

Book Reviews*

Methods in Enzymology. Volume 193. Mass Spectrometry. Edited by James A. McCloskey (University of Utah). Academic Press: San Diego. 1990. xxx + 960 pp. \$99.00. ISBN 0-12-182094-7.

In the 1960's, as the applications of mass spectrometry to organic chemistry grew rapidly, there developed a need for a comprehensive text on the subject. This was met, perhaps most successfully, by Budzikiewicz, Djerassi, and Williams' book, *Mass Spectrometry of Organic Compounds*. The last few years have seen an equally spectacular development in the applications of mass spectrometry to biological compounds, driven by new capabilities for sample introduction and ionization, by the technique of tandem mass spectrometry, and by improvements in mass range and sensitivity. There is now an overwhelming need for an authoritative and comprehensive text which covers this subject. Excellent books have appeared recently which cover parts of this subject such as the mass spectrometry of peptides (for example, Desiderio's "Mass Spectrometry of Peptides") or that cover particularly successful conferences, e.g., McNeal's "The Analysis of Peptides and Proteins by Mass Spectrometry". There have also been good modern introductions to mass spectrometry, e.g., that of J. T. Watson. In spite of this and the appearance of excellent edited volumes by Gaskell on "Mass Spectrometry in Biomedical Research" and by McEwen and Larson on "Mass Spectrometry of Biological Materials", there is room for a comprehensive treatment of biological mass spectrometry.

McCloskey's book is certainly comprehensive and authoritative. It covers fundamental aspects of ionization and collisional activation, instrumentation with special emphasis on sector instruments, and many aspects of methodology including ancillary topics such as isotopic labeling, chromatographic separation, enzymatic degradation, and chemical derivatization. Most attention, however, goes to procedures for producing spectra and interpretation of the information contained in them. In many cases this involves a description of a particular experiment, including the choice of ionization and mass analysis procedure, followed by examples of typical data and its interpretation. Often, the bulk of the individual presentations deal with exemplary data taken for known compounds; however, this is by no means always the case and the increased emphasis on solving actual problems is one of the most important trends in biological mass spectrometry.

The book is organized into four main sections, covering general techniques, peptides and proteins, glycoconjugates, and nucleic acid constituents. The 70 contributors include many of the scientists most active in the area of biological mass spectrometry; Jim McCloskey is to be congratulated on bringing together such an exceptional group and orchestrating their contributions so as to produce an up-to-date account of the subject. Although a considerable amount of introductory material is given, the book will probably be of most use in the hands of the biological scientist who already has some background in mass spectrometry. One can see it being particularly valuable as a source of information on the more difficult aspects of the subject, or as a reference book which can be used when designing experiments which use mass spectrometry or in interpreting their results. The indexes are detailed and will facilitate this type of use. There is also a lot of material here which will challenge specialists in mass spectrometry, and the book is recommended to this group too.

The editor has clearly had a master-plan in mind and has taken pains to achieve it. For example, the main divisions of the book work well and the choice of topics in the general technique section is logical. In a few cases, individual contributors have provided more than one section, and this has allowed the editor to better develop his subject. The few flaws which this reviewer noted are all endemic to multicontributor texts. Overlap between contributions has not been entirely avoided. In some cases this is desirable, as when different mass spectrometric techniques are employed to address a common biological problem. In other cases, however, it is less so, and in a few cases, where the nomenclature for mass spectrometry is still evolving, the reader may miss the fact that identical techniques go by different names in the sections of different contributors. The book is remarkably current in its treatment of many of the emerging topics in mass spectrometry, especially the electrospray and laser desorption methods of ionization. It is less complete in the treatment of alternatives to sector instruments where Fourier transform ion cyclotron resonance is given very little attention. The book is particularly strong on the use of mass spectrometry for peptide sequencing where a coherent

group of sections by Biemann, Gibson, Carr, and Martin and their coauthors is recommended. Another strength is the treatment of nucleic acid derivatives, the area of research of the editor, and one which is covered by a small group of contributors who have produced dovetailed text. It is a measure of the progress being made in biological mass spectrometry that the topic of glycoconjugates receives more attention than that of either peptides and proteins or nucleic acid constituents. This section is placed in perspective by the thoughtful introduction of Laine, and the progress reported in the individual contributions is representative of the growing capabilities of mass spectrometry in a difficult area of science.

Very high standards are set by this book, and it is recommended with considerable enthusiasm.

R. Graham Cooks, *Purdue University*

New Developments in Molecular Chirality. Edited by Paul G. Mezey (University of Saskatchewan). Kluwer Academic Publishers: Dordrecht. 1991. vii + 293 pp. \$99.00. ISBN 0-7923-1021-7.

This volume, the fifth in the publisher's series *Understanding Chemical Reactivity*, consists of a preface and nine chapters by different authors who discuss various fundamental aspects of molecular chirality from mathematical points of view. Chapter topics span a broad range of interests: symmetry and chirality at the atomic and subatomic levels, chirality algebra, two-dimensional chirality, topological stereochemistry, and chiral features of proteins to name but several. The chapters are well-written and referenced. Some chemists interested in molecular chirality will find these chapters challenging, possibly even enlightening, but many will find few links between these contributions and their own work. This book belongs in the institutional library at major colleges and universities.

Eugene A. Mash, *The University of Arizona*

Organic Synthesis at High Pressures. Edited by Kiyoshi Matsumoto (Kyoto University) and R. Morrin Acheson (Queen's University, Oxford). John Wiley & Sons: New York. 1991. 456 pp. \$75.00. ISBN 0-471-62761-5.

This is the first book that summarizes the application of high-pressure techniques for organic synthesis. The text is tailored to a non-mathematical treatment of high-pressure chemistry in that it is more concerned with the practical synthetic aspects of this topic. Accordingly, this series of review articles complements the earlier book by Issacs in which the application of high-pressure techniques to mechanistic studies was the focus. The chapters include articles published in the primary literature through 1989.

The book is organized into three general sections: (1) a brief discussion of the physical chemistry associated with high pressures, (2) a discussion of the apparatus and engineering requirements, and (3) reviews of the applications to classes of synthetic reactions. This final section, which constitutes the bulk of the text, includes chapters devoted to nucleophilic substitutions, nucleophilic additions, the Diels-Alder reaction, 1,3-dipolar cycloadditions, and organometallic reactions.

Basic physical concepts of high-pressure systems are discussed in the first section, which includes an excellent discussion of the effects of pressure on equilibria and kinetics of chemical processes. The presentation is fragmentary in that it does not provide the derivation of the mathematical expressions given; however, considering the audience for this text, the level of coverage is appropriate. The authors have included a complete bibliography to the primary literature, and if inclined, one can readily proceed to the original article.

The discussion of the engineering designs of high-pressure vessels presented in the second section of the book is inappropriate for the synthetic community. This community will have little interest in autoclave design features, the discussion of materials for autoclaves, or the principles of metal fatigue.

The third section of the book is comprised of Chapters 4-15 and is the highlight of the text. Chapters 9 and 10, for example, which summarize the Diels-Alder reaction at high pressures, are well-written and thoroughly referenced. The remainder of the chapters in this section will provide the synthetic practitioner with a complete compilation of the advantages of high-pressure conditions in organic and organometallic reactions.

The editors, Professors Matsumoto and Acheson, are commended for having provided a consistent writing style throughout, even though each of the chapters is written by a different author(s) whose native language

*Unsigned book reviews are by the Book Review Editor.

is not English. Each chapter, however, has structural formulas drawn by the authors, and there is not a consistent format for rendering structures between the chapters. Still, this inconsistency is of minimal consequence. The sole major flaw in this book is the index. The subject and keyword indices are merely adequate and there is no author index.

In summary, this book provides the synthetic practitioner with a succinct, yet thorough, compilation of the application of high-pressure techniques to organic synthesis. This book should be read by graduate students interested in organic synthesis and will be purchased by many specialists.

Philip DeShong, *University of Maryland*

Chemistry of Nucleosides and Nucleotides. Volume 2. Edited by Leroy B. Townsend (University of Michigan). Plenum Press: New York and London. 1991. ix + 468 pp. \$95.00. ISBN 0-306-43646-9.

This book contains five chapters dealing with specialized topics in various areas of nucleoside and nucleotide chemistry: (1) Mesoinic Nucleosides and Heterobases; (2) Synthesis and Properties of Various Disaccharide Nucleosides; (3) The Synthesis, Reactions, and Properties of Nucleoside Mono-, Di-, Tri-, and Tetraphosphates and Nucleotides with Changes in the Phosphoryl Residue; (4) The Synthesis and Chemistry of Heterocyclic Analogues of Purine Nucleosides and Nucleotides; and (5) Substrate Binding of Adenine Nucleosides and Nucleotides to Certain Enzymes.

Although this book was printed in 1991, most of the chapters were probably written around 1986, as acknowledged by one of the authors (page 143, Chapter 3). Its delayed appearance, therefore, represents a significant drawback. The chapters are clearly written and contain abundant chemical structures to facilitate the discussion. There are practically no errors despite the handling of numerous structures. All of the chapters have adequate numbers of references although the format used for the references is not uniform throughout and it causes some degree of confusion.

The first chapter represents the first attempt to organize this interesting topic and it will definitely be of use to a chemist who wishes to enter this field for the first time. It is worth noting, however, that judging by the number of recent citations the amount of work currently being done in this area is not very voluminous.

The second chapter is also very didactic and useful, as the previous one, but one also detects a low level of recent synthetic activity in this area. This situation is likely to change, however, as biochemists unravel more mechanisms involving these types of interesting chemical structures. Chapter 3 is an excellent chapter, and an attempt was made by the author to make it the most actualized of the book. The field of nucleotide chemistry, however, is a very rapidly growing field, and due to the book's late appearance the chapter will look incomplete to the 1991 reader. The author of this chapter brilliantly succeeds in bringing together the most relevant aspects of the chemistry and biology of this important area.

Chapter 4 constitutes 50% of the book and it represents a very comprehensive account of the research done in that field until the time the book was written. This chapter is recommended mainly as a reference source.

Chapter 5 is the only chapter in the book that does not deal with synthetic organic chemistry; however, it discusses very important aspects of structure-activity relationship in adenosine nucleoside/nucleotide binding enzymes that should be of interest to nucleoside chemists engaged in drug design.

Despite its late arrival this book should be very valuable in an academic setting as well as in a research institute to assist scientists who wish to initiate projects in any of the areas treated in this book. An index and references are included.

Victor E. Marquez, *National Cancer Institute, NIH*

Biotransformations. A Survey of the Biotransformations of Drugs and Chemicals in Animals. Volume 3. Edited by D. R. Hawkins (Huntingdon Research Center, Ltd.). The Royal Society of Chemistry: Cambridge, U.K. 1991. xviii + 462 pp. £89.50. ISBN 0-85186-177-6.

This is the third volume in a series that surveys advances in the metabolism of agricultural, environmental, and pharmaceutical agents in animals. This series appears to be a reincarnation of the Specialist Periodical Reports on Foreign Compound Metabolism in Mammals published by the Chemical Society between 1970 and 1981. The biotransformations of approximately 270 compounds are described in Volume 3, with 90% of the citations coming from the 1989 literature and the remaining 10% from papers published in 1988. The metabolism of each compound is summarized in a 1-2 page abstract that includes line drawings of the substrate and products. As in earlier volumes, an introductory chapter highlights the novel biotransformations and mechanisms of toxicity discussed in the volume. The individual entries are organized according to functional group classes (hydrocarbons, polycyclic

aromatic hydrocarbons, alkenes, acyclic functional groups, substituted aromatic compounds, heterocycles, functional nitrogen compounds, nitrosamines, amino acids, steroids, and miscellaneous). Comprehensive indexes covering Volumes 1-3 give access to the contents by compound name, reaction type, and key functional groups.

The principal shortcoming of the series is that the individual volumes cannot be used to determine what is known about the metabolism of a given compound. Each entry in Volume 3, for example, summarizes the results of a single publication without providing a perspective on prior work or references to earlier literature. Nevertheless, the initial chapter in each volume is a quick entry to novel findings, and the cumulative information provided by the series makes this a useful reference work to advances in the field of xenobiotic metabolism. It is unfortunate that the doubling in the price of the volumes over the past 3 years makes the series primarily of interest for library acquisition.

Paul R. Ortiz de Montellano, *University of California, San Francisco*

Liquid Transport Processes in Polymeric Materials; Modeling and Industrial Applications. By J. M. Vergnaud (University of Saint-Etienne). Prentice-Hall: Englewood Cliffs. 1991. xx + 362 pp. \$60.00. ISBN 0-13-538315-3.

I agreed to review this book for probably the same reason I would have been inclined to buy it—a quick glance at the title and table of contents. Transport of liquids in polymers is a topic of unquestionable importance and a book in this area is clearly a good idea; the reading, however, disappointed me. Writing books is an arduous and lonely task and it is all too easy to blame the authors for the results. Publishers, however, also bear a responsibility. Authors need help improving their manuscripts and yet this is another case of how this partnership does not always work. In this case it is apparent that no one but the author ever gave thought about such issues as contents, balance, and writing; my impression is that the camera-ready manuscript went into production without anybody ever glancing at it. There has been no editing and the end product is clearly unbalanced. The first seven chapters describe material readily available in classical sources, such as J. Crank "The Mathematics of Diffusion", H. S. Carslaw and J. C. Jaeger "Conduction of Heat in Solids", J. Crank and G. S. Park "Diffusion in Polymers". Chapters 1-3 focus on diffusion in plane sheets, cylinders, and spheres, Chapters 4-6 focus on the same topics but from a numerical viewpoint, and Chapter 7 gives a numerical analysis in three-dimensional transient transport with a bit on diffusion in anisotropic media. None of these chapters has a single reference at the end of the chapters even though there is not much here that cannot be obtained (more clearly) from other sources. A newcomer to the field might have a hard time finding out where to go for additional information. According to the author index, Crank is quoted on pages, 2, 8, 10, 12, 19, 21, 33, and 36; however, none of these references appear anywhere in the text. One has to wait until p 113 before he is mentioned which is actually better than Carslaw and Jaeger or Bird, Stewart, and Lightfoot, who do not appear even once. The subject index does not help much either; I tried to look for the definition of the Biot number and I discovered that there are no entries under "B" (as well as many other letters). Things change drastically in Chapters 8-13. Chapter 8, "Matters Transport Between Plasticized PVC and Liquids" (sic), has 85 references, Chapter 9, "Absorption and Desorption of Liquids by Rubber", 20 references, Chapter 10, "Drug Delivery and Pharmaceutical Applications", 41 references, Chapter 11, "Release of Active Agent in Agriculture" (sic), 8 references, Chapter 12, "Drying of Coating" (sic), 9 references, and Chapter 13, "Absorption and Desorption of Moisture by Wood", 24 references. The last chapters are clearly the author's territory as is reflected by the fact that he is quoted 152 times whereas other American researchers working in similar areas (J. L. Duda, H. B. Hopfenberg, W. J. Koros, D. R. Paul, and N. A. Peppas) are quoted once, twice, thrice, or not at all; even J. Crank's and G. S. Park's "Diffusion in Polymers" is mentioned only once.

Researchers can read reviews before deciding to buy a book; libraries do not. The best the author has to offer is in Chapters 8-13. Unfortunately the reader might not reach this point.

J. M. Ottino, *Northwestern University*

Topics in Current Chemistry. Volume 158. Photoinduced Electron Transfer II. Edited by Jochen Mattay. Springer-Verlag: Berlin. 1990. xii + 203 pp. \$95.00. ISBN 0-387-52568-8.

This monograph contains four separate chapters written to address differing aspects of photoinduced electron-transfer chemistry. While the first volume (No. 156) of this series was oriented more toward organic systems, this volume deals almost exclusively with coordination compounds.

The four contributions in this volume deal with different aspects of photoinduced electron transfer although the chapters by Vogler and Kunkel and Hennig and co-workers are closely related and there is some

similarity in the chapters by Balzani and co-workers and Scandola and co-workers. The organization of the book was surprising in that the first and fourth chapters were the most similar in terms of topics covered.

The first chapter by Vogler and Kunkely discusses outersphere photoinduced electron-transfer processes. Not much work has been carried out in this area so the chapter is a complete discussion of the work in the area. This area will be a focus area in the future, and the material presented here will be useful as a background for anyone interested in intermolecular charge transfer.

The chapters by Balzani et al. and Scandola et al. are very complimentary. Balzani focuses on the light absorber and the sensitization process. The chapter starts out with simple mononuclear systems and builds up to the description of the preparation and utility of complex polynuclear systems. While there are still unknowns in how these systems are optimized, the constraints are outlined for the reader.

The chapter by Scandola et al. on photoinduced electron and energy transfer is the longest and one of the best simplified treatments of electron-transfer theory I have seen. This area has exploded in recent years, and the authors are careful to capture the essence of the work without being encyclopedic.

The last chapter by Hennig and co-workers on photoinduced electron transfer in ion pairs is misplaced. The reader should read this chapter directly after the chapter by Vogler and Kunkely. In fact, much of the introductory material is similar enough that the two subjects could have been merged into one large chapter.

The book was easy to read, relatively free of typographical errors, and interesting in concept and scope. It represents a solid piece of work in an important area of inorganic chemistry.

John D. Petersen, *Clemson University*

Chiral Separations by Liquid Chromatography. ACS Symposium Series 471. Edited by Satinder Ahuja (Ciba-Geigy Corp.). American Chemical Society: Washington, DC. 1991. x + 239 pp. \$59.95. ISBN 0-8412-2116-2.

In the last two decades great strides have been made in the separation of enantiomers, which is of tremendous importance in the fields of biochemistry and pharmacy. The inadvertent use of racemic thalidomide for "morning sickness" by pregnant women, which resulted in tragic birth defects caused by the (*S*)-enantiomer of this drug, is one of the most dramatic examples of the pharmacological differences in the properties of enantiomers. The discussions in this book, based on a symposium sponsored by the Division of Analytical Chemistry at the 200th National Meeting of the American Chemical Society in Washington, DC, August 26–31, 1990, are devoted to the use of liquid chromatography, mostly HPLC, which has been developed as the most promising technique for separating chiral enantiomers. The book consists of 13 chapters in typescript form, replete with figures, tables, and references, followed by indexes of authors, their affiliations, and subjects. The first chapter is a comprehensive overview of the subject by the editor with 48 references.

Application of Charge Density Research to Chemistry and Drug Design. NATO Advanced Study Institute Series, Series B: Physics. Volume 250. Edited by George A. Jeffrey and Juan F. Piniella (University of Pittsburgh and Universitat Autònoma de Barcelona, respectively). Plenum Press: New York and London. 1991. xi + 409 pp. \$110.00. ISBN 0-306-43880-1.

This book contains the proceedings of a NATO Advanced Study Institute program on the Application of Charge Density Research to Chemistry and Drug Design held April 17–27, 1990, in Sant Feliu de Guixols, Costa Brava, Spain. Advances made possible by computer technology in the past 20 years have allowed the quick measurement of thousands of diffraction spectra and provided instruments capable of very high precision. This symposium brought together experts in both the experimental and theoretical sides of this field. This volume consists of 36 chapters in typescript form presented by the participants describing applications on the title subject. At the end there is a list of the participants with their affiliations and a subject index.

Advances in X-RAY ANALYSIS. Volume 34. Edited by Charles S. Barrett (University of Denver), John V. Gilfrich (Sachs/Freeman Associates), I. C. Noyan (IBM Research Center), Ting C. Huang (IBM Almaden Research Center), and Paul K. Predecki (University of Denver). Plenum Press: New York and London. 1991. xxi + 743 pp. \$115.00. ISBN 0-306-44003-2.

This volume contains the proceedings of the 39th Annual Denver X-Ray Conference on Applications of X-Ray Analysis, held July 30–August 3, 1990, in Steamboat Springs, CO. The papers presented in this volume, in typescript form, are organized under the following headings: I. Surface and Near-Surface X-Ray Spectroscopy; II. Determination of Low Concentration Levels by X-Ray Spectrometry; III. Long-

Wavelength X-Ray Spectrometry; IV. XRF Data Reduction; V. XRF Instrumentation and Techniques; VI. Geological and Other Applications of X-Ray Spectrometry; VII. Solid-State and Position-Sensitive Detectors for XRD; VIII. Qualitative and Quantitative Phase Analysis by XRD; IX. Nonambient Application of Diffraction; X. Crystallite Size/Strain Analysis; XI. Thin Film and Semiconductor Characterization by X-Ray Diffraction; and XII. Analysis of Stress and Fracture by Diffraction Methods. There are author and subject indexes; affiliations of authors are given at the heading of each paper.

Organic Syntheses. Volume 69. Edited by Leo A. Paquette. John Wiley & Sons: New York. 1990. xx + 328 pp. \$34.95. ISBN 0-471-54560-0. The paperback version is distributed free of charge by the Organic Division of the American Chemical Society to members of the Organic Division of the American and French Chemical Societies, the Perkin Division of the Royal Society of Chemistry, and the Society of Synthetic Organic Chemistry, Japan.

This volume contains 31 experimental procedures checked and edited by members of the Board of Editors. These preparations include three procedures detailing kinetic resolution by enzymatic means, five stereocontrolled processes useful for constructing relatively complex molecules, seven procedures focussing on the role that organometallic reagents play in the transformation of functional groups, seven procedures for preparing starting materials that play an established role in important structural transformations and/or multistep syntheses, six procedures having a strong methodological bent, and three convenient procedures for making functionalized molecules having varied applications. These preparations are preceded by a tribute written by John C. Sheehan to Max Tishler, a former member of the Board of Directors (October 30, 1906 to March 17, 1989).

The hard-bound edition contains a list of 27 unchecked procedures that may be obtained by mail and Cumulative Author and Subject Indexes for Volumes 65–69.

Advances in Molecular Modeling. A Research Annual. Volume 2. 1990. Edited by Dennis Liotta (Emory University). Jai Press, Inc.: Greenwich and London. 1990. xi + 163 pp. \$78.50. ISBN 0-89232-949-1.

This volume continues the new series that explores various applications of molecular modeling. Compared to the first volume, this one places a much greater emphasis on molecular mechanics applications.

The first chapter, by J. J. Dannenberg, describes MNDO and AM1 modeling of free radical and Diels–Alder reactions. Both calculated reaction enthalpies and enthalpies of activation are compared with experimental data for a large variety of reactions. It includes 116 references with a few from 1989.

The second chapter, by J. J. Gajewski, K. E. Gilbert, and J. McKelvey, provides a detailed description of the MMX force field used in the commercial modeling program, PCMODEL. This widely used program (it runs on both MAC II and DOS machines) is built around the Allinger MM2 code, but differs from it both by the convenience of its graphical input shell and by its inclusion of a number of extensions to the force field to include selected metal complexes and transition states. This chapter is particularly valuable, since these enhancements are not described adequately elsewhere.

The third chapter, by K. A. Durkin, M. J. Sherrod, and D. Liotta, describes the development of new molecular mechanics parameters for β -lactams. This chapter provides an introduction to the process of developing an empirical force field for special structural situations and conveys well the ambiguities and frustrations that can result.

The last chapter, by G. R. Painter, J. P. Shocker, and C. W. Andrews, describes the application of molecular mechanics to a study of drug-membrane interactions. Like the previous chapter it deals with the development of a specialized molecular mechanics force field. The resulting force field is then applied to the analysis of ^1H coupling constants and NOE data as they apply to the conformations of AZT.

These four chapters provide a useful overview of several important aspects of molecular modeling. Their didactic approach would make them particularly valuable for readings in a molecular modeling course.

Charles F. Wilcox, *Cornell University*

Preparative Polar Organometallic Chemistry. Volume 2. By Lambert Brandsma (Rijksuniversiteit Utrecht). Springer-Verlag: Berlin. 1990. xii + 227 pp. \$49.00. ISBN 0-387-52749-4.

This book is the second volume in a series, and as with the first, it consists of a collection of detailed laboratory procedures for the synthesis and functionalization of specific types of organoalkali compounds. In this volume, only polar organometallic intermediates derived from replacement of sp^3 -protons by alkali metal atoms are considered, and in this regard, it complements the first volume which considers similar intermediates obtained from the replacement of sp^2 -protons. A stated goal

of the series is to provide practical bench-top laboratory manuals for the working synthetic chemist, and it is clear that a significant effort has been made to achieve this goal. In this volume, four sections help the reader to rapidly locate a reaction or compound of interest: (1) a detailed table of contents that includes topics such as metalation of aromatic and olefinic hydrocarbons, metalation of saturated sulfur compounds, metalation of heterosubstituted allylic and benzylic compounds, and generation of lithium halocarbenoids, to name a few; (2) a metalation-functionalization index that provides a synopsis of all the chemical reactions in the book; (3) a list of reagents and starting compounds (for both Volumes 1 and 2); and (4) a complementary subject index (for both Volumes 1 and 2). Two appendices provide a listing of general and special techniques as well as procedures for the purification and storage of some of the more sensitive reagents and solvents; these are also welcomed additions for the intended utilization of this book at the bench. The experimental procedures themselves, which are carried out on a "preparative" (0.1 mol) scale, have all been tested in the author's laboratory and provide detailed information, including reaction times, temperatures, and purification procedures, along with a number of insightful unpublished observations by the author and his co-workers. From this collection of general procedures, it is likely that one will find information that is useful for carrying out similar transformations on analogous substrates.

In summary, although a reference book of this nature is rarely read cover-to-cover, in doing so, the reader will certainly augment his/her knowledge of the reactivity and synthetic utility of polar organometallic intermediates and the specialized techniques and reagents, such as the Lochmann-Schlosser reagent (BuLi/*t*-BuOK), that are required for their preparation. Thus, overall, the book has met its objective, and the added thoughtfulness of publishing it with the more affordable soft-cover should make this book accessible as a valuable research tool of both the starting synthetic student and the more established researcher.

Lawrence R. Sita, *California Institute of Technology*

Modern NMR Techniques and Their Application in Chemistry. Edited by Alexander I. Popov and Klaas Hallenga (Michigan State University and Universit  Libre de Bruxelles). Marcel Dekker: New York. 1991. x + 665 pp. \$135.00. ISBN 0-8247-8332-8.

This book, Volume 11 of Dekker's *Practical Spectroscopy* series, is intended to provide chemists with an overview of the spectacular advances in NMR in the last decade. Because these advances are found in every branch of chemistry, the editors have included chapters on rather diverse subjects, ranging from organic structure determination to equilibrium studies in solution. Since the chapters are so different, each will be reviewed separately. Chapter 1 contains a rather traditional introduction to basic NMR. It is intended that this chapter lay the groundwork for those that follow; however, the authors of the later chapters have mostly proceeded as if the earlier chapters are not there! Chapter 2, entitled Fourier-Transform NMR: Theoretical and Practical Aspects, contains a delightful section on the single-pulse experiment in which numerous practical aspects are discussed and illustrated. The last half of the chapter is a treatment of the 2D NMR experiment using the density matrix formalism. This is probably more suited to an advanced graduate text than a treatise on practical spectroscopy. Chapter 3 covers solid-state NMR of spin $1/2$ nuclei, including systems with both large and small homonuclear dipolar interactions. Chapter 4 addresses the solid-state behavior of quadrupolar nuclei. The presentation in both chapters is satisfactory for the intended audience. Chapter 5 is a good treatment of quantitative NMR spectroscopy. Numerous topics of importance to anyone interested in making peak area measurements are covered; however, this reviewer was unable to find a discussion of dynamic range—the problem of accurately measuring small peaks in the presence of extremely large peaks. Chapter 6, Structure Determination of Organic Compounds, is probably the weak point of the book. In about 50 pages the author covers everything from chemical shift equivalence of diastereotopic groups to the 2D INADEQUATE experiment for determining carbon-carbon connectivities. Recent advances in organic structure determination have been given better coverage in dozens of review articles, chapters, and books in the last decade. Inorganic structure determination is covered in Chapter 7. Here the author discusses both compounds containing organic "ligands" and "pure" inorganics. This chapter could be appropriately subtitled Multinuclear NMR Spectroscopy, for there is considerable discussion of phosphorus, fluorine, boron, aluminum, etc. Chapter 8, Equilibria Studies in Solution, affords the reader the opportunity to learn about an application of NMR spectroscopy which is quite different from the more common "structural" topics. It is well-written and deserves the attention of individuals from a variety of disciplines. However, it is somewhat inappropriate for this to be included among topics of recent vintage, in that most of the references are 15–25 years old. Another topic with a rich heritage from the earlier years of NMR, Reaction Kinetics and Exchange, is the subject for Chapter 9. The

examples are from the recent literature and are largely systems other than proton and carbon. Readers acquainted with the pioneering proton work done 20–30 years ago would find the chapter interesting and informative, but a person with no knowledge of the field would get a very distorted picture. The final chapter is entitled Two-Dimensional NMR Studies of Biomacromolecules. The author discusses, and then uses biochemical examples to illustrate, several of the more common 2D experiments. At the end of the chapter he takes the reader through the structure determination of a small protein, and along the way we receive another dose of the density matrix formalism! One who desires an overview of the numerous 2D experiments, including shortcomings, will find better coverage here than in either Chapter 2 or 6.

In conclusion, this reviewer feels that individuals with narrowly focused research will find that the book is too broad in scope to be of value. This is unfortunate. Clearly, few will conclude that every chapter is "must" reading, but most would surely profit from a careful study of at least half of them. Technically the book is well done. Figures, tables, and equations are clearly drawn. There are numerous errors, more in some chapters than in others, but they are mostly of a trivial nature.

Harold M. Bell, *Virginia Polytechnic Institute and State University*

Electroorganic Synthesis. Best Synthetic Methods Series. By Tatsuya Shono (Kyoto University). Series editors: A. R. Katritzky, O. Meth-Cohn and C. W. Rees. Academic Press, Ltd.: London. 1991. xiv + 155 pp. \$65.00. ISBN 0-12-640640-5.

The author has made a number of significant contributions to the field of electroorganic synthesis over the past 25 years and is perhaps the pre-eminent figure in the pertinent area of indirect oxidations, an area he pioneered and in which he continues to publish. Accordingly, his monograph deserves serious consideration. Like others working in this field, Dr. Shono is distressed by the organic chemists' unwillingness to consider the electrode as an attractive synthetic tool, and this slim book is his messianic effort to inform his colleagues of what they are overlooking. It is specifically oriented to the "practicalities and versatility of electroorganic synthesis" and features brief (but clear) experimental details for more than 150 electrochemical transformations of specific compounds. A unique feature is an appendix that provides names and addresses of several purveyors of the necessary electrochemical equipment, including cells, in a number of the major countries of the world. The book's seven chapters provide some 238 references of which 78, approximately one-third, are to the author's own work.

For the synthetic organic chemist who is willing to seriously consider electroorganic synthesis, this book could prove invaluable, offering, as it does, detailed descriptions, with yields, of the preparation of a wide and representative range of products. It can be strongly recommended to such potential users. It does not, however, solve the fundamental problem of the resistance of potential users who, understandably, are unwilling to purchase new, occasionally expensive, unfamiliar equipment of possible limited utility, that requires that they *think* in ways unorthodox to the synthetic organic chemist. The author's earnest efforts, notwithstanding, electroorganic chemistry will probably continue to be a stepchild.

The book does have some minor shortcomings, predominantly in the equations, including the occasional use of "X" and "Y" without adequate clarification, the frequency absences of charges (e.g. Nu instead of Nu⁻), such that equations "do not balance", the appearance of "H" in products without indicating its investment, and neutral reactants adding or losing electrons yet producing neutral products. There is a pentacovalent carbon on p 29, an occasional typo (e.g. styrene for styrene, p 31), and unorthodox (but not ambiguous) nomenclature (2-butyl bromide, p 145). There is a scattering of minor grammatical errors, e.g. plurals for singulars, that should have been caught. The above "aggravations" detract minimally from Dr. Shono's useful contribution. It belongs in all libraries where organic chemists are likely to browse and possibly be tempted to broaden their horizons.

Jack H. Stocker, *University of New Orleans*

Organic Synthesis Highlights. By Prof. Dr. Johann Mulzer (Institut f r Organ. Chemie der Freien Universit t, Berlin), Prof. Dr. Hans-Josef Altenbach (Fachbereich Chemie der Universit t/Gesamthochschule, Paderborn), Prof. Dr. Manfred Braun (Institut f r Organ. Chemie, D sseldorf), Prof. Dr. Karsten Krohn (Institut f r Organ. Chemie, der TU Braunschweig), and Prof. Dr. Hans-Ulrich Reissig (Institut f r Organ. Chemie, Darmstadt). Verlagsgesellschaft mbH: Weinheim (Federal Republic of Germany). 1991. x + 410 pp. \$65.00. ISBN 3-527-27955-5 (Weinheim). ISBN 0-889573-918-6 (New York).

Organic Synthesis Highlights is made up of a series of 49 short essays that are typically 5–8 pages long. The book is loosely divided into two main parts: Methods, Reagents and Mechanisms (33 essays) and Applications in Total Synthesis (16 essays). In the Methods section, there are 16 essays on Stereodifferentiating Addition Reactions (Cram's Rule,

Diels Alder, Dipolar cycloadditions, Claisen rearrangement, etc.), 7 essays on Cyclization Reactions (radical, Weiss reaction, halolactonization, etc.), 5 essays on Organotransition Metals, 1 essay on Electrochemistry, 4 essays on Bio-oriented Methods (enzymes, biomimetic syntheses), and 2 essays on Synthesis with Ex-Chiral-Pool Starting Materials. (I had to reflect a moment before realizing that "Ex-Chiral-Pool" must mean "from the chiral pool", not "former chiral pool".) Total Synthesis subjects are sometimes by class (alkaloids, *O*-glycosides, fenestranes, etc.) and sometimes by molecule (compactin, coriolin, statine, etc.).

The book shows both the advantages and the disadvantages of the essay format. On the upside, the essays are short, easy to read, and can be read or browsed in any order. There are lots of structures and reagents for those who prefer to look at the pictures. The essays are particularly nice starting points for planning one or a series of lectures for an advanced synthesis course. Of course, such short essays could not possibly provide detailed historical perspectives or comprehensive overviews. Any experienced synthetic chemist will probably be disappointed in places at what was and was not discussed. However, the authors generally do a good job selecting subjects and examples from a huge pool of possibilities. The book is written at a high level, so one needs a good knowledge of basic reactions and synthetic terminology to read it. Graduate students in an intense synthesis course should be ready.

There is some repetition and overlap in the essays (cross-referencing is good), but this is normally not a problem because one does not read the book through in order. An exception is the chapter on Chiral Lewis Acids, much of which is a repeat of the preceding chapter on Asymmetric Diels Alder Reactions. Although there are some more current references, most of the subjects treated in the essays are from papers published in the early-to-mid 80's (up to about 1987). Some chapters are more current (there is a brief discussion on "catalytic antibodies", for example) and others less (the Radical Cyclization chapter was a special disappointment, discussing no work after 1985).

On the production side, I found the formatting of references [19] too similar to that of structure numbers (19). Eventually I adapted, but I had to pause at the beginning to decide if a number was a reference or a structure.

In summary, the title *Organic Synthesis Highlights* captures well the book's essence. This is not a reference work in synthesis, but it is entertaining to read, and it is packed with references.

Dennis P. Curran, *University of Pittsburgh*

Studies in Organic Chemistry. Volume 42. Similarity Models in Organic Chemistry, Biochemistry and Related Fields. Edited by R. I. Zalewski, T. M. Krygowski, and J. Shorter. Elsevier: Amsterdam. 1991. vi + 688 pp. \$240.00. ISBN 0-444-88186-1.

This typescript volume of the *Studies in Organic Chemistry* series presents in-depth coverage of selected topics in "similarity models". The volume may also be considered as the third volume of a loosely connected series of *Advances in Linear Free Energy Relationships* (1972) and *Correlation Analysis in Chemistry—Recent Advances* (1978). It contains 11 chapters ranging in length from 28 to 102 pages.

Chapter 1 (T. M. Krygowski and K. Wozniak, 76 pp, 50 refs) covers an overview of the statistical basis of using "similarity models". Chapter 2 (J. Shorter, 72 pp, 329 refs) is an excellent summary of the influence of electronic substituents principally on chemical reactivity in aromatic systems. Some of the most important advances in the field during the last decade on the Hammett equation and its multiparametric extensions are dealt with in fair detail. Chapter 3 (M. Godfrey, 28 pp, 43 refs) considers the transmission of substituent effects across molecular skeletons to functional group by two fundamentally different approaches: the classical approach of separating the electronic effects into field, inductive, and resonance effects and an alternative or complementary approach of separating them into polarization and charge-transfer effects based on the perturbational molecular orbital theory. Chapter 4 (G. Hafelinger, 44 pp, 81 refs) discusses the properties of hydrogen as a substituent in planar organic π -system by means of quantum chemical procedures. Chapter 5 (C. Laurence, 52 pp, 178 refs) describes the correlation analysis of IR and UV spectroscopic data. Chapter 6 (H. Langhals, 60 pp, 113 refs) examines the behavior of binary solvent systems. Chapter 7 (J. Oszczapowicz, 60 pp, 77 refs) presents the application of correlation analysis for prediction of gas chromatographic retention data of organic compounds. Chapter 8 (J. S. Jaworski and M. K. Kalinowski, 43 pp, 233 refs) deals with the similarity model in the field of organic electrochemistry. Chapter 9 (R. I. Zalewski, 102 pp, 389 refs) contains a detailed account of the mathematical basis of principal component analysis and its applications. Chapter 10 (D. J. Livingstone, 72 pp, 513 refs) provides a thorough review of most of the significant contributions in the field of quantitative structure-activity relationships during the last 10 years. Chapter 11 (M. Charton, 60 pp, 82 refs) is devoted to detailed examination of the quantitative description of steric effects by correlation

analysis.

This book covers over 2000 papers with almost 700 pages of text. Over 60% of the references were published since 1980 and cover some of the most significant advances made in 1980s. However, less than 1% of the literature included was published since 1990 probably because of the preparation period of the book. The index is rather limited, running less than 6 pages. The word "Similarity Models" in the title may not be the best choice for this volume. It implies a much more broader scope of subject matter than is actually covered. There are somewhat different but rapidly growing important applications in the field of molecular similarity (see *Concepts and Applications of Molecular Similarity*, Edited by M. A. Johnson and G. M. Maggiora; Wiley: New York, 1990).

Overall, this book gives a good coverage of modern work on a number of currently important topics in the field of correlation analysis. Both a person entering into the field of correlation analysis and a more experienced scientist working in this field will benefit from this book. In particular, the book can serve as a useful starting point to identify a literature source for background information or to delve further into a subject of interest. This book will be an important addition to any library collection in correlation analysis.

Ki Hwan Kim, *Abbott Laboratories*

Michael Faraday and the Royal Institution: the Genius of Man and Place. By John M. Thomas (the Royal Institution). Adam Hilger: Bristol. Distributed in the U.S. by AIDC, Colchester, Vermont, and the American Institute of Physics, New York. 1991. xii + 233 pp. \$25.00. ISBN 0-7503-0145-7.

This is a fascinating book describing the life and scientific activities of Michael Faraday. It is addressed to a very broad audience from high school seniors with an interest in science and the educated nonscientific public to practicing scientists and engineers. It seems to me to have accomplished this difficult feat remarkably well.

The first three chapters giving a background on Faraday are certainly accessible to all. The long chapter on Faraday's scientific contributions can either be perused as a survey or read in detail. Either way it is quite possible for the reader to get a feel for the extremely broad contributions of this polymath to chemistry, physics, and technology. The illustrations and photographs are particularly effective. The chapter on his writings conveys very well a feeling for the style and substance of the man through apt quotations which should not swamp the educated reader of any background.

Chapter 7 constitutes an extensive discussion of Faraday's contributions to the Royal Institution. The average reader will certainly get a feel for the variety of topics covered in the Discourses and Christmas lectures and the personalities involved, but scientists will be deeply interested in the quotations which convey a flavor of the presentations. Again, the photographs and illustrations are a great help. The final chapter on the popularization of science and the Christmas discourses is especially well done and is especially appropriate for these times when a concentrated effort must be made both to interest young people in a scientific or technical career and to educate the public broadly on the methods, the concepts, and the possible contributions of science. The appendices list the discourses of Faraday and the honors and recognition he received.

The book is a fine tribute to Michael Faraday on the 200th anniversary of his birth. It reflects not only Professor Thomas's great admiration for the man but his own ability to emulate him in presenting science to a broad audience.

H. G. Drickamer, *University of Illinois, Champaign-Urbana*

Chlorine in Coal. Coal Science and Technology 17. Edited by J. Stringer (Electric Power Research Institute, Palo Alto, CA) and D. D. Banerjee (Center for Research on Sulfur in Coal, Centerville, IL). Elsevier: Amsterdam, Oxford, New York, and Tokyo. 1991. viii + 512 pp. \$200.00. ISBN 0-444-87499-2.

This book contains the Proceedings of an International Conference held in Chicago, IL, October 9-11, 1989. There are 23 papers printed, with abstracts, and many are followed by discussions. The meeting was called because of the concern about the release of chlorine during the processing of coal. At the end of the book there is a list of the contributors with their affiliations followed by a brief subject index.

Geometry and Thermodynamics. Common Problems of Quasi-Crystals, Liquid Crystals, and Incommensurate Systems. NATO ASI Series, Series B: Physics. Volume 229. Edited by J.-C. Tolédano (National Center of Telecommunication Studies, France). Plenum Press: New York and London. 1990. x + 466 pp. \$105.00. ISBN 0-306-436604.

This book grew out of a NATO-Advance Research Workshop held in Preveza, Greece, in September 1989 during which 50 experts considered the three fields in 35 h of conferences and discussions. Their con-

siderations (mainly physics) are presented in typescript form with many illustrations under the following headings: Structure and Geometry; Models for Stability and Growth; and, lastly, Dynamics and Phasons. Abstracts are supplied with each paper along with the affiliations of the authors. There is a very brief subject index.

Plastics Additives. 3rd edition. Edited by R. Gächter (Ciba Geigy, Switzerland) and H. Müller (Ciba Geigy, Switzerland). Associate Editor: P. P. Klemchuk (Ciba Geigy). Oxford University Press: New York. 1990. vii + 970 pp. \$88.00. ISBN 0-19-520855-2.

The 20 chapters found in this reference handbook will supply the answers and provide the information that anyone associated with plastic products will need: the technologist who wishes to produce an effective, non-blocking, pigmented LLDPE film, the theoretical chemist who desires to understand the chemistry of UV stabilization for a molded automobile part, or the plant chemist who must analyze any additive level for quality control assurance. Every additive used in polymer systems from ABS to vinyl acetate copolymers is addressed in this 970-page text. This quantity of information covered makes this book the only reference a chemist or engineer will need when a question about additives is posed.

The handbook starts with the beginning step of processing the polymer. Plastics cannot be processed into useable items unless they are subject to some form of high energy input, usually temperature and high shear. The finished plastic product can also be subjected to destructive energy from sunlight or γ irradiation. Protection from the ensuing destructive chemical reactions due to these harsh environments is required if the plastic needed is to provide some serviceable function. Dr. F. Gugumus, in approximately 240 pages in Chapters 1 and 3, covers polymer stabilization chemistry in great detail. Recommended levels of antioxidants and processing stabilizers, discoloration concerns, synergists, and testing procedures are discussed for 21 polymers or polymer systems in Chapter 1. In Chapter 3, Dr. Gugumus expands on light stabilization. The exciting new area of HALS additives is discussed, a new addition from the previous editions.

Chapter 2, a short treatise on metal deactivators, by Dr. H. Muller bridges the more detailed chapters, 1 and 3. The stabilization of polyethylene and polypropylene in wire and cable applications from metals, especially Cu, is covered in this chapter. As in all the chapters, a list of commercial additive suppliers in the U.S. is added at the end of the chapter. This makes it quite easy to locate a supply of an additive of interest.

Chapter 4 completes the chapters on polymer stabilization by addressing the unique stabilization chemistry associated with PVC plastic. Dr. H. Andreas discusses the use of several metal containing stabilizer systems. He also touches upon the use of metal-free stabilizers and various other stabilizers used in PVC processing and end use. PVC is a unique plastic and many in the PVC business would classify the production of PVC products as a highly skilled art. In many of its end uses, PVC is compounded with a large percentage of plasticizer. Chapter 5, by L. Meier, covers the theory of plastic and plasticizer mixtures and their applications. The 100 pages on plasticizers plus the chapters on *PVC Stabilization*, Chapter 7, by D. Böhme, *High Polymeric Processing Aids for PVC*, and Chapter 8, *High-Polymeric Additives for Improving Impact Strength*, Dr. D. Hepp, could be considered a separate book in and of itself, so their incorporation into this handbook is welcomed.

In Chapter 6, Dr. T. Riedel discusses the roles of lubricants and related additives, i.e., mold release agents and antiblocking additives, in plastics. This chapter does a complete job of detailing the effects of lubricant additives on the processing of plastics. I find just one fault with this chapter. Polymer processing aids, used for melt fracture elimination and for increasing output in film production, comprise close to a 2M lb/yr business, yet only two short paragraphs mention their use. Some would argue that processing aids would deserve a chapter unto themselves. Perhaps a thought will be given to this for the 4th edition.

Chapter 9, by Dr. H. D. Schlumpf, and Chapter 10, by Dr. R. Kleinholtz et al., discuss the attributes that fillers and fiber reinforcements bring to various polymer systems. The importance of this technology to thermoplastic resins in automobile applications has grown tremendously in the last decade alone and will continue to increase in use and quantity.

The aesthetics of plastics has improved considerably during the last 50 years and has probably been the most noticeable during the last 10 or 20 years. In Chapter 11, Dr. W. Damm and Dr. E. Herrmann describe the use of colorants that has made this possible. Brighter colors have been introduced to plastics and color fastness has improved, but environmental concerns with the use of heavy metal pigments are growing. Many options are becoming available with new organic pigments. In Chapter 11, Part II, Dr. Damm details the technology of pigment incorporation.

Two specialized additive areas that have seen a lot of activity in the last 10 years are flame retardancy and antistat protection. Flame re-

tardants have become important in plastics used for commercial transportation and in construction applications. In Chapter 12, Dr. H. J. Troitzsch starts with the theory of combustion in plastics and specifies flame retardant formulas and the testing procedures to quantify their efficiency. Packaging, either temporary or permanent, of electronic materials in plastics has increased the need for the dissipation of static charges found to build up on plastics. Dr. G. Pfahler describes in Chapter 13 the effectiveness of internal and external antistats and details several test methods that measure their effectiveness.

Chapters 14-18 focus on very specific additive uses. K. Berger briefly describes the application of *Fluorescent Whitening Agents* in Chapter 14. Whitening agents show advantages in specific polymer systems such as PVC, polystyrenes, and polycarbonates and are added for aesthetic value. Dr. J. Lorenz, in Chapter 15, discusses the uses of biostabilizers in plastics. Again, these additives find a limited, specific use in polymers mainly for films in agricultural uses and medical applications.

Blowing agents are discussed in Chapter 16 by H. Hurnick. The chemistry associated with these specific additives is quite fascinating and the chapter covers it quite well. In Chapter 17, Dr. A. L. Berg and W. C. Endstra discuss the importance of cross-linking agents for certain polymers. Certainly, there is interference between additives in many polymer compositions, but the most obvious would be between antioxidants and the organic peroxides used for cross-linking the polymer chains. This and other additive interactions are reviewed in this chapter. Chapter 18, by J. Jansen, describes the physical chemistry that occurs when nucleating agents are added to plastic to improve their clarity. These additives have found significant uses in PET and PP plastics.

The last two chapters, 19 and 20, are new to this book from the 2nd edition. The concern for people's exposure to a significant amount of additives, especially in food packaging, has made the governments of the world more restrictive to additive addition in plastics. The increase in plastic demand has also made a world market for plastic producers, thus requiring the increased interactions with several government regulations. Dr. R. Leimgruber covers these topics in his chapter on *Aspect of Plastics Additives*. This chapter is the perfect reference on world wide government regulations, toxicity testing procedures, and industrial hygiene aspects for handling additives.

Chapter 20 closes the book with a full review on analytical procedures for the identification and quantification of additives by Dr. W. Freitag. Everyone associated with plastic additives probably runs an analytical lab to ensure that a quality product is produced. This chapter will allow the analytical chemist a chance to verify his/her testing procedures or perhaps it will suggest a method that might be an improvement in their testing.

In summary, this handbook will serve the neophyte to polymer systems as well as it will serve the experienced polymer scientist. It is the perfect introduction to plastic additives for the inexperienced, and as he or she progresses into the field of plastic's technology it becomes a referenced handbook that will be referred to time and time again.

Wayne Riley, Exxon Chemical Co.

Applications of Synchrotron Radiation. Edited by C. R. A. Catlow and G. N. Greaves. Blackie and Son: London and New York. 1990. xii + 387 pp. \$145.00. ISBN 0-216-92677-7.

This is an edited volume with 15 chapters contributed by 20 authors who review a number of structural and analytical techniques that extensively utilize synchrotron radiation to characterize materials on the atomic, molecular, and extended (crystalline) scale. After a general and comprehensive review of properties of synchrotron radiation and the various associated methodologies and instrumentation,¹ 14 chapters follow that cover (1) X-ray Diffraction (discussed in two chapters: one on powder diffraction and another on protein crystallography), (2) X-ray Topography, (3) Small Angle X-ray Scattering (two chapters: one on microemulsions and the other on time-resolved study of polymers), (4) EXAFS (four chapters on the following subjects: glasses, ionic conductors, catalysts, and biomolecules), (5) Surface Science, (6) X-ray Microscopy, (7) Trace Element Analysis, (8) Atomic and Molecular Spectroscopy, and (9) Time-resolved Spectroscopy. Other "up-coming" applications such as radiographic and tomographic imagings, angiography, lithography, magnetic circular dichroism, earth science and minerals characterization, and glancing angle studies of surface and buried interface were not included. Some of these topics are covered in another volume of the same title, which was edited by H. Winick et al. and published by Gordon and Breach Science Publishers (1989) as a symposium proceedings (from Beijing, 1988). The current volume is more chemistry and materials science oriented, whereas the 1989 volume is more physics oriented. These two volumes complement each other, although there is a strong overlap in the areas of X-ray topography and EXAFS.

The chapters are rated as "A" or "B". "A" denotes "adequate" with

information on the subject matter being current and/or state-of-the-art to the practitioner as well as helpful to the inquisitive newcomer. "B" denotes "barely adequate" and indicates a narrow scope of subject matter and/or sketchy descriptions that leave the reader wondering. Such "B" chapters are interestingly accompanied with a shorter list of literature references than that expected for a general review of the special topics associated with modern applications of synchrotron radiation.

The "B" chapters are X-ray Diffraction from powders and crystallites, EXAFS and structural studies of glasses, Looking at Solid Surfaces with Synchrotron Radiation, and Time-resolved Spectroscopy. The remaining chapters were given an "A" rating.

In the chapter on X-ray diffraction the five application areas (high resolution, time-resolved, high pressure, anomalous dispersion, and surface films) were each discussed rather sketchily. Single-crystal studies occupy less than two pages of text with no mention of the power of source polarization to examine anisotropy. This chapter cited 26 references.

In the first of the four EXAFS chapters, the title should have included "oxide" or "silicate" in front of "glasses", since these are the only glasses discussed. Except for germane glasses, neither other oxide glasses nor metallic and semiconducting chalcogenide glasses were mentioned. Also, EXAFS experimentation, which is an important ingredient "know-how" of this synchrotron tool, was not discussed at all. Further, no reference was made to the work Experimental X-ray Absorption Spectroscopy by Lytle in the volume edited by Winick et al., and the correct citation for the calculated backscattering factors in Figure 6.5 should have been that of Teo and Lee [*J. Am. Chem. Soc.* 1979, 101, 2815], not Hayes and Boyce who extracted the figure from the former paper.

The chapter Looking at Solid Surfaces with Synchrotron Radiation suffers the same drawback as the X-ray powder diffraction chapter. It contains only 23 literature references for an application which takes nearly 50% of synchrotron beam. No basic principles are given for any of the surface tools used. In the section on SEXAFS, for instance, the scholarly work of J. Stohr (130 pp + 355 refs) in the EXAFS monograph edited by Koningsberger and Prins (J. Wiley, 1988) was totally ignored.

The title of the last chapter, Time resolved Spectroscopy, should also have been more explicit and contained the word "fluorescence" in its heading since this is all that the chapter discussed. Thirty references are cited in this chapter. There are also a (growing) number of time-resolved spectroscopic studies using synchrotron X-rays like energy dispersive EXAFS and quick-scan EXAFS in the literature.

If a newcomer to the synchrotron community were to learn anything from this volume, it would be from the chapter on X-ray topography. In this chapter, the basic principles of topography and phenomenology associated with experimentation are well presented. Applications are substantiated with well-discussed examples and future directions. This is an A+ chapter with 106 refs. Two other chapters, X-ray Microscopy and Synchrotron Radiation Trace Element Analysis, also fall into this category.

(1) The NSLS X-ray ring has thus far been operated up to 200 mA, not 500 mA as listed in Table 1.1. Also, the new facilities under construction category did not list the SPring-8 in Japan, designed to operate at 8 GeV and 100 mA electron current.

Joe Wong, Lawrence Livermore National Laboratory,
University of California

Chemical Analysis: A Series of Monographs on Analytical Chemistry and its Applications. Volume 109. Fluorometric Analysis in Biomedical Chemistry: Trends and Techniques Including HPLC Applications. By Norio Ichinose (Hamamatsu University), George Schwedt (Clausthal University), Frank Michael Schnepel (Stuttgart University), and Kyoko Adachi (Hamamatsu University). Edited by J. D. Winefordner. Editor Emeritus: I. M. Kolthoff. John Wiley & Sons, Inc.: New York. 1991. xiv + 225 pp. \$75.00. ISBN 0471-52258-9.

This monograph provides a general description of fluorescence methods of analysis, particularly as related to biochemical and biomedical

analysis. The text is divided into five chapters on (1) introduction, (2) physical property of fluorescence, (3) principle of fluorescence measurements, (4) biochemical and biomedical applications, and (5) biochemical and biomedical applications of fluorometric analysis using HPLC. The latter two chapters are largely a compilation of applications in the literature. Thus, these are likely to be outdated fairly soon. In general, this monograph should be useful to the practicing fluorescence spectroscopist, but will be of limited use as a sole source or as a textbook for a class. It is this reviewer's opinion that the monograph also suffers from some minor problems of organization and syntax. Presumably, the problems with syntax are largely due to translation of this monograph from Japanese to English.

The five chapters of this monograph are designed to provide the theoretical foundation for fluorometric analysis as well as outline the applications of the technique. Chapter 1 is a brief introduction to fluorescence as an analytical technique. A brief discussion is also provided on the other four chapters which follow in the text. Chapter 2 is a discussion of the general theory of photoluminescence, including photoabsorption and emission, characteristics of fluorescence, fluorescence quantum yield, influence of various factors on solution fluorescence, the chemical structure of fluorophores, examples of fluorophores, and the basis of luminescence analysis. This chapter serves as the major background for those who are not familiar with fluorescence spectroscopy. While this discussion is somewhat limited, it should be easily digestible by those readers with an undergraduate degree in chemistry. Chapter 3 is a general description of fluorescence instrumentation and covers the principles of fluorescence measurements. This is a short chapter which will need to be supplemented for those interested in more in-depth coverage. This is particularly true for the novice who is not at all familiar with fluorescence spectroscopy. Chapter 4 covers biochemical and biomedical applications of fluorometric methods of analysis. This chapter is largely a survey of applications in the literature. It is divided into fluorescence methods for various compounds of biochemical and biomedical interest such as amines, amino acids, alkaloids, vitamins, and steroids. Derivatization techniques for each are also discussed. The final chapter (Chapter 5) is also in the form of a compilation of applications in the literature. However, this chapter is a survey of applications which employ high-performance liquid chromatography (HPLC). These applications are grouped by compounds with classifications similar to those in Chapter 4.

Isiah M. Warner, Emory University

Catalytic Science and Technology. Volume 1. Edited by Satoshi Yoshida (Kyoto University), Nobutsune Takezawa (Hokkaido University), and Tetsuji Ono (Kogyo Co., Ltd.). Kodansha: Tokyo. VCH: New York. 1991. xxvi + 538 pp. \$162.00. ISBN 1-56081-123-3.

This book contains the Proceedings of the First Tokyo Conference on Advanced Catalytic Science and Technology held in Tokyo, July 1-5, 1990. There are five plenary lectures, 37 oral presentations, 23 industrial poster presentations, and 62 general poster presentations. These are followed by author and subject indexes.

Studies in Surface Science and Catalysis. Volume 69. Zeolite Chemistry and Catalysis. Edited by P. A. Jacobs (Katholieke Universiteit Leuven), N. I. Jaeger (Universität Bremen), and L. Kubelková and B. Wichterlová (Czechoslovak Academy of Sciences). Elsevier: Amsterdam, Oxford, New York, and Tokyo. 1991. xiv + 514 pp. \$203.00. ISBN 0-444-88245-6.

This book contains the Proceedings of an International Symposium held in Prague, Czechoslovakia, September 8-13, 1991. This symposium focussed on the effect of modifying components on the structure and reactivity of molecular sieves. After a brief Preface by the editors, it contains 52 papers, with abstracts, presented by the contributors to the symposium. There are subject and author indexes and a list of other studies in the *Surface Science and Catalysis* series.