

Pucci, and Binsch have suggested<sup>10</sup>) that a true understanding of these reactions will be obtained only after theoretical information on their energy surfaces and reaction dynamics becomes available.<sup>11</sup>

**Acknowledgments.** We are grateful to the National Science Foundation and Chevron Research Corporation for financial support of this work.

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- (12) National Science Foundation Predoctoral Fellow.
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## Book Reviews\*

**A Biographical Dictionary of Scientists. Second Edition.** Edited by T. I. WILLIAMS. Wiley/Halsted, New York, N.Y. 1975. xv + 641 pp. \$7.95.

Short biographies, averaging about half a page each, of over a thousand dead scientists and technologists make up the content of this interesting book. The biographies are discursive and eminently readable, such that the book is a pleasure to browse in. The period covered starts with Ancient Greece, and reaches as close to the present as Sir Robert Watson-Watt, pioneer developer of radar, who died in December 1973. Chemists are strongly represented. The editor could not reasonably be expected to avoid being somewhat subjective as to whom to include and to omit, and his choosing was obviously not easy, nor could his choice please everyone. Nevertheless it is unfortunate that Johan von Goethe, who was a great scientist as well as poet, and who originated the concept of morphology in biology, was overlooked. The inclusion of Ferdinand de Lesseps, the diplomat who successfully promoted the construction of the Suez Canal, also seems odd.

A 32-page chronological list of births and deaths is an interesting and useful appendix, and an innovation over the first edition.

**Blastfurnace and Steel Slag, Production, Properties, and Uses.** By A. R. LEE (The British Quarrying and Slag Federation Ltd.). Wiley/Halsted, New York, N.Y. 1975. ix + 119 pp. \$11.75.

This little book is a lucid survey of a major industrial by-product whose annual production is about one hundred million tons. The presentation is technologically oriented but is suitable for the informed layman as well as the casual chemist, owing to the fact that the author carefully introduces each topic from a basic level and defines all terms. There are many illustrations, figures, references, and tables, including, oddly enough, one of conversion factors from British to metric units.

**Chemical Process Economics. Second Edition.** By JOHN HAPPEL and DONALD G. JORDAN. Marcel Dekker Inc., New York, N.Y. 1975. xii + 511 pp. \$19.75.

The original 1958 edition of this book has been both revised and expanded to take into account the great changes that have occurred in the chemical industry since then. It is a textbook of eco-

nomics to teach fourth-year students how to apply technical information to economic design and operation of chemical plants.

**Colour 73.** Edited by R. W. G. HUNT. Wiley/Halsted, New York, N.Y. 1974. xviii + 566 pp. \$39.95.

This volume contains the survey lectures and the abstracts of the papers presented at the Second Congress of the International Colour Association, held at the University of York in 1973. The emphasis of the Congress was on color vision and on applications of color in printing, textiles, ceramics, etc. Chemistry was only a very peripheral concern and was most evident in the papers on colorimetry. The frontispiece is a portrait in black and white honoring the late Deane B. Judd of the Bureau of Standards.

**Heat Exchangers; Design and Theory Sourcebook.** Edited by N. H. AFGAN and E. U. SCHLUNDER. McGraw-Hill Book Co., New York, N.Y. 1974. xvi + 893 pp. \$39.50.

The International Centre for Heat and Mass Transfer devoted its Fifth Seminar to heat exchangers and invited 58 contributors representing academic and government institutions and industries. The index of only 2¼ pages is inadequate for a book intended to be a "source book", and it is a pity that the eighteen blank pages headed "Design and Calculation Work Notes" were not devoted to a more substantial index.

**Heat Transfer in Flames.** Edited by N. H. AFGAN and J. M. BEER. Wiley/Halsted, New York, N.Y. 1974. viii + 502 pp. \$28.50.

This book is a collection of selected papers from the 1973 seminar of the International Centre for Heat and Mass Transfer. The 34 papers are grouped under five headings: Method of Calculation; Radiative Properties; Experimental Methods; Heat Transfer in Unsteady Confined Flames; and Open-Flame Heat Transfer. The orientation is technological and applied, but there is much to interest the physical chemist concerned with combustion. Flames in internal combustion engines are the subject of several papers, an area of obvious importance to the chemist who must deal with engine emissions, pollution, and fuel efficiency.

The index, which amounts to less than one page, is absurd.

**Hydrogen Energy.** Edited by T. N. VEZIROĞLU (Clean Energy

\* Unsigned book reviews are by the Book Review Editor.

Research Institute, University of Miami). Plenum Press, New York, N.Y. 1975. In two parts: xli + xxvi + 1379 pp. \$95.00.

This two-volume work represents the Proceedings of the Hydrogen Economy Miami Energy Conference, held in March 1974. Part A contains 45 papers grouped into three chapters: Primary Energy Sources; Hydrogen Production; and Hydrogen Storage and Transmission. Part B contains another 45 papers, grouped under the headings Hydrogen Utilization, and General Considerations, plus a panel discussion "How and When Will Hydrogen Energy Get Started in Industry" and a substantial subject index. The theme of the conference is the commercial and residential use of hydrogen fuel obtained from solar, geothermal, nuclear, wind, and sea sources of energy. The papers, which are reproduced directly from typescript, are a mixture of reviews and accounts of original research.

**Interactions Between Ions and Molecules.** Edited by P. AUSLOOS (National Bureau of Standards). Plenum Press, New York, N.Y. 1975. ix + 690 pp. \$54.00.

This volume consists of the texts of the 28 lectures given at the 1974 NATO Advanced Study Institute held in Biarritz, along with reports from four panels on the subjects: Determination of Rate Constants of Ion-Molecule Reactions; Charge Transfer; Planetary Ionospheres; and New Instrumentation. The papers, which consist of both reviews and reports of original research, are reproduced directly from the authors' rather nonuniform typescripts, and contain tables, figures, and references. There is a proper subject index of eight pages.

**Low-Dimensional Cooperative Phenomena.** Edited by H. J. KELLER (Universität Heidelberg). Plenum Press, New York, N.Y. 1975. viii + 350 pp. \$25.50.

This enigmatically titled volume contains the texts of the 17 lectures given at the 1974 NATO Advanced Study Institute held in Starnberg. The subtitle of the conference is "The Possibility of High-temperature Superconductivity", a more communicative choice of words. The papers are largely concerned with the properties of metals, metal compounds, and organic pseudo-metals. Some are reviews, some are reports of original research, and all are reproduced from the authors' typescripts. There is a proper subject index.

**Medicinal Chemistry IV.** Edited by J. MAAS. Elsevier Scientific Publishing Co., Amsterdam. 1975. viii + 376 pp. Dfl. 90.00 (about \$34.75).

This book is the Proceedings of the International Symposium on Medicinal Chemistry held in Noordwijkerhout, Netherlands, in 1974. It consists of sixteen lectures plus a preface and concluding remarks. The papers are reproduced from the authors' typescripts, and are reviews, reports of original research, or combinations. There is no index.

**Natürliche, natur-identische und synthetische Geschmackstoffe und deren lebensmittelrechtliche Aspekte.** Edited by W. AUERSWALD and B. M. BRANDSTETTER. Wilhelm Maudrich Verlag, Vienna. 1973. 43 pp. (price not stated).

This paperback booklet contains the texts of four papers on the general subject of flavor and aroma agents in food and the regulations applying to them, particularly in Germany and Austria; fifteen pages are devoted to the subsequent discussion, and five to introduction and conclusion.

**Organic Reaction Mechanisms. 1973.** Edited by A. R. BUTLER and M. J. PERKINS. Wiley/Interscience, New York, N.Y. 1975. 579 pp. \$56.00.

This eighth volume in the series continues, under new editorship, the policy of giving comprehensive coverage in succinct review form of the contributions to the subject appearing in the year named. This year, the bibliography exceeds 5000 papers, a fact that should give chemists some appreciation of the magnitude of service that the publication of this work represents.

Several innovations are included this year. The most important is the plan to publish certain sections of the volume separately, to put the material closer to the financial reach of individuals (no indication of which sections will be so treated, nor when, is given, however). The chapter on photochemistry found in earlier volumes

is now omitted, because that subject is adequately covered in the Specialist Periodic Reports of the Chemical Society. The references are now collected at the end of each chapter, instead of being at the foot of each page, in order to reduce printing costs.

As heretofore, there are full author and subject indexes, which help substantially to maintain the usefulness of this work as an important service to organic chemists.

**Organic Reactions. Volume 22.** Edited by WILLIAM G. DAUBEN (University of California). John Wiley & Sons, New York, N.Y. 1975. ix + 474 pp. \$24.95.

With this volume, the Editorial Board has decided to begin a program of updating earlier reviews. Although the material in Volume 1, published in 1942, is still useful and, in fact, widely consulted, the span of 33 years since that time has seen a vast amount of new chemistry. The rate of advance differs greatly from one subject to another, of course, and the editors have selected three chapters for which the need for revision seemed more urgent: "The Clemmensen Reduction" (E. Vedejs), "The Reformatsky Reaction" (M. W. Rathke), and "The Claisen and Cope Rearrangements" (S. J. Rhoads and N. R. Raulins). The first two of these are essentially reports of newer developments and are thus supplements to the original chapters. The last subject has been completely rewritten as a comprehensive coverage.

The remaining chapter in this volume is a new subject, "Substitution Reactions Using Organocopper Reagents" (G. H. Posner), and reflects the great growth of organocopper chemistry in the last few years. This chapter complements the one on "Conjugate Addition Reactions of Organocopper Reagents" contributed to Volume 19 by the same author.

It is hard to overestimate the value to the synthetic organic chemist that this series continues to maintain.

**Organic Syntheses. Volume 54.** Edited by R. E. IRELAND (California Institute of Technology). John Wiley & Sons, New York, N.Y. 1975. ix + 156 pp. \$10.95.

This familiar work continues to evolve to meet the changing needs of organic chemists concerned with synthesis. Twenty-two detailed experimental procedures that have undergone independent checking for their accuracy and reproducibility are included. This volume features some multistage syntheses of unusual interest, one of which begins on a large scale reminiscent of the early volumes of "Organic Syntheses". This is the preparation of [18]annulene, of which 268 mg (0.54%) is obtained by Herculean manipulations starting with 50 g of 1,5-hexadiyne and a 12-l. flask.

Many of the preparations are at least as valuable as model procedures as they are as sources of desirable compounds; for example, five different preparations of aldehydes are given, including one using 1,3-bis(methylthio)allyllithium, and one using 4,4-dimethyl-2-oxazoline. Notes and discussions are copious and now include useful spectroscopic information. Supplementary pages (24 in all) list procedures on hand but not yet checked.

**Organic Syntheses Via Boranes.** By HERBERT C. BROWN (Purdue University) with techniques by G. W. KRAMER, A. B. LEVY, and M. M. MIDLAND. Wiley/Interscience, New York, N.Y. 1975. xix + 283 pp. \$17.50.

The master practitioner in a given field is usually very willing to share his results, but it is much less common for him to share his methods, and few undertake the arduousness of preparing a book to make the methods as widely and conveniently available as possible. Professor Brown, however, is well known for his emphasis on practice and his eagerness to show other chemists how something might be done better. This book demonstrates his philosophy very well and is sure to earn the gratitude of the many chemists who have known of the value of organoboranes in principle, but who have been reluctant to employ them themselves because of experimental unfamiliarity.

This book consists of eight paired chapters, half on surveys, half on procedures, plus a ninth on Laboratory Operations with Air-Sensitive Substances. The subjects of the paired chapters are: Hydroboration with Borane; Hydroboration with Borane Derivatives; Organoborane Conversions; and Carbon Bond Formation via Organoboranes. The survey chapters are brief but lucid descriptions of the scope and limitations of the reactions and are not meant to be comprehensive. There are no tables, and the number of refer-

ences in each is between 39 and 81. The "procedure" chapters are longer and consist of rich collections of laboratory directions in the style of "Organic Syntheses". These procedures have been collected by the three associates listed under the title and have been contributed in the form of elaborations of procedures originally published in journal articles. Detailed "Notes" are included and, where important, drawings of apparatus are provided.

The last chapter is prolifically illustrated with drawings and photographs and is a most valuable source for practical laboratory techniques. Its scope is wider than its title suggests, and there is much information in it on the handling of gases in the laboratory: how to measure them, transfer them, store them, etc. An Appendix of Sources of Technical Literature (including apparatus), complete with addresses, a good subject index, and a restrained list of abbreviations unambiguously defined, are provided as additional aids to the user.

This is a book that should achieve wide personal purchase; it is most likely to be criticized for not being longer.

**Synthetic Peptides. Volume 3.** By GEORGE R. PETTIT (Arizona State University). Academic Press, New York, N.Y. 1975. vii + 438 pp. \$39.50.

Only by reading the preface can one deduce that this volume is a survey of the literature for the two-year period, January 1971 to January 1973. The book consists almost entirely of tables, of which the largest is entitled Amino Acid Derivatives. This table includes chromatographic data, melting point, optical rotation, and an indication of whether the reference gives other information, such as infrared or nmr spectra. The other tables cover peptides grouped according to sizes, solid-phase synthesis, and other types of peptides (depsi-, chromo-, nucleo-, and steroidal), and there is a two-page survey of racemization. The bibliography for the short period covered is no less than 734 references.

#### Texts on Introductory Chemistry Received

**Chemistry: A Life Science Approach.** By STUART J. BAUM (State University of New York College at Plattsburgh) and CHARLES W. J. SCAIFE (Union College). Macmillan Publishing Co. Inc., New York, N.Y. 1975. xx + 746 pp. \$13.95.

**Chemistry.** By LINUS PAULING (Linus Pauling Institute of Science and Medicine) and PETER PAULING (University College, London). W. H. Freeman and Co., San Francisco, Calif. 1975. xvi + 767 pp. \$13.95.

**Introduction to Chemistry. Second Edition.** By T. R. DICKSON. John Wiley & Sons, Inc., New York, N.Y. 1975. xix + 457 pp. \$11.95.

**Chemistry: The Science and the Scene.** By RONALD D. CLARK and ROBERT L. S. AMAI (New Mexico Highlands University). John Wiley & Sons, Inc., New York, N.Y. 1975. ix + 355 pp. \$10.95.

**Chemistry of Our World.** By JOHN GARLAND (Washington State University). Macmillan Publishing Co. Inc., New York, N.Y. 1975. xvii + 647 pp. \$13.95.

**An Introduction to Chemical Principles.** By JACK S. FERNANDEZ and ROBERT D. WHITAKER (University of South Florida). Macmillan Publishing Co. Inc., New York, N.Y. 1975. xxv + 589 pp. \$12.95.

**Pericyclic Reactions.** By G. B. GILL and M. R. WILLIS (University of Nottingham). Wiley/Halsted, New York, N.Y. 1974. xiii + 240 pp. \$9.00.

This is an introductory book intended primarily for students in their final year of undergraduate study or in their first year of graduate study. The authors, therefore, reference mostly review articles and relatively few original papers in the literature prior to 1973.

The first two chapters deal with molecular orbital theory and aromaticity and provide an adequate background for the remainder of the book. Chapter 3 discusses the stereochemical requirements of cycloaddition, electrocyclic, sigmatropic, and cheletropic reactions. Various theoretical explanations of pericyclic reactions are briefly outlined in the following two chapters. These include

the frontier orbital approach, the orbital symmetry method, the Zimmerman method, and the Dewar approach. Finally, the last chapter provides examples of pericyclic reactions categorized according to reaction type and number of participating electrons.

Overall, I believe this is a very good introductory text on pericyclic reactions. The book is clearly written with many illustrations and examples. A rather limited number of problems are dispersed throughout the text with answers in the appendix. Unfortunately, the book (limp bound edition) is poorly bound. Numerous loose pages resulted after only one reading.

Ronald L. Blankespoor, *Wake Forest University*

**Aqueous Dielectrics.** By J. B. HASTED (Birkbeck College). Wiley/Halsted, New York, N.Y. 1974. xiii + 302 pp. \$18.50.

This book is well organized and effectively illustrated. Figures, formulas, and tables of information are presented in such a manner as to be readily understood and utilized.

Included is necessary information regarding the various aspects of the topic, but many significant concepts and references which have appeared in the past ten years do not appear. In some areas covered by the author, too little detail is provided, but to provide more would have necessitated a several-volume treatise on the subject. The chapters devoted to the broad applicability of the concept to earth sciences and to biological systems is interesting, though quite terse.

A chapter devoted to modeling efforts concerning the structure and properties of water and aqueous dielectrics appears to have been appropriate to include in this book.

The book is interesting, useful, and readable, if not all inclusive.

D. L. Wertz, *University of Southern Mississippi*

**Terpenoids and Steroids. Volume 4.** By K. H. OVERTON, Senior Reporter. The Chemical Society, London. 1974. x + 608 pp. £18.50.

This fourth volume of the now well-established series of Reports reviews the literature published between September 1972 and August 1973. In addition, this book gains considerable value by two comprehensive, specialized accounts of steroids ("Microbiological Reactions of Steroids" by L. L. Smith and "Steroid Conformations from X-Ray Analysis Data" by C. Romers and colleagues) that are normally not covered in the annual Reports. Furthermore, a list of pertinent reviews on terpenoids that have been published between 1968 and 1973 will be welcomed by researchers and teachers alike.

Part I in this book contains seven chapters covering the recent literature on the isolation, chemistry, synthesis, and biosynthesis of the various types of terpenoids. A. F. Thomas reviews the monoterpenes including the cannabinoids. The chapter contains a particularly large number of new and novel syntheses which reflect the rapidly increasing interest in this research area. The second chapter (R. W. Mills and T. Money) is introduced by a table showing the various structural types of sesquiterpenoids. In addition, a large number of recent publications related to structure, synthesis, and biosynthesis of this structurally diversified group is reviewed. J. R. Hanson covers the diterpenoids and the new structural and biosynthetic findings on the relatively new group of sesterterpenoids. Reports on the different types of triterpenoids (J. D. Connolly) and the carotenoids and polyterpenoids (G. Britton) follow. The last chapter of Part I summarizes new findings in the biosynthesis of terpenoids and steroids, competently reviewed by D. V. Banthorpe and B. V. Charlwood.

Part II contains a chapter on steroid properties and reactions (D. N. Kirk), but the literature on steroid synthesis is not covered in this volume. However, the two comprehensive accounts that were mentioned above are excellent compensations. Professor L. L. Smith needs to be complimented for the immense amount of work put into the chapter on "Microbiological Reactions on Steroids" which contains nearly 500 literature references mainly from the time period 1967-1973. A wealth of information is provided which should also be of interest to researchers outside the steroid field. "Steroid Conformations from X-ray Analysis Data" by C. Romers, C. Altona, and colleagues provides a critical account of the available steroid X-ray data. From the available data, the authors shed light on the influence of configuration and functional groups on the conformation of steroids. This chapter should therefore at-

tract the attention of a large group of scientists, in particular, organic chemists, biochemists, and pharmacologists.

Nikolaus H. Fischer, *Louisiana State University*

**Essential Aspects of Mass Spectrometry.** By ALBERTO FRIGERIO (Mario Negri Institute for Pharmacological Research). Spectrum Publications, Inc., Flushing, N.Y. 1974. x + 121 pp. \$7.95.

The purpose of this short book is stated to be an introduction for students and professionals in chemistry and other scientific disciplines. As may be expected, no single short volume can address this multiplicity of purposes consistently and adequately. The book consists of five untitled chapters. The point of departure is Figure 1, which depicts the breaking of a vase with a slingshot and its reconstruction from the pieces. Instrumentation is covered only to the point of explaining the simplest aspects, and there is no description of ion sources, detectors, operating conditions, etc. Ion fragmentation and the origin of mass spectra are explained in a highly abbreviated version of Bieman's classic text. The last section is devoted to GCMS, and deals chiefly with single ion detection and mass fragmentography. Instrumental aspects are covered as block diagrams only. A few paragraphs are devoted to chemical ionization and field ionization as useful methods for the determination of molecular weights. The text contains some awkward or unconventional phrases; literature references are restricted to standard books and catalogs of spectra. The book will not be useful to the practicing mass spectrometrists, nor to someone who wants to adopt the technique to his research. It will be adequate to provide a conversational acquaintance with the field.

G. G. Meisels, *University of Nebraska—Lincoln*

**Practical Clinical Enzymology and Biochemical Profiling: Techniques and Interpretations.** By PAUL L. WOLF, DOROTHY WILLIAMS, and ELIZABETH VON DER MUEHLL (Stanford University Medical Center). John Wiley & Sons, New York, N.Y. 1973. 580 pp. \$15.50.

The authors state that "this book is intended as a review and reference textbook for clinical pathologists and medical technologists who are concerned with daily problems in diagnostic clinical enzymology and biochemical profiling".

The book is roughly divided in three parts. The first is devoted to the methods of assay of a variety of enzymatic activities as carried out in the authors' laboratories; alternative methods are not included. This is the least satisfactory part of the book.

The second section is devoted to detailed discussions of enzyme patterns associated with various abnormalities and diseases. The associated pathologies of various organs are amply illustrated. This section is very informative and provides good reference material, which does not go too deep. Some omissions, such as the application and significance of isoenzymes (e.g., alkaline phosphatase, creatine phosphate kinase) in diagnosis, betray the fact that the book is somewhat out of date. All photographs are in black and white. Some colored photographs would have been an added bonus and would make the identification of "green blood" (for example) unequivocal.

In the last chapter ("Multiphasic Testing") the authors describe their attempts to integrate clinical data with a lab computer for possible computerized biochemical screening of various diseases and abnormalities. Typical computerized patterns (128) of various abnormalities been reproduced from data accumulated in the authors' laboratories. This approach, although controversial, will inevitably expand.

There are a number of irritating features in this book: Many of the abbreviations are not conventional and certainly not familiar to the chemist; a plain hexagon is used to represent the aromatic benzene ring; references are not cited in a consistent conventional manner.

Although not likely to appeal to chemists, it should provide a useful reference book in a clinical laboratory.

Angelo Schibeci, *University of Michigan*

**Microbial Growth.** Edited by P. S. S. DAWSON. Dowden, Hutchinson and Ross Inc., Stroudsburg, Pa. 1975. 440 pp. \$27.00.

The eighth volume in the series of Benchmark Papers in Microbiology, this collection of 29 classic papers deals with bacteria,

fungi, algae, and protozoa. Growth, nutrition, cultural techniques, chemical composition, induction of synchronous cell division, and useful techniques for studying microbial growth under natural conditions are among the topics included. The papers are accompanied by editorial comments. Beginning with H. M. Ward's research of 1895 and ending with T. D. Brock's paper from 1971, this volume provides an excellent perspective of the development of microbial research.

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

**Treatise on Materials Science and Technology. Volume 4.** Edited by HERBERT HERMAN. Academic Press, New York and London. 1975. xii + 323 pp. \$29.50.

The fourth volume in the series on Materials Science and Technology, similar to the preceding volumes, deals with a wide variety of topics. Five independent papers indicate the diversity of the field.

In the first article Vook discusses advanced techniques for studying the microstructure of thin films. The introduction—as is the case with most other papers—is clear and concise and well suited to either refresh the memory of the researcher in related fields as well as to guide the student in material science. Methods such as high-energy electron and X-ray diffraction together with their microscopic counterparts, transition electron microscopy (TEM) and X-ray topography, are discussed. The main emphasis is on reflection high-energy electron diffraction (RHEED), low-energy electron diffraction (LEED, TEM) replica techniques, and scanning electron microscopy (SEM). A surprisingly short chapter on amorphous films does not yet include the progress of the last few years on amorphous rare earth transition metal films.

Diffusion in substitutional alloys is reviewed in a contribution by Stark with a treatment which runs from first principles over random walk of vacancies to correlation effects.

An account of solid solution strengthening in face-centered-cubic alloys is given by Evans. Newest development in this age-old field are presented together with a comprehensive list of references.

In one of the high points of this treatise Chang examines the thermodynamics of binary ordered and disordered intermetallic phases, particularly pertaining to the CsCl- and Au<sub>3</sub>Cu-type structures. The connection between atomic disorder, defects, and the various thermodynamic functions is discussed.

In the final contribution Koczak and Kuhn review metal powder processing, with emphasis on modern methods of powder preparation (such as jet spraying etc.), shaping, densification, and the general sintering processes.

The series as a whole attempts to bring together a library of various aspects of materials science. The resulting diversity of the subjects should make the treatise interesting to a wide spectrum of graduate students as well as scientists and engineers in materials related research.

In a preview of future volumes the editor indicates a partial change to a more topical approach with concentration on special areas of research. This may indeed give the volumes more of a common goal and possibly further increase their market appeal.

Hans Oesterreicher

*University of California—San Diego (La Jolla)*

**Computer-Based Chemical Information.** Edited by EDWARD M. ARNETT and ALLEN KENT (University of Pittsburgh). Marcel Dekker, Inc., New York, N.Y. 1973. ix + 217 pp. \$18.25.

This is Volume 4 of Books in Library and Information Science. This book is a report on a major study on the implementation and use of computer-based chemical information, carried out during 1968–1970. One of the six chapters describes inception and early development of the Pittsburgh Chemical Information Center. In the other chapters there are discussed the research chemist and his information environment, system design and implementation, interactive retrieval systems, and economics of retrospective machine searching.

An unusual feature is a chapter on behavioral studies carried out on the chemist's use of the literature before and after introduction of computer-based chemical information services. This particular study, originally conceived as an extensive and fundamental project, would have been of considerable worth, but a cut in funding

reduced it severely to an accumulation of descriptive data. The work on interactive retrieval systems, while well planned, amounts to a study in frustration; the users simply were not interested. The discussions of systems design and implementation and of economics of retrospective searching undoubtedly will have some use in providing guidelines for those contemplating setting up computer-based services.

Robert E. Stobaugh, *Chemical Abstracts Service*

**Information Retrieval and Documentation in Chemistry.** By CHARLES H. DAVIS and JAMES E. RUSH. Greenwood Press, Westport, Conn. 1974. xx + 284 pp. \$12.95.

This book is No. 8 in Contributions in Librarianship and Information Science.

The preface of this book states that its intention is "to explicate, if not popularize, major aspects of IS&R processes as they are exemplified by the field of chemical documentation." The reviewer feels that rather than explicating, the book provides introductory material on a number of aspects of information retrieval and documentation in chemistry.

The topics covered are: the human factor, indexing and classification, abstracting, information retrieval principles, retrieval systems evaluation, and nomenclature, linear notation, and topological systems for chemical structure representation. The first five topics listed do not require any detailed knowledge of chemistry for understanding. The last three do deal with specific chemical topics, although the principles discussed can be applied to other disciplines. The topics of abstracting, indexing, and retrieval systems are treated in a broad sense. It is a pleasant surprise to find the inclusion of topics of human factors and evaluation, since these are so often neglected. Unfortunately, these chapters are very short, a reflection more on the state of the art than the coverage of the book. There is considerable detail on the techniques of chemical structure representation. However, the section on nomenclature is somewhat misleading, since the naming practices described for *Chemical Abstracts* indexes have not been used there for over three years. The book in general functions adequately as an introduction and as an index to more advanced and detailed work.

Robert E. Stobaugh, *Chemical Abstracts Service*

**Thermodynamic Data for Inorganic Sulphides, Selenides and Tellurides.** By K. C. MILLS (National Physical Laboratory, Great Britain). Butterworths, London. 1974. 845 pp. \$65.00.

A number of organizations (e.g., the U.S. National Bureau of Standards, the CODATA Task Force, etc.) are involved in a continual reassessment of the existing thermodynamic data for all chemical species. Concomitant with such generalized efforts, there is also a need for more detailed data compilations for specific classes of materials that are of technological importance. Mills has filled that need for the binary chalcogenides, many of which have been used in solid-state applications. His data base is all information that appeared in *Chemical Abstracts* prior to the end of 1970. Although a significant amount of new material has appeared between then and the 1974 publication date, Mills' work should have a useful life as a primary source for those researching the thermodynamics of inorganic sulfides, selenides, and tellurides.

The book is divided into four sections. The first of these is an introduction and glossary of symbols and units used in later sections, and, more important, a description of the methods used to evaluate the tabulated data. Since many of the data are, of necessity, estimated, a fairly detailed discussion of estimation procedures is given along with the thought rationalizations leading to Mills' assignment of probable uncertainties. This section is followed by the summary tables of thermodynamic data. For each chemical entry are listed: the molecular weight (based on the 1961 tables), the melting point (based on IPTS 1948), the standard enthalpy of formation, the standard entropy and heat capacity, and  $(H^\circ_T - H^\circ_0)$ —all at 298K; and  $D^\circ_0$  for the gaseous species. All entries are duplicated in both calories and joule units.

The bulk of the book is devoted to detailed discussions of the existing data for each binary pair. For a typical entry the discussion starts with a description of the phases that have been reported and moves on to a detailed analysis of the data existing for each phase. Where several discordant values for a given thermochemical property exist, a choice is usually made and the basis for the choice and uncertainty limit is explained. Free-energy (activity) data are in-

cluded for systems of variable stoichiometry. The literature sources are tabulated in chronological order, and the section for each binary pair is ended with a listing of all references used.

The final section of the book is a reproduction of computer printouts that tabulate  $C_p$ ,  $H(T) - H(298)$ ,  $S(T) - S(298)$ , and  $-[G(T) - H(298)]/T$  at 100K intervals up to a maximum of 2000K (calories only) for the stoichiometric phases discussed in the earlier sections.

A comparison of data for some twenty chemical species between Mills' compilation and that of the U.S. National Bureau of Standards (NBS Technical Notes 270-3,4,6) reveals differences of as much as 4 kcal mol<sup>-1</sup> in standard enthalpies of formation. One must, therefore, exercise some care in determining chemical equilibria using the different data bases. Until the completion of the NBS effort, Mills' compilation enjoys the advantage of including literature references and estimated uncertainties.

Claus A. Wulff, *University of Vermont*

**Chemical Thermodynamics. A Course of Study.** By FREDERICK T. WALL (Rice University). W. H. Freeman and Co., San Francisco, Calif. 1974. ix + 493 pp. \$14.95.

Professor Wall opens the preface to the third edition of his "Chemical Thermodynamics" with the observation that is "... not markedly different from earlier editions, since the basic goals remain unchanged." Indeed, a comparison of the tables of contents of the second (1965) and third (1974) editions reveals an almost perfect one-for-one concordance in chapter headings and pagination—with the exception of a newly inserted chapter devoted to an alternative derivation of the statistical mechanical distributions. Hence, chemists who have been using this text successfully in recent years will find in it nothing that would force them to revise a set of lectures geared to the earlier editions. This is somewhat unfortunate since the past ten years have been a significant growth period for thermodynamics, particularly in its experimental application to new areas.

Those who are unfamiliar with the previous editions and who are called upon to teach a course in chemical thermodynamics may wish to consider Wall's book as a basic text, although this reviewer feels that the textual material needs extensive supplementation. The level is appropriate to students who have had an initial exposure to physical chemistry, physics, simple calculus, and elementary probability theory, i.e., upperclass majors and entering graduate students. The book's primary appeal will be to students who have an interest and need for gaining a thorough understanding of the fundamentals of thermodynamics and statistical thermodynamics. It is less appropriate for a student whose primary aim is using thermodynamic tools, experimental and calculational, as a research aid.

Far too little space is devoted to calorimetry and thermochemistry, and essentially none to the applications of calorimetry. The material introducing the third-law is excellent, but seems to take no cognizance of the experimental results and theoretical treatments of the past forty years.

The sections devoted to the statistical thermodynamics of gases, ideal and real, serve as an excellent introduction to the field, and the new chapter presents an alternative treatment that helps to bridge the gap between mathematical probability and molecular reality. The emphasis is on obtaining exact solutions to tractable problems. This reviewer feels that some mention should be made of how the formalisms of statistical mechanics can be used to correlate entropies where a complete data base is lacking.

Claus A. Wulff, *University of Vermont*

**Chromatographic Methods.** By R. STOCK (Trent Polytechnic) and C. B. F. RICE (Liverpool Polytechnic). Wiley/Halsted, New York, N.Y. 1974. viii + 383 pp. \$15.75, cloth; \$8.95, paper.

This book provides a general introduction to the whole field of chromatography and chromatographic techniques. Although it consists of only six chapters, most of the currently used techniques and their areas of application are described. Chapter I briefly classifies chromatographic methods starting off on the right foot; i.e., in chromatography one relies on the relative movement of two phases, one mobile and one stationary. One basic classification then follows from a consideration of three phases liquid (L), solid (S), and gas (G): L-S, G-S, L-L, G-L; S-S and G-G are excluded for obvious reasons. The nature of absorption isotherms is dis-

cussed and their relation to chromatographic methods made clear. The chapter ends with a section on "Choice of Method", which, brief as it is, will be very useful for analysts. It relates the nature of the species to be separated to the most appropriate chromatographic technique.

The remaining chapters may be summarized as follows:

Chapter 2. Liquid Chromatography (LC): elution and gradient elution analysis from solid absorbents; partition LC; ion-exchange LC; gel-permeation chromatography; high performance liquid chromatography (HPLC).

Chapter 3. Paper Chromatography: zone electrophoresis; reversed phase methods; ion-exchange papers; paper electrophoresis.

Chapter 4. Gas Chromatography (GC): gas-liquid chromatography (GLC); pyrolysis GC (PGC); capillary column chromatography; gas-solid chromatography (GSC); supercritical phase chromatography.

Chapter 5. Thin layer chromatography (TLC).

Chapter 6. "Model Experiments" useful for introducing the main chromatographic techniques to the student or to the analyst with little previous experience are discussed in this chapter. Some 22 clearly described, easily performed experiments cover seven main chromatographic techniques. For example, an extremely simple and inexpensive GC apparatus is suggested made from glass tubing, using a commercial detergent as a column material, and the change in color of a hydrogen flame as a detector.

A feature of the book is a four-page bibliography of journals and books in chromatography which will be helpful to those wishing to explore the literature more intensively. The bibliography is organized by technique so that the important works in paper chromatography, for example, can easily be found. With respect to GC, this reviewer found the absence in the list of the classic texts by Keulemans and by Dal Nogare and Juvet somewhat surprising. In addition, no mention is made of programmed temperature, which is to GC what gradient elution is to LC. A listing of Harris and Habgood's text on programmed temperature GC would have made up for this deficiency somewhat.

Aside from the minor criticisms mentioned above, this book is recommended for the novice who wishes a broad overview of the theory and practice of chromatography. The book is suitable for use at the undergraduate level for a one- to two-semester course dealing with the broad subject of chromatography. While it would have to be supplemented with other materials, it would serve as a good basic text in this field.

Irving G. Young, *Honeywell Power Sources Center*

**Affinity Chromatography.** By C. R. LOWE and P. D. G. DEAN (Liverpool University). John Wiley & Sons, New York, N.Y. 1974. v + 272 pp. \$16.95.

This book is a well-done comprehensive treatment of the principles of affinity chromatography as applied to biological systems. It covers not only the aspects of applications of affinity chromatography in molecular biology and biochemical research, but also it deals with the detailed chemistry and methodology involved in the preparation of affinity matrices. This is very desirable, and it is probably the best book in print on the subject of affinity chromatography.

The bibliography is extensive and essentially complete through mid-1973 (note, 1974 publication date). The authors use a large number of examples of separations from well-selected literature references, and the captions for each figure are so complete that one seldom needs to refer to the text for explanation. A wide range of examples are used covering applications to the purification of simple enzymes, studies of enzyme mechanisms, isolation of specific receptor sites in cells, and investigation of complex multienzyme systems. The authors have fully developed the concept of matrix-ligand-macromolecule systems—their interactions and the various specific and nonspecific factors influencing those interactions.

The book has some shortcomings. The style of cross-references may be disturbing to some readers. It would have been better if the authors used cross-references by page number instead of by chapter and section. Occasionally cross-reference errors have occurred in the book. No titles of papers have been given in the list of bibliography. Because one of the aims of this book is to serve as a guide to the literature, a traditional bibliographic format would have been much more informative. Also it would have been more useful

to research biochemists if there were a table at the end of the book which summarized systems separated, matrix, ligand, macromolecule separation conditions, and special comments. Also this book does not consider an outline of group separation. Of course, it is possible that not enough information on this subject is yet available. However the strengths of this book far exceed its shortcomings. It is a worthwhile investment.

Salil K. Das, *Meharry Medical College*

**Functional Monomers. Volume II.** By RONALD H. YOCUM and EDWIN B. NYQUIST (Dow Chemical Co.). Marcel Dekker, Inc., New York, N.Y. 1974. x + 818 pp. \$46.50.

This volume is divided into three sections: Reactive Heterocyclic Monomers by Donald A. Tomalia, Dow Chemical Co.; Acidic Monomers and Basic Monomers: Vinyl Pyridines and Aminoalkyl Acrylates and Methacrylates by Leo S. Luskin, Rohm and Haas Co.

The chapter on Reactive Heterocyclic Monomers is divided into three-, five-, and six-membered heterocyclic monomers "that contain N, O, or S heteroatoms and are polymerizable by a free-radical mechanism". It is well written, informative, and contains an accumulative structural index and 1369 references. The author quickly gets into reactions and applications.

The section on acidic monomers deals with maleic anhydride and maleic acid, fumaric acid, itaconic acid and crotonic acid. Although it is well researched and written, the author tends to dwell upon monomer manufacture. The absence of acrylic acid and methacrylic acid is disturbing, even though their copolymers are discussed.

In the chapter on basic monomers, the sections on monomer preparation and applications are well written. There is a useful referenced accumulative structural index of basic monomers not discussed in the chapter. The chapter is followed by many references.

As a whole the book is a good complement to Volume I, and to both the academic and industrial researcher provides many pathways to innovation.

Kenneth Abate, *Celanese Coatings & Specialties Company*

**Functional Chemistry of the Brain.** By ADRIAN J. DUNN and STEPHEN C. BRODY (University of Florida and University of Colorado). Wiley/Halsted, New York, N.Y. 1974. xiv + 272 pp. \$14.95.

The book should provide a very useful and firm introduction to brain biochemistry. The first chapter provides a concise but adequate review of brain anatomy and function. This is followed by up-to-date reviews of the major areas of importance to brain biochemistry and excellent discussions of neurotransmitters and brain function. Exceptions are the lack of information in the area of brain sterols and a few statements that seem incorrect. For example, it is very unlikely that "ATP cannot be transported across the mitochondrial membrane". The chapters are lucid, well written, and pertinent to the topics being discussed and are easy to read.

The authors have dealt with controversial topics such as the biochemistry of learning in a factual and objective manner. For example, they recognize the importance of investigations in such areas and describe the various research approaches and types of data that have been obtained. They also indicate the limitations of various types of investigations and indicate where conclusions should be tempered; this is done without being overly critical.

The book contains a good glossary of terms and a very useful documentation of various drugs and their modes of action in the brain. The text should be valuable to anyone entering the neuroscience area, especially graduate students and medical students. It certainly could be used as a textbook for an introductory course relating to brain biochemistry.

L. L. Bieber, *Michigan State University*

**Applications of Liquid Scintillation Counting.** By DONALD L. HORROCKS (Beckman Instruments, Inc.). Academic Press, New York, N.Y. 1974. xiii + 346 pp. \$29.50.

This book contains an excellent description of the technique of liquid scintillation counting, combining a general review of the basic principles with a description of the many and varied applications. It represents the first such complete reference book on this subject in ten years aside from collections of symposia reports. It is well produced with a normal number of typographical errors and contains reasonably clear figures and relevant tables of data. In



many respects it is a very pragmatically oriented compilation designed for a user of the technique. In general, the text assumes some knowledge of the general field of nuclear and radiochemistry, but it could be quite useful both at the upper level in most undergraduate programs as well as in a program for technicians. The level of the mathematics presented is understandable for readers with only a minimum preparation. Furthermore, each chapter contains an excellent list of references pertinent to the material covered for greater in-depth explanations of specific topics.

The organization of the subject matter in the 28 chapters is logical and straightforward. The first two chapters cover the history of this technique and a general explanation of the basic processes involved. Chapters III and IV discuss in greater detail different components of a system while Chapter V explores applications to different types of radiation. The remaining 13 chapters discuss in detail various aspects of the technique including sample preparations, counting vials, background effects, chemiluminescence, Cerenkov counting, etc. The concluding chapter addresses the important subject of statistical considerations in reasonably complete fashion as applied to liquid scintillation counting.

In summary, this text can be recommended to scientists of all disciplines who are interested in utilizing this invaluable technique.

John M. D'Auria, *Simon Fraser University*

**Colorimetric and Fluorimetric Analysis of Organic Compounds and Drugs.** By M. PESEZ and J. BARTOS (Roussel-UCLAF, Romainville, France). Marcel Dekker, Inc., New York, N.Y. 1974. xiv + 672 pp. \$39.50.

This book is the first volume of a series on Clinical and Biochemical Analysis edited by M. K. Schwartz of Memorial Sloan-Kettering Cancer Center. It is intended to provide a compilation of laboratory tested procedures for use in these areas. The main section is divided into fourteen chapters, according to functional group. Each chapter begins with a discussion of the colorimetric and fluorimetric methods presented, proceeds to general methods for analysis of that functional group followed by specific procedures for compounds containing that functional group. In all, some 300 procedures are presented, of which about one-third are fluorimetric. Each procedure has been tested in the authors' laboratory, and modifications of some were made. In addition, some of the procedures listed are the product of work in the authors' lab which have not been previously presented.

Since the purpose of the book is to provide a compilation of procedures, the first chapter, a superficial introduction to colorimetry and fluorometry, is unnecessary. A chapter entitled "Additional Practical Hints", which appears to be a literature review, could also have been deleted. The book can be helpful to those with a specific analyte in mind who are looking for a tested procedure for analysis.

Richard Delumyea, *University of Michigan*

**Guide to Fluorescence Literature. Volume 3.** By R. A. PASSWATER (American Instrument Co.). IFI Plenum Data Co., New York, N.Y. 1974. ix + 358 pp. \$29.50.

This volume surveys the literature from 1968 to late 1972 and contains over 5000 references. The Guide has been reorganized and now contains fourteen sections (Volume 2 had five). This has significantly simplified use of the Guide although some arbitrariness in classification of papers cannot be avoided. The first section, Chemical and Biological Analysis, contains some 980 references divided into fourteen subsections and should serve as a model for all sections of future editions of the Guide. The author's attempt to divide the section on Inorganic Analysis into "general" and "specific" procedures produced the only confusing section. In the remainder of the sections, references are arranged alphabetically by first author and all references are indexed by author and subject.

In the preface, the author indicates that the object of the Guide is to eliminate the tedium of searching the literature for references and thereby avoid duplication of research effort. This may prove to be an impossible goal, owing in part to the lag time between compilation and publication; however, the Guide should serve as an excellent starting place for researchers beginning new projects and as a valuable review of the literature for those in the field.

Richard Delumyea, *University of Michigan*

**Biochemistry.** By M. D. YUDKIN and R. E. OFFORD (University of Oxford). Houghton Mifflin Co., Boston, Mass. 1975. x + 528 pp. \$14.95.

In content, arrangement, appearance, and general tenor, this book closely resembles a number of other undergraduate college-level biochemistry textbooks that have come onto the market in the last few years, for example, Bohinski's "Modern Concepts in Biochemistry" or the Third Edition of "Outlines in Biochemistry" by Cohn and Stumpf. Perhaps this book, a version of which has been published in Great Britain under the title "Comprehensible Biochemistry", views its subject from a slightly more chemical, rather than biological, perspective than is usual. It does seem to presuppose a slightly better familiarity and facility with physical chemical principles than I have found common in the students I have taught.

The authors succeed in unifying the chapters by presenting carefully and closely reasoned arguments to reach conceptual generalizations; the "facts" to be learned are incorporated as illustrative detail. Some students new to the field may find the subtlety of the argument obscures or distracts from the basic material they will be expected to master. As the authors explicitly state more than once, the point of much of the discussion becomes fully clear only after the student has read material presented many pages later on. This may, however, illustrate an unfortunate characteristic of this field of science, rather than any failure of these authors.

In my opinion, illustrations and chemical formulas are not as usefully presented or integrated into the text as has been done elsewhere, and the absence of any suggested supplemental references is regrettable. Basically, however, the differences between this textbook and others in the same subject are minor. Anyone responsible for selecting or recommending a book to accompany a college-level biochemistry course should consider this book.

J. A. Gally, *Meharry Medical College*

**Encyclopedia of Electrochemistry of the Elements. Volume II.** Edited by A. J. BARD (University of Texas at Austin). Marcel Dekker, Inc., New York, N.Y. 1974. xii + 515 pp. \$60.00.

This volume apparently belongs to Part I of a planned two-part series, although only the volume number appears on and within the book. The introduction to this volume states that the series intends to "provide a critical, systematic, and comprehensive review" of inorganic electrochemistry (Part I) and of organic electrochemistry (Part II). It further states that the series is designed to "provide the natural starting point for new electrochemical investigations and to suggest areas where further research is needed." The series employs a classification of the elements similar to that of Gmelin. An "organizational chart" at the front of each volume lists the elements in alphabetical order and gives the number assigned to each element. Also, since chapters are being published in the order received from authors, volume and chapter number for each element will be given in the chart. This means that only the final one or two volumes will contain a complete organizational chart. Presumably, each chapter of each volume will follow the same general outline, consisting of five major sections: (1) standard potentials, (2) voltammetric characteristics, (3) kinetic parameters and double-layer properties, (4) electrochemical studies (a survey and critical review of electrochemical reactions of the element and its compounds), and (5) applied electrochemistry.

Volume II treats eight elements in six chapters: B, As, Nb and Ta, Re and Tc, O, and Cu. Chapter lengths vary from 17 pp for boron to 160 pp for oxygen. Literature citations vary in number from 70 for boron to 1118 for oxygen. The latest literature references are 1972 for two chapters, 1971 for three chapters, and 1970 for one chapter. Each chapter follows the general outline given above.

It is not possible to comment on the value of a single volume of a series of this type. Concerning the series, it appears that some of the material in each volume should be of rather general interest, e.g., compilations of electrode potentials, but that a considerable portion would not. When completed, the series should be a valuable addition to libraries that serve researchers in electrochemistry. However, the series is not recommended as a general library acquisition, particularly for smaller libraries.

E. Lyndol Harris, *McMurry College*

**Structure and Bonding, Volume 18.** Edited by J. D. DUNITZ (Zürich). Springer-Verlag, New York, N.Y., 1974. 216 pp. \$27.90.

The topic of this volume of "Structure and Bonding" is Large Molecules. The chapter titles and their authors are: "Redox Behavior of Metalloporphyrins" by J. H. Fuhrhop; "Optical Activity of Conjugated Proteins" by G. Blauer; "Heteropolymolybdates and Heteropolytungstates" by T. J. R. Weakley; and "Hydrogen Bonding in Solids" by A. Novak.

The first review deals mainly with the spectral characterization and electrochemical potentials of reversible metalloporphyrin redox reactions and reports little in the area of biochemical reactions. Although the majority of the tables and figures are taken from the author's own research, the review is well written and contains an extensive coverage of the recent spectral and electrochemical literature on metalloporphyrins. The main problem with the review is that the author has chosen to delete most experimental details and thus the tables of redox potentials and spectral data contain no information on solvent or supporting electrolyte, nor in some cases is it even evident whether the solvent is aqueous or non-aqueous. This omission is unfortunate since both the reversibility and redox potentials of porphyrins as well as their spectra are intimately dependent on solution conditions, and an absolute comparison of data between different techniques and different laboratories becomes difficult without returning to the original literature.

The second chapter on optical activity of conjugated proteins contains a survey of recent relevant chemical systems investigated by ORD and CD. The reviewer does not aim for a comprehensive treatment of all published work on optical activity of conjugated proteins but rather evaluates recent structural information obtained by ORD and CD techniques which is not included in other pertinent reviews. The bibliography contains 393 references with the majority running from 1969 to 1973.

In the third chapter the aspects of heteropolymolybdates and heteropolytungstates are surveyed in terms of the structural chemistry and electronic properties of these metal complexes. Studies of kinetics, equilibria, and physicochemical properties in solution are not included in this review. The literature contains 237 references and covers the available literature to July 1973.

The fourth chapter is taken from a plenary lecture presented at the First European Crystallographic Meeting in Bordeaux, September 1973. The article attempts to correlate spectroscopic data such as stretching and bending frequencies with hydrogen bond lengths, the latter mostly obtained from crystal structure studies. A reasonable correlation is shown to exist in most instances. The references include papers published as recently as 1973.

The high price of the book indicates that the book is designed as a source of reference. However, because the chapters cover such different scientific disciplines, very few readers will find all four chapters equally of interest. There is neither a subject index nor an index to the authors whose work is being discussed. A cumulative title index of Volumes 1-18 is included at the back of the book.

Karl M. Kadish, *California State University—Fullerton*

**Molecules and Radiation: An Introduction to Modern Molecular Spectroscopy.** By J. I. STEINFELD (Massachusetts Institute of Technology). Harper and Row, New York, N.Y. 1974. xiv + 348 pp. \$25.00.

The role of spectroscopy in chemistry is shifting away from the determination of structural parameters by tabulation and assignment of spectral lines toward studies of the dynamics of the interaction of radiation with molecules. Examples of this trend include the current research activity in photofragmentation spectroscopy, optical level-crossing spectroscopy, and multiphoton spectroscopy. It is the object of this graduate-level textbook to provide a background of basic spectroscopic principles adequate for understanding much of both traditional and contemporary spectroscopy. Because of his unusually lucid explanations, the author has succeeded admirably in his stated objective of providing such a background without making the text so geared to current research trends that it would quickly become outdated. The selection of problems at the end of each chapter is excellent, as is the selection of references both to monographs and to the primary research literature. The level of presentation assumes as a prerequisite a rigorous undergraduate physical chemistry course. Interestingly, the most difficult chapter for many students may be the first, which is a review of quantum mechanical results including time-dependent

perturbation theory and its applications to the interaction of radiation and matter. Aside from this first chapter the text appears to be excellently suited not only for class use but also for self-instruction. Indeed its outstanding suitability for the latter is perhaps its greatest strength. It is strongly recommended that this book be examined by anyone interested in either teaching or learning about spectroscopy from a contemporary point of view.

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

**Sulfur Ylides, Emerging Synthetic Intermediates.** By BARRY M. TROST and LAWRENCE S. MELVIN, JR. (University of Wisconsin). Academic Press, Inc., New York, N.Y. 1975. x + 344 pp. \$39.50.

Volume 31 of a series of monographs in organic chemistry deals with the rapidly developing area of sulfur ylides in synthesis. It has been nine years and 24 volumes of this series ago since A. W. Johnson reviewed the subject of all classes of ylides. The authors have brought together in this monograph most of the synthetically useful topics concerning the sulfonium, sulfoxonium, and aminosulfoxonium ylides.

The book is essentially divided in half, in that 156 pages are devoted to descriptive information and references, and another 163 pages include a tabular survey of ylides and ylide reactions. The book essentially covers the literature of this field to 1974.

The first half of the monograph systematically describes the synthesis and structures of sulfur ylides. It discusses the typical alkylidene transfer reactions, carbonyl additions, and conjugate addition reactions from both a mechanistic and synthetic standpoint. Also included is a chapter on the more recent sigmatropic rearrangements of sulfur ylides and their use in synthesis. An interesting and useful addition to this book is a short chapter on related synthetic methods, which allows the reader to place the subject of ylide chemistry in perspective when considering alternative synthetic approaches. Finally, in the first half of the book is a very useful chapter on typical experimental conditions for selected stabilized and nonstabilized sulfur ylides. The authors have incorporated into this volume a great deal of experimental experience and suggestions.

The tabular survey of sulfur ylides which comprises the appendix of this book clearly presents an exhaustive compilation of types and reactions of the most common sulfur ylides. The tables typically contain information on reaction conditions, products, yields, and references. The whole book is virtually free of errors in typography and in structural formulas.

This monograph should be a welcomed addition to the synthetic chemist's library. Unfortunately, the book is priced out of range for most graduate students. Despite the price, I recommend the monograph not only as a timely and needed update of sulfur ylides but as an instructive text for learning new synthetic methodology.

J. P. Marino, *University of Michigan*

**The Theory of Rate Processes in Biology and Medicine.** By FRANK H. JOHNSON (Princeton), HENRY EYRING (University of Utah), and BETSY JONES STOVER (University of Utah and University of North Carolina). John Wiley and Sons, New York, N.Y. 1974. xi + 703 pp. \$27.50.

Ambitious in scope, this book is intended for an audience of chemists, biologists, and physicians interested in theoretical aspects of rate processes in living systems. The first half of the introductory chapter is a concise presentation of the theory of absolute reaction rates. Yet, within the scant twenty-five pages allotted, it can provide the uninitiated reader with only a nodding acquaintance with the topics it addresses, which range from potential surfaces to partition functions. The chapter continues by discussing applications to biological processes within the context of absolute rate theory. The authors delve into the elastomeric-rack hypothesis of enzyme catalysis and devote the final ten pages, somewhat inappropriately for a general introduction, to olfaction.

The remainder of the book interprets, a chapter at a time, biological data from the point of view adopted. Luminescence, temperature and pressure effects, inhibition, and irradiation and mutation are taken up sequentially. Results are stated generally without mathematical derivations. Care has been taken to define all symbols used, and little is demanded mathematically of the reader beyond simple algebra.



Instructors will find these chapters a rich source of examples, fascinating, if dated. Indeed, a serious shortcoming of this book is that the citations are painfully out of date. Even a cursory examination of the bibliography will show only a small fraction of the references to be more recent than 1970. The majority of the pre-1954 references and examples are to be found in "The Kinetic Basis of Molecular Biology", by F. H. Johnson, Henry Eyring, and M. J. Polissar, John Wiley & Sons, 1954.

The present book is more a revision of the older book than its sequel. The reader will look in vain for the inclusion of new topics such as photosynthesis or vision. The most notable addition to the newer book is the final chapter, "The Dynamics of Mammalian Life". Here, the authors discuss recent data on radiobiological effects of several radionuclides, and they present their steady-state theory of mutation rates and its application to cancer.

*Eva L. Menger, University of California—Santa Cruz*

**Growth of Crystals from the Vapour.** By MARC M. FAKTOR and IAN GARRETT (Post Office Research Department, London). Chapman and Hall, London. 1974. viii + 300 pp. \$22.75.

Heightened interest and activity in crystal growth, stimulated primarily by electronic applications, has led to a number of recent books in this area. None of these, however, has been devoted exclusively to growth from the vapor in spite of the widespread use of the technique. With publication of the present book, this deficiency has been corrected. Vapor-phase crystal growth is a multidisciplinary effort and, consequently, any book purporting to cover the activity must address a diversity of fundamentals. Faktor and Garrett have recognized this problem and have attempted to extract the relevant concepts from the various disciplines. In this respect, their efforts are commendable.

Beginning with a discussion of the principles of thermodynamics, crystallography, and phase equilibria, the authors attempt to lay a theoretical foundation upon which to build in subsequent chapters. This is followed by a chapter on nucleation theory and the surface chemistry associated with vapor-crystal interfaces. However, the processes and concepts associated with vapor transport receive the greatest attention. The relative significances of pure diffusive transport and the Stefan flow are treated in considerable detail. These concepts are well illustrated with numerical, exemplary calculations for several systems including elemental sublimation, dissociative sublimation (both with and without the presence of an inert gas), and chemical vapor transport. Although emphasis is placed on closed tube processes, extension of the concepts to open-tube, flow systems is discussed. One chapter treats the interplay of the various sequential and parallel steps leading to crystal growth. Hypothetical illustrations of gas transport and kinetic limitations reveal their expected impacts on the crystal growth rate and the spatial concentration distributions of the various chemical species during vapor growth.

Although a chapter is devoted to experimental techniques, this book is by no means a comprehensive survey of vapor phase crystal growth methods. Instead, it appears designed to familiarize the reader with an array of fundamental concepts for use in the delineation and efficient solution of problems associated with vapor growth. The book should be valuable, not only to the novice, but also to the experienced crystal grower who wishes to reinforce his understanding of the basic principles.

*Don W. Shaw, Texas Instruments Incorporated*

**Methodicum Chemicum. Volume 1. Parts A and B. Analytical Methods.** Editor-in-Chief: F. KORTE (Bonn, Germany). Academic Press, New York, N.Y. 1974. x + 1218 pp. \$98.00.

As stated by the editor in the preface to the series, "Methodicum Chemicum" is intended as a "short critical description of chemical methods applied in scientific research and practice. It is particularly aimed at chemists as well as scientists working in associated areas including medicine who make use of chemical methods to solve their interrelated problems". The entire series will consist of three parts, in a total of eleven volumes: (a) "General Part" (Volumes 1-3); (b) "Systematic Syntheses" (Volumes 4-8); (c) "Special Part" (Volumes 9-11).

The present volume represents the first in the series, deals with

analytical methods, and consists of two parts (in separate volumes): **A** (Chapters 1-8) containing purification, wet processes, and determination of structure; **B** (Chapters 9-14) containing micro-methods, biological methods, quality control, and automatization. Each chapter, and in most instances individual sections within chapters, are written by different authors, with proficiency and expertise in the area of coverage, comprising a truly international group of contributors.

The first chapter deals with "Foundations for the Critical Discussion of Analytical Methods" and presents a brief but good discussion of the "theoretical" (i.e., calibration, optimization, specificity, statistics, etc.) aspects of analytical methods. Chapter 2 covers "methods of separation" and includes such techniques as zone melting, all types of chromatography, ion exchange, electrophoresis, etc. Chapter 3 covers "determination of classes of compounds and functional groups by chemical methods", and Chapter 4 treats the "importance of chemical transformations for analytical purposes". Chapter 5 is spectroscopic and photometric methods and treats in great detail ESR, NMR, IR, NQR, CD and ORD, and Raman, neutron, microwave, Faraday effect, photoelectron and Mössbauer spectroscopy. Chapter 6 treats "fragmentation methods" and covers mass spectrometry, field ionization and special mass spectrometric methods, electronbrenzen and pyrolysis of polymers. Chapter 7 is diffraction methods and covers X-ray analysis, anomalous scattering of X-rays, neutron diffraction, methods using electron microscopy, and electron diffraction analysis. Chapter 8 handles equilibrium and kinetic methods and has sections on polarographic and voltammetric techniques, organic applications of ion resonance spectroscopy, and determination of tautomeric equilibria. Chapter 9 covers special physical methods and treats such areas as molecular weight determination, calorimetry, dipole moments, determination of surface area and porosity of solids, detection and identification of donor-acceptor complexes, etc. Chapter 10 deals with trace analysis of elements of organic materials and covers such techniques as atomic absorption, flame emission and atomic fluorescence spectroscopy, X-ray fluorescence and electron probe microanalysis, activation analysis, measurement of low radioactivity in metabolic studies, polarographic determination of trace elements, etc. Chapter 11 is methods for the determination of essential organic components and treats such topics as pesticides, pharmaceuticals, food additives and contaminants, organic compounds in water and waste water, determination of fats, oils and waxes, etc. Chapter 12 treats carbohydrates, proteins, and nucleic acids and includes sections on the separation and determination of polysaccharides, proteins, peptides and nucleic acids, peptide sequencing by GC-mass spectrometry, and others. Chapter 13 covers biochemical and biological methods and includes enzymatic analysis, toxicological and pharmacological methods, etc. Chapter 14 treats developmental trends in analytical methods and has sections on applications of combinations of instrumental methods, trends in instrumental analysis, automation of analytical methods, and trends in ultramicro elemental analysis.

On the whole each chapter and section is well written with a good discussion of the theory and principles as well as practical techniques of the procedures described. Each section has extensive references to reviews and monographs as well as to the primary literature, with references through 1971. Techniques with which this reviewer is familiar and hence can judge in detail, such as NMR, GC, etc., are treated at a level appropriate and useful for a person knowledgeable in the field as well as for scientists in general looking for guidance in an unfamiliar area.

This series clearly represents a major undertaking in the compilation and codification in one place of the methods, techniques, and practices of chemistry. It does for chemical techniques and methodology what Beilstein does for organic compounds. It serves as a quick, handy and excellent initial reference and a "place to start" for expert and novice alike in the methods of chemistry. If this initial volume is an indication of the type and quality of future volumes as well, the series will serve a very useful purpose and earn the gratitude of a broad spectrum of practicing scientists. It definitely belongs on the shelf of every scientific library and, if it were not for the cost, on individual bookshelves. It is hoped that when the series is completed, periodic supplements will appear to update useful classical methods and incorporate new techniques.

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