Additions and Corrections

Main-Group–Organotransition-Metal Chemistry: The Cyclopentadienylchromium Polyiodides Including $[(C_5Me_5)_2Cr_2I_3^+]_2[I_{16}^{2-}]$ [*J. Am. Chem. Soc.* **1990**, *112*, 1860–1864]. DAVID B. MORSE, THOMAS B. RAUCHFUSS,* and SCOTT R. WILSON

An important reference to previous work on organometallic polyiodides was omitted: Bottomley, F.; Darkwa, J.; Sutin, L.; White, P. S. *Organometallics* **1986**, *5*, 2165. The authors isolated $[(C_5Me_5)_2V(NO)]_2I_8$.

Computer Software Reviews

NMR″, Version 1.0. Calleo Scientific Software Publishers: 1300 Miramont Dr., Fort Collins, CO 80524. List price $275.00 for NMR″ and $375.00 for NMR″ II (faster Mac II or SE/30 version that requires a floating point coprocessor).

This program simulates NMR spectra, including second-order lines, from chemical shifts and coupling constants with use of Macintosh computers. The number of atoms that can be handled in one run, which depends on the currently available memory on your computer, is calculated and printed for you. All natural NMR-active isotopes of all elements are included, and dipolar as well as scalar coupling can be simulated. The program is very easy to use, at least for someone with experience on a Macintosh computer.

NMR″ requires a Mac 512KE, Mac Plus, Mac SE, or Mac II, with a Mac II or SE/30 recommended if simulating >5 $I = {}^1/_2$ spins. A six-spin test system that took several hours on an SE took only 9 min on a Mac II. Input consists of isotopes present (with user-defined abundances), chemical shifts, coupling constants, spectrometer frequency, line widths, spectrum width, tick mark spacing, and plot resolution. The output, a simulated spectrum, was comparable to that obtained with a different program with a larger computer in a test case.

NMR simulation programs with iteration routines (the user does the iterating with NMR″) are available with large spectrometers and externally for large computers, but in the former case it is necessary to tie up the instrument during the simulation, and in the latter case access to a large computer is needed. Thus, this small computer program has a place for academic or industrial users with appropriately configured Macintosh computers. It should be useful to students wishing to learn how the variation of chemical shifts and coupling constants affects NMR spectra and to researchers wanting to obtain the best shifts and coupling constants from the spectrum of a research compound.

Robert B. Bates, *University of Arizona*

Book Reviews*

Sulphur-containing Drugs and Related Organic Compounds. Chemistry, Biochemistry and Toxicology. Volume 1: Part A. Metabolism of Sulphur Functional Groups. Edited by L. A. Damani (Kings College London, University of London). John Wiley & Sons: Chichester and New York. 1989. 167 pp. $89.95. ISBN 0-470-21257-8.

Volume 1, Part A, begins a projected three-volume series, each volume to be in two parts. The series will emphasize the chemistry and biochemistry of biotransformations and drug toxicity of sulfur-containing xenobiotics, i.e., compounds acquired from the environment by living organisms (in quotations, ph, the British style for sulphur, will be used for the American style of f). The Editor states that "until now a comprehensive compilation of metabolic and toxicological data on sulphur compounds has not been published". The readership claimed includes biochemical, clinical and other types of pharmacologists, toxicologists, biochemists, organic and medicinal chemists, and "medical scientists".

The 167 pages by eight coauthors include the following seven chapters: general organic chemistry and biochemistry of sulphur (20 pages, 51 refs); natural occurrence (32 pages, 127 refs); agricultural chemicals (32 pages, 99 refs); other industrial and medicinal aspects (19 pages, 29 refs); inorganics (22 pages, 108 refs); and the functionalities of thioethers, thiols, dithioic acids, and disulphides, first as to oxidation, reduction, and hydrolysis (16 pages, 47 refs) and then as to biochemical conjugations (10 pages, 37 refs). Although the authors "were asked to ensure that the coverage of material was comprehensive", the total of only about 500 references for the breadth of topics covered seems a bit sparse; for example, Jocelyn's *Biochemistry of the SH Group* alone contains 2000

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*Unsigned book reviews are by the Book Review Editor.

references less than 10 years old. An estimated one-fourth of the citations are only to secondary sources; unfortunately, one can think of two dozen or so uncited major books or series that as secondary sources would have provided valuable leading references for readers. The seven-page subject index seems a little skimpy, and there is no author index. On the plus side, frequent cross references are a benefit.

In more places than one would wish, superficial, vague or trivial items occupy space that might have been used to better purpose, and unfamiliar items introduced too often are not made clear until later, if at all. A dozen or so misleading statements, several misspellings and some 30 (usually trivial) typographical errors were noted.

Care should be taken in using the book as a guide to nomenclature, at least vis-à-vis IUPAC recommendations; e.g., repeated use of persulphides for hydrodisulfides (RSSH), propane thiol for 1- (or 2-)-propanethiol, *n*-butyl thiol for 1-butanethiol, methyl sulfonium for methylsulfonium, alkylaryl sulfides for alkyl aryl sulfides, and (!) thiosulfoxides/thiosulfones for thiosulfinates/thiosulfonates, RS(O)SR and $RS(O_2)SR$, respectively. Names used for insecticides evidently differ from common ones in the United States to the extent that only 4 of 14 names sampled could be located in a comprehensive index.

Despite the foregoing criticisms, since the book does indeed appear to be unique, as claimed, in many aspects of its coverage of biochemical, metabolic, and toxicological aspects of sulfur compounds, major libraries probably should acquire it, even though the cost–benefit ratio is disappointing in many respects, relative to what might have been. The book should be useful for a bird's-eye view of the broad topics covered, if one bears in mind that a complementary search of the journal literature should be considered if really comprehensive coverage is desired for many of the topics.

Lamar Field, *Vanderbilt University*

Sulphur-containing Drugs and Related Organic Compounds. Chemistry, Biochemistry and Toxicology. Volume 2: Part B. Analytical, Biochemical and Toxicological Aspects of Sulphur Xenobiochemistry. Edited by L. A. Damani (Kings College London, University of London). John Wiley & Sons: Chichester and New York. 1989. 175 pp. $74.95. ISBN 0-470-21501-1.

Background material in the preceding review of Volume 1, Part A, need not be repeated. Volume 2, Part B, seems a significant improvement over Volume 1, Part A (even though some five-dozen typos exceed the previous number). Volume 2, Part B, contains 175 pages by 11 coauthors in the following seven chapters: interactions of sulphur-containing xenobiotics with cytochrome(s) P-450 and glucuronyl transferases (37 pages, 147 refs) and then with *S*-adenosyl-L-methionine-dependent methyltransferases (39 pages, 122 refs); the sulphane pool (13 pages, 63 refs); thiol-disulphide exchange (19 pages, 113 refs); cysteine conjugate β-lyase with respect to toxic thiol production (13 pages, 45 refs) and then with regard to other aspects (21 pages, 116 refs); and, finally, metabolism of carbon disulphide (12 pages, 38 refs). The total of well over 600 references is a notable improvement over the 500 or so in Volume 1, Part A, especially since secondary sources are cited only about half as often and since more of the secondary sources one would expect are cited. Again, the subject index amounts only to about six pages, and there is no author index.

There are only a half-dozen or so obscurities, and the superficial, vague, or trivial aspects alluded to for Volume 1, Part A, are negligible in Volume 2, Part B. In about a half-dozen instances, however, unfamiliar items are introduced without prior clarification, e.g., prooxidant, hydropic, and S-thiolation (used several times, in common with other authors, but never defined); in view of the emphasis on glucuronides, it would have been nice to find a representative structure either in Volume 2, Part B, or Volume 1, Part A, to which a cross reference is made. The term "mixed disulfides" is perpetuated as an all-too-common misnomer that should be buried forever; it is intended to mean *unsymmetrical* disulfides of the structure R^1SSR^2, but it really implies a mixture of two or more disulfides of any kind. There are some half-dozen significant misleading errors, for example: methimazole is shown as **4** on page 14 with an incomplete structure, but then as **18** on page 15 with the correct structure; the structure of ranitidine is incomplete (page 14), and the structure attributed to the incomplete name "aurothiomalate" (**17**, page 15) actually is the structure of dimercaprol (but, to add to the confusion, dimercaprol is correctly assigned as the name for **17** on page 16, and structure **19** is correctly shown for gold sodium thiomalate on pages 16–17).

No catalogue will list the erroneous names of dithiothreitolcott (page 108), cycloheximiole (page 110), or *t*-butyl hydroxoperoxide (page 111; *t*-butylhydroperoxide, on page 101, would have hit the mark had two words been used). These misnomers might have been typographical errors, but other instances also imply possible problems with use of the book as a style guide for nomenclature, at least according to IUPAC rules (e.g., one sees, inter alia, phenyl methane thiol, but allylsulphide, diethylmaleate, δ-aminolevulinic, and dimethylsulphoxide; "diethyldithiocarbamate" is treated as a compound rather than as an ion). As in Volume 1, Part A, the term persulphide is used repeatedly, but at least the IUPAC-recommended term of hydrodisulphide is given once parenthetically (an effect spoiled by use of the aberration of "hydrosulphide" later).

Despite the foregoing shortcomings, the cost–benefit aspect of Volume 2, Part B (43¢/page vs 9–29¢/page for five books recently reviewed in *J. Am. Chem. Soc.*) seems considerably more favorable than for Volume 1, Part A, and the volume no doubt will be useful to those concerned with metabolic and toxicological aspects of sulfur-containing xenobiotics.

Lamar Field, *Vanderbilt University*

Molecular Sieves. Principles of Synthesis and Identification. By R. Szostak (Georgia Institute of Technology). Van Nostrand Reinhold: New York. 1988. xix + 524 pp. $69.95. ISBN 0-442-28023-8.

An increasing interest in zeolites is linked to the improved yield and selectivity they provide as catalysts in gasoline and speciality chemical manufacture. Szostak's *Molecular Sieves* places emphasis on the inorganic chemistry of crystalline zeolites, and she generates a sense of delight with the progress being made.

The work opens with a close-up view of how crystalline microporosity develops in zeolites, including adsorption site acidity and shape selectivity, which are both relevant to catalytic applications. The second chapter on hydrothermal synthesis describes transitions from monomeric species to embryonic crystals as they take shape from an initial gel structure. She describes in most cases how the initiation of zeolite crystallization follows an induction period and is later accompanied by an optimum and then a decline in crystallinity. The reader gains an insight into organic molecules or ions which, when used as additives, serve as structural templates. This area is not fully understood, and the author places emphasis on template behavior in areas where it has become clear.

An intriguing story is revealed in Chapter 3 where the author presents a time-lapse overview of synthetic oligomers and related zeolite intermediates identified by capillary gas chromatography/mass spectrometry. These reactive intermediates have also been studied by NMR using ^{29}Si to probe silicate structure, ^{27}Al to probe aluminate structure, and ^{13}C to probe organic templates. As stories of scientific mystery go, this chapter alone is worth the price of admission. The reader is also given a manager's perspectives on where all this exciting research takes us because, as Szostak tells us "we have yet to 'engineer' the desired structure for a specific catalyst or adsorptive application".

The fourth chapter describes the growing field of non-aluminate molecular sieves by summarizing much information from scientific and patent literature. The final sections deal with practical, physical, and X-ray structural characterizations and tabulations of zeolitic materials.

This reviewer was delighted with the author's ability to orient the reader, placing essential details into an easily assimilated larger picture while leaving parts of the canvas unpainted when the picture was not ready to be made clear. This book with its experimentalist flavor will be valued by those having a direct interest in zeolites and their applications, and by those who want to read about the latest developments (with 800 references) in the field from a clearly written text that is worthwhile as well as enjoyable to read.

David H. Freeman, *University of Maryland*

Distance Geometry and Molecular Conformation. By G. M. Crippen (University of Michigan) and T. F. Havel (Scripps Clinic and Research Foundation). John Wiley & Sons: New York and Chichester. 1988. x + 541 pp. $142.00. ISBN 0-471-92061-4.

Distance geometry as defined and used by the authors in this book is the use of interatomic distances or distance ranges to represent flexible molecules. There are a number of advantages to such a representation. Many properties of molecules, for example, bond distances and angles, are naturally represented in this manner, and certain experiments give results which can be interpreted as giving information about interatomic distances. Furthermore, the distance representation is a form of internal coordinates and thus is independent of molecular rotation and translation. Most importantly, by using distance ranges between some atoms, all possible conformations of a flexible molecule can be represented. However, the distances are invariant to molecular inversion so at least some chirality information cannot be expressed with distances alone. The fundamental problem which distance geometry addresses is, given a set of distance and chirality constraints which define a flexible molecule, to find one or more conformations which satisfy them or prove that no such conformations exist. The main thrust of this book is to present methods to solve this problem and ways in which these methods can be applied to interesting chemical problems.

The book consists of an introductory section which gives an overview of the problem and the book, followed by two large sections, each written mainly by one of the authors. The first major part (Chapters 2–5) is written by Dr. Havel and deals with the mathematical background to distance geometry methods. Chapter 2 deals with the question of chirality constraints. As noted above, such constraints must be added to the distance representation to capture information about the handedness of a molecule. In practice, when the distance constraints are inexact, it is often necessary to add chirality constraints on individual chiral centers. The general treatment of chirality constraints and their interrelations is discussed. Chapter 3 deals with the consistency (or lack thereof) of a complete set of exact interatomic distances. Such a set may not necessarily be consistent with any arrangement of points in space. Chapter 4 involves the mathematical characterization of molecular flexibility permitted when some interatomic distances are known exactly and some are unknown. Chapter 5 extends this treatment to the case in which at least upper and lower bounds are specified for all interatomic distances.

The second major part of the book, written by Dr. Crippen, deals mainly with a solution to the fundamental problem of distance geometry and its applications. Chapter 6 presents the EMBED algorithm which is a practical method for generation of three dimensional coordinates for conformations which satisfy distance and chirality constraints and which is the heart of most distance geometry computer programs. Chapter 7 presents applications of the EMBED algorithm to experimental data. The most important and widely used application is in the calculation of molecular conformations from NMR data. Chapter 8 deals with ligand binding and mainly presents ways in which distance representations can be used to develop binding site models and flexible docking of ligands to such models. Chapter 9 contains topics related to energy minimization including some discussion of the problem of finding global minima and a discussion of the so-called energy embedding techniques.

The authors state that this book has two intended audiences: one is computationally oriented chemists and the other is mathematicians who might be interested in chemical applications. While an interdisciplinary approach might be admirable in theory, I suspect that all but the most mathematically inclined chemists will find the first half of the book very hard going indeed (even though appendices are provided with some of the mathematical background) and will give it a cursory skim before going on to the second part, which is more chemically oriented. Given the partitioning of the book and its intended audience, it may have been better to split it into two books. Each could have been more tailored to the needs of either chemists or mathematicians and perhaps the resulting volumes could have been more suitably priced for individual purchase.

J. Scott Dixon, *SmithKline Beecham Pharmaceutical R&D*

Kinetics of Diffusion Controlled Chemical Processes. By A. A. Ovchinnikov, S. F. Timashev, and A. A. Belyy (Institute of Chemical Physics, USSR Academy of Sciences). Nova Science: Commack, NY. 1989. vi + 239 pp. $67.00. ISBN 0-941743-52-7.

Thoughts about the interaction between diffusion and chemical reaction are usually about phase boundaries affecting reactions, as at electrodes or heterogeneous catalytic surfaces. This book, with the (minor) exception of a chapter on membrane separations, is about something else. It deals with the fact that elementary reactions only take place between nearby molecules. Mostly this just means that there is an upper limit to bimolecular reaction rate constants, something like 10^{10} M^{-1} s^{-1}. The "Smoluchowski equation" $k = 4\pi\rho_{AB}(D_A + D_B)$ that generates this value presupposes, however, that potentially reacting molecules A and B first have to diffuse to within ρ_{AB} of one another before reaction can take place. As Smoluchowski himself noted 75 years ago, diffusion is not necessary if A and B are somehow already close. There are two ways this can happen. One is a theoretical construct: Suppose A and B molecules were initially located at random positions and reactions were magically "switched on" at $t = 0$; a transient faster reaction between occasional already neighboring A–B pairs would have to die out before the reaction rate is governed by diffusion. The second reason does relate to real chemistry: the reactive species A may be generated close to its partner B by some chemical or photochemical means. An example would be cutting DNA by generating OH radicals very close to a selected cutting site by catalytically decomposing H_2O_2 at an EDTA–Fe complex bound to the DNA at the target site.

Mathematical aspects of the space/time problem involved here have attracted the attentions of chemical physicists for many years. In this book the subject is expounded systematically and clearly in its analytical (as opposed to computational) form at a level suited to a theoretically inclined graduate student. The authors' own views are emphasized and provide the flavor of the presentation. Because the contributions to this field from large-scale molecular dynamics simulations done over the past decade are not discussed, the book cannot be said to represent the current state of the theory of diffusion-controlled reactions. It is nonetheless a good book to have in the library if you are interested in theoretical reaction kinetics, for it does significantly extend the classical 1961 review of the analytical theory by Richard Noyes, particularly in discussing later contributions from the Soviet Union. Now if one of the molecular dynamics people would just sit down and write a comparable book describing what they have discovered...

William Gardiner, *University of Texas at Austin*

Essentials of Medicinal Chemistry. Second Edition. By A. Korolkovas (University of São Paulo). John Wiley & Sons: New York and Chichester. 1988. xii + 1204 pp. $125.00. ISBN 0-471-99356-5.

This well-organized commpendium has been brought up-to-date as far as 1987, emphasizing the essential drugs listed by the World Health Organization in 1985. It is intended as a reference work for both students and professionals, including those in the various health sciences. An introductory chapter presents basic considerations, development of drugs, and the theory of drug action. The six following chapters take up drugs by type: psychopharmacological agents, pharmacodynamic agents, chemotherapeutic agents, drugs for metabolic diseases and endocrine function, vitamins and hormones, and miscellaneous agents. Names, structures, properties, sources, handling, assay, and use are given. Bibliographies, given at the end of each chapter, are extensive. The subject index, 92 pages, is suitably massive and makes accessibility practical.

The Chemistry of Macrocyclic Ligand Complexes. By L. F. Lindoy (James Cook University). Cambridge University: Cambridge and New York. 1989. viii + 264 pp. $69.50. ISBN 0-521-25261-X.

This very readable book provides an overview of macrocyclic chemistry. The author has attempted to write a book that is suitable both as an introductory text for advanced undergraduate and graduate students and as a reference book for those involved in research with macrocycles. For those teaching a course in macrocycle chemistry or incorporating this material into courses at the undergraduate or early graduate level, this book would be a valuable resource. After a brief introductory chapter, the author surveys synthetic procedures, including those for more complex macrocycles (e.g., catenands, binucleating macrocycles, cage macrocycles). This is followed by a chapter devoted to polyethers and related macrocycles, then a chapter on host–guest interactions. Brief chapters deal with thermodynamic, kinetic, and redox aspects of macrocyclic systems. A chapter describing natural macrocycles covers cyclic antibiotics, vitamin B_{12}, chlorophyll, and haem proteins. Selected references up to 1986 are included.

Because this is an overview, the author does not attempt to include all work done with macrocycles. This is appropriate for use of the book as an introduction to macrocycles, both for students and for researchers entering this area of chemistry. The book would be less useful for those already familiar with macrocycles, where a more thorough treatment would be required.

Dorothy E. Hamilton, *Smith College*

Electron Spin Resonance. Specialist Periodical Reports Volume 11B. Editor/Senior Reporter M. C. R. Symons (University of Leicester). Royal Society of Chemistry: Cambridge. 1989. xv + 294 pp. $195.00. ISBN 0-85186-871-1.

The *Specialist Periodical Report* in electron spin resonance is published in two parts in alternate years. Volume A deals with organic and bioorganic topics and Volume B with inorganic and bioinorganic topics. Theoretical topics are treated in both volumes. Although many of the chapters in Volume 11B are continuations of chapters in earlier volumes, there are new chapters on certain special topics in this book of eight reviews.

The first chapter, entitled In Vivo Detection of Free Radical Metabolites by Spin Trapping, by R. P. Mason, K. R. Maples, and K. T. Knecht, provides a brief review (8 pages, 34 references) of a challenging area of EPR that will be of interest to generalists and specialists alike. The many problems in the application of this technique, the potential dividends, and the current status of applications are tightly sketched in this useful chapter.

In the second short chapter (also 8 pages), A. Hudson reviews developments in theoretical aspects of EPR since early 1987. A number of typical and nontypical experiments and their theoretical analyses are mentioned, but the final section on numerical methods and spectral analysis is especially useful. Hudson's final sentence, a question, requires an answer.

J. F. Gibson reviews results of EPR studies on transition metal ions from mid-1986 to mid-1988 in Chapter 3 (57 pages). Initially Gibson outlines advances in novel classes of chemical systems and phenomena, e.g., mixed-valence complexes, spin crossovers, superconductors, and then proceeds to systematically review results on transition metals organized by d-electron configuration, but results for lanthanides are not reviewed as such. Presumably, this is a reflection of the lack of activity in the area.

Recent Developments of ENDOR Spectroscopy in the Study of Defects in Solids is treated in 45 pages (59 references) by J.-M. Spaeth. This is not a usual review article, since largely results only from the

Paderborn group are used to illustrate applications of the technique. The chapter also departs from the usual style of the *Specialist Reports* series in that much background and experimental technique material is covered, and there are few references to current literature. However, the chapter is highly recommended as being an ideal introduction to ENDOR spectroscopy as well as illustrating how the technique may be systematically applied in a specific area, that being studies of defects.

Another special topic is treated in Chapter 5, entitled Inorganic and Organometallic Radicals and Clusters Prepared in a Rotating Cryostat by Metal Vapour Techniques, by J. A. Howard and B. Mile. As the title suggests, rather exotic chemical species are identified and characterized in the review. The review is an excellent source of examples of new structures and bonding schemes in unusual chemical species. It also documents that this is a lively area of chemistry.

M. C. R. Symons reviews Inorganic and Organometallic Radicals (28 pages, 160 references) in the traditional sense. He notes that his review could overlap somewhat with the special topic reports, but he has effectively avoided repetition of topics covered elsewhere. The report illustrates continuing work on new radical species with excellent illustrations of their spectral features and how these are used in interpreting properties of radicals. Symons's review is essential reading for those who wish to keep informed of advances in EPR studies of radicals.

A thorough and carefully documented review of EPR results on Metalloproteins (310 references) is presented by G. R. Hanson and G. L. Wilson. As the number of references suggests, an enormous amount of work has been carried out in this area in the past couple of years, and the extent of the review reflects the value of EPR techniques in the study of metalloproteins.

The final chapter, by Sandra S. Eaton and Gareth R. Eaton, reviews EPR results for Complexes of Paramagnetic Metals with Paramagnetic Ligands. The review covers material from the late 1970s to mid-1988, and an examination of the references documents the authors' contribution to this interesting line of research. The material is logically presented in that metal complexes of classes of paramagnetic ligands are covered systematically. Readers are cautioned to pay careful attention to the Hamiltonian for exchange elected by Eaton and Eaton. In their review −J means ferromagnetic. North Americans tend to use +J for ferromagnetic, and the authors only missed the sign convention once. The review is well worth reading.

Finally, a comment concerning the title of the series and the terms ESR and EPR. For historical reasons, the term ESR will probably continue to be used, but EPR has been adopted by most of the community as the preferred term. There is an index to authors in the references only.

William E. Hatfield, *University of North Carolina*

Practical Fourier Transform Infrared Spectroscopy: Industrial and Laboratory Chemical Analysis. Edited by J. R. Ferraro (Argonne National Laboratories) and K. Krishnan (BioRad Digilab Division). Academic: San Diego and New York. 1989. xiii + 534 pp. $69.00. ISBN 0-12-254125-1.

This book explores the practical uses of modern Fourier transform infrared (FTIR) spectrometry in the industrial and laboratory environment. It contains nine chapters dealing with a wide range of areas in which FTIR spectrometry has emerged as an important tool for not only the industrial chemist but chemists in general. The choice of contributors to the individual chapters provides the reader with an international perspective on the application of FTIR spectrometry. Chapters 1 and 2 both deal with the application of vibrational spectroscopy to the analysis of superconductors. Chapter 1 deals with the analysis of the widely known high-temperature ceramic superconductors, while Chapter 2 discusses the application to charge-transfer organic superconductors as well as synthetic organic electrical conductors. The latter include polymer-salt complexes, transition element–macrocycle ligand complexes and organic polymers. Chapter 3 provides a very good overview of FTIR microsampling methods (FTIR microscopy) and discusses a wide variety of applications from forensics to biology and convincingly demonstrates the enormous utility of this relatively new sampling accessory.

Chapter 4 deals with Fourier transform Raman spectrometry. Its inclusion in an FTIR spectrometry book is logical given that the FT-Raman technique can be added to many commercial FTIR spectrometers as an accessory. The basic principles of the FT-Raman technique are discussed in some detail. FT-Raman spectroscopy's ability to solve many of the typical problems normally encountered in conventional Raman spectroscopy with real world samples is convincingly presented. Chapter 5 is concerned with vibrational circular dichroism (VCD) and its application to a variety of problems in biochemistry. A very large part of the chapter deals with basic experimental design and provides a good background on the history of the technique and its significance to biochemical studies. Chapter 6 deals with the use of FTIR spectrometry for the analysis of silicon semiconductors. Methods for characterizing impurities such as carbon, oxygen, hydrogen, and nitrogen are presented. Epitaxial thickness measurements are also discussed.

Chapter 7 deals with the use of FTIR spectrometry for the solution of a variety of industrial problems while Chapter 8 involves the important area of quantitative analysis using FTIR spectrometry and the statistical methods employed. Gas chromatography coupled to FTIR spectrometry (GC-FTIR) and its application in such areas as the environment, the food and fragrance industries, pesticides, polymers, and forensics is the subject of Chapter 9.

This book is an excellent reference source for those familiar with the field of FTIR spectrometry and also provides a good overview for those less familar with the field. It provides numerous references and covers many currently important applications as well as exploring several newly emerging areas likely to impact the field in the future.

Robert S. Brown, *Colorado State University*

Studies in Surface Science and Catalysis. Volume 45. Transition Metal Oxides: Surface Chemistry and Catalysis. By Harold H. Kung (Northwestern University). Elsevier: Amsterdam. 1989. xi + 285 pp. $113.25. ISBN 0-444-87394-5.

The publishers promote this book as an up-to-date summary of existing information on the structure, electronic properties, chemistry, and catalytic properties of transition metal oxides. The book itself does not disappoint, although some technical background in modern experimental techniques in the field is necessary for maximum benefit to the reader.

There are 14 chapters divided into three major categories. Chapters 1–3 introduce transition metal oxides and discuss their bulk and surface structure and their physical and electronic properties. Chapters 4–7 discuss surface aspects of coordinative unsaturation, acidity, reduction of transition metal oxides at surfaces, and the nature, detection, and reactivity of adsorbed oxygen. Chapter 8, on the preparation of oxides leads into the chapters (9–14) on surface catalytic reactions. Reactions such as metathesis, isomerization, decomposition, hydrogenation, selective oxidation, photoassisted surface processes, and reactions of CO and CO_2 with H_2 are highlighted. The reactions are discussed by specific molecule for each type of reaction.

The author presents a balanced approach to the presentation of data. Background and bulk material properties are included in most chapters. This is usually followed by a discussion of kinetics and reaction mechanisms in the later chapters. For those trying to obtain a reasonable overview of surface catalysis with an understanding of how surface properties and catalytic activity relate, this book will be useful.

Robin D. Rogers, *Northern Illinois University*

Volumes of Proceedings

New Trends in Physics and Physical Chemistry of Polymers. Edited by Lieng-Huang Lee (Xerox Corporation). Plenum: New York and London. 1989. x + 662 pp. $120.00. ISBN 0-306-43383-4.

This volume of typescript papers originated at the Third Chemical Congress of North America, held in Toronto in 1988. Many of the contributions are intended to honor Prof. P.-G. de Gennes, recipient of the ACS Polymer Chemist of the Year Award. The papers are grouped under six headings: Adsorption of Colloids and Polymers; Adhesion, Fractal and Wetting of Polymers; Dynamics and Characterization of Polymer Solutions; Diffusion and Interdiffusion of Polymers; Entanglement and Reptation of Polymers Melts and Networks; and Phase Transitions and Gel Electrophoresis. They include an award address by Prof. de Gennes (Dynamics of Adsorbed Polymers), transcripts of the ensuing discussions, final remarks by Prof. de Gennes, and a Letter to the Editor. An appendix provides a list of publications by Prof. de Gennes and brief remarks about the contributors. A true author index (i.e., of citations) and a substantial subject index complete the book.

Separations Using Aqueous Phase Systems. Applications in Cell Biology and Biotechnology. Edited by Derek Fisher (Royal Free Hospital School of Medicine) and Ian A. Sutherland (National Institute for Medical Research, U.K.). Plenum: New York and London. 1989. xvii + 504 pp. $95.00. ISBN 0-306-43227-7.

The Fifth International Conference on Phase Partitioning on Advances in Separations Using Aqueous Phase Systems in Cell Biology and Biotechnology is too long a title for an acronym or initial-letter abbreviation, but it describes an event that took place in Oxford in 1987. It generated 77 papers, arranged in this volume in 10 "chapters", which include experimental partitioning of a wide range of kinds, and a substantial amount of attention to emerging techniques. Well indexed.