

Book Reviews*

Principles and Applications of Electrochemistry. Third Edition. By D. R. Crow (Wolverhampton Polytechnic). Routledge, Chapman and Hall: New York, 1988. ix + 230 pp. \$27.95. ISBN 0-412-30270-5.

This book is designed for an undergraduate course in electrochemistry. The author has concentrated on the basics of electrochemistry, while spicing the text with examples of applications in a variety of fields.

A brief introduction is followed by a sound treatment of ionic interactions, ionic equilibria and ionic conduction (Chapters 2-4). The next two chapters deal with the theory and applications of reversible electrode potentials. Potentiometric and amperometric sensors are discussed here with an emphasis on pH determination. Chapter 7 (Interfacial Phenomena) covers a variety of topics including the double-layer, electrokinetic phenomena and membrane equilibria. The final two chapters deal with electrode kinetics (emphasizing hydrogen and oxygen evolution) and applications such as voltammetry, batteries, and electrocatalysis. Each chapter concludes with a short set of problems and some suggestions for further reading.

This is a well-written book that introduces electrochemistry in a logical sequence. Equations are presented in a way that should make them appear more relevant to students. The author has attempted to keep this third edition reasonably short, while including application and recent developments. This has led to a rather brief treatment of many topics, especially in the final two chapters. This is unfortunate because I feel that it limits the book's usefulness as a main text for courses in electrochemistry.

Peter G. Pickup, *Memorial University of Newfoundland*

Reviews in Modern Astronomy I: Cosmic Chemistry. Edited by G. Klare (Heidelberg). Springer-Verlag: Heidelberg and New York, 1988. vii + 253 pp. \$32.10. ISBN 0-387-50412-5.

This book contains 12 reviews written by internationally recognized authorities from Belgium, France, Germany, Switzerland, the United Kingdom, and the United States. Although these are generally well-written, informative and up-to-date, invited reviews, comprised of selections from the proceedings of the annual meeting of the *Astronomische Gesellschaft* held in Cologne in May 1988 (the first to be published as *Reviews in Modern Astronomy* and the first reported in English), it is difficult to believe that many chemists outside the area of expertise of astronomical chemistry will find much to attract them in this book.

To practitioners in the field, however, these articles will be of great value, for their exhaustive references as well as for their excellent scientific content. One of these articles contains 277 citations, but the closest any of these come to chemical journals is one from *Science* (by two astronomers), one from *Earth and Planetary Science Letters* (an astrophysical paper), and two from *Reviews of Modern Physics*.

That the subject is topical and up-to-date, in its infancy in fact, can be gleaned from a perusal of the reference lists as well. Most of the citations are from the 1980s. For example, an article with 88 references had 16 from the 1970s, 71 from the 1980s, and only one earlier than these. The models used, and which are presently evolving under intense scrutiny, are as yet frequently not completely successful, again reflecting the newness of the field. The article by Herbst, *Interstellar Molecular Formation Processes*, lists 27 "selected gas phase models", of which only one was published before 1978 and seven were from 1988 alone. In one of the most recent calculations, "over 2500 gas phase reactions are included involving over 270 species in a time-dependent analysis". It is obviously a new and exciting field.

Chemists not conversant in the area of stellar and interstellar-media chemistry may be able to understand only the first two articles in any detail and perhaps portions of one or two others. The first article reviews the estimates for molecular and elemental abundances on the basis of gas and dust analyses obtained recently on the fly-by to Halley's comet, while the second paper reviews the important role played by meteorites, in particular by carbonaceous chondrites, in helping to define the bulk chemical composition of solar system material. This latter article deals with an area that is considerably more mature than the other articles. The rest of the articles, written for the worldwide astronomical community, use many terms unfamiliar to almost all chemists, e.g., hot sdO subdwarfs, reticons, CCDs, dex, Strogren index c_1 , (B-H)_{-0.5}, b-y, β , R-I, V-K, G-type dwarfs, and pc, to name a few; none of these was defined as far as this reviewer could see.

In summary, although this book probably will be highly welcomed by

workers in the field, it will probably find at most a very small audience among mainstream chemists. It is not an entry-level book into the area of "cosmic chemistry". Overall the book would have been more pleasing if there had been more editorial standardization of format, citations in the text and in the reference list, type font and size, etc.

Marvin W. Rowe, *Texas A&M University*

Free Energy Transduction and Biochemical Cycle Kinetics. By Terrell L. Hill (University of California). Springer-Verlag: New York and Berlin, 1989. 119 pp. \$27.00. ISBN 0-387-96836-9.

This book provides a clear treatment of the principles of free-energy transduction. It constitutes an excellent introduction to the subject for the investigator who wants a concise introductory treatment and a lucid, logical development of the subject for the advanced student.

The book is divided into three chapters each of which consists of a number of sections. Chapter I introduces the concept of diagrams to represent the possible states of any system and the allowable transitions between the states. This concept is illustrated with the use of a few simple examples, and these examples, or modifications and extensions thereof, are employed throughout the first two chapters. The probability of the various states is developed and, from this, the concept of thermodynamic force and its relationship to the product of rate constants and reactant concentrations is introduced. This leads to a discussion of transition, cycle, and operational fluxes. The important concept of the efficiency and rate of free-energy dissipation is included in the first chapter.

The second chapter expands the principles developed in the previous chapter. A "King-Altman" type of diagram (graphical) analysis is employed for treatment of state probabilities. This includes discussion of tracer kinetics and also some recent investigations of random walks.

The final chapter continues the discussion of the rate of free-energy dissipation with particular application to muscle contraction.

One of the merits of this book is the fact that its organization is such that it is enjoyable reading. In my opinion, any advanced student of biology would find reading this concise book a worthwhile educational experience. The bibliography is not extensive, but it includes the pertinent references.

Arthur R. Schulz, *Indiana University*

High-Resolution Solid-State NMR of Silicates and Zeolites. By G. Engelhardt (University of Konstanz) and D. Michel (Karl Marx University). John Wiley and Sons: New York, 1987. xiv + 485 pp. \$117.00. ISBN 0-471-91597-1.

This book represents a collaborative effort by the two authors, who introduce the basic principles and techniques of high-resolution solid-state NMR and their application to the interpretation of the structure of silicates, aluminosilicates, zeolites, and adsorbed molecules.

Chapter I begins with a brief historical account of the development of NMR and delineates the scope and organization of the book. Chapter II introduces the basic principles and methods of high-resolution NMR of solids and adsorbed molecules. The treatment is sophisticated and assumes some familiarity with the FT-NMR experiment. All of the frequently employed solid-state NMR techniques are explained: high-power dipolar decoupling, cross-polarization, and magic angle spinning. Some of the inherent peculiarities in obtaining high-resolution NMR spectra of adsorbed molecules are also covered.

Chapter III discusses the ²⁹Si NMR spectra of aqueous silicate solutions. The results provide valuable information on the structure and distribution of silicate anions in solution. All of the background information on notation for silicate building units is clearly explained so that the reader who is unfamiliar with aluminosilicate chemistry can understand the interpretation of the spectra.

Chapter IV discusses experimental methods, and spectral parameters associated with ²⁹Si and ²⁷Al NMR, and the theoretical interpretation of ²⁹Si NMR chemical shifts. A short survey of physical methods for the structural analysis of the silicate and aluminosilicate framework is presented, although this section could have been amplified.

Chapter V discusses the application of ²⁹Si and ²⁷Al NMR to the interpretation of the structure in silicates, aluminosilicates, and zeolites. The emphasis in this chapter is on the interpretation of the framework structure of zeolites, although there is an excellent section on layered silicates. All of the background information on Loewenstein's rule and zeolite framework types is clearly explained. The chapter also contains sections on the effects of cations on the NMR spectra, investigations on

*Unsigned book reviews are by the Book Review Editor.

the modification of zeolites, zeolite synthesis, especially of pentasil-type zeolites, and a short section on NMR studies on aluminophosphate and silicoaluminophosphate molecular sieves.

Chapter VI covers NMR studies involving nuclei other than ^{29}Si and ^{27}Al such as ^{17}O NMR of framework oxygen, alkali metal and thallium NMR of charge-compensating ions in zeolites and non-zeolitic silicates, and ^1H NMR of zeolites.

Chapter VII discusses the high-resolution NMR of adsorbed molecules. Included in this chapter are sections on the adsorption of molecules on zeolites and silicas, the characterization of chemically modified surfaces, the interaction of molecules with immobilized transition metal ions, the identification of acid sites on zeolites and silicates, and the interpretation of chemical shifts due to adsorption interactions using the quantum-chemical approach.

Throughout Chapters III-VII many summaries are interspersed that highlight the most significant experimental observations. This approach facilitates using the text as a primer for recent developments in the field of solid-state NMR of silicates, aluminosilicates, and zeolites.

The book is an excellent source of information and allows the practitioner to appreciate the utility of the NMR technique. The book is amply illustrated with actual NMR spectra which elucidate the explanations in the text. The references extend up to the end of 1986, although citations from 1986 are sparse.

I would definitely recommend this book to anyone contemplating using solid-state NMR for the structural elucidation of silicates and zeolites.

Walter E. Rudzinski, *Southwest Texas State University*

Advances in Heterocyclic Chemistry. Volume 42. Edited by A. R. Katritzky (University of Florida). Academic Press: San Diego and New York. 1987. vii + 410 pp. \$91.00. ISBN 0-12-020642-0.

This volume is a nice mixture of the chemical and physical aspects of heterocyclic compounds. A chapter on diazabicycloundecene (DBU) and related compounds, by I. Hermecz, is in the traditional pattern, and largely deals with the compound that has become widely used as a strongly basic catalyst with low nucleophilicity. Use of the Diels-Alder reaction with heteroatom reacting sites for synthesis of natural products is reviewed by T. Kametani and S. Hibino, who have been major contributors to research on the subject. Claisen rearrangements in various heterocyclic systems are the subject of a chapter by C. J. Moody. The electronic effects of heteroaromatic substituents (e.g., pyridyl) are treated by V. P. Mamaev, O. P. Shkurko, and S. G. Baram. Mass spectrometry of heterocyclic compounds, with particular attention to stereochemistry in carbohydrates and related compounds, is reviewed by J. R. J. Pare, K. Jankowski, and J. W. ApSimon. As is customary in this series, there is no index, but a cumulative index for Volumes 41-45 is scheduled to appear in Volume 45.

Ion Chromatography in Water Analysis. By O. Shpigun (Moscow State University) and Yu. A. Zolotov (Vernadsky Institute of Geochemistry and Analytical Chemistry). John Wiley & Sons: New York and Chichester. 188 pp. \$59.95. ISBN 0470-21202-0.

This is a relatively short book which is well-written and packed with useful information. Although the focus of the book is water analysis, this book would be of interest to, as well as beneficial to, all ion chromatographers. The book is comprised of 13 chapters, each covering a specific topic in ion chromatography or in water analysis. Chapters 1-7 cover the operating principles of ion chromatography as well as the detectors and other equipment used in IC. These seven chapters comprise 86 pages of the text. This operating information, concise and well written as well as replete with illustrative examples based on water analysis, seems to compete with the last six chapters of the book dealing with water analysis for position as the dominant portion of the book. The last six chapters deal with the determination of inorganic anions (Chapter 8), organic acids (Chapter 9), metals (Chapter 10), aliphatic amines (Chapter 11), simultaneous cation anion determinations (Chapter 12), and the analysis of water of various types (Chapter 13).

There are several aspects of this book which should warrant its use by ion chromatographers and/or people interested in water analysis. One aspect is the frequent citing of research performed in the Soviet Union. It is refreshing, as well as scientifically stimulating, to have access to a book that should cover the contribution of Soviet scientists to the ion-chromatographic literature in a thorough manner. A second aspect of this book that is extremely useful is the large volume of information contained in a set of carefully constructed tables. Chapter 3, on sorbents, for example, contains tables comparing the specific anion and cation exchangers including such information as composition, exchange capacity, particle size, and manufacturer. Chapter 8, Determination of Inorganic Anions, contains truly outstanding tables listing chromatographic particulars. The tables include a table on dual-column results, a table on single-column separations, a table on separations with direct UV

detection, and a table with separations using amperometric detection. Each table contains information regarding sample type, analytes, operating conditions, results, and references. Perhaps one of the few drawbacks in this book is that Chapter 10, Determination of Metals, does not contain data in this tabular form. Chapter 13, Analysis of Water of Various Types, covers specific types of water samples. The types covered, high-purity water; drinking and tap water; rainwater; surface water and groundwater; seawater, well, and highly mineralized water; and wastewater, are all covered in brief, well-referenced sections.

Overall, this book is a highly useful compilation of relevant analytical data discussed in a fashion which provides for an easy-to-read and easy-to-comprehend volume. This book would be a valued addition to the reference library of anyone interested in ion chromatography and/or water analysis.

James G. Tarter, *TALEM, Inc.*

High Performance Liquid Chromatography of Biopolymers and Bioligomers. Part B: Separation of Individual Compound Classes. Journal of Chromatography Library Volume 41B. By O. Mikeš (Czechoslovak Academy of Sciences). Elsevier: Amsterdam and New York. 1988. xxii + 722 pp. \$189.50. ISBN 0-444-43034-2.

This is the second volume of a two-volume set aimed at an area of enormous current interest: the high-performance liquid-chromatographic separation of large biomolecules such as proteins and amino acids. Part A deals with principles, materials, and techniques whereas this volume deals with the individual compound classes.

The author deserves to be congratulated for taking on such a forbidding task in light of the rapidly changing character of the field as well as the wide scope of areas covered. The chapter numberings continue from Part A, so the first chapter in this volume, Chapter 7, deals with proteins and their higher molecular weight fragments. Chapter 8 deals with enzymes; Chapter 9 with peptides; Chapter 10 with nucleic acids, polynucleotides, and oligonucleotides; Chapter 11 with polysaccharides and oligosaccharides. Chapters 12 and 13 provide an applied emphasis. Chapter 12 looks at viruses, bacteriophages, and ribosomes, glycosphingolipids, gangliosides, and glycopeptides. Chapter 13 is an excellent applied chapter on protein analyses starting with separation and isolation of starting proteins, followed by sections on hydrolysis, protein sequencing, amino acid analysis, and the application of mass spectroscopy to aid in peptide identification. Sections are also included on the sequencing and analysis of nucleic acids, polysaccharides, glycolipids, and glycopeptides. The real value of this text comes in the next two chapters, which run from page 469 to page 642. Chapter 14 consists of four major tables, which contain lists of separated substances based on data from original papers or reviews. This Registry chapter's tables are as follows: (1) Contents of the Registry (2 pages), (2) Chromatographed Substances (71 pages), (3) Key to the Symbols Used for LC Packings (1 page), and (4) Biomedical Applications (6 pages). An Appendix collecting the references from 1983 to 1986 is also included to update the Bibliography. Chapter 15 is a 1304-reference bibliography covering the period from 1980 to about 1986. Of note is the fact that only 762 references were found up to 1982 and the rest are since then. This is a tribute to the vitality of the field, and the text, due to the natural delays in publication, does not have all of the latest advances. A short concluding chapter on the future prospects seems dated now but is worthy of attention because of the points made regarding growth in separation methods. A comprehensive 57-page index of Volumes A and B concludes this volume.

The major criticism to this text is the fact that the latest references are in 1986 (mainly late 1985) and this is now 1989. However the text does provide an excellent reference to the field for a beginning researcher and, with its extensive bibliography, a good source of past research in the area of interest. Libraries and individuals working in the field of biomolecular HPLC should have this text for reference purposes.

Fred H. Walters, *University of Southwestern Louisiana*

Phytochemical Methods. A Guide to Modern Techniques of Plant Analysis. By J. B. Harborne (University of Reading). Chapman and Hall: London and New York. 1984. xii + 288 pp. \$39.50. ISBN 0-412-34330-4.

This second edition retains the basic structure of the first, with chapters organized by chemical classes, i.e., terpenoids, nitrogen compounds, but practical experiments and a handy appendix of TLC procedures have been added. The practical experiments can guide one through a specific procedure for any typical class of compounds, although it is assumed that the reader knows how to carry out extractions, TLC or GC analysis, etc. Overall this book will be useful to investigators who are looking into a new area of phytochemical analysis, whether they have experience in other areas or are starting their first project. It would be an excellent book for a new student facing a plant extraction project or for a class on natural product analysis.

This book describes many separation, purification, and analysis pro-

cedures, both for classes of general compounds and for specific cases, so that it provides the reader with a very good sense for the type of procedure that might be required for one's own problem. A minor complaint is that while the book is a treasure trove of TLC visualization systems, these are not listed in the index, forcing the reader who noticed an interesting system in past reading to waste time hunting around for the desired recipe.

The book's major weakness is its failure to address certain valuable identification systems. TLC and UV/vis spectroscopic techniques are described most often, with GC and mass spectroscopy receiving some note. These methods are perfectly appropriate for identifying known compounds, but the characterization of new compounds will certainly now rely extensively on NMR spectroscopy, which is barely mentioned. In fact even the cited references are out of date (although the publication date of 1984 may explain part of the problem) and quite inadequate.

In summary, the separation and purification information is good enough to recommend this book, especially for new projects or students, but if you are dealing with an uncharacterized compound, other sources will be required.

Andrew L. Waterhouse, *Tulane University*

Mass Spectrometry/Mass Spectrometry: Techniques and Applications of Tandem Mass Spectrometry. By Kenneth L. Busch (Indiana University) et al. VCH: New York and Weinheim. 1989. xii + 333 pp. \$89.00. ISBN 0895-73275-0.

These authors (Busch, Glish, and McLuckey) have put together an excellent text on tandem mass spectrometry, providing 899 references through 1988. The organization of the material offers a complete overview of the area. The book covers the history of MS/MS, basic concepts, nomenclature, the myriad of instruments with which MS/MS experiments have been performed, types of reactions that have been observed, and applications that are both fundamental and analytically oriented. Principles, instrumentation, and applications of both high- and low-energy gas-phase collisional processes are fully covered. The text touches on just about every possible topic related to MS/MS including not only collision-induced dissociation but also photodissociation, ion/molecule reactions, and charge permutation reactions. Sections of the book cover the complete range of introductory through "advanced" material, making it a complete reference book for anyone working in tandem mass spectrometry.

In the preface of the book, the authors state "...this text is intended to be useful to the novice desiring to learn about the technique of MS/MS, as well as to current practitioners of the technique. For those in the latter category, it is hoped this text will stimulate new ideas for experiments." The book is written not for a true novice, but for someone already familiar with the field of mass spectrometry. For example, introductory material is presented on the components of MS instrumentation, offering the relevant equations but no figures showing what an electric sector, quadrupole mass filter, etc. actually look like. Many of the instruments that have been assembled for MS/MS studies, but not commercially available, are presented and evaluated. Specific information on commercial instruments is not given, which may be disadvantageous to readers who want to get into tandem mass spectrometry, but such a discussion would be of limited utility for this rapidly changing and growing field. For the novice there are too few examples. No MS/MS spectrum is interpreted in any detail from which a true novice could benefit.

Despite these disadvantages for true novices the book is extremely useful for practicing mass spectrometrists. This complete review of the field to date can quickly direct readers to the literature relevant to most aspects of the subject. A full one-third of the book is dedicated to analytical applications, and demonstrates that MS/MS has truly come of age as a powerful analytical technique.

This is a text that all mass spectrometrists and libraries should have. Busch et al. have done a commendable job in producing a comprehensive review of the instrumental and chemical aspects (both fundamental and advanced) of the diverse field of tandem mass spectrometry.

John Allison, *Michigan State University*

The Wiley/NBS Registry of Mass Spectral Data. By Fred W. McLafferty and Douglas B. Stauffer. John Wiley & Sons: New York. 1989. 8000 pp. 7 Volume Set. \$700.00. ISBN 0471-62886-7.

This work is a combination of the Wiley Registry of Mass Spectral Data and the NBS (EPA/NIH) collection. It is the largest collection of printed mass-spectral reference data available. Over 112 300 different chemical compounds are represented. All are positive-ion, electron-ionization (70 eV) spectra, with unit-mass resolution.

The objective of this work was to compile the largest collection of printed reference spectra, but to condense the information into as few volumes as possible in order to make it reasonably affordable. To achieve

this objective, the authors have adopted a highly condensed format, much smaller than that used in previous editions of the Registry. However, the effect of condensing the data so much has made the books somewhat inconvenient to use.

For each compound, only a bar-graph spectrum is given, with no listing of the m/z values provided. The bar-graph spectra are very small, typically $1\frac{1}{2}$ in. \times $1\frac{3}{4}$ in. The X-axis is not labeled in m/z units for every spectrum, only for every third spectrum. The scale is approximately 77 Da per in., with tick marks every 5 Da. There are no m/z annotations above major peaks, so that it is sometimes difficult to obtain actual m/z values, especially if they fall between the 5 amu tick marks. The printing resolution is very good, however, so that the aid of a magnifying glass does help in peak identification. The authors justifiably argue that a larger, easier-to-use format would require at least three times as many volumes to house this number of spectra.

A nice feature is the inclusion of the CAS chemical structure, printed on each bar-graph spectrum where space allows without obscuring peaks. Also provided for each compound is the following information: its nominal molecular weight; elemental composition; CAS registry number; a source code indicating the source of the spectrum (journal code, page, spectrum number); compound names, both CAS and common; a notation that indicates whether the spectrum was from the Wiley or NBS collection; and the serial number of the spectrum on magnetic tape.

Spectra are organized first of all according to nominal molecular weight (based upon the most abundant isotope of each element). Each molecular weight group is subdivided according to number of carbons, then number of hydrogens, and then number of other atoms arranged alphabetically. Isotopically enriched spectra are placed next to the spectrum of the otherwise unlabeled compound.

The authors have made every attempt to correct errors and to choose the best spectrum when more than one spectrum was available for the same compound. The quality of the spectra is generally quite good, although a small percentage of spectra appear sparse, with the carbon-13 and other low abundance peaks missing. The authors acknowledge that given the huge number of spectra, some errors are inevitable, and that it is an on-going process to find and correct these errors.

The spectra used in this collection were obtained from over 300 different sources and laboratories around the world. Thus, there is a wide variety of different classes of compounds represented. In spite of some difficulty in using the highly condensed format, this collection is valuable and useful because of the large number and variety of compounds which it contains.

James Windak, *The University of Michigan*

Reality and the Physicist. By Bernard d'Espagnat (University of Paris); translated from the French by J. C. Whitehouse (University of Bradford) and Bernard d'Espagnat. Cambridge University: Cambridge and New York. 1989. 280 pp. \$59.50. ISBN 0-521-32940-x (cloth), \$19.95. ISBN 0-521-33846-8 (paperback).

One of the bizarre implications of quantum mechanics that Einstein could not bring himself to accept is what has become known as "nonlocality", or the untenability of "Einstein locality". In a famous 1935 paper by Einstein, Podolsky, and Rosen (EPR), the authors showed that action at a distance, faster than light, is in some sense inherent in quantum theory unless certain correlations can somehow be accounted for by an (as yet undiscovered) inner structure in the quantum world. It was not until two decades later when Bohm recast the EPR thought experiment, rendering it more amenable to analysis and to experiment, that an outpouring of philosophical and popular works on the subject began. It became clear that Einstein's hoped-for realistic resolution was a vain hope.

Some authors, setting rigid rules about what are legitimate matters for discussion, denied that any paradox is involved. Others, however, including d'Espagnat, found the contradictions between reasonable notions of reality and quantum mechanics so disturbing that they immersed themselves in a quest for enlightenment. d'Espagnat's significant prior contributions to the field make him an uncommonly qualified interpreter of the conceptual problems involved. Therefore it is reasonable to expect his new book *Reality and the Physicist* to bring important perspectives to the nonspecialist to whom he has expressly addressed this work.

How successful is the book in its aims? It is fair to say that it is not appropriate as a first study for scientists interested in learning about pivotal quantum concepts, even if they already have strong backgrounds in, for example, atomic and molecular quantum mechanics. The presentation is so abstract and vague about certain details that a reader not already initiated into the arcane field is fed far too little concrete information to allow him to appreciate the author's arguments. A reader not yet acquainted with the EPR story, Schrodinger's cat, Wigner's friend, the EWG many-worlds approach, the de Broglie-Bohm-Bell nonlocal hidden variables interpretation, and Bell's inequalities, is likely

to find the text baffling. On the other hand, the concepts discussed by d'Espagnat are intrinsically so fascinating and so fundamental that thoughtful scientists will want to profit from the author's searching analyses. But the reader must be prepared to persevere through obscure and tortuous passages and personal, almost mystical comments about life, culture, and meaning. Then, if he has taken the trouble to become familiar with the principal elements of the field beforehand, he will be treated to sensitive reviews of philosophy and what man is entitled to know about the real world around him.

Lawrence S. Bartell, *University of Michigan*

Troubleshooting LC Systems. By John W. Dolan and Lloyd R. Snyder (LC Resources). Humana: Clifton, NJ. 1989. viii + 515 pp. \$65.00. ISBN 0-89603-151-9.

This book covers the principles of successful troubleshooting of liquid chromatography systems and should be useful to LC users at all levels of experience. The book is divided into three sections: Section I, General Considerations; Section II, Individual LC Modules; Section III, Troubleshooting the Separation plus Other Problems.

Under General Considerations, logical approaches to troubleshooting, the basics of separation, principles of troubleshooting, and prevention of problems are discussed. An excellent and comprehensive set of flow charts designed to help one quickly isolate and correct a wide variety of LC problems can be found in Chapter 2. This reviewer anticipates that this particular chapter will be consulted frequently. In Section II the principle of operation and recommendations for preventive maintenance are described for each component module in a LC system. The authors have wisely avoided any discussion or reference to specific instrument brands but focus instead on generic LC modules, leaving instrument-specific procedures to be found in manuals supplied by the manufacturers. Components examined include reservoirs and degassing, pumps, tubing, fittings, injectors, autosamplers, columns, detectors, recorders, and data systems. A handy list of spare parts to have available for emergency use and routine maintenance of each component is also provided. The third section addresses nonequipment problems pertaining to the separation, and coverage here is directed to topics such as band tailing, peak distortion, and other changes in the appearance of chromatograms, quantitation gradient elution, and sample pretreatment.

This book is well written and very informative and reflects the vast experience of the authors in this field. Because of the expansive nature of the topics covered and the high quality of treatment, this book is strongly recommended for purchase by both the beginning and the experienced LC user.

Eugene F. Barry, *University of Lowell*

Molecular Neurobiology. Edited by Nicolas G. Bazan (Louisiana State University Medical Center) and David U'Prichard (Johns Hopkins University School of Medicine). Humana: Clifton, NJ. 1988. 398 pp. \$85.00. ISBN 0-89603-152-7.

Molecular Neurobiology compiles up-to-date, complete reviews of topics of importance in the field of the neural sciences. These topics are still under investigation by active researchers and have utmost relevance to medicine. Different approaches are taken today to study the complexities of the nervous system. It is review articles such as those that appear in this volume that give an in-depth coverage of the latest developments in the special area of neurobiology.

The advances in biochemistry, molecular biology, immunology, and analytical detection techniques have opened new avenues of research in living systems. It is a pleasure to see the use of a variety of methods to investigate the mechanisms of biological processes. One tries to describe a biological system, understand how it functions under normal conditions, how it can be altered under certain abnormal conditions, and how it can be modified or reversed from these altered states. The goal is to understand normal physiology, disease states and provide therapy, that is devise ways to correct abnormalities via use of drugs, corrective surgery, behavior modification, or genetic alteration. This is the purpose of integrating chemistry, biology, molecular biology, and genetic engineering into physiology, pathology, and pharmacology. The topics covered in *Molecular Neurobiology* are excellent examples of this integration as applied to the study of the nervous system. Solomon Snyder's opening remarks describe very clearly the goals of molecular neurobiology.

The article by Jon Lindstrom et al. on the nicotinic acetylcholine receptors is a comprehensive review of not only the chemistry, structure, and function of ACh receptors but an excellent summary of the comparative data on neuronal ACh receptors obtained utilizing monoclonal antibodies and cDNA probes. The significance of the results is discussed in detail.

The two papers on β -adrenergic and GABA receptors brings the reader up-to-date on the latest relevant data on the structure and function of these receptors. Furthermore, the use of molecular biological tech-

niques and its implications in therapeutics and pharmacology is fascinating.

Paul Greengard has an excellent review article on protein phosphorylation reactions which gives direct experimental evidence of their role as mediators of signal transduction in nerve cells.

Barnstable's article on retinal development shows the extensive use of immunological methods in detecting molecular changes during differentiation and growth, and the elegant use of monoclonal antibodies in the study of the light-dependent conformational changes in the opsin polypeptide.

Civelli et al. believe that further knowledge of the opioid receptors relies on the use of molecular genetic techniques in future studies. Breakfield and Geller's paper on "Gene Transfer into the Nervous System" also places emphasis on the applications of molecular genetics. Even though molecular biology and genetic engineering techniques are used as special research tools and give very specific information, their use in generating genetically modified cells or creating animal models should be done with caution. Emphasis should be placed on understanding nervous system abnormalities at the synaptic, receptor, enzyme, or genetic levels but therapy should be achieved pharmacologically rather than by manipulating the genes. Sorey and Gnatt give a treatise on how the understanding of human cholinesterase genes can lead to potential therapeutic applications in surgery, organophosphate insecticide or nerve gas poisoning, and genetic defects.

All of the articles are well organized and written by experts who have a history of significant contributions to research in this area. This book will be an indispensable reference to researchers in molecular neurobiology and clinicians in neurology and psychiatry.

Nuran M. Kumbaraci, *Stevens Institute of Technology*

Strategies and Tactics in Organic Synthesis. Volume 2. Edited by Thomas Lindberg (The NutraSweet Company). Academic: San Diego and New York. 1989. xv + 469 pp. \$75.00. ISBN 0-12-450281-4.

The present volume, the second in this series, describes the evolution of more than a dozen contemporary natural product syntheses. In some respects the book is reminiscent of earlier compilations of total syntheses, such as Fleming's *Selected Organic Syntheses* or *Creativity in Organic Synthesis* by Bindra and Bindra. It is distinguished from them, however, by the degree of detail in which the individual syntheses are examined and, most importantly, by the fact that here each of the chapters has been written by the investigators who actually carried out the work. As a result the reader not only sees the completed syntheses as they would appear in the primary literature but also gets a first-hand account of the false starts and missteps which preceded their ultimate success. The value of such a compilation is obvious. For the practicing synthetic chemist it provides a wealth of anecdotal information not available elsewhere. Moreover, since each of the chapters is extensively referenced, it is a simple matter to trace a useful reagent or transformation to its source. For the student of synthesis at the graduate or advanced undergraduate level, the book is a fine introduction to the art of synthetic design. It has always seemed to this reviewer that the study of existing syntheses constitutes the best means of developing one's own synthetic judgment, and in this respect, the book is a valuable educational resource.

In Volume 2 of this series one will find chapters dealing with the total synthesis of streptonigrin and lavendamycin (D. L. Boger), phyllanthocin (S. D. Burke), retigeranic acid (T. A. Engler), saxitoxin (P. A. Jacobi), the bottom half of ivermectin (M. E. Jung), α -cyclopirozonic acid (A. P. Kozikowski and M. N. Greco), indole alkaloids (S. F. Martin), casbene and bertyadiol (A. B. Smith III and B. D. Dorsey), polyquinanes (D. D. Sternbach), pseudomonic acid C (D. R. Williams), actinobolin (B. Fraser-Reid and R. Tsang), and olivomycin A (W. R. Roush), along with two syntheses of quadrone (S. D. Burke and P. Helquist). Each chapter is well written and the editor is to be congratulated on having assembled this interesting and useful contribution to the synthetic literature.

Chris A. Broka, *Syntex Research*

Electroanalytical Chemistry. A Series of Advances. Volume 15. By A. J. Bard (University of Texas). Marcel Dekker: New York and Basel. 1989. xii + 376 pp. \$110.00. ISBN 0-8247-7646-1.

This text is the latest in the distinguished series edited by Bard. Over the past 20 years, each *Electroanalytical Chemistry* installment has provided topical, well-written, and interesting accounts of several areas of electrochemistry. Volume 15 upholds this long tradition with reports on *Electrochemistry of Liquid-Liquid Interfaces* by H. H. J. Girault and D. J. Schiffrin, *Ellipsometry: Principles and Recent Applications in Electrochemistry* by S. Gottesfeld, and *Voltammetry at Ultramicroelectrodes* by R. M. Wightman and D. O. Wipf.

The first chapter is a detailed and thorough (287 references) treatment of the electrochemistry of liquid-liquid interfaces. Since the subject is necessarily physical in nature, the chapter is replete with thermodynamic

equations and accompanying plots. The authors do a remarkably good job of leading the reader through this intimidating aspect of the subject. The writing is so well organized and annotated that it is not difficult to read or comprehend. The last portion of the chapter contains many chemical and electroanalytical studies. Again the organized writing style and judicious selection of subject material makes this portion of the chapter quick reading.

The second chapter, on ellipsometry, is decidedly more analytical in nature and equally well written. Gottesfeld first describes the theoretical and instrumental aspects of ellipsometry necessary to understand the numerous examples provided later. These sections appear to be detailed enough and the references substantial enough that the neophyte could undertake this technique without undue trouble. The emphasis of the chapter, however, is clearly on the applications. Simple, film-thickness measurements are presented first, followed by examples of morphology changes, and finally by quite complicated and subtle examples like polypyrrole and polyaniline. This progressive presentation is greatly appreciated, since the reader can develop a feel for the technique and the sometimes confounding shapes the data may take before being asked to understand the complicated film chemistry ascertained from these data. Further applications to (sub)monolayers, double-layer studies, metal deposition/corrosion, and semiconductor surfaces close out this excellent chapter.

The final chapter, by Wightman and Wipf, is particularly timely, since ultramicroelectrodes are finding increasing use, not only in electroanalytical chemistry, but in inorganic and organic electrochemical studies. The authors provide a wonderful section on diffusion at microelectrode surfaces; the equations are simple enough to be understood, and the excellent use of graphs and literature examples makes the vital concepts and equations in this section all but impossible to misunderstand. (It is unfortunate that the importance of migration at such surfaces was not appreciated at the time this chapter was written, since incorporation into the present chapter would have been ideal.) The authors then build on these concepts to discuss the truly exciting applications of ultramicroelectrodes—use in resistive solutions and fast electrochemistry. A quite detailed section on the construction and evaluation of electrodes should be an indispensable guide to researchers wishing to employ these new methods.

It is easy to recommend a book that is part of such a successful series and especially easy for this edition. Like so many of its predecessors, copies of this book will appear in numerous bookshelves and citations will appear in many publications.

Charles R. Leidner, *Purdue University*

Surface Organometallic Chemistry: Molecular Approaches to Surface Catalysis. Series C: Mathematical and Physical Sciences—Volume 231. By Jean-Marie Basset et al. (CNRS). Kluwer: Dordrecht. 1988. ix + 330 pp. \$94.00. ISBN 90-277-2724-4.

This book is a well-organized and effectively presented series of reports on the following topics: reaction of organometallics with oxides, zeolites, and metals; molecular models of oxides, metals, and surface complexes; synthesis of new porous supports; and the molecular approach to mechanisms of surface reactions and catalysis. The articles are written by selected participants of a NATO workshop who are well-known for their work in the areas of organometallic, inorganic, and surface chemistry and catalysis relating to the subject of organometallic surface chemistry. Besides catalysis, the main topics considered are reactions of organometallics with surfaces of metal oxides, metals, and zeolites; molecular models of surfaces, metal oxides, and metals; molecular approaches to the mechanisms of surface reactions; and synthesis and modification of zeolites and related microporous solids.

It starts out after an excellent summary and conclusions to the workshop and is then followed by a short but pertinent introduction to metal oxide surfaces (Knözinger). This introduction evolves into a summary of the reactions of organometallics with oxide surfaces (Evans) and is subsequently developed in more detail by a discussion of a number of catalytic test reactions (Whyman). The special application of the reaction of organometallics with supported metal particles by the group of the late Professor Yermakov (Ryndin) as well as important aspects of physical characterization techniques (Gallezot) follow. High nuclearity molecular metal clusters providing an excellent system of models between the metallic state and the molecular state is then presented in the article by Longoni. Elementary steps in heterogeneous oxidation reactions in terms of molecular models of surface complexes are thereupon discussed (Klemperer). Some specialized but relevant examples of metalimine molybdenum complexes (Chan) and of molecular models of rhenium oxide catalysts in alkene metathesis reactions (Herrmann) complete this part of the subject.

The subsequent material dealing with metal oxides with regular structures presents an authoritative and readable presentation of the

synthetic chemistry of zeolites (Barrer), the new structurally analogous class of ALPO and SAPO materials (Rabo), and an introduction to aluminosilicate clays (Clearfield). A final chapter on the design of new supported structures including organometallics concludes the discussion with an overview of future possibilities (Derouane).

This book will provide very useful reading for both the worker with a specialized motivation in the particular interface area of organometallic chemistry relating to solid surfaces and to the surface scientist seeking an introduction to this interesting emerging area. It is, in this reader's opinion, an effective and readable example of a well-collected body of information covering a broad range of new results from the viewpoints both of scientific interest and materials application in a specific area.

Thor Rhodin, *Cornell University*

Calcium in Essential Hypertension. Edited by K. Aoki and E. D. Frohlich (Nagoya University Medical School and Ochsner Medical Foundation). Academic: San Diego and New York. 1989. xviii + 675 pp. \$150.00. ISBN 0-12-058845-5.

This is an interesting book that discusses hypertension and basic physiology of vascular smooth muscle (VSM) cells. The central theme is the role played by Ca^{2+} ion as a second messenger in excitation-contraction coupling and pharmacomechanical coupling in VSM cells, and how altered Ca^{2+} metabolism can lead to increased state of contraction of the cells and primary hypertension. The book serves as a good review and summary of the regulation of contraction in VSM, and the roles played by the cell membrane (ion channels, pumps, and receptor-enzyme complexes), sarcoplasmic reticulum (SR) membrane (Ca^{2+} -release channels and pumps), and phosphorylations by various protein kinases. The involvement of the second messenger systems, the cyclic nucleotides, and phosphoinositol (PI) turnover, with production of IP_3 (inositol triphosphate) and DAG (diacyl glycerol), is discussed. The data are reviewed concerning reported alterations in some parameters in VSM from hypertensive animals, such as the SHR (spontaneously hypertensive rats) and DOCA (desoxy-corticosterone acetate)-salt hypertensive. A major section (Chapters 21–27) covers results of the use of calcium-antagonist drugs in the treatment of hypertension in humans. Thus, the book ranges between basic science data and clinical data.

Of the 28 chapters in this book, 9 are authored/co-authored by one of the editors (K. Aoki) and 2 are by the second editor (E. D. Frohlich). Dr. Aoki is the co-developer of the SHR model. Some very well-known basic physiologists have authored other chapters, including A. P. Somlyo, G. Droogmans, K. G. Morgan, J. T. Stull, F. Mekata, E. E. Daniel, T. Godfraind, D. J. Triggle, R. C. Webb, D. F. Bohr, C. van Breemen, R. C. Dhalla, and M. J. Mulvany.

The deficiencies in this book include: (1) The role of the vascular endothelial cells, with the various vasodilating and vasoconstricting factors released therefrom, is virtually ignored in this book. (2) The basic science of the vascular nerves and postsynaptic potentials or EJPs (excitatory junction potentials), and their possible role in hypertension and vasospasm, is essentially not covered. (3) Not mentioned is the evidence, published during the past 2–3 years, which demonstrates that cyclic GMP and cyclic AMP inhibit the inward Ca^{2+} slow current through the voltage-dependent Ca^{2+} slow channels, and thus can be an important mechanism by which vasodilation (and blood pressure reduction) is produced by agents like nitroprusside, ANP (atrial natriuretic peptides), and EDRF (endothelial-derived relaxing factor). (4) Experiments on mechanism of action of Ca-antagonist drugs, using whole-cell voltage clamp measurement of Ca^{2+} slow current, is scantily covered. (5) The clinical data covers primarily only use of calcium-antagonist drugs.

In summary, this book, although having several deficiencies, is valuable reading for those individuals who are interested in the causes and treatment of hypertension and in the basic physiology of VSM cells. It is expensive however.

Nicholas Sperelakis, *University of Cincinnati*

Preparative-Scale Chromatography. Chromatographic Science Series. Volume 46. Edited by Eli Gruska (The Hebrew University of Jerusalem). Marcel Dekker: New York and Basel. 1989. xi + 324 pp. \$99.75. ISBN 0-8247-8061-2.

This book is the bound version of 15 contributions by 28 leading international scientists originally published in the journal *Separation Science and Technology Volume 22, Numbers 8–10, 1987*. For scientists who demand state-of-the-art preparative chromatography, i.e., simultaneous purification and collection of large quantities of a target chemical species, the book is an excellent resource. The most pertinent theoretical developments coupled with experimental evaluation are presented. The contributions are harmoniously organized, and no severe overlap of subject matter occurs. Interesting chemical systems are examined and used as examples. In particular, large-scale recovery of dinitrophenyl amino acids, dipeptides, high fructose corn syrup, albumin, and pure

oligonucleotides are reported. Preparative chromatography is also shown to be a valuable technique in separating isomers obtained in synthetic procedures.

Contributions 1–2 deal with preparative gas chromatography (PGC) with the emphasis on understanding and controlling band profiles in nonlinear chromatography, and recognizing solute–solute interactions that lead to poorer than anticipated separations. A rigorous numerical simulation of band propagation for nonlinear isotherm in PGC conditions is presented. Contributions 3–9 comprise the major emphasis of the book and deal with preparative liquid chromatography (PLC). PLC column design and method development is addressed. Key chromatographic parameters such as sample volume, analyte concentration, particle diameter, column length, column diameter, and eluent flow rate pertaining to productivity optimization are clearly evaluated both theoretically and experimentally with useful guidelines reported. In the liquid and gas chromatography contributions, overloaded column conditions at typical capacity factor (k') values are emphasized. Methods based upon extrapolation from analytical-scale linear isotherm conditions to preparative-scale nonlinear isotherm conditions are developed. The technique of displacement liquid chromatography, at relatively high k' values, is not covered in detail. Contributions 10–12 deal with preparative counter-current chromatography (PCC). Several synchronous flow-through arrangements are theoretically and experimentally evaluated with the cross-axis geometry found to be optimum. Continuous PCC is compared to batch separation approaches. Contributions 13–14 deal with preparative ion-exchange chromatography. Automated multi-step cleanup with stepwise elution is described for biological samples. Finally, contribution 15 briefly covers preparative thin-layer chromatography.

In general the book is rigorous and detailed, but the various authors manage to reduce their respective contributions down to useful and informative guidelines. The readership should be widespread, with both academic and industrial scientists in a variety of fields readily benefitting from this advanced level book.

Robert E. Synovec, University of Washington

Bioprocess Technology. Kinetics and Reactors. By Anton Moser (Technische Universität Graz). Springer-Verlag: New York. 1988. xxx + 451 pp. \$125.00. ISBN 0-387-96603-X.

This book was revised and translated from the German edition of *Bioprosesstechnik: Berechnungsgrundlagen der Reaktionstechnik Biokatalytischer Prozesse*. As stated in the Preface, it is the result of 15 years of experience in teaching and research. It stems from lectures that Professor Moser gave in several universities, including those in Austria, Canada, Belgium, Sweden, East Germany, West Germany, Bulgaria, and The Netherlands. Generally speaking, it is difficult to evaluate a book that is associated with classroom lectures because what Professor Moser does in his lectures will have a lot to do with whether the book is useful or not as a textbook in helping the students learn. Furthermore, it will also depend on the background of the students for whom it is intended. This reviewer has been teaching a course on "Introduction to Biochemical Engineering" since 1966. I do not use a textbook because I have not been able to find one that suits my purpose. After reading *Bioprocess Technology* by Professor Moser, I will say that I will not use it as a textbook for my class.

After a brief introduction (Chapter 1), the second chapter is entitled *The Principles of Bioprocess Technology*. This title is puzzling because the first half of the chapter covers really a collection of definitions of specific rates and yield factors and some rather trivial relationships with stoichiometric coefficients. The second half of Chapter 2 contains some discussions about mathematical modeling which do not seem to mix well with the first half. This chapter is probably unnecessary, and the definitions and discussions could easily be inserted wherever needed in later chapters.

Chapter 3, on bioreactors, appears to be intended for a review or summary of chemical reactors. This is where the European schools and the American schools may differ. The students in the above-mentioned class of this reviewer will all have had the necessary background of chemical reaction engineering. As a brief review, this chapter is not well done. The presentation of some of the advanced materials involving complicated modes of operation is not clear nor adequate.

Chapters 4 and 5 could be simply combined as one single chapter. They deal with enzyme kinetics, cell growth on single and multiple substrates, growth of mixed cultures, and process rate in heterogeneous reaction mixtures; Chapter 6 describes the reactor design and performance.

In the opinion of this reviewer, the book is too long. Besides a brief introduction, a book of two chapters should be sufficient. There should be a substantial chapter on kinetics of bioreactions and then a short one on bioreactors to show how biokinetics is incorporated into chemical reaction engineering in designing and evaluating bioreactors. The or-

ganization of Professor Moser's book is such that this reviewer found it hard to read and follow. Many of the charts which are there, presumably for helping the clarity, cause only more confusion.

This book does not serve well as a reference for chemists, biochemists, or biological scientists who want to know something quickly about bioreactors. For possible use as a textbook, this reviewer was looking for some homework assignments and examples, but could not find any.

George T. Tsao, Purdue University

Books on Applied Subjects

Dispersing Powders in Liquids. Handbook of Powder Technology. Volume 7. By R. D. Nelson (E. I. du Pont de Nemours & Co., Inc.). Elsevier: Amsterdam and New York. 1988. xviii + 246 pp. \$84.25. ISBN 0-444-43004-0.

Slurries consist of dispersions of small particles in a liquid; the solid particles may agglomerate, but the presence of a dispersant can prevent this and produce a stable slurry. This book is written to acquaint industrial chemists with the subject and to provide laboratory procedures for selecting dispersants and preparing stable dispersions. About one-half of the book consists of appendixes on the properties of solids, liquids, and surfactants, on surfactant manufacturers, and on units, constants, and symbols.

Heat Exchangers. Selection, Design and Construction. By E. A. D. Saunders (ESDU International). John Wiley & Sons: New York and Chichester, and Longman: Harlow. 1989. xv + 568 pp. \$99.95. ISBN 0-470-20870-8.

This book describes construction and application of heat exchangers used in the process industries. A chapter on fouling and one on heat transfer have some connection with chemistry.

Pesticide Index. Edited by H. Kidd and D. Hartley. Royal Society of Chemistry: Cambridge. 1988. iv + 258 pp. \$32.00. ISBN 0-85186-733-2.

This is a quick reference guide to names and manufacturers of pesticides. The entries are of two types: active ingredients and trade names. Alternative names, trade names, and in most cases, IUPAC systematic names are given, along with a description of the type of use or activity. A list, with full addresses, of marketing companies is included.

Information Resources in Toxicology. Second Edition. By Philip Wexler (National Library of Medicine). Elsevier: New York and Amsterdam. 1988. xxiv + 510 pp. \$90.00. ISBN 0-444-01214-1.

This book is divided into two parts: United States Resources and International Resources. History, bibliography, periodicals, data bases, abstract sources, audiovisual aids, legislation and regulation, relevant organizations, educational programs, testing laboratories, and poison control centers are listed. The international section is subdivided according to country. The index is appropriately substantial.

Evaporation Technology. Principles, Applications, Economics. By Reinhard Billet (Ruhr-Universität Bochum). VCH: Weinheim and New York. 1989. ix + 317 pp. \$125.00. ISBN 0-895-73813-9.

This is a book written for those who teach or practice evaporation engineering, or wish to learn about it. It is a translation of a German original, brought up to date in the process. It deals with energy management, operation, design, accessories, batch evaporation, flash crystallization, ecological engineering, and desalination of seawater.

Crossflow Filtration. Theory and Practice. By Jacob Murkes and Claes-Göran Carlsson. John Wiley & Sons: Chichester and New York. 1989. x + 133 pp. \$67.95. ISBN 0-471-92097-5.

Crossflow filtration is stated to be a relatively new technique that has only recently been applied to particulate separation. The four chapters present the general background, low-shear, high-shear, and electrically enhanced crossflow filtration from the standpoint of chemical engineering.

Managing Industrial Hazardous Waste. A Practical Handbook. By Gary F. Lindgren (Heritage Environmental Services). Lewis: Chelsea. 1989. xiii + 389 pp. \$59.95. ISBN 0-87371-147-5.

This book was written for chemists and others in the manufacturing industry who are responsible for management of wastes. It aims to provide a framework for understanding regulatory requirements and a "philosophy" for decision-making. An extensive group of appendixes appears to be potentially very helpful; there is even one entitled Useful Telephone Numbers.

Hazardous Waste Minimization Handbook. By Thomas E. Higgins (CH2M HILL). Lewis: Chelsea. 1989. xvii + 228 pp. \$49.95. ISBN 0-87371-176-9.

Managing wastes has become an important and urgent concern. One approach is the garage-sale philosophy: if you don't want it, try to sell it. Another is to minimize its production, and that is the aim of this book.

It is designed for industrial engineers and managers, the author states in the preface; it is surprising that chemists do not seem to be brought in, for increasing the yield of reactions is an important way to reduce wastes. The subjects covered are painting and coating and removal of coatings, metal plating and finishing, degreasing, machining, and waste treatment and minimization.

Wood Adhesives. Chemistry and Technology. Volume 2. Edited by A. Pizzi (Council for Scientific and Industrial Research). Marcel Dekker: New York and Basel. 1989. xv + 416 pp. \$125.00. ISBN 0-8247-8052-3.

There is much chemistry in this volume, from protein adhesives, polyvinyl alcohol, and phenol-formaldehyde resins to release of formaldehyde from wood products and hotmelts for wood products. The 11 chapters are all contributed by chemists from industry, universities, and government laboratories. They embody much applied polymer chemistry. Chemical structures, graphs of physical properties, and tables of data are more prominent than photographs of laminated wood; the book is thus written for the scientific professional rather than the fabricator. Although it is intended for adhesiologists, it would be a saviour to all kinds of chemists whose child comes home from school saying, "My teacher told me to ask you to explain why glue sticks".

Lecture Notes in Earth Sciences 21. Contaminated Sediments. By Ulrich Förstner (Technische Universität Hamburg-Harburg). Springer-Verlag: New York and Berlin. 1989. 157 pp. \$19.00. ISBN 0-387-51076-1.

This soft-bound book is made up of a 7-page subject index and seven chapters: Introduction, Priority Pollutants, Assessment Methods, Particle Associations, Transfer Processes, Environmental Impact, and Dredged Materials.

Advances in Soil Science. Volume 10. Edited by B. A. Stewart (U.S. Department of Agriculture). Springer-Verlag: New York and Berlin. 1989. ix + 200 pp. \$79.00. ISBN 0-387-96900-4.

The type of "soil science" in this book has a strong relationship to chemistry, as indicated by the titles of the five contributed chapters: Reactions Controlling Heavy Metal Solubility in Soils, The Components of Nitrogen Availability Assessments in Forest Soils, Carbon Sources for Bacterial Denitrification, Integrated Nitrogen Management in Irrigated Rice, and Tropical Soils and Soil Classification Updates. There is a good index of 6 pages.

World Directory of Pesticide Control Organisations. Edited by G. Ekstrom (Swedish National Food Administration) and H. Kidd (Royal Society of Chemistry). Royal Society of Chemistry: Cambridge. 1989. v + 309 pp. \$56.00. ISBN 0-85186-723-5.

This soft-bound book is a revised edition of *Control of Pesticide Applications and Residues in Food*, published in 1986. It has information from 45 more countries. It contains over 1200 contact addresses from 132 countries and has become an important adjunct to international cooperation.

Maximum Concentrations at the Workplace and Biological Tolerance Values for Working Materials 1988. Commission for the Investigation of Health Hazards of Chemical Compounds in the Work Area. Report XXIV. By DFG (Deutsche Forschungsgemeinschaft). VCH: New York and Weinheim. 1988. 90 pp. \$17.00. ISBN 0-89573-840-6.

This soft-bound book is divided into two parts, as indicated by the title. The first part includes lists of compounds for which maximum allowable concentrations have, and have not, been established, and sections on carcinogenic materials, dusts, and fumes, and special working materials (organic peroxides, gasoline, turpentine, pyrolysis products of organic materials, and metal-working fluids). The second part is similar, but shorter.

Radioactive Waste Management. By Robert E. Berlin (Manhattan College) and Catherine C. Stanton (Catherine C. Stanton & Associates, Inc.). John Wiley & Sons: New York and Chichester. 1989. xvi + 444 pp. \$75.00. ISBN 0-471-85792-0.

The intention of the authors is "to provide a comprehensive and current review of the field of radioactive waste management to be used by practitioners in the field and by students of the subject". This is accomplished in 7 chapters, the first of which is a general introduction, and several appendixes. Regulation, safety, technology, and remediation are all considered. There is much solid information and a good index.

Food Emulsifiers. Chemistry, Technology, Functional Properties and Applications. Developments in Food Science 19. Edited by G. Charalambous and G. Doxastakis. Elsevier: Amsterdam and New York. 1989. xx + 550 pp. \$184.25. ISBN 0-444-87306-6.

This book is a collection of contributed chapters in typescript form, assembled to provide a reference work of current technical information of interest to the food scientist. A large portion is devoted to corn, egg, milk, soybean, meat, and marine proteins. Gums and phospholipids are also treated. Much practical emulsion chemistry is included. A 5-page subject index concludes the work.

Industrial Boilers. By David Gunn and Robert Horton. John Wiley & Sons: New York and Chichester. 1989. xviii + 362 pp. \$137.00. ISBN 0-47021055-9.

Chemistry is involved with the subject of this book in chapters on combustion, water treatment, and corrosion.

Handbook of Plastics Test Methods. Third Edition. Edited by Roger P. Brown (Rapra Technology Ltd.). John Wiley & Sons: New York and Chichester. 1988. xii + 442 pp. \$159.00. ISBN 0-470-21134-2.

This work, the original edition of which was published in 1971, bears the imprimatur of the Plastics & Rubber Institute and has the character of a source of standard methods. All manner of mechanical, electrical, optical, thermal, and environmental properties are included, but chemical tests are very limited.

Volumes of Proceedings

Microbial Quality Assurance in Pharmaceuticals, Cosmetics, and Toiletries. Edited by S. F. Bloomfield (King's College, London) et al. John Wiley & Sons: New York and Chichester. 1988. 222 pp. \$59.95. ISBN 0-470-21122-9.

The 14 papers in this book are derived from lectures given at a "postgraduate school" held in 1987 at King's College, London. The audience was composed of scientists in the pharmaceutical, cosmetics, and toiletries industries, and in hospital pharmacy. Preservation of the substances used was the major theme, and antimicrobial agents are featured in some papers.

Computer Simulation of Biomolecular Systems. Theoretical and Experimental Applications. Edited by Wilfred F. van Gunsteren (University of Groningen) and Paul K. Weiner (Alliant Computer Systems Corporation). ESCOM: Leiden. 1989. viii + 224 pp. \$95.00. ISBN 90-72199-03-0.

This volume is "a sampling" of papers contributed by participants in two symposia sponsored by Alliant Computer Systems Corporation in 1987 (Princeton) and 1988 (Amsterdam). The selection and arrangement are intended to provide an introduction to the technique of computation of free energy in biological systems, an account of the present state of this application to molecular systems, and some other recent developments in molecular modeling and structure refinement. The 14 papers are set in type, and there is an extensive subject index.