

Book Reviews*

Advances in Heterocyclic Chemistry. Volume 18. Edited by A. R. KATRITZKY and A. J. BOULTON (University of East Anglia). Academic Press, New York, N.Y. 1975. ix + 486 pp. \$48.50.

This year's volume of this useful series contains six chapters: The Chemistry of Isatin (F. D. Popp); Thiochromanones and Related Compounds (S. W. Schneller); Thioureas in the Synthesis of Heterocycles (T. S. Griffin, T. S. Woods, and D. L. Klayman); Advances in the Chemistry of Chrom-3-enes (L. Merlini); Tautomerism and Electronic Structure of Biological Pyrimidines (J. S. Kwiatkowski and B. Pullman); and Recent Advances in the Chemistry of Benzo[*b*]furan and Its Derivatives. Part 1: Occurrence and Synthesis (P. Cagniant and D. Cagniant). This book is also available in a Library Edition with microfiche (\$63.00). As usual, the chapters are comprehensive and exhaustively documented (e.g., the first chapter alone contains 637 references). There is no index, unfortunately, although the detailed tables of contents at the beginning of each chapter do much to reduce the need for one. A Cumulative Index of Titles provides a summary of the contents of earlier volumes.

Annual Reports in Inorganic and General Syntheses—1974. Edited by K. NIEDENZU (University of Kentucky) and H. ZIMMER (University of Cincinnati). Academic Press, New York, N.Y. 1975. xvii + 369 pp. \$18.50.

This volume continues the pattern of the two earlier ones in the series in reviewing new advances of possible synthetic interest, with a broad enough view to include some information on structure or mechanism. The material is presented in textual form, with rather few equations. This treatment is probably largely due to the nature of the subject, but it does prevent visual scanning. One must read the chapters through, but since they each encompass one element or related group of elements, that is not arduous. A substantial subject index, a feature new with this volume, does much to make retrieval of information easier.

Annual Reports in Organic Synthesis—1974. Edited by L. S. HEGEDUS (Colorado State University) and S. R. WILSON (Indiana University). Academic Press, New York, N.Y. 1975. xiv + 397 pp. \$14.00.

Having reached the age of five, this series may be considered as well established. In it are surveyed 45 primary journals for "all reactions and methods which are new, synthetically useful, and reasonably general." Rapid publication, easy visual scanning, and a low price continue to be guiding principles. To achieve them, only journals received by the editors by March 1st, 1975, have been covered, discursive text has been almost wholly avoided (nearly all reactions are presented graphically), and the content has been so arranged that an index could be dispensed with.

The eight chapters are organized according to type of reaction (e.g., oxidation), functional group preparation, protecting groups, etc. Chapter VII is charmingly titled "Other Completely Miscellaneous Reactions", and includes one reaction which, it is reported, gives yields of "80-350%". With such advances, the future of organic synthesis is surely bright!

Annual Reports on the Progress of Chemistry. Volume 71, 1974. Section B: Organic Chemistry. The Chemical Society, London, 1975. xix + 594 pp.

The Annual Reports, which are distinct from the Chemical Society's Specialist Periodical Reports and are more general, have felt the impact of the increase in published research, and steps were taken last year to keep the Reports to a more manageable size. As a result, this year's volume is about 20% smaller. Still further measures have been recommended, and may be adopted for next year's Reports, by which the reporters will be directed to evaluate the key papers in their fields, and to select certain topics of current interest for emphasis.

The present volume covers all of organic chemistry in twenty chapters, ranging from physical methods and techniques to enzyme mechanisms. The large group of reporters who made this volume possible are to be thanked for so competently digesting the enormous amount of material before them and presenting it in a readable form with restrained but helpful critical evaluation. It is certainly a welcome aid for keeping up, not only with one's own specialty, but with organic chemistry as a whole.

Ascorbinometric Titrations. By L. ERDEY and G. SVEHLA. Akadémiai Kiadó, Budapest. 1973. 183 pp. \$8.50.

Ascorbic acid, long known as vitamin C for its nutritional importance, is a good reducing agent. In 1950, the late Professor Erdey introduced it as an analytical reagent, and since then the use of the reversible system ascorbic acid/dehydroascorbic acid has been extensively developed as a method of volumetric titration of inorganic and organic oxidizing agents. This book is a treatise on such use. It contains numerous complete laboratory procedures, as well as background material and discussion. The bibliography contains 170 references, and is supplemented by a two-page author index, as well as a subject index.

Creativity in Organic Synthesis. Volume 1. By J. S. BINDRA and R. BINDRA (Pfizer Inc.). Academic Press, New York, N.Y. 1975. xiv + 322 pp. \$11.50.

This book is a collection of 67 examples of the authors' selection of "outstanding accomplishments of natural products synthesis during the last five years." The syntheses are presented in the form of equations with fully drawn structural formulas. There is a minimum of text, only short introductory paragraphs dealing with the background of the substance being synthesized. Critical discussion is essentially absent, but there are many amplifying footnotes with extra documentation. There is a rather brief subject index; an author index would have been particularly appropriate for this book, however.

Dictionary of Organic Compounds. Fourth Edition. Eleventh Supplement. Edited by J. B. THOMSON. Oxford University Press, New York, N.Y. 1975. 231 pp. \$44.00.

This supplement incorporates new material published in and before 1974, ranging from Abietinal to Zoanthoxanthin. Such a well-known work as this hardly needs a review, for organic chemists will be glad to know that it has appeared, but will take its high quality and comprehensiveness for granted. It is somewhat frightening to read some of the new listings. Under the letter W, for example, there are only four substances, none of which would be comprehensible without a dictionary: Warburgiadione, Webbixanthin, Wightionolide, and Wurtzitane. It is curious to muse whether the structures would be much more evident from the IUPAC names. In any event, the editor has thoughtfully provided a formula index.

Reagents for Organic Synthesis. Volume 5. by MARY FIESER and LOUIS F. FIESER (Harvard University). Wiley/Interscience, New York, N.Y. 1975. vii + 864 pp. \$28.95.

Once again the accumulation of reports of synthetic reagents has reached critical mass and has burst forth as a new volume in this now well-known and useful series. The preface claims that about 350 reagents are treated for the first time, and new references to about 400 others are given. Special mention is given to new reagents based on selenium, to bis(ributylstannyl)ethylene as a reagent for the synthesis of acetylenes, to phase-transfer catalysts, and to crown ethers.

The reagents are arranged in alphabetical order and are generally easily located, although one occasionally encounters inconsistencies or anachronisms, such as "butyloxy" (but "ethoxy"), "furane" for furan, etc. The authors state that they have tried to avoid unnecessary abbreviations, but there is an unfortunately large quantity of them to be found, many of which save little space over the formulas. One equation, for example, carries over the arrow

* Unsigned book reviews are by the Book Review Editor.

"LTA, Py/Cu(OAc)₂", when substitution of "Pb(OAc)₄" for LTA would have been both clearer and more consistent. Literature citations are a bit peculiar, too, and include "Am. Soc." and "J. Org.", presumably to save space, yet "Tetrahedron Letters" is written out in full every time. These are all small things, however, and the work continues to be a valuable and interesting aid to the organic chemist.

Russian-English Chemical and Polytechnical Dictionary. Third Edition. By L. I. CALLAHAM. Wiley/Interscience, New York, N.Y. 1975. xxviii + 852 pp. \$34.95.

This useful dictionary has evolved steadily with the growth of the science and the inevitable increase in technical terms. It is intended for "English-speaking scientists and engineers with a fair knowledge of Russian and a very good knowledge of their own specialties", and it does a good job. The number of pages since the pages are larger. The Cyrillic type is clearer, a helpful feature to those who do not read it every day. It is gratifying to find that many acronyms are listed, for they can be particularly frustrating to the casual reader of scientific Russian.

Aldehydes—Photometric Analysis. Volumes 1 and 2. By EUGENE SAWICKI and CAROLE R. SAWICKI. Academic Press, New York, N.Y. 1975. Vol. 1: xxviii + 283 pp. \$27.25. Vol. 2: xiv + 344 pp. \$28.00.

These two volumes are the first of a planned seven-volume work. Individual aldehydes or classes of aldehydes are taken up in alphabetical order. For each aldehyde, the essential physical and spectrographic properties are given, after which the heart of the treatment is taken up under the curiously ambiguous heading "Organic Syntheses Methods of Assay". The material is in fact a systematic discussion of each method or reagent that has been used or adapted for colorimetric determination of that aldehyde. Specific experimental directions are included, along with tables and figures (mostly spectra). Everything is well documented.

Many aldehydes are covered that might at first seem obscure, but most of them turn out to have significance in biology, industry, or environmental pollution. Indeed, it is the present concern for contaminants in the environment that has given rise to many of the methods described, and which makes this work timely. These first two volumes are intended to present the present state of the art for 66 aldehydes. Future volumes are planned to cover aldehyde precursors, environmental mixtures, etc. The work is meant to appeal not only to chemists in research, but those engaged in analytical control and the many peripheral areas such as engineering, biology, toxicology, or forensic chemistry, where analysis and detection of organic compounds is significant.

Atlas of Spectral Data and Physical Constants for Organic Compounds. Second Edition. Edited by J. G. GRASSELLI (The Standard Oil Co., Ohio) and W. M. RITCHEY (Case Western Reserve University). CRC Press, Cleveland Ohio. 1975. 4,527 pp (in six volumes). \$500.00 for the set.

It seems only a short time ago that the first edition of this work appeared, and received favorable review. It was thus rather astonishing to open a very large box, and to find in it six volumes, each one of which is about half the size of the original one-volume edition. It was a staggering load to carry from the mail room; the amount of work that must have gone into compiling it is even more staggering, even without considering the short time in which it was done.

The most frustrating shortcoming of the first edition, its limited coverage, has been remedied by increasing the number of compounds covered from 8,000 to 21,000, and for the original 8,000 compounds, adding more or better spectral data. New with this edition are listings of Raman and ¹³C NMR data, and molecular weights for compounds based on parent ion data from mass spectrometry as well as atomic weights. An effort to include cross-correlation of spectral data has been started with this edition, in the instance of infrared and NMR spectroscopy of some common classes of compounds.

The actual tables of data occupy Volumes II through IV. Apart from their great expansion, the most notable improvement is the expression of infrared spectra uniformly in wave numbers (data originally published in microns has been converted by computer).

As any work of reference expands, so does the problem of re-

trieval of information. The editors have been very conscious of this, for the last two volumes are devoted to the many indexes: Molecular Formula; Molecular Weight; Melting Point; Boiling Point; Wiswesser Line Notation; Infrared, Raman, Ultraviolet, PMR, ¹³C NMR, and Mass Spectra. The editors emphasize the value of the Wiswesser Line Notation, which has so many advantages over conventional nomenclature. They have used its amenability to permuting to construct a Chemical Structure and Substructure Index, which provides a means of searching for or classifying a compound on the basis of functional groups.

With all the information packed into this work, the user should not object to the unavoidable fact that a small amount of work is required to become acquainted with how to use it, and especially how to get the most out of it. In this respect, it is analogous to learning how to use *Beilstein*, or the cumulative index to *Chemical Abstracts*. Incidentally, those who have wondered about the purpose of the CODEN symbols that have become a feature of our journals ("JACSAT" in this one), will find them put to use as a concise means of providing the literature references in this work.

This compilation must be regarded as essential to a library serving the needs of organic chemists. It is most certainly an advance of such magnitude over the first edition that the possession of the latter hardly lessens the need to acquire the new one. Research organizations that must account for their man-hours in economic terms should find that this work, although substantial in cost, will pay for itself easily in time saved.

Biochemistry of Bacterial Growth. Second Edition. Edited by J. MANDELSTAM and K. MCQUILLEN. Wiley/Halsted, New York, N.Y. 1973. x + 582 pp. \$19.95.

The bulk of this paperback volume consists of a group of contributed chapters, four of which deal with synthesis of different classes of substances by bacteria; the other chapters cover cell structures, growth, genetics, metabolism, and differentiation. In this edition, the original concluding chapter has been dropped, the subject of regulation has been completely rewritten, and the remaining chapters have been brought up to date.

Biological Interfaces. An Introduction to the Surface and Colloid Science of Biochemical and Biological Systems. By MALCOLM N. JONES (University of Manchester). Elsevier Scientific Publishing Co., New York, N.Y. 1975. ix + 240 pp. \$24.75 (paperback, \$13.25).

This book is based on a course in physical biochemistry for third-year undergraduates taught by the author, but it is perhaps more suitable for seniors or beginning graduate students in American universities. Two chapters deal with general colloid chemistry and interfacial tension, four with biological monolayers, electrical double layers, micelles, and interactions between proteins and amphipathic substances, and two chapters deal with cellular interactions and membrane models. Experimental methods are given prominence. Although the assumed purpose of this work is to be a textbook, it is not written in the pedagogic style characteristic of American textbooks, but is more like a reference book. Its content is thus more concentrated than most textbooks. It has substantial bibliographies and a good index, both of which augment its reference utility.

The Catalytic Chemistry of Nitrogen Oxides. Edited by R. L. KLIMISCH and J. G. LARSON (General Motors Research Laboratories). Plenum Press, New York, N.Y. 1975. ix + 340 pp. \$27.50.

A symposium held at the General Motors Research Laboratories in 1974 provides the 18 papers of this volume. They are divided into four subject areas: Fundamental Studies of Nitrogen Oxide/Surface Interactions; Related Catalytic Chemistry; Selectivity, Kinetics, and Poisoning; and Catalytic Applications. Although a concern with automotive emissions is evident, the symposium approached the subject broadly, and the papers are mostly original reports of fundamental investigations on reduction or decomposition of nitric oxide. The full texts of the discussion following each paper are given, as well as substantial lists of references. Author and subject indexes increase the usefulness of the book.

Cell Patterning. Edited by R. PORTER and J. RIVERS. Elsevier/Excerpta Medica/North Holland, Amsterdam. 1975. viii + 356

pp. Dfl. 62.50 (\$26.95).

This book is CIBA Symposium 29. The contributed papers are essentially biological, but several of them are concerned with the biochemistry of heredity and of organ development.

Chemical Bonds. By HARRY B. GRAY (California Institute of Technology). W. A. Benjamin Inc., Menlo Park, Calif. 1973. viii + 232 pp. \$4.95.

This paperback volume "is intended to provide a reasonably complete introduction to atomic and molecular structure and bonding for science students." Its six chapters are: Atomic Structure; Electronic Properties of Atoms and Molecules; Diatomic Molecules; Polyatomic Molecules; Transition-Metal Complexes; and Bonding in Solids. A special feature is the generous use of illustrations, many of which are done with the air-brush technique.

Chemical Kinetics Data for the Upper and Lower Atmosphere: Proceedings of the Symposium. Edited by S. W. BENSON, D. M. GOLDEN, and J. R. BARKER. Wiley/Interscience, New York, N.Y. 1975. xvi + 656 pp. \$37.50.

The symposium held in September 1974 that gave rise to this book was organized under the auspices of CODATA (Committee on Data for Science and Technology of the International Council of Scientific Unions). Its area of concern was assessment of the accuracy and quality of kinetic data and their significance with respect to the problems of atmospheric pollution. Its 37 papers are accounts of original research, and, indeed, the book is formally considered to be a supplement to the *International Journal of Chemical Kinetics*. It is curious that none of the contributions is concerned with Freons and fluorocarbons, which are so much in the news these days; presumably this is a reflection of the rapid movement in the field, for, as short a time ago as 1974, their potential danger had not come to the fore.

The Chemistry of Amidines and Imidates. Edited by S. PATAI. Wiley/Interscience, New York, N.Y. 1975. xiii + 677 pp. \$58.00.

The rapidity with which the series "The Chemistry of Functional Groups" is nearing completion is impressive and gratifying. The present volume continues the high standard set by the earlier ones, and treats a group of compounds of growing synthetic and biochemical importance. There are separate chapters on "Biological Reactions and Pharmaceutical Uses of Imidic Acid Derivatives" and "Preparation and Synthetic Uses of Amidines". Certain other subjects not so generally appreciated are also given the attention of individual chapters, such as electrochemistry and thermochemistry. Hydrazine derivatives are treated in a chapter on amidrazones, but an anticipated chapter on amidoximes did not materialize. At least one subject, restricted rotation, is found in three different chapters. No date for the termination of literature coverage is given, but the foreword is dated February 1975, and some references from 1974 can be found in the bibliographies. The indexes (author and subject) are exemplary.

Chemistry and Biochemistry of Thiocyanic Acid and Its Derivatives. Edited by A. A. NEWMAN. Academic Press, London. 1975. xiv + 351 pp. £12.00 (\$29.75).

The editor points out that no recent publication exists devoted broadly to the chemistry of thiocyanic acid and thiocyanates, whereas both industrial and biological interest in such compounds has increased substantially. This book is intended to fill this gap. Its six chapters are titled: General Chemistry; Coordination Chemistry; Molten Thiocyanates; Biochemistry; Technology; Industrial Applications; and Analytical Chemistry. Organic thiocyanates and isothiocyanates are included in the first chapter; the 20 pages devoted to their synthesis and reactions seem few in comparison to the space devoted to inorganic derivatives (more than two chapters), but the treatment is well done and useful. The bibliographies are extensive, but a casual inspection disclosed nothing later than 1973 (no statement appears about the termination date for the search of the literature, unfortunately). The good subject index will help to make this a useful work of reference.

Contribution à la détermination de la configuration et de la conformation molécolaires des corticostéroïdes. By P. GENARD. Masson et Cie, Paris. 1974. xvi + 296 pp. 180 F.

The author uses nuclear magnetic resonance to determine detailed

structural information about corticosteroids as a basis for correlating their biological activity with structure. Many spectra are shown, and there are many tables; much of the information given appears to be original with the author, and not to be available elsewhere. There is no index, but the table of contents is very detailed.

Corso Teorico-Pratico di Risonanza Magnetica Nucleare. Edited by A. FRIGERIO. Tamburini Editore, Milan. 1973. xiv + 543 pp. L. 10,000.

This softbound volume of contributed chapters is a detailed introduction to nuclear magnetic resonance, ranging from an introduction to the general phenomenon to specific applications in biology, natural products, polymers, and drugs. Two of the chapters are in English, the rest in Italian. A group of exercises with reproduced spectra, and a useful group of tables with titles such as "Chemical Shift di Gruppi Metilenici . . ." complete the work, which lacks an index.

Corso Teorico-Pratico di Spettroscopia di Assorbimento Atomico. Edited by A. FRIGERIO. Tamburini Editore, Milan. 1975. xi + 238 pp. L. 4500.

This text contains the papers given at a course of study held in November 1973, by the Mario Negri Institute of Pharmacological Research, in Milan, devoted to atomic absorption with particular attention to its application to analysis in biochemistry and of environmental pollution. There were nine lectures, one of which is printed in English; the others are in Italian.

Dictionary of Biochemistry. By J. STENESK (Western Michigan University). Wiley/Interscience, New York, N.Y. 1975. viii + 344 pp. \$22.50.

This is a dictionary designed to give quick identification of terms rather than detailed explanations, and the definitions are accordingly brief. The author has steered his way carefully between formal scientific terms and laboratory jargon, avoiding most of the latter by utilizing books and journals as sources. The seemingly limitless abbreviations used by biochemists are well represented. A compilation of this sort reveals the dangerous ambiguities inherent in the use of such abbreviations. For example, PGA is defined as meaning either prostaglandin with double bond at C-10, C-11, or pteroylglutamic acid, or phosphoglyceric acid. There are more phrases than single words, a helpful feature. Cross-referencing is good. There will always be arguments as to what should have been included or omitted in a dictionary of limited size, but this one stands up well to random spot-checking. The fact that it has been compiled from publications that have appeared since 1962 gives it a currency that is especially valuable.

Energy and Man: Technical and Social Aspects of Energy. Edited by M. G. MORGAN (Carnegie-Mellon University). IEEE Press, New York, N.Y. 1975. xi + 521 pp. \$19.95.

This book is a collection of selected reprints of articles from both scientific and lay journals and conference reports. According to the editor's preface, it addresses a problem at the interface of society and technology, primarily from the perspective of the technologist. Although it does not deal with chemistry as such, it should be of interest to chemists who are concerned in any way with the present energy problems, and it provides perspective that would otherwise require a large amount of effort to build up from scattered sources.

Histamine. Edited by C. MASLINSKI. Dowden, Hutchinson & Ross, Stroudsburg, Pa. Distributed by Wiley/Halsted, New York, N.Y. 1974. xii + 364 pp. \$20.00.

This monograph is the proceedings of a satellite symposium of the XXVth International Congress of Physiological Sciences, held in Poland in 1971. The 37 papers are reports of original research, and deal with determination, release, inactivation, and metabolism of histamine, with the relation of amines and histamine to the nervous system, and with other physiological aspects.

Modern Glass Practice. Seventh Edition. By S. R. SCHOLLES. Revised by C. H. GREENE. Cahners Books, Boston, Mass. 1975. xi + 493 pp. \$29.95.

This edition is said to be a "completely revised and rewritten" version of the original, which first appeared in 1935, and the last edition of which appeared in 1952. It is concerned primarily with the manufacture of glass rather than its chemistry, although there are elementary discussions of inorganic chemistry in the early chapters,

and physical chemistry and thermodynamics are brought in at various appropriate places. It is written as a textbook for students in glass technology, with exercises at the ends of the chapters, but a secondary audience of executives in glass manufacture, and the general reader, was kept in mind. References are given also, but those having to do with chemistry seem rather old.

Modern Science Dictionary, Second Edition. By A. HECHTLINGER and J. E. BERCK. Franklin Publishing Co., Palisade, N.Y. 1975. 848 pp. \$20.00.

This dictionary was originally compiled to meet the needs of high school students and their teachers. The definitions are accordingly rather simple, and in many instances so general or vague as to bring to mind Pope's famous couplet, "A little learning is a dangerous thing; drink deep, or taste not the Pyraean spring." In this enlarged edition, an Addendum of 70 pages appears at the front; the original text has been left untouched, without attempting to interpolate the new entries.

The number of terms that one might expect to find in such a dictionary, but which are missing, is unduly large. Examples are: nitrosamines; nuclear magnetic resonance; mohole; nanometer; Land camera; exciton, Lewis acid; reed valve; Rankine engine; etc. Some definitions are one-sided, such as that for "alkylation", which is concerned only with petroleum technology. Others are vividly superficial, such as "Benedict's reagent: A bluish solution used in testing for the presence of sugars." That for "kauri gum": "A resinous exudation of an Australian pine . . .", should bring any New Zealander to his boiling point! However, it is hard to fault the definition "nose: A protuberance on the face of air breathing vertebrates . . .", although one might wonder about a student who felt it necessary to look up such a word. The feeling that the revising and enlarging could have been very much better is hard to avoid.

Orbital and Electron Density Diagrams. By ANDREW STREITWIESER, JR., and PETER H. OWENS. Macmillan, New York, N.Y. 1973. xiv + 159 pp. \$6.50.

This book is subtitled "An Application of Computer Graphics", and, although there is much text, it is the diagrams that dominate. The results of ab initio quantum mechanical calculations of electron distribution in molecules are presented in vividly visual form by means of three-dimensional computer plotting. The appearance of the plots is as though a taut rubber sheet with quadrille striations had been distorted by stresses from above or below, giving a topographic display. The results are striking, beautiful, and scientifically revealing.

The accompanying textual material is written with unusual clarity; a college freshman could follow it readily, yet it still has something to say of value to the more advanced chemist. Indeed, the authors state that it was their intention that the book would be useful for the entire chemistry curriculum. It ranges from hydrogen to cyclopropane, diacetylene, and the HCN·HF donor-acceptor complex. Any chemist should be intrigued by an examination of this novel way of rendering quantum mechanical calculations, and the potential value in teaching is immediately apparent.

Organic Electronic Spectral Data. Volume XI. Edited by J. P. PHILLIPS, H. FEUER, P. M. LAUGHTON, and B. S. THYAGARAJAN. Wiley/Interscience, New York, N.Y. 1975. xiii + 1057 pp. \$42.00.

The compiling of ultraviolet-visible spectra begun in 1956 necessitated an annual publication schedule some time ago, and the size of this latest volume, which covers only the literature of 1969, suggests that two volumes per year will soon be required. As in previous volumes, the content is one great table, in which compounds appear in formula-index order. For each entry, the name, the solvent, the wavelength and intensity of the absorption bands, and the literature reference are given. The enormous amount of material presented can be judged from the fact that a typical page has about 25 entries.

Organic Sulphur Chemistry: Structure, Mechanism, and Synthesis. Edited by E. J. M. STIRLING (University College of North Wales). Butterworths, London and Boston, 1975. 495 pp. Price ?

This book is the record of the VIth International Symposium on Organic Sulphur Chemistry, held in 1974. The full texts of the thirteen plenary lectures and the abstracts of the numerous contributed papers are reproduced, together with a subject index and what is headed as "Author index" but is in fact an index to the contributors rather than to authors cited. Synthesis, structure, mechanism of reactions, stereochemistry, and sulfur heterocycles are dealt with in papers from

more than twenty different countries. Tables, spectra, and diagrams, along with full bibliographies, add to the value of the material included.

Organophosphorus Stereochemistry. Parts I and II. Edited by W. E. MCEWEN and K. D. BERLIN. Dowden, Hutchinson & Ross, Inc., Stroudsburg, Pa. Distributed by Wiley/Halsted, New York, N.Y. 1975. Part I: xviii + 387 pp. \$30.00. Part II: xv + 319 pp. \$28.00.

The ambitious series "Benchmark Papers in Organic Chemistry" has produced another offspring, and this time it is twins. The editors of these two volumes have gone beyond the simple goal of presenting in facsimile form the outstandingly significant papers in the development of the subject, and attempt "to lead a neophyte in the field from the point of no specialized knowledge right up to the current frontiers of research." This is an admirable service, and one that would be welcomed by those planning to enter research in almost any field.

Part I begins with a group of papers starting in 1958 for historical perspective, and then presents a group of six papers detailing the development of the concept of pseudorotation, which has had such an impact on thinking about stereochemistry in phosphorus compounds. Phosphines and related compounds are the subject of the next thirteen papers, and the final sixteen papers cover the stereochemistry of phosphonium compounds to as recently as 1973. As is characteristic of this series of books, commentary by the editors accompanies each group of papers. An innovation of much value is the inclusion of an Appendix, which consists of 35 pages of tables of all known optically active phosphorus(III) and phosphorus(IV) compounds.

Part II parallels Part I, and treats phosphorus(V) stereochemistry. It is subdivided into sections on the Wittig reaction, on phosphoryl compounds, and on phosphoranes, and includes papers as late as 1973. An Appendix tabulates all known optically active compounds of the types covered.

In the Series Editor's Preface, Calvin VanderWerf states that the editors have produced "a genuine research tool for the expert and an invaluable guide for the nonspecialist . . ."; this characterization seems very appropriate.

Physics and Chemistry of Ice. Edited by E. WHALLEY, S. J. JONES, and L. W. GOLD. The Royal Society of Canada, Ottawa. 1973. xiii + 403 pp. Price not stated.

A symposium on the title subject, held in 1972, generated the large number of papers in this volume. The papers are reports of original research, except for the last one, entitled "The Ices", which is an original poem by E. Whalley. Its resounding opening couplet reads " 'They're hexagons,' J. Kepler said, 'those snowflakes in the storm.' But Konig in the physics lab found ice in cubic form."

Phytochemistry. Volume III: Inorganic Elements and Special Groups of Chemicals. Edited by L. P. MILLER (Boyce Thompson Institute for Plant Research). Van Nostrand-Reinhold, New York, N.Y. 1973. xiv + 448 pp. \$24.50.

This is the final volume in a "comprehensive series covering all aspects of plant chemistry." It is concerned with the nature, origin, and function of plant constituents. Volume I was subtitled "The Process and Products of Photosynthesis", and Volume II, "Organic Metabolites". The fifteen contributed papers in Volume III are devoted to specific classes of substances, such as lignins, surface waxes, vitamins, etc., or to broader subjects, such as "The Role of Minerals in Phytochemistry" and "Importance of Secondary Plant Constituents as Drugs". The author and subject indexes are specific to this volume.

Progress in Nuclear Medicine. Volume 3: Regional Pulmonary Function in Health and Disease. Edited by B. L. HOLMAN and J. F. LINDEMAN. University Park Press, Baltimore, Md. 1973. xii + 203 pp. Price ?

This work is essentially clinically oriented, but it deals with applied radiochemistry in the form of radiopharmaceuticals for perfusion scanning, and radioactive gases for examination of lung function.

Radioactivity and Atomic Theory. By the late FREDERICK SODDY. Edited by T. J. TRENN. Wiley/Halsted, New York, N.Y. 1975. xv + 517 pp.

The pioneering work of Frederick Soddy, Nobel Laureate in Chemistry for 1921, in collaboration with Ernest Rutherford, in the development of the science of radioactivity, is well known in broad terms. This book provides a deeper insight into the thinking and per-

ception of this scientific giant, by bringing together the initial group of Annual Reports on Radioactivity that he wrote for the Chemical Society. They are reviews of the state of research and thinking in the subject with a wide perspective, embracing atomic theory in general. In this volume, the reports for 1904 to 1920 are presented in facsimile form, with corrections to some of the references, a comprehensive name index, an integrated subject index, and introductory commentary by the editor.

Raman/IR Atlas of Organic Compounds. Volume 2. Edited by B. SCHRADER and W. MEIER. Verlag Chemie, Weinheim/Bergstr. 1975. Complete atlas, DM 795.

This volume completes the work begun in 1974. As with Vol. 1 (reviewed in this journal, 97, 247 (1975)), it is in a special loose-leaf binder. On each page are given both the infrared and the Raman spectra of a compound, with the purpose of presenting the complementary information given by each simultaneously. The variety of compounds has been selected so as to show a full range of representative types, from open-chain saturated compounds to inorganic compounds of interest to organic chemists. The spectra extend to the far-infrared (about 100 cm^{-1}), and it is helpful that the scale is linear in wave number. The spectra are arranged in logical groups, but there is also an index list of them and a formula index. There is no other such compilation available, and those chemists concerned with structure elucidation and identification should find it a valuable aid.

Recent Topics in Chemical Carcinogenesis. Edited by S. ODASHIMA, S. TAKAYAMA, and H. SATO. University Park Press, Baltimore, Md. 1975. xxv + 456 pp. \$44.50.

This is a memorial volume for the late Professor Tomizo Yoshida and is No. 17 of the GANN Monographs in Cancer Research, initiated by him and sponsored by the Japanese Cancer Association. The introductory pages contain a photograph, a biography, and several appreciations. The scientific content consists of papers contributed from around the world and is arranged in these sections: Mutagenicity and *in vitro* Carcinogenesis; Chemistry and Metabolism of N-Nitroso Compounds; Environmental Carcinogenesis; and Experimental Model of Tumours in Various Organs. It is noteworthy that the last section is much concerned with tumors induced by nitrosamines and N-nitroso amides, classes of compound now generally indicated as powerful carcinogens.

This book is beautifully produced and is a fitting memorial. The papers, which are mostly accounts of recent and original research, will be found useful not only by specialists in the field, but by most chemists concerned with environmental toxicity or with chemotherapy.

Residue Reviews. Volumes 58 and 59. Edited by F. A. GUNTHER and J. D. GUNTHER. Springer-Verlag, New York, N.Y. 1975. Vol. 58: vi + 160 pp. \$18.80. Vol. 59: viii + 145 pp. \$16.80.

The importance of residues of pesticides and other substances that may be found in foods is receiving even wider recognition. This series of critical reviews continues to address the requirement for detailed knowledge of the chemistry inherent in the subject: detection, analysis, metabolic fate and biochemical effects, etc. Volume 58 contains two reviews: Metabolic Fates of Herbicides in Animals, and The Metabolism of Contact Herbicides in Stored Grains. Volume 59 contains six shorter reviews, which deal with gas-liquid chromatography, fluorescence spectroscopy, and various biological effects of 2,4,5-T and DDT. Of particular interest is a discussion of "the eggshell problem", the effect of DDT on the strength of the shells of eggs of wild birds and the consequent effects on efficiency of reproduction.

Sulphur in Australasian Agriculture. Edited by K. D. MCLACHLAN. Sydney University Press, Sydney, N.S.W. Distributed in U.S.A. by International Scholarly Book Services, Inc., Portland, Ore. 1975. xiv + 261 pp. \$24.75.

This book is a record of the papers presented at a meeting held in Canberra in 1974. It consists of 27 contributions which are short reviews dealing with reactions of sulfur compounds in soils, plant and animal nutrition, effects and correction of sulfur deficiency, and fertilizer technology.

The Structure of Fibrous Biopolymers. Colston Papers No. 26. Edited by E. D. T. ATKINS and A. KELLER. Butterworths, London. 1975. 437 pp. £16.00.

This book is the proceedings of the twenty-sixth symposium of the

Colston Research Society, associated with the University of Bristol, held in April 1974. It is unusually well produced for a book of this sort. There are twenty-five papers, which are more in the nature of short reviews, and a "popular lecture" in the form of a biography of William Thomas Astbury. The papers are roughly equally divided between polysaccharides and collagen chemistry, and are very well illustrated and include good bibliographies.

The Structure and Function of Chromatin. CIBA Foundation Symposium No. 28. Elsevier/Excerpta Medica/North Holland, Amsterdam. 1975. ix + 368 pp. Dfl. 61.00 (ca. \$23.50).

The symposium of which this book is the proceedings was held in London in April 1974. There were fifteen papers on original research plus an introduction and a foreword on histone nomenclature. The new system of nomenclature has been submitted to an IUPAC-IUB Commission on Nomenclature; meanwhile, the papers generally use the older forms.

The papers are mainly concerned with the proteins of the chromosome; the Chairman of the Symposium remarks in his Introduction that "the chemistry of the main types of the histones is now reasonably well defined and study of the non-histone proteins has begun." The Chairman goes on to discuss the pioneer work of Albrecht Kossel, who discovered the histones. It is appropriate that he isolated them from goose erythrocytes, since he worked in Strasbourg, so famous for *paté de foie gras*.

The papers are well illustrated, the accompanying discussions are transcribed, and there is a subject index, a feature all too often omitted from proceedings.

Tables on the Thermophysical Properties of Liquids and Gases. Second Edition. By N. B. VARGAFTIK. Wiley/Halsted, New York, N.Y. 1975. xiii + 758 pp. Price ?

This is an English version of a Russian original, the date of which is not given. There was little to translate, for, true to the title, the book consists almost entirely of tables of thermodynamic and transport properties of a wide range of pure substances and mixtures (including normal and dissociated states). The information is drawn heavily from the Soviet literature, some of which is not easily available, and the book is of immediate value for this fact. It should be of value to physical chemists and to chemical engineers. A detailed, cross-referenced index is a commendable feature.

Topics in Current Chemistry 55. Triplet States II. Edited by F. L. BOSCHKE et al. Springer-Verlag, New York, N.Y. 1975. 135 pp. \$25.00.

The latest in this series of critical reviews contains three contributions: Characterization of Triplet States by Optical Spectroscopy (U. P. Wild); Reactions of Aromatic Nitro Compounds via Excited Triplet States (D. O. Döpp); and Triplet Intermediates from Diazo Compounds (Carbenes) (H. Dürr). In each case, the authors have been active in recent research in the field, and their reviews summarize their own work and put it into perspective. The bibliographies are extensive, but only very few are dated as late as 1974, and it appears that the systematic coverage of the literature may have ceased with 1973. There is no preface to the book, and the contributors do not mention when they terminated their literature searches. This is a particularly unfortunate (and unnecessary) shortcoming in a book whose very title suggests that it is right up to date. The reviews, however, are well done and authoritative, if a bit expensive.

Handbook of Plastics and Elastomers. Edited by C. A. HARPER (Westinghouse Electric Corp.). McGraw-Hill Book Co., New York, N.Y. 1975. viii + 1024 pp. \$39.50.

This book provides a very extensive collection of data and information on the utilization of polymeric materials. The information presented ranges from the very fundamental, such as the chemical and structural properties of virtually all of the polymers of commercial interest, to the very practical, such as performance limits, standard testing procedures, and the advantages and disadvantages of different fabrication techniques. The handbook includes a very useful glossary of terms, an extensive subject index, and many references to the original literature.

There is a wealth of information provided here, in as organized a manner as one could expect, considering the wide variety of topics covered. It will certainly be extremely useful to anyone involved with any of the more practical aspects of polymer science.

J. E. Mark, *Massachusetts Institute of Technology*

Proteins. Structure and Function. Volumes 1 and 2. Edited by M. FUNATSU, K. HIROMI, K. IMAHORI, T. MURACHI, and K. NARITA. Halsted/John Wiley & Sons, New York, N.Y. 1973. Vol. 1: ix + 329 pp. \$19. Vol. 2: ix + 270 pp. \$14.50.

The title of this work is misleading. It is not a general book on protein structure and function but rather a collection of review articles on well-studied enzymes: trypsin, lysozyme, T2 and T4 phage lysozyme and endolysin, ribonuclease T₁, amylase, bromelain, ricin, threonine deaminases, ribulose-1,5-diphosphate carboxylases. The last article is "The N-Terminal Acetyl Group of Proteins and Its Possible Implications in Protein Biosynthesis". Although these reviews are general, the authors (all Japanese) tend to emphasize their own work. Since many of the authors publish in the Japanese language, a publication in English which includes the work of these highly qualified scientists is very valuable.

The articles are well written and include an abundance of original data and references. The article on trypsin by Tadashi Inagami is especially well done. There are no striking 3-D pictures or elaborate illustrations.

This work is not a general work as the title implies and would therefore be inappropriate for use as a text or general reference. If, however, one wishes a good review on one of the enzymes or the subject listed above, this work would be a good place to look.

Garfield P. Royer, *The Ohio State University*

Polymer Spectroscopy. Edited by DIETER O. HUMMEL (University of Cologne). Verlag Chemie, Weinheim/Bergst. 1974. 401 pp. \$50 (approx.).

Practicing polymer physicists and chemists will welcome this book for its value as a reference volume and as a learning tool. It is well written and quite up to date. The book was prepared to fill a need expressed by participants of the First European Symposium on Polymer Spectroscopy, which was held in Cologne in 1969; in all likelihood "Polymer Spectroscopy" meets this need quite well. The result of efforts by Professor Hummel and his colleagues is a book whose approach is quite strong on physicochemical, as opposed to technological, aspects of polymer spectroscopy. For example, none of the material presented deals with analyses directed toward additives of any kind found in most commercial polymer systems. The level of many parts of this book corresponds to that of some advanced undergraduates or most graduate students who would be interested in spectroscopic analysis.

"Polymer Spectroscopy" covers a wide range of spectroscopic techniques, although it has a few limitations. Specifically, ultraviolet spectroscopy has been excluded from the scope of the book. Also, the new generation of measurements based on Fourier transform analysis of infrared and nuclear magnetic resonance is essentially not mentioned here. ESCA techniques and experiments based on inelastic scattering of neutrons are not mentioned.

Each of the various chapters is concerned with one general category of spectroscopic technique. The first chapter (Chapter 2) contains contributions from Professor Hummel as well as from H. Tadokoro, M. Kobayashi, and D. Hendra; its topic is vibrational spectroscopy. The introductory part of Chapter 2 is a well-developed presentation of group theory of physical and chemical structures found in polymers. Vibrational modes for isolated chains in a variety of conformations and structures are analyzed; lattice vibrational modes are also covered. The treatment of vibrational processes is clearly written in terms of illustrating the bases on which band assignments can be made. A section on applied infrared absorption spectroscopy is presented, with a rather complete presentation of data for almost all technically important polymers. A good treatment of theory and practice of Raman spectroscopy is also included in Chapter 2. Correspondence between ir absorption and Raman scattering is described, and examples of many Raman spectra available at the time of publication are shown. Chapter 2 occupies nearly half the book.

The next chapter, which deals with high resolution NMR, was prepared by E. Klesper. Its contents includes a good section of fundamentals of NMR from which readers can develop a solid operational understanding of the technique. Chapter 3 contains a very large presentation on statistics of chemical microstructure in macromolecules. These statistics apply to the placement sequence of small molecules in terms both of stereoregularity and of copolymer content. The special case of ¹³C NMR for determining tacticity is described well, and the extent to which information on chain con-

formation can be obtained is presented here. An outstandingly complete bibliographic index of NMR work on polymers is appended to Chapter 3.

Chapter 4, which is by H. Fischer, deals with electron spin resonance. It starts with a presentation of principles of the technique and a description of common physical situations for measurement. The section on applications of ESR to analysis of polymer systems includes good coverage of radiation chemistry in polymer (mostly polyethylene) solids, free radical polymerization processes in homopolymer and copolymer synthesis, and generation of free radicals during plastic deformation of semicrystalline polymer solids.

The last chapter was written by Professor Hummel and deals with mass spectrometry. It covers the kinds of results obtained from mass spectrometry of polymer specimens decomposed by electron ionization impact, field ionization, field desorption, and pyrofield ion conditions. In several cases there is good coverage of the experimental configuration. There are sections covering thermal decomposition chemistry and chemical rearrangements occurring during pyrolysis. Finally, examples of mass spectrometry of many common polymers are presented, and there is a section dealing with how these techniques can provide information on sequence distributions in several specific copolymers.

Stephen H. Carr, *Northwestern University*

Aims, Methods and Assessment in Advanced Science Education. Edited by D. E. BILLING and B. S. FURNISS (Thames Polytechnic). Heyden & Sons Ltd., London-New York-Rheine. 1973. x + 168 pp. \$11.

The fourteen contributors to this volume review recent research in advanced high school and university science and describe several innovative programs. Currently important areas of educational investigation are related to the needs for change in upper level science courses.

The sequence of topics follows the systematic approach of educational planning which specifies objectives, develops teaching methods accordingly, and chooses means of evaluation to determine whether the objectives are met. The first section deals with the function and classification of objectives. A chapter relates the needs of industry to science teaching aims. The second section on curriculum developments includes descriptions of five innovative science courses. These courses, offered in England, are interesting attempts to provide alternatives to the conventional curriculum. Although their applicability is limited, they serve as examples of new ways of thinking about science education. The chapters of the third section on educational techniques cover programmed learning methods, computer-based laboratory courses, the production of chemistry television programs, and a comparison of lecture, laboratory, and small group teaching methods. In the final section dealing with assessment, various methods are compared, and student views on evaluation are summarized. Factors determining the validity and reliability of examinations are analyzed. A comprehensive chapter on objective testing is included. Appendices contain useful information: a glossary of educational terms, a list of some organizations concerned with education, and notes on the contributors.

Alice Sackheim Cohen, *University of Michigan*

Topics in Current Chemistry (Fortschritte der Chemischen Forschung). Volume 42. New Concepts II. Edited by A. DAVISON (Massachusetts Institute of Technology), M. J. S. DEWAR (University of Texas), K. HAFNER (Technische Hochschule Darmstadt), E. HEILBRONNER (Universität Basel), U. HOFMANN (Universität Heidelberg), J. M. LEHN (Université de Strasbourg), K. NIEDENZU (University of Kentucky), KL. SCHÄFER (Universität Heidelberg), and G. WITTIG (Universität Heidelberg). Springer-Verlag, Berlin-Heidelberg-New York. 1973. iv + 170 pp. \$20.80.

The present volume in this continuing series of collections of critical reviews contains three significant articles, each dealing with applications of various quantum chemical methods to the description of the structures and reactivities of organic molecules. The articles and their authors are: "Qualitative and Semiquantitative Evaluation of Reaction Paths", by M. Simonetta, a survey of the techniques now available for applying orbital symmetry rules to a wide variety of reactions; "Graph Theory and Molecular Orbitals", by I. Gutman and N. Trinajstić, a scholarly exposition on the basic principles of graph theory and its applications to the de-

scription of Hückel rules, loop rules, and Kekulé structures; and "The Electrostatic Molecular Potential as a Tool for the Interpretation of Molecular Properties", by E. Scrocco and J. Tomasi, an extensively illustrated discussion of the calculation of electrostatic potentials from SCF charge distributions and their use in describing small saturated molecules such as cyclopropane, unsaturated molecules such as cyclopropene, heteroaromatic molecules such as pyridine, and adduct molecules such as formamide-water.

The high level of scholarship reflected in these articles and the close relationship of their topics makes this volume unusually attractive both to practicing quantum chemists and to organic chemists interested in recent developments in theory.

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

Biosynthesis. Volume 3. A Specialist Periodical Report. Senior Reporter and Editor: T. A. GEISSMAN. The Chemical Society, London. 1975. 293 pp. £11.00.

This is the third review of biosynthetic studies produced in the Chemical Society's series under Dr. Geissman's direction. All but one of the six chapters in it are continuations of surveys begun in the first and second volumes. These condense and evaluate the biosynthetic literature produced during 1973 on C₅-C₁₀ Terpenoid Compounds (J. R. Hanson), Triterpenes, Steroids and Carotenoids (H. H. Rees and T. W. Goodwin), Phenolic Compounds Derived from Shikimate (J. B. Harborne), Stable Isotopes in Biosynthetic Studies (M. Tanabe), and Alkaloids (E. Leete). The latter contribution this time includes information on the pathway of synthesis in microbes of the vitamin B₆ group of compounds. This illustrates the flexibility granted the authors, which greatly enhances the value of the series.

The new topic treated in this volume is Biosynthesis of Quinones (R. Bentley). The literature covered derives mainly from 1970 to 1973. Considerable attention is devoted to microbial pathways for synthesizing naphthoquinones of the vitamin K series and ubiquinones such as coenzyme Q, but the routes of synthesis in plants of various other naphthoquinones, benzoquinones, and anthraquinones are also treated in detail.

As in previous volumes of this series, these literature surveys are clearly but succinctly presented, authoritative, and thorough. They should prove of great value to workers in the areas covered. Though not intended for neophytes or as recreational reading, they do direct the less well prepared reader to more general presentations of topics of interest to him and can serve as excellent entries into the literature concerning biosynthesis of specific compounds or structures. At their best they evaluate concisely the evidence, methodology, and assumptions underlying present conclusions concerning the synthesis of a large number of natural products, some restricted to a few organisms, some nearly ubiquitous—a literature that is broadly dispersed and notoriously hard to locate. The authors, senior reviewer, and publishers should all be encouraged to continue in this useful vein.

Irving P. Crawford, *Scripps Clinic and Research Foundation*

Biochemical and Biophysical Perspectives in Marine Biology. Edited by D. C. MALINS (Seattle University and U.S. National Fisheries Services) and J. R. SARGENT (Institute of Marine Biochemistry, Aberdeen). Academic Press, New York, N.Y. 1974. xv + 343 pp. \$23.25.

This volume is the first in a proposed series dealing with marine systems of potential interest to biochemists and biophysicists. The editors have accordingly chosen an interesting array of subjects, all of which are appropriate (though not restricted) to a volume of this nature. It has the usual problems associated with a multi-author treatise, for instance, the lack of consistency in the size, style, and scope of articles. Since this volume is entitled "Perspectives", one hopes to be presented with succinct synopses containing introductions, discussions of methods and major problems, speculations, and summaries. Rather, one gets a range of presentations from well-summarized "perspective-type" articles to major reviews and is left with the feeling that the mission of the series is not yet well defined by an adequate editorial policy.

The article by Dr. J. Maetz deals with adaptation to hypo- and hyperosmotic environments. Its 160 pages are more suggestive of an advanced text book than a perspective. While it is an excellent and comprehensive review, it is too long for all but the most interested and competent to handle.

Four articles of approximately equal length comprise the remaining 160 pages. These articles deal with biochromes (D. L. Fox), biochemical genetics of fishes (F. M. Utter et al.), biochemistry of fish swimming (E. Bilinski), and survival at low temperature (A. L. DeVries). They vary considerably with respect to the degree of speculation and summation and would in general be improved by more emphasis in these areas. However, they are well written, comprehensive, and interesting, and surely fulfill the mission of presenting stimulating "perspective-type" articles.

As a whole the book provides useful material for references, introduction to and reviews of new fields, and ideas relating both to organisms and to systems for study. It is a valuable book for biochemistry and biophysics departmental libraries and a readable, stimulating book for a personal library.

Kenneth Neilson, *Scripps Institution of Oceanography*

Quantum Mechanics for Organic Chemists. By HOWARD E. ZIMMERMAN (University of Wisconsin). Academic Press, New York, N.Y. 1975. x + 215 pp. \$16.50.

This book is intended as a text for a first-year graduate course for organic chemists. The material covered and the level of sophistication expected of the student are comparable to the books by J. D. Roberts and Andrew Streitwieser. The approach is of the cook-book-recipe type, similar to the Roberts book, but the present text lacks the clarity of the earlier text.

There is a strong need for an up-to-date text on quantum mechanics for organic chemists. Unfortunately, more than three-quarters of this book is devoted to Hückel theory, with an approach that clearly assumes that the student will perform all calculations with a pencil and paper. The ready availability of computer programs for extended Hückel, CNDO, INDO, MINDO, and ab initio calculations and the current easy access to computers to make use of these programs are completely ignored. A book actually comparing the results obtained from these methods would be very valuable to the organic chemist.

There is no mention of the physical problems that require a wave-like description of electrons. However, this is a general shortcoming of quantum chemistry texts.

This book will be effective in teaching the beginning organic chemist how to do Hückel calculations. It will not teach him how he might use the more modern methods to interpret his experimental results or give him a deeper understanding of the nature of chemical bonding and chemical reactivity.

G. A. Petersson, *Wesleyan University*

Purification with Activated Carbon. By JOHN W. HASSLER. Chemical Publishing Co., Inc., New York, N.Y. 1974. vii + 390 pp. \$22.50.

This book would be a welcome addition to the library of anyone who wants an introduction to the area of using activated carbon for adsorption; to the professional already in the field, its value lies largely in its compilation of data on carbons, their uses, and manufacture which is not easily available in any other single source.

The chapters on the Manufacture of Activated Carbon, the Nature of Activated Carbon, and Representative Industrial Applications are quite good. They suffer, however, from the major drawback of the book in general, that is, a lack of currency. The references at the end of the two last-mentioned chapters have as their most recent entries respectively one from 1961 and 1962. Those working in such frontier areas as competitive adsorption process or mathematical modeling of adsorption processes, for example, will find little or no mention of these subjects in the book.

The chapter on Purification of Domestic and Industrial Waste Waters suffers from several inadequacies. By 1974 there were four municipal treatment plants in operation and several others in various stages of construction and design using physicochemical treatment. This is a much more advanced state of the art than the bench and pilot plant scale as stated in the book. Furthermore, there is no mention of break-point chlorination, which is both an important method for ammonia removal from sewage and an important process utilizing activated carbon; the chloramines produced by the chlorination are removed by activated carbon treatment. This is again doubtless an instance of the subject matter being somewhat out of date, but it flaws an otherwise fine book.

Judd C. Posner, *University of Michigan*

Techniques and Topics in Bioinorganic Chemistry. Edited by C. A. MCAULIFFE (University of Manchester). Halsted-Wiley, New York, N.Y. 1975. xv + 351 pp. \$34.95.

This book is one of the initial volumes of the new Halsted press series, "Aspects of Inorganic Chemistry". It is addressed primarily to the bioinorganic chemistry of iron and molybdenum and current important physical techniques of study. In addition, there are also somewhat smaller sections on zinc-containing metalloenzymes (carboxypeptidase, carbonic anhydrase) and calcium-binding proteins such as low molecular weight albumins and staphylococcal nuclease. There are five basic parts to the book with copious, relatively up-to-date references for each.

Part I, "Structural and Electronic Aspects of Metal Ions In Proteins" (M. W. Makinen), consists of five chapters and attempts to emphasize the importance of precise stereochemical data in determination of metal ion function and reactivity in proteins, especially hemoglobin, myoglobin, and a number of divalent, substituted carboxypeptidases. Thus, metal ion-protein molecular structures derived through x-ray diffraction methods are correlated with spectroscopic results.

Part II, "Principles of Catalysis by Metalloenzymes" (J. M. Pratt), is a five-chapter section dealing with kinetic and thermodynamic aspects of reactivity and redox behavior for hemoglobin, myoglobin, catalase, peroxidase, and ferridoxins as involved in nitrogen fixation. This section highlights the ways in which proteins may affect reactivity of transition metal complexes and concludes with material on cobalt corrinoids.

Part III, "The Biochemical Functions of Molybdenum" (F. L. Bowden), traces the role of molybdenum enzymes in the utilization of inorganic nitrogen for the production of proteins, nucleic acids, and other nitrogenous cell material. Plant enzymes such as nitrate reductase and nitrogenase are considered along with the less well understood mammalian enzymes: xanthine oxidase and dehydrogenase, aldehyde oxidase, and sulfite oxidase. The usefulness of electron spin resonance in molybdenum studies is made apparent, and the section ends with consideration of a number of model systems using this technique.

Part IV, "Polynuclear Iron III Proteins" (John Webb), consists of six chapters involving aspects of the hydrolytic polymerization of iron(III) and physical techniques (especially cryomagnetic susceptibility and Mössbauer spectroscopy) for the study of such systems. Biological roles for polynuclear iron(III) are considered through discussion of: green and brown iron(III) phosvitin, gastroferrin, ferritin, hemosiderin, and iron-dextran.

Part V, "Metal Ions as N.M.R. Probes in Biochemistry" (S. J. Ferguson), is a concluding chapter that considers the utility and problems of the NMR of species such as ^{23}Na , ^{25}Mg , ^{43}Ca , ^{39}K , and ^{203}Tl in bioinorganic studies.

Over-all, this book should prove to be a worthwhile acquisition for active researchers in a rapidly growing interdisciplinary field. At the same time it might also serve as the basis for a special-topics, advanced level graduate course for students having a sound background in physical-inorganic chemistry.

William Michael Reiff, *Northeastern University*

Fundamentals of the Chemistry and Application of Dyes. By P. RYS and H. ZOLLINGER (Eidgenössische Technische Hochschule, Zurich). Wiley-Interscience, New York, N.Y. 1972. v + 185 pp. \$14.95.

This review of dye chemistry was written for the general chemical reader in industry and university. The authors attempt to bring a modern, theoretical point of view to the subject of dye chemistry, and they succeed in part. Where they fail is a consequence of the fact that there are really no good theoretical insights into the reasons that a specific organic molecule shows absorption in a certain region of the visible spectrum. It is true that quantum mechanical computations can predict spectral absorption, sometimes quite well, but computational results and understanding are two different things. Because of this fact, the authors are forced to consider color and constitution of molecules in terms of empirical relationships observed by Witt in the 19th century. This gives the book an old-fashioned feel at first glimpse. The shortcomings in this direction are compensated by explanations of the importance of equilibria and rates in determining the courses of various reactions used in color chemistry.

The principal part of the book is devoted to the structures, syn-

theses, and applications of various dye types: azo dyes, polymethine dyes, carbonium dyes, condensed dyes, etc. This section of the book is very well done. The individual chapters (each devoted to a specific dye type) are tersely but clearly written, and reaction mechanistic considerations as used by the authors really do help understanding. In fact, it is quite an achievement to cover the whole field of dye chemistry so well with so few pages. The last chapter, devoted to the various theories of dyeing, is quite a good introduction for a novice (like the reviewer) in that particular area. However, the authors come a cropper in their chapter (number 2) on the theory of color in organic compounds. Their terseness in this chapter will make it incomprehensible to the reader not thoroughly familiar with molecular orbital theory, and its superficiality will make it superfluous for the non-naive reader. It simply is not possible, in four-and-one-half pages, to go from Schroedinger equation to configuration interaction, with side excursions into the VB method and particle-in-a-box theory. The same can be said for a five-page treatment of color specification by the CIE system. A fuller explanation of the role of orbital symmetry in determining absorption intensity and more attention to solvent effects on dye absorption should have been included. My final caveat concerns the frequently occurring neologisms (colouristic, nucleofugal, nityryl, and nitroacidium).

John Figueras, *Eastman Kodak Company*

Structural Inorganic Chemistry. By A. F. WELLS (University of Connecticut). Oxford University Press, New York, N.Y. 1972. xxiii + 1095 pp. \$70.00.

A new edition of a classic work such as this is obviously approached with high expectations. Regardless of the reader's familiarity with earlier editions, it is certain that he will not be disappointed by the fourth edition.

One approach for evaluating this work is to briefly compare it with the previous edition. The general format of the two editions is the same; essential introductory topics are discussed in Part I and a systematic coverage of descriptive structural chemistry is presented in Part II. However, the entire book has apparently been rewritten, and the content of Part I has been extensively changed. The coverage of wave mechanics and experimental methods of structure determination have been deleted. The treatment of the geometrical and topological bases of crystal chemistry has been expanded to three chapters (Polyhedra and Nets, Sphere Packings, and Tetrahedral and Octahedral Structures) and a chapter on symmetry has been added. Part II has been revised and expanded to include several new chapters.

The author seems to recognize the need for systematizing and unifying the ever-expanding volume of structural data. Emphasis has been placed on the essential tools of structural chemistry. The discussion of layers, polyhedra, and packing are surprisingly extensive. Numerous relationships between simple structures and their derivative structures are drawn and, more importantly, the origins of such relationships, e.g., structural distortion or ion substitution, addition, or subtraction, are clearly outlined. The use of symmetry (space group) constraints in identifying structural relationships is not included; however, an adequate treatment of this topic is probably beyond the scope of the work. It is also unfortunate that important new methods of structure determination such as lattice imaging techniques could not be included, but the author has judiciously selected the background material.

The coverage of descriptive topics is truly remarkable. On close examination, the structural data of several elements have been found to be complete and up to date. Coverage of the literature extends into 1971 and is by no means limited to structures of solids. Use of a format based on the periodic table is convenient for chemists, but complicates the correlation of structures. This difficulty has been overcome by extensive cross-referencing. The coverage is concise; experimental results are described and the relationships and systematics of structures are noted without treading the thin ice of theory and speculation. This aspect clearly contributes to the lasting value of the work. Although minor errors can be found, the author wisely advises his reader to be critical and to examine the original literature. A substantial number of literature references are conveniently listed in the margins adjacent to the text. This work will obviously find extensive use as a reference source.

The fourth edition has clearly preserved the tradition of excellence and uniqueness established by the earlier works. It is une-

qualed both as a reference for teachers and students and as a source of structural data. The work is a must for every library.

J. M. Haschke, *University of Michigan*

Vibrational Spectra and Structure. Volume 3. By JAMES R. DURIG (University of South Carolina). Marcel Dekker, New York, N.Y. 1975. iii + 328 pp. \$29.75.

This book consists of three different topics: a chapter for each topic.

The first chapter is devoted to the theory of the molecular symmetry group by P. R. Bunker. The "molecular symmetry group" is composed of nuclear permutations or permutations with inversion. It is different from the "point group" which is composed of rotations or reflections and the "rotation group". The molecular symmetry group can be used to label the rovibronic states (rotation, vibration, and electronic) and to derive the selection rule for rovibronic transitions. For this purpose, the use of the molecular symmetry group may be better than that of the point group or the rotation group, except that the Eckart condition must be applied in order to locate the molecule-fixed axes after each symmetry operation has been performed. This can be the most difficult part in using the method. In this chapter, only the rovibrational states (rotation and vibration) are concerned. The development of this new theory, first introduced in 1962, has been fairly completely reviewed. Examples of asymmetric top, symmetric top, and linear molecules were discussed in two different categories: rigid molecules and nonrigid molecules, which have insuperable and superable energy barriers, respectively.

In the second chapter, J. Overend provides an up-to-date review of rotation-vibration spectroscopy. Detailed information concerning various instrumentation which is capable of producing resolution as high as 0.02 wave number is included. The theoretical aspect of rotation-vibrational energy levels is discussed in an easy-to-understand way. Quite an extended explanation is provided for the rotation-vibration perturbation through vibration, rotation, and rotation-vibration resonances. Finally, a discussion of how digital computer programs can assist one to apply the Loomis-Wood diagrams to obtain more reliable rotation-vibration assignments is presented. A number of examples are given to illustrate the theories described. However, in view of recent development in Raman spectroscopy, "Raman" should not be used exclusively for vibrational transition region as it has always been used.

In the last chapter, G. J. Thomas summarizes the recent application of laser Raman techniques used to obtain structural information from biopolymers, such as proteins, nucleic acids, lipids, and carbohydrates. The application of laser Raman spectroscopy to study biochemical systems offers many advantages over x-ray crystallography. The technique has been developed to such a sophisticated level that it is able to detect specific structural changes of biopolymers in solution. This can help us to gain more understanding of the mechanism of the infection of some viruses and find an effective means to control some diseases. It can also be applied to understand certain functions of neuron membrane. The author makes an up-to-date review of this field.

As a whole, the book is well written. Chapters I and II will be of interest to theoretical chemists, physicist, and spectroscopists. Chapter III will serve as a good guide to biochemists and physiologists who are interested knowing how Raman technique can be applied to study the structure and function of biopolymers.

Tze-chi Jao, *University of Puerto Rico*

The Emergence of Agricultural Science: Justus Liebig and the Americans, 1840-1880. By MARGARET W. ROSSITER (The University of California Berkeley). Yale University Press, New Haven, Conn., 1975. xiv + 275 pp. \$15.00.

This interesting and well-written volume, one of the highly regarded Yale Studies in the History of Science and Medicine, describes the American reaction to the profound impact made in the United States in the 1840's by the publications and research of the great German organic chemist, Justus von Liebig in the area of agricultural chemistry. Before 1860, American agriculture was backward and inefficient compared to its European counterpart. Consequently a number of young Americans of that period traveled to Europe to study under the agricultural chemists there and returned to set up schools, chemical research laboratories, and agricultural research stations in the United States. In "The Emergence of Agri-

cultural Science", Dr. Margaret Rossiter tells the story of three of these people: Eben Norton Horsford (1818-1893), who attempted with only limited success to duplicate Liebig's laboratory at Harvard; his cousin, John Pitkin Norton (1822-1852), who held the first chair of agricultural chemistry at Yale; and Samuel William Johnson (1830-1909), Norton's successor at Yale after Norton's tragic death from overwork. The author has skillfully incorporated American social history, agricultural history, the history of education, and the history of science to give a picture of the expanding role of science in this country at the time the American agricultural science establishment was being revolutionized. Although "The Emergence of Agricultural Science" will undoubtedly have only a relatively small number of readers, it is as enjoyable to read as many best-selling popular histories.

David H. Kenny, *Michigan Technological University*

Ozone Chemistry and Technology. A Review of the Literature: 1961-1974. Edited by J. S. MURPHY and J. R. ORR. The Franklin Institute Press, Philadelphia, Pa. 1975. vii + 392 pp. \$30.00.

This volume consists of nine overviews of ozone chemistry divided along subject areas of general, organic, inorganic, polymer, and atmospheric chemistry, instrumentation, waste-water treatment, and the effect on vegetation and animals. The overviews are brief introductions to the topic written by experts in each area. They are useful and informative, although characterized by a range of styles and emphases. Nevertheless, the principal value of the volume lies with its bibliography and indexes (author and subject). They comprise two-thirds of the page count. The subject index is helpfully organized, but a serious researcher will probably still find it more valuable to examine the pertinent literature citations dealing with his subject. This is readily accomplished by studying the bibliographies appropriate to the subject, since they are arranged according to years at the end of each overview. The bibliography is very complete, having been compiled from issues of the abstracting journal, *Ozone Chemistry and Technology* after screening over 4000 journals. A serious investigator of a topic in ozone chemistry will undoubtedly find this volume a more expeditious way to search the literature than using *Chemical Abstracts*. He can be reasonably confident that the effort will be thorough with the exception of 1974, for which the literature cited is not complete.

Robert L. Kuczowski, *University of Michigan*

Aliphatic Chemistry. Volume 3. Edited by A. MCKILLOP, Senior Reporter. The Chemical Society, London, England. 1975. xii + 409 pp. £13.50.

This is the third volume in this series on aliphatic chemistry with the format remaining similar to that of the first two volumes. The material is a review of the 1973 literature in this area. The first chapter (Acetylenes, Alkanes, Allenes, and Olefins) reflects the seemingly ever-increasing interest in pericyclic processes; e.g., with respect to acetylenes, there are 14 pages on cycloadditions while only 10 pages cover all of electrophilic, nucleophilic, and radical additions. Not surprisingly the material on alkanes comprises only one out of 130 pages in this chapter. The second chapter deals with the other major functional groups not covered in Chapter 1, while the remaining three chapters concern naturally occurring polyunsaturated compounds (Chapter 3), prostaglandins (Chapter 4), and fatty acid and related compounds (Chapter 5).

This type of volume serves a useful purpose in affording a glimpse of a whole year's literature in some very specific areas; the book would seem to be most useful for chemists who are really struggling to keep current. That the material was over one year old on publication and now is over two years old is certainly a drawback, but one that really does not limit seriously the utility of the volume to those of us who have limited time to spend with the original literature and only a very limited time for literature that is not current. Thus the volume serves very nicely as a quick check of the efficiency of one's own literature survey process and provides useful summaries of recent advances in the area of naturally occurring aliphatic systems.

J. Christopher Philips, *The University of Detroit*

Spores. VI. Edited by PHILIPP GERHARDT, RALPH N. COSTILOW, and HAROLD L. SADOFF. American Society for Microbiology, Washington, D.C. 1975. 619 pp. \$15.00.

Comparative sporology occupies the first section of this collection of papers. Actinomycetes, myxobacteria, Azotobacter, slime molds, blue-green algae, fungi, and yeasts are included. This is followed by discussions of sporulation, germination, dormancy, and resistance of *Bacillus subtilis* and a few other organisms. The final chapter deals with such diverse subjects as dielectric and electrochemical properties of bacterial cells, antigens, inclusions, susceptibility to bacteriocin, and genetic maps.

M. C. W. Smith, *Ann Arbor, Michigan*

The Nutrition Crisis, a Reader. By THEODORE P. LABUZA. West Publishing Co., St. Paul, Minn. 1975. 512 pp. \$8.95.

The underlying theme in this collection of reprints is a plea for more scientific nutritional research. Among the subjects treated are nutritional standards and status, dietary practices, obesity, heart disease and atherosclerosis, and the food-people-energy crisis. If you are opposed to vitamin supplements, natural foods, and organic gardening, this book will reinforce your prejudices.

M. C. W. Smith, *Ann Arbor, Michigan*

Microbiology—1975. Edited by DAVID SCHLESSINGER. American Society for Microbiology, Washington, D.C. 1975. 521 pp. \$16.00.

This collection of articles is directed toward the medical microbiologist. Major sections are devoted to rapid diagnostic techniques in clinical microbiology, pathogenic mechanisms in bacterial diseases, mycotoxins, new vaccines, and cell differentiation and communication.

M. C. W. Smith, *Ann Arbor, Michigan*

Organometallic and Coordination Chemistry of Platinum. By U. BELLUCO (University of Venice). Academic Press, New York, N.Y. 1974. xii + 701 pp. \$45.50.

Professor Belluco has attempted a truly monumental task by writing a book which covers the chemistry of platinum. The chemistry included runs from "classical" coordination complexes of Pt(II) and Pt(IV) to newer organometallic derivatives. The stated aim of the book is to serve both students and researchers in the field, and a strong attempt has been made to keep the book as current as possible with the addition of appendices covering work up through 1973.

The book is arranged as follows: Chapter I, Coordination Compounds; II, Substitution Reactions; III, Hydride Complexes; VI, Platinum-Carbon σ -Bonded Compounds; V, Complexes with Pt-Si, Pt-Ge, Pt-Sn, and Pt-Pb Bonds; VI, Complexes with Unsaturated Hydrocarbons; VII, Homogeneous Catalytic Processes. Within each chapter are numerous subheadings which cover preparative methods, chemical bonding and structure, and reactivity. References to the original literature are given so the text is indeed useful to researchers. There are many tables of data which summarize the literature.

While this reviewer has found the book to be extremely useful, there is a serious deficiency. Namely, it is hard to find the data one is looking for. There is no list of tables or figures and the subject index is not sufficiently detailed. For a book of nearly 700 pages, each page crammed with facts, an index of only 10 pages is woefully inadequate. In spite of these shortcomings, Belluco has done an outstanding job and the book should be of value to teachers, researchers, and students alike.

M. David Curtis, *The University of Michigan*

Wilson and Wilson's Comprehensive Analytical Chemistry. Volume 4. Edited by G. SVEHLA (The Queen's University of Belfast). Elsevier Scientific Publishing Co., Amsterdam. 1975. xvii + 374 pp. \$51.95.

This is another book in the series "Comprehensive Analytical Chemistry", which, according to the editor, should be a self-sufficient reference work or at least a starting point for any analytical investigation. This volume is divided into three chapters: Instrumentation for Spectroscopy; Atomic Absorption and Fluorescence Spectroscopy;

and Diffuse Reflectance Spectroscopy. The first chapter broadly covers the topics of sources, monochromators, and detectors which comprise spectrometers covering the uv to infrared region. The section on sources covers eleven types with a very brief presentation of the major facts. This multifaceted, but brief, coverage continues throughout the chapter. Strong points in this chapter are subsections on lasers and Fourier transform spectroscopy. Chapter 2 is a thorough discussion of the twin techniques of Atomic Absorption Spectroscopy (AAS) and Atomic Fluorescence Spectroscopy (AFS). After a sound review of basic theory there follows a lengthy section on instrumentation. A feature of this chapter is a 42-page section on experimental techniques including tables on detection limits in flames by AAS and AFS, discussion on generation of calibration curves, and the problem of chemical and physical interferences. Chapter 3 on Diffuse Reflectance Spectroscopy covers modern techniques widely used in analytical laboratories. The chapter includes numerous photographs and optical diagrams of the most popular diffuse reflectance spectrometers in use today. The in situ measurement of thin layer chromatograms is given a subsection of its own. The well-known application of this technique to analysis of paint pigments is included in an extensive (40 pp) concluding section on instrumental application. This volume should be useful to chemists and physicists engaged in analytical spectroscopy studies.

F. W. Behnke, *Eastman Kodak Company*

Practical Inorganic Chemistry. Second Edition. By G. PASS and H. SUTCLIFFE (University of Salford), Chapman and Hall, London, and John Wiley & Sons, New York, N.Y. 1974. xvi + 239 pp. \$7.95.

This reviewer enjoyed the experiments in the first edition of "Practical Inorganic Chemistry", and it seems that the second edition is an improvement on an already good book. The experiments cover the gamut of synthetic inorganic chemistry, from high-temperature reactions to high-vacuum techniques. A wide range of difficulty in the experiments is embraced so that students may start with more straightforward procedures and progress to more complex ones. The balance between synthetic procedures and theory is excellent, and references to the original literature are given. This book deserves the attention of anyone teaching an inorganic preparations laboratory.

M. David Curtis, *The University of Michigan*

Energy. By GERARD M. CRAWLEY. Macmillan Publishing Co., New York, N.Y. 1975. xiii + 337 pp. \$10.95.

This introductory text is designed for science and nonscience majors and is intended to provide the basic physics necessary for both groups to intelligently assess energy-related problems. The basics are covered well in Part I (five chapters). The style is that of a running narrative and is interspersed with humorous contemporary analogies (e.g., in defining force, "Mayor Daley exerts a lot of force around Chicago."). Part 2 reviews the problems, past, present, and future, of energy supply and demand. The titles of some chapters in Part 3 ("An awkward alternative: Fission", "One hope for the future: Fusion", and "An ultimate answer? Solar energy") illustrate the only objection of this reviewer. The author does not always take a sufficiently detached view of the subject and fails, at times, to clearly differentiate between fact and opinion. Each chapter in the book ends with "Summary and conclusions" which give the author's conclusions. Students should be cautioned to read the entire chapter before reading this section, so that they can form their own opinions. The remaining two parts of the text deal with the nonscientific aspects of energy production, use and conservation which are too often ignored in science texts. Overall the book is well written, interesting, and even entertaining and will stimulate discussion of this timely and important subject. It is not therefore a standard physics textbook.

Richard Delumyea *Great Lakes Research Division
University of Michigan*