

Book Reviews*

Annual Review of Energy, Volume 1. Edited by J. M. HOLLANDER and M. K. SIMMONS. Annual Reviews, Inc., Palo Alto, Calif., 1976. xi + 793 pp. \$17.00.

This expansion of "Annual Reviews" is most timely. As is traditional with the other fields covered by the "Annual Reviews" series, this new series presents selective and scholarly reviews and analyses of the literature, but it is also intended to provide commentary on the state of the new, interdisciplinary areas that are arising.

This volume focusses on energy matters in the United States (Volume 2 will treat the subject on a global basis). It begins with a 36-page overview, "Energy in Our Future", by Harrison Brown. Nearly half of the rest of the book consists of a group of chapters under the general heading "Energy Supply and Distribution: Resources and Technologies", in which chemistry and chemical engineering figure prominently in the treatment of the many forms of energy conversion. This section is followed by smaller ones on economics, energy conservation, environmental and health matters, energy policy and politics, and international aspects. The reviews are well written so as to be useful sources of substantive information in themselves, but they include bibliographies that provide access to more detailed sources. Illustrations, diagrams, and tables abound. There is an author index and a detailed subject index, which makes this volume usable independently.

Ninth World Petroleum Congress. Proceedings, Volume 5: Processing & Storage. Applied Science Publishers Ltd., Barking, Essex. 1975. x + 420 pp. \$75.00.

There is no statement in this volume of when and where the Congress took place, but the contributed papers in it are thoroughly international. The papers have a general orientation toward engineering and production, but many contain substantial amounts of organic chemistry. Some are essentially surveys, such as the group of five papers devoted to obtaining liquid fuels from oil sands and from coal. Others are accounts of new advances in such fields as catalytic cracking and isomerization, desulfurization, separation of hydrocarbon mixtures, and analytical methods. There are a few mysterious titles, such as "Development and Application of New and Modified Residues", which might serve as a desperation title for a doctoral research project gone wrong.

The discussions following the papers are presented in the form of indirect discourse, which allows the editor to polish them up a bit. Another pleasant feature is that all papers begin with an abstract, which is both English and French. The book is very well printed and bound, and would be a useful addition to a library in any way concerned with world energy problems. The other six volumes of the Proceedings are not particularly chemical in nature, although Volume 7, an index volume, would be of help in using the volume reviewed here.

Organic Reactions, Volume 23. Edited by W. G. DAUBEN, John Wiley & Sons, Inc., New York, N.Y., 1976. vii + 520 pp. \$27.50.

The latest volume in this work of such great value to synthetic organic chemists consists of three chapters: Reduction and Related Reactions of α,β -Unsaturated Compounds with Metals in Liquid Ammonia (D. Caine); The Acyloin Condensation (J. J. Bloomfield, D. C. Owsley, and J. M. Nelke); and Alkenes from Tosylhydrazones (R. H. Shapiro). They follow the established pattern of a historical introduction, discussion of mechanism, survey of scope and limitations, experimental techniques and examples, and comprehensive tabulation of published instances.

Chapter 1, which fills half the book, is essentially a review of the Birch reduction, broadly conceived. It also contains valuable ancillary information on the nature of solutions of metals in liquid ammonia, and techniques for handling them. Chapter 2 covers a subject which appeared, with a different emphasis, in "Organic Reactions" 28 years ago, since which time much new information and understanding have

appeared. Chapter 3 is devoted to the Bamford-Stevens reaction and related reactions, a subject that in other recent reviews has been treated primarily from the standpoint of formation of carbenes. A subject index and cumulative contributor and chapter/topic indexes complete this welcome volume.

Peptides: Chemistry, Structure and Biology. Proceedings of the Fourth American Peptide Symposium. Edited by R. WALTER and J. MEIENHOFER. Ann Arbor Science Publishers, Ann Arbor, Mich. 1975. xvii + 1053 pp. \$34.50.

This very thick, hard-bound book of proceedings of a symposium held only six months before publication is remarkably prompt. It begins with a tribute to the late Lyman C. Craig, developer of the countercurrent extraction technique, the rotary evaporator, and the thin-film dialyzer.

The papers seem to be mostly accounts of original research, although some are surveys. The accounts fall in between being summaries and being full journal papers, and will presumably be republished in more complete form elsewhere. Some experimental detail can be found, but it is generally much abbreviated.

The scope of the symposium can be gauged from the titles of the sections into which the papers are grouped: Conformational Studies; Synthetic Studies; Biologically Active Peptides; Brain-specific Peptides; Neurohypophyseal Hormones and Neurophysin Proteins; Hypothalamic Peptides; Antibiotics, Enzyme Inhibitors, and Toxins; Analytical and Isolation Procedures. There is a subject index, unusually good for a book of proceedings.

The Tautomerism of Heterocycles (Advances in Heterocyclic Chemistry, Supplement I). By J. ELGUERO, C. MARZIN, A. R. KATRITZKY, and P. LINDA. Academic Press, New York, N.Y. 1976. xxvii + 655 pp. \$54.00.

This supplement is a completely new examination of the subject that was first treated in several separate chapters in Volumes 1 and 2 of the series. Those chapters were so successful in stimulating new work that they became obsolete. The scope of the subject as well as the depth of treatment has expanded, and rings of size other than five or six members now have a separate chapter. The authors point out the value of the subject in understanding such biochemical topics as nucleic acids, and the importance of always writing the correct tautomeric structure.

The concern of the treatment remains with those structures for which one member of the tautomeric equilibrium is an aromatic heterocycle, as in the classical example of pyridone \rightleftharpoons hydroxypyridine, although some nonaromatic systems have been included. Ring-chain tautomerism has been added to the scope, for cases in which movement of a proton is involved. The earlier treatment was confined to compounds with N, O, or S as heteroatoms; others, such as Se and P, are now included.

There are some peculiarities in the make-up of this book that deserve comment. A novel system of citing references was introduced by one of the authors in the book "Chemistry of Heterocyclic N-Oxides". This system, which was described in the review of that book (*J. Am. Chem. Soc.*, **94**, 2559 (1972)), has been favorably received, and is now used for the present book. Anyone who has had to handle large numbers of references in writing a work of reference knows the dangers of making errors, losing references, etc. The claim is made that the new system reduces both the work of compiling the references and the likelihood of errors. The other feature of this book is the absence of a subject index, for which an exceptionally detailed Table of Contents is substituted. It is no less than 15 pages long, for only six chapters. It is well done, and for many subjects enables the reader to find the proper page, but not without a bit more work than a subject index would have required. It would have been nice to have had both.

Treatise on Analytical Chemistry, Part II, Volume 15, Section B-2, Organic Analysis II. Edited by I. M. KOLTHOFF and P. J. ELVING.

* Unsigned book reviews are by the Book Review Editor.

Wiley/Interscience, New York, N.Y. 1976. xxi + 509 pp. \$31.00.

This volume further extends the treatment of organic functional group analysis with six contributed chapters: Sulfur-based Functions Other than Divalent (J. G. Baldinus); Detection of Nitrogen in Samples (R. F. Muraca); Amines (F. E. Critchfield and J. E. Ruch); Diazonium Group; Diazo Group; and Azo Group (all by R. F. Muraca). The first chapter is somewhat misleadingly titled, for it treats such divalent-sulfur functions as thiocarbonates, xanthates, thio and dithio acids, thioamides, sulfenic acid derivatives, etc.

As in previous volumes, qualitative and quantitative analysis are treated, and all methods, chemical and physical, are presented. It is a most valuable help to have otherwise widely scattered methods brought together for comprehensive discussion, and the inclusion of recommended or typical laboratory procedures is a special convenience.

Each chapter has a substantial introductory section devoted to properties. These sections are surprisingly uneven; in some chapters, "properties" seems to be strictly interpreted to mean physical and pharmacological properties, only including chemical properties of the acid-base type. In others, extensive discussions of structure, synthesis, and reactions appear. These subjects seem out of place, and their quality does not match that of the purely analytical sections. At worst, some parts are erroneous and misleading. In one chapter, the structure of diazoalkanes is explained as being "isomeric" with diazonium compounds, an astonishing misconception. Certain authors do not understand that there is a fundamental difference between resonance between canonical structures and equilibrium between compounds. It would improve future volumes if the topics of structure, synthesis, and reactions would be omitted, or be written by chemists well grounded in the subjects. It is also disturbing to find benzene rings written as plane hexagons, implying cyclohexane, in some places, along with properly written forms in others, sometimes in the same chapter.

It is good that this volume has its own index, for many chemists will find it useful who do not need the whole series. It is curious, however, to note that the index is only half as long as the Table of Contents!

Hormonal Proteins and Peptides. Volume III. Edited by C. H. LI (University of California, San Francisco). Academic Press, New York, N.Y. 1975. xi + 296 pp. \$24.50.

Five chapters on biochemical, biophysical, and medical approaches to the study of growth hormone (GH), a 22 000 MW soluble protein, are presented in this book. In the opening chapter by C. H. Li, research on human growth hormone (HGH) from the period 1967 to 1973 is discussed with special regard to the relationship between enzymatic structure and function. A large number of biochemical and biophysical techniques uses in this endeavor are presented. The period covered by this chapter may explain a notable lack of NMR studies of this protein and other polypeptides of the pituitary system.

The second article, by T. Hayashida, gives a thorough account of immunological and biological studies of antisera to GH from several species. The various *in vitro* methods employed for the demonstration of antigenicity of GH are reviewed. The author states that exogenously administered antibodies to GH can completely block the biological activity of this latter protein in rats whose pituitary glands have been removed. The evolutionary invariance of GH with respect to immunochemical criteria is also suggested by Hayashida.

In the third review, R. F. Escamilla summarizes his experiences on the clinical studies of HGH in children with growth problems. Of special interest is the finding that only GH from primates are effective in man and that hypopituitary dwarfism can be effectively treated with HGH. In this latter study, no toxic side effects were noted; however, a tendency to mild glucose intolerance was observed.

J. H. Lawrence and co-workers discuss in the fourth paper the clinical state of somatic overgrowth (acromegaly). This condition is usually caused by an eosinophilic tumor with resulting hypersecretion of GH leading to the observed symptoms. These workers describe the successful treatment of acromegaly by directing large doses of heavy particle ionizing radiation to the pituitary area, whereupon the excessive GH secretion became controlled. These authors noted no postirradiation reactions associated with this procedure.

L. L. Bennett in the concluding article presents an account of the development of pituitary research with a biographical sketch of Herbert M. Evans, codiscoverer of GH in 1921.

The studies presented in this book demonstrate the utility of com-

bining the talents of investigators employing biophysical and biochemical techniques with those employing techniques of clinical medicine. A greater understanding of a particular pathological condition than that obtainable by each group of workers alone may be achieved. The present compilation of papers will be found useful not only to those workers primarily interested in GH but also to those who are interested in an example of the successful interface of the chemical and medical sciences.

D. Allan Butterfield, *University of Kentucky*

Top Down Structured Programming. By C. L. MCGOWAN and J. R. KELLY (Brown University). Petrocelli/Charter Publishers, New York, N.Y. 1975. viii + 288 pp. \$14.95.

This book discusses the implementation and advantages of structured programming, specifically the top down variation. It includes the language-independent sufficiency and correctness considerations of structured programming and uses several examples to demonstrate the principles being discussed. Although the bulk of the programming examples use PLI, there are FORTRAN, COBOL, and assembler examples given to demonstrate the applicability of the technique to these languages. The application of top down structured programming to real programming problems is illustrated with several small programs and a discussion of the IBM Chief Programmer Team concept and a multitask resource management operating system. Details on implementation of a PLI preprocessor and assembler macros for structured programming are given in the two appendices.

Henry E. Dayringer, *Cornell University*

Analytical Atomic Spectroscopy. By W. G. SCHRENK (Kansas State University). Plenum Press, New York, N.Y. 1975. xvii + 375 pp. \$32.50.

This book offers analytical spectroscopists and students an introduction to the basic principles and instrumentation used in this field. Principles are stressed. Detailed methods of analysis for specific elements are not included. The readable, lucid style of the author makes the book enjoyable.

After a short historical introduction, the second chapter of 35 pages is an elementary treatment of the origin of atomic spectra. Instrumentation is discussed in the succeeding four chapters under the headings of filters, prisms, gratings, and lenses (30 pp), spectrometers (25 pp), accessory equipment for arc and spark spectrochemical analysis (25 pp), and recording and reading spectra (20 pp). Then follows chapters on qualitative and semiquantitative arc-spark emission (20 pp) and quantitative spectrochemical analysis (40 pp). The remaining three chapters treat flame emission spectroscopy (31 pp), analytical atomic absorption spectroscopy (46 pp), and atomic fluorescence spectroscopy (19 pp). Several appendices are included. Particularly useful will be the tables of sensitive spectral lines of 70 elements arranged by wavelength and by element; emission intensity and gf factors are included. This information was abridged from National Bureau of Standards publications. Regretfully the table listing elemental detection limits for FES and AAS contain data only to 1969 and omits sensitivity data entirely.

The treatment of material is somewhat general, adequate for an introductory text but disappointing for anyone searching for sidelights or an in-depth treatment. Page allocations to many of the topics are about double those found in the usual instrumental analysis text. There are no problems or laboratory exercises. If one is looking for a well-written analytical spectroscopy text of an intermediate level, this book is recommended. For a course at the graduate level, additional material would be necessary. Practicing spectroscopists will find the book lacking in depth when compared to reviews and monographs.

John A. Dean, *University of Tennessee at Knoxville*

Chemical Analysis of Organometallic Compounds. Volume 4. By T. R. CROMPTON (Goosnargh, nr. Preston, Lancashire). Academic Press, New York, N.Y. 1975. x + 302 pp. \$23.25.

This volume covers the analysis of organometallic compounds of group 5 elements with special emphasis placed on organophosphorus compounds. Methods of analysis discussed include "wet" chemical procedures, e.g., titrimetry, as well as instrumental techniques, e.g., spectrophotometry and gas chromatography. Regretfully, little if any attention is given in this text to the utilization of NMR, especially that of ^{31}P , and mass spectrometry, both of which are rather powerful analytical tools. The presentation of the material is clear and infor-

mative. Experimental procedures are discussed in great detail and are often accompanied by a list of necessary equipment as well as illustrations in the form of charts, tables, and graphs. Frequently, critical comments are made concerning the importance, merits, and demerits of the various methods.

Appropriately, the main chapter is devoted to organophosphorus compounds (243 pp). Noteworthy in particular are the procedures describing the analyses of insecticides, pesticides, nerve gases (GB Sarin and GA Tabun), adenosine phosphates, carbohydrate phosphates, glycerophosphates and the esters of phosphoric, phosphorous, phosphonic, phosphinic, phosphonous, pyrophosphoric, and pyrophosphonic acids, many of which are of biological importance. Attention is given to the analysis of tertiary phosphines and phosphites; however, no mention is made of their coordination complexes with the transition elements, despite the growing importance of this class of compounds as homogeneous catalysts. The minor chapters in this volume deal with the analysis of organoarsenic (22 pp), organoantimony (2 pp) and organobismuth (2 pp) compounds. A one-line chapter is devoted to the organometallic compounds of group 5A elements, stating that references pertaining to their analytical chemistry have not been found. The inclusion of palladium among group 5A elements has been made by error.

In view of its content, this book should be of great benefit to a large segment of the scientific community. Researchers in disciplines such as analytical chemistry, biochemistry, biology as well as agriculture, environmental and food sciences, will undoubtedly find in this text valuable information in aid of their research efforts.

Avi Efraty, Rutgers University, New Brunswick

Reaction Kinetics, Volume 1. Senior Reporter: P. G. ASHMORE (University of Manchester). The Chemical Society, London. 1975. xi + 396 pp. £13.50.

This volume in the Chemical Society's Specialist Periodical Reports contains eight chapters: Chemical Kinetics—Retrospect and Prospects (by S. W. Benson); Reactions of Atoms in Ground and Electronically Excited States (R. J. Donovan and H. M. Gillespie); Unimolecular Reactions (P. J. Robinson); A Critical Survey of Rate Constants for Reactions in Gas-phase Hydrocarbon Oxidation (R. W. Walker); Kinetic Studies in Silicon Chemistry (I. M. T. Davidson); Network Effects in the Dissociation and Recombination of a Diatomic Gas (H. O. Pritchard); Recent Advances in the Analysis of Kinetic Data (A. Jones); and Kinetics of Oscillating Reactions (B. F. Gray).

The usefulness of this book as a reference work is severely limited by the complete absence of any subject index. The literature references are current through the last quarter of 1973. There are approximately 1700 persons cited in the author index. S. W. Benson is most frequently referred to with none of the citations coming from his short (13-page) but interesting first chapter. Authors of undergraduate chemistry textbooks could profitably refer to Benson's comments in this chapter for ideas to update the typical textbook chapter on reaction kinetics.

Judging from the number of times he underlined portions of Pritchard's chapter, a distinguished theoretical kineticist of my acquaintance found this chapter to be the most interesting one in my copy of this book. Shock tube workers and laser chemical physicists are likely to share this enthusiasm. My own solution chemistry background led me to prefer the oscillating reactions chapter that is made all the more interesting by Gray's mordant criticisms of some of the recent work in this field.

Edward M. Eyring, University of Utah

Cytochromes P-450 and b₅: Structure, Function, and Interaction. Volume 58 in *Advances in Experimental Medicine and Biology*. Edited by D. Y. COOPER, O. ROSENTHAL (University of Pennsylvania School of Medicine), R. SNYDER, and C. WITMER (Thomas Jefferson University). Plenum Press, New York, N.Y. 1975. xiv + 554 pp. \$39.50.

Both cytochrome P-450 and the cytochrome P-450 mixed function oxidase (hydroxylating) system have appropriately received a great deal of attention during the last decade and are continuing to do so. Some of the reasons for this intense research interest are the wide range of compounds that serve as substrates for the cytochrome P-450 system, its role in drug metabolism, detoxification, and the transformation of polyaromatic compounds into carcinogenic agents. In ad-

dition there is now extensive research interest in oxidation-reduction enzymes and proteins in general.

The present volume is an interesting and relatively up-to-date report on a variety of research approaches directed toward understanding both cytochrome P-450 structure and function and the cytochrome P-450 system. This book is the published form of the Proceedings of the Second Philadelphia Conference on Heme Protein P-450, which was held in Philadelphia at Thomas Jefferson University on April 5-6, 1974. The conference consisted of four sessions, and the book follows the same format, such that after every four or five papers presented there is a discussion section. The subject matter of the papers ranges from the biophysical chemistry of purified cytochrome P-450 to whole organism pharmacology of the P-450 system, and thus makes the book highly interdisciplinary in nature. It is primarily the first two sessions that deal with the biochemical and biophysical characterization of the cytochrome P-450 itself via optical, magnetic, and immunological methods. Many of these papers also are studies of the P-450 system as it occurs in cells and microsomal preparations. The discussions in the first two sessions seem to be especially pertinent, e.g., the need to be cautious in attempts to implicate primarily the cytochrome P-450 system in carcinogenesis. Also of interest in both paper and discussion was the "extra" electron that purified cytochrome P-450 accepts upon reduction.

The third section of the book is directed toward determining the relationship of the P-450 system to other redox and enzymic systems. An interesting example, which is also discussed, is the exploration of the role of the P-450 system in the oxidation of ethanol. The last session, in conformation with the title of the book, deals with the role of cytochrome b₅ in the operation of the cytochrome P-450 system.

It is fair to say that while this book is probably not an especially good introduction to cytochrome P-450, it is one that can be highly recommended and would be valuable for those actively working in this and related areas of research. Even within the context of not being an introductory work, this book can also serve as an effective overview of the recent chemistry and biology of cytochrome P-450 for those whose interests are mainly chemical but include this extremely versatile and important redox protein.

Benjamin A. Feinberg, University of Wisconsin—Milwaukee

Handbook of Enzyme Biotechnology. Edited by ALAN WISEMAN (University of Surrey). Ellis Horwood Ltd., Publisher, Chichester. Halsted/Wiley, New York, N.Y. 1975. xii + 275 pp. \$45.00.

The areas considered by this book are of great industrial importance, and, as the foreword states, there is a need for books reviewing the principles and state of the art of the field. Unfortunately, this book is of limited value in this regard. Furthermore, the title is misleading since much of the text is not presented in "handbook" format. The enzyme and fermentation topics reviewed include the properties of the systems, the factors involved in large-scale production, extraction, purification, and immobilization of enzymes, and many industrial and analytical applications are listed. With such an enormous area being covered in a short book, the treatment afforded most topics is inevitably superficial. For industrial scientists becoming interested in enzyme biotechnology, but with no prior knowledge, the text provides a quickly absorbable overview for general awareness purposes. Those who have had any previous contact with the field may find the lists of enzyme and equipment suppliers useful, but will wish to proceed without delay to more definitive and detailed treatises. At a cost of \$45.00, individual purchase cannot be recommended.

J. Bryan Jones, University of Toronto

Thermocouple Temperature Measurement. By P. A. KINZIE. John Wiley & Sons, Inc., New York, N.Y. 1973. v + 278 pp. \$14.95.

The book is very much like an encyclopedia which contains specific data on thermocouple systems. It is well referenced and makes very effective use of appendices, especially Appendix B which is a very useful guide to a particular couple of interest. I feel that the inclusion of another chapter which would treat the theoretical aspects of the subject is needed for completeness. Also, several specific examples or applications would help show the novice how to use the book to solve specific problems.

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