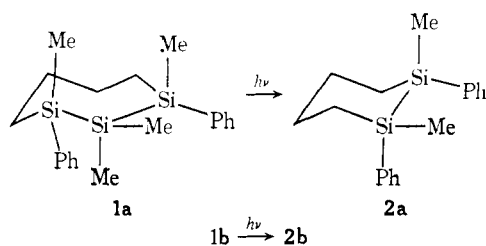


Table I. Stereochemical Consequence in the Photochemical Conversion of **1** to **2**

Composition of 1 (%)		Irradiation time (hr)	Solvent	Composition of 2 (%)	
Cis	Trans			Cis	Trans
95.0	5.0	1.0	Benzene	95.3	4.7
99.4	0.6	0.75	<i>n</i> -Hexane	95.2	4.8
8.6	91.4	1.5	<i>n</i> -Hexane	8.0	92.0
5.2	94.8	1.0	<i>n</i> -Hexane	5.4	94.6

authentic samples,⁴ the results being summarized in Table I. The composition of the trisilane **1** was determined from integrated intensities of the corresponding Si²-CH₃ nmr signals.⁵ The stereochemical assignment of **2** was performed by vpc analysis, and the results were corrected by the factor calculated from analysis of **2** with known composition by vpc and nmr at the same time.

The results in Table I clearly indicate that the photochemical ring contraction of 1,2,3-trisilacycloheptane proceeds in a highly stereospecific manner with retention of configurations at both Si¹ and Si³ centers as shown in the following scheme.



(4) K. Tamao, M. Kumada, and M. Ishikawa, *J. Organometal. Chem.*, **31**, 17 (1971).

(5) Spectra were integrated at 100 Hz/250-sec sweeps, on a Varian HA-100.

The photochemically generated dimethylsilylenes undergo insertion into an Si-H bond with retention of configuration,⁶ and their relative rates of insertion into XC₆H₄SiMe₂H indicate nucleophilic character of the species.⁷ These results together with the present finding suggest a concerted elimination of the singlet silylene in the irradiated 1,2,3-trisilacycloheptane systems. However, due to the known configurational stability of chiral silyl radicals,⁸ the possibility of homolytic fission of an Si-Si bond followed by SH₂ type attack of the silyl radical⁹ on the residual Si-Si bond cannot necessarily be eliminated at the present moment.

Related work is in progress.

(6) H. Sakurai and M. Murakami, *J. Amer. Chem. Soc.*, **94**, 5080 (1972).

(7) H. Sakurai, S. Komiya, and Y. Nakadaira, 28th Annual Meeting of the Chemical Society of Japan, April 2, 1973, Abstracts, III-1226, reported log (relative rate) = 0.84σ^o in the reaction with the photochemically generated :SiMe₂ from **1**.

(8) (a) H. Sakurai, M. Murakami, and M. Kumada, *J. Amer. Chem. Soc.*, **91**, 519 (1969); (b) A. G. Brook and J. M. Duff, *ibid.*, **91**, 2118 (1969).

(9) (a) A. Hosomi and H. Sakurai, *J. Amer. Chem. Soc.*, **94**, 1384 (1972); (b) *Chem. Lett.*, 193 (1972); (c) Y. Nakadaira and H. Sakurai, *J. Organometal. Chem.*, **47**, 61 (1973).

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Received December 31, 1973

Book Reviews*

Carbenes. Volume I. Edited by MAITLAND JONES, Jr. (Princeton University), and ROBERT A. MOSS (Rutgers University). Wiley-Interscience, New York, N. Y. 1973. 356 pp. \$24.95.

"The past decade has seen carbene chemistry change from a compendium of novelties to a discipline requiring close attention to the intricate details of mechanism," the editors state in their preface. They have accordingly initiated a series of "critical surveys of topical areas," of which this volume is the first collection.

There are three chapters: Carbenes from Diazo Compounds; The Application of Relative Reactivity Studies to the Carbene Olefin Addition Reaction; and Generation of Carbenes by Photochemical Cycloelimination Reactions. Although these chapters are not meant to be encyclopedic, the fact that the references cited total 908 indicates coverage of the topics with substantial degree of thoroughness. It is, however, particularly unfortunate in such a rapidly advancing field that the authors do not state the dates after which they ceased covering the literature. The preface is dated May, 1972, and references later than 1971 are not apparent to casual examination.

The emphasis is on carbenes themselves—their formation, properties, and reactions. Accordingly, the effects of spin multiplicity, coordination, method of generation, etc., are examined in detail, and the evidence is critically weighed. It becomes evident

in reading these chapters that the number of unanswered questions and incompletely understood phenomena is large. One aspect of this situation is that tabulation of comparative data (rates, yields, etc.) are commonly spotty, out of necessity. This can lead to a feeling of frustration that is in no way the fault of the authors. One set of tables, however, is really impressive in extent; the chapter on the carbene-olefin addition contains nearly 100 pages of them.

This volume is an indispensable reference to chemists concerned with carbenes, not only because of the depth of its treatment but also because of the competence of the contributors in presenting critical discussions of the sometimes bewildering mass of data available.

The Chemistry of Synthetic Dyes. Volume VI. Reactive Dyes. Edited by K. VENKATARAMAN (National Chemical Laboratory, Poona, India). Academic Press, New York, N. Y. 1972. xix + 463 pp. \$32.00

This series is designed to cover new developments since 1950, and is "intended primarily for chemists and technologists who are concerned with the synthesis of dyes and their applications," but there is much of general organic interest. The reactive dyes covered in this volume are entirely a new development since 1950, and are thus not discussed in Volumes I and II. The term is used to describe dyes with a capability for reaction with a hydroxyl group, which

* Unsigned book reviews are by the Book Review Editor.

are of major importance in the dyeing of cotton and rayon. The subject is divided into three long chapters: Reactive Groups (E. Siegel), Chromophore Systems (K.-H. Schundehütte), and Application and Properties (D. Hildebrand). The literature on this subject is heavy with patents, and it is therefore particularly valuable to have it comprehensively reviewed by chemists intimately familiar with industrial dye chemistry. There is an author index and a subject index that has the special usefulness of listing the often mysterious trade names for dyes.

Electrochemistry. Volume 3. Edited by G. J. HILLS (University of Southampton). The Chemical Society, London, 1973. ix + 250 pp. £8.00.

This is a further volume in the well-known "Specialist Periodical Report" series; it reviews the literature published in 1971. The topics selected are: Reversible Electrode Systems; Conductance of Electrolyte Solutions; The Solid Metal Electrode in Aqueous Solution; Reactions of Individual Metal Systems; Corrosion Processes; Ionic Double Layers and Adsorption; Organic Electrochemistry; Electrolyte Solutions; and Electroanalytical Chemistry. As usual there is a comprehensive author index, but no subject index.

Encyclopedia of Industrial Chemical Analysis. Volume 18: Silicon to Thiophene. Edited by F. D. SNELL and L. S. ETTRE. Wiley/Interscience, New York, N. Y. 1973. xiv + 545 pp. \$40.00 (\$35.00 by subscription).

The fifteen subjects taken up in this volume include such important topics as silver, soaps, steel, styrene polymers, thallium, sugar, and tea (the reader must refer to an earlier volume for milk and cream). As usual, the articles are written by persons obviously expert in their subjects, but in a manner easily comprehensible to the generally trained chemist. Tables, illustrations, sample procedures, and bibliographies combine in making these contributions useful.

The Fine Structure of Cotton. By I. V. DE GRUY, J. H. CARRA, and W. R. GOYNES. Edited by R. T. O'CONNOR. Marcel Dekker Inc., New York, N. Y. 1973. xi + 224 pp. \$3.00.

This is a book almost entirely composed of pictures obtained by light microscopy, electron transmission microscopy, or electron scanning microscopy. They are beautifully reproduced in full-page plates and are quite impressive. There is also a 19-page introduction entitled "The Story of Cotton." It is described in the Preface as "a book for the industrial producer and the entire cotton industry including the textile researcher," but it will surely have much interest for polymer chemists and botanists as well.

Liquid Crystals. No. 5 Symposium of the Faraday Society. Edited by F. C. TOMPKINS. The Chemical Society, London, 1973. 186 pp. £4.00.

The title symposium was held in London in December, 1971, and contained seventeen papers of international origin. The papers are reports of original research, both theoretical and experimental, and are written up in journal format. The texts of the general discussions at the symposium are also included. There is no subject index.

Metastable Precursor Ions. By R. NEETER and C. W. F. KORT (University of Amsterdam). American Elsevier, New York, N. Y. 1973. 415 pp. \$29.50.

This is a book of tables of numbers obtained as a computer print-out. For each mass number from 1 to 500, there are tabulated all possible metastable transitions $m_1^+ - m_2^+ + (m_1 - m_2)$ as values of m_2^2/m_1 . This is a different arrangement from that used in Beynon, Saunders, and Williams, "Table of Metastable Transitions for Use in Mass Spectrometry," and is intended to permit rapid insight into the metastable decompositions of one particular ion. The advantage over nomograms is that such tables are more accurate and less restricted.

Origins of Life. Chemistry and Radioastronomy. Edited by L. MARGULIS. Springer-Verlag, New York, N. Y. 1973. xvi + 291 pp. \$17.20.

This book reports the Proceedings of the Fourth Conference on Origins of Life, conducted by the Smithsonian Institution in 1971. It is an unusual volume, for it consists entirely of discussions, without formal papers. There are, literally, 264 pages of dialogue, some of it fascinating for its scientific detail (e.g., a table of molecules found in interstellar space), some for its sheer banality (e.g., "after-

noon coffee is ready"), and some for its refreshing frankness (e.g., "I don't know a damn thing about carbonatites"). Amazingly, there is a detailed subject index! The symposium must have been great fun and may well have been extremely stimulating, but one is inclined to wonder if it is worth a book.

Residue Reviews. Volume 48. Edited by F. A. GUNTHER and J. D. GUNTHER. Springer-Verlag, New York, N. Y. 1973. vii + 168 pp. \$17.20.

These indefatigable editors have assembled another group of review papers on residual pesticides and other contaminants in "any segment of the environment." This volume includes chapters on cadmium residues, pesticide stability in materials in cold storage, biological oxidation and conjugation of pesticides, regulation of pesticides in Finland, and carcinogenicity of pesticides. There are resumes of each article in French and German and a good subject index.

Terpenoids and Steroids. Volume 3. Edited by K. H. OVERTON (University of Glasgow). The Chemical Society, London, 1973. ix + 526 pp. £12.00.

Seven contributors have produced nine chapters to cover the literature from September, 1971, to August, 1972. Six of these are devoted to terpenoids from monoterpenoids to polyterpenoids, a seventh chapter covers biosynthesis of terpenoids and steroids, and two cover steroids. As usual, syntheses and properties and reactions are given even emphasis. A short introduction focusses attention on certain highlights. A page of errata for Volume 2 and a comprehensive author index complete the volume.

Das Leben und Wirken von Hans Fischer. By ALFRED TREIBS. Hans Fischer-Gesellschaft, München, Technische Universität München, 1971. 681 pp. Price?

Hans Fischer's total synthesis of hemin, completed in 1929, constitutes a landmark in the history of natural product chemistry. No one had previously attempted to synthesize molecules of comparable complexity and succeeded; nor were feats of equal magnitude achieved until more than a decade later. How the total synthesis of hemin came about is recounted vividly and in great detail by Alfred Treibs, Fischer's senior associate and colleague over a period of many years.

Fischer, trained both as a chemist and physician and influenced by the eminent internist, F. v. Müller, turned his early attention to the bile pigment bilirubin. Structural work that ensued led inevitably to a systematic study of the unusually idiosyncratic pyrroles and porphyrins. These efforts, covering a period of twenty-five years, culminated in the total synthesis of hemin and later in the correct structures of chlorophyll a and b.

The structure of the Fischer laboratory was pyramidal and hierarchical in the style characteristic of Continental research institutes of the period. Students numbering nearly 100 at any one time worked hard and long hours preparing kilos of pyrroles and grams of porphyrins willingly and even cheerfully in the knowledge that they received an education and training of unequalled thoroughness and that reflected glory would be their reward. As an effective research organization aimed at solving a single, albeit extraordinarily broad research problem, Fischer's laboratory has probably not been surpassed.

Treibs traces Fischer's life and career from beginning to tragic end with devotion and affection. No one knew the story better or could have recorded it from a closer vantage point. It is a monumental, historically invaluable effort which succeeds in conveying the magnitude of Fischer's work and the qualities of this extraordinary man. To Fischer students in particular, this volume makes fascinating and nostalgic reading. For the benefit of a broader readership one wishes that an English translation will be forthcoming.

Konrad Bloch, *Harvard University*

Analytical Chemistry of Neptunium. By V. A. MIKHAILOV. Halsted Press, John Wiley & Sons, Inc., New York, N. Y. 1973. vii + 235 pp. \$24.00.

This book, a 1971 volume in the Russian "Analytical Chemistry of the Elements" series, was translated by R. Kondor of the Israel Program for Scientific Translations. It consists of five chapters: I, General Information on Neptunium; II, The Chemical-Analytical Characteristics of Neptunium and Its Compounds; III, Methods for Separating Neptunium from Foreign Elements; IV, Quantitative Determination of Neptunium; and V, Determination of Neptunium in Various Materials and Analysis of Its Preparations.

The first chapter discusses the reactions by which neptunium is prepared and the nuclear properties of the element, including useful tables on the mode of decay of the various isotopes and the α and γ spectra of neptunium-237. The chapter concludes with a discussion of gloveboxes that is too brief to be of much value.

Chapter II reviews neptunium chemistry, with particular emphasis on topics of interest to the analyst, such as hydrolysis, oxidation states, absorption spectrophotometry, complex formation, electrochemistry, and insoluble compounds. The treatment is terse and generally noncritical, but appears to be an adequate background for the chapters that follow.

The separation of neptunium by precipitation, electrodeposition, solvent extraction, and ion exchange is described in Chapter III. There is considerable discussion of the chemical principles involved, including many tables of relevant data, followed in most cases by specific "how-to" procedures. Especially thorough is the section on solvent extraction which occupies over half of the chapter. A feature of great value to the inexperienced analyst is a table listing all the separation methods discussed in the text, along with information on such factors as yield and time requirement, to aid in selecting the most suitable procedure for a given separation.

A good discussion of error and yield determination opens Chapter IV, which then goes on to describe the methods for the quantitative determination of neptunium including radiometric counting, neutron activation, spectrophotometry, titrimetry, and various electrochemical procedures such as coulometry. As in Chapter III, there is treatment of the principles involved followed by a specific procedure. The chapter concludes with a table to aid the analyst in selecting the most appropriate procedure.

Chapter V discusses methods for separating and analyzing neptunium in irradiated uranium and neptunium and various compounds and alloys, as well as the determination of impurities in neptunium. As in previous chapters, the discussion is thorough without being unduly verbose and is supplemented with informative tables.

The index contains only major topics and as such amounts to little more than an expanded table of contents with little, if any, cross-references. For example, such topics as coulometry, spectroscopy, and alloys do not have separate alphabetical entries, even though they are discussed in the text. The entries for neptunium compounds refer only to the pages in Chapter II where they are discussed in general; there is no reference to their analysis, which is described in Chapter V.

Although written in Russia, the book by no means limits itself to Russian practice. The references are international in scope and reflect a cosmopolitan approach to the subject. However, references to instrumentation and to instrumental analysis books are confined to Russian products that are not common in the West, but this drawback is minimal because of the relative ease of selecting equivalent instrumentation for a specific task.

The book is well translated and contains very few examples of awkward syntax and typographical errors. It provides a thorough, comprehensive, no-nonsense approach to the subject and can be recommended to research and development chemists as well as to analytical chemists.

J. M. Cleveland, *Dow Chemical U.S.A., Rocky Flats Division*

Dynamic Mass Spectrometry. Volume 3. Edited by D. PRICE (University of Salford). Heyden & Son, Inc., New York, N. Y. 1973. vii + 340 pp. \$21.50.

Mass spectrometers are often classified into two groups, according to the field arrangement used for mass analysis: instruments with static fields and dynamic instruments which use a periodic electric field. The subject of dynamic mass spectrometry embraces the latter group, in which time dispersion of the ions is a critical function of the instrument.

This series presents individual reviews and research articles on dynamic mass spectrometry. The present volume contains reviews of negative-ion studies using a time-of-flight mass spectrometer, of the application of inhomogeneous oscillatory electric fields in ion physics, and of the application of dynamic mass spectrometers to problems in gas analysis. These reviews comprise more than half of the book. Approximately a quarter of the book is devoted to the proceedings of the 3rd European Symposium on the Time-of-Flight Mass Spectrometer held at Salford, England, in July 1971. These chapters tend to be short, specialized research reports dealing with studies in which time-of-flight mass spectrometry was used as an analytical technique. Examples are studies of flash photolysis, of the kinetics of methyl radical reactions at high temperatures, of shock-heated CO_2 and H_2O , of gas evolution from molten glass, of

thermal-volatilization analysis, and of laser volatilization of surface layers.

Also included in this volume is a bibliography of references pertaining to dynamic mass spectrometry, which builds on the bibliography presented in Volume 2. It is organized according to instrument type and includes papers published well into 1971 as well as all papers published on the subject in 1970.

The review chapters, in particular, are well written and informative. The book will be particularly useful to those persons who are familiar with the fundamentals and applications of mass spectrometry. Although the book is not intended to serve as a general introduction to the subject, the review chapters and the bibliography provide a good point of reference for familiarization with the field of dynamic mass spectrometry.

Don C. De Jongh, *University of Montreal*

Ultrastructure of Animal Viruses and Bacteriophages, an Atlas. By ALBERT J. DALTON (National Cancer Institute) and FRANÇOISE HAGUENAU (Laboratoire de Médecine Experimentale). Academic Press, New York and London. 1973. vii + 413 pp. \$37.50.

The "Ultrastructure of Animal Viruses and Bacteriophages, an Atlas" is purported to be a reference work providing detailed information on the ultrastructural aspects of viral replication and internal and external organization. The editors stress that it is not meant to be yet another attempt at virus classification and that the formulation, assembly, and editing were not easy tasks. Starting with the editor's preface the book abounds with apologies for disorganization, complex classification, brief discussions, incomplete references, and a paucity of post-1970 references.

The reader becomes aware of these problems in the first chapter, "Classification and Nomenclature of Viruses." Joseph Melnick discusses the constant and picayune feuding between virologists and the ICVN (International Committee on Viral Nomenclature). This section is well written but fails to provide the book with a usable framework from which to build. The plan of the book follows neither the ICVN guideline nor the suggestions of Dr. Melnick. It appears the editors have taken Melnick's quip, "one man's sense is another man's nonsense", all too seriously. Most of the faults lie within the disorganization. Most of the information is there, if you could only find out where it is. The reader is constantly flipping pages and holding places with all ten fingers since the figures are placed after the references at the end of each chapter and there are few identifiable headings or titles on the pictures. This necessitates reading the entire legend for a group of photos which is all too often entitled according to stain or cell preparation rather than virus identification. In addition, many pages have four to eight photos with all explanation lumped into one legend.

The text associated with each chapter also lacks continuity. Each chapter was written and organized according to the mannerisms of the particular author rather than to a uniform outline. Therefore a particular viral feature may be discussed at any point and thus affords difficulty in comparing viruses in different chapters. There should have been a table of Classification and Viral Characteristics at the beginning of each chapter for each viral group discussed. This should then be followed by a uniform discussion of each virus.

There are some bright spots provided by those authors interested in creating a reference atlas rather than an epistle of self-glorification. Chapters on "Picodnaviruses" by Heather Mayor, "Adenoviruses" by R. W. Horne, "Herpesviruses" by B. Roizman and P. Spear, "Picornaviruses" by G. Godman, and "Oncornaviruses" by J. W. Beard are exemplary in providing excellent photographs, models, and explanation. The brief but excellent section on bacteriophages is out of place in this book and suffers from its minor role.

This book is a beautiful compilation of electron photomicrographs of an assortment of viruses. It is neither an atlas nor a very useful reference book, but rather a group of review articles, some of which are excellent.

Peter N. Gray, *The University of Oklahoma Health Sciences Center*

Advances in Molten Salt Chemistry. Volume 2. Edited by J. BRAUNSTEIN (Oak Ridge National Laboratory), GLEB MAMANTOV (University of Tennessee), and G. P. SMITH (Oak Ridge National Laboratory). Plenum Press, New York and London. 1973. 259 pp. \$20.00.

The second volume in this series consists of four chapters: "Molten Organic Salts—Physical Properties" by J. E. Lind, Jr., Stanford University; "Solubilities of Reactive Gases in Molten Salts" by S. N. Flengas and A. Block-Bolten, University of Toronto;

"High-Temperature Coordination Chemistry of Group VIII" by K. E. Johnson and J. R. Dickinson, University of Saskatchewan, Regina Campus; and "Electroanalytical Chemistry in Molten Salts—A Review of Recent Developments," by K. W. Fung and G. Mamantov, University of Tennessee.

Lind's contribution of 26 pages concerns itself with an examination of the thermodynamic and transport properties of molten salts. Data for tetraalkylammonium salts are discussed with reference to the principles underlying the structures of simple ionic fluids. Studies of complex organic mixtures are not included.

In Chapter 2 the authors develop the thermodynamic treatment of gas-solvent equilibrium and then discuss specific systems, especially the solution of $TiCl_4$, $ZrCl_4$, and $HfCl_4$ in alkali metal chloride melts. Data on the solubility of the halogens, HCl, HF, H_2O , SO_2 , NH_3 , and the rare gases are also given. One section is devoted to chemical synthesis.

The Johnson-Dickinson chapter includes the principles (46 of the total 108 pages) of electronic spectroscopy with sections on atomic spectra, coupling schemes, and the effects of electric and magnetic fields, and the spectra and bonding in diatomic molecules and polyatomic molecules as a function of symmetry and spin-orbit coupling. This is followed by a brief look at the oxides and halides of the group VIII elements in the gas phase and an extensive section on these elements in molten salts. The bulk of the data come from pre-1971 work.

The last chapter by Fung and Mamantov covers developments in electroanalytical chemistry of molten salts over the period 1965-1971. The solvent systems reported are LiCl-KCl eutectic, NaCl-KCl (50:50 mol %), $AlCl_3$ -MCl mixtures, other chlorides and halides, and nitrates.

Edwin M. Larsen, *University of Wisconsin-Madison*

Advanced Molecular Quantum Mechanics: An Introduction to Relativistic Quantum Mechanics and the Quantum Theory of Radiation. By R. E. Moss (University of Southampton). Chapman and Hall, London. 1973. xvi + 300 pp. \$18.50.

There has been a need for some time for an exposition of relativistic quantum mechanics presented at the level of an advanced graduate course in quantum chemistry. Although this monograph contains no exercises and is not intended as a text, it does provide a very useful and informative introduction to this important field. Indeed the most glaring flaw in this book is that its subtitle, given above, is a much more accurate description of its contents than is its main title, "Advanced Molecular Quantum Mechanics." One of the shorter chapters does deal with molecular Hamiltonians, but the reader expecting much along this line will be disappointed. Over 100 pages are devoted to background material in the areas of nonrelativistic quantum mechanics, vector and matrix algebra, classical mechanics, special relativity, the interaction of charged particles with electromagnetic fields, and the classical theory of electromagnetic fields. Then follow the chapters dealing with the topics described by the subtitle, namely relativistic wave equations, the Dirac equation, the wave equation for many electrons, the molecular Hamiltonian, the hydrogen atom, quantum field theory, and the interaction of radiation with matter. A very useful appendix presents in detail the SI units used throughout the book together with their conversion factors to mixed CGS units. The entire volume has been very carefully written, with the author having devoted considerable thought to his presentation. The reading is not light, however, as there are 1022 numbered equations. The beginning student of relativistic quantum mechanics may well find it desirable and even necessary to study first the type of elementary treatment as given in Sherwin's text "An Introduction to Quantum Mechanics." Nevertheless, the present volume is highly recommended to serious advanced students and to researchers in quantum chemistry who wish to further their understanding of the basic principles covered in this book or to find research ideas in the author's suggestions of unsolved problems.

Lawrence L. Lohr, Jr., *University of Michigan*

Modern Concepts in Biochemistry. By R. C. BOHINSKI (John Carroll University). Allyn and Bacon, Inc., Boston, Mass. 1973. ix + 567 pp. Price?

The field of biochemistry is immense and important and is growing in both respects at an enormous pace. The problem of the teacher of biochemistry at the undergraduate or graduate level is to find a textbook which will introduce the student to biochemistry concepts without overwhelming with facts. Shortened textbooks are now available which provide adequate introduction to the

concepts but can carry the student no further. Other excellent textbooks are all inclusive reference works which tend to overawe the student. Dr. Bohinski has written this text to bridge this gap, an intermediate book providing both fundamental concepts and the additional information necessary to lead the student to a deeper, more complete knowledge of the subject.

The book consists of 18 chapters, five appendices, and a brief index. Chapters 1 and 2 provide an introduction to the field of biochemistry and an overview of the text. Chapter 2 also presents the theory and practice of some commonly employed biochemical methods. Chapter 3 discusses ionization equilibria and the concept of buffers. Chapters 4 through 8 present the five major types of biochemical compounds: proteins, enzymes, nucleic acids, carbohydrates, and lipids, in that order. Each type of compound is discussed in terms of the relationship between molecular structure and biological function. Chapter 9 examines the cellular ultrastructure. Chapter 10 analyzes the principles of bioenergetics. Chapters 11 through 18 are devoted to metabolic cycles and processes in which the compounds presented in Chapters 4 through 8 take part. The areas presented are carbohydrate metabolism including the citric acid cycle and oxidative phosphorylation, lipid metabolism, nucleic acid metabolism, photosynthesis, and finally protein biosynthesis and regulation of gene function. Except for Chapters 1 and 9, each chapter includes a series of excellent review questions at the end. A total of 123 numbered figures appear; however, several hundred more drawings and compound structures are found throughout the text. Also, each page has a wide margin for annotations, a highly practical idea for students.

In general, the text is well written, easy to read and comprehend by the beginning student. Although some teachers might prefer a different order of presentation of concepts, the present arrangement of the text seems to be very logical. The author has accomplished a superb job, producing a student-oriented textbook which should find wide acceptance in undergraduate courses in biochemistry.

Donald F. Logsdon, Jr., *U. S. Air Force Academy*

Methods of Neurochemistry. Volume 5. Edited by RAINER FRIED (Creighton University). Marcel Dekker, Inc., New York, N. Y. 1973. viii + 280 pp. \$19.50.

This fifth volume on "Methods of Neurochemistry" continues to reflect the stimulating variety which characterizes neurochemistry. The first chapter, by Melancon and Nadler, deals with the prenatal diagnosis of genetic disorders leading to mental retardation. Techniques of handling amniotic fluid cells, culturing, and identifying them in preparation for enzymatic assays are described. A variety of lipid diseases, *e.g.*, Gaucher's disease, Niemann-Pick, Tay-Sachs, and other genetic disorders, can be identified in addition to carbohydrate disorders for which assay methods are given.

Seiden, in Chapter 2, described behavioral methods used in pharmacological investigation, particularly operant behavior techniques. Some of the schedules commonly used are concisely described, aversive reinforcement, escape, etc., and the various different action of drugs on these operant paradigms discussed. Enough detail is offered to give the uninitiated a bird's eye view of the present status of these methods now in use with an appendix giving a detailed protocol to show how an actual series of tests would be done.

Sampson, Redburn, and Hind deal, in Chapter 3, with microtubules and microtubular protein, a subject of present great interest. The authors have not only assembled descriptions of the techniques available for the study of microtubular proteins but also discuss the rationale behind the tests and the implications of microtubules for function. Binding by colchicine or vinblastine is discussed as an assay method, and isolation procedures for microtubular proteins by batch and column procedures are given in addition to the isolation of intact microtubules, a problem of another order of difficulty. The authors deal with such questions also as properties and purities of the various isolated preparations.

In Chapter 4, Abdel-Latif discusses ion transport in synaptosomes and the role of Na K ATPase. The preparation of synaptosomes by subcellular fractionation techniques is given. Then, assay methods for Na K ATPase are presented before studies of ion transport in synaptosomes are discussed. Uptake of labeled choline in synaptosomes is described as is the transport of norepinephrine and tryptophan. Spectrophotometric measurements of swelling, useful in studies of the permeability properties of the synaptosomes, are described, and the conclusion is reached that a permeability barrier to the influx and outflux of various ions exists with the uptake of various materials moving against a concentration gradient, Na K ATPase being involved as part of the uptake mechanism. The

author gives this view as an hypothesis in hopes that his discussion will serve as an impetus for further study of this concept.

The last chapter, by Gutmann, is a critical evaluation of denervation and reinnervation studies of striated muscle. This subject has been well presented by a recognized authority in the field who has contributed much to stimulate present interest in the trophic influence of nerve on muscle. After an introduction where some of the terminology used to describe degeneration and retrograde changes is given, the author describes surgical methods used to denervate muscle study including cross-innervation. He notes the differences between species which give rise to different patterns of degeneration and regeneration, points which may not readily be apparent to the uninitiated. The general concept of axoplasmic transport as related to the movement of trophic materials is discussed briefly, and then the neurochemistry of muscles is discussed. Changes caused by cross-innervation are discussed with respect to DNA, RNA, and protein, as well as shifts in glycolytic and oxidative metabolism patterns. Finally, a discussion of the limitations of cross-innervation studies is presented, the author concluding that impulse directed and spontaneous transmitter release of a trophic neural control substance regulating muscle gene function is the best hypothesis at present.

Sidney Ochs, *Indiana University Medical Center*

Oxidation and Reduction of Organic Compounds. By KENNETH L. RINEHART, JR. (University of Illinois). Prentice-Hall, Inc., Englewood Cliffs, N. J. 1973. 148 pp. \$9.65 (\$5.95 paperback).

This book is a member of a series of monographs on various special topics in organic chemistry. The level is such that it could be used complementary to the first course in organic chemistry. A first year graduate student also could read it profitably for a good overview of oxidation-reduction reactions. The author aims for a level below that of a standard reference text to which one would turn when faced with an actual synthetic problem, and above that of the treatment given the subject in current popular texts dealing with introductory organic chemistry.

The strengths of this book are its wide and very inclusive coverage of both familiar synthetic methods and perhaps less familiar reactions (*e.g.*, the Tischenko reaction). The treatment of these various methods is concise, clear, and accurate with respect to experimental details. Literature reference to reviews and original sources is given.

The stereochemical aspects of olefin oxidation and carbonyl group reduction are very well done and enable the student to achieve a fair understanding of stereoselectivity in synthetic transformations. In fact, the author generally strikes an excellent balance between synthetic utility and theoretical implications.

The mechanisms of the various reactions, insofar as they can be separated from implications based upon stereochemical course, are not discussed in detail. The author acknowledges that comparatively less research has been carried out in this area relative to other reaction types such as substitution elimination or condensations. However, mechanism problems are collected at the end of each chapter. This is a bit misleading since the mechanism of dehydrogenation of 1,4-cyclohexadiene by DDQ (problem 1b, p 34) is still very much undecided. The same can be said of the mechanism of catalytic hydrogenation of olefins (problem 1c, p 34).

An author must select material which he regards as important, and, of course, this process assumes omission of material considered of less importance to the scope of the book. Two specific omissions which I might point out are singlet oxygen oxidations and ruthenium tetroxide oxidations. A more general area of omission is reference to the use of microorganism for carrying out many of the types of transformations treated. With recent improvements in this method, it frequently becomes the method of choice for convenience and selectivity. Perhaps the field has matured to a point where a separate volume might be devoted to this technique.

I recommend this book strongly for seniors and first-year graduate students.

Robert Moriarty, *University of Illinois, Chicago Circle*

The Inorganic Chemistry of Biological Processes. By M. N. HUGHES (Queen Elizabeth College, London University). John Wiley & Sons, New York, N. Y. 1973. iv + 304 pp. \$12.95.

This book, according to the author, is intended as an introduction to inorganic biochemistry and originated in an advanced undergraduate course at Queen Elizabeth College. It consists of nine chapters. The first two present background material in biochemistry and inorganic chemistry. Chapter 3 continues the

discussion of metal ions with particular reference to systems of biological interest. Chapters 4 and 5 are concerned with the roles of metal ions in some specific hydrolytic (Chapter 4) and redox (Chapter 5) enzymes. Chapters 6 and 7 deal with nitrogen fixation and oxygen carriers, respectively. Chapter 8 looks at the chemistry of the alkali and alkaline earth metals as related to membrane transport, nerve transmission, muscle contraction, and so on. Chapter 9 is entitled "Metal Ions and Chelating Agents in Medicine." Each chapter has a list of references, either general (Chapters 1, 2, and 9) or more detailed.

The book is very ambitious in its aims, but rather disappointing in practice. It is at its best when dealing with specific enzymatic mechanisms (Chapter 4 in particular), but becomes so general as to be useless when dealing with classes of enzymes. Further confusion results from the separation, in several cases, of inorganic studies from the enzymes to which they are relevant, which results either in redundancy or in lack of continuity. As is inevitable in such a rapidly expanding field, a fair amount of material (*e.g.*, the structure of iron-sulfur prosthetic groups) is already out of date. It is my feeling that the book would have been improved by the omission of much of the material in the earlier chapters. While the idea of educating both biochemists and inorganic chemists in bioinorganic chemistry is an admirable one, the level at which the biochemical material is presented is too elementary to be particularly useful, while the inorganic section is perhaps too detailed. Overall the book is very uneven, with certain topics being covered in some depth while others are covered only superficially.

Thomas H. Whitesides, *University of Wisconsin-Madison*

New Journals

Journal of Physical and Chemical Reference Data. DAVID R. LIDE, JR., Editor. Published by the American Chemical Society and the American Institute of Physics for the National Bureau of Standards. Volume 1, No. 1, 1972. Subscription \$20 for members of affiliated societies, \$60 for others (per year).

Archives of Environmental Contamination and Toxicology. LOUIS KYKKEN, Editor. Published quarterly by Springer-Verlag, New York, Inc. Volume 1, No. 1, February 1973. Subscription for 1973, \$39.00 (institutional), \$24.00 (personal).

Collective Phenomena. H. FROHLICH, Editor. Published by Gordon and Breach Science Publishers, New York. Volume 1, No. 1, August 1972. Subscription per volume of four issues, \$45.00 (institutional), \$15.00 (personal).

Biochemical Systematics. E. SCHOFFENIELS and T. SWAIN, Editors. Published by Pergamon Press, Oxford and New York. Volume 1, No. 1, January 1973. Quarterly, subscription \$30.00 (institutional), \$12.00 (personal).

Chemical Engineering Communications. CORNELIUS J. PINGS, Editor. Published by Gordon and Breach, New York, London, and Paris. Volume 1, No. 1, July 1973. Six issues per volume; subscription \$49.00 (institutional), \$17.50 (personal).

Ion Exchange and Membranes. J. A. MIKES, Editor. Published by Gordon and Breach, New York, London, and Paris. Volume 1, No. 1, August 1972. Four issues per volume; subscription \$45.00 (institutional), \$16.00 (personal).

Chemical Principles, Third Edition. By W. L. MASTERTON (University of Connecticut) and E. J. SLOWINSKI (Macalester College). W. B. Saunders Co., Philadelphia Pa. 1973. xi + 707 pp. \$12.95.

In this textbook for general chemistry, the authors have attempted to meet current demands by showing throughout explicitly "how the principles of chemistry apply to the world around" the student. The only major organizational changes over the second edition are the moving of organic chemistry to an earlier position and the insertion of a new chapter on water and aqueous solutions. An Instructors Manual of 135 pages is available, giving answers to the problems in the text.

Chemistry. By E. H. CORDES and R. SCHAEFFER (Indiana University). Harper and Row, New York, N. Y. 1973. xiv + 706 pp. \$12.95.

This is a textbook for a college course in general chemistry that takes the term more literally than is customary, and thereby avoids being an introductory book on just inorganic and physical chem-

istry. Although the chemistry of carbon compounds and other covalent materials is introduced at the start, this book is nevertheless intended for the student who will go on to further courses in chemistry. It is organized into four parts: Fundamentals of Chemistry; Water (including acid-base chemistry); Light and Energy; and Electron Transfer Reactions. Those interested in new approaches to the teaching of general chemistry should not overlook this book.

Chemistry. By L. W. FINE (Housatonic Community College). Prentice-Hall, Inc., Englewood Cliffs, N. J. 1972. xiv + 910 pp. \$12.45.

This text for general chemistry follows the conventional order but has the special characteristic of emphasizing how chemical principles were elaborated and verified. It thus includes more historical material and information about scientists of fame than is usual. An unusual feature is the inclusion of a three-page section on Application of the Computer to Chemistry.

Chemistry and the Environment. By D. O. JOHNSTON, J. T. NETTERVILLE, J. L. WOOD, and M. M. JONES (David Lipscomb College and Vanderbilt University). W. B. Saunders Co., Philadelphia, Pa. 1973. xi + 452 pp. \$10.95.

This book is "intended for one-quarter or one-semester courses in chemistry for liberal arts students." It begins with a prologue entitled "Science and Technology as a New Philosophy" and then covers such areas as "Life and Chemistry," "Chemistry for Better Living—Consumer Products," and, remarkably, "Chemistry for Worse Living," which includes a section on "gin" that is only slightly shorter than that on "hallucinogens."

Essentials of General, Organic and Biochemistry. Second Edition. By J. P. ROUTH, D. P. EYMAN, and D. J. BURTON (University of Iowa). W. B. Saunders Co., Philadelphia, Pa. 1973. xiv + 652 pp. \$12.95.

This is apparently a text for a course in general chemistry intended to prepare students for further study in chemistry, although the breadth of its purview and the emphasis given to examples of current interest give it a wider appeal. It has evidently been entirely rewritten, with the inclusion of a number of new topics such as nuclear processes.

General Chemistry. By R. S. BECKER and W. E. WENTWORTH (University of Houston). Houghton Mifflin Co., Boston, Mass. 1973. xiii + 779 pp. \$12.95.

This book "is written for an introductory full year course with students of chemistry, science and engineering in mind." It appears to be a rigorous text that makes little concession to current fashions, although "no knowledge of calculus and no previous exposure to chemistry" are assumed. An indication of its general tenor is the fact that it is very well provided with diagrams, figures, and tables, but is not embellished with pictures of such popular appeal as rockets, refineries, space rovers, computers, cans of codfish, or ring-tailed rats. In addition to the usual topics, it includes chapters on electrochemistry, photochemistry, nuclear chemistry, and biochemistry. Answers to the problems are included as an appendix.

Problems for General and Environmental Chemistry. By W. M. RISEN, JR., and G. P. FLYNN (Brown University). Prentice-Hall, Inc., Englewood Cliffs, N. J. 1972. xii + 440 pp. \$5.70.

The subject is divided into 20 chapters, each of which begins with a compact "pragmatic survey of the key material" and then presents a series of exercises, followed by a list of hints on how to attack the problem. Solutions are given at the end of the book, which also has appendices of useful information.

Textbooks and Laboratory Manuals for Introductory or General Chemistry

Chemistry. Imagination and Implication. By A. TRUMAN SCHWARTZ (Macalester College). Academic Press, New York, N. Y. 1973. xv + 571 pp. \$10.95. A textbook for chemistry for students not concentrating in science.

Chemistry, Man, and Environmental Change. An Integrated Approach. By J. CALVIN GIDDINGS (University of Utah). Canfield Press/Harper and Row, San Francisco, Calif. 1973. viii + 472 pp. \$10.95. A textbook "for nonscience students who desire an introduction to the science of environment without an undue burden of scientific detail."

Chemistry. By DARYLE H. BUSCH (Ohio State University), HARRISON SHULL (Indiana University), and ROBERT T. CONLEY (Wright State University). Allyn and Bacon, Inc., Boston, Mass. 1973. xiv + 929 pp. \$13.95. A textbook that emphasizes the principles and logical organization of the present knowledge of chemistry.

Models in Chemical Science. By GEORGE S. HAMMOND (California Institute of Technology), JANET OSTERYOUNG (Colorado State University), THOMAS H. CRAWFORD (University of Louisville), and HARRY B. GRAY (California Institute of Technology). W. A. Benjamin, Inc., Menlo Park, Calif. 1971. xiii + 422 pp. \$10.95. An approach to general chemistry "that stresses the role of models in stimulating interplay between theory and experiment."

Annual Reports in Inorganic and General Syntheses—1972. Edited by KURT NIENENZU and HANS ZIMMER. Academic Press, Inc., New York, N. Y. 1973. xix + 313 pp. \$12.50.

This is an interesting and worthwhile addition to the literature of inorganic chemistry. A more suitable title would refer to "Inorganic and Organometallic Syntheses," since there is a considerable emphasis on the synthesis of organometallic compounds in this book.

The book is interesting in that it makes no attempt to give recipes for the synthesis of specific compounds, but attempts instead to identify the important compounds of interest whose syntheses have been published during the year. The paperbound volume is well referenced, so that it can act as a guide to the original literature.

Another interesting feature of the book is its organization, which is based largely on the Periodic Table, so that it is relatively easy to locate which compounds of a given element are reported. However, the lack of an index is a serious shortcoming of the book. It is not possible to find which complexes of a given ligand are reported, for example. This is a serious shortcoming, and this reviewer recommends that an index appear in future volumes.

The editors of the book have chosen to include another interesting feature, namely, short articles on various aspects of the synthesis of inorganic and organometallic compounds. For example, an excellent article by Darl H. McDaniel on "Stabilizing Effects of Large Counter-Ions" appears in this volume, which enhances this book's value considerably.

As a cost-saving device, the publishers have chosen to photoreproduce the typescripts submitted by the authors of the various chapters. This results in a lack of uniformity in appearance because of the many different type styles used in the book, and the lack of right justification also detracts somewhat from the appearance. However, the reproduction is quite clear and readable.

The editors have assembled an impressive list of contributors for the various chapters dealing with the periodic groups, including M. J. Steffell, I. A. Boenig, B. J. McCormick, J. B. Smart, L. A. Melcher, J. P. Oliver, K. S. Mazdiyasn, F. W. Moore, and G. A. Tsigdinos, G. Davies, J. R. Wasson, and H. J. Stoklosa, P. R. Mitchell, B. T. Heaton, J. Thayer, R. D. Joyner, P. A. S. Smith, E. Linder, H. D. Erbert, L. C. Duncan, K. Seppelt, C. D. Miller, J. J. Alexander, R. O. Bach, and D. H. McDaniel.

This reviewer recommends the book to researchers in chemistry who are especially concerned with recent developments in synthetic inorganic chemistry.

Stanley Kirschner, *Wayne State University*

Electrochemical Systems. By JOHN S. NEWMAN (University of California). Prentice-Hall, Inc., Englewood Cliffs, N. J. 1973. xiv + 432 pp. \$18.95.

Scientific information is available to all who can read; however, a textbook, even an advanced text such as this, is more than a simple collection of facts. To write a textbook, of course, requires a great deal of selecting and editing, but more importantly the information must be presented in a manner conducive to assimilation. Organization might be the single most important aspect of textbook construction. The present work is impeccably organized. This organization is introduced by the pedagogic device of stating a rather complex electrochemical problem and then dissecting it into its component parts. These components, electrochemical thermodynamics, electrode kinetics and interfacial phenomena, and transport properties then comprise the first three major divisions of the book. These parts are then reassembled in a final section in which real electrochemical systems are described and analyzed. In keeping with its intended use, several problems are presented at the end of appropriate chapters, and a table of notation appears at the end of each chapter.

The book is quite obviously directed more toward chemical engi-

neers than chemists, and for this reason the more chemical aspects of electrode reactions are perhaps understated. The section dealing with electrode kinetics and the double layer is sufficient for the primary purposes of the book, but could profitably be supplemented. Chemical reactions coupled to electron transfer are completely ignored, and since these reactions affect the kinetics, thermodynamics, and transport properties of an electrochemical system, their omission is of some consequence. Considering the author's interests it is not surprising that the last two sections constitute the best of the book. Some of the material in these sections has appeared previously as chapter contributions to series volumes; nonetheless, their reappearance in a single volume is quite useful. Because of these last two sections, this work should receive a broader audience than originally intended. Scientists in all areas of electrochemistry could profitably study the last two hundred pages.

Lynn Marcoux, *Texas Tech University*

Polymerization of Heterocyclics. By OTTO VOGL (Polymer Science and Engineering University of Massachusetts) and JUNJI FURUKAWA (Kyoto University, Japan). Marcel Dekker, New York, N. Y. 1973. viii + 217 pp. \$19.50.

This book contains a series of reviews of the ring-opening polymerization of cyclic ethers, perfluoro epoxides, trioxanes, alkylene sulfides, lactones, and lactams. Unlike several previous reviews which have concentrated on kinetics, the present book emphasizes the effect of changing parameters such as catalyst type, ring size, and end groups on the chemical mechanism of polymerization and on the nature of the polymers obtained. Thus the reader is able to gain an insight into how variations in such parameters can be used to design new types of polymers. For example, the thermal and oxidative stability of polytrioxanes can be modified by the addition of suitable comonomers to the polymerization, and the hydrolytic stability of polycaprolactone can be enhanced by the appropriate choice of initiator which controls the end group.

Two chapters deserve particular comment. The first, "Polymerization of Perfluoro Epoxides" by H. S. Eleuterio, describes not only a new class of highly stable fluorocarbon polymers but also difficulties met and overcome in the synthesis of the monomers. The second and also the longest chapter (54 pages) is "Lactam Polymerization" by Jan Sebenda. While successfully reviewing the massive amount of literature on this subject, the author has also succeeded in concurrently presenting a critical review of the many side reactions which occur. These play a very important part in determining the properties of the polymer by leading to the decay of active species and promoting the formation of irregular molecules inside the polymer molecules.

This book should be of particular interest to the organic chemist working in the field of polymer synthesis.

John Newbould, *General Motors Research Laboratories*

The Hall Effect in Metals and Alloys. By C. M. HURD (National Research Council of Canada). Plenum Press, New York and London. 1972. xiii + 400 pp. \$28.00.

The book is a volume in the International Cryogenics Monograph Series edited by K. Mendelsohn and K. D. Timmerhaus. At a glance one may wonder about what kind of useful information a chemist can obtain by reading this book of such a highly specialized subject matter. Indeed, except for its relation with the topology of the Fermi surface and with the mobility of electrons, the Hall effect of metals and alloys does not have any practical application, since the effect is generally too small to be utilized. However, readers of this book can have the pleasant surprise of finding that it offers very broad and detailed information concerning the transport properties of metals and alloys in a very readable way. Written by an experimentalist, the explanation of the theory is mostly descriptive, but it still gives an adequate and detailed account of the whole aspect of the Hall effect. Further, the results of the measurements of the Hall effect so far obtained on metals and binary alloys are summarized with brief explanations in Chapter 7. This chapter itself covers 140 pages and includes more than 450 references. It alone serves as a quick and convenient referral. The overall value of the book is that it gives readable accounts of the Hall effect to those with a general familiarity of solid-state physics, but who may not be familiar with electron-transport properties. It also serves as an adequate reference book for those who are currently engaged in the study of this subject.

The first five chapters give a review of the theory. In Chapters 1 and 2, an elementary description of the motion of electrons in the presence of external electric and magnetic field and its relation with

the topology of the Fermi surface are given. These descriptions are concise and physical enough so that even those who do not have much background in electron-transport problems can easily grasp the general concept of the problem.

The results of Chapters 1 and 2 are then applied in Chapters 3, 4, and 5 to interpret the Hall effect in groups of metals of increasing complexity. Chapter 3 deals with the Hall effect in the so-called simple metals like Al, In, etc., for which the Fermi surface is almost spherical and the nearly-free-electron theory is known to be a good approximation. Here, the dependence of the Hall effect on the shape of the Fermi surface, the temperature, and impurities are discussed in full. Based on this knowledge, the Hall effect in the group of Ib metals like Cu, Ag, etc., and dilute alloys derived from them are discussed in detail in Chapter 4. Since the electronic structure of these metals has been investigated in great detail, the analysis of the experimental data can be quite detailed, and hence this chapter forms the most essential part of this book. Chapter 5, on the other hand, gives rather brief and qualitative descriptions of the Hall effect of magnetic metals, where the so-called anomalous Hall effect is produced from the interaction between the conduction electrons and the localized magnetic moment.

Chapter 6 gives a practical and useful review of the methods of making Hall-effect measurements. Further, techniques are described for measurements under unusual conditions such as at high pressures, in liquid metals. The effect in superconductors which is still under active consideration by theorists is briefly reviewed.

In view of the above content, the book can be recommended to chemists who have a general interest in electron transport problems in metals.

Hiroshi Sato, *Ford Motor Company*

The Organic Chemist's Book of Orbitals. By WILLIAM L. JORGENSEN and LIONEL SALEM. Academic Press, New York, N. Y. 1973. xii + 305 pp. \$11.50.

The authors tell us that this book is for organic chemists "for whom orbitals have ceased to be an abstract concept but have instead become concrete and useful in the daily practice of chemistry."

The book has two major sections. The first, "How Molecular Orbitals are Built by Delocalization: A Unified Approach Based on Bond Orbitals and Group Orbitals," runs 45 pages. The second, "Three-Dimensional Molecular Orbitals," occupies most of the rest of the book, 230 pages. Very little space is devoted to the applications of molecular orbitals to organic reactions, but pertinent references are given so that the interested reader can refer to the original literature. Literature references are also given for each of the molecular species pictured.

The text is extremely well written and the material presented in a logical and pleasing manner. The three-dimensional pictures are also done well, although it may take some readers a while to become accustomed to the computer-generated drawings. This is by no means a significant drawback. A wide variety of organic molecular species are represented, 104 to be exact, from hydrogen with two valence electrons to maleic anhydride with thirty-six. For a very few of the more complex molecular species only π orbitals are presented. For the most part, however, all the orbitals of a particular species are presented. As many organic chemists are familiar only with π orbitals, the complete orbital pictures will be beneficial.

Organic chemists use many visual aids in thinking about and studying chemical problems. The use of molecular models in the study of structural and stereochemical problems is one example. The three-dimensional orbital pictures in this book could prove to be another useful tool in the same vein, as they will be used for the study of orbital spacial relationships and interactions in organic molecules.

The book is eminently readable. Its easy and lucid style would make it a suitable supplementary text in advanced undergraduate or graduate courses in organic chemistry and/or molecular orbital theory.

The authors have been successful and produced for us a handbook of the molecular orbitals of some interesting organic species. It should be a welcome addition to the bookshelves of many organic chemists.

David S. Weiss, *University of Michigan*

Functional Monomers. Volume 1. Edited by RONALD H. YOCUM and EDWIN B. NYQUIST (Dow Chemical Co.). Marcel Dekker, Inc., New York, N. Y. 1973. xii + 715 pp. \$39.50.

The subtitle of this book, "Their Preparation, Polymerization, and Application," points out clearly the aim and scope of this first

part of a planned two-volume work. The stated purpose of the editors was to provide the polymer chemist with a practical reference book dealing with the functional monomers, defined as monomers which possess and maintain a reactive site after polymerization.

All authors in this volume are from Dow Chemical Company, which may have helped to maintain a high degree of uniformity in the treatments of the various monomers. The preparation of monomer, its polymerization, the chemical reactions of the resulting polymers, and the commercial applications for the polymers are discussed for all of the monomers covered.

The style of the book is very much that of a monograph touching at least briefly the multitudinous references cited. The book abounds with tables of data compiled from the literature. The number of pages devoted to references and tables outnumber the pages of text. There is also a complete author index in addition to a subject index.

Chapter 1, Acrylamide and Other Alpha, Beta Unsaturated Amides, by Dalton C. MacWilliams covers chiefly acrylamide and methacrylamide. Chapter 2, Reactive Halogenated Monomers, by Charles F. Raley and Richard J. Dolinski covers haloalkyl acrylates and methacrylates, haloalkyl acrylic acids and esters, phenylallyl halides, and halogenated styrenes and butadienes. Allyl and methallyl halides are omitted. Chapter 3, Hydroxy Monomers, by Edwin B. Nyquist covers hydroxyalkyl acrylates and methacrylates as well as allyl alcohol. *N*-Methylolacrylamide and methacrylamide were also included. Chapter 4, Sulfonic Acids and Sulfonate Monomers, by Donald A. Kangas covers chiefly the salts and derivatives of ethylenesulfonic acid, allylsulfonic acid, and styrenesulfonic acid, and also 2-sulfoethyl methacrylate.

The goal of the editors has been achieved in putting together in one place substantially all of the information available on functional monomers. The industrial polymer chemist concerned with specialty polymers will find this a very useful book.

Edward M. Fettes, *Northern Petrochemical Company*

Drug Design. Volume IV. Edited by E. J. ARIENS (University of Nijmegen). Academic Press, New York and London. 1973. 489 pp. \$35.00.

This volume continues a series of monographs dealing with the chemical and physical factors which must be considered in the design of a therapeutic or biologically active agent. Volumes I, II, and III dealt with factors of importance in the pharmacokinetic and pharmacodynamic phases of drug action. Such topics as absorption, distribution, metabolism, and excretion of drugs were discussed as well as the interaction of drugs with the biological structure through which they exert their action (receptor).

While "Drug Design," Volume IV, is said to deal chiefly with the pharmaceutical phase of drug action, over half of the book consists of monographs dealing with compounds with specific biological activities. The first portion, dealing with the pharmaceutical phase, treats such topics as biopharmaceutics, bioavailability, gastrointestinal membranes transport, and solid dosage forms with prolonged action and topical drug products. The latter half of the book provides monographs on the design of biologically active compounds with specific activities. Included are monographs of such topics as sunscreen preparations, litholytic agents, biologically active nucleosides, and insecticidal chlorohydrocarbon derivatives.

Monographs in Volume IV are well written by authors well qualified to discuss the subject and will be of value to scientists interested in compounds with biological activity. Terms are well defined and the material related to biological activity is well presented to ensure understanding by chemists or other scientists with a minimum background in the subject.

J. E. Gearien, *University of Illinois at the Medical Center, Chicago*

Principles of Organic Mass Spectrometry. By D. H. WILLIAMS and I. HOWE. McGraw-Hill Book Co., Ltd., Maidenhead, Berks, England. 1972. 245 pp. £5.00.

Although organic chemists continue to depend on empirical rules for the interpretation of the mass spectra of organic molecules, there has arisen in the last six years a large body of theory which is revolutionizing the approach toward the understanding of these spectra. Since Dudley Williams has acted as one of the essential driving forces in this movement it is fitting that he should coauthor the first book that puts these new principles together. Thus, "Principles

of Organic Mass Spectrometry" by Williams and Howe is the first text of a new generation in mass spectrometry—a generation in which fledgling theory grasps, however tentatively, all those disparate phenomena associated with the high-energy fragmentation of organic molecules and brings them within a new, growing, coherent framework.

The authors are, in fact, so much a part of this transition that one criticism of their book is its consistent journalistic tone. Throughout the text one has the feeling again and again of reading material which may change on opening the newest issue of the journal. Nevertheless, I do not see how it could be otherwise since a field in such rapid movement precludes the possibility of presenting time-honored principles.

In 245 pages, including an adequate subject index and twelve chapters, Williams and Howe cover in variable depth all of the areas important to modern organic mass spectrometry. In no case are any of these areas covered anywhere near the point necessary to take up a research program on dropping the book, but in every case the presentation is correct and up to date. Examples from the literature are relied on heavily as a framework for their coherent approach, and the book is the best overall introduction to the current field that I know of.

I have used the text as the foundation of a series of lectures on organic mass spectrometry for our graduate students here, and the presentation, following Williams and Howe's approach, was a pleasure to give and was equally well received. Thus, after an introduction discussing instrument function, the authors go on to ion types and the currently used theories for fragmentation including a qualitative approach to the quasi-equilibrium and the RKKM theories. There is adequate discussion of ion energetics and the problems associated with ionization and appearance potentials. After an extensive but not exhaustive treatment of the relationship between structure and fragmentation, the authors devote a series of chapters to special topics in the field of gaseous ion chemistry. These include ion-cyclotron and field ionization and as well overviews of computers and gas chromatography in mass spectrometry.

Readers should not expect complete or even extensive coverage from this book. The authors have essentially chosen those studies in their particular interests as the basis for the various topics. In many cases rather involved and detailed research areas such as, for example, deuterium labeling or determination of appearance potentials among many others, are treated in a cursory manner and thus this is not a book to get into advanced detail of the type necessary to work in the area. It is though an excellent and balanced overview and should, as the authors intended, interest many chemists in an area which is reaching toward maturity.

I learned a lot from the book and like it, and the price is certainly right.

Mark M. Green, *University of Michigan*

Microbial Life in the Soil. An Introduction. By TSUTOMU HATTORI (Tohoku University, Japan). Marcel Dekker, Inc., New York, N. Y. 1973. vi + 427 pp. \$27.50.

Most modern soil microbiology is biochemically and/or ecologically oriented, but the author of this volume has attempted what he terms a "systems analysis" of microbial life in soil. Mathematical formulations are frequently employed. There are numerous equations describing microbial growth, activity, and interactions, but their derivations and applications are not presented with sufficient clarity to be readily understood by most students of the subject. This is regrettable since the area of antagonistic and associative relationships of soil microorganisms is particularly in need of greater quantification. Dr. Hattori has a special interest in the nature and magnitude of electrostatic charges on the surfaces of microbial cells and clay particles. The physical chemistry of these systems as well as their microbiological consequences are treated in considerable detail. Adsorptive phenomena and aggregation are presented as dynamic aspects of the soil environment, but aside from these favorable features, coverage is generally inadequate and the treatment of special topics selected for consideration is often much too brief to be useful to either the student or the professional. Errors are numerous and there are deficiencies throughout the text. The volume lacks balance and presents an erroneous impression of the content and concerns of contemporary soil microbiology. It will appeal in part, however, to those interested in mathematical descriptions of microbial behavior.

David Pramer, *Rutgers University*