

pressure; heat of vaporization; solid, liquid, and ideal gas heat capacity; second virial coefficient; liquid and vapor viscosity; liquid and vapor thermal conductivity; and surface tension.

The program requires an IBM XT or AT compatible computer with at least 256 Kb of RAM and 4 Mb of hard disk capacity. A math coprocessor is required, indeed the setup routine will not run without one being present. A graphics terminal is required, and CGA, EGA, VGA, or Hercules graphics cards are supported. Installation is simply accomplished. The search routines are straightforward, and there are terse, but useful help screens to provide reminders (although occasionally it is necessary to search for the help screen that applies to the particular task you may have forgotten how to do). The printed documentation provided with the program is also brief, but quite adequate.

The database itself consists of numerical data, a four-character quality code (for instance, XE2Z means the following: an experimental value, from a critically evaluated source, with accuracy better than 1%, with accuracy assigned by the author of the evaluated source), notes, and references. There is also a reference to the existence of environmental data, which is not part of this database but is available to DIPPR project supporters. The data include 13 temperature-dependent properties along with equations for calculation of the properties as a function of temperature. The manner in which the calculations are done is well documented.

The database can be searched by "identifiers", including class, name, molecular formula, or CAS Registry Number. Under name and molecular formula searches, embedded substrings can be used as the search items; e.g., "BrCl" as a search item will return the three compounds in the database containing one Br and one Cl. Searching under "bromochloro" returns bromochlorodifluoromethane but not bromotrichloromethane. The second class of searches is based on properties. In such searches, the property (or properties) is chosen, and the program prompts for the numerical range to be specified, e.g. mp between 300 and 400 K. The property searches and identifier searches can be combined in several ways to either "or" or "and" the queries, and the list of hits can be pruned after it is generated.

Once a single entry or set of entries has been identified, data relating to that compound or set can be selected and then displayed on the monitor or sent to a dot matrix printer (either with or without accompanying notes and references). Alternatively, an ASCII file can be generated and saved by specifying a pathname. The data can be displayed or printed in SI, CGS, or English units, but disk files are always created in SI units. For the temperature-dependent data, displaying or printing the data includes the value at 298.15 K, as well as equations and coefficients for calculating data at other temperatures. A further alternative is to calculate the value of a property at a specified temperature or to create a graphical representation of the data over a specified temperature range. The data or plot can be displayed or sent to a dot matrix printer.

Two FORTRAN modules are provided as a means to copy data directly from the database to an external FORTRAN application. For a single component in the database, the routines supply either a value for a single designated property or an array containing regression coefficients for calculation of a single temperature-dependent property.

TDS reports that an expanded version of the program will soon be available with additions to the database to bring the total number of components to 1023. The program itself is reported to have some "cosmetic" changes and some enhancements in search options, and the new version will not require a math coprocessor. Owners of version 1.0 may trade-in for version 2.0 for the difference in selling price (\$400.00). The DIPPR database is augmented with annual releases, and TDS indicates that future annual updates to the database will be available without purchase of the entire software package.

The database itself is the product of a great deal of careful evaluation, and the current software allows one to exploit that database in a number of very useful ways. Clearly, however, the average chemist who needs this kind of physical and thermochemical data on an occasional basis will continue to rely on a handbook, not this program. The audience for the program is likely to be industrial chemists and engineers who deal with a variety of common industrial chemicals on a regular basis.

F. K. Cartledge, Louisiana State University

Book Reviews *

Photochemistry, Volume 19. Edited by D. Bryce-Smith and A. Gilbert. The Royal Society of Chemistry: London. 1988. xviii + 580 pp. \$239.00. ISBN 0-85186-175-X.

This ambitious attempt to summarize the literature from July 1986 to June 1987 for an increasingly diverse field continues its invaluable service to the photochemical community. The reviews are laid out in the now familiar format, with Part I covering photophysical processes, Part II covering transition metal and main group photochemistry, Part III covering organic photochemistry, Part IV covering polymer photochemistry, and Part V covering solar energy conversion. Particularly extensive are the seven chapters on organic photochemistry in Part III, which includes treatments of ketone and enone photochemistry, aromatic and aliphatic hydrocarbon photochemistry, photoredox chemistry, photochemistry of heteroatomic compounds, and photoeliminations.

Part I, by Cundall, is the least satisfactory of the reviews. In addition to a rather terse coverage of an enormous body of work in time-resolved spectroscopy, it is encumbered by a type font that does not print well in condensed form and by a total lack of figures, which makes "browsing" impossible. Part II, by Cox, has a more acceptable number of figures, although the shortness of the chapters again contributes to a terse coverage of the field of inorganic photochemistry. This is further hampered by a rather artificial division into photochemistry of transition metal complexes and transition metal organometallic compounds, which inevitably produces redundancies. The chapters by Horspool, by Cox, and by Reid on organic photochemistry in Part III are the most readable and enjoyable of the lot. Extensive use of figures makes browsing facile, and the extensive coverage of this area—over half the monograph—provides reassurance that the preponderance of the relevant literature has been cited. The depth of coverage also allows some analysis of the conclusions drawn by the cited authors, where differences in interpretation are possible. The treatment of polymer photochemistry by Allen (Part IV) is heavily and appropriately referenced, although the brevity of the chapter provides little evaluation of the material, and reference to the primary

literature is necessary. Finally, Part V on solar energy conversion, by Harriman, is a welcome summary of recent developments in this important, if somewhat moribund, area.

Returning with this volume is the "Introduction and Review of the Year", by Bryce-Smith and Gilbert. Although necessarily selective, this observation of the "highlights" provides a welcome analysis of areas for further reading in later chapters.

In summary, this report provides a useful and in-depth compendium of developments in organic photochemistry. Organic photochemists can certainly profit by its depth, although its high cost serves as an enormous barrier for its inclusion in personal libraries, where it rightfully belongs. Inorganic, physical, and polymer photochemists will find it of more limited utility, although it can provide an extensive source of references for the years in question.

Laren M. Tolbert, Georgia Institute of Technology

Rubberlike Elasticity, A Molecular Primer. By James E. Mark (University of Cincinnati) and Burak Erman (Bogazici University). John Wiley & Sons: New York. 1988. viii + 196 pp. \$135.00. ISBN 0471-61499-8.

This book is an introductory level, thoroughly referenced presentation of rubberlike elasticity in a concise but clear manner. The material should be understandable to chemists with a solid undergraduate physical chemistry background. Molecular concepts, explained with simple physical models and analogies from other fields of science, are emphasized throughout the text. The division of the book into two parts will help the average reader to gain a gradual understanding of the material.

Part A, Fundamentals, defines rubberlike elasticity, lists its molecular requirements, and describes the origin of elastic force. The analogy between a gas and an elastomer, i.e., both pressure and retraction are entropy driven, is expertly presented. A chapter on the fundamental features of stress-strain relationship follows. The third chapter describes the preparation of networks, and the most important structure-related concepts, such as functionality, dangling chain, loop, cycle rank, etc. The next two chapters deal with statistical theory for idealized and real

*Unsigned book reviews are by the Book Review Editor.

networks: Flory's affine and constrained junction models, the phantom model, and the slip-link model are discussed in sufficient detail. Chapter 6 explains the elastic equations of state, followed by a thermodynamic treatment of network swelling. Part A ends with brief reviews of the functional dependence of force on deformation, temperature and structure.

Part B, Additional Topics, begins with examples of experimental techniques employed to obtain information on network topology. Chapter 12 describes strain-induced crystallization. Chapter 13 focuses on bimodal networks and non-Gaussian behavior. Some complex phenomena, such as birefringence, osmotic compressibility, and gel collapse, which many readers may not be familiar with, are also reviewed. Application of neutron scattering measurements on deformed networks, the significance and properties of biopolymers, and the mechanism of reinforcement are the final topics. Chapter 21 contains the long list of yet unexplained phenomena of rubberlike elasticity.

In summary, the average reader should find *Rubberlike Elasticity, A Molecular Primer* useful and quite interesting. As a final note, a chapter or two on linear viscoelasticity should have been included, due to its unquestionable relevance to the material.

Janos Szamosi, *Union Camp Corporation*

Practical HPLC Method Development. By L. R. Snyder (LC Resources, Inc.) and J. L. Glajch and J. J. Kirkland (E. I. du Pont de Nemours & Company). John Wiley & Sons: New York and Chichester. 1988. xvi + 260 pp. \$45.00. ISBN 0-471-62782-8.

The authors present an efficient path for the development of HPLC separations. The book consists of nine chapters, each of which focuses on a key aspect of the separation. In Chapter 1 the series of steps associated with method development are outlined; they are treated in more detail in subsequent chapters. For example, the basics of separation from the viewpoint of mobile-phase effects are presented in Chapter 2 and depict the influence of solvent strength, mobile-phase selectivity, column type and temperature, and plate number on HPLC separations. In Chapter 3 the role of the column is discussed with focus directed to characteristics of columns and packings, column specifications, and the three most important kinds of column problems in HPLC method development: retention and resolution reproducibility, band tailing, and column lifetime. Chapter 4 emphasizes the first steps in developing an HPLC method, including choice of detection conditions, optimization of mobile-phase selectivity and use of gradient elution for initial runs, and solvent optimization for the reversed-phase, ion-pair, and normal-phase modes of HPLC. For the more difficult samples to be adequately resolved (those samples for which solvent optimization suggestions in Chapter 4 proved unsuccessful), additional separation variables are summarized in Chapter 5; attention is directed here to ionic strength, pH, column type and manufacturer, mobile-phase additives, temperature, and multidimensional techniques. In Chapter 6 the applications, principles, and optimization of gradient elution and related experimental considerations are presented. The special needs of samples containing inorganic ions, macromolecules, and enantiomers as well as the different criteria that must be used for detection of components at less than the level of 100 ppm are treated in Chapter 7. Computer-assisted approaches to method development are discussed in Chapter 8. The last chapter, and perhaps the most significant in the book, outlines specific instructions to be followed for developing reversed-phase, normal-phase, and ion-pair methods and contains handy nomographs and tables.

The authors present a systematic and practical approach to the development of HPLC methods and eliminate the often confusing aspects of controlling the many separation parameters involved. This book is highly recommended to chromatographers working in both routine and research laboratories where HPLC is utilized.

Eugene F. Barry, *University of Lowell*

Modern Models of Bonding and Delocalization. Edited by J. F. Liebman (University of Maryland Baltimore County) and A. Greenberg (New Jersey Institute of Technology). VCH: New York and Weinheim. 1989. xiv + 461 pp. \$84.00. ISBN 0895-73714-0.

This book, a volume in the series *Molecular Structure and Energetics* edited by Liebman and Greenberg, consists of nine autonomous chapters. The contents of the chapters are best described by the individual titles (authors enclosed in parentheses): 1, Localization and Delocalization (M. J. S. Dewar); 2, Structure and Bonding in Compounds Containing Cyclopropane Rings (T. S. Slee); 3, Through-Bond and Through-Space Interactions in Unsaturated Hydrocarbons: Their Implications for Chemical Reactivity and Long-Range Electron Transfer (M. N. Paddon-Row and K. D. Jordan); 4, Studies on the Atrance Compounds (G. Wu, K. Lu, and Y. Wu); 5, Charge Transfer in Self-Decoupling π Systems (W. Rettig); 6, Chemistry of Dioxymethylenes and Dioxiranes

(S. A. Kafafi, R. I. Martinez, and J. T. Herron); 7, Organic Chemistry of Dioxiranes (R. W. Murray); 8, Rydberg Chemistry (E. M. Evleth and E. Kassab); 9, Ethylenedione: Its Ions and Analogues (J. A. Berson, D. M. Birney, W. P. Dailey, III, and J. F. Liebman). In each chapter, a lucid exposition of the subject matter and its significance, a comprehensive review of past and current works, and a projection of future developments are presented. There are extensive reference citations, especially in Chapters 3, 5, and 9 which include some 1988 publications. The book will definitely serve as a valuable source of reference to those involved in these research areas. For those interested in the current status of applying chemical bonding theories to organic chemistry and the related areas in inorganic, organometallic, physical, and biological/toxicological chemistry, the book will provide important information and data.

The unifying factor among the diverse subjects dealt with in this volume is the emphasis on the interplay between theory and experiment. The leading chapter by Professor Dewar offers an eloquent interpretation of numerous qualitative organic theories in terms of different modes of conjugation inherent in a simple MO model. His conviction that the value of a theoretical model depends on its usefulness is apparently shared by many of the other authors.

The book constitutes a continuing testimony of the power and beauty of simple chemical theories: fascinating accounts, stimulating discussions, and splendid examples are abundant in demonstrating the essential roles of theories in the interpretation of chemical phenomena and design of chemical reactions. The reviewer found reading this book a very enriching experience and believes that other chemists will also find this true.

Alice Chung-Phillips, *Miami University*

Aqueous Size-Exclusion Chromatography. *Journal of Chromatography Library*. Volume 40. Edited by P. L. Dubin (Indiana-Purdue University). Elsevier: Amsterdam and New York. 1988. xviii + 449 pp. \$144.75. ISBN 0-444-42957-3.

Water-soluble polymers constitute one of the most difficult classes of polymers that can be analyzed by size-exclusion chromatography (SEC). The reason for this is that these polymers, which include synthetic polymers as well as biopolymers, contain hydrophobic, hydrophilic, and/or ionic functional groups that may interact with the SEC packing. In addition, the conformation of water-soluble polymers, especially polyelectrolytes, is very sensitive toward its environment. As a result, it is often difficult to develop reliable SEC systems to characterize these polymers. In view of this, Dubin's book on aqueous SEC is a useful source of information that addresses many of these problems.

This book is essentially a collection of papers consisting of both reviews and research papers on a number of important topics involving aqueous SEC. Although there is a considerable amount of overlap among chapters, there is a lot of useful information. The book contains 15 chapters and is arbitrarily divided into five sections: Separation Mechanisms, Characterization of Stationary Phases, New Packings, Biopolymers, and Associating Systems. Several chapters appear to be incorrectly categorized.

Chapter 1 (size-exclusion parameters) gives a rather brief overview of the theory of SEC and only a superficial discussion on calibration approaches. Chapter 2 deals with hydrophobic interactions of carbohydrates and alkanols with cross-linked polysaccharide packings and has little relevance to aqueous SEC. A useful review of electrostatic effects is presented in Chapter 3. Chapter 4 deals with SEC of inorganic compounds (salts, inorganic polymers, and metal complexes). Although SEC of inorganic ions has been supplanted by ion chromatography, the sections on inorganic polymers and metallic complexes are informative.

Chapter 5 is a thorough review on the characterization of packing pore structure. Included are excellent discussions on inverse SEC and the effect of pore size and shape on resolution. Inverse SEC is also treated in Chapter 6. A brief overview of band broadening and factors affecting column efficiency is given in Chapter 7.

Chapter 8 is an excellent survey of silica packings for SEC. The synthesis and SEC properties of a number of stationary phases are adequately covered. Recommendations for mobile-phase selection are given along with a list of commercially available SEC silica packings. Chapter 9 deals with polymeric, hydrophilic packings as well as silica packings. This chapter also contains a useful application section on biopolymers; unfortunately the authors only included applications involving TSK packings.

Chromatographers involved with SEC of proteins will value Chapter 10, which gives many useful guidelines for mobile-phase and packing selection. Included are thorough discussions on the use of denaturing mobile phases and the preparation of proteins for SEC analysis. Chapter 11 is a research paper rather than a review on serum lipoproteins. However, it does contain useful information. The use of low-angle laser light scattering detection for SEC of proteins is briefly reviewed in Chapter 12.

The last three chapters on the use of SEC to study associating systems is a welcome addition, since this important topic is usually overlooked in most other books on SEC. Chapter 13 reviews various static equilibrium and chromatographic approaches used to measure equilibrium constants between macromolecules and ligands. The frontal boundary method of SEC to study protein association is well covered in Chapter 14. In Chapter 15, the SEC of micelles is surveyed with emphasis on the measurement of monomer-micelle equilibrium as well as the thermodynamics of micellization.

Although the chapters of this book are rather loosely connected, they do contain a great deal of information that should be useful to chromatographers involved with characterizing water-soluble polymers and biopolymers.

Howard G. Barth, E. I. du Pont de Nemours & Company

Annual Review of Materials Science. Volume 17. Edited by Robert A. Huggins (Stanford University) et al. Annual Reviews: Palo Alto, CA. 1987. viii + 394 pp. \$64.00. ISBN 0-8243-1717-3.

This book keeps up the high standards of previous volumes in the series. The coverage in the various chapters ranges from fundamental to applied aspects of materials science. Mathematical treatments are generally avoided, and the book is very readable for the nonspecialist.

An introductory chapter on The Early History of the Materials Research Laboratories, by R. L. Sproul, is followed by a chapters on Heavy Electron Metals by H. R. Ott, emphasizing in particular electrical resistivity, magnetic susceptibility, and specific heat. Other chapters covering special materials are High-Strength Concrete by J. Skalny and L. Roberts; Organic Thin Films for Semiconductor Wafer Diagnostics (in particular films of *N,N'*-dimethyl-3,4,9,10-perylene-tetracarboxylic diimide and 3,4,7,8-naphthalenetetracarboxylic dianhydride) by S. R. Forrest, M. L. Kaplan, and P. H. Schmidt; Polymer Materials for Microlithography by E. Reichmanis and L. F. Thompson; Metal Oxide Varistors (i.e., variable resistors in which the electrical resistivity is a function of the applied voltage) by R. Einzinger; and Ceramic Substrates for Microelectronic Packaging by U. Chowdry and A. W. Sleight. Chapters on preparation, processing, and structural changes are as follows: Development of High-Quality InP Single Crystals by M. Mrioka, K. Tada, and S. Akai; Crucible-Free Methods of Growing Oxide Crystals from the Melt by V. V. Osiko, M. A. Borik, and E. E. Lomonova; Synthesis of Diamond under Metastable Conditions (i.e., in the graphite-stable region) by R. C. De Vries; and The Science and Engineering of Large-Diameter Czochralski Silicon Crystal Growth by W. Lin and K. E. Benson. Three chapters listed under properties and phenomena are as follows: Transport in Chemical Potential Gradients of Multicomponent Oxides by H. Schmalzried; Interdiffusion in Amorphous Multilayered Materials by A. L. Greer; and Strength and Toughness of Ceramic Matrix Composites by W. B. Hillig. The collection is rounded off by chapters on The Microscopy of Bulk-Grown III-V Semiconductor Materials by G. T. Brown and Grain Boundaries in Polycrystalline Ceramics by D. R. Clarke.

This book covers a wide range of important problems. For the chemist it gives insight into the relation between composition, texture, preparation method, and properties. The book is highly recommended for those interested in the properties of materials.

Philip Coppens, SUNY/Buffalo

Progress in Inorganic Chemistry. Volume 36. Edited by Stephen J. Lippard (Massachusetts Institute of Technology). John Wiley & Sons: New York and Chichester. 1988. 514 pp. \$95.00. ISBN 0471-61144-1.

This volume contains five chapters covering a broad range of topics, a subject index, and a cumulative index covering volumes 1-36 in this series. The first chapter, Carbon-Hydrogen-Transition Metal Bonds, by Maurice Brookhart, Malcolm L. H. Green, and Luet-Lok Wong, deals with the topic of covalent interactions between carbon-hydrogen groups (agostic interactions) and transition metal centers in organometallic compounds. The review is well-written and comprehensive in its coverage of the topic up to 1987. It is very well documented and includes many figures and several tables summarizing pertinent crystallographic and NMR data on the compounds discussed.

The second chapter, Mechanistic Aspects of Organometallic Radical Reactions, by David R. Tyler, emphasizes the importance of radical reactions in organometallic chemistry and how pervasive radical reactions and mechanisms are in organometallic chemistry. Six methods for preparing radicals are discussed and their reactions are grouped into seven categories for discussion. The topic is well-documented and includes many reactions and mechanistic schemes.

The third chapter, Chemical and Physical Properties of Triangular Bridged Metal Complexes, by Roderick D. Cannon and Ross P. White, emphasizes the descriptive chemistry of triangular-bridged metal com-

plexes of V, Cr, Mn, Fe, Ru, Ir, and Rh. The authors do a good job of pointing out the problems associated with the early literature in the field. Structural and physical data, obtained from a variety of techniques, are also assessed.

The fourth chapter, Cyclic and Heterocyclic Thiazenes, by Richard T. Oakley, is an excellent, well-written review of the subject. The review is well-documented and is supported with many figures. The theoretical and electronic aspects of these species are especially well treated.

The fifth chapter, Ligand Additivity in the Vibrational Spectroscopy, Electrochemistry, and Photoelectron Spectroscopy of Metal Carbonyl Derivatives, by Bruce E. Bursten and Michael R. Green, provides a very readable treatment of a very complex subject. Ligand additivity is discussed in light of vibrational spectroscopy, electrochemistry and photoelectron spectroscopy. Each topic is well-documented and supported with many tables and figures.

Although all the chapters in this volume are well-written, I would particularly recommend chapters 1 and 5 for reading in advanced courses in inorganic chemistry.

William H. Ilsley, Middle Tennessee State University

Biological Monitoring of Toxic Metals. Edited by Thomas W. Clarkson (University of Rochester) et al. Plenum Press: New York and London. 1988. xi + 686 pp. \$115.00. ISBN 0-306-42809-1.

Proceedings of a conference, organized jointly by the University of Rochester Division of Toxicology and the Scientific Committee on the Toxicology of Metals at the Karolinska Institute (Sweden), on the Scientific Basis and Practical Applications of Biological Monitoring of Toxic Metals, held June 2-6, 1986, in Rochester, NY. An Overview Report prepared by C. G. Elinder, L. Gerhardsson, and G. Oberdoerster appears at the first of the proceedings (71 pages), having been circulated in draft form among conference participants in advance, requesting comments and refinements prior to final editing for publication. The Overview Report and first four papers (76 pages) provide a useful conceptual framework for monitoring metals together with brief summaries of metabolism and metabolic models, analytical methodology, quality assurance and quality control, and the status of biological monitoring in developing countries, together with very brief reviews of specific metals as they relate to human toxicity.

A series of 17 subsequent working papers (329 pages) present more detailed and up-to-date reviews of the toxicology of Cd, Pb, Hg, Ni, Mn, As, Al, Sb, Cr, Se, Co, Sn, and V as well as various elements and compounds involved in semiconductor technology. Topics included in specific working papers include natural abundance and speciation, recognized sources, routes and levels of human exposure, specific populations or subgroups at risk, absorption and transport, metabolic implications, specific organs, tissues, enzymes or cell organelles affected, kinetics of accumulation, turnover and excretion, overt symptoms of toxicity, possible media for biological monitoring, collection methodology and precautions, observed concentration ranges, and dose/effect and dose/response relationships. Two invited papers (33 pages) address analytical methodology, and the final eight papers (147 pages) consider the advantages, pitfalls, and precautions in using various biological media for monitoring metals. Conference organizers, invited speakers, and rapporteurs are internationally recognized and respected authorities in the field. Reviews are informative and readable, packed with valuable summarizing statements and pertinent data, backed by extensive bibliographies, making them useful to the casual reader or practitioner as well as the avid researcher.

Nord L. Gale, University of Missouri—Rolla

Books on Applied Subjects

Heat Exchanger Design. Second Edition. By Arthur P. Fraas. John Wiley & Sons: New York and Chichester. 1989. x + 547 pp. \$59.95. ISBN 0-471-62868-9.

This book is written for practicing engineers involved with design, testing, selection, or installation of heat exchangers, which are increasingly important in the chemical industries, as well as in cryogenics, food processing, electric utilities, etc. Thirty representative cases are described, and a large amount of information is included in handbook form.

Viscous and Compressible Fluid Dynamics. By M. E. O'Neill (University College London) and F. Chorlton (University of Aston). John Wiley & Sons: New York and Chichester. 1989. 395 pp. \$79.95. ISBN 0-470-21263-2.

Fluid mechanics of liquids and gases, presented at the level of the advanced undergraduate or beginning graduate student, is the topic of this book, which is intended as a companion volume to *Ideal and Incompressible Fluid Dynamics* by the same authors.

Hazard Assessment of Chemicals. Volume 5. Edited by Jitendra Saxena (Environmental Protection Agency). Hemisphere: Washington, DC. 1987. xiii + 436 pp. \$69.95. ISBN 0-89116-450-2.

There are nine contributed chapters in this volume. Two of them are case studies: the methyl isocyanate leak in Bhopal and the biological impact of oil-well drilling fluids. The review chapters are concerned with chemical wastes, pesticides, particulate and gaseous contaminants, radiolabeling in environmental and toxicological research, pattern recognition in assessing chemical hazards, and electrochemical measurement of pollutants. There is an index of chemical substances and a general subject index.

Hazards, Decontamination, and Replacement of PCB. A Comprehensive Guide. Environmental Science Research Volume 37. Edited by Jean-Pierre Crine (Hydro-Quebec Research Institute). Plenum: New York and London. 1988. viii + 232 pp. \$55.00. ISBN 0-306-43088-6.

In this typescript book, the problem attending the use of polychlorinated biphenyls are addressed by chemists, engineers, toxicologists, physicians, biologists, and environmentalists. The papers are grouped under six headings: Basic Properties and Analytical Techniques, Human Health Hazards, Environmental Effects, Decontamination and Retrofilling, Destruction, and Combustion by Products and Replacement Liquids.

The index of just over one page is disappointingly skimpy.

The Risk Assessment of Environmental Hazards: A Textbook of Case Studies. Edited by Dennis J. Paustenbach (McLaren Environmental Engineering). John Wiley & Sons: New York and Chichester. 1989. xviii + 1155 pp. \$125.00. ISBN 0-471-84998-7.

This book is subtitled "A Textbook of Case Studies". Its 34 chapters are divided among eight sections: Basic Principles, Assessing Water Contaminants, Assessing Hazardous Waste Sites, Assessing Air Contaminants, Assessing Occupational Hazards, Assessing Potential Hazards to Consumers, Assessing the Risks to Wildlife, and Risk Management. Chemical substances are prominent in the subject matter, which ranges from mine tailings to industrial wastes and from formaldehyde to pesticides on farms. Thoroughly indexed.

Principles of Hazardous Materials Management. By Roger D. Griffin. Lewis: Chelsea, MI. 1988. iv + 207 pp. \$45.00. ISBN 0-87371-145-9.

The author cites his frustration in teaching an introductory course in the management of hazardous materials as the motivation for writing this book. Unlike other books, which are more or less discipline specific, this book is intended to be multidisciplinary. It begins with the general principles of toxicology and risk assessment, and then covers transportation (natural and commercial), characterization and analysis, management and disposal, and regulation (both Federal and Californian). It is intended for those who deal with management of hazardous materials and require an expanded understanding of all aspects; as such, it is also suitable for the educated layman. It contains a glossary of abbreviations and acronyms as well as a subject index.

Pharmaceutical Technology. Drug Stability. Edited by M. H. Rubinstein (Liverpool Polytechnic). John Wiley & Sons: New York and Chichester. 1989. 167 pp. \$69.95. ISBN 0-470-21411-2.

The subject of this book is the science of producing dosage forms that result in controlled release of a medicinal agent in the body. The 14 papers in this book constitute the proceedings of international conferences held in the United Kingdom in 1986, 1987, and 1988. They are mostly reports of recent research.

Security Mechanisms for Computer Networks. By Sead Muftic (University of Sarajevo). John Wiley & Sons: New York and Chichester. 1989. 195 pp. \$47.95. ISBN 0-470-21387-6.

The coordinated action of European universities, research institutes, and companies, supported by the Commission of European Communities, led to a project report on the title subject, which is obviously of wide significance in science and technology. The eight chapters have the following titles: Introduction—An Overview of Security Architecture for OSI Model Networks, Applications of Cryptography and Key Management Techniques, Entity Identification and Authentication Mechanisms, Entity Authorization and Access Control Mechanisms, Mechanisms for Protection of Data in Transfer, Database Security in Computer Networks, Protection for Distributed Systems Management in the OSI Environment, and References and Literature.

Numerical Groundwater Modelling. Flow and Contaminant Migration. By William C. Walton. Lewis: Chelsea, MI. 1989. ix + 272 pp. \$84.00. ISBN 0-87371-196-3.

Accompanying this book are two disks with microcomputer programs for simulating the flow of groundwater and migration of contaminants in three dimensions. The book itself describes the use of these programs. About three-quarters of the book consists of appendixes, the two largest being source codes for the two programs. The author assumes a

knowledge of hydrology and some computer experience on the part of the users, who are expected to be practicing professionals in the field.

Analytical Groundwater Modeling. Flow and Contaminant Migration. By William C. Walton. Lewis: Chelsea, MI. 1989. xi + 173 pp. \$68.00. ISBN 0-87371-178-5.

Four copyrighted but not copy-protected computer programs come with this book and are stated to enable "quick and easy simulation and graphing of uncomplicated two-dimensional groundwater flow and contaminant migration". Operation, concepts, techniques, and methods are described in 58 pages of text, after which come source codes and related information in appendix form.

Polymers As Materials for Packaging. By J. Stepek et al. John Wiley & Sons: New York. 1988. vi + 489 pp. \$79.95. ISBN 0-470-20720-5.

This is a handbook with sections written by different authors. It outlines the utilization of plastics in packaging today. All the major plastics used in modern packaging are covered. The book also addresses problems of packaging technology and describes the structures, properties, and basic chemistry of these plastics. There is also a chapter that discusses the application of plastics in packaging technology and another solely devoted to the hygienic properties of packaging materials (food contact applicability). The book contains numerous references and has a thorough index.

Principles of Environmental Sampling. Edited by Lawrence H. Keith. American Chemical Society: Washington, DC. 1988. xxiv + 458 pp. \$59.95. ISBN 0-8412-1437-9.

This 31-chapter book is based on a symposium sponsored by the American Chemical Society Committee on Environmental Improvement.

The book is divided into 6 sections, ranging from four to seven chapters each. Section 1 deals with the principles of planning, sample design, and quality control which prevail over all the special considerations that matrix variation impose. Special matrix requirements involving sampling equipment, sampling techniques, and preservation are then discussed in general in Section 2. The remaining four sections give a more detailed discussion of the individual matrix requirements needed for water (Section 3), air and stacks (Section 4), biota (Section 5), and solids, sludge, and liquid wastes (Section 6).

This is not a "how-to" book of procedures, but a comprehensive summary of what to consider when formulating techniques. Many chapters are devoted to statistical analysis of data for evaluating proposed methods of sampling.

This is a book aimed at advanced professionals. References at the end of chapters include many useful government reports and publications that would otherwise be difficult to identify. An extensive subject index and useful glossary are included, along with an affiliation index.

Experimental Toxicology: The Basic Issues. By Diana Anderson (The British Industrial Biological Research Association) and D. M. Conning (The British Nutrition Foundation). The Royal Society of Chemistry: London. 1988. xiv + 478 pp. \$138.00. ISBN 0-85168-108-3.

The book is comprised of 25 contributed chapters. Each chapter covers a different aspect of toxicology, including biochemical principles, metabolism, immunotoxicology, genetics, testing, epidemiology, regulation, environmental toxicology, ethics, and laboratory practice. The chapters are well referenced, and there is a good index.

Crop Safeners for Herbicides. Development, Uses, and Mechanisms of Action. Edited by Kriton K. Hatzios and Robert E. Hoagland. Academic: San Diego and New York. 1988. xiv + 400 pp. \$69.95. ISBN 0-12-332910-8.

Ever since the idea of enhancing crop tolerance to nonselective herbicides through chemical treatment was conceived in the 1940s, "herbicide safening" has become an accepted agricultural practice. The term "herbicide safeners", or "herbicide antidotes", refers to chemical agents that selectively protect crop plants from herbicide injury, without protecting any weeds. The purpose of this book is not only to bring the reader up to date on the present status of the agronomic uses, development, chemistry, and mechanisms of action of crop safeners but also to assess the impact of safeners in various parts of the world, to discuss alternative approaches to herbicide safening that could be used, and to speculate a bit about the future of safeners. The two chapters of Part 1 focus on the development and uses of herbicide safeners in the United States, Japan, and other parts of the world from industrial and university perspectives. Part 2 gives a comprehensive overview of the mechanisms of action of herbicide safeners and discusses the mechanisms of action of specific classes of safeners in greater detail. Part 3 provides suggestions for alternative approaches to crop safening against herbicide injury, and Part 4 contains a single chapter on the progress and prospects of herbicide safeners. Many of the chapters are comprehensive reviews on certain aspects of herbicide safening but certain chapters present results of research not previously published.