characterize their detailed structure. The book ends with an Author Index and extensive Subject Index.

This reviewer congratulates Dr. Szwarc for conceiving this book and assembling coherently a vast amount of up-to-date information (many references are of 1973, 1974) and the publisher for speedy printing (the Preface is signed August 1974).

J. P. Kennedy, *The University of Akron*

Metal Ions in Biological Systems. Volumes 1, 2, and 4. Edited by H. SIGEL (University of Basel). Marcel Dekker, Inc., New York, N.Y., Vol. 1: 1973. xii + 267 pp. $21.75. Vol. 2: 1973. xi + 294 pp. $27.50. Vol. 4: 1974. xi + 261 pp. $24.75.

Volumes 1, 2, and 4 of "Metal Ions in Biological Systems" contain a series of review articles on three general topics in the field of bioinorganic chemistry. In the first volume, there are six articles which deal with the stability, structure, kinetics, and optical properties of simple complexes of metal ions with amino acids, peptides, nucleosides, and nucleotides. Organizationally, the book is excellent with related chapters grouped together providing an uninterrupted discussion of different aspects of the same general topic. The articles themselves contain a large amount of experimental data and are well referenced. The biological significance of the work is usually indicated. The areas in which experimental work is needed are explicitly pointed out which should help to encourage research in these directions.

Volume 2 covers mixed ligand complexes. The factors governing their stability, structure, and kinetic properties, as well as a mathematical model for predicting the species present in a complex mixture of metal ions and ligands (plasma), are covered in the first four chapters. The fifth chapter contains a discussion of artificial enzyme models. The volume is well organized and the articles themselves contain a large amount of experimental data and are well referenced. The biological significance of the work is also discussed. This is especially true of the fourth chapter in which a large number of examples of the application of a mathematical model in predicting the effects of the administration of various drugs are discussed.

The fourth volume contains four articles on the use of metal ions as probes in biological systems. It is dominated by a lengthy, all-inclusive article on the use of paramagnetic probes in NMR spectroscopy to obtain structural information. The remaining three articles cover both spectroscopic and thermochemical techniques for studying bioinorganic systems. Here again, the organization and the articles themselves are excellent.

These three volumes provide a welcome review of the present knowledge in selected areas of bioinorganic chemistry and are recommended to researchers actively involved in the field in its broadest sense.

William Eventoff, *Purdue University*

The Biochemical Mode of Action of Pesticides. By J. R. CORBETT (Fisons Ltd., Agrochemical Division). Academic Press, New York and London. 1974. ix + 330 pp. $18.50.

To synthesize and present lucidly the tremendous volume of information available on the biochemical effects of pesticides is no small task. J. R. Corbett has, however, done a creditable job with such a project in a brief and well-organized text. The book is divided into nine chapters, all but the last of which deal with pesticide effects on specific metabolic activities. The final chapter includes a useful summary of the previous eight.

Being true to its title, the book places all of its emphasis on mode of action. Pesticides are discussed according to the biochemical pathway they affect (or are suspected to affect). Thus, the reader will find herbicides, rodenticides, insecticides, and fungicides discussed within the same chapter. Likewise, diverse organisms such as fungi, nematodes, schistosomes, and insects are sometimes treated together, as in the chapter on pesticides interfering with respiration.

Each chapter begins with a brief introduction to the biochemical process affected by the pesticides to be discussed (i.e., photosynthesis, acetylcholinesterase function, plant growth, etc.). Structural formulas of all relevant pesticides are included with each chapter. Following the introductory remarks, the author discusses in detail the existing evidence and hypotheses explaining the particular mode of action in question. Many of Corbett's discussions refer to work in previous but more specialized reviews. The reader will frequently need to go to these to get original source material.

Reading the book provides one with a good understanding of what is known and what is unknown about how pesticides behave in biological systems. It becomes immediately clear that many pesticides, some of which are currently experiencing heavy use, are quite unknown as to their modes of action. Corbett groups some pesticides by convenience because so little is understood about their biochemical effects.

The most well-written chapters seemed, predictably, to be the ones where mode of action is best understood. Chapter 3, on acetylcholesterase inhibition, is a noteworthy example. Chapter 4, on neuroactive insecticides other than acetylcholinesterase inhibitors, deals almost entirely with DDT studies with some mention of pyrethroids and surprisingly little discussion of cyclodienes.

Being as comprehensive as it is, the book is necessarily brief, and serious researchers will find it to be little more than a useful introduction to the relevant literature. It is well organized and complete, however, and anyone interested in obtaining a good overview of pesticide biochemistry will find this volume to be of much use.

John C. Kricher, *Wheaton College*

The Electrochemistry of Metals and Semiconductors. By A. K. VIJH (Hydro-Quebec Institute of Research, Varennes, Quebec, Canada). Marcel Dekker, Inc., New York, N.Y. 1973. xiv + 297 pp. $26.00.

Between the covers of this book, there is contained a vast amount of very interesting and extremely useful information concerning electrochemical processes which take place on bulk semiconductor surfaces or on semiconducting films supported on metallic bases. After reading this book, this reviewer is confronted with a number of inconsistencies.

Contrary to the statement of the title, electrode processes taking place on metallic surfaces are not discussed. Stress is placed only on metal surfaces covered by semiconducting films. Of course, in the introduction on page 1, Vijh states that the book is really directed toward the contribution of the principles of solid state theory to the study of electrode processes. But then, the huge section of the literature devoted to electrode processes occurring at alloy electrodes with a discussion of how the electronic structure of the electrode material influences electron transfer, adsorption of intermediates, and formation and composition of anodic and cathodic films is missing. Probably a better title would be, "An Introduction to the Electrochemistry at Semiconducting Surfaces." From this viewpoint, though, Chapter 8 on the solid electrolytes should not be

included in the book since the most successful and useful solid electrolytes are ionic conductors. In any case, the discussion on fuel cells beginning on page 244 is surely a misfit.

Also, in the introduction, the author wishes to present the material to electrochemists with a weak foundation in the theory of the solid state. The superficial and naive discussions of solid state theory (such as molecular orbital and band theory, the Fermi level, density of states, surface states, and relationships between the electronic structure of the bulk and the electrochemical and catalytic properties of the surface) in Chapter 1 will be of little use to such electrochemists. On the other hand, the treatment of the material requires an advanced understanding of electrochemistry such as that possessed by a competent electroanalytical chemist and is of little use to the beginning electrochemist or the solid state scientist; consequently, one wonders for whom was the book written and what gap in the existing published literature does it fill.

James P. Hoare, *General Motors Research Laboratories*

Chemical Carcinogenesis. Part A and Part B. Edited by PAUL O. P. TS'O (Johns Hopkins University) and JOSEPH A. DIPAOLO (National Cancer Institute). Marcel Dekker, Inc., New York, N.Y. 1974. xx + 440 pp and xviii + 352 pp. $29.75 and $26.50.

These two books which comprise Part A and Part B of Volume 4 in the series "Biochemistry of Disease" are based on a symposium held at Johns Hopkins Medical Institutions from October 31 to November 3, 1972, entitled "Model Studies in Chemical Carcinogenesis." The first 16 chapters of Part A are concerned with the chemical and enzymatic aspects of activation and metabolism of chemical carcinogens whereas the last three chapters are devoted to DNA repair processes in mammalian cells. The former section of Part A will be of particular interest to chemist and biochemists alike who are involved with the physiocochemical, organic or biochemical aspects of the basic mechanism of polycyclic hydrocarbon carcinogenesis.

Part B includes examination of the following topics: cell transformation and differentiation, mammalian cell mutagenesis, the relationship of viral carcinogenesis to chemical carcinogenesis, and cancer immunology and immunotherapy.

Both parts are well coordinated into an interdisciplinary viewpoint so the text serves a variety of disciplines such as chemistry, biology, biochemistry, immunology, pathology, pharmacology, and other areas related to cancer research. It will therefore be a valuable source of reference for anyone conducting basic biomedical research in any way related to the cancer area. The list of contributors is impressive, representing in many cases the foremost scientist in each area. Although the symposium took place just over two years ago, a fair proportion of the chapters contain methods and results which have been published since this meeting, and therefore these volumes tend to be more current than suggested by the date of publication. One word of warning to potential purchasers and users of these books: although Part A and Part B are in separate books, the author index and subject index to both parts can only be found in Part B.

Laurence H. Hurley, *University of Kentucky*

Gas Analysis Instrumentation. By A. VERDIN (Analysis Automation Ltd., Oxford). John Wiley & Sons, New York, N.Y. 1973. xii + 414 pp. $26.00

The prospective user of this detailed reference volume should be forewarned that the gas analysis referred to here is not that of the research laboratory or even of the control laboratory. Instead, the book is concerned with *continuous* gas analyzers that measure the concentration of a given gas or vapor. Not considered are the more versatile *laboratory* analyzer instruments that may employ the same principles but can usually be adjusted to perform a number of different analyses.

The book provides a wealth of detail on continuous gas analysis and its instrumentation. The first half describes various instrumental methods of analysis: filament, paramagnetic, optical, gas chromatographic, electrochemical, etc. For each method there is a concise summary of principles, followed by a lengthy listing of commercially available analyzers (over 200 analyzers from 100 manufacturers) and their important characteristics.

The remainder of the book presents detailed comments on many analyzer applications in areas such as explosive hazards, toxic hazards, air pollution, controlled atmospheres, process control, etc. These are followed by discussions of general considerations in continuous gas analysis such as sample handling, calibration, maintenance, and safety.

Continuous gas analyzers today can be important adjuncts to many research programs in biomedicine, air pollution, etc. Although this book would appear to be directed primarily toward the chemical engineer and the many automated gas analyzers required in industrial processes, the research analyst and control chemist will also find here a wealth of well-indexed information on gas analysis problems and instrumentation. Any chemist or engineer with problems of gas analysis, be it continuous or static, will gain an interesting perspective if he consults this book as part of his literature search.

W. Wayne Meinke, *KMS Fusion, Inc., Ann Arbor, Michigan*

Analytical Ion-Exchange Procedures in Chemistry and Biology—Theory, Equipment, Techniques. By JOSEPH X. KHYM (Oak Ridge National Laboratory). Prentice-Hall, Inc., Englewood Cliffs, N.J. 1974. xii + 257 pp. $14.00.

Ion-exchange processes have become an important part of chemistry and biology. The use of these techniques often simplifies some of the long and tedious separations, so a good knowledge of the ion-exchange materials and their properties is essential for all experimenters. The purpose of this book is to introduce the various techniques to the beginner as well as to serve as a refresher to the expert.

This book is divided into nine chapters. Chapter 1 deals with the fundamentals of ion-exchange. It gives the various operations that can be performed with ion-exchange materials, the nature and properties of ion-exchange resins, and finally the mechanisms of ion-exchange reactions. The next section describes the batch and column techniques of ion-exchange processes and gives the plate theory of elution chromatography. In the next chapter, a description of various ion-exchange resins and the proper way of selecting the right one is given. In Chapter 4, the laboratory columns and accessories are described, and it also gives information on operational techniques. Next, the quantitation of elution curves is given. Some chemical operations which are simplified by use of ion-exchange resins are given in the following chapter. The ion-exchange chromatography of organic substances and inorganic substances are given in Chapter 7. The subsequent chapters deal with partition, salting out, ion-exchange, and ligand exchange chromatography. The book gives a number of references and a subject index.

Over-all, this book gives a lucid picture of ion-exchange processes and should be a good source for the beginner.

Jose Philip, *Parke, Davis & Company*

Spectroscopic Methods of Identification of Microquantities of Organic Materials. By G. M. OYLING (Department of the Environment of the State Government of Tasmania, Australia). Marcel Dekker, Inc., New York, N.Y. 1974. vii + 147 pp. $29.50.

Spectroscopic techniques are essential for expeditious characterization of organic compounds. Although these methods have demonstrated utility in this regard, there is a real need to extend their capabilities to the limit in order to obtain structural information on microquantities of material. Further, since many problems involve identification of compounds present in mixtures, the need for interfacing spectroscopic and chromatographic instrumentation is apparent.

This book, which is a part of *Applied Spectroscopy Reviews,* surveys this area with emphasis on coupling spectroscopic identification techniques with gas chromatography. It is organized according to spectral method and critically reviews the utility of the method to qualitative microanalysis. The book is well documented (519 references) and, although its scope in regard to chromatographic methods is limited, does provide organized survey of current technology. The book is not a textbook but will provide those interested with an authoritative source of current information on this subject.

D. H. Szulczewski, *Parke, Davis & Company*