7550A, and Houston Instruments DMP29, PC695, DMP51, or DMP52. When tested with a HP 7475A plotter, Tekalike performed superbly. Graphics which were saved could be plotted at various speeds and with control over the page arrangement and size. The quality was noticeably superior to the plot as seen on the screen, giving results comparable to plots directly from the mainframe. The only requirement is that the plotter use the RS-232 interface protocol. (It is not possible to use a plotter with an HP/IB configuration.)

Tekalike's ability to integrate graphics from a mainframe into the Macintosh environment is particularly elegant in that it is possible to display graphics from a mainframe, save it on a disk, then view it at any time while no longer in communication with the host computer. The software is intended to provide the capability to take graphic output and convert it into a Macpaint document. (Note that the Macpaint software is not part of Tekalike and must be provided by the user.) This task Tekalike accomplishes easily, but because of the limitations of the screen resolution, the results may be disappointing, depending upon the graphics, as the resulting Macpaint documents are often not of sufficient quality to paste directly into word processor documents.

A graphic recording can also be converted into a Macdraw document (Macdraw not included). The image can be scaled to fit on one Macdraw page using the "Shrink" feature. If this is not used, then a multiple page document is created. Once the document has been transferred, it is possible to rearrange the graph as elements can be grouped and moved about, thus allowing editing of a plot or picture without having to change the generating program. However, the information is not converted into true Macdraw objects.

There is a "Zoom" feature which allows a closeup of any region of the display. This works extremely well when used with a good quality graphic output stored on disk. Zooming provides the opportunity to plot specific areas without modification of the plotting software, a real time saver.

Tekalike will support standard screen editors such as the Vax Edit/EDT editor using VT100 commands. It can be used with or without a keypad, although the latter is more convenient. With the Vax editor, the backspace key sends the cursor back to the beginning of the line while moving back one space requires a control command.

A text stream can be recorded and later viewed with Macwrite (not included). The text is saved as Geneva typeface and can be edited as any Macwrite document. This allows the opportunity to incorporate text output directly into a word-processed document.

Tekalike can be used to dial another computer with either a rotary or touch tone phone with the number saved. All the communications parameters such a baud rate (300 to 19200), parity, handshake, local echo, auto line feed, and bits per character can be set and saved for future use. When interacting generally with host, your computer can be set as an ANSI terminal with adjustable character size and margin settings. In this format text scrolls, but when a graphic output is sent by the host, the terminal automatically switches to Tektronix mode. After the graphs have been viewed, the terminal can be switched back to the ANSI mode. Even though the screen lacks color capability, color plots can be realistically previewed with different colors represented by eight different shading patterns.

A real advantage of this software is that it enables the user to input graphical data directly to a mainframe computer using the Macintosh Mouse. For example, drawing molecular structures for Molecular Mechanics calculation is greatly simplified.

The accompanying manual is very good if you are familiar with the Macintosh. Since all operations are menu controlled, a few hours with Tekalike is all that is necessary to learn its features. Examples of all operations are provided in the manual as well.

John Pojman, *The University of Texas at Austin*

Book Reviews*

Folk Medicine. The Art and the Science. Edited by Richard P. Steiner (University of Utah). American Chemical Society: Washington, DC. 1986. viii + 223 pp. $22.95. ISBN 0-8412-0939-1. (Also available in paperback: ISBN 0-8412-0946-4.)

This book appears at a time of renewed interest in folk medicine and will provide interesting reading for the layman as well as physicians and researchers.

The first seven chapters are devoted to the medicinal plants of specific areas or cultures. These are Aztec sources of Mexican folk medicine, Zuni Indian medicine, medicine of India, and medicinal plants of Fiji, Papua-New Guinea, Australia, and Africa. Attempts are made to evaluate plants on the basis of efficacy or laboratory analysis. The antithrombotic activity of garlic is the subject of Chapter 8. This is followed by a discussion of the scientific basis of the therapeutic effects of ginseng. The next three chapters describe Chinese medicinal plants. The last two chapters are concerned with the bioactive components of Zingiberaceous and Zizyphus plants. The last seven chapters emphasize the isolation and identification of specific bioactive compounds. References are included.

M. C. W. Smith, *Ann Arbor, Michigan*

Chemical Demonstrations: A Sourcebook for Teachers. By L. R. Summerlein (The University of Alabama at Birmingham) and J. L. Ealy, Jr. (The Hill School). American Chemical Society: Washington, DC. 1985. ix + 190 pp. $19.95. ISBN 0-8412-0923-5.

The book contains 108 teaching demonstrations conveniently bound, presumably for laboratory use, in a ring binder format.

The authors do not specify the educational level for which the demonstrations are designed other than to suggest their use in an introductory program. This may be quite consistent with their admonition, perhaps to college teachers particularly, that often "we overlook very effective demonstrations because they are so simple". Most of the demonstrations seem appropriate for audiences of different ages. In addition to being simple and easy to understand, the demonstrations conform to the authors' criterion that demonstrations be fun.

I liked No. 42, Carbon as a Catalyst, which suggests that a sugar cube can be burned after being coated with cigarette ashes, and No. 85, The Surface Tension of Water, in which floated powdered sulfur sinks when the water surface is touched with one's finger.

Important to large group lecturers is the identification of some demonstrations which can be done in Petri plates and shown on the overhead projector. The comparative reactivity of several metals in a marked plate and the reaction of sodium with water and an indicator, as examples, project beautifully. Perhaps the crystallization of sodium acetate, demonstration No. 17, might work well in a Petri plate for projection too.

There are times when the authors may sacrifice simplicity in favor of the unusual. The various clock and oscillating reactions are not easily assembled or easily understood, but chemists everywhere will surely forgive such excursions from the basic text.

Some demonstration lecturers may want to quibble about the acetylene bubbles which replace the carbide cannon and the flame test of the fireworks elements that everyone does differently. The authors anticipate this and encourage the reader to modify the demonstrations to fit one's own needs.

It is a nice collection, clearly presented, with teaching tips and questions for students to consider following each demonstration.

James W. Cox, *The University of Montana*

Trace Analysis. Volume 4. Edited by James F. Lawrence (Food Research Division, Health Protection Branch, Health and Welfare Canada). Academic Press: Orlando, FL. 1985. xii + 305 pp. $65.00. ISBN 0-12-682104-6.

This fourth volume of the series continues the state-of-the-art, invited-expert(s) review format of the earlier volumes. Volumes 1 (1981) and 2 (1982) dealt largely with the application of high-performance liquid chromatography to organic and metal ion trace analysis in such diverse areas as water, mycotoxins, and vitamins, together with articles on detectors and enrichment techniques. Volume 3 (1984) expanded the scope of the methods to biological tissues and fluids, drugs, and environmental pollutants.

Volume 4 (1985) broadens the scope still further. L. Ebdon and B. A. King discuss the recent developments and applications concerning ion-selective polymeric membrane electrodes. Electrodes for ions include those for protons, sodium, potassium, lithium, calcium, magnesium, chloride, and nitrate. Ammonia and carbon dioxide electrodes are reviewed. Enzyme electrodes and biosensors are described for the measurement of urea, creatinine, amino acids, glucose, and nitrate. Drug detection electrodes, immunoelectrodes, and the measurement of mem-

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*Unsigned book reviews are by the Book Review Editor.

brane potentials of biological systems are also discussed.

T. F. Bidleman is the author of an article on adsorbents for high-volume collection of organic vapors. Collection efficiencies, adsorbent materials, chromatographic approaches, and vapor-particle partitioning of high molecular weight organics are the topics discussed.

R. E. Van Grieken and J. J. LaBrecque contributed a review on trace analysis of environmental samples by X-ray emission spectroscopy. Topics include a comparison of X-ray emission analysis techniques, air and water pollution, and special solids such as fly ash.

J. R. Garbarino and H. E. Taylor discuss developments and applications of inductively coupled plasma emission spectroscopy to water analysis. Quantitation of the method and its application to the analysis of natural waters are the topics included.

S. Landsberger, R. E. Jervis, and S. Monaro review the trace analysis of wet atmospheric deposition by nuclear methods, which include neutron activation, proton-induced X-ray emission, and X-ray fluorescence. Theoretical considerations, experimental procedures, and interpretation of results are discussed.

Jack L. Lambert, *Kansas State University*

Cosmetic Analysis. Selected Methods and Techniques. Cosmetic Science and Technology Series. Volume 4. Edited by P. Boré (L'Oréal). Marcel Dekker Inc.: New York and Basel. 1985. xiii + 534 pp. $85.00. ISBN 0-8247-7113-3.

This book is the fourth in a series dealing with recent advances in the science of cosmetics. Previous volumes have dealt with preservatives, scientific and regulatory foundations, and psychological approaches to product testing. It is not organized according to the types of formulations or the chemical natures of ingredients. Instead the book consists of nine chapters dealing with selected procedures which may be applied to the analysis of these substances. Each analytical technique is illustrated, however, by its applicability to specific classes of compounds, which include polymers, antioxidants, oxides, quaternary ammonium salts, volatile components, preservatives, amino acids, proteins, and dyes. Almost half the book is devoted to analytical profiles (spectra and solubilities) of selected polymers which are frequently incorporated into cosmetics. The IR, ^{1}H NMR, and ^{13}C NMR spectra have been taken from the library of the L'Oréal Co. and were obtained from commercial samples which had not been purified. The first two chapters deal with nonseparative techniques (spectroscopy and voltammetry) and the remaining seven describe chromatographic techniques (GC, pyrolysis GC, high-performance TLC, ion-exchange chromatography, and HPLC). Each chapter is arranged in a consistent manner, giving a brief introduction which is followed by details of the instrumentation and methods of sample preparation. Analytical chemists working in this field should be familiar with the techniques described in this book, which cannot be considered as a comprehensive handbook on the analysis of cosmetics. However, it does contain a good deal of useful reference material such as the spectral library and the TLC data for the identification of preservatives. In addition, it will serve as a good introduction to those who are unfamilar with this field of analysis.

Christopher M. Riley, *University of Florida*

Molybdenum Enzymes. Edited by Thomas G. Spiro (Princeton University). John Wiley and Sons, Inc.: New York. 1985. x + 611 pp. $125. ISBN 0-471-88542-8.

This book is Volume 7 of the series "Metal Ions in Biology". As with the previous four volumes, one particular metal is singled out. This time it is molybdenum, the only second- or third-row transition metal so far found to have biological roles and (surprisingly to me) the most abundant transition metal in seawater. About half the book is devoted to nitrogenase and the remainder to the molybdenum redox enzymes that catalyze the transfer of oxygen atoms to and from substrates.

Chapter 1 (R. H. Holm and E. D. Simhon) deals with Mo/W/Fe-sulfur clusters, over 100 of which have been prepared since 1969. Their syntheses, structures, and reactions and their relevance to the native clusters found in nitrogenase are discussed. This chapter is followed by an account (E. I. Steifel and S. P. Cramer) of the isolation and properties of the FeMo cofactor of nitrogenase. Chapter 3 (P. J. Stephens) discusses the structures of the two components of nitrogenase, namely FeMo protein and Fe protein. One is impressed by the large number of spectroscopic methods used, but one awaits with great interest the X-ray structural determinations. An incisive account of the binding of nitrogenase with a wide variety of substrates, including dinitrogen, is contained in Chapter 4 (B. K. Burgess) while in Chapter 5, R. N. F. Thorneley and D. J. Lowe discuss the mechanistic aspects of nitrogenase, which have been developed with use of a variety of rapid reaction techniques in conjunction with classical steady-state analysis. The portion of the book devoted to nitrogenase concludes with Chapter 6 (M. Hidai) which delineates the preparation, characterization, and the reactions of dinitrogen complexes of transition metals.

There has been substantial progress in a short time in understanding the inorganic chemistry of molybdenum and this is detailed in Chapter 7 (C. D. Garner and S. Bristow). This is a useful survey of oxomolybdenum complexes and the ramifications for molybdoenzymes behavior. The chemistry and biology of the Mo cofactor is presented in Chapter 8 (S. P. Cramer and E. I. Steifel). Its structural characterization, which is the focus of this chapter, will be an important step in the overall understanding of molybdenum enzymes. Chapter 9 (R. Hille and V. Massey) deals with the hydroxylases, xanthine oxidase (mainly), aldehyde oxidase, and sulfite oxidase. I found this chapter particularly interesting since it covers all the aspects necessary for a complete understanding of enzyme activity—one of which, the kinetics, has sometimes been deemphasized. The final chapter (M. W. W. Adams and L. E. Mortenson) covers the reductases, specifically nitrate reductase and formate dehydrogenase. These enzymes have received much less attention than nitrogenase (perhaps understandably). Nevertheless, the reduction of nitrate (eventually to ammonia) is of great importance, since less than 1% of total nitrogen incorporated into organic material is via the fixation of dinitrogen by nitrogenase.

These chapters, written by active workers in the area, are uniformly very good, giving comprehensive information. There are a few minor errors, an amusing one being the oxomolyfdenum heading for pp 351–381. The book gives an excellent description of the state of molybdenum bioinorganic chemistry and is a "must" for workers in the field. The overall feeling the book engenders is that with all the scholarly researches, it is still not even definite that substrates bind at the molybdenum center in these enzymes and that we are still far off from an understanding of the catalysis by these molybdenum enzymes. This is both the present frustration and the future challenge.

Ralph G. Wilkins, *New Mexico State University*

Mass Spectrometry of Large Molecules. Edited by S. Facchetti. Elsevier Science Publishers: Amsterdam and New York. 1985. xii + 322 pp. $85.25. ISBN 0-444-42456-3.

This book contains the typescripts of 17 lectures given as a course of instruction for the Joint Research Centre of the European Community in September 1983. The emphasis is on biological macromolecules, such as peptides, although several of the chapters treat methods and principles independent of the scientific type of substrate, and two of the lectures are devoted to synthetic polymers and their oligomeric relatives. The aim of giving a thorough discourse on what has and can be done, and how best to do it, seems to have been met. Various aspects of instrumentation, sample handling, and data processing are taken up, and important applications are presented, even to such a specific degree as shown in a lecture "Mass spectrometric analysis of bile acids in neonatal liver diseases."

The typescript is pleasingly uniform, the illustrations and formulas are well-drawn, and the lists of references are substantial. A subject index is included, but it is regrettably short (only about 150 entries).

Advances in Chemistry Series No. 212. Historic Paper and Textile Materials: Conservation and Characterization. Edited by H. L. Needles and S. H. Zeronian. American Chemical Society: Washington, DC. 1986. xi + 462 pp. $94.95. ISBN 0-8412-0900-6.

The content of this book was "developed" from a symposium sponsored by the Cellulose, Paper, and Textile Division in 1984. Apart from the initial chapter, Charting the Future: Conservation Principles of Henry Francis du Pont, by M. A. Fikioris, the book consists essentially of reports of original research, grouped under three headings: Conservation and Degradation of Textiles; Characterization and Preservation of Textiles; and Conservation, Degradation, and Characterization of Paper. These subjects are obviously important to museums, but also to archivists. Furthermore, they are important to chemists, not only because chemistry is central to understanding and preventing deterioration but also because the pages of book and journals deteriorate, even if they are written for and used by chemists. Embrittlement of older journals is a serious threat to the chemical and most other literature printed after the middle of the nineteenth century, when wood-pulp paper sized with alum came into general use.

Spectrometric Techniques. Volume 4. Edited by George A. Vanasse (Air Force Geophysics Laboratory). Academic Press: Orlando, FL. 1985. xii + 262 pp. $75.50. ISBN 0-12-710404-6.

This volume includes three chapters: the first on coherent anti-Stokes Raman spectroscopy, by James J. Valentini (62 pp); the second on diffraction gratings and mountings for the vacuum ultraviolet spectral region, by W. R. Hunter (118 pp); and the third on mass spectrometric techniques, by Edmond Murad (71 pp). There is a combined 10-pp index.

The nature of the physical processes in CARS is discussed in 25 particularly clearly written pages, and the remainder of the chapter is devoted to instrumental design and applications. Combustion analysis properly occupies many of these latter pages, but time-resolved CARS, resonance CARS, and the study of biological molecules using the latter also receive emphasis. The latest reference is dated 1983.

The long chapter on VUV gratings and mountings is an astonishing compendium of theory and practical information on their preparation and construction. It is highly recommended as both a readable introduction and a collection of useful tips, not only for instruments for the vacuum ultraviolet but also to a lesser extent for other instruments as well. There are references dated 1984.

The mass spectrometry chapter is astonishingly condensed but still easy to read. The author spends 14 pages on ion sources, 12 pages on devices for mass analysis, 7 pages on detectors, and 24 pages on applications, three times as much on high-temperature mass spectrometry—admittedly a topic for which there is no recent readable introduction—as on analytical applications in organic chemistry and biochemistry. *De gustibus non est disputandum*! I was pleasantly surprised, though, to find an explanation of every ionization and analysis method I could think of in this short chapter, although field desorption was not specifically given that name. References through 1984 are quoted.

The first and last chapters, then, can be recommended to introduce their fields. With its wealth of practical information, the second chapter is a real jewel and deserves a special place in the laboratory for those in the field.

Maurice M. Bursey, *University of North Carolina at Chapel Hill*

Asymmetric Synthesis. Volume 5. Chiral Catalysis. Edited by J. D. Morrison (University of New Hampshire). Academic Press: Orlando, FL. 1985. xiv + 291 pp. $93.50. ISBN 0-12-507705-X.

This volume has 10 chapters of varying length and is the fifth and final volume of a series reviewing progress in asymmetric synthesis since 1971. The chapters are the following: 1. Chiral Ligands for Asymmetric Catalysis; 2. Asymmetric Catalytic Hydrogenation: Mechanism and Origin of Enantioselection; 3. The Applicability of Asymmetric Homogeneous Catalytic Hydrogenation; 4. Asymmetric Hydrosilylation and Hydrocarbonylation; 5. Asymmetric Coupling Reactions; 6. Asymmetric Catalytic Isomerization of Functionalized Olefins; 7. Synthetic Aspects and Applications of Asymmetric Epoxidation; 8. On the Mechanism of Asymmetric Epoxidation with Titanium–Tartrate Catalysts; 9. Enzymes as Chiral Catalysts; 10. Asymmetric Heterogeneous Catalytic Hydrogenation.

Chapter 3 contains an extremely useful Appendix containing 7 tables that list various types of olefins that have been hydrogenated in >50% ee and a last table that gives ligand structures along with their acronyms or numbers. Chapters 3 and 8 compliment each other in their coverage of homogeneous in comparison to heterogeneous hydrogenations.

Chapter 4 includes coverage on Asymmetric Hydrosilylation of Prochiral Carbonyl Compounds (ketones, keto esters, keto amides, and imines) and olefins.

Chapters 7 and 8, covering the Sharpless Asymmetric Epoxidation, contain a wealth of detail. These chapters would have been even more valuable if the footnotes to Unpublished results and Personal Communication had been expanded to include the experimental details of the results being referenced.

I found Chapter 9, Enzymes as Chiral Catalysts, of particular interest as an introduction in being able to choose between enzymatic and chemical methods for particular transformations. Subheadings include the following: Exploitation of Enantiomeric Specificity; Stereospecific Additions to Stereoheterotopic Faces; Distinctions of Stereoheterotopic Groups and Atoms; Stereospecific Transformations of Meso Compounds; Exploitation of Combinations of Enzyme Specificity and Multi-Enzyme Reactions.

This volume is a useful summary of the field of chiral catalysis in asymmetric synthesis with references extending into 1983. The individual chapter authors have compiled an impressive list of primary and secondary references in the field. As such, this book will be a valuable addition to a *library* collection with access to the primary journals.

Donald E. Butler, *Warner Lambert/Parke Davis Research*

Bioactive Polymer Systems—An Overview. Edited by C. G. Gebelein and C. E. Carraher, Jr. Plenum Press: New York. 1985. xxiv + 689 pp. $95.00. ISBN 0-306-41855-X.

This book contains a rather eclectic collection of 22 articles written by active workers in the various areas and related in some fashion, sometimes loosely, to the subject of the book title. Each article is meant to serve as an introduction to the field rather than an in-depth review for the already initiated or a collection of the author's private contributions. In general, references go through 1982 with occasional listings for 1983. This book succeeds admirably in what it sets out to do and a number of the articles are real treasures.

After prefatory articles defining "bioactive polymeric systems" and discussing biocompatibility, there are six articles on polymers as vehicles for controlled release of various types of substances, particularly pesticides, antifertility agents, plant growth regulators, animal repellents, and drug delivery systems with separate chapters devoted to hydrogels and biodegradable systems based on polypeptides. The subject is taken up again in a later chapter, particularly well done by Whitely, on drug delivery with protein and polypeptide carriers, showing how the vehicle can be more than simply a carrier but can participate in a *pas de deux* of efficacy conferring protection, selectivity, and transportation across barriers such as membranes—perhaps even the blood–brain barrier. Much more is attainable than sustained release—probably the original goal of binding drugs to polymers.

After chapters on affinity chromatography, radiation grafting in reagent insolubilization, and immobilization of enzymes come a series of articles on polymers as biologically active agents or as models for biological activity. A particularly rich chapter is that by Samanen on biomedical polypeptides as pharmaceutical agents. This chapter dwells on the types of peptide modifications possible, the types of behavior that can be affected and improved, the classes of peptides of biological interest and medicinal potential, and the directions of future research including a detailed discussion of the blood brain barrier. This chapter contains many tables of biologically interesting peptide analogues and 350 references. It is clearly of interest to peptide chemists but may be hidden from their view by the book title. Other chapters in this series include one on the biomedical uses of polysaccharides, interferon inducers, synthetic nucleic acid analogues with nonsugar backbones, bioactive carboxylic anions, a description of the activity of (*cis*-dichlorodiamine)platinum(II) against malignancies, and the potential of polymeric platinum carriers, iron-complexing bioactive polymers, and medicinal uses of metal-containing polymers.

Two other chapters deserve special mention. One is that by Imanishi on enzyme-mimicking polymers. This article focuses on work published since 1978, much of it by Japanese workers. It dissects the factors involved in polymer catalysis, giving many examples of not only rate enhancements but improved regioselectivity and stereospecificity. Also discussed are cyclodextrins and crown ethers as enzyme mimics as well as micelles and organized molecular arrays such as membranes, vesicles, and liquid crystals. Much in the article may not be considered to fall in the areas of polymeric catalysts as such and may therefore be obscured. The article has 288 references. The other is entitled Polymeric Antitumor Agents on a Molecular and Cellular Level by Dorn, Hoerpel, and Ringsdorf. It is less a treatise on cancer chemotherapy but rather a review of the use of natural mechanisms of cell transport and knowledge of metabolic activation of drugs to make creative drug–polymer attachments. There follows a detailed discussion on polymerizable lipids forming stable membranes and liposomes and initial thrusts at forming potential tumor cell scavengers.

This book will be a rich source for people interested in starting research at the polymer–medicine interface and would provide the basis for interesting graduate level courses for polymer scientists.

Toby M. Chapman, *University of Pittsburgh*

Biophysics and Biochemistry at Low Temperatures. By F. Franks (University of Cambridge). Cambridge University Press: Cambridge and New York. 1985. x + 210 pp. $44.50. ISBN 0-521-26320-4.

This book presents an overview of the complex topic of cryobiology. It will appeal to those chemists, biologists, physicists, and engineers who would like a short, but thoughtful, introduction to the subject. The interdisciplinary nature of the material can be appreciated from a listing of the chapters presented: 1. Water, temperature and life; 2. The physics of water at subzero temperatures; 3. Physical chemistry of aqueous solutions at subzero temperatures; 4. Cryobiochemistry—responses of proteins to suboptimal temperatures; 5. The single cell: responses to chill and freezing; 6. Freeze avoidance in living organisms; 7. Freeze tolerance in living organisms; 8. Cryobiology: the laboratory preservation of cells, tissues and organs; 9. The technology of metastable water; and 10. Matters arising. The book includes a list of key references that will provide an entree into the vast literature in these areas.

Because of the broad range of subjects covered, and the shortness of the text, this is not a book to be purchased for reference purposes. Instead, it provides a thought-provoking view of our understanding of such fundamental processes as ice nucleation, biological antifreezes, cold hardening mechanisms in plants, freeze avoidance and freeze tolerance mechanisms in a variety of organisms, and the basics of cryopreservation of biological structures, to name a few. A major audience for the book will probably be students who want an overview of these important and interesting topics. For the latter reason the book would be a valuable addition to libraries.

Ray Fall, *University of Colorado*

Fourier Transform N.M.R. Spectroscopy. Second Edition. By Derek Shaw (IGE Medical Systems Ltd.). Elsevier Science Publishers: Amsterdam and New York. 1984. xii + 304 pp. $75.00. ISBN 0-444-42285-4.

This book is the second edition of a book first published in 1976. The new edition includes a limited discussion of new multipulse sequences that have evolved during the last 5–10 years (e.g., INEPT, DEPT, etc.), (Chapter 5). Also, multidimensional NMR is now included in Chapter 10, as well as imaging methods. The strong point of this book is the chapters on the basic Fourier-transform NMR experiment, excitation methods, and instrumentation (Chapters 3–6). Especially interesting is the discussion on Fourier pairs, convolutions, cross-correlation, and auto-correlation in Chapter 3.

This book is well-written and contains only a few typographical errors. However, a limitation of the book is the rather limited description of the various new pulse sequences that are now in common usage. Perhaps a complete density matrix formalism is beyond the scope of this book; however, even a vector-model description of the simplest spectral editing sequences would have been appreciated in Chapters 5 and 10.

Overall, the book is excellent for individuals desiring an elementary introduction to Fourier transform NMR spectroscopy and contains many valuable references.

H. C. Dorn, *Virginia Polytechnic University*

Americium and Curium Chemistry and Technology. Edited by N. M. Edelstein (Lawrence Berkeley Laboratory), J. Navratil (Rockwell International), and W. W. Schulz (Rockwell Hanford Laboratory). D. Reidel Publishing Co.: Dordrecht, Holland. 1985. vii + 339 pp. Cloth $44.50. ISBN 90-277-2097-5.

This book is a compendium of papers from the symposium held at the International Chemical Congress in Honolulu, Hawaii, December 1984. The history of the discovery and characterization of the nuclear and chemical properties of Am and Cm is covered, beginning with an interesting account by Seaborg of their original discovery in 1944. Other aspects of the early history are given in fascinating detail by Ghiorso, Penneman, Müller, and Keller. The solution and analytical chemistry of these elements is well covered by several authors with extensive reference lists, including the solution chemistry, coulometric, radiopolarographic, and titration methods for Am and investigations on the stability of Am(V) and Am(VI) in nitrate media. The electronic structure, thermodynamics, and optical spectroscopy of Am and Cm in various oxidation states are covered in several chapters, as well as the preparation and properties of many chemical compounds. Heavy ion reactions producing isotopes of Cf, No, and Es from Cm targets and the use of ^{248}Cm targets in attempts of make superheavy elements are described. The synthesis of nuclides of Fm, Cf, Cm, Np, U, Th, Ac, and Ra with ^{16}O beams on ^{238}U targets is the topic of another chapter. Another contribution describes the production of U, Pu, Am, and Cm nuclides by multiple neutron capture in a high flux reactor from UO_2 and ^{241}Am targets, followed by solvent extractions and ion-exchange radiochemical separations, respectively, and of short-lived $^{243-246}$Bk tracers by α-particle bombardment of ^{241}Am or ^{243}Am targets, followed by solvent extraction chemistry. Stability constants for certain chloro and bromo complexes of lanthanoid and actinoid elements were studied and compared. Other papers discuss geochemical studies of Am and Pu in soil, including effects of environmental leaching which appears to mobilize Am much more easily than Pu. The production and recovery of pure ^{241}Am from β^- decay of reactor-produced ^{241}Pu in multigram quantities is reported, as well as production of multigram amounts of ^{243}Am and ^{244}Cm. Processing into Am metal is discussed.

Extensive reference lists to prior work are given in almost all of the papers. In spite of the fact that the cloth cover was bound upside down and backwards in the review copy, this book is a valuable and essential addition to the library of those working with Am, Cm, and transuranium radiochemistry.

R. W. Fink, *Georgia Tech*

Oxidation and Reduction in Inorganic and Analytical Chemistry. By Alan Vincent (Kingston Polytechnic). John Wiley & Sons: New York. 1985. x + 83 pp. $16.95. ISBN 0-471-90698-0.

This small text is designed for programmed learning and review, at the mid-undergraduate college level, of oxidation and reduction concepts which are often a trial for students. It should be a useful review for students preparing to enter graduate school, especially if part of a series of books, or computer discs, with similar focused goals. The programs of the text nicely develop applications to analytical problems, simple thermodynamics, and oxidation diagrams of elements but do not reach the level of Eh-pH diagrams. The book starts at a very basic level with regard to redox concepts but at the same time expects the student to have a working knowledge of the electronegativity and electronic structure of the main group elements, a basic understanding of the mole concept, and the relationship between free energy and an equilibrium constant.

The flavor of the Queen's English is very apparent in the book and is distracting. There is a supplemental computer disc available to give more needed practice for the advanced topic of the text; however, it is formatted for BBC (British Broadcasting Corp.) model B microcomputer, and its compatibility to common U.S. personal computers is questionable.

Richard D. Geer, *Montana State University*

Fundamental Transition Metal Organometallic Chemistry. By Charles M. Lukehart (Vanderbilt University). Brooks/Cole Publishers: Monterey, CA. 1985. xiv + 447 pp. $28.00. ISBN 0-534-03801-8.

This book is meant to serve as a text book for an upper-level undergraduate or graduate course in transition metal organometallic chemistry. The text is organized in a manner similar to the functional group approach commonly encountered in undergraduate organic chemistry text books. Thus, after an initial chapter on the historical perspectives and fundamental concepts, the student is introduced to the syntheses and structures of important classes of organometallic compounds, including binary metal carbonyls and related derivatives, the cyclopentadienyl complexes, other complexes containing small molecules, and complexes containing hydride, alkyl, and acyl ligands. Chapter seven introduces the student to the dynamics of fluxional behavior of a number of well-studied mono-, bi-, and polynuclear complexes. The fundamental reactions of organometallic chemistry are described in Chapters 9–11. The second part of the text describes the applications of transition metal organometallic complexes in organic syntheses and homogeneous catalysis. A set of problems is found at the end of each chapter although no solutions or literature references are presented. There is, however, a list of further additional readings (primarily review articles) given at the end of each chapter. The index is quite extensive. Additional useful features are a list of abbreviations and an index of structural data. Overall, the text very nicely satisfies the current need for an advanced undergraduate text on organometallic chemistry.

Warren P. Giering, *Boston University*

Progress in Nuclear Magnetic Resonance Spectroscopy. Volume 16. Edited by J. W. Emsley (The University, Southampton), J. Feeney (National Institute for Medical Research, London), and L. H. Sutcliffe (The University, Liverpool). Pergamon Press: New York. 1985. v + 381 pp. $138.00. ISBN 0-08-033238-2.

Seven articles received between August 1982 and March 1984 are contained in this number of the series. The first article, Non-Biological Aspects of Phosphorus-31 NMR Spectroscopy, by D. G. Gorenstein (University of Illinois at Chicago), begins with a brief discussion of phosphorus shifts and spin couplings. The majority of the article, however, is the extensive compilation of phosphorus-31 data found in a 60-pp appendix, which contains citations covering the period December 1969–June 1982. Neither biomolecules nor metal complexes are included because both had been reviewed recently elsewhere. In a very brief second article, Practical Aspects of Tritium Magnetic Resonance, by J. P. Bloxsidge and J. A. Elvidge (University of Surrey), the authors describe tritium (the most sensitive nucleus) NMR as the method of choice for determining the extent and specificity of labeling reactions, particularly when exchange reactions could invalidate the results of standard degradation and counting procedures. Measurement of J_{HT} permits accurate calculation of inaccessible values of J_{HH}. Radiological safety precautions required are relatively minor. The Problem of Intramolecular Rotation in Liquids and Nuclear Magnetic Resonance, by H. G. Hertz (Karlsruhe), compares and contrasts translational and rotational motions. It is noted that since each vector will have a different time dependence, there is no single "rotational diffusion coefficient". Separation of effects on relaxation due to internal rotation from those of intermolecular processes is attempted, and the results are compared with data from experiments which use variable temperature to vary the correlation times.

Product Operator Formalism for the Description of NMR Pulse Experiments, by O. W. Sorensen, G. W. Eich, M. H. Levitt, G. Bodenhausen, and R. R. Ernst (ETH, Zurich), describes multiple pulse and multiple quantum coherence experiments using the title formalism. This is said to provide a middle course between the semiclassical vector models which are difficult to apply to these cases and the complete density matrix approach which, although capable of describing any "arbitrarily complex" pulse experiment, often does so with loss of intuitive physical understanding. Nonetheless, the article will not be light reading for the nonmathematically inclined. Carbon-13 Chemical Shift Anisotropy, by W. S. Veeman (Laboratory of Molecular Spectroscopy, Nijmegen), discusses the different high resolution techniques by which shielding tensors in solids can be determined. These include the standard one, shift measured as a function of rotation angle for a single crystal, as well as powder patterns for noncrystalline samples, measurement of sideband intensities in magic angle spinning experiments, and two-dimensional NMR of powders. An extensive collection of data classified by functional group is presented in tables.

Nuclear Magnetic Resonance Studies of Zeolites, by J. Klinowski (Cambridge), discusses primarily silicon-29 resonance, although aluminum-27 is included as well. The article begins with an introduction to the structures and nomenclature of these hydrated, porous aluminosilicates which find such varied uses as catalysts, sorbents, and ion exchangers. Data from magic angle spinning experiments are presented which show that the silicon chemical shifts fall into ranges which depend on the degree of condensation, i.e., the number (0–4) of silicon atoms linked by oxygen bridges to a central silicon. Similarly, differing shifts are found depending upon the number of aluminum atoms bridged to the central silicon and spectra differ with the Si/Al ratio. Numerous data are summarized. Studies of zeolite acidity by proton NMR and NMR of exchangeable cations such as thallium are included. Multipulse NMR in Liquids, by C. J. Turner (Columbia), reviews multiple pulse methods applied to isotropic liquids but excludes techniques which require double Fourier transforms and those which employ broadband excitation. Since no previous review has included all "1D" pulse methods, the author intends to cover the most simple to the most complex currently available. Pulse sequences which provide resolution enhancement, selective suppression (frequently of solvent resonance), sensitivity enhancement (numerous polarization transfer techniques, but largely proton to carbon), spectral editing, and information on connectivity are discussed.

This volume is, in contrast to Volume 15, type set and attractively produced. It will certainly be of interest to libraries, and while single articles will be of interest to scientists in many different fields, it seems that the subjects are sufficiently diverse that few individuals will find the book a cost effective investment.

Wilson M. Gulick, Jr., *Michigan Technological University*

Advances in Protein Chemistry. Volume 37. Edited by C. B. Anfinsen, John T. Edsall, and Frederic M. Richards. Academic Press Inc.: Orlando, FL. 1985. 374 pp. $49.00/£43.00. ISBN 0-12-034237-5.

This volume represents the continuing annual edition of review articles contributed by leading researchers in the area of protein chemistry, describing the many significant advances made in this expanding field. The four articles of the 1985 addition to the series deal with the nature of polypeptide chain bends in proteins and peptides, the resonance Raman spectroscopy of the heme group pertaining to the structure and dynamics of heme proteins, the many advances made in the past two decades on the structure and biochemistry of the important plasma protein serum albumin, and the description and chemistry of posttranslational modification of proteins which are brought about without the participation of enzymes.

In the first article, George D. Rose, Lila M. Gierasch, and John A. Smith examine the various facets of structure, stability, and function of turns in peptides and proteins. Turns are usually confined to the solvent-accessible surface areas of proteins, comprised of polar and hydrogen-bonding interactions between key C=O and NH groups of neighboring amino acid residues whose location in the polypeptide chain sequences can be predicted with some confidence from the energy minima of calculated hydrophobocity profiles. The α-, β-, and γ-type turns also play an important role in stabilizing the biologically active conformation of cyclic peptides. The authors present a detailed description, identification, and method of prediction of turns, together with a coherent picture of their role in protein and polypeptide chain folding.

Thomas G. Spiro presents a comprehensive overview of the nature of heme resonance Raman spectra and the sort of information the spectral perturbations, ligation, and changes in oxidation state of the central atom can provide. The high-frequency region of the resonance Raman spectrum contains spectral bands which have been assigned to the peripheral substituents of the porphyrin ring, while certain bands in the low-frequency region have been associated with vibrations of the axial ligand. Hence, the background has been established for valuable detailed spectroscopic information regarding the structural and electronic changes which accompany the binding and transport of oxygen and electrons in the heme-associated proteins. The recent literature and the work from the authors laboratory on model systems and some of the important heme protein such as cytochrome oxidase, cytochrome *c*, hemoglobin, and myoglobin are reviewed in this second article of the volume.

Serum albumin is the principal protein of blood plasma (5–8 g/100 mL and 32 to 60% of the total circulating plasma proteins of mammalian sera) charged with the transport and scavanging of sparingly soluble metabolic products such as fatty acids, hematin, bilirubin, etc. Theodore Peters, Jr., reviews the progress of the past two decades made on serum albumin, in the third review article. The multidomain character of this protein has been initially postulated by the late Joseph F. Foster and Weber and co-workers based primarily on titratioon and limited proteolysis studies. The sequence and model studies of Brown and Meloun and co-workers and McLachlan and Walker in the 1970's have led to the three-domain structure on which much of the modeling and thinking about the binding properties of this protein are based. Despite the fact that this protein was one of the earliest to be crystallized in the 1940's by Cohn and co-workers, as pointed out by the author "albumin has relinquished few of its secrets through X-ray crystallography to date."

In the final article, John J. Harding describes many of the covalent changes and reactions of proteins and enzymes in body fluids and body tissue which proceeds without the help of enzymes. Many of these reactions such as the correct cross-link formation among disulfide groups in a variety of extracellular proteins such as insulin, serum albumin, γ-globulin, the reaction involved in the binding and release of retinal in the visual process, the cross-linking reactions in the formation of functional collagen in tendon, connective tissue, etc., represent but a few of the essential nonenzymic life reactions. Many other reactions discussed by the author, such as the glycoslation of various tissues, red blood cells in diabetes, carbamylation in kidney failure, and reactions with drugs and their metabolic products are thought to be deleterious to the body. Among the different topics reviewed, the author also discusses the sort of biological defense the human body marshalls against these potentially harmful reactions.

The four articles of this volume provide authoritative coverage of the selected topics, current in protein research. This volume represents a useful addition to the ongoing series of the "Advances".

Theodore T. Herskovits, *Fordham University*

Pharmacokinetics of Cardiovascular, Central Nervous System, and Antimicrobial Drugs. By P. G. Welling (Warner-Lambert/Parke-Davis) and F. L. S. Tse (Sandoz Research Institute). The Royal Society of Chemistry: London. 1985. 462 pp. £39.00 ($71.00). ISBN 0-85186-937-8. Available from ACS, Washington.

This book deals exclusively with the pharmacokinetics of three major classes of drugs presented in three main sections: (1) Cardiovascular Drugs, 175 pp; (2) Drugs Acting on the Central Nervous System (CNS), 110 pp; and (3) Antimicrobial Agents, 170 pp. It is born out of a series of five review articles on the subject of drug kinetics written by P. G. Welling for The Chemical Society, London, during the years 1972–1980. The literature coverage extends through 1982 in the present text and represents a total of 13 years of more recent research on pharmacokinetic studies of drugs in three major therapeutic areas that have undergone dramatic changes during these years.

No attempt is made to provide an exhaustive coverage of the huge volume of literature that has been generated on the pharmacokinetics of cardiovascular, CNS, and antimicrobial agents; however, the selective reviewing describes the important trends in the pharmacokinetic and biopharmaceutic studies of these three drug classes. The multifactorial, qualitative, and quantitative aspects of drug absorption, distribution, metabolism, and excretion for a wide spectrum of drugs that are in clinical use are discussed, including a considerable quantity of data derived from normal and disease state studies on human subjects. The numerous graphical representations facilitate rapid retrieval and assessment of kinetic data.

There is a total of 2414 primary references to original research published in refereed journals, each section containing its own references at the end of the section. It is a valuable and reliable reference text to pharmacists, pharmacologists, and clinicians alike.

There is a short compound index at the end, although the book would benefit from a more comprehensive subject index as well as an author index.

Pankaja K. Kadaba, *University of Kentucky*

Stereochemistry of Heterogeneous Metal Catalysis. By M. Bartok, J. Czombos, K. Felfoldi, L. Gera, Gy. Gondos, A. Molnar, F. Notheisz, I. Palinko, Gy. Wittmann, and A. G. Zsigmond (Jozsef Attila University). John Wiley & Sons: New York. 1985. xxiv + 632 pp. $132.00. ISBN 0471-90553-4.

This remarkable compilation is the only book yet published dedicated to all stereochemical aspects of heterogeneous metal catalysis, and yet it covers much more than one usually envisions as stereochemistry. Its chapters are organized by compound type: Alkanes, Cycloalkanes, Olefins, Alkynes, Aromatic Compounds, Alcohols and Diols, Carbonyl Compounds, Nitrogen Containing Compounds, Oxygen-Containing Cyclic Compounds, Nitrogen-Containing Cyclic Compounds, Enantioselective Hydrogenation on Modified Metals, and Miscellaneous. References are listed at the end of each chapter, totaling over 3000. A complete subject index and very usable author index are presented.

Although written for the organic chemist, this book will be of great use to all interested in catalysis of organic compounds. Its depth and breadth are impressive. As an example the chapter on Olefins deals with direct instrumental methods of observing adsorbed species, isomerization, isotope exchange, hydrogenation of open-chained, cyclic, substituted cyclic, unsaturated cycloalkanones, dienes and polymers, fused bicyclics, bridged bicyclics, tricyclics, and stereoids, as well as deuteration, epoxidation, vinyl substitution,and ring contraction.

Well written and error free, this book might even serve as a text for advanced courses in organic or physical chemistry. Its organization allows ease in use as a reference book. It is strongly recommended to both industrial and academic chemists involved in the study of organic compounds on metal surfaces, in synthesis, and in stereochemical manipulations.

Kenneth J. Klabunde, *Kansas State University*

Molecular Thermodynamics of Fluid-Phase Equilibria. Second Edition. By J. M. Prausnitz (University of California), R. N. Lichtenthaler (University of Heodelberg), and E. G. de Azevedo (Technical University of Lisbon). Prentice-Hall Inc.: Englewood Cliffs, NJ. 1986. xiii + 600 pp. $44.95. ISBN 0-13-599564-7.

This book is the second edition of an earlier book published in 1969. As before, it bears the trademark of a clear writing style and covers many practical applications. It is an updated book on solution thermodynamics and should be of interest to applied chemists.

For readers familiar with the first edition, revisions come essentially in Chapters 4, 6, 7, 8, and 10 and in the appendices. New materials such as the nonrandom two-liquid (NRTL) and UNIQUAC methods for calculating activity coefficients are presented. In addition, the discussions of high-pressure phase equilibria now include the six types of phase diagrams for binary mixtures. The hard-sphere equation of state is introduced and is modified for use in the perturbed hard-chain equation. The appendices contain new descriptions of ensemble statistical mechanics and the perturbation theory of liquids.

These new developments reflect the ongoing interchange between molecular theories and engineering methods for property prediction. This book succeeds in making molecular arguments useful in practical applications. However, this book is not meant to be a text on statistical mechanics. The viewpoint is firmly based on engineering application. For example, the molecular distribution functions are not used. Therefore major parts of molecular theory, such as integral equations, structure factors, and techniques of computer simulation are not found. In their place, one finds answers to questions on equations and procedures to use in order to make phase equilibrium calculations. The methodology is usually laid out with fundamental thermodynamics and buttressed with molecular arguments.

The book discusses current methods of calculation in the chemical process industry. The substances treated include hydrocarbons and polar fluids that are encountered in these chemical processes, such as acids, ketones, and alcohols. Polymer solutions are discussed in the context of the Flory-Huggins approach. The chapters are grouped according to gas mixtures, liquid mixtures, and gas-liquid and liquid-solid systems. First the necessary thermodynamic relations are introduced. Next, expressions are derived based on simple equations of state to illustrate the use of the thermodynamic relations. The virial coefficients (second and third) and the fugacity coefficients are discussed. For liquid mixtures, the activity coefficient models due to van Laar, Margules, Wohl, Wilson, NRTL, and UNIQUAC are presented. There is a fine discussion on the Scatchard-Hildebrand solubility theory whereby a connection is made with the van Laar and van der Waals equations. Corresponding states and the lattice gas theories are then presented. Gas solubility in liquids is treated essentially in terms of the Henry's law constant. Solubility of solids in liquids is analyzed in terms of the solubility parameters. High-pressure phase equilibria contain a brief discussion of the topical subject of supercritical solvent extraction using the Redlich-Kwong equation as an example. The applications illustrating the methods are presented in many tables and figures.

There are many homework problems, although there are few worked out examples. The text could serve as an introduction to the subject of thermodynamics of solutions. Thus it is suitable for a special senior or graduate thermodynamics course. Due to its coverage of useful methods, the book could also be used for self-study by practicing chemists and engineers. Among similar books on solution thermodynamics, this book should be highly valued for its clarity of presentation and grasp of materials. As mentioned in their preface, we hope that the enthusiasm the authors hold toward the subject will prove contagious to the readers.

Lloyd L. Lee, *University of Oklahoma*

New Journal

Journal of Analytical Atomic Spectrometry. Volume 1. No. 1, February 1986. Edited by J. M. Ottaway. 96 + 28 + vi pp. Reports of original research and reviews. Bimonthly. £319.00 per year.

Books on Applied Subjects

The Manufacture of Soaps, Other Detergents and Glycerine. By Edgar Woolatt. Ellis Horwood: Chichester. Distributed by John Wiley & Sons: New York. 1985. 473 pp. $125.00. ISBN 0470-29234-3.

This book is "intended for students, both inside and outside the soaps", according to the author. It is concerned mostly with manufacturing and equipment, but it also touches on economics, analysis, properties of ingredients, and the theory of detergency.

Second European Conference on Coal Liquid Mixtures. The Institution of Chemical Engineers Symposium Series No. 95. The Institution of Chemical Engineers: Rugby, England. 1985. iv + 426 pp. $42.00. ISBN 0-08-031446-5.

The typescript proceedings of a conference, with sections on slurry fuels, combustion equipment, heat transfer, economics, and international aspects.

Plywood and Adhesive Technology. By Terry Sellers, Jr. Marcel Dekker: New York. 680 pp. $99.75. ISBN 0-8247-7407-8.

Eleven of the 26 chapters are devoted to resin-adhesives and the technology of their use and testing.

Handbook of Petroleum Refining Processes. Edited by Robert A. Meyers. McGraw-Hill: New York. 1985. 528 pp. $59.50. ISBN 0-07-041763-6.

Comprised of sections on alkylation and polymerization, cracking, catalytic re-forming, isomerization, hydrotreating, visbreaking and coating, separation processes, sweetening, aromatic complexes, and gasification, for each of which the technology, pollution control, and economic aspects are treated.

Industrial Adhesion Problems. Edited by D. M. Brewis and D. Briggs. John Wiley & Sons: New York. 1985. xxii + 298 pp. $85.00. ISBN 0-471-84005-X.

The first chapter reviews the fundamentals of adhesion, the second is devoted to analytical techniques used to investigate adhesive joints, and the third is concerned with the thermodynamics and surface science of adhesion. The remaining chapters cover types of adhesives and types of materials to be joined. The subject is interpreted broadly enough to include coatings, printing inks, and problems in the aircraft industry (when and why does an airplane become unglued?). Well indexed.