Computer Software Reviews

PLT. Version 5.0. Rylaz Products, 514 Edward Street, Madison, Wisconsin 53711. List price $80.00 ($75.00 if payment accompanies order).

PLT is a complete program that allows one to draw high-quality chemical structures with IBM PC/XT/AT/PS2 or clones. It supports VGA, EGA, CGA, or Hercules graphics. Files for a variety of printers are included, Epson 9-pin and 24-pin (default), HP Laserjet, postscript printers, and HP 7470A and 7475A plotters. At least 512K of memory are required, and although a hard disk is not mandatory it is highly recommended. A mouse can be used although keyboard commands are simple and present no problem.

PLT is a what-you-see-is-what-you-get structure-writing program. It can plot to disk for later recall and can print in one of three proportionally spaced graphics fonts. Greek letters, degree, triple and double bonds, arrows, etc. are available. Circles, arcs, curves, and sine and cosine waves are easily drawn. Lines can be drawn as solid or dotted, dashed, hatched, wiggly, wedged, bold, double, or triple. Template structures can be loaded directly from the program, although the number of these is somewhat limited. New template structures provided by the user are, however, easily added. Perhaps the most appealing feature of the program is the ability to move a portion or all of a drawing, change its size, and rotate, erase part, reverse, or transfer it to another drawing. Frequently used text fragments can be saved and retrieved with a single command.

A manual is provided which is comprehensive and explains each individual command. For a first-time user a tutorial section is included which allows one to become familiar with the program and to begin drawing structures with little additional study. There are a few typographical errors, and some commands could be more fully explained, i.e. the use of subscripts. Drawings produced on a dot-matrix printer, an Epson LX, are of high quality such that work is not required to make them journal acceptable.

PLT is a high-quality program available at a relatively low price. Plotting and printing chemical structures including stereochemical structures is relatively simple. The program should be seriously considered.

William S. Wadsworth, Jr., *South Dakota State University*

*Book Reviews**

Electroanalysis of Biologically Important Compounds. By J. P. Hart (Bristol Polytechnic, U.K.). Ellis Norwood: New York. 1990. 213 pp. $79.95. ISBN 0-13-252107-5.

The stated objective of this book is to demonstrate that modern electroanalytical techniques can be used to overcome many of the problems encountered in the analysis of biological compounds with emphasis on the measurement of these substances in foods, pharmaceuticals and biological matrices. The book comprises five chapters. Chapter 1 (26 pages) describes some of the more important polarographic/voltammetric electroanalytical techniques and the principles of amperometric and coulometric detectors employed in conjunction with high-performance liquid chromatography and flow injection analysis. Each technique is discussed very briefly, and it is unlikely that anyone not already familiar with electroanalytical chemistry could gain much understanding from the material presented in this chapter. The discussions of AC polarography, various pulse polarographic/voltammetric techniques, and linear-sweep and cyclic voltammetry are particularly weak. The excitation waveform for AC polarography shown on page 17 is carelessly and confusingly drawn, and the cyclic voltammogram shown on page 22 is an extraordinarily miserable example. The explanation of a three-electrode operational amplifier potentiostat is inadequate and, indeed, misleading. Chapter 2 (44 pages) discusses, first, mechanistic aspects of the electrochemistry of pyrimidine and purine derivatives, including nucleic acids, and then describes electroanalytical methods which can be employed to measure these compounds. The remaining chapters deal similarly with amino acids, peptides and proteins (Chapter 3, 51 pages), vitamins (Chapter 4, 54 pages), and selected coenzymes (Chapter 5, 17 pages). Each chapter presents a reasonably thorough review of direct electroanalytical methods which have been used to determine appropriate biological molecules. However, the author does not adequately emphasize the fact that electroanalytical methods are really of little value for direct analyses of biomolecules in real biological matrices because of their lack of selectivity and their susceptibility to many other interferences. The sections on LCEC in Chapters 2–5, therefore, were of considerably more value. However, it was surprising that the recent advances in neurochemical analyses of the biogenic amines and other neurotransmitters and their metabolites using LCEC were not discussed more thoroughly.

Overall, this is a rather disappointing book. The title is much too broad. There are far superior texts and review chapters available which can provide a better introduction to both the principles and applications of electroanalytical methods. In addition, mechanistic aspects of the electrochemistry of biological molecules have been dealt with more authoritatively and comprehensively elsewhere. However, some readers may find that the book provides a good guide to the literature relating to some compounds of interest.

Glenn Dryhurst, *University of Oklahoma*

Biological Monitoring of Exposure to Chemicals—Organic Compounds. Edited by Mat H. Ho and H. Kenneth Dillon (University of Alabama). John Wiley & Sons: New York, Chichester, Toronto, and Singapore. 1987. ix + 352 pp. $65.00. ISBN 0471-82275-2.

The chapters of this book are essentially derived from papers presented at the Symposium on the Biological Monitoring of Exposure to Organic Compounds which was held in conjunction with the 187th National Meeting of ACS in St. Louis, Missouri, 1984. In view of this aspect the content of the book could be expected to be fragmentary; however, to the credit of the Editors, the sequence of the chapters is in a logical order as to minimize this drawback.

The first six chapters of the book cover the general aspects of biological monitoring. Although some of the topics discussed in this portion of the book are traditional, that is they are well-known in the field of toxicology, the style and the organization by which they are presented make this section valuable for didactic use. In addition, in this section there are some innovative topics; many of them are presented in Chapter 3 by V. Fiserova-Bergerova who presented the use of multicompartmental simulation models for the identification and correction of several factors which may distort the outcome of biological monitoring of inhalation exposures. The problems of inappropriate extrapolation of biological threshold values from laboratory data are also dealt with extensively in this chapter.

Factors which affect the levels of organic volatile compounds in alveolor air and blood are discussed in Chapter 4 by Brugnone et al. along with the presentation of the data obtained from the study of 17 different organic solvents. The shortcomings of biological monitoring of solvents are presented in Chapter 5 by van Hemmen and de Mik. The role of clinical pathology methods in biological monitoring is discussed by Meeks in Chapter 6.

Most of the following chapters are reports on specific applications of biological monitoring of exposure to certain organic compounds such as benzene, toluene, xylene, styrene, methylethyl ketone, hexane, methanol, 1,1,1-trichloroethane, tetrachloroethylene, organophosphorus pesticides, chlorinated pesticides, *N*,*N*-dimethylformamide, polychlorinated biphenyls, hexachlorobenzene, 2,3,7,8-tetrachlorodibenzo-*p*-dioxin, and 1,2-dimethylhydrazine.

The various biological exposure indices discussed in the last three chapters include direct measurements of parent compounds in alveolar air or in blood, their metabolites in blood and urine, indicators of mi-

---

*Unsigned book reviews are by the Book Review Editor.

crosomal enzyme induction, and other indices of biological lesions, from early detection to irreversible physiological damage, such as porphyrin excretion, serum enzymes, and liver and kidney function tests. Interesting proposals of carcinogenic risk monitoring are those presented by Mueller et al. in Chapter 7 with the detection of urinary *N*-7-phenylguanine as an indicator of carcinogenen–DNA adducts and by Lindholm et al. in Chapter 23 with the measurement of cell-mediated immunity after exposure to carcinogens. These papers and several others in the book should stimulate further research in the area of biological monitoring.

In addition to be a valid reference to research toxicologists, this collection of papers could be the source of useful information for teachers and students of occupational medicine and industrial hygiene courses.

Vincent N. Finelli, *Florida Atlantic University*

Advances in Enzymology and Related Areas of Molecular Biology. Volume 64. Edited by Alton Meister. John Wiley and Sons: New York. 1991. 494 pp. $69.95. ISBN 0-471-50949-3.

Among the seven reviews of this volume, the treatise by R. C. Fahey and A. R. Sundquist addresses the "Evolution of Glutathione Metabolism", taking note of the phylogenetic distribution and implied evolutionary relationships between key enzymes of glutathione (GSH) metabolism, the thiol which has an important antioxidant role in biology. Evidence is reviewed for the occurrence of GSH in prokaryotes which appear to have given rise to chloroplasts and mitochondria in eukaryotes by endosymbiosis. Those few eukaryotic species in which GSH has not been identified apparently lack mitochondria. Selected properties of several GSH-metabolizing enzymes in plants and animals are reviewed which facilitate consideration of evolutionary relationships. Arguments are presented for endosymbiotic origins of enzymes as τ-glutamylcysteine synthetase, GSH reductase, GSH S-transferases, and GSH synthetase. This review provides a stimulating excursion into potential mechanisms whereby eukaryotes have acquired the ability to generate GSH and points to specific biochemical functions whereby this thiol can play roles essential to the survival of aerobic forms of life.

James M. Manning reviews "Covalent Inhibitors of Red Cell Sickling", detailing the chemistry and residue sites of reaction in hemoglobin as well as the functional consequences to hemoglobin of such modifications. Although several such reagents have been developed, none is in current use as a chemotherapeutic agent in the control of sickle cell anemia. This review explores reasons for the successes and failures of such compounds and should prove quite useful not only in the further consideration of this type of chemotherapeutic approach but also as a guide to the reactivity of selected sites in hemoglobin.

The "Structural Basis for Catalysis by Tryptophan Synthase" is reviewed in great detail by Edith Wilson Miles, providing an important update to her last thorough review of this enzyme in 1979. Accounts of the pitfalls and successes encountered in the attempts to grow adequate crystals whose X-ray diffraction patterns provided the 3-D structure of this enzyme provide useful insights into the pathway to this stage of knowledge of enzyme structure. An encompassing view of the structure and catalytic mechanism of this catalyst is synthesized from the information gained by kinetic approaches as well as chemical modification, site-directed mutagenesis, and X-ray crystallography. Indeed, this review should be of interest to those concerned with this catalyst as well as with a variety of other enzymes now being subjected to such multi-faceted analytical approaches. The several diagrams and the color representation of the 3-D structure of this oligomeric enzyme clearly illustrate and amplify major points in the text.

"Structure and Mechanism of F_0F_1-Type ATP Synthases and ATPases", by H. S. Penefsky and R. L. Cross, addresses the mechanism of action of these proton-translocating enzymes found in membranes of bacteria, chloroplasts, and mitochondria. Models of mechanisms are considered which could account for ATP synthesis and other coupled vectorial processes catalyzed by these unique enzymes, relating rate, binding, and equilibrium constants for component steps as well as conserved structural features of these enzymes. This is an important review of the current state of understanding the role of these enzymes in oxidative phosphorylation and photophosphorylation.

K. V. Rajagopalan reviews "Novel Aspects of the Biochemistry of the Molybdenum Cofactor". In contrast to the binding of other metallic trace elements which serve as cofactors by ligand fields generated from amino acid side chains, the biological functions of molybdenum appear to be expressed only when the metal is bound to specific organic prosthetic molecules. This review presents an absorbing account of the evidence from studies in vivo and in vitro for the existence and structural properties of derivatized pterin molecules serving as molybdopterin cofactors in a variety of mammalian, plant, and microbial catalysts, including sulfite oxidase, xanthine oxidase, and nitrate reductase. Well-illustrated discussions of the redox chemistry and biosynthetic pathways of molybdopterin cofactors are presented. This review should be of interest to those concerned with these unusual ctalysts as well as the role of this trace metal in biology.

"Ovothiols: Biological and Chemical Perspectives" by B. M. Shapiro and P. B. Hopkins reviews the oxidative burst accounting for the ovoperoxidase-catalyzed cross-linking and deposition of the envelope protecting newly fertilized sea urchin eggs and the redox active family of aromatic thiols discovered by these investigators, the 1-methyl-4-mercaptohistidines, which appear to provide a defense against uncontrolled oxidative stress during membrane formation. The isolation and chemistry of the ovothiol family are reviewed in detail as are methods for their chemical synthesis and evidence for their potential roles as antioxidants. This is a clearly written, well-illustrated review of these unusual compounds which future research may reveal to play a broader role in biology.

This volume concludes with an extensively documented review of [*N*-Carboxyalkyl]-Amino Acids by J. Thompson and S. P. F. Miller, covering the chemistry, enzymology, chemical synthesis, and biological implications of the plant tumor opines, marine invertebrate imino acids, N^5-(1-carboxyethyl)ornithine, and saccharopine. Author and subject indices for this volume as well as a cumulative author index for Volumes 1–64 are included in this volume.

Herbert M. Kagan, *Boston University School of Medicine*

Challenges in Synthetic Organic Chemistry. By Teruaki Mukaiyama (Science University of Tokyo). Clarendon Press, Oxford University Press: Oxford, New York. 1990. 225 pp. $63.00. ISBN 0-19-855-644-6.

Prof. Mukaiyama's book can be viewed in several different lights: as a monograph on synthesis for active research workers; as a chapter in the history of chemistry which illuminates the phenomenal rise of Japanese research; and as a muted autobiographical essay that provides glimpses of the creative process.

In the four decades since he started his scientific career in post World War II Japan, Dr. Mukaiyama put his stamp on several important areas of organic synthesis. He has arranged the description of his major contributions in thirteen chapters grouped into three parts: Approaches to Dehydration Reactions; Searching for Novel Synthetic Control; and New Concepts in Synthetic Control. The translation from Japanese edited by Dr. J. E. Baldwin of Oxford University flows smoothly. There are ample equations and extensive references to Dr. Mukaiyama's own papers. For a synthetic chemist, it is a source book that is interesting reading.

Prof. Mukaiyama and his many students have done pioneering work with titanium compounds for activating enolates. They have studied organosulfur and organophosphorus reagents, used boron and tin compounds and trityl salts, developed proline-derived chiral auxiliaries, and elaborated the concept of "synthetic control" for devising highly diastereoselective reactions.

These and other synthetic approaches are described by Dr. Mukaiyama in a lucid fashion. He also indicates his train of thought that led from his early studies on dehydration to a wide array of highly successful reagents and reactions. It is possible to start at any point in the book and go forward or backward in time to follow a chemical trend because the chapters are essentially chronological in order with adequate cross-referencing between chapters. One can easily come across reagents or reactions that could suggest fruitful experiments in one's own laboratory.

An American chemist might find some aspects of the Japanese academic research scene unusual. One gets the impression that Prof. Mukaiyama had almost unlimited access to manpower: he establishes optimum conditions for numerous reactions and compares many versions of a reagent under study to find the best one suited for specific transformations (Chapter 10 constitutes a fine narration of this type of research approach). Thus, discussions during a lunch led to a new idea for promoting esterification reactions with the onium salts of azaarenes. An experiment was started forthwith with a bottle of a promising chemical found on a nearby shelf. Meticulous work from that point on and extensive testing of many variants of reagents, substrates, and reaction conditions led to highly efficient reactions for esterification and amide bond formation, improved techniques for macrolide synthesis, transformations of secondary alcohols with inversion, carbodiimide preparation, Beckman reagent under basic condition, etc.

After about 4 years of intensive research on a particular concept, Dr. Mukaiyama was usually ready to pursue a new concept and devise a new set of experiments for his students, "... the most important requirement for the development of research is to carry out experiments as soon as an attractive idea occurs in your mind...", says Dr. Mukaiyama. This heavy input of experimental work for each concept—reasonably easy in the Japanese system to fund and arrange at major universities—has aided Japan in achieving the prominent position it now enjoys in the field of synthetic organic chemistry.

Prof. Mukaiyama's book allows brief glimpses into his thinking as an organic chemist, as an educator, and as a prominent scientist in the new

Japan. He notes that all his papers have been published in Japanese journals. In keeping with Japanese academic custom, he retired from his leadership position at Tokyo University at the age of 60 and moved on to a much smaller university. He was offered a professorship at Stanford University to continue his research activities for another decade but he declined.

This book portrays elegant synthetic organic chemistry in the framework of international science—conducted by a talented scholar who embodies Japanese attitudes and values.

M. S. Manhas, *Stevens Institute of Technology*

Chemical Analysis. Volume 110. An Introduction to Laboratory Automation. By Victor Cerda (University of the Balearic Islands, Palma de Mallorca, Spain) and Guillermo Ramis (University of Valencia, Burjassot, Valencia, Spain). Edited by J. D. Winefordner. Wiley: New York. 1990. xiv + 321 pp. $69.95. ISBN 0-471-61818-7.

This is a tutorial in laboratory automation, intended to be used by chemists who have not had much formal background in the areas of electronics and small computer applications but who have a need to present instruction in this area. After a brief introduction to the concept of laboratory automation in analytical chemistry, the authors lead off with chapters that provide introductions to analog and digital electronics, microprocessors, transducers, and instrument-to-instrument communications. Following this is a chapter devoted to a description of the instruments which the authors use in automating operations in chemical analysis. They then describe in detail several applications from titrimetry, electrochemistry, spectroscopy, calorimetry, and flow injection analysis which use the instruments which have been discussed. The final chapter of the book is a discussion of components such as electric motors, shaft encoders, and articulated arms, which are the building blocks for laboratory robots.

The introductory chapters are comprehensive in scope but quite brief. For example, Chapter 2 takes the reader from Ohm's law to operational amplifiers in 55 pages. Chapter 3 starts with definitions of basic terms of digital electronics and follows with descriptions of some of the SN74XXX series of basic ICs. The chapter on microprocessors is built around the Intel 8085 chip, taken as illustrative of the 80X86 series of computers. There is discussion of its architecture and of the techniques which can be used to communicate with a small digital computer, interrupt, skip-check, and DMA. However, applications in the following chapters actually use either the Commodore VIC-20 or Intel 8088. This chapter also presents a discussion of the use of interface cards.

This is followed by a chapter devoted to transducers, signal conditioning, and data acquisition. The reader is given a brief introduction to temperature, light, pressure, and impedance transducers. A/D and D/A converters are described and programmable interface cards are introduced, using BASIC language illustrations. With this preparation, a chapter is devoted to a discussion of communication protocols and hardware.

At this point the discussion becomes specific. Chapter 7 describes the instruments, the Keithley 175 multimeter, the HP 8452A diode array spectrophotometer, the Perkin-Elmer LS-5 spectrofluorimeter, Mettler and Zymark analytical balances with electronic readouts, and the Crison Microsampler 2040, which are used in the illustrations of automation which are to follow in Chapter 8.

This chapter is the heart of the book. In it detailed descriptions are given of applications in potentiometric titrations, conductimetric titrations, potentiometric stripping analysis, photometric titrations, fluorimetry, and calorimetry. These involve the use of Commodore VIC-20 and IBM PC and PS/2 computers. For each illustration, a general description of the operation of a custom software package is given. These are written in interpreted or complied BASIC and are available from the authors.

In assessing the value of this book, this reader is of the opinion that the later chapters will be most valuable. The early chapters provide little more than a list of important topics. This is not intended as criticism, because the treatment is obviously mandated by space limitations. However, it would have been useful to present references to standard works in each of the areas.

The authors' goal has been to present examples of automation which can be used in an instructional setting. Within the limits of types of experiments that are covered, they have succeeded. The experiments are those which are encountered in analytical chemistry teaching laboratories. The apparatus described is readily available and relatively inexpensive. Assuming that the programs perform as advertised, it should be possible for a person with relatively little background to set these up and use them.

Particular attention should also be directed to Chapter 6 which deals with communications. Here the necessary details of both RS232 and IEEE488 protocols are nicely summarized. Details of RS232 programming using BASIC are presented, which are comparable to the instructions that are provided with other popular languages. A general purpose hardware implementation of the IEEE488 protocol is described. This is a card that is supplied with a library of assembly language routines which can be called by the short BASIC programs described by the authors.

Charles K. Mann, *Florida State University*

Corrosion Data from Polarization Measurements. By Rudolf Stefec (Prague Institute of Chemistry and Technology). Ellis Horwood: New York, London, Toronto, Sydney, Tokyo, Singapore. 1990. 386 pp. $84.00. ISBN 0-13-173725-2.

This addition to the Series in Corrosion and Its Prevention is a source index of polarization curves for materials of engineering interest. The original intent of the author was to construct an expert system, known as PolarBank, on the corrosion/polarization behavior of metals in various corrosive environments. In addition, a few electrodeposition systems are also surveyed. The book represents a progress report for this ongoing project. Construction of such a data base is clearly a worthwhile, although tedious, task. While the author is to be commended for his energy, the usefulness of such work depends upon good organization and a critical evaluation of the literature. The structure of the data base is quite good with alphanumeric indexes of the metal-alloys, source references, authors, environment, and measurement objectives. The majority (67%) of the book contains paragraph-length descriptions of the individual polarization curves. This portion of the book is largely unrewarding and the reader is further ahead pursuing the original source reference. The data base covers 504 papers yielding 4444 polarization curves. From a western perspective the Soviet and Eastern-bloc literature is effectively covered, although the same cannot be said of the global scene. For example, there is not a single citation from Corrosion Science which is the only international journal devoted to the subject. Similarly there is only one reference to Japanese work despite their significant contribution to the development of this field over the last 30 years. This imbalanced treatment is further accentuated by the author's reference to unpublished data, e.g. source reference 281–283.

In summary, I found the indexing of polarization data useful although far from complete. Beyond the index the book is of little value.

Thomas P. Moffat, *University of Texas at Austin*

Dioxygen Activation and Homogeneous Catalytic Oxidation. Studies in Surface Science and Catalysis. Volume 66. Edited by L. I. Simándi (Hungarian Academy of Sciences, Budapest). Elsevier: Amsterdam, Oxford, New York, Tokyo. xiv + 700 pp. $225.50. ISBN 0-444-88876-4.

This book contains the Proceedings of the Fourth International Symposium on Dioxygen Activation and Homogeneous Catalytic Oxidation held in Balatonfüred, Hungary, September 10–14, 1990. The 76 papers and posters presented in typescript form are organized under the following headings: Oxidation of Saturated Hydrocarbons; Oxidation of Unsaturated Hydrocarbons; Oxidation of Aromatic Hydrocarbon Derivatives; Oxidation of Hydroxy Compounds; Biomimetic Oxidations; Copper Complexes as Catalysis; Iron Complexes as Catalysts; Cobalt Complexes as Catalysts; Oxidations with Oxo and Peroxo Complexes and H_2O_2; Singlet Oxygen Reactions; Industrial Applications; and Miscellaneous Systems. There is an author index and a subject index.

Molten Salt Techniques. Volume 4. Edited by Robert J. Gale (Louisiana State University) and David G. Lovering (David Graham Consultancy, England). Plenum Press: New York. 1991. xx + 275 pp. $75.00. ISBN 0-306-43554-3.

This volume consists of seven independently written chapters. The first chapter (Narayan and Phani) covers amide melts, with particular emphasis upon electrochemical properties and practical details for working in these solvents. It is an excellent and well-balanced review. The second chapter (Poole et al.), on the physicochemical properties of liquid organic salts using chromatographic techniques, is not as balanced a review. It consists of a theoretical introduction followed by a presentation of data originating primarily with the authors.

The next three chapters are related to particular types of measurements: thermal conductivity and diffusivity (Ohta and Waseda), magnetic measurements (Warren), and calorimetric measurements (Gaune-Escard). All three of these are well-balanced and well-written reviews. Noteworthy points are the strong advocacy of the laser flash method (Ohta and Waseda) and the detailed and well-integrated discussion of experimental apparatus (Warren). Gaune-Escard's review restricts itself to methodology and does not present the results of high-temperature calorimetric measurements.

The sixth chapter covers ultra-high-pressure experimental techniques (Williams and Jeanloz). The authors emphasize recent developments and capabilities for P–T measurements ($P > 10^{10}$ Pa, $T \geq 10^3$ K) but provide an adequate general introduction and a few well-done illustrative examples.

The seventh chapter (Nelson and Kaun) is entitled Battery Construction, Testing, and Materials, but it is actually of much more limited scope, focusing on the Li-alloy/FeS and Li-alloy/FeS_2 cells and batteries associated with the U.S. Department of Energy programs operating since the 1960s. Other molten-salt batteries are treated very briefly (3 pages).

Overall, Volume 4 is a worthwhile continuation of the series, with attractive and solid production and good editing. The practical comments and references will be valuable to established workers in these areas and the reviews themselves provide a solid background.

James A. Plambeck, *University of Alberta*

Catalysis and Adsorption by Zeolites. Studies in Surface Science and Catalysis. Volume 65. Edited by G. Öhlmann (Zentralinstut für Physikalische Chemie, Berlin), H. Pfeifer (Universität Leipzig), and R. Fricke (Zentralinstitut für Physikalische Chemie, Berlin). Elsevier: Amsterdam, Oxford, New York, Tokyo. 1991. xiv + 718 pp. $225.50. ISBN 0-444-89088-2.

This book contains the Proceedings of "ZEOCAT 90" held in Leipzig, Germany, August 20–23, 1990. It contains the text of 18 invited lectures and 41 submitted papers, which are listed under the following headings: Catalysis; Sorption and diffusion; Synthesis and structure; and Acidity. Besides a subject and an author index, there is a list of the other volumes in the series. The book is printed in typescript form.

Catalyst Deactivation. Studies in Surface Science and Catalysis. Volume 68. Edited by Calvin H. Bartholomew and John B. Butt (Brigham Young University and Northwestern University, respectively). Elsevier: Amsterdam, Oxford, New York, Tokyo. 1991. xiv + 826 pp. $254.50. ISBN 0-444-88832-2.

This book contains the Proceedings of the 5th International Symposium on the title subject held in Evanston, IL, on June 24–26, 1991. There are four review articles based on the Plenary Lecturers' presentations: In Situ Electron Microscopy Studies of Catalyst Deactivation, by R. T. K. Baker (Auburn University); Thermal Stability of Catalyst Supports, by D. L. Trimm (University of New South Wales); The Modeling of Catalyst Deactivation by Coke Formation, by G. F. Froment (University of Gent); and Promotion by Poisoning, by J. R. Ropstrup-Nielsen (Haldor Topsoe, Denmark). These are followed by 98 papers based on oral or poster presentations organized under the following headings: Carbon Deposition and Coking; Hydrotreating Catalysis; Modeling and Kinetic Studies; Oxides; Poisoning; Sintering; Techniques; and Zeolites. All of the papers are in typescript form and each is preceded by a summary or abstract. There is an author index (affiliations are given at the headings of each paper) but no subject index. There is a list of the preceding volumes in the series.

Preparation of Catalysts V. Studies in Surface Science and Catalysis. Volume 63. Edited by G. Poncelet (Université Catholique de Louvain, Belgium), P. A. Jacobs (Katholieke Universiteit, Leuven, Belgium), and P. Grange and B. Delmon (Université Catholique de Louvain, Belgium). Elsevier: Amsterdam, Oxford, New York, Tokyo. 1991. xiv + 748 pp. $225.50. ISBN 0-444-88616-8.

This book contains the Proceedings of the Fifth International Symposium on the title subject held in Louvain-la-Neuve, Belgium, on September 3–6, 1990. The 70 papers in typescript form are organized under the following headings: Studies of unit operations in catalyst preparation; Catalyst preparation via the sol-gel route; Preparation of catalysts from layered structures and pillaring of clays; Preparation and modification of zeolite-based catalysts; Carbon supported catalysts; Preparation of oxidation catalysts; and Novel and unusual preparation methods. There is an author index and a list of the preceding volumes in the series, but no subject index.

Profiles, Pathways, and Dreams. Volume 1: The Right Place at the Right Time. Volume 2: From Design to Discovery. Volume 3: Steroids Made It Possible. Volume 4: My 132 Semesters of Chemistry Studies. Volume 5: Enjoying Organic Chemistry. Series edited by Jeffrey I. Seeman (Philip Morris Research Center). American Chemical Society: Washington, DC. A series of autobiographies of chemists. $24.95 each. Volume 1: By John D. Roberts. 1990. xx + 300 pp. ISBN 0-8412-1766-1. Volume 2: By Donald J. Cram. 1990. xxii + 146 pp. ISBN 0-8412-1768-8. Volume 3: By Carl Djerassi. 1990. xxiv + 205 pp. ISBN 0-8412-1773-4. Volume 4: By Vladimir Prelog. 1991. xxiv + 120 pp. ISBN 0-8412-1772-6. Volume 5: By Egbert Havinga. 1991. xx + 122 pp. ISBN 0-8412-1774-2.

These are fascinating accounts of the personal and professional lives of five famous organic chemists. The series editor is to be congratulated for convincing these men to take the time and effort to produce these autobiographies, and both the editor and the Society deserve much credit for bringing the project to fruition up to this point. Each volume contains a note about the editor, an introduction to the series, and a note about the interaction between the editor and the author. According to Dr. Seeman, we can expect 22 such autobiographies in all.

Analytical Applications of Spectroscopy II. Edited by A. M. C. Davies (Norwich Near-Infrared Consultancy) and C. S. Creaser (University of East Anglia). The Royal Society of Chemistry: Cambridge, UK. 1991. xii + 324 pp. £49.50. ISBN 0-85186-403-1.

This second volume of the title subject includes papers presented at the Spectroscopy Across the Spectrum conference held in July 1990 at Hertford, UK. The first conference was held in 1987. After an introduction by J. G. Grasselli, there are 32 chapters in typescript form organized under sections headed as follows: Vibrational Spectroscopy; Microscopy; Mass Spectrometry; Combined Techniques; and, finally, Chemometrics and Data Handling. There are many good figures of spectra and instruments. Subject and author indexes are provided.

Polymer Alloys and Blends: Thermodynamics and Rheology. By Leszek A. Utracki (Industrial Materials Research Institute, National Research Council of Canada). Carl Hanser Verlag: Munich and Vienna; distributed in North America by Oxford University Press: Don Mills, ON, and New York. 1990. xi + 356 pp. $90.00. ISBN 0-19-520796-3.

The author's aim is to "construct as complete an image of PAB fundamentals as possible"; in approaching this aim, he claims to have read "about 20,000 patents and papers". This claim is credible, for the selected bibliography fills 36 pp. of this book.

The importance of polymer alloys and blends is increasing very rapidly, and this book is acknowledged to be out of date as soon as it was published, with respect to latest developments, which appear at a high rate. However, one must still start with the fundamentals that this book provides. To mention one of the areas contributing to the increasing interest in polymer alloys and blends, the recycling of plastics can be expected to reach staggering proportions. The author states that "the annual volume of plastics scrap in the USA is already sufficient to pave the New-York-Los Angeles freeway with a layer 15 meters wide and 37 cm. thick"!

The book is organized in three parts: Introduction to Polymer Alloys and Blends; Polymer/Polymer Miscibility, and Rheology of Polymer Alloys and Blends. There are also four Appendixes: Commercial Polymer Alloys and Blends; Survey of Patent Literature on Engineering PAB's; Abbreviations for Thermoplastics, and Selected Monographies on Polymer Rheology. There is a blends index and a subject index.

Peter A. S. Smith, *University of Michigan*

Electrophilic Aromatic Substitution. By Roger Taylor (University of Sussex, UK). Wiley: Chichester, New York, Brisbane, Toronto, Singapore. 1990. xvi + 513 pp. $190.00. ISBN 0-471-92482-2.

This masterpiece by one of the world's foremost authorities on electrophilic aromatic substitution is destined to stand for many years as the premier reference work on what is certainly one of the major classes of reactions in organic chemistry. The monumental task of distilling down the immense primary literature on this subject into such a well-organized 500-page book with 2700 references was clearly a labor of love.

The scope of this book is broad enough to include electrophilic aromatic substitution reactions on annulenes, metallocenes, and carboranes, as well as those on benzenoid aromatics, but it specifically omits aromatic heterocycles, which have been reviewed in other books. An exceptionally detailed 10-page table of contents and a good index make it easy to find specific reactions and individual compounds quickly. Two lucid introductory chapters on basic principles are followed by the main body of the book, which is divided into four broad categories: hydrogen exchange (Chapter 3), the replacement of a substituent by hydrogen (Chapter 4), the replacement of hydrogen by an electrophile (Chapters 5–9), and the replacement of a substituent X by a substituent Y (Chapter 10). A concluding chapter ties together many quantitative aspects of the subject. Within each section, reactions are grouped according to the electrophile used (proton, carbon, halogen, metal, etc.), and names such as plumbyldemercuriation are frequently attached.

One of the most valuable aspects of Taylor's book is the fantastic wealth of tabulated quantitative data it contains. No longer will we have to scour the primary literature in search of numerical data on electrophilic aromatic substitution reactions; everything is right here. More than just a "handbook", however, this monograph contains extensive treatments of such fundamental mechanistic principles as kinetic isotope effects, inductive and field effects, resonance effects, steric hindrance, hyperconjugation, inter alia, and thereby represents a valuable treatise on physical organic chemistry. As the author points out, electrophilic aromatic substitution reactions have played a central role in the historical development of theories on organic reaction mechanisms.

This is a book that every chemistry library should have as a resource both for teaching and for research; however, the steep price is likely to diminish its attractiveness to most individual chemists.

Lawrence T. Scott, *University of Nevada, Reno*

Advances in Chemical Physics. Volume LXXVIII. Edited by I. Prigogine (University of Brussels) and S. A. Rice (University of Chicago). John Wiley & Sons, Inc.: New York. 1990. ix + 299 pp. $69.95. ISBN 0-471-52666-5.

This volume reviews a number of the hottest topics in modern many-body chemical physics. Reviews by Stratt and Doll focus on quantum mechanical problems in liquids and clusters. Stratt's work focuses on analytical theories of quantum states in liquids, while Doll discusses numerical path integral methods. Mazenko discusses the glass transition from the point of view of mode/mode coupling theories. Skolnick focuses on theories and simulations of dense polymer dynamics, and Henderson reviews theories of the double layer.

In keeping with the series tradition, the reviews are each from a personal perspective and, although up-to-date, do not always present a comprehensive view of fast-breaking developments. Nevertheless, the book is recommended, especially for newcomers, in order to give some perspective on exciting problems of the day.

Peter G. Wolynes, *University of Illinois*

Methods in Enzymology. Volume 188. Hydrocarbons and Methylotrophy. Edited by Mary E. Lidstrom (California Institute of Technology). Academic Press: San Diego. 1990. xxxii + 504 pp. $69.95. ISBN 0-12-182089-0.

This is a recent volume in a series with a long-standing and well-deserved reputation for excellence. The focus of this volume is on enzymes from organisms that utilize or degrade hydrocarbons or C_1 compounds. More specifically, the book is divided into two sections: Section I principally covers enzymes involved in hydrocarbon oxidation (e.g., dehydrogenases, monooxygenases, and dioxygenases) or degradation (e.g. lignin peroxidase); Section II covers various dissimilatory and assimilatory enzymes in methylotrophic organisms. As alluded to by the editor in the preface, organisms that utilize hydrocarbons and C_1 compounds, and the unique enzymes involved, are the subjects of intense current interest for scientific, economic, and ecological reasons. Several enzymes discussed contain novel cofactors and metal sites. Therefore this volume is especially timely.

The coverage is very good, and the selection of contributors is commendable. There are 72 different contributions, including articles on hydrocarbon monooxygenase, benzene and toluene dioxygenases, catechol and protocatechuate dioxygenases, methane monooxygenase, lignin peroxidase, amine oxidases and dehydrogenases, methanol dehydrogenases, formate and formaldehyde dehydrogenases. For the most part the articles are clearly written and highly informative. But there are considerable variations in the coverage among the articles and in the experimental details provided. In part this reflects the fact that the study of certain enzymes is at a relatively early stage. In other instances the purification procedures are cursorily described, or no table summarizing the purification is present, though it is clear from the context that the information could have been provided. Some contributions did not provide sufficient information on the purity or stability of the enzyme discussed, which also detracts somewhat from the overall usefulness of this volume. On the whole, however, this is a solid addition to an outstanding series. Researchers in biochemistry, biophysics, and metallobiochemistry who are interested in the enzymes covered should definitely consider obtaining a copy for their laboratories. There is no doubt that this volume has the potential to be an exemplary "quick and handy reference guide", as its editor hopes.

David M. Dooley, *Amherst College*

Inorganic Reactions and Methods. Volume 10: The Formation of Bonds to Carbon, Silicon, Germanium, Tin, and Lead (Part 2). Edited by A. P. Hagen (University of Oklahoma). VCH: New York and Weinheim. 1989. xxxii + 506 pp. $175.00. ISBN 0-89573-260-2.

Volume 10 of this extensive series surveys the bond formation between the group 14 elements (carbon, silicon, germanium, tin, and lead) and those of group 13 (boron, aluminum, gallium, indium, and thallium) and group 2 (beryllium, magnesium, calcium, strontium, barium, and radium). It is one of four volumes covering bond formation of the elements of group 14. The others cover bonds to group 14 elements (Volume 9, not yet published), bonds to group 1 (lithium, sodium, etc), group 11 (copper, silver, and gold), and group 12 (zinc, cadmium, and mercury) (Volume 11, published), and bonds to the transition elements and group 18 gases as well as carbides, silicides, and germanides (Volume 12, not yet published). The scope of this project is immense, and while only seven of the total of seventeen volumes has so far appeared, it is hoped that this project will reach completion.

To capture the scope of Volume 10, the reader must realize that the bond combinations of carbon-to-boron, carbon-to-aluminum, and carbon-to-magnesium are covered in the same volume as are all the lesser bond combinations. The volume is thoughtfully organized into subdivisions with references placed at the end of each indexed subdivision. The sections are written by expert contributors, making this volume authoritative and tremendously useful. I can think of no series with such coverage and scope. In addition to the subdivisions covering these bond formations, there is a list of abbreviations used (6 pages), an author index keyed to the subdivisions (37 pages), a compound index (110 pages), and a subject index (15 pages). Each of these features has been incorporated with the reader in mind; these features are extensive, well thought out, and easily accessible. In sum, this single volume is quite an achievement with a remarkable amount of material crammed into its ~500 pages.

Robert Damrauer, *University of Colorado at Denver*

NMR Basic Principles and Progress. Volume 24. High Pressure NMR. Edited by Jiri Jonas (University of Illinois). Springer-Verlag: New York, Berlin, Heidelberg. 1991. 263 pp. $98.00. ISBN 0-387-52938-1.

Most NMR studies use temperature as the only experimental variable and leave the pressure constant, usually at 1 atm. The use of pressure, however, is very effective in overcoming the limited interpretation of the results obtained at atmospheric pressure and further is expected to add another dimension to the various investigations. A change in pressure can result in a modification of molecular motion due to changes both in intermolecular interactions by a decrease in intermolecular distance at high pressure and in molecular structure, which may be reflected in a variation of electronic distribution. Such a variation would be revealed by changes in the NMR parameters: chemical shift, spin–spin coupling, and relaxation times. High-pressure NMR investigations, therefore, can provide information about molecular conformation, intramolecular dynamics, intermolecular interactions, structure of liquids, solid-phase transition, etc.

The recent publication of the monograph *High Pressure NMR* consists of six chapters, each of which is described by high-pressure NMR specialists in the review article style. The chapters are titled and authored as follows: Solid State NMR Studies at High Pressure by D. Brinkman; High Pressure NMR Investigations of Motion and Phase Transitions in Molecular Systems by K. O. Prins; High Pressure NMR Studies of the Dynamics in Liquids and Complex Systems by J. Jonas; High Pressure NMR Studies on Water and Aqueous Solutions by E. W. Lang and H.-D. Lüdemann; High Resolution Variable Pressure NMR for Chemical Kinetics by J. W. Akitt and A. E. Merbach; and, lastly, Glass Cell Method for High Pressure, High Resolution NMR Measurements. Applications to the Studies of Pressure Effects on Molecular Conformation and Structure by H. Yamada.

This book gives to the reader detailed information of the basic principles and recent progress of NMR experiments under high pressure and should contribute greatly to the investigations of NMR spectroscopists and researchers in various fields. For this reason, the appearance of this monograph is well-timed.

Isao Ando, *Tokyo Institute of Technology*

Surfaces, Interfaces, and Colloids. Principles and Applications. By Drew Myers. VCH: New York. 1991. xii + 433 pp. $49.50. ISBN 1-56081-033-5.

The book is described as serving as a narrow footbridge for scientists, technologists, and students who may use or need to use some aspect of surface and colloid chemistry. Although fairly quantitative in approach, the use of equations and especially of derivations is restrained, as are reference citations. Appended, however, are lists for each chapter of general bibliographies and a few footnoted references. Chapter headings include the following: Surfaces and Interfaces, Molecular Basis of Surface Activity; Long-Range Attractive Forces; Electrostatic Forces and the Electrical Double Layer; Capillarity, Solid Surfaces; Liquid–Fluid Interfaces: Adsorption at Solid–Liquid Interfaces; Colloids and Colloidal Stability; Emulsions, Foams, Aerosols; Polymers at Interfaces; Association Colloids; Micelles, Vesicles and Membranes; Solubilization, Micellar Catalyst (sic), and Microemulsions; Wetting and Spreading; Friction, Lubrication, and Wear; Adhesion.

The stated purpose is served fairly well. The topics are covered in a reasonably accurate and straightforward way, with some perceptive analysis and a considerable awareness of practical applications. The person who is an amateur in surface and colloid chemistry but has some general chemical or chemical engineering background will find the book able to bring him/her to semiprofessional status in these fields. The bibliographies and references are sufficiently well chosen that their reading will provide an entree to such greater depth that might be needed. The book is written in a pleasant and occasionally jocular manner, and the printing is in large, clear type.

It is a pet peeve of mine that technical books are often skimped in the indexing. The present case of a seven-page, double-spaced index is no exception. As a few examples, nucleation, flotation, lyophobic colloids, permittivity, theta solvent, "palisade", and the Rehbinder effect are discussed but do not appear in the index. BET is a minor subheading, under Adsorption. The book is not a textbook—there are no exercises and no problems. The section on micelles is good, but that on microemulsions is weak, as is the treatment of electrokinetic effects. There is very little on heterogeneous catalysis, essentially nothing on the structure and spectroscopy of well-defined surfaces, and nothing on fractal situations. There is a tendency to introduce a quantity without definition and without noting that it is described in a later chapter. And there are a fair number of errors, ranging from obvious and not-so-obvious typos to conceptual misstatements, such as a confusing of free energy and energy. There is an unusually complete treatment of van der Waals forces, illustrating, incidentally, the incredible awkwardness of the SI system of units in dealing with electrostatics; the Lifshitz approach, however, is not covered. I was saddened that while my book is included in several chapter Bibliographies, it is only as the out of print, 1976 third edition (mis-stated to be 1984) rather than the current 1990 fifth edition. R. H. Hunter's treatise on Colloid Science (1987) is not included, nor are those of J. S. Rowlinson and B. Widom on Capillarity (1982) or M. J. and R. D. Vold on Colloid and Interface Chemistry (1983).

The above comments are intended mainly to help define the nature and scope of the book. It should definitely be a useful addition to any library, personal or institutional, where there is a need for a relatively undemanding but reasonably authoritative introduction to surface and colloid chemistry.

Arthur W. Adamson, *University of Southern California*

The Chemistry of Heterocyclic Compounds. Volume 50: Bicyclic Diazepines. Edited by R. Ian Fryer (Rugers University). Wiley-Interscience: New York. 1991. xi + 1100 pp. $275.00. ISBN 0-471-52148-5.

The timeliness of this book is underlined by the fact that diazepines now rival β-lactams as one of the unique classes of heterocyclic compounds endowed with major relevance to the worlds of biology and medicine. In fact, only recently has the broad scope of diazepine pharmacology began to be fully comprehended. In addition to the classical CNS aspects, new discoveries involving such diverse effects as PAF antagonists, CCK agonists, and tat inhibition have added momentum to the exploration of this class of compounds. This diversity of diazepine pharmacology suggests the existence of some yet-to-be-elucidated mimicry of a recurring motif in protein structure.

The authors, two of the foremost experts in this field, are to be congratulated for their perseverance in assimilating an enormous volume of information from a multitude of sources—the book lists 1677 primary literature references plus reviews and monographs!

Each of the nine chapters provides a clear, concise overview of a subgroup of compounds. This is accomplished by organizing the material within a logical framework. In general, the chemistry of diazepines is shown to be rich but disparate, the cohesion implied by unity of structural type being lost in the diversity of reactions and methods of preparation associated with the positioning of nitrogen atoms as 1,1, 1,3, or 1,4.

Excellent compendia of compounds and data are included at the end of each chapter, simplifying information retrieval by investigators in this field.

The book is written, in the Taylor/Weissberger tradition, from a purely chemical perspective. As a consequence, the casual reader gains no inkling of the pharmacological richness of the compounds being discussed. Greater use of Chemical Abstracts citations would have aided recourse to primary sources, particularly when foreign patents and rather obscure journals are cited.

Overall this is an outstanding contribution to heterocyclic literature, encyclopedic in scope and particularly invaluable to medicinal chemists in this field.

David L. Coffen, *Hoffmann-La Roche Inc.*

Topics in Applied Chemistry. Infrared Absorbing Dyes. Edited by Masaru Matsuoka (University of Osaka Prefecture). Plenum Press: New York. 1990. xiv + 220 pp. $59.50. ISBN 0-306-434784.

According to the editor, the development of solid-state lasers emitting in the 780–830-nm range has stimulated research in the area of infrared absorbing dyes. This book attempts to review the synthesis and characteristics of these dyes and their applications to various technologies including optical recording, thermal writing displays, laser printers, laser filters, infrared photography, and photodynamic therapy. A separate chapter by Ueno and Yuasa, devoted to the characteristics and limitations of solid-state lasers, serves as a bridge between the chapters covering materials and the chapters covering technology.

The eight chapters devoted to different dye classes function more as a survey of dye structures than as a detailed review. Many original references are missing from illustrated structure classes, which weakens the value of these chapters as a reference tool. Notable exceptions are the chapters by Namba (Metal-Complex Dyes) and by Seto (Photochromic Dyes) which are more thoroughly referenced (through 1989).

The chapters covering technologies in which infrared absorbing dyes are an integral part are both well-written and concise. The materials requirements of the technologies are well described. The chapter by Sternberg and Dolphin on Medical Applications is an excellent, well-referenced (through 1988) review of photodynamic therapy with respect to materials and methods, their limitations, and future directions in the field.

To those chemists looking for an introduction to infrared absorbing dyes and their applications, this book would be a useful tool. However, these areas are expanding and changing rapidly and many of the reference lists in these chapters only go through 1988.

Michael R. Detty, *Eastman Kodak Company*

The Chemical Physics of Surfaces. Second Edition. By S. Roy Morrison (Simon Fraser University). Plenum Press: New York. 1990. XVIII + 438 pp. $69.50. ISBN 0-306-43549-7.

The first edition of this book appeared in 1977, when the study of surfaces had reached a new quality due to the development of a multiplicity of new surface sensitive techniques and of new concepts for the description of surface properties. The content of this book has been changed little in this second edition. As before, the author treats primarily semiconductor surfaces, making the title somewhat misleading. Metal surfaces are discussed only occasionally in connection with surface reconstruction and with adsorption.

The emphasis of the book is on the chemical aspects of surfaces and their interaction with gases or liquids. The terminology and language used is familiar to the chemist. Mathematical derivations are limited to a minimum. A special feature of this book is the inclusion of the semiconductor/electrolyte interface into the representation. This is helpful for bridging the gap usually found between the discussion of surfaces in vacuum or in contact with gases and the electrochemical aspects of such interfaces.

New developments are mainly described in the chapter on "Experimental Methods", where in 60 pages a summarizing survey on more than 50 different techniques is given, many of them having been developed in the last decade. Another extension is the treatment of photoelectrochemical processes in the chapter on "Photoeffects on Semiconductor Surfaces". For compensation, the chapter on the role of surface sites in heterogeneous catalysis has now been omitted.

The book is very useful for readers who want to get a quick overview of the great variety of phenomena which are found at semiconductor surfaces. It offers a brief survey of the techniques available for investigating the properties of such surfaces. A guidance to deeper information is given in the large number of references for further reading. The book will find its audience among scientists who are looking for a general introduction to surface studies of semiconductors.

H. Gerischer, *Fritz-Haber-Institut der Max-Planck-Gesellschaft*

Chemical Graph Theory—Introduction and Fundamentals. Edited by D. Bonchev and D. H. Rouvray. Gordon & Breach Science Publishers: New York. 1991. xii + 288 pp. $115.00. ISBN 0-85626-454-7.

This book review evaluates the following items: (1) Are the objectives of the book clearly stated and do the authors accomplish these objectives, (2) does the book duplicate already existing books, (3) are there any novel aspects of the book, and (4) what are the good and bad features of the book? "This volume is intended to provide a useful introduction to the area by treating the fundamentals of the subject and some of its more important applications." This book contains six chapters each written by an expert in the field. The first chapter by D. H. Rouvray gives an interesting historical account of the origins of chemical graph theory. Briefly, the first recognizable chemical graphs were drawn in 1758 by William Cullen and subsequently improved in 1789 by William Higgens. This laid the groundwork for the emergence of structure theory as we know it today. My favorite four characters in this drama are Kekulé, Dobereiner, Cayley, and Gerhardt. These four scientists evolved concepts that have immeasurably contributed to my own research.

The second chapter, written by the late Oskar E. Polansky, gives an introduction to the elements of graph theory. This well-written chapter will require commitment by the reader as it is packed with definitions. More chemical examples and applications in this chapter would have helped maintain the reader's interest. Nevertheless, the owner of this book will be in possession of a handy reference for graph theoretical terminology.

In the third chapter, Alan L. Goodson discusses the role of graph theory in chemical nomenclature. The development of a nomenclature (and codification) system for molecules which is comprehensive and capable of use by both the chemist and the computer remains an important research endeavor. Some of the material reviewed in this chapter is used in my *Chemical Literature* course. At the end of this chapter, references 77 and 84 are identical, as are references 79 and 88.

Chapter 4 is a well-written introductory review on polynomials in graph theory by Ivan Gutman.

Isomer enumeration is treated in Chapter 5 by Alexandru T. Balaban. This chapter should be of interest to all who teach beginning organic chemistry. I would have preferred "...Stereoisomerism" as the title to section 5.2.1 rather than "...Steric Isomerism". Like Goodson, Balaban also presents a brief history. For example, Cayley in 1857 was the first to enumerate alkane and alkyl radical isomers having up to 13 carbon atoms, though his results were in error by 1 to 3 for the 12 and 13 carbon isomers. Balaban's applications of Polya's theorem and Ruch's double coset formalism on simple enumeration examples will be easily understood and appreciated by the novice reader. The reviewer would like to add that Polya's theorem overestimates the number of alkane isomers above $C_{22}H_{46}$ because excluded volume for highly branched isomers is not taken into account [Klein, D. J. *J. Chem. Phys.* **1981**, *75*, 5186]. Robinson, Harary, and Balaban were the first to develop recursions for alkane isomer numbers that include stereoisomers.

Chapter 6 by Nenad Trinajstić reviews graph theory and molecular orbitals. This chapter complements Gutman's chapter nicely and is more application oriented. The isomorphism between Hückel theory and graph spectral theory has resulted in numerous useful applications.

In summary, the introduction to the fundamentals of chemical graph theory is accomplished by this work. No references after 1989 will be found among the more than 780 references cited. Thus, some recent important findings in benzenoid enumerations [*J. Mol. Struct.* (*Theochem*) **1991**, *230*, 155], for example, will not be found in this book.

J. R. Dias, *University of Missouri—Kansas City*

Nucleic Acids in Chemistry and Biology. Edited by G. Michael Blackburn (University of Sheffield) and Michael J. Gait (MRC Laboratory of Molecular Biology, Cambridge). IRL Press: Oxford, New York, and Tokyo. 1990. xiv + 448 pp. Cloth: $115.00. ISBN 0-19-963120-4. Paperback: $49.95. ISBN 0-19-963121-2.

In 1955 I participated in a weekly seminar series that attempted, rather successfully, I think, to review all of the literature on nucleic acids! The growth of this field has been so remarkable that it is now difficult to cover comprehensively even small segments of it. Many books in this field therefore are more limited in scope and attempt greater depth than this one. The editors of the present volume have sought to bring together those aspects of the subject that are of particular interest to chemists. The result is a book that includes nucleic acid structure and reactions, molecular biology, medicinal applications, as well as the chemical synthesis of nucleic acid components. Anyone primarily interested in learning about these specific aspects can of course find more comprehensive sources. But the editors have succeeded in producing a mix that can be quite beneficial for students with a chemical background desiring an overview and perhaps searching for research opportunities in this field. I believe the volume is intended, and can be recommended, for them.

About half the book is written by the editors, but other parts are contributed by selected authors. The chapters are as follows: 1. Introduction and overview, by G. M. Blackburn and M. J. Gait; 2. DNA and RNA structure, by G. M. Blackburn; 3. Chemical synthesis, by G. M. Blackburn and M. J. Gait; 4. Biosynthesis of nucleotides, by R. T. Walker and M. J. Gait; 5. DNA sequence information and transmission, by A. J. Flavell and G. C. Barr; 6. RNA sequence information and transmission, by D. Söll and U. Rajbhandary; 7. Covalent interactions of nucleic acids with small molecules, by G. M. Blackburn; 8. Reversible interactions of nucleic acids with small molecules, by. W. D. Wilson; 9. Interaction of nucleic acids with proteins, by A. Goldman and D. L. Ollis; and 10. DNA sequence rearrangements and alterations, by A. J. Flavelle.

The book is up-to-date and well-written. A particularly attractive feature is that the authors keep their broad perspective in mind while considering the individual topics and frequently point out interrelationships: For example, while structures of DNA and RNA are being explained (Chapter 2), the authors point out their implications for molecular biology. The discussion of the hydrolysis of phosphate esters for chemical synthesis (Chapter 3) is coupled to a consideration of enzymatic hydrolysis. In Chapter 7 DNA repair is taken up immediately after the consideration of the interaction of DNA with small molecules; the products of the interaction then become the substrates for the repair.

Of course, a book whose purpose requires the editors to pick and choose must reflect some bias. Not all would agree with the first sentence in the book, that "nucleic acids dominate modern molecular science". I would have preferred references in the text; the book does contain suggestions for "further reading". I was disappointed that some nucleic acid reactions that I considered of particular interest to chemists have been omitted. But these are matters of preference and judgment. On the whole, I believe that the book has accomplished its aim of providing a broad outline of the subject for a specialized group of individuals.

Gunther L. Eichhorn, *National Institutes of Health*

Surfactant Science Series. Volume 37. Cationic Surfactants: Physical Chemistry. Edited by Donn N. Rubingh (Procter & Gamble Co.) and Paul M. Holland (General Research Corp.). Marcel Dekker, Inc.: New York. 1991. viii + 527 pp. $125.00 (U.S. and Canada). ISBN 0-8247-8357-3.

This monograph constitutes Volume 37 of the very useful and popular *Surfactant Science Series*. The volume is one of three on cationic surfactants which together serve to update the current information on this topic since the original 1970 volume was published. The general aim of this particular volume is to present an up-to-date review of the physical chemistry of cationic surfactants. The text is divided into three major sections, the first of which focusses on the properties of cationic surfactants in solutions and at interfaces. The topics covered in this section include the following: Chapter 1, Aqueous Phase Science of Cationic Surfactant Salts by R. G. Laughlin (40 pages, 58 references), which presents an overview of the general phase behavior and properties exhibited by cationic surfactants; Chapter 2, Micellization of Cationic Surfactants by R. Zana (44 pages, 220 references), which discusses the micellization processes for cationic surfactants in both aqueous and organic solvents; and Chapter 3, Adsorption of Cationic Surfactants at Interfaces by B. T. Ingram and R. H. Ottewill (53 pages, 123 references), which summarizes the adsorption characteristics of cationic surfactants at fluid (or solid)–liquid interfaces.

The second major section consists of three chapters and concerns the nature and mechanism of the interactions of cationic surfactants with other surfactants, polymers, films, or membranes as well as discusses the unique features and properties exhibited by such mixed systems. The specific chapters of this second part are the following: Chapter 4, Cationic Surfactants in Mixed Surfactant Systems by P. M. Holland and D. N. Rubingh (46 pages, 104 references); Chapter 5, Interactions Between Polymers and Cationic Surfactants by K. Hayakawa and J. C. T. Kwak (59 pages, 179 references); and Chapter 6, Penetration of Insoluble Monolayers by Cationic Amphiphiles by L. Ter-Minassian-Saraga (72 pages, 76 references).

The final section of the monograph focusses on some of the different areas of applications of cationic surfactant systems. Included in this section are the following: Chapter 7, Chemical Reactivity in Micelles and Similar Assemblies of Cationic Surfactants by C. A. Bunton (82 pages, 182 references), which discusses the nature, quantitative kinetic treatments, and possible applications of micellar reaction rate effects; Chapter 8, Adsorption of Cationic Surfactants and the Flotation of Minerals by D. W. Fuerstenau and R. Herrera-Urbina (40 pages, 65 references), which describes the relationships between cationic surfactant adsorption at the mineral–water interface, wetting, and flotation as well as gives examples of the utilization of such surfactants in mineral flotation applications; Chapter 9, Fabric Softening by R. G. Laughlin (18 pages, 44 references), which discusses the general fabric softening process and describes the properties and action of cationic softener formulations for industrial applications; and Chapter 10, Surface-Active Cationic Compounds in Detergency by D. N. Rubingh (39 pages, 49 references), which reviews the mechanism of action and describes the recent utilization of different cationic surfactant systems in detergency applications.

In addition, the work contains a 2-page list of contributors, 2-page table of contents, and a very thorough 19-page subject index. It should be noted that about half of the chapters contain a useful list of the symbols/acronyms used. Although one could think of many other possible topics for inclusion in a monograph devoted to such a broad area as the physical chemistry of cationic surfactants, the topics actually selected for this volume are timely and do provide a nice overview and picture of the major areas of current research interest and applications in this field. All of these chapters are written by leaders in their fields, and they are quite thorough and insightful. In general, the chapters are concise, well-organized, and well-written. The illustrations (figures, tables, charts, etc.) are adequate. The presentation style of the chapters is fairly uniform which is generally unusual for such multiauthored work. The chapters are generally well-referenced (a total of ca. 1100 references are cited) and cover the literature thru 1988.

All in all, this monograph provides a good update on the status of the physical chemistry of cationic surfactants. Although expensive, it will prove to be a valuable reference for scientists working in the specific areas discussed as well as those interested in surface and colloidal chemistry, micellar chemistry and catalysis, surfactant adsorption phenomena, polymer science, detergency, and mineral flotation in general.

Willie L. Hinze, *Wake Forest University*

Quasicrystals, Networks, and Molecules with Fivefold Symmetry. Edited by I. Hargittai (Hungarian Academy of Sciences and Eotvos University). VCH Publishers: New York. 1990. 314 pp. $85.00. ISBN 0-89573-723-X.

This edited work has nineteen chapters with thirty-seven contributing authors. Nevertheless the editor has succeeded in minimizing the discontinuities that often appear in such multiauthored books. The first chapter is, appropriately, historical and philosophical. Next the concept of generalized crystallography is introduced using the Fibonacci sequence to dispel the myth that periodicity is necessary for sharp diffraction. There is a chapter which introduces the concept of chaos and web-mapping and one on computer-simulated images. The next two chapters are concerned with the X-ray diffraction spectra of quasicrystalline alloys. There is a comparison of Pauling's cubic model and the quasicrystal model, with the implication that either or both might be correct. Neither of these chapters answers the practicing crystallographers' questions: How does he know if he has a quasicrystal and how does he derive its structure?

The next five chapters are mathematical and inform the reader that there are theoretically many more aperiodic tilings than that of the Penrose in 2, 3, 4, and *n* dimensions. Chemistry comes back in Chapter 13, where molecules and ions with 5-fold symmetry are discussed. There are four chapters on Buckminster fullerene and a final chapter on centro polyindrons which are formed by fusing cyclopentane rings.

The chemist will be most at ease with the last five chapters; the mathematician will enjoy the middle five chapters. Crystallographers will learn that there are a wide variety of lattices available once the requirement of perodicity is abandoned. Considering the unfamiliarity and complexity of the subject, the book is very readable. It is well produced with good illustrations, some of which are in color.

George A. Jeffrey, *University of Pittsburgh*

Piperidine: Structure, Preparation, Reactivity, and Synthetic Applications of Piperidine and Its Derivatives. By M. Rubiralta, E. Giralt, and A. Diez (University of Barcelona, Spain). Elsevier: Amsterdam. 1991. xvi + 444 pp. $188.50. ISBN 0-44-88348-7.

In their Introduction the authors pose the question "...does it make sense in the last decade of the twentieth century to write a monograph dedicated to such a simple molecule as piperidine whose structure has been known for over 100 years? Has not everything of importance been written on the subject?..." This reviewer is pleased to answer the first question in the affirmative and as regards the second to say that what is written in this monograph will, in his view, certainly be of considerable use to its readers.

Chapter 1 comprises an Introduction while Chapter 2 discusses the historically interesting question, which at one time was of considerable controversy, of the conformation of the piperidine ring. Chapters 3, 4, and 5 deal with spectroscopic details of piperidine derivatives, and Chapter 6 concentrates on rotational isomerism of 2-alkylpiperidines. The remaining chapters of the book are increasingly concerned with synthetic aspects, particularly of 2-cyanopiperidines and piperidones.

The interest and importance of piperidine chemistry to a great extent is concerned with its conformational analysis and, in particular, with the simultaneous possibilities of ring and nitrogen inversion which give rise to very interesting temperature-variable nuclear magnetic spectroscopic properties. In this book the authors have combined historically interesting aspects with a thoroughly modern approach. The book is both highly up-to-date (references to significant work published in 1990 are included) and authoritative: very few errors indeed were detected. In their treatment, instead of attempting any approach based on a comprehensive overview, the authors have selected some of the most important and interesting aspects of the chemistry of piperidine and written most informatively about these. The book is recommended to all those who work with piperidine derivatives and further as a good introduction to the chemistry of non-aromatic nitrogen heterocycles.

Alan R. Katritzky, *University of Florida*

Growth of Crystals. Volume 17. Edited by E. I. Givargizov and S. A. Grinberg (Institute of Crystallography, Academy of Sciences of the USSR, Moscow). Translated by Dennis W. Wester. Consultants Bureau: New York. 1991. 216 pp. $95.00. ISBN 0-306-18117-7.

This publication is the latest in a series with the same title that began with papers from the First Soviet Conference on Crystal Growth in 1956. Frequently the volumes have been devoted to the publication of papers presented at Soviet crystal growth conferences or at international symposia held in the Soviet Union. At other times they consist of papers and reviews invited by the editors. They provide a window on Soviet achievements and viewpoints concerning the preparation of single crystals. This subject is taking on increasing importance for chemists since it is a cornerstone in the synthesis and processing of materials for solid-state research and applications. Synthesis and processing has been identified in the recent National Research Council study "Materials Science and Engineering for the 1990's" as the critical pacing items for progress in materials science and as an area where chemical viewpoints are urgently needed. The present volume consists of review articles in three areas: epitaxy and transformation in thin films, growth of crystals from solution, and growth of crystals from the melt. The editors are two distinguished scientists at the Institute of Crystallography which is the lead institution for crystal growth in the Soviet Union. Dennis Wester has provided an admirable translation. The Institute of Crystallography has been the moving force for this series primarily because of the interest of the late N. N. Sheftal', the long time editor of previous volumes and a distinguished hydrothermal crystal grower in his own right.

The thin film papers deal with subjects that are considered hot in the west, ranging from plasma deposition through laser annealing and photo assisted deposition. They are generally terse and to the point and provide a good source of Russian references which are often overlooked. The papers on growth from solution include an excellent summary of the growth of aluminum and gallium phosphates (quartz analogues with large piezoelectric coupling constants and surface acoustic wave device applications). This paper and two others, one on KDP and one on rare earth phosphates, are particularly germane because they adapt the typically Russian phase equilibria viewpoint. This and other wet classical physical chemistry approaches are usually neglected by westerners working in solution growth. As a result, regrettably, many U.S. and European papers are only a step beyond recipes. The papers on melt growth particularly emphasize understanding impurity segregation, a subject which some people in the west may think is passê but where practical crystal growers often are confronted with data which they cannot readily interpret in terms of elementary theories like Burton–Prim Slichter.

In the light of post-glastnost opportunities for more easy scientific exchange this compendium and its predecessors should help to focus our attention on individuals and institutions in the Soviet Union where exchanges playing to Soviet strengths in materials preparation would be worthwhile. Soviet strengths in preparation coupled, I dare say, to US strengths in knowing what to prepare could really open some new vistas.

In summary, the present volume is welcome and continues a strong Soviet tradition in crystal growth. One hopes that this tradition will be enlivened by further contacts with the west so that Volume 18 will have a couple of show-stopping reviews replete with new insights, techniques, or materials which come from joint insights and activities which "we" could use just as much as "them".

R. A. Laudise, *AT&T Bell Laboratories*

The Chemistry of Polymers. By John W. Nicholson (Laboratory of the Government Chemist, Teddington). Royal Society of Chemistry: Cambridge, UK. 1991. xii + 174 pp. £14.50. ISBN 0-85186-413-9.

This book was written to introduce new graduates and others who have not previously studied polymer chemistry to this subject. The author has attempted to provide a brief, readable introduction to the chemistry of polymers while also emphasizing their applications. This is a laudable ambition which has not been fulfilled, mostly because of an inordinate number of misprints, oversimplifications, and misconceptions. Although recent topics such as polymers in medicine, ionomers, electronically conducting polymers, interpenetrating polymer networks, inorganic polymers, polymer liquid crystals, and polymers and the environment are introduced near the end of this volume, earlier chapters on polymer chemistry, polymerization reactions, polymer structure, crosslinking, polymer solutions, and methods of determining relative molar mass, for example, are written without mention of newer techniques and modern ideas. For example, although the author mentions gel permeation chromatography, GPC, as a method for determining relative molar mass, he never describes this method at all, even though it is the one most widely used by polymer chemists. The author is also inconsistent. For example, although he states on page 45 that he will use the term *configuration* for the arrangement of atoms that cannot be altered except by breaking chemical bonds and the term *conformation* for the arrangement of atoms that can be altered by rotation around a single bond, he uses the term *configuration* on page 82 for particular *conformations.* Such inconsistencies are very confusing to a reader.

Examples of misprints appear as early as page 1 of the text in which the formula $CH_3C{=}O$ instead of CH_3CHO is shown for acetaldehyde, here called ethanal. This illustrates another problem with this book as an introductory text, namely, the use of IUPAC nomenclature for some, but not all, simple compounds. Also on page 1, vinyl acetate is called vinyl ethanoate, although such usage is very rare among polymer chemists. Misprints among molecular formulas and structures are not rare: page 10 shows the acrylic acid repeat group when that of methyl methacrylate is described; page 14 shows not only a totally scrambled structure for Nylon 66 containing both a urethane and a carbonyl group but also the structure of Nylon 12, clearly labeled Nylon 11. On page 15, bisphenol A is erroneously called a diepoxide. An equation for enthalpy change on mixing on page 77 is given per lattice site, not per unit volume as stated. On page 93, there is a misprint in one of the osmotic pressure equations, and on page 95, the amount of scattered light is stated to be *directly* proportional to (wavelength)^4 instead of *inversely* proportional. This is not an exhaustive list of misprints.

Chapter 3, on polymer structure, contains a large number of unexplained concepts, a very disconcerting circumstance for a naive reader. For example, on page 51, crazes are mentioned, even pictured, but not explained. On page 52, the glass transition is called a second-order transition, a matter of great controversy, and, worse, the characteristics of a second-order transition are not described. Farther on, the author says nothing about the dependence of the glass transition temperature on the time scale of the measurement, but he then states that there is great uncertainty in the numerical value of this temperature. The reader will be quite confused. One of the techniques mentioned for this measurement is differential scanning calorimetry, but the technique is not described in any way.

At the bottom of page 1, molecules with relative molar mass 1000 and above are called polymers, even though the usual lower molecular weight limit for a polymer is between 5000 and 10^4. Chapter 5, on polymer solutions, is full of confusion. On page 80, there is a figure showing a polymer placed on a square lattice; unfortunately, this polymer does not use only nearest neighbor sites to occupy the lattice. This inaccuracy could confuse a reader who later wishes to understand the derivation of the equations of the Flory–Huggins theory. On page 84, the unperturbed dimensions of a polymer chain are defined erroneously. And so on.

Sonja Krause, *Rensselaer Polytechnic Institute*

Introduction to Applied Solid State Physics. Second Edition. By Richard Dalven (U. C. Berkeley). Plenum Press: New York. 1990. 395 pp. $39.50. ISBN 0-306-43434-2.

This book is an excellent introduction to applied solid-state physics, with emphasis on such timely topics as semiconductors, superconductors, nonlinear optical materials, and ferromagnetic materials. It is directed toward readers with an elementary background in solid-state physics, although it is highly readable and would be very useful for interested scientists with a minimal knowledge of band theory. There are extensive references and reading lists to aid the reader in reviewing background material not covered or to go beyond the scope of the text. For each topic there is a qualitative review of the physics underlying a particular application, followed by very clear treatments of various applications. In every case, the author does an excellent job building an understanding of the underlying principles, with a clear progression from simple approximations to more complex treatments.

This book is highly recommended for chemists, physicists, materials scientists, and electrical engineers interested in solid-state materials and their applications. It would also be a suitable text for an applied solid-state physics course, or a valuable auxiliary text for a materials chemistry or materials science course. Each chapter concludes with a set of problems as well as references and comments and suggested reading sections.

Catherine Page, *University of Oregon*

Biophysical and Biochemical Aspects of Fluorescence Spectroscopy. Edited by T. Gregory Dewey (University of Denver). Plenum: New York. 1991. xvii + 294 pp. $69.50. ISBN 0-306-43627-2.

In 1991 three books of collected chapters will appear, all dealing with the same, present subject. Two of these are even from the same publisher, Plenum Press. The application of fluorescence techniques in the biological sciences is certainly an active field, but the appearance of three volumes in the one year does seem to be superfluous. Nevertheless, there are some positive recommendations to be made for this present work. The editor is to be commended for restricting each chapter to less than 30 pages, except for one. This greatly enhances readability as well as keeping down the price. On the negative side, the editor should have restricted some authors from writing Introductions which are too advanced for a general reader and from using too much technical jargon and inconsistent abbreviations. There are also some confusing errors, e.g., on p 233 and in Figure 7 (p 244).

The diverse applications of fluorescence spectroscopy are well represented. The opening chapter by M. Eftink is a clear and expert exposition of the mechanisms of fluorescence quenching. The length and detail of this chapter tends to make it ponderous, however. The next chapter by M. Petersheim deals with a rather narrowly chosen area of lanthanide luminescence for study of cation binding sites. The next chapter is about the use of fluorescent tags in DNA sequencing. This chapter is padded with detailed experimental protocols and is of little interest to the fluorescence community. D. Jameson and T. Hazlett give a clear account of the frequency domain techniques for measuring time-resolved fluorescence. The promising area of fluorescence methods for studying receptor events is covered in the following chapter. Unfortunately it has an introduction which contains too much technical detail, a deterrent to the uninitiated reader. The next chapter deals with almost the same subject, but again the introduction seems to be designed to baffle the novice. In pleasing contrast, a short review of energy transfer measurements in membrane biochemistry by T. Dewey is excellent in all respects. He gives a succinct and useful table listing these methods.

The final two chapters are concerned with fluorescence microscope imaging techniques. The first of these chapters contains a number of errors. Happily, the second, which covers fluorescence photobleaching, is noteworthy for its clarity and is a valuable review for the general reader.

John Lee, *University of Georgia*

Soil Analysis: Modern Instrumental Techniques. Second Edition. Books in Soils, Plants and the Environment Series. Edited by Keith A. Smith (Edinburgh School of Agriculture). Marcel Dekker, Inc.: New York. 1991. 672 pp. $150.00 (U.S. and Canada), $180.00 (all other countries). ISBN 0-8247-8355-7.

Increasing interest in contaminants and contaminant distribution in the environment has focused attention of analytical and environmental chemists on current instrumental methods of soil and plant analysis. The second edition of this book is therefore a welcome addition to the texts available to those interested in recent instrumental soil and plant analysis as well as its use in contaminant and environmental studies.

The book contains 14 chapters written by international experts. Instrumental methods such as atomic absorption and flame-emission spectrometry; inductively coupled plasma spectrometry; ion-selective electrodes; continuous-flow, flow-injection, and discrete analysis; ion chromatography; automated instruments for determination of total carbon, nitrogen, and sulfur in soils by combustion techniques; and X-ray fluorescence analysis are covered in the first seven chapters. Nuclear and radiochemical analyses and instrumental neutron-activation analysis are presented in Chapters 8 and 9. Isotopic procedures; analysis of nitrogen, carbon, and oxygen isotope ratios by optical emission spectrometry; and analysis of nitrogen isotope ratios by mass spectrometry are discussed in Chapters 10 and 11. Chapters 12 and 13 examine use of chromatography in soil analysis: gas chromatographic analysis of soil atmosphere, determination of pesticides by gas chromatography, and high-pressure liquid chromatography. The final chapter, one of three new additions to the second edition, examines analyses of functional groups in soil by nuclear magnetic resonance spectroscopy.

Appropriate as a reference text for chemists using instrumental methods of soil and plant analysis in environmental, toxicological, or low-temperature geochemical investigations, the second edition will also serve as a text in an advanced instrumental analysis course dealing with environmental problems. Specific analytical problems are discussed; advantages of each method are presented.

This book fills a gap between books covering traditional methods and specialized monographs on individual instrumental techniques, which usually are not written with the soil and plant analysts in mind.

Analytical techniques are combined with discussions of sample preparation and matrix problems as well as critical reviews of applications to soil science. New chapters in the second edition include inductively coupled plasma atomic-emission spectrometry, with material on inductively coupled plasma mass spectrometry and ion chromatography. The book is well-written, has uniformly high-quality illustrations and tables, and is well referenced with current literature.

Michael M. Reddy, *U.S. Geological Survey*

Biocatalysts for Industry. Edited by Jonathan S. Dordick (University of Iowa). Plenum Press: New York. 1991. xvi + 330 pp. $75.00. ISBN 0-306-43652-3.

This book is a timely compilation of much of the research at the forefront of biocatalysis. Since the book does not originate from a meeting, the chapters are in selected areas of most interest to industrialists and academics, and their style is somewhat alike. The book is thoroughly recommended for both experts requiring a compilation of research results with extensive bibliography and also for those people wishing to become acquainted with the rapidly changing field of industrial biocatalysis.

After the introduction, the book begins with a fascinating chapter on the history of biocatalysis. This material is often overlooked, and it is interesting to have it included in this book. The chapters on biocatalysis in processes where chemical catalysts cannot be utilized are well-written and complete, as are the discussions of emerging biocatalytic processes which follow. These processes which must compete with conventional methods include lignin degradation, fossil fuel production, non-aqueous enzymology, and lipase biocatalysis. Unfortunately, the chapter on Enzymes in Organic Solvents (A. Zaks), an area which represents the most rapidly advancing and exciting subsection of the biocatalytic field, is almost identical to a three year old minireview (a multiple author paper) by the same author. The chaptes on lipase catalysis (V. John and G. Abraham) and biocatalysis in supercritical fluids (T. Randolph et al.) are particularly strong. The book concludes with a section on future directions, encompassing protein engineering to catalytic antibodies.

In conclusion, this book represents outstanding value for the money and most chapters have been put together with considerable care and attention.

Alan J. Russell, *University of Pittsburgh*

Applications of Plasma Source Mass Spectrometry. Edited by Grenville Holland (University of Durham) and Andrew N. Eaton (VG Elemental Ltd., Winsford). The Royal Society of Chemistry: Cambridge, UK. 1991. viii + 222 pp. £37.50. ISBN 0-85186-566-6.

This book features selected papers from the Second International Conference on Plasma Source Mass Spectrometry, which was held at the University of Durham on September 24–28, 1990 (the first conference on this topic met at Durham in 1988). There are 21 papers presented in typescript form and a subject index. The affiliations of the authors are given in the paper headings.

NMR Basic Principles and Progress. **Volume 23**. **Deuterium and Shift Calculation**. Edited by P. Diehl, E. Fluck, H. Günther, R. Kosfeld, and J. Seelig. Springer-Verlag: Berlin. 1990. 262 pages. $98.00. ISBN 3-540-52949-7.

The first chapter (60 pages) by M. L. Martin and G. J. Martin entitled Deuterium NMR in the Study of Site-Specific Natural Isotope Fractionation (SNIF-NMR) deals with the use of quantitative deuterium NMR spectroscopy at natural abundance level as an analytical tool to detect the non-random distribution of deuterium among different hydrogen sites in a given molecule. Site-specific isotope fractionation is the result of isotope effects on physical processes and chemical or biochemical reactions in the course of natural or technological transformations. The main sources of isotopic fractionation in natural products are discussed and the basic principles of quantitative deuterium NMR spectroscopy as well as the experimental techniques including the precision and the accuracy of the method are described. Examples for the determination of kinetic and thermodynamic isotope effects and the investigation of reaction mechanisms and biochemical pathways are reviewed. The potential of the NMR method for the assessment of the origin and quality of compounds in food products is demonstrated. The ability of the method for detecting and quantifying the enrichment of wines by addition of sugar to the must before fermentation is only one of numerous examples. Throughout the chapter the results of the site-specific NMR method are compared with mass spectroscopic methods which supply only the mean isotope distribution. A particular interesting example demonstrating the advantage of the NMR method is the exciting story of the unambiguous authentification of natural vanillin aroma, despite synthetic labeling of the chemical product in order to mimic the mean isotope ratio of the natural product. This chapter is not free from printing errors but overall clearly demonstrates the progress and the broad potential of the NMR method to study site-specific H/D isotope fractionation in many fields of fundamental and practical interest.

The second chapter (101 pages) by H.-H. Limbach, Dynamic NMR Spectroscopy in the Presence of Kinetic Hydrogen/Deuterium Isotope Effects, shows how dynamic NMR spectroscopy can be applied to investigate kinetic isotope effects in proton-transfer reactions. The first half of the review provides the theoretical background of the method. A general introduction into dynamic NMR spectroscopy is followed by a description of the strategies to measure kinetic deuterium isotope effects of multiple proton-transfer reactions by dynamic NMR measurements. The proton inventory technique where dynamic NMR measurements are performed as a function of the deuterium fraction in the mobile proton sites is reviewed in detail. Typical equations to relate the dynamic NMR data to the rate constant of the isotopic reactions are derived and the specific NMR line-shape equations for exchange reactions in the presence of kinetic isotope effects are presented. Computational aspects concerning the line-shape simulations as well as experimental aspects are considered. The detailed discussion of experimental results includes examples for inter- and intramolecular multiple proton transfers using different NMR methods in liquids as well as in the solid state. So far, the examples are limited mainly to proton transfers between nitrogen and oxygen atoms. On the basis of the solid theoretical framework and the strategies developed in this review, however, it can be anticipated that dynamic NMR spectroscopy will be applied in the future to study deuterium isotope effects on the rate of proton, hydrogen, and hydride transfer in many other systems.

The third chapter (97 pages) by W. Kutzelnigg, U. Fleischer, and M. Schindler, entitled The IGLO-Method: Ab-initio Calculation and Interpretation of NMR Chemical shifts and Magnetic Susecptibilities, describes the theoretical principles and the application of this novel and important computational method. The chapter includes a very clear introduction underlining the basic theoretical principles of the IGLO method. The discussion of the theoretical principles is intentionally simplified to allow also non-theoreticians to learn the basic principles of the method (subsections which can be skipped with no loss of clarity are indicated), while more theoretical inclined readers are referred to the original papers for more details. Most of the review is devoted to the application of the IGLO method, mostly to the calculation of the chemical shifts of various nuclei in different chemical environments and to their interpretation in terms of orbital contributions. The calculated chemical shifts of all first-row and second-row elements (i.e. Li to Cl) are reviewed and the agreement with experiment is indeed very impressive. The recent applications of IGLO to carbocations (particular to controversial cases) and to cases such as the "dioxirane-example" (discussed on p 224), in which the identity of the reaction product was revised as a consequence of the IGLO calculations, are particularly impressive demonstrating the strength of the IGLO method. The application section includes many unpublished calculations which will be most useful to the potential users of this method. It is likely that this well-written review will bring the IGLO method to the attention of a wider audience, prompting its application to a variety of chemical problems.

H.-U. Siehl, *University of Tübingen*
Y. Apeloig, *Technion*

Recent Advances in the Chemistry of Insect Control. **Volume II**. Edited by L. C. Crombie. The Royal Society of Chemistry: Cambridge, UK. 1990. xi + 296 pp. £45.00/$83.00. ISBN 0-85186-627-1.

This softbound volume contains, in typescript form, the 18 lectures given at the Second International Symposium on the title subject held in Oxford in 1989. There is no index.

Carbohydrate Chemistry: Volume 22. **Monosaccharides, Disaccharides, and Specific Oligosaccharides**. Edited by R. J. Ferrier (University of Wellington). Royal Society of Chemistry: Cambridge, UK. 1990. xvi + 294 pp. £82.50. ISBN 0-85186-212-8.

This volume contains the comprehensive but succinct review characteristic of the series in which it is the intention "to note all relevant papers published on the subject" in 1988. The text is reproduced from camera-ready copy and is accompanied by a complete author index, in itself of much volume.

Some Recollections of Gap Jumping. By Sir Derek H. R. Barton. American Chemical Society: Washington, DC. 1991. $24.95. xxiv + 144 pp. ISBN 0-8412-1770-X.

This book represents another volume in the series *Profile, Pathways, and Dreams* edited by Jeffrey I. Seeman. (See the comments on the Series in an earlier issue of this journal.) The "Gap Jumping" that appears in the title of Sir Derek's autobiography is said by the author to refer to gaps in chains of reasoning in reference to organic chemistry that he has been able to jump, but one might also consider that it may refer to the geographical gaps such as those between Britain and Boston, Britain and France, and France and Texas that the author has also jumped in his career.