Book Reviews*

Experimental Organic Chemistry. By David Todd. Prentice-Hall, Inc., Englewood Cliffs, N.J. xxxv + 347 pp. $13.95.

In an introduction, the author states that he has used a large number of different organic chemistry laboratory texts over the years and as a result has developed certain prejudices about how introductory organic laboratory courses should be taught. He must have learned a lot from his wide-ranging experience with other texts because he has produced an impressive laboratory manual. I feel this manual will be deservedly popular with students. The laboratory text is appealing because of the author's choice of interesting and informative experiments, many of them new, and the informal yet enthusiastic manner in which they are written.

Even though there is an emphasis on laboratory safety all through the text, I would strongly recommend that instructors who adopt this laboratory manual also require that their students buy and read an additional safety manual, such as "Safety in Academic Chemical Laboratories", by the Committee on Chemical Safety of the American Chemical Society. It is disturbing that in three experiments, hydrazine hydrate is a starting material, but there is no cautionary note about handling this hazardous chemical. In another experiment in which 35 mg of diazomethane is generated from *N*-methyl-*p*-toluenesulfonamide, there are warnings about diazomethane, but I would want my students to know more than this textbook tells them about its inherent dangers. Benzene appears in five different experiments and, although the students are warned to take every reasonable precaution to avoid breathing benzene vapor, many instructors will wonder why the author did not have the students use a less dangerous aromatic hydrocarbon and will alter these experiments accordingly.

Another concern is the manner in which infrared spectra are presented. Most textbooks present the position of absorption in terms of a linear wavelength scale. In "Experimental Organic Chemistry" some of the infrared spectra are presented in terms of linear wavelength and some in terms of linear wavenumber. This might be all right, if the students were given an explanation, but the student is given none. Two infrared spectra are presented on page 32, one of 1-butanol and the other of *n*-butyl bromide. Not only are the spectra labeled using different systems of nomenclature, but one of them is linear in terms of wavenumber and the other is linear in terms of wavelength.

Basically, this is an excellent laboratory manual; however, instructors who use it will have to do a better job of informing their students about the hazards involved with some of the chemicals used in the experiments than this textbook does.

David H. Kenny, *Michigan Technological University*

Laboratory Engineering and Manipulations. Third Edition. Techniques of Chemistry. Volume XIII. Edited by Edmond S. Perry and Arnold Weissburger. Wiley-Interscience, New York. 1979. xi + 531 pp. $40.00.

The rubric "engineering" can be made to encompass a lot of topics, as can "manipulations". Happily, chemists can read this updating of "Laboratory Engineering and Manipulations" in total comfort, because the "manipulations" are those with which most of us have already had some experience, and the "engineering" is all quite understandable. The several different chapters are by different authors, but there is a minimum of duplication of material. The chapters are:

I. Selection of Materials for the Construction of Equipment (63 pp, 104 refs). The chapter covers material properties, corrosion of metals, nonmetals, and evaluation of chemical resistance. The tone is more toward industrial-scale chemistry than small-scale usage. Element 41 is identified as "columbium", an antique term at worst.

II. Laboratory Heat Transfer (48 pp, 9 ref, plus a reading list). After an introduction to the principles of heat transfer, which covers some very necessary background formulas and definitions, we encounter temperature measurement and control, means of heating, methods of cooling, insulation, and miscellaneous considerations. The reference list leans heavily toward industrial applications, but the chapter's contents can easily be applied to small-scale work.

III. Grinding, Blending, Screening, and Classifying (57 pp, 33 refs). The four title topics are covered in order, with necessary mathematical niceties. The emphasis is industrial.

IV. Pumps and Flow Measurements (37 pp, 17 refs, plus a reading list). Separate sections on pumping and flow measurement are followed by a brief discussion of practical applications. This chapter is especially well illustrated. Figures 4.11 and 4.12 are interchanged by mistake.

V. Glove Box Techniques (95 pp, 447 refs). We find here sections on glove boxes and auxiliary equipment, fire and explosion control, building design, toxic materials, and nontoxic materials. The emphasis is heavily toward the safe handling of radioactive substances in controlled atmospheres, but the procedures can be applied, as appropriate, to ordinary laboratory work.

VI. Mixing (42 pp, 9 refs). There are twelve sections, with such topics as principles, cutting, chopping, grinding, scale-ups, scale-downs, power consumption, equipment, materials, and examples. Much is made in the volume's introduction of the fact that a chapter on "operations with gases" has been deleted in this new edition, and that the material is found in the new Chapter VII. I think that "Mixing" should be mixed into Chapter III in the next edition. The current coverage is mixed between large and small-scale.

VII. Vacuum Technique (57 pp, 12 refs, plus a reading list). Sections include an introduction, theory, elements of the system, design and construction, applications, ultrahigh vacuum, leak detection, and operation and maintenance. I use high vacuum to transfer and measure out gaseous or volatile reactants—no such monkeyshines here. Reading the chapter taught me a lot about the fine points, but if I were asked to move labeled water from flask A to flask B, using what the chapter taught me in the way of manipulations, I'd be sore tempted to use a bucket! Sanderson's "Vacuum Manipulation of Volatile Compounds", and Part I of Shriver's "The Manipulation of Air-Sensitive Compounds" remain as required reading in this area, and are not found as references in Chapter VII.

VIII. Solvent Removal, Evaporation, and Drying (70 pp, 43 refs). There are sections here on phase equilibria, heat and mass transfer, and methods of solvent removal. This is by far the most mathematical of all the chapters, the vast number of equations being applicable in large- or small-scale settings. The author even includes, in textbook style, worked-out problems as examples.

Any mistakes in this book are oversights and not intended to deceive. There are occasional lapses into jargon, and even into farenheit temperatures, perhaps to remind us that other people can be specialists too. This volume should be part of any chemistry/chemical engineering library and could profitably be found in many personal collections. With it, you have access to the considerations that underlie wise choice of equipment and techniques—you can really probe the region beyond the lurid enticements that equipment salesmen can so glibly make.

Robert M. Kren, *University of Michigan—Flint*

Annual Review of Biophysics and Bioengineering. Volume 8. Edited by L. J. Mullins. Annual Reviews, Inc., Palo Alto, Calif. 1979. vii + 436 pp. $17.00.

This volume includes 15 reviews (with literature references through 1978) in the general field of biophysics. An enormous range of topics is covered, including reports on neutral prostheses, electrical activity in cell membranes, and high resolution electron microscopy. Of particular interest to chemists in general will be Burt et al.'s discussion of ^{31}P NMR as an in vivo probe to biochemical activity, Jennrich and Ralston's review of procedures for fitting data to nonlinear equations (with sample computer programs), Woodward and Hilton's treatment of hydrogen exchange kinetics in proteins, and Careri et al.'s examination of evidence that thermal fluctuations in protein conformation are important in enzymatic catalysis. A unified author index for all of the reviews increases the utility of the volume.

George D. J. Phillies, *The University of Michigan*

Techniques and Experiments for Organic Chemistry. Third Edition. By Addison Ault. Allyn and Bacon, Inc., Boston. 1979. xiv + 442 pp. $15.95.

This latest edition of a widely used organic chemistry laboratory manual, which first appeared in 1973, retains the organization and all of the experiments of the previous edition. At least eight new experiments have been added.

The students who will use this laboratory manual deserve a better updating than this third edition provides. For example, one of the new experiments is the preparation of triphenylcarbinol (sic). It is unfortunate that the outdated carbinol system of nomenclature is being perpetuated by a leading organic chemistry laboratory manual. The nomenclature of other compounds is also not up to date. Simple symmetrical ethers are named omitting the prefix *di*.

A problem on page 83 of this text asks, "Using extraction procedures only, how would you separate a mixture of naphthalene, benzoic acid and

*Unsigned book reviews are by the Book Review Editor.

α-naphthylamine?" I hope no student subsequently attempts this extraction. In a preliminary section, however, α-naphthylamine was identified as a carcinogen.

The success of previous editions of this text in the marketplace indicates that they must have had many good points; however, I would not recommend the adoption of this third edition unless an additional safety manual was required and the instructor was willing to substitute less hazardous chemicals for more hazardous ones. Benzene, for example, is used in at least five experiments.

David H. Kenny, *Michigan Technological University*

Liquid Crystals and Biological Structures. By G. H. Brown and J. J. Wolken. Academic Press, New York. 1979. xi + 187 pp. $19.00.

Liquid crystals are neither liquids nor crystals. They possess unique chemical and physical properties that make them of special interest both as objects of basic research and in practical applications. This book attempts to describe some of the relationships between liquid crystals and biological structures.

The book begins with a few very short chapters that review the structure and behavior of liquid crystals. The level of the material presented in these chapters is elementary, but the authors have used terminology and nomenclature that would be familiar only to persons already acquainted with liquid crystals.

Biologically important substances and liquid crystal behavior are discussed beginning with Chapter Five. The approach of the authors has been to identify some of the biological structures that exhibit liquid crystal properties, to discuss the role and importance of those structures to a living organism, and finally to discuss their liquid crystal behavior. The authors generally do not directly discuss the question of how the liquid crystal properties are essential to the substances' functions.

This book is recommended to those who are conversant with liquid crystal properties and are interested in a brief introduction to the display of these properties by biological structures. This book is not, and was not intended to be, a comprehensive review of the subject. It contains a short list of general references. The few cited references serve to introduce the reader to the available literature on the subject; they do not provide a comprehensive bibliography.

Richard D. Olmsted, *Augsburg College*

Electron Spin Resonance. Volume 5. Senior Reporter: P. B. Ayscough. The Chemical Society, London. 1979. xiii + 378 pp. $77.00.

This book, like previous volumes in this series, contains reviews on a wide variety of topics with individual chapters written by experts in each field. This volume covers the literature from December 1976 to May 1978.

The chapter titles in Volume 5 include CIDNP (covered for the first time); Theoretical Aspects of ESR, ENDOR and ELDOR; Triplets and Biradicals; Transition Metal Ions; Inorganic and Organo-metallic Radicals; Structure of Organic Radicals; Kinetics and Mechanisms of Organic Radical Reactions; Radicals in Solids; Spin Label Studies; and Biological and Medical Studies.

Books of this sort are extremely useful as compendia of references but should not be mistaken for textbooks. Although there is an author index, there is no subject index and it is difficult to find topics that are covered in different chapters by different authors. For example, spin trapping occurs throughout the book under various headings, with no cross references.

This volume makes interesting reading for an expert in the field, since its complete literature coverage brings references together from a variety of sources. Reading the book is virtually certain to produce research ideas. Therefore, this continuing series rates an "essential for the professional" and a commendation for a job well done.

William A. Pryor, *Louisiana State University*

Chemical Reactor Analysis and Design. By G. F. Froment and K. B. Bischoff. John Wiley & Sons, Inc., New York. 1979. xxxix + 765 pp. $29.95.

Froment and Bischoff take a design-oriented approach to their subject. (The word "Synthesis", rather than "Analysis", would be more descriptive of the contents.) They start at the "point" or micro-level with chemical kinetics and add on mass- and heat-transport considerations, building toward integrated input/output relations for reasonably realistic models of reaction systems. The idealizations of plug flow and perfectly mixed flow reactors (the authors eschew the usual CSTR notation) are carried to their ultimate in terms of productivity and selectivity enhancement in various reaction settings. Then our imperfect realizations of the "one-dimensional" reactor types are pointed out, and we are led into the real world of tubular reactors with radial gradients, multi-phase systems where fluid mechanics can be only roughly modeled, and staged, heat-integrated, large-scale industrial reactors. One can only hope the neophyte reaction engineer does not quail before the awesome intricacies described in the TVA ammonia synthesis example!

This book has good typography and a clear Table of Notation right up front. It brings special strengths in its treatments of sequential model discrimination, the sorting out of reasonable representations of heterogeneous catalytic kinetics, and the modeling of coking and noncatalytic gas–solid reactions. It offers minimal but adequate coverage of polymerization kinetics and reactor options, a feature lacking in most earlier texts. It backs up the usual speculative passages on CSTR instability with Bush's fine published example of a *real* case.

I find two weaknesses in the book. One is the filling of page after page with "blackboard"-type derivations. Their sheer spread detracts from emphasis of the well-drawn judgments that should emerge. For example, the conclusion that the primitive (and mathematically simpler) film theory will suffice in almost all cases of absorption with reaction becomes lost amid the stream of penetration-theory derivations. Likewise, the (admittedly elegant) van Welsenaere and Froment treatment of sensitivity to thermal runaway (pp 483–92) fails to convey a real understanding of this important problem; fortunately, a later example on xylene oxidation (pp 539–46) does the job.

The second weakness is that the authors, in repeating so many examples from their numerous prior publications, occasionally give contradictory messages. For example, portraying (incorrectly) 7- or 9-equation sets of "pseudo"-molecular reactions as the state of the art in tubular reactor design for ethane and propane pyrolysis completely vitiates the early groundwork laid (pp 35–38) for a proper free-radical formulation.

This text can be recommended for use in reactor design courses where the instructor desires to emphasize detailed design numerics and the ability to derive independently the differential and algebraic relations appropriate to a particular situation. For those who prefer more emphasis on chemistry and pithier derivations, Carberry's text will still be the first choice.

David I. Saletan, *Shell Development Company*

The Chemistry of Nonaqueous Solvents. Volume VA. Edited by J. J. Lagowski. Academic Press, New York. 1979. xvii + 297 pp. $31.00.

The set of volumes projected in 1965 reaches completion with Volume V, which is being published in two parts: VA, Principles and Basic Solvents; VB, Acidic and Aprotic Solvents. The book reviewed here, VA, has six chapters contributed by eleven authors.

The four chapters that may be assigned to "principles" are: Solvation and Complex Formation in Protic and Aprotic Solvents (S. Ahrland); Solvent Basicity (R. L. Benoit and C. Louis); Nonaqueous Solvents in Organic Electroanalytical Chemistry (P. Zuman and S. Wawzonek), and Ion-selective Electrodes in Nonaqueous Solvents (E. Pungor and K. Tóth). These review the subjects from both descriptive and mathematical standpoints and have bibliographies of over 100 references each. The other two chapters treat pyridine, (J. M. Nigretto and M. Jozefowicz) and hydrazine (D. Bauer and P. Gaillochet), respectively, in a comprehensive fashion, starting with preparation/purification and properties. There is much useful information in tables as well as the text, and both author and subject indexes are included.

Advances in Heterocyclic Chemistry. Volume 25. Edited by A. R. Katritzky and A. J. Boulton. Academic Press, New York. 1980. ix + 397 pp. $41.00.

The successful pattern of some new subjects and some chapters bringing older subjects up to date is continued in this volume. Ten contributors, including one of the editors, have contributed six chapters, three of which extend chapters of early volumes in this series: Isoxazole Chemistry Since 1963 (B. J. Wakefield and D. J. Wright); Heterocyclic Pseudobases (J. W. Bunting), and The Literature of Heterocyclic Chemistry, Part II (A. R. Katritzky and P. M. Jones). The last is a list of monographs and reviews classified according to the type of heterocyclic ring discussed. It covers the literature published since 1965 and is a most useful contribution. Its value could be further increased if the actual titles of the reviews were given, rather than the bare reference details, even though that would require more space.

A subject new to this series is 4-Thiazolidinones (G. R. Newkome and A. Nayak). It carries on from the review by F. C. Brown published in *Chemical Reviews* in 1962. In the seemingly short time since then, several thousand papers dealing with this class of compound have appeared owing to its physiological activity, but because of the enormity of the material, "only the important literature highlights" are reviewed in this volume (nevertheless, there are 192 citations).

Heteroaromatic Radicals, Part I: General Properties; Radicals with Group V Ring Heteroatoms (P. Hanson) is the first half of an extensive treatment of this previously unreviewed subject. Ring Synthesis of Heteroaromatic Nitro Compounds (S. Rajappa and M. D. Nair), another new subject, is devoted to synthetic procedures by which heteroaromatic

nitro compounds are constructed from noncyclic starting materials in which the nitro group is already in place.

Chemistry Reviews (Soviet Scientific Reviews. Section B). Volume 1. Edited by M. E. Vol'pin. Harwood Academic Publishers, P.O. Box 786, Cooper Station, New York. 1979. ix + 277 pp. $46.00.

This new series has been started in order "to make accounts of recent scientific advances in the USSR more readily and rapidly accessible to scientists who do not read Russian". The reviews are stated to have been writted in Russian, and to have been translated rapidly (and anonymously), with no opportunity for even the editor to see the result or to read proofs. Considering the dangers inherent in such a procedure, the text reads remarkably well and does not generally betray its hasty birth.

There are four reviews in this volume: Effect of Magnetic Field on Radical Reactions in Solution (Molin, Sagdeev, and Salikhov); Molecular Basis for Heterogeneous Catalysis by Acids Through the Participation of Brönsted Centers (V. Kazanskii); New Developments in the Reaction Mechanisms of Organometallic Compounds (I. P. Beletskaya), and General Principles of Enzymatic Catalysis (Berezin, Klysov, and Martinek). References appear to run through 1977, and the bibliographies, while appropriately heavy on Soviet publications, are internationally comprehensive. There is no index and the table of contents is too brief to be a substitute. These volumes are planned to appear annually, and they are clearly an improvement in international communication of new scientific developments.

Introduction to Chemical Nomenclature. Fifth Edition. By R. S. Cahn and O. C. Dermer. Butterworths Inc., Woburn, Mass. 1979. 200 pp. $27.50.

It has been only four years since the previous edition of this useful work, but expansion of published nomenclature recommendations by IUPAC and changes in *Chemical Abstracts* indexing practices justify this revision. More extended treatment appears in connection with stereochemistry, natural products, and organometallic compounds. Few readers will be unaware of the drastic changes adopted in CAS indexes and will be glad to see them explained here.

This is a book that elucidates nomenclature in a good-humored way, and the authors do not attempt to dictate. They point out that IUPAC nomenclature recommendations are frequently permissive, offering alternatives to suit different needs, whereas CAS practice is based on single-minded concentration on the problems of indexing, as contrasted to the needs of verbal and discursive communication. Both have their place, and both are fairly and clearly treated. This book is a valuable complement to the recently published "Nomenclautre of Organic Chemistry", Sections A, B, C, D, E, F, and H, produced by IUPAC, and, as its title implies, covers inorganic nomenclature as well. There is an appendix listing important recent changes by IUPAC and CAS, and a good subject index.

Compendium of Phase-Transfer Reactions and Related Synthetic Methods. By Walter E. Keller. Fluka A.G., Buchs, Switzerland. 1979. Distributed in U.S.A. by Tridom Chemical, Inc. 255 Oser Ave., Hauppage, N.Y. 11787. xxv + 165 pp. $12.00.

This book is a tabular compendium, except for 15 pages of introductory text, which includes a preface by Professor M. Makosza of Warsaw and a short chapter on Reactions of Quaternary Ammonium Salts in a Homogeneous Phase of Non-aqueous Solvents by Professor G. Simchen of Stuttgart. The table is organized by type of product (acetals, cyclic ethers, etc.) and gives the specific reactions, the catalyst, base, and solvent used, the yield, and the reference. There are no less than 691 citations, plus a page of literature reviews. As a loose insert, there is a chart giving the solubilities of eight quaternary ammonium salts in 32 different solvents at three temperatures, along with physical properties of the solvents, including dielectric constant. This is an obviously useful book and its paper binding may not be able to withstand the constant thumbing that it is likely to receive.

(Heilbron's) Dictionary of Organic Compounds. Fourth Edition. Fifteenth and Cumulative Supplement. Edited by J. B. Thomson. Oxford University Press, New York. 1979. 1058 pp. $198.00.

With this volume, the Fourth Edition of this standard work of reference is completed. New material published "in and before 1978" has been integrated with that which was published in the eleventh through the fourteenth annual supplements, producing a more efficiently usable resource. For those who require the information, however, the new entries are designated by a symbol (‡). There is a formula index for all new compounds to supplement the alphabetic arrangement of compounds by name. The familiar format has been retained, giving structural formula, physical properties, natural source if any, and key references. However, a compound does not have to be of known structure to be listed, and there are entries under such titles as "Antibiotic U-43,120". It is gratifying to see the stereochemistry of the many complex polycyclic natural compounds shown clearly.

Curiously, the books of this set do not carry the name of the originator, Sir Ian Heilbron, anywhere to be seen, although the publisher's letter of transmittal refers to it as "Heilbron's Dictionary...". This set continues to be an essential acquisition for chemical libraries.

Coordination Chemistry of Macrocyclic Compounds (80–21). Edited by Gordon A. Melson. Plenum Press, New York and London. 1979. XiV + 664 pp. $49.50.

The purpose of this book is to provide a single source reference for the rapidly expanding field of the coordination chemistry of macrocylic compounds. This volume has over 1900 references, although there will be some duplication since each chapter is a self-contained unit.

The book is well-organized with a general introduction followed by the synthesis of macrocyclic compounds and then discussions of physical properties and reactivity to the relationship of these compounds to natural products. The specific chapters are: 1. General Introduction; 2. Synthesis of Macrocylic Complexes; 3. Thermodynamics and Kinetics of Cation–Macrocycle Interaction; 4. Structural Aspects; 5. Ligand Field Spectra and Magnetic Properties of Synthetic Macrocyclic Complexes; 6. Chemical Reactivity in Constrained Systems; 7. Metal Complexes of Phthalocyanines; 8. Coordination Chemistry of Porphyrins; 9. Physicochemical Studies of Crown and Cryptate Complexes; and 10. Natural Product Model Systems.

This book will be of value for both scientists working in the field of macrocyclic chemistry and for those interested in learning about this research. Some of the areas of macrocyclic compound chemistry are growing rapidly so that some of this book does not reflect the current state of knowledge. Regardless, for many scientists this book is an excellent place to begin study of a fascinating area of coordination chemistry.

Ronald O. Ragsdale, *University of Utah*

Principles of Thermodynamics. By J. A. Beattie and I. Oppenheim. (Volume 2 in the series Studies In Modern Thermodynamics.) Elsevier Scientific Publishing Co., Amsterdam and New York. 1979. viii + 328 pp. $47.50.

The authors describe the main purpose of their book as a presentation of "a rigorous and logical discussion of the fundamentals of classical thermodynamics" including a thorough discussion of the Gibbs criteria for equilibrium and stability. The book is "directed primarily to research workers and teachers ...[it]... is also suitable as a text for advanced courses in thermodynamics. With the addition of supplementary material it will also be of value in elementary courses for students intending to study thermodynamics at a higher level." The book does not have any end-of-chapter problems. The explicit treatment of work terms is restricted for the most part to systems involving only expansion work. Activity and equilibrium constants are not discussed explicitly. Although partial molar quantities are discussed (14 pp), not much space is given to solution thermodynamics. There are few applications to treatment of real data; the emphasis throughout is on the principles.

The authors' exposition of the principles is superb. In addition the book is very clearly and crisply written. The authors have indeed presented a rigorous and logical discussion of the fundamentals of thermodynamics, and they have done so while simultaneously giving the reader a good description of numerous historical aspects of the development of classical thermodynamics. I enjoyed reading the book and I enthusiastically recommend it to all who enjoy thermodynamics.

Peter Rock, *University of California, Davis*

Complex Hydrides. By A. Hajos. Elsevier Scientific Publishing Co., Amsterdam and New York. 1979. 398 pp. $76.00.

This year, perhaps the chemist need not be reminded of the discoveries by H. I. Schlesinger, A. B. Burg, and H. C. Brown of diborane and lithium aluminum hydride in 1930–1940 which revolutionized the methodology of organic chemical reduction. As a result of these developments, the modern synthetic practitioner undertaking a reduction reaction must only reach for the appropriate commercially available complex metal hydride reagent which is stored on the shelf or, more prudently, in a desiccator or drybox. The diversity and range of these reagents offer convenient, efficient, and mild methods for the reductions of practically all of the organic functional groups with some degree of predictability in chemo-, stereo-, and enantioselectivity.

This constitutes the first comprehensive work on the complex metal hydrides and their use in organic synthesis since Gaylord's treatise published in 1956 and Hajos' book (in German) which appeared in 1966. Aside from being updated (literature coverage to the end of 1977), Hajos' new volume has been largely revised and reorganized. Thus the 1966

edition devotes about one-fifth of the book to preparative inorganic and analytical chemistry while the remaining two sections deal with reductions of functional groups and classes of organic compounds (e.g., alkaloids, terpenes), respectively. The current text, on the other hand, is subdivided according to metal hydride type. The result is a most useful addition to the synthetic organic literature.

The book comprises the following chapters on specific classes of hydrides: alkali metal and alkali-earth metal hydrides, borane and its derivatives, aluminum hydride and its derivatives, metal borohydrides, metal aluminum hydrides, silanes, organotin hydrides, transition metal hydrides. By far the shortest chapter (12 pp) deals with diborane. This is not a shortcoming, however, since books and compendia abound on this and the multitude of related reagents. The longest chapter (93 pp) is rightly devoted to the metal aluminum hydrides which include the important derivatives $LiAlH_4$–Lewis acid combinations, $LiAl(OR)_3H$, and Redal. (Dibal is covered under the aluminum hydrides.) Each specific hydride reagent is discussed first in terms of its physical properties, method of preparation, and commercial procurability. Very useful information on the stability and potential danger (if applicable) as well as a table of solubilities in common solvents for particular reagent are then provided. There follows a description of the interconversion of functional groups which can be achieved by this reagent. Unfortunately, typical experimental conditions are not included. Additional short chapters review the analytical procedures (5 pp), selective reductions (10 pp), and mechanistic aspects (11 pp) of the complex hydrides. In view of the increasing emphasis on achieving selective reduction of one functional group in the presence of others, the general coverage of this subject is disappointing. On the other hand, mechanistic and stereochemical aspects appear to be adequately summarized.

The subject index leads relatively rapidly to the type of functional group (main entry) which results from the application of a metal hydride (subentry) but not vice versa. A tabular survey of hydride agents according to functional group reduced, not reduced, or possibly reduced in the introductory chapter greatly facilitates any search.

This work deserves a prominent position on the laboratory shelf of the synthetic chemist for the battles of reduction which are routinely encountered in synthetic wars.

V. Snieckus, *University of Waterloo*

Optically Active Polymers. Edited by Eric Selegny. D. Reidel Publishing Co., Dordrecht, Holland. 1979. XLL + 147 pp. $71.05.

This book is the fifth and final volume in a series entitled "Charged and Reactive Polymers". Its chapters are based on presentations at an Internationational Advanced Study Institute held at Forges-les-Eaux, France, in 1975. Very few references are more recent than that date. Seven chapters (about 175 pp) deal extensively with synthesis of optically active polymers, four of which are reviews and three specific topics. Six chapters (60 pp) deal with conformational studies with special reference to circular dichroism and optical rotatory dispersion. Seven chapters (130 pp) discuss investigations of interactions between optically active polymers and small molecules and ions, with special emphasis on measurement of chiroptical properties. One chapter (46 pp) deals with synthetic optically active polymers as catalysts for asymmetric synthesis and one (7 pp) with their use in separation of enantiomers. The chapters vary widely in length and coverage, from lengthy reviews to brief communications of specialized research topics. The emphasis is heavily on synthetic polymers prepared by vinyl, ring-opening, and condensation polymerization. Polyamino acids are discussed in detail, polysaccharides and DNA almost in passing. The diversity of interest and some individual contributions are impressive and the book serves as a useful overview, but much of the material can be found elsewhere.

Conrad Schuerch, *State University of New York*

Atomic Absorption, Fluorescence and Flame Emission Spectroscopy: A Practical Approach. Second Edition. By K. C. Thompson and R. J. Reynolds. John Wiley and Sons, New York, N.Y. 1978. x + 319 pp. $39.95.

The organization, content, and general approach of this book are accurately conveyed by its subtitle. The first seven chapters (roughly 80% of the book) deal exclusively with atomic absorption (AA). Following a brief but useful discussion of general measurement principles (including clear definitions of sensitivity, detection limit, and quantitative standardization methods), there appears a 64 pp chapter entitled Characteristics of the Elements. Included in this chapter are optimum AA wavelengths, "sensitivities for 1% absorption", typical AA detection limits, optimum flames and flame conditions, interfering elements, and substances which can be added to the sample to suppress interferences for 52 elements plus the rare earths. The next longest chapter considers, in great detail, example applications of AA to real analyses in such areas as clinical, environmental, and metallurgical sciences.

Other chapters deal with present-day commercial AA instrumentation (an especially nice discussion of electrothermal atomization techniques is presented) and modified burner-nebulizer systems for specialized applications. Newer developments in instrumentation are discussed briefly (e.g., Zeeman background correction) or not at all (e.g., continuum-source AA). No appreciable consideration of "computer techniques" in AA or modern S/N enhancement techniques applied to AA is offered.

A single chapter of only 25 pp discusses flame emission (FE) and atomic fluorescence (AF). Useful comparisons of the potential advantages and actual problems associated with AF are given. The "practical" value of the brief consideration of FE is substantially less than that of the extended chapters dealing with AA methodology. The book closes with a brief chapter on Theory, which provides a useful overview but does not (and was not intended to) supplant the detailed discussions of principles which appear in comprehensive treatises on the subject.

The authors have achieved their objective of providing "a practical working guide" to AA, but rather less successfully for FE and AF. Laboratories which perform AA determinations of a variety of elements in diverse samples will wish to have copies readily available. Technical libraries should have copies. Although the book is not intended as a teaching text, certain sections (particularly those dealing with theoretical principles, conventional flame AA instrumentation, and electrothermal AA techniques) should be very useful for that purpose. The book is copiously (and, for the most part, very well) illustrated and several hundred literature citations (through 1977) are given.

E. L. Wehry, *University of Tennessee*

Solar Energy Conversion in Topics in Applied Physics. Volume 31. Edited by B. O. Seraphin. Springer-Verlag, New York and Berlin. 1979. XII + 336 pp.

This book reviews the key aspects of the materials science of solar energy conversion. The text is composed of an introduction and six chapters. The first two deal with photothermal solar energy conversion and, in particular, spectrally selective surfaces for use in these devices. The next chapter deals with photoelectrolysis with semiconductor electrodes. Finally, the last three chapters review important topics in photovoltaic devices including carrier lifetime in silicon, problems with the Cu_2S/CdS cell and heterojunction phenomena and interfacial defects. Of course, each of these topics could be the subject of an entire volume and hence they could not possibly be thoroughly reviewed in such a limited space. However, the authors discuss each topic in a reasonable manner, highlighting both the advantages and problems associated with each method.

The general philosophy behind this volume is to emphasize problem areas in the material science of solar energy devices. This has clearly been carried out in the reviews of spectrally selective surfaces and the Cu_2S/CdS cell. On the other hand, the chapter dealing with photoelectrolysis, while providing a readable review of basic principles, does not isolate the problems associated with these devices to the same extent as the previous discussions. However, the goal of this book, as stated by the editor, was to stimulate further research in the solid state aspects of solar energy conversion and in this respect it will be considered successful.

William R. Cherry, *West Virginia University*

Reactions of Free Radicals Produced from Organic Compounds in Aqueous Solution by Means of Radiation. By A. J. Swallow. Pergamon Press, Oxford. 1978. 170 pp. $25.00.

This monograph comprises numbers 3 and 4 of Volume 9 of "Progress in Reaction Kinetics", edited by K. R. Jennings and R. B. Cundall. Like previous volumes in the series, this volume seeks to provide a comprehensive survey of reaction kinetics for the nonspecialist. The topic surveyed, reactions of organic free radicals produced in water by radiolysis, is of interest to a wide range of investigators and the level of development in the chapter is appropriate for such a catholic audience. The author delineates the limitations as well as the strengths of the pulse radiolysis method and clearly outlines the qualitative and quantitative aspects of the field. Much of the relevant rate data are presented in quite accessible tabular form. Although there is no index for location of individual compounds of interest, the functional group classification of the substrates makes finding a desired compound quite easy.

This review covers the period from Oct. 1971 to Dec. 1976 and extends an earlier review of the same topic by this author. Most simple organic functional groups, as well as simple nitrogen heterocycles and carbohydrates, are considered, but macromolecular free radicals (e.g., synthetic polymers, proteins, or DNA) and radicals produced in ice are not discussed.

The volume will be useful not only to specialists, who will appreciate the comprehensive tables of kinetic data, but also to novices who wish to explore possible uses of pulse radiolysis in mechanistic studies of organic free radicals.

Marye Anne Fox, *University of Texas at Austin*