

back-bonding in these  $d^2$  oxo compounds. The molybdenum-oxo-TCNE complex, the known imido-carbonyl complexes, and most of the reported oxo-acetylene compounds are isoelectronic with 1-6 and adopt the same basic structure, presumably for the same electronic reasons.<sup>6,7,18</sup>

The ethylene, carbonyl, and isonitrile complexes exhibit moderate thermal stability, with less than 10% decomposition after 24 h at 90 °C in benzene solution in a sealed tube. The propylene and butadiene complexes, however, are substantially decomposed within 24 h at 40 °C. The decompositions of 2-4 appear to proceed via loss of the olefin ligands. The thermal stability parallels the ligand substitution reactions that interconvert 1-6: the strength of metal-ligand bonding appears to vary in the order  $\text{CH}_2=\text{CH}_2 \sim \text{CO} \sim \text{CNCMe}_3 \gg \text{CH}_2=\text{CHCH}=\text{CH}_2 > \text{PMePh}_2 \sim \text{CH}_2=\text{CHMe}$ .

This work indicates that olefins and other  $\pi$ -acid ligands can bind strongly to transition-metal oxide species if the metal is in a  $d^2$  configuration. We have not as yet observed rearrangement of an oxo-olefin complex to an oxametallacyclobutane (suggested

to occur in osmium tetroxide and chromyl chloride oxidations<sup>3</sup>) or observed formation of  $\text{CO}_2$  from the oxo-carbonyl compound. These processes may be unfavorable in this system because of the strength of the tungsten-oxygen multiple bond and the presence of  $\pi$ -back-bonding interactions. Studies are in progress to explore the reactivity of these and other high-valent olefin and carbonyl complexes.

**Acknowledgment.** This work was supported by the donors of the Petroleum Research Fund, administered by the American Chemical Society, and by the Graduate School Research Fund of the University of Washington.

**Supplementary Material Available:** Spectroscopic data for 2-6 and tables of analytical data for 2-5 and crystallographic data for 2: atomic coordinates, bond distances and angles, anisotropic temperature factors, hydrogen atom coordinates, and observed and calculated structure factors (25 pages). Ordering information is given on any current masthead page.

## Book Reviews\*

**Chemistry of Pyrotechnics: Basic Principles and Theory.** By John A. Conkling (Washington College). Marcel Dekker: New York and Basel. 1985. vi + 190 pp. \$49.75. ISBN 0-8247-7443-4.

A book of this sort can be counted on to awaken the sleeping pyrotechnician in most chemists. In this case, the reader has to be patient while the author discusses elementary chemistry, physics, and thermodynamics in the first three chapters. Thereafter come chapters on Pyrotechnic Principles, Ignition and Propagation, Heat and Delay Compositions, Color and Light Production, and Smoke and Sound. In these later chapters appear many formulations. The approach is generally more empirical than the title suggests, but scientific explanations appear throughout. The references are generally to secondary sources. Safety is emphasized repeatedly. Two small appendixes deal with Obtaining Pyrotechnic Literature and Mixing Test Quantities of Pyrotechnic Compositions. The book provides a good overall perspective, but the later parts might be considered unsuitable for a reader whose weak technical background makes the early chapters necessary, and the chemist who might make use of the later chapters is not likely to need the introductory material. A 6-page index completes the work.

**Metallo-organic Chemistry.** By Anthony J. Pearson (Case Western Reserve University). John Wiley & Sons: New York. 1985. xi + 398 pp. \$29.95.

Several textbooks covering the organometallic area have appeared in the last few years, and this is one of the best. The literature is covered up to mid-1982, and (unlike some other recent texts) Pearson has done a good job of providing key literature references throughout. The author's expressed intent was "to provide a basic coverage of the chemistry of organo-transition metal complexes and to set this in the context of their application in synthetic organic chemistry", and he does this very well.

The first chapter deals with the basic bonding (using the frontier MO approach) and electron-counting concepts which are used extensively in the text. Chapter two addresses fluxionality and dynamic equilibria and surveys some common organometallic reaction types with an emphasis on some of the classic catalytic processes (such as olefin metathesis and polymerization, the Wacker process, hydrogenation, etc.) in the field. Chapters three through nine cover the descriptive chemistry of carbon ligands, arranged with respect to ligand hapticity ( $\sigma$ -alkyl; carbene and carbyne; alkene and alkyne; allyl; diene; dienyl; arene and triene). These chapters nicely incorporate (1) syntheses, (2) physical characteristics of complexes, (3) reactivities of organometallic complexes, especially with regard to their organic synthetic uses, and (4) mechanistic considerations, including detailed stereochemical information. The illustrations and figures are descriptive, clear, and plentiful; stereochemistry is always faithfully shown when known.

The text was written primarily for "synthetic organic chemists whose education has so far neglected organometallic chemistry", but inorganic

chemists will find it equally valuable as a reference work since their education has historically neglected detailed synthetic applications of metals to organic synthesis.

Gregory L. Hillhouse, University of Chicago

**Biochemistry of Dioxygen.** By L. L. Ingraham and D. L. Meyer (University of California, Davis). Plenum Press: New York. 1985. xi + 287 pp. \$45.00. ISBN 0-306-41948-3.

While the intended audience for this book is the research biochemist, it will certainly also be of great value to the organic or bioorganic chemist working in the area or who contemplates doing research in the area of oxygen metabolism or related areas where results could have consequences for the more biochemically oriented metabolism studies. The book includes a timely survey of work reflecting the title as well as related areas, viz. the chemistry of ground-state oxygen, singlet oxygen, peroxides, and superoxide ion. The latter topics serve as an introduction to a systematic survey of the enzyme systems involved in dioxygen metabolism. This survey is organized around characteristics of the enzyme-activated dioxygen reactions with categories in which dioxygen (1) reacts as a one-, two-, or four-electron acceptor from the substrate or (2) reacts as a two-electron acceptor and an oxygen atom donor, or (3) reacts as a two oxygen atom donor. The book also includes important chapters on the related subjects of dioxygen toxicity and bioluminescence.

The introductory chapters on ground-state dioxygen, etc., include properties, reactions, and, where appropriate, methods of generating the subject oxidant or compounds. The emphasis is on aspects of these topics that are pertinent to the subsequent chapters on enzyme activation of dioxygen. The chapters on the various types of enzymes are generally organized to include the type of reaction catalyzed, what is known about the structure of the enzyme type, specific examples of the type, and current views on the mechanism of action of the enzyme type.

The book is interpretive at many points, particularly where competing mechanisms are reviewed and discussed. In general, this reviewer found such discussions to be balanced and informative. However, in discussing the mechanism of quenching of singlet dioxygen by  $\beta$ -carotene, the authors characterize the interaction of singlet dioxygen and ground-state singlet  $\beta$ -carotene to give triplet dioxygen and excited triplet  $\beta$ -carotene as being quantum-mechanically forbidden, which it is not. This view may have led the authors to their stated belief that the available evidence on the competing mechanisms for singlet dioxygen quenching by  $\beta$ -carotene is not sufficient to confirm or eliminate any of the proposed mechanisms. To this reviewer the balance of the evidence would seem to favor quenching by energy transfer.

The strength of this book is the bringing together in an organized fashion the great range of subjects fitting the title. The book suffers from too many typographical errors to be easily excused on this point, such errors are particularly damaging in figures, where misinterpretation is likely.

In summary, the authors have done a service to those working or

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

contemplating working in the various fields encompassed by the title. It is recommended not only for these audiences but also as a possible text or supplementary text for graduate courses on this topic.

Robert W. Murray, *University of Missouri—St. Louis*

**Chemistry of Atmospheres. An Introduction to the Chemistry of the Atmospheres of Earth, the Planets and Their Satellites.** By Richard P. Wayne (University of Oxford). Clarendon Press, Oxford University Press: New York, 1985. xii + 361 pp. \$39.95 cloth. ISBN 0-19-855176-2. \$19.95 paperback. ISBN 0-19-855175-4.

This book provides a comprehensive overview of atmospheric chemistry. The author notes in his preface that it was written as an introductory textbook, and it should serve that purpose admirably.

The first chapter surveys the chemical composition of the atmosphere, which is followed by a discussion of atmospheric physics. Chapter 3 covers fundamentals of photochemistry and reaction kinetics, and the rest of the chapters focus on topics that have been of intense research interest in recent years, including ozone in the atmosphere, pollution, ions, the air glow, and the origin and nature of planetary atmospheres, planet by planet.

The author elected not to include references in the book, since it was to be more of a classroom text than a research reference. This is less important in the first few chapters than in the later chapters where the topics incorporate results of relatively recent research. However, an extensive bibliography at the end of each chapter provides ample references for the serious student. For chemical reactions, few reaction-rate coefficients are given, but overall the discussion, explanations, and interpretations are well-done.

In recent years many text books have been extremely long. In less than 400 pages, the author has presented not only a readable and reasonably thorough treatment of the subject, and a good text for use in teaching the subject, but also an informative and convenient reference for the interested scientist.

Robert R. Reeves, *Rensselaer Polytechnic Institute*

**The Chemist's English.** By Robert Schoenfeld (University of Melbourne). VCH Publishers: Deerfield Beach, FL, 1985. xii + 173 pp. \$17.95. ISBN 0-89573-436-2.

Rarely does a book come along that is sheer fun to read, and almost never is such a book also informative and useful. This one qualifies, and it must be an exceptional person who can read it without chuckling and without coming away with a better insight into the requirements of scientific writing. The purpose of the book is stated by the author in his preface: "I do not set out to give you a recipe for good scientific writing; I want to give you an *appetite* for good English." As the recently retired Editor of the *Australian Journal of Chemistry*, he has had a good opportunity to observe the best and worst faces of the subject. He makes only two assumptions: "(1) you have something to say; (2) you are inhibited by fear of making mistakes."

The titles of the 35 chapters are themselves amusing as well as revealing, as a few examples will reveal: *That's the Way She Crumbles, Language-Wise; Is You Is or Is You Ain't My Data?; A Chemical Analysis of the English Sentence.* As one reads through the book, the realization comes into view that Robert Schoenfeld has penetrated to the perception of a fundamental truth: chemists are different from ordinary people, and they even write differently. He sets out the difference between Standard Spoken English (spoken by chemists with a few dialectal twists), Standard Written English (used by chemists in prefaces, forewords, and in some discursive papers), and Chemists' English (found in reports of original research in journals). Reasons are given for everything, amusingly and convincingly, from the fact that "react" is not a transitive verb and should never be so used (could one write "the President reacted the Navy to the threat?") to the proper way to use such terms as "via", "due to", "using", etc. It is all done in a very reasonable, nonauthoritarian way that leaves the reader with a good feeling of expanded consciousness rather than a resentful feeling of having been brow-beaten.

In a chapter headed *How Good is Your English? How Good is English?*, Schoenfeld takes on the problem of ambiguity. In connection with grammatical elision, a dangerous habit that chemists are prone to practice, he puts forth the sentence "The aqueous layer was removed, the solvent concentrated, and the residue exploded," and asks whether the residue was deliberately exploded, or whether it exploded "out of its own inscrutable malice". However, in another chapter, the title is *Arguing with Authority* (was that deliberately chosen to be ambiguous, Bob?).

It is difficult to resist quoting extensively from this book, to share both the chuckles and the insights. Perhaps one more may be allowed. Chapter 8, after taking up the propriety of coining new words from mixed roots (Greek and Latin, Old English and Old French, etc.), ends with this paragraph:

"I have a habit of thinking of languages as women.... French, for

instance, is a highly strung girl just out of convent school, forever nervously brushing foreign matter out of her skirt. English, now, is a cheerfully promiscuous wench, buxom and attractive, gaily bestowing her favours on whomever she fancies, but always her own mistress, following no fashions but those that suit her. And if the dear girl decides to adorn herself with Tetravalency, then let her; it would look preposterous on anyone else but on her it seems right somehow."

Chemists owe it to themselves to read this book, and a high proportion of those who do are likely to want a copy to keep all to themselves, to sneak a look at from time to time, on occasions of linguistic need or the desire for a flash of good cheer.

**Handbook of Heterocyclic Chemistry.** By Alan R. Katritzky (University of Florida), in collaboration with C. W. Bird, A. J. Boulton, G. W. H. Cheesman, J. M. Lagowski, W. Levowski, A. McKillop, K. T. Potts, and C. W. Rees. Pergamon Press: Oxford and New York, 1985. xxii + 542 pp. \$29.95 softbound; ISBN 0-08-030726-4. \$80.00 hardbound; ISBN 0-08-026217-1.

This volume is a remarkable distillation of the content of the 8-volume "Comprehensive Heterocyclic Chemistry", of which it represents Volume 9. Not only has the material been condensed, it has also been reorganized so as to bring scattered information together. It is divided into the parts Preliminaries, Structure, Reactivity, and Synthesis. The first part describes the arrangement of the work and sets the subject in perspective. Each of the other three parts starts with an Overview. The part on Structure takes up the subject in order of ring size and number of heteroatoms, as does the part on Reactivity. For Synthesis, the organization is by number of heteroatoms in the first place and then by number of rings. The style is succinct, and the pages drip with structural formulas and equations. Tables there are, but their use is sparing, for it is intended that the user consult the larger, parent work for fine detail.

The index is thorough, but the table of contents is so detailed (it occupies 14 pages) that in most cases one may not need to use the index. The production is at a high standard, with clear type and professionally drawn structures. It is also minor criticism that the unfortunate policy has been adopted of placing ring substituents directly against the ring corners, rather than connecting them through a drawn bond. This treatment gives one an uneasy feeling about the location of substituents, occasional ones of which are set with an unsettling space between the substituent and the ring, giving a vague resemblance to radical pairs or reactants.

This book can be recommended for purchase by serious researchers and students and will save them many a trip to the library to consult its comprehensive parent.

**Writing the Laboratory Notebook.** By Howard M. Kanare (Portland Cement Association). American Chemical Society: Washington, DC, 1985. xii + 145 pp. Hardbound: \$19.95. ISBN 0-8412-0906-5. Paperback: \$12.95. ISBN 0-8412-0933-2.

This very useful book addresses university and industrial researchers and students, and their managers and supervisors, each on their own level. It begins with a convincing chapter on why it is important to keep a good notebook of one's scientific or technological work and then proceeds to specifics in detail. A chapter on "hardware" tells one how to select a notebook (paper, binding), the kinds of pen and ink to use, and how to store the notebook so as to avoid deterioration. Appendices give names and addresses of manufacturers. Another chapter takes up legal and ethical aspects (ownership, rights, and obligations). Management and organization of notebooks are covered in two chapters. A particularly interesting chapter presents examples of notebook entries of various types. Protection of Patents and Inventions is given a chapter. The last chapter describes the electronic notebook and evenhandedly sets out the advantages and disadvantages (e.g., there is "no commercially available system... of proving who was the author of a particular (electronic) notebook passage").

An appendix is devoted to the generally neglected topic of teaching good notekeeping. Another appendix has photographs from notebooks of famous scientists, such as Leonardo da Vinci, Michael Faraday, and Alexander Fleming (additional examples are to be found in the main text of the book). It ends with an amusing example from the notebook of Grace Hopper about a malfunction of an early electronic computer. The problem was traced to a moth caught in the relay; the offending insect was taped to the notebook page, with the notation "First actual case of a bug being found."

**Vibronic Coupling.** By Gad Fischer (Ben Gurion University of the Negev). Academic Press: Orlando, FL, 1984. viii + 222 pp. \$42.00. ISBN 0-12-257240-8.

This text, which is subtitled *The Interaction between the Electronic and Nuclear Motions*, is billed as attempting to make vibronic coupling

"readily comprehensible to more than just the specialist research worker." It is "addressed to those who are not familiar with vibronic coupling but yet have some background in quantum chemistry." This reviewer believes that many readers who satisfy that description will find this to be tough reading.

The first part of the book approaches the theoretical aspects of the topic, dealing with the separation of variables for two- and three-body problems, followed by motion in diatomic and polyatomic molecules, then transition intensities, Jahn-Teller effects, and calculational approaches to vibronic coupling. The general tone of this approach is tedious, yet missing details often force the reader to backpedal to follow the material.

A treatment of the occurrence and ramifications of vibronic coupling in molecular spectroscopy and molecular dynamics constitutes the second half of the text. Even here, for example, in examining the mirror symmetry in the spectrum of benzene, the reader is buried by further theoretical details. Only a fleeting mention is made of the interesting features of the spectrum. Finally a nice picture emerges of absorption and emission intensities for lines related by symmetry in terms of transition moments.

Though potentially of great value to the specialist, this text will prove to be a difficult entry to vibronic coupling for the nonspecialist. The experimentalist, particularly, will look for direct ties to observations but will find them difficult to ferret out.

Richard D. Bates, Jr., *Georgetown University*

**Methods in Enzymology. Volumes 110 (Part A) and 111 (Part B): Steroids and Isoprenoids.** Edited by John H. Law (University of Arizona) and Hans C. Rilling (University of Utah). Academic Press, Inc.: New York, 1985. Volume 110: xxv + 460 pp. \$55.00. ISBN 0-12-182010-6. Volume 111: xxv + 607 pp. \$65.50. ISBN 0-12-182011-4.

This pair of volumes is a timely update to previous volumes devoted to steroids and related compounds (e.g., Volumes 15 and 71). Part A is concerned with the purification and characterization of enzymes involved with monomer synthesis, condensation reactions, and cyclization, while Part B covers the identification, purification, and metabolism of sterols and isoprenoids. The section on metabolism contains several physiological topics (e.g., carrier proteins and receptors) as well as the usual metabolic enzymes.

The strengths of this treatise include the variety of techniques, their practical presentation, and the inclusion of different phylogenetic approaches. The section on Identification illustrates several of these points. First of all, it contains numerous, up-to-date separation methodologies, including chromatography (absorption, gas-liquid, and reverse-phase) and spectroscopy (NMR, UV, and mass). Furthermore, practical comments (e.g., the precautions on handling and preparing labile samples) give the information a benchtop utility that has become a hallmark of the *Methods in Enzymology* series. The theory behind the elution profiles seen under various conditions is also given so that specific techniques in the text can be intelligently adapted. Finally, because these compounds are so ubiquitous, chapters have been included to cover special methods, problems, and topics in nonvertebrates and plants.

The weaknesses include the slighting of two major subjects: (1) 3-hydroxy-3-methylglutaryl CoA reductase and (2) enzymatic inhibitors of the steroid pathway. The former deficiency is acknowledged by the editors and excused by noting that this topic has recently become controversial; that is a reason to demand more coverage, not less. Finally, great strides have been made in developing specific enzyme inhibitors for steroid synthesis. Since these inhibitors have potential both as experimental tools as well as therapeutic agents (e.g., in hypercholesterolemia and various endocrinopathies), I was disappointed at their lack of adequate coverage.

Nonetheless, no pair of volumes can hope to include everything in this broad area and the strengths certainly exceed the deficiencies. Anyone working on the synthesis or metabolism of steroids and isoprenoids will find this a valuable and useful set of books.

Franklyn F. Bolander, Jr., *University of South Carolina*

**Inorganic Syntheses. Volume 23.** Edited by Stanley Kirschner (Wayne State University). John Wiley & Sons: New York, 1985. xxii + 257 pp. \$39.95. ISBN 0-471-81873-9.

Here is another volume in an excellent series that provides "detailed and foolproof procedures for the preparation of important and timely compounds". Each contribution includes a brief background, leads to the literature, a note of any particular hazards, and a consideration of properties. Each submission is also evaluated in a second laboratory by an independent team, and careful editing assures a high degree of completeness. One's general impression is that the average chemist *should* be able to prepare the indicated compounds according to the listed procedures.

The achievement of the stated goal of featuring important materials

is, of course, highly dependent on the submissions volunteered. The present volume contains 41 preparations, many with directions for several compounds of a type, and with a distinctly international flavor of contributors and checkers. These are subdivided into sections on organometallic compounds (11 preparations), compounds of biological interest (3), stereoisomers (6), bridge and cluster compounds (6), and unusual ligands and compounds (miscellaneous) (15). The emphasis is certainly on coordination chemistry; there is only one solid-state synthesis contribution. The volume includes cumulative author, subject, and formula indexes for Volumes 21-23. The interested user seeking a given synthesis will then need to check cumulative indexes in four volumes to see whether a suitable preparation is available, namely, Volumes 10, 15, and 20 and the current issue. Three more volumes are actively in process.

John D. Corbett, *Iowa State University*

**Structure Determination by X-Ray Crystallography. Second Edition.** By M. F. C. Ladd (University of Surrey) and R. A. Palmer (Birkbeck College, University of London). Plenum Press: New York, 1985. xxii + 502 pp. \$39.50. ISBN 0-306-41878-9.

This is a good textbook in basic X-ray crystallography. The overall layout follows that of the first (1977) edition. The first 100 pages cover crystal geometry, including symmetry groups and the reciprocal lattice. Application of these concepts to the characterization of crystals by X-ray diffraction follow, with examples, about 100 pages. The remainder of the volume discusses methods of structure analysis including Patterson, heavy atom, and direct methods as well as refinement and evaluation of molecular geometry. Two structure analyses are followed in some detail. Many additional topics are discussed in an appendix.

A 25% expansion of the text relative to the first edition reflects added material on direct methods, Patterson search, least-squares refinement, molecular geometry assessment, structural disorder, data reduction methods, and experimental technique. Expanded sections on macromolecular isomorphous replacement and anomalous scattering are also included, as are a few additions to the good collection of exercise problems, with solutions.

Christer E. Nordman, *University of Michigan*

**Römpps Chemie-Lexikon. Band 4: M-Pk.** By Otto-Albrecht Neumüller. Franckh'sche Verlagshandlung, W. Keller & Co.: Stuttgart, 1985. xii + 795 pp. DM 195.00. ISBN 3-440-04514-5.

This unusually useful and comprehensive dictionary for chemists passes the midpoint of the alphabet with this volume. An idea of its coverage may be gained by looking at the first few entries. It starts off with Greek  $\mu$ , which is correctly defined as an indicator for bridging structures in inorganic chemistry, as a symbol for "micro", and as a physical unit. Similarly, the several meanings of m and of M are defined, even including the use of M to indicate any metal. Later comes "3M", defined as the name of a well-known chemical firm, whose address and principal products are also given. "Maalox", the indigestion remedy, "Macaloid", the thickener, and "Machur", a former professor of chemistry at the Universities of Cairo and Vienna, are among the early entries. When compounds are defined, fully definitive structures are drawn where needed; with "maltose", for example, a Haworth projection is shown. The fact that the definitions are in German makes surprisingly little difference. Cross-references make finding a desired term easier. Among the more amusing entries is "Pizzagewürz" (pizza spice), which is identified as oregano. Could one find that in any other chemical dictionary?

The sustained thoroughness and authoritativeness of this work commend it for purchase by all technical libraries.

**Residue Reviews. Volume 96.** Edited by Francis A. Gunther and Jane Davies Gunther. Springer-Verlag: New York and Berlin, 1985. ix + 140 pp. \$32.50. ISBN 0-387-96194-1.

This series began in 1962 and has provided a steady stream of review articles about residues of pesticides in foods, including their chemistry and biochemistry. The subject has been defined broadly, and material on toxic contaminants that are not, strictly speaking, pesticides is to be found among the reviews. In the present volume, there are four reviews: Samples used for interlaboratory studies of methods for pesticide residues analysis in foodstuffs, by N. A. Smart; Cadmium in aquatic foodwebs, by S. H. Kay; Behavioral responses of birds to pesticides and other contaminants, by D. B. Peakall; and Protocol guidelines for the investigation of photochemical fate of pesticides, by G. G. Choudhry and G. R. B. Webster.

**Palladium Reagents in Organic Syntheses.** By Richard F. Heck (University of Delaware). Academic Press: London and Orlando, FL, 1985. xx + 461 pp. \$99.00. ISBN 0-12-336140-0.

Palladium-organic chemistry has expanded so rapidly and impressively

in recent years that it is not easy to keep abreast of the subject, especially for those who are not directly involved with it but might wish to use it. The two problems faced by the chemist wishing to make use of palladium reagents in organic synthesis are selecting the preparatively significant reactions out of the many extraneous ones and determining the appropriate experimental procedures. This is where this book comes in: it is written to solve both problems.

The emphasis is on reactions using palladium reagents as catalysts, but the treatment is not limited to such situations. Both preparation of reagents and recovery of palladium are described. Full experimental directions are provided; it appears that in most instances the reader will not have to go further than this book to start work. In nine additional chapters, the various types of palladium-assisted reactions are systematically arranged, their general features are described, and usually several experimental examples are given. Frequently one finds both a general procedure as well as specific examples. Additional examples are listed in tables; there are no fewer than 170 tables in the book! The references, which are all gathered together, number 509 and include publications up to mid-1983.

This book is certain to be much in demand by experimentalists, who might do a lot worse than invest a C-note in it. They would then be able to expose it to the rigors of the laboratory bench without guilt.

#### Books on Physical and Mathematical Subjects

**Applied Classical Electrodynamics, Volume 1: Linear Optics.** By F. A. Hopf and G. I. Stegeman (University of Arizona). John Wiley & Sons: New York, 1985. x + 262 pp. ISBN 0-471-82788-6.

This is the first of two books on the subject which are "designed to give a background on issues in optical physics that relate to material science and laser applications."

**Numerical Methods for Differential Equations and Applications.** By Liviu Ixaru. D. Reidel Publishing Co.: Dordrecht, Boston, and Lancaster, 1984. xxi + 337 pp. \$69.00. ISBN 90-277-1597-1.

"This book is addressed to persons who... are often faced with the problem of numerically solving differential equations." "Persons who are active in research in theoretical physics, chemistry, or engineering are perhaps the most suited readers."

**The Theory of Magnetism II: Thermodynamics and Statistical Mechanics.** By Daniel C. Mattis. Springer-Verlag: Berlin and New York, 1985. xii + 177 pp. \$29.50. ISBN 3-540-15025-0 (Berlin) and 0-387-15025-0 (New York).

The author has written this book for self-study by those who are interested in learning how to use the tool of magnetic phenomena to understand statistical mechanics and the nature of states of matter.

**Analysis in Classes of Discontinuous Functions and Equations of Mathematical Physics.** By A. I. Vol'pert and S. I. Hudjaev (Academy of Sciences of the USSR). Martinus Nijhoff Publishers: Dordrecht, Boston, and Lancaster, 1985. xviii + 678 pp. \$177.50. ISBN 90-247-3109-7.

The "fundamentals of the analysis in  $BV$  spaces and the theory of boundary value problems for elliptic and parabolic equations" are discussed. A chapter is devoted to "Mathematical Problems of Macrokinetics" and gives much attention to combustion and ignition.

**The Principles and Practice of Electron Microscopy.** By Ian M. Watt (Johnson Matthey Research Centre). Cambridge University Press: Cambridge and New York, 1985. viii + 303 pp. \$49.50. ISBN 0-521-25557-0.

"This book has been written for anyone whose work or study encounters the results of electron microscopy, whether in biology, medicine, or technology". It describes the types of instruments, sample preparation, specialized techniques, and examples of use.

#### Books Received on Introductory Chemistry

**Chemical Principles. Sixth Edition.** By William L. Masterton, Emil J. Slowinski (Macalester College), and Conrad L. Stanitski (Randolph-Macon College). Saunders College Publishing: Philadelphia, 1985. xvii + 861 pp. ISBN 0-03-070744-7.

**Chemical Principles in the Laboratory with Qualitative Analysis. Alternate Edition.** By Emil J. Slowinski, Wayne Wolsey (Macalester College), and William L. Masterton (University of Connecticut). Saunders College Publishing: Philadelphia, 1983. x + 353 pp. \$18.95. ISBN 0-03-062649-8.

**Chemical Principles with a Qualitative Analysis Supplement. Alternate Edition.** By William L. Masterton (University of Connecticut), Emil J. Slowinski (Macalester College), and Conrad L. Stanitski (Randolph-Macon College). Saunders College Publishing: Philadelphia, 1983. xiii + 791 pp. \$34.95. ISBN 0-03-062646-3.

**Descriptive Chemistry.** By Donald A. McQuarrie and Peter A. Rock (University of California, Davis). W. H. Freeman & Co.: New York, 1985. iv + 176 pp. \$14.95. ISBN 0-7167-1706-9.

**Basic Concepts of Chemistry. Second Edition.** By Leo J. Malone (St. Louis University). John Wiley & Sons: New York, 1985. xviii + 603 pp. \$29.95. ISBN 0-471-88600-9.

**Chemical Principles, Properties, and Reactions.** By Kenneth L. Henold (University of Detroit) and Frank Walmsley (University of Toledo). Addison-Wesley: Reading, MA, 1984. xx + 730 pp. ISBN 0-201-10422-9.

**Chemistry, Man, and Society. Fourth Edition.** By Mark M. Jones (Vanderbilt University), David O. Johnston (David Lipscomb College), John T. Netterville (Williamson County Schools, TN), and James L. Wood (Resource Consultants, Inc.). Saunders College Publishing: Philadelphia, 1983. xi + 513 pp. \$27.95. ISBN 0-03-063032-0.

**General Chemistry: Principles and Modern Applications. Fourth Edition.** By Ralph H. Petrucci (California State University, San Bernardino). MacMillan: New York, 1985. xviii + 874. \$30.00. ISBN 0-02-394790-X.

**In Preparation for College Chemistry. Third Edition.** By William S. Seese (Casper College) and Guido H. Daub (University of New Mexico). Prentice-Hall: Englewood Cliffs, NJ, 1985. xiii + 286 pp. \$19.95. ISBN 0-13-453770-X.

**Basic Chemistry. Fourth Edition.** By William S. Seese (Casper College) and Guido H. Daub (University of New Mexico). Prentice-Hall: Englewood Cliffs, NJ, 1985. xvi + 655 pp. \$29.95. ISBN 0-13-057811-8.

**General Chemistry in the Laboratory.** By Julian L. Roberts, Jr., J. Leland Hollenberg (University of Redlands), and James M. Postma (California State University, Chico). W. H. Freeman & Co.: New York, 1984. xvi + 464 pp. \$18.95. ISBN 0-7167-1574-0.

**Chemistry: The Central Science. Third Edition.** By Theodore L. Brown (University of Illinois) and H. Eugene LeMay, Jr. (University of Nevada). Prentice-Hall: Englewood Cliffs, NJ, 1985. xxi + 893 pp. \$35.95. ISBN 0-13-128950-0.

**Chemical Skills. Second Edition.** By Edward I. Peters (West Valley College). McGraw-Hill: New York, 1984. xv + 472 pp. \$6.95. ISBN 0-07-049557-2.

**Chemical Principles in the Laboratory. Fourth Edition.** By Emil J. Slowinski (Macalester College), Wayne C. Wolsey (Macalester College), and William L. Masterton (University of Connecticut). Saunders College Publishing: Philadelphia, 1985. xi + 335 pp. \$21.95. ISBN 0-03-070754-4.