

Book Reviews

Specialist Periodical Report Series. Volume 10. Mass Spectrometry. Edited by M. E. Rose (The Open University). The Royal Society of Chemistry: Cambridge. 1989. xv + 431 pp. \$182.00. ISBN 0-85186-348-5.

The *Specialist Periodical Report Series* developed when the field of chemistry became too large to be adequately reviewed in a single volume. This tenth volume on mass spectrometry suggests that even the subfield of mass spectrometry may be getting unwieldy. Rose and co-authors make a valiant effort. The book covers the literature from July 1986 to June 1988, citing a staggering 3300 references and achieving, at best, selected coverage of the field. A combination of a rapidly changing field of study and the seemingly inevitable slowness of the publication process again conspire to make the volume somewhat out of date before it even appears.

The book is divided into eleven chapters; many of the authors have contributed to previous volumes in the series. Chapter 1 (Ionization Processes and Ion Dynamics) covers ionization processes in some detail, but primarily for molecules with less than ten atoms. Much information on photoionization and ion spectroscopy is presented, but many interesting ionization processes are not included (e.g., thermospray, electrospray, and plasma desorption ionization). Chapter 2 (Structures and Reactions of Gas Phase Organic Ions) is quite comprehensive in its coverage, including a discussion of neutralization/reionization mass spectrometry and collision-induced decomposition.

Chapter 3 (Developments and Trends in Instrumentation) is excellent, touching on ionization methods, mass analyzers, and detection devices. Chapter 4 (Applications of Computers and Microprocessors in Mass Spectrometry) covers a variety of hardware and software issues, noting the rise in the use of personal computers in mass spectrometry. Chapter 5 (Organic Negative Ions: Structure, Reactivity, and Mechanisms) catalogs over 550 references to negative ion studies, making for informative, if tedious, reading.

Chapter 6 (Analysis of Mixtures Part I: GC-MS) includes a host of related topics, with a good discussion of chemical derivatization. Chapter 7 (Analysis of Mixtures Part II: Techniques Other Than GC-MS) deals with CZE-MS, SFC-MS, HPLC-MS, and MS-MS. The authors have evaluated, as well as reviewed, the literature, making for a particularly valuable chapter.

Chapter 8 (Application to Natural Products: Nucleosides, Nucleotides, and Nucleic Acids) covers the specified topic in some detail. It is somewhat disappointing, however, in that it does so at the expense of all other classes of natural products. Chapter 9 (Studies of Drug Metabolism and Pharmacokinetics) addresses quantitation and contamination problems, but it is so heavily documented that it becomes difficult to read unless one is looking for information on a particular drug.

Chapters 10 and 11 (Metal-containing and Inorganic Compounds and High Temperature Studies of Inorganic Systems) cover inorganic and organometallic mass spectrometry. This coverage seems disproportionately high, considering the selectivity of the rest of the book.

The volume is an important addition to libraries, but it should be recommended to personal collections with care. For the topics covered, it provides an excellent directory to the primary literature.

Robert J. Anderegg, *Glaxo, Inc.*

Principles of Magnetic Resonance. Third Edition. By Charles P. Slichter (University of Illinois at Urbana—Champaign). Springer Verlag: New York. 1989. XI + 655 pp. \$49.50. ISBN 0-387-50157-6.

This book is written with the intention of providing the background necessary or useful to the application of magnetic resonance to the study of solids. It is not a recipe book, and it does not contain abundant illustrations of applications or directions on how to do experiments. Rather the emphasis is on a careful and complete exposition of what happens in the various resonance experiments; the analysis is couched in the language of quantum mechanics, and it is essential that the reader be familiar with the use of quantum mechanics (operators, commutation, matrix elements, etc.) if benefit is to be obtained. If the reader is thus prepared, the book is a fantastic treasure-house of knowledge, insights, and perspective, and the possibilities for use of the NMR technique for investigation of structure, dynamics, and physical properties open onto broad vistas in all directions. This is the third edition of the book, and it is much expanded over earlier editions as a result of the great surge in new kinds of experiments that are being developed daily. The primary emphasis is on nuclear magnetic resonance, although aspects of electron

spin resonance and nuclear quadrupole resonance are also covered. High-resolution NMR spectroscopy in liquids sneaks in, in one or two places: for example, in the discussion of 2-dimensional FT spectra. However, the book is not intended to, and does not, deal with the manifold applications of high-resolution spectroscopy in the study of complex organic molecules so wide-spread today. What it does do is make very clear the phenomena important in the experiment: dipolar broadening, nuclear-electron interactions, motional narrowing, spin temperature, double resonance, multiple quantum coherence, electric quadrupolar effects, the magic angle,

This book will be the bed-rock of the library of the scientist interested in using NMR in the study of solids for many years to come. The reader who studies and digests the contents will be completely prepared to conceive the experiment appropriate for the problem and will be aware of the boundaries of validity and reliability of the results.

Aksel A. Bothner-By, *Carnegie Mellon University*

Electronic Absorption Spectra of Radical Ions. By T. Shida (Kyoto University). Elsevier: Amsterdam and New York. 1988. xiv + 446 pp. \$242.00. ISBN 0-444-43035-0.

This book is primarily a catalog of electronic spectra of radical ions and if you need these spectra then you need this book. The book contains over 700 recorded spectra of radical cations and anions obtained primarily from γ irradiation of the molecule in a low-temperature glass matrix. The spectra were taken over a range of 4 to 40 kK.

The first 25 pages give a brief but thorough description of the procedures and pitfalls of the method. What follows are hundreds of pages of beautiful spectra with the wavelength of each of the major peaks labeled (in nm). Extinction coefficients are provided for many of the radical ions. For most species both the cation and the anion spectra are provided. For some species spectra in several different solvents are presented. When uncertainties in the spectra exist, that portion of the spectra is shown as a dashed line.

The last section of the book consists of 30 pages of comments on each of the spectra, a list of 100 references, and an index. For those who need dependable spectral information on radical ions, this book will be a godsend.

W. Daniel Edwards, *University of Idaho*

Kinetic Methods in Analytical Chemistry. By D. Pérez-Bendito and M. Silva (University of Cordoba). John Wiley & Sons: New York and Chichester. 1988. 330 pp. \$74.95. ISBN 0-470-21181-4.

This text provides, for the analytical chemist, a most valuable overview and reference of kinetics methods, theory, and practice in the field to 1987. I believe it will be a useful addition to the bookshelves not only of analytical chemistry teachers and students but also chemists and biochemists in industry and academe interested in mechanistic problems. It may also supplement reading in graduate courses on kinetics. The nine chapters are well-selected and written. Chapter 1, an introduction to kinetics methods, provides classifications and a succinct summary of some basic kinetics principles. Chapter 2 introduces the theory and provides examples and applications of catalyzed reactions, including redox, chemiluminescence, Landolt, oscillating, and ligand-exchange reactions but excluding enzymatic and voltammetric reactions. One wonders if many of the methods tabulated are actually used when more simple, alternative AA, ICP, or electrochemical analytical methods exist. As pointed out, however, often kinetics influence or play a role in these routine instrumental techniques. Chapters 3 and 4 review activation and inhibition, and catalytic titrations, respectively. Applications include the determination of ligands, metals, and metal mixtures. Chapter 5 deals with uncatalyzed reaction methods and their applications to inorganic and organic compounds, the latter by oxidation and bromination. Uncatalyzed methods are useful for specific analyses when conventional instrumental methods are too laborious or time consuming. Often, too, chemical steps can be avoided and the kinetics method is more direct. The value of the book in illustrating such methods of research is very apparent in this and the subsequent four chapters. Chapter 6 details differential reaction rate methods, which apply to the resolution of closely related species. Chapter 7 summarizes pulse and stopped flow techniques, *T*, *P*, electric field and pH jump techniques, flash photolysis and pulse radiolysis, etc. Graduate students, in particular, should find the well-organized chapter on instrumentation (Chapter 7) and that on sensitivity, selectivity, accuracy, and precision, following IUPAC definitions and

recommendations (Chapter 8), especially helpful in selecting and devising methods for their research and the subsequent presentation of results. In the final chapter, analyses of real samples, the authors discuss the effects of sensitivity and selectivity and then detail representative applications. It was surprising to learn that the species most frequently assayed in real samples by kinetics methods are, in order, Mn > Fe > Cu = I > V, Co.... The extent of kinetics methods is especially impressive in environmental studies, clinical and pharmaceutical chemistry, industrial products, geological materials and agricultural products, and food analyses. A aficionado of kinetics methods or no, the monograph somehow conveys to its reader a sense to want to know more about this topic and its scope for utility.

Robert J. Gale, *Louisiana State University*

Polymers: Polymer Characterization and Analysis. Edited by H. F. Mark and J. I. Kroschwitz. John Wiley & Sons: New York. 1990. xxvi + 957 pp. \$85.00. ISBN 0-471-51325-3.

This book is a collection of reviews from the *Encyclopedia of Polymer Science and Engineering* that fall into the category of polymer characterization and analysis. The reviews appear exactly as they do in the "Encyclopedia" and are alphabetically arranged.

Several of the selected topics are general, such as characterization of polymers and molecular weight determination, but most cover a particular method of analysis in depth. Subjects include electron and light microscopy, diffraction, thermal analysis, scattering, osmometry, micro-mechanical measurements, impact resistance, NMR, etc. The reviews are generally well-written, include many high-quality diagrams and tables, and are well-referenced. A 17-page index is included.

While the 18-volume encyclopedia from which it is derived costs \$200.00 per volume, this collection is only \$85.00. "Polymers" could thus be an alternative for organizations with smaller budgets and scope, and the price also makes it accessible to the individual.

Charles Z. Hotz, *The Dow Chemical Company*

Fourier transforms in NMR, Optical, and Mass Spectrometry: A User's Handbook. By A. G. Marshall and F. R. Verdun (Ohio State University). Elsevier: Amsterdam and New York. 1990. xvi + 450 pp. \$107.25. ISBN 0-444-87360-0.

There are many applications of Fourier transforms in science and a large number of articles and books on the subject. This text is unique in presenting the material in a manner that unifies the nomenclature, makes clear the connections between the concepts as applied in a wide variety of spectroscopic techniques, and provides clear examples both with theoretical support and with easily understood physical analogies. The written material is well supported by a large number of figures.

The organization of the book is as a text for a course, but it is also designed to be used by practitioners of spectroscopy. It contains a logical development of the mathematics with an emphasis on practical applications of the ideas. Each chapter includes references for additional reading, practice problems, and solutions to the problems. A set of appendices include a compilation of the commonly needed mathematical theorems and equations; a description of the fast Fourier transform algorithm with program listings; a set of Fourier transform properties and an extensive "pictorial atlas" of the real and imaginary components of time domain functions with the frequency domain results of complex Fourier transformation; and a substantial index.

Approximately half of the book is devoted to the general development of fundamental concepts including an analysis of common features among

the various spectroscopies, noise considerations, and a treatment of non-Fourier transform methods that also may be used for interconversions between time and frequency domains. The remainder of the book addresses the three major applications cited in the title. Each part concisely reviews the general techniques. In addition, current developments and examples of applications in mass spectrometry, NMR, and optical interferometry are explained and illustrated.

The book is well organized and clearly written. It will certainly be of great value to a wide range of readers including those who wish to understand the various applications of Fourier transform techniques and those who need practical information to supplement their background as practitioners of spectroscopic techniques.

Patrick R. Jones, *University of the Pacific*

Polymer Handbook. Third Edition. Edited by J. Brandup and E. H. Immergut. John Wiley & Sons: New York. 1989. 1850 pp. \$150.00. ISBN 0471-81244-7.

This useful reference is a compilation of non-critical data relating to polymers and polymerization. Much has been added to this edition (the second edition appeared in 1975), indeed; the editors report it to have 30% more data.

The eight sections of the handbook are organized the same as those in the second edition. The first chapter, nomenclature, has been expanded and is much more useful than before. The next sections, polymerization and depolymerization, physical properties of monomers and solvents, physical properties of oligomers, and physical constants of some important polymers, all have modestly increased in size from the last edition. The two sections, solid-state properties and solution properties, show the greatest enlargements, each increasing over 200 pages. The last chapter is a list of abbreviations of polymer names. The edition includes a moderately detailed 18-page index. The information contained in this handbook could not be found in any one source making it a necessity for every technical library and useful to anyone who needs access to polymer properties.

Charles Z. Hotz, *Dow Chemical Company*

Encyclopedia of Polymer Science and Engineering. Second Edition. Volume 17. Edited by H. F. Mark and J. I. Kroschwitz. John Wiley & Sons: New York. 1989. 1039 pp. \$200.00. ISBN 0-471-81181-5.

Volume 17 is the last volume of this encyclopedia, and it covers the entries "Transitions and Relaxations" to "Zwitterionic Polymerization". Much has changed in this excellent collection since its first edition in 1971. Lengthy new reviews have appeared on transitions and relaxations, vinyl ester polymers, water-soluble polymers, and xerographic materials. New entries have also appeared on vesicles, vinylpyridinium salts, waste treatment, xanthan, and zwitterionic polymerization. Gone from this edition (entries that appeared in the first edition) are ultrasonic fabrication, vinylamine polymers, viscometry, vulcanized fiber, and zein. Some of these subjects have been deleted, while others have been placed elsewhere (for example, information on viscometry could be found under a lengthy review of solution properties). Most of the entries that appeared in the first edition have been expanded and updated. This encyclopedia is an excellent collection of reviews, most detailed and containing many references. The volume contains no index of its own, but it is accompanied by an index to Volumes 13-16.

Charles Z. Hotz, *Dow Chemical Company*