Book Reviews*

Chimie Organique Expérimentale. By M. Blanchard-Desce, B. Fosset, F. Guyot, L. Jullien, and S. Palacin. Hermann: Paris. 1987. xi + 408 pp. 260 F. ISBN 2-7056-6063-1.

This organic laboratory textbook contains 120 short experiments classified according to functional groups. The first chapter is an introduction to apparatus, elementary techniques, and safety. Each experiment includes the following: (1) a section on practical aspects of the experiments (material, reagent, safety, time required), (2) an experimental procedure, (3) a thorough discussion of the theory involved, and (4) one or two references to the literature. The discussion sections always propose reaction mechanisms and are intended to familiarize the student with the basic principles underlying the reactions. Most of the experiments are intended for periods of 3 h or less, and several experiments can be combined to design multi-step synthesis or longer sequences of closely related reactions.

This text places a strong emphasis on safety, including frequent hazard warnings and precautions. However, a few experiments are unsafe in the hands of undergraduate students. It is disturbing to find the synthesis of a carcinogenic nitrosamine or the preparation of explosive heavy metals acetylides in an elementary laboratory textbook. Another minor weakness of the book concerns instrumental methods. There is no theoretical section on spectroscopy or chromatography and there is little emphasis on these techniques in the experiments.

This book is a useful laboratory manual; the text contains a wide range of interesting experiments. However, I recommend to instructors who will use it to provide complementary sources for spectroscopy and chromatography.

Robert Chênevert, *Laval University*

Methods of Protein Microcharacterization. A Practical Handbook. Edited by John E. Shively. Humana Press: Clifton, NJ. 1986. xix + 456 pages. $64.50. ISBN 0-89603-090-3.

This is a state-of-the-art handbook describing methods of isolating and sequencing very small quantities of proteins. The book is divided into sections concerned with Microisolation Techniques, Microamino Acid Analysis, Amino Terminal Analysis, Carboxyl-Terminal Analysis, and Mass Spectrometric Analysis of Polypeptides. The text is well-written, easy to read, and could serve as a laboratory manual. Each chapter is written by experts in the field and is organized into sections on materials, instrumentation, and detailed protocol, and it concludes with several examples of the method applied to various protein systems.

The section of Microisolation describes microsequencing in the 20-pmol range, peptide mapping by HPLC, and elution of proteins from polyacrylamide gels with 50–90% recovery from microgram quantities.

New techniques of amino acid analysis applied to picomole quantities of proteins include derivatization of amino acids with fluorescamine as they elute from the column and precolumn derivatization with *o*-phthaldialdehyde followed by separation by HPLC. The latter technique can be completed within 30 min.

The section dealing with amino terminal analysis discusses new advances in manual Edman degradation including the use of HPLC to decrease the cycle time. Methods for the automated Edman degradation have been improved so that sample requirements have been reduced from 100 to 1 nmol. Other methods described include the gas-phase sequencer, the multi-purpose sequencer, and solid-phase methods of microsequencing that allow characterization in the 50–100 pmol range. There are also chapters on PTH–amino acid analysis using HPLC and on the preparation of chemicals necessary for Edman methods.

Methods of carboxyl terminal analysis described include enzymatic and chemical ones. Each chapter describes procedures used for digestion and detection and includes examples.

The last section deals with mass spectrometric analysis of proteins and includes chapters on GCMS, FAB, and SIMS methods. Both dipeptide and oligopeptide analysis by GCMS are described giving details on digestion, conversion to volatile derivatives, analysis, and sequence alignment. FAB and SIMS methods are described for analysis of nonderivatized larger molecules up to 4000 daltons. The author discusses instrumentation, methods of sample preparation, and strategies that can be used for sequencing.

The methods in this book are those developed in the last 5 years. Areas of ongoing research are listed at the back of the book including fluorescent Edman reagents that will increase sensitivity 10- to 100-fold, micro-carboxyl terminal analysis techniques, increased use of FAB/MS analysis, improvements in amino acid analysis, improvements in protein purification by HPLC, developments in the sub-nanomole range of solid-phase Edman chemistry, and coupling of isolation techniques to microsequence analysis techniques.

In conclusion, this text serves as a manual for chemists and biochemists desiring to either purify or sequence micro quantities of a protein or peptide of interest. There is sufficient detail to allow one to proceed with a protocol and to develop the instrumentation required. But there is not so much detail that one loses sight of the goal of the particular technique. This book would be highly recommended for the laboratory that is characterizing proteins that are available in only small amounts.

Elizabeth Holbrook and Sung-Hou Kim, *University of California*

Proteins and Enzymes. By J. Ellis Bell and Evelyn T. Bell (University of Rochester). Prentice-Hall, Inc.: Englewood Cliffs, New Jersey. 1988. XII + 499 pp. $49.00. ISBN 0-13-731647-X.

The principles of protein structure and function have been a continuing challenge of the biochemist and require the use of experimental tools derived from organic and physical chemistry, X-ray crystallography, microbial genetics, and the newer recombinant-DNA and protein-engineering approaches. *Proteins and Enzymes* reviews many of these subjects and focuses attention on how these may contribute to an understanding of the mechanism of protein action.

Bell and Bell divide the text into four major sections: chemical methods of protein modification; physical measurements; the four levels of protein structure; and finally, enzyme kinetics. Although these subjects form the basis of the subject of protein chemistry, each topic could not be treated exhaustively or even equally. Instead the authors selected subjects of current interest and emphasized experimental procedures that are commonly used.

The text begins with a short review of protein purification, protein determination, amino acid analysis, and enzyme activity. The next chapter on protein purification covers the familiar and acceptable methods and also the newer techniques of hydrophobic chromatography, chromatofocusing, and affinity chromatography. The section on molecular weight determinations reviews basic concepts and then describes the most useful methodologies. Considering current usage of SDS-gels and gel filtration, the description of sedimentation methods (5 pages) is excessive.

The reviewer found the chemical methods of protein cleavage, modification, and cross-linking to have several deficiencies. The chemical structures and equations shown in the figures are poorly presented and sometimes difficult to follow. The purification of peptides using counter-current methods (pages 95 and 96) is seldom used because the machines to perform a large number of transfers must now be made by the investigator. It is unfortunate that the authors did not summarize the rates of reaction of different alkylating reagents and the effect of pH on their reactivities with different functional groups. It is difficult for the reader to appreciate the conditions of the reactions and to make the necessary choices. The cross-linking reagents are covered in more detail than is necessary since the methodology gives less useful information than that derived from X-ray diffraction studies. Sequence analysis of proteins and of genes is presented with appropriate examples. Post-translational changes of proteins are mentioned and how these must be identified from the amino acid sequence of proteins.

The structure–function relationships are covered in chapters on chemical modifications, physical measurements, and X-ray diffraction analyses. Specific examples for a number of proteins are given with residue numbers of important amino acids designated, but it is difficult to appreciate the information in the absence of diagrams depicting the three-dimensional structure. A few added diagrams or partial arrangements of residues at active sites or ligand binding regions would improve the descriptions.

The nine final chapters cover enzyme kinetics. The theme presented is the classical kinetic approach to the study of mechanism and control of enzyme-catalyzed reactions. Then the authors continue with rapid kinetics, isotope use, and allosteric models. A reasonable question is: "Should *Proteins and Enzymes* emphasize kinetics to this extent when X-ray studies of enzymes gives us our greatest insight into the mechanism of action of protein molecules?"

Finally, it is clear that *Proteins and Enzymes* will be a useful addition to the current library of books on protein chemistry. It can be used as a text for students with a background in basic biochemistry. It will serve

*Unsigned book reviews are by the Book Review Editor.

as a reference text for the research community who require descriptions of specific topics of protein chemistry. Unfortunately, the book lacks a bibliography and this is a very serious omission. A book dealing with methodologies must provide citations to enable a competent student and researcher to examine details, data, and the conclusions reached in order to apply a procedure correctly to a new problem.

Albert Light, *Purdue University*

Experimental Techniques in High-Pressure Research. By W. F. Sherman and A. A. Stadtmuller (King's College, London). John Wiley & Sons, Ltd.: Chichester and New York. 1987. x + 471 pp. $126.00. ISBN 0-471-10313-6.

This book provides an introduction to high-pressure technology, including the physics, metallurgy, and materials science that have brought us to the point where ~280 GPA pressures (~2.8×10^6 atm) can be routinely generated in small volumes with diamond-anvil cells. Details of materials selection and anvil design cover the early work of P. W. Bridgman, the belt design of H. T. Hall, the massive-support and multistaging of Drickamer, as well as the tetrahedral, octahedral, cubic, and spherical high-pressure enclosures. There is an excellent chapter on pressure-transmitting media and an extensive discussion of hydrostatic pressure devices and seals which facilitate the use of windows, electrical and thermocouple lead-throughs, tubing, and values in high-pressure systems.

Various pressure-calibrating techniques are discussed, including mechanical and strain gauges, electrical and optical transitions, and classical fixed points. The Ruby R_1 fluorescence band is the most widely used scale for static high-pressure work.

More than one-third of the book is devoted to high-pressure optical studies and the coverage is excellent—back-scatter Raman spectroscopy, two-window transmission cells for UV/VIS/IR spectroscopy, three- and four-window cells, and the widely used diamond-anvil cells for X-ray, UV/VIS/IR, and Raman spectroscopy. High-pressure studies have explored all of the electromagnetic spectrum except the vacuum ultraviolet.

Finally, the book includes a chapter devoted to laboratory safety which is very important. Imperfections in designs, materials failure, and the general recognition of responsibility of the researcher for the safety of those in his laboratory are discussed. Safety enclosures are needed to protect workers from liquid or gas jets, solid shrapnel, and toxic materials.

This is an excellent summary of the current state of high-pressure technology. Although the price is high, I recommend it to all practitioners of the high-pressure art.

John L. Margrave, *Rice University*

Theilheimer's Synthetic Methods of Organic Chemisty. Volume 41. Edited by S. F. Finch. S. Karger AG: Basel. 1987. xx + 520 pp. SF 590 (ca. $393.50). ISBN 3-8055-4496-0.

With this volume, this near-classic work begins the ninth series. It is currently compiled from material published in 1985 and early 1986 abstracted in the *Journal of Synthetic Methods* (Derwent Publications). The content consists, as always, of a systematically arranged collection of entries in which structural formulas and equations are prominent and the text is compressed and is concerned primarily with experimental procedure.

The classification system used in *Theilheimer* is based on transformations in bonding (e.g., formation of H–O bonds) and can be useful to those willing to take a few minutes to learn its essence. However, an enormous index makes it easy to find things independently of the classification system. Whether one prefers to scan the pages randomly or to track down something very specific, this work provides an elegant way to keep abreast of the burgeoning literature on synthesis. As is customary, a short essay, "Trends in Synthetic Organic Chemistry 1987", begins the volume. In it, the growing importance of enzymatic methods in organic chemistry is noted, as is the development of cycloaddition methods. The advantages obtainable with rare-earth reagents, such as samarium iodide, are recognized, not to mention the seemingly limitless proliferation of the use of palladium compounds in synthesis.

This work remains an essential library tool for the chemist active in organic synthesis.

Methods of Enzymology. Volumes 135, 136, and 137. Parts B, C, and D: Immobilized Enzymes and Cells. Edited by K. Mosbach. Academic Press: Orlando. 1987 and 1988. Part B: xxx + 675 pp. $65.00. ISBN 0-12-182035-1. Part C: xxx + 584 pp. $69.00. ISBN 0-12-182036-x. Part D: xxxv + 767 pp. $89.00. ISBN 0-12-182037-8.

These volumes of short contributed chapters are divided into sections as follows: Part B, Immobilization Techniques for Enzymes, Immobilization Techniques for Cells/Organelles, Application of Immobilized Enzymes/Cells to Fundamental Studies in Biochemistry; Part C, Multistep Enzyme Systems and Coenzymes, Immobilized Enzymes Cells in Organic Synthesis, and Enzyme Engineering (Enzyme Technology); Part D, Analytical Applications with Emphasis on Biosensors, Medical Applications, and Novel Techniques for and Aspects of Immobilized Enzymes and cells. Each volume is individually paginated and has its own author and subject indexes. Much of the content is obviously principally of biochemical interest, but Part C includes a subject of growing importance in conventional organic chemistry: the use of immobilized enzymes in organic synthesis.

Methods in Enzymology. Volume 143. Sulfur and Sulfur Amino Acids. Volume 148. Plant Cell Membranes. Volume 149. Drug and Enzyme Targeting, Part B. Volume 151. Molecular Genetics of Mammalian Cells. Academic Press: Orlando. 1987. Volume 143: Edited by W. B. Jakoby and O. W. Griffith. xxxv + 582 pp. $65.00. ISBN 0-12-182043-2. Volume 148: Edited by L. Packer and R. Douce. xxxii + 762 pp. $79.00. ISBN 0-12-182048-3. Volume 149: Edited by R. Green and K. H. Widder. xxviii + 359 pp. $55.00. ISBN 0-12-182049-1. Volume 151: Edited by M. M. Gottesmann. xxx + 609 pp. $72.50. ISBN 0-12-182052-1.

These volumes feature a large number of short contributed chapters (some as short as 4 pages). Volume 143 includes a Section on Separation and Analysis, one on Preparative Methods, and one on Enzymes. An important aspect not suggested by the title is the inclusion of much material on selenium compounds. Volume 148 is divided into six Sections according to structural components, plus one on General Physical and Biochemical Methods, which includes the application of NMR to plant tissues. Volume 149 has three sections: Cell Targeting Techniques; Liposome Carriers; and Cellular Carriers. Several subsections are devoted to ghosts. Volume 151 has five sections: Cell Lines Useful for Genetic Analysis; Special Techniques for Mutant Selection; Genetic Mapping and Analysis; Isolation and Detection of Mutant Genes; and Gene Regulation in Tissue Culture. Each volume has the usual thorough author and subject indexes.

Analytical Chemistry by Open Learning: Classical Methods: Volume 2. By John Mendham (Thames Polytechnic), David Dodd (Sandwell College), and Derek Cooper (North Staffordshire Polytechnic). John Wiley and Sons: New York. 1987. xxi + 351 pp. $23.95. ISBN 0471-91365-0.

This series is intended for the student or technician wishing to learn the fundamental aspects of analytical chemistry in a self-paced, self-learning manner. Titles of books in the series cover a wide range of "instrumental" and "classical" methods. A preknowledge of chemical equations, stoichiometric relationships, and ionization equilibria is assumed for this book.

Volume 1 has seven parts; the first five deal with equilibria and their application to classical analysis. These should be read before proceeding to any other part in Volumes 1 or 2. Other topics covered in Volume 1 include a general treatment of volumetric methods (part 6) and acid–base titrations (part 7).

Volume 2 has six parts which include precipitation, gravimetric analysis, precipitation titrations, redox titrimetry, complexation reactions, and complexometric titrations. The coverage of these topics is traditional but very thorough and, in some cases, more effective than in typical analytical textbooks. Summaries and objectives are given after each topic to help the student focus on important points. Also helpful are self-assessment questions, which enable the reader to measure progress. Extended solutions to these questions are given at the end of the text.

Part 8 on precipitation discusses the qualitative and quantitative aspects of solubility and the effects on solubility equilibrium. It also provides the groundwork for the next two parts. Part 9 is an extensive chapter on gravimetric analysis and the various problems associated with precipitate formation and purity. It also discusses some of the reagents used to precipitate analytes and illustrates concepts with three case studies. Part 10 deals with precipitation titrations with emphasis on argentometric titrimetry. This chapter discusses the situations when precipitation in titrimetric analysis can best be applied, the construction of titration curves, and end-point detection. Part 11 on redox titrimetry covers the practical and theoretical aspects of titration curves including end-point detection. An excellent section on a comparative study of three commonly used oxidizing agents is also included. Part 12 deals with complexation reactions and the factors affecting the stability of metal complexes. This chapter also serves as an introduction to part 13 on complex-formation titrations which emphasizes EDTA as a titrimetric reagent and includes calculation of titration curves and end-point detection.

These texts, Volumes 1 and 2, will serve the technician with practical laboratory experience who desires to learn more about the foundations of classical methods of analysis. Access to tutorial support will be ad-

vantageous in this case. These texts can also act as supplemental material for the student who is taking a traditional quantitative analysis course with a laboratory component.

James W. Webb, *Illinois State University*

Singlet O_2. Volume I. Physical-Chemical Aspects. Volume II. Reaction Modes and Products, Part 1. Volume III. Reaction Modes and Products, Part 2. Volume IV. Polymers and Biomolecules. Edited by Aryeh A. Frimer (Bar-Ilan University). CRC Press: Boca Raton. 1985. Volume I: xi + 236 pp. Volume II: xi + 284 pp. Volume III: xi + 269 pp. Volume IV: xi + 208 pp. Sold as a set only. U.S. $590.00. Outside U.S. $680.00. ISBN 0-8493-6439-6 (set).

This four-volume set is comprised of fifteen review articles on the subject of singlet dioxygen. As with many of the CRC Press publications of this type, these volumes are very useful either as an introductory source for a student interested in learning about the subject of singlet dioxygen as a whole or for a researcher looking for references to certain aspects of singlet-dioxygen chemistry. These roles are particularly important in a field where the literature is extensive and spread over journals in several subdisciplines of chemistry. The authors of the review articles in these volumes are well-respected specialists in the field of singlet dioxygen; the editor has made an excellent choice of authors and topics to be covered.

Volume I covers different aspects of the physical chemistry of singlet O_2 in five relatively short articles: electronic structure and energy transfer by M. Kasha; chemical and physical sources by I. Rosenthal; spectroscopy by A. V. Khan; reactions in the gas phase by R. P. Wayne; and lifetimes and reaction rate constants in solution by B. M. Monroe. This volume is a particularly good reference source. Volumes II and III consist of seven review articles on the subject of reaction modes and products. Four of these are relatively short: the 1,2-dioxetane ring system by A. L. Baumstark; mechanisms of peroxide chemiluminescence by T. Wilson; the singlet oxygen ene reaction by A. A. Frimer and L. M. Stephenson; endoperoxides by A. J. Bloodworth and H. J. Eggelte. Three longer reviews follow: synthesis with singlet oxygen by M. Matsumoto, photooxidation of sulfur compounds by W. Ando and T. Takata, and theoretical calculations of singlet oxygen reactions by K. Yamaguchi. Volume IV is comprised of three review articles, which discuss reactions of singlet dioxygen with polymers and biomolecules: oxidation of polymers and their stabilization by J. F. Rabek; photosensitized oxidation of biomolecules by R. C. Straight and J. D. Spikes; and photooxidation of foods by I. Rosenthal.

Splitting the work into four volumes makes the set convenient to use and it would be a useful addition to the personal libraries of many chemists. However, few individuals will purchase it because the price is prohibitive. I do not pretend to understand the publisher's marketing philosophy behind this price but its result is indeed unfortunate.

Joan Selverstone Valentine, *University of California, Los Angeles*

Advances in Polymer Science. 81. Catalytical and Radical Polymerization. By P. C. Barbe et al. (Himont Italia S.p.A., Centro Ricerche Giulio Natta). Springer-Verlag: Heidelberg and New York. 1986. 240 pp. $79.00. ISBN 0-387-16754-4.

Volume 81 consists of four excellent reviews on catalytic and radical polymerization. The first three papers focus on catalytic polymerization of olefins and acetylenes. The review by P. C. Barbe, G. Cecchin, and L. Noristi is on "Catalytic System Ti-Complex/$MgCl_2$" for Olefin Polymerization. The chapter is well written, discussing the catalyst and cocatalyst systems and their interaction on polymerization of olefins. The section on polymerization describes the effect of alkyl groups and Lewis bases, influences of temperature and hydrogen, and chain transfer mechanisms. The discussion on the number of active sites and propagation rate and proposed structures of the active sites are well documented with several tables and figures. The paper also describes the polymer morphology, copolymerization, and industrial application. The chapter is easy to read because of the many tables and structural illustrations and its excellent organization.

The second review deals with the "Determination of the Number of Active Centers in Zieglar-Natta Polymerization of Olefins", by J. Mejzlik, M. Lesna, and J. Kratochvila. It lists the methods developed for the determination of the active centers and discusses the various methods and their advantages, limitations, and shortcomings. This review will be especially useful to investigators looking for methods for the determination of active centers.

The third review is entitled "Polyacetylenes with Substituents: Their Synthesis and Properties". T. Masuda and T. Higashimura describe the preparations of various substituted polyacetylenes using metal catalysts of Nb, Ta, Mo, and W. The section on polymerization behavior and mechanism deals with monomers, catalyst and cocatalyst system, and effect of solvents and temperature. The reaction mechanisms is shown with equations and discusses polymerization, cyclotrimerization, and copolymerization. Characterization by IR, NMR, and UV is discussed. The paper also notes the properties of polymers and describes the experimental preparations of polymers in detail.

The last review is on "Hydroxyl-Terminated Polymers Obtained by Free Radical Polymerization", by J. C. Brosse et al. It discusses the use of various initiators for the synthesis of these polymers, methods used for their characterization, and reaction mechanism. The mechanism section details the initiators, polymerization kinetics, transfer reactions, and autoacceleration with a good number of tables and figures. Application of these polymers together with modification of polymers is well written.

The book will be a good reference for investigators working on catalytic polymerization of olefins and substituted acetelynes.

Sharf U. Ahmed, *DePaul University*

Thin Metal Films and Gas Chemisorption. Edited by P. Wissmann (Universität Erlangen). Elsevier Science Publishers: Amsterdam and New York. 1987. XVI 538 pp. $161.00. ISBN 0-123-45678-9.

This book, published in the series *Studies in Surface Science and Catalysis*, contains 10 chapters written by experts in the fields of the structure, electronic properties, and reactivity of thin metal films with respect to gas adsorption, catalysis, and adhesive properties. The book specifically focuses on the properties of polycrystalline thin metal films, with reference to studies conducted on single crystalline substrates, in order to fill a gap between model studies in idealized systems and technologically more relevant surfaces. In several articles it is demonstrated that such techniques as photoelectron spectroscopy, vibrational spectroscopies and work-function measurements, combined with gas adsorption experiments, can produce valuable information on the structural and electronic properties of thin films. The individual chapters are comprehensive reviews for the specific research areas, containing sufficient background information and details to allow the non-specialist to introduce herself or himself into the field. As such, the book is recommended as a reference book in surface science and material research laboratories. In the following the individual chapters are briefly summarized.

R. Anton reviews in Chapter 1 the structural characteristics of thin films produced by electron microscopy and diffraction techniques. The application of TEM for in "in situ" growth, chemisorption and reaction studies is summarized and a detailed discussion of the influence of nucleation and growth processes on film structure is given.

Chapter 2, written by D. Dayal, H.-U. Finzel, and P. Wissmann, reviews resistivity measurements on pure and gas covered silver films. The concepts of conductivity measurements on smooth, rough, and discontinuous silver films are discussed, and the influence of oxygen adsorption on these films is described. Selected topics deal with special effects relevant to the conductive properties of thin films.

An introduction into an applied subject, i.e., application and deterioration of thin films used for microelectronic devices, is given by R. E. Hummel in Chapter 3. Particular emphasis is given to failure mechanisms in thin film metallizations.

The effects of electron and photon irradiation on the adsorption and adhesion of thin films is summarized by H. Schade in Chapter 4. Following a brief introduction, irradiation induced enhancement of adsorption on metal and semiconductor surfaces is discussed. Experiments conducted on irradiation enhanced adhesion are reviewed, pointing out that at present only qualitative explanations for these phenomena can be given.

A comprehensive and excellent review on photoelectron spectroscopy, including inverse photoemission, is given in Chapter 5 by A. Goldmann. The principles and experimental aspects are described, followed by experimental results on clean metal and alloy surfaces and adsorption studies on nickel and silver substrates. Halogen induced corrosion processes on copper and silver surfaces demonstrate the usefulness of photoelectron spectroscopy to study the formation of surface compounds.

H. Heidberg and H. Weiss review the techniques and the theory of vibrational spectroscopy applied to adsorbates on thin films, including such specific effects as dipolar coupling in pure and isotropically mixed adsorbate phases. This chapter also includes a tabulation (although not comprehensive) of systems investigated by vibrational spectroscopies up to work published in 1986.

An excellent discussion on the derivation of the concepts of the macroscopic and local electron work function of metals is given in Chapter 7 by K. Wandelt. These concepts are then applied to determine the local work function of heterogeneous substrates by photoelectron spectroscopy of adsorbed xenon (PAX). Case studies on stepped surfaces, epitaxial films, alloys, and adsorbed alkali atoms are reviewed, and a comparison between the PAX method and scanning tunneling microscopy (STM) is given.

Chapter 8, "Opitcal Analysis of Adsorbed Gases on metals and metal films", by M. Watanabe reviews the theory of nonclassical reflectance of p- and s-polarized light and the experimental results of ellipsometric

studies of gas adsorption on metals. The mechanisms proposed for surface enhanced Raman scattering (SERS) are summarized and discussed at the end of this chapter.

A wealth of information on adsorption and catalytic reactions on metal films has been obtained by calorimetric and resistance measurements. These studies are reviewed by G. Wedler in Chapter 9. The specific systems discussed include O_2, CO_2, H_2, and CO adsorption in iron films, the adsorption and absorption of hydrogen by palladium films, and the Boudouard reaction on iron films.

The final chapter of this book, by B. E. Nieuwenhuys, reviews adsorption and catalysis on alloy surfaces. The techniques, their applicability, and the sources of error when a surface composition is titrated by gas adsorption are discussed. This comprehensive summary of alloy systems including gas adsorption and catalytic reactions on these is an ideal starting point from which to get aquainted with this research area. In particular, published data are critically discussed, pointing out misconceptions or neglect of entropic and nonequilibrium effects that have to be considered in the interpretation of segregation and adsorption studies on alloy surfaces.

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Inorganic Chemistry Concepts. Volume 11. Variety in Coordination Modes of Ligands in Metal Complexes. By Shinichi Kawaguchi (Kinki University School of Medicine, Osaka). Springer-Verlag: New York, Heidelberg and Berlin. 1988. ix + 123 pp. $75.00. ISBN 0-387-18305-1.

This book consists of five chapters, each a compendium illustrative of recent research on simple ligands bound to transition-metal elements in a variety of structurally different modes. A total of 337 literature references are cited, most prior to 1985, and not a few of these are to previous review articles. Chapters are arranged in order of increasing complexity of the ligating species, nicely following the general format specified by the editors of this series.

Chapter 1 quickly overviews the bonding modes available to these ligands to set the stage for the topics to follow. It concludes with a discussion of linkage isomerism, which is elaborated in Chapter 3. Chapter 2 is entitled "Monatomic Ligands", but it deals only with the modes of bonding possible for the hydride ligand, although all halogens and the small chalcogens and pnicogens also merit this appellation. Organometallic complexes containing terminal hydride ligands, singly and multiply bridged hydrogens, and "interstitial" hydrogen ligands are described, although some of the more recent variations, such as those containing B–H–M bridges, are not mentioned. A wealth of information is given on the *trans*-effect, detailing changes in bonding and spectroscopic parameters of hydride ligands positioned across a metal atom from a varied ligand. This chapter also contains a short discussion of homogeneous transition-metal hydrogenation catalysts and asymmetric hydrogenation catalysts. Although certainly involving species with metal–hydride bonds, these particular topics have already been thoroughly reviewed elsewhere.

Chapter 3, entitled "Diatomic Ligands", is devoted to the variety of bonding modes available to carbon monoxide and dinitrogen with metal atoms. Good examples of complexes containing all the various terminal and "side-on" bonded CO and N_2 ligands are cited. The chapter includes a discussion of the basicity of complexed dinitrogen, and this is connected to the other processes involved in the formation of ammonia and hydrazine during the reduction of certain "nitrogen-fixing" organometallic derivatives of the earlier transition elements. Chapter 4, "Triatomic Ligands", deals primarily with the bonding modes adopted by the thiocyanato ligand, exemplary of the much larger group of triatomic "ambident ion" ligands. Examples are cited of terminal N- or S-bonded isomers, of a variety of μ_2- or μ_3-bridging species, and of several types of dinuclear species linked by bidentate –NCS– bridges. This chapter also combines a discussion of the spectroscopic techniques that are useful in probing the bonding modes adopted by these complexes and continues with a discussion of hard and soft acid and base (HSAB) theory with regards to the thiocyanato ligand and related species. This latter discussion moves a bit far afield from the chapter title in particular and from the mission of the text in general. The chapter concludes with references to complexes in which variation in the electronic and steric effects of the other ligands cause unexpected preference for the thiocyanato linkage isomer over the other, as well as cases in which two different terminal bonding modes are adopted within the same molecule.

Chapter 5, entitled "Polyatomic Ligands: β-Dicarbonyl Compounds", is a compilation of the more than 20 ways in which pentane-2,4-dione (AcAcH) and its mono-, di-, and even trianionic derivatives and their C-substituted and other close analogues may bond to transition metals. The complexity of the situation is illustrated by the 140 references to derivatives of this class. In this section, main-group, lanthanide, and actinide element complexes are also discussed, considerably broadening the perspective. The author begins with examples of the classical O,O′-bonded species, continues with references to the bridging modes found for "AcAc-" in small oligomeric derivatives, and then moves into the more complex manners of bonding of β-diketonate ligands, including central C, end-on, and η_3-bonding modes. Some of the most interesting sections of this chapter focus on how slight changes in substituents, metal centers, or competitor ligands can cause quite different structural responses. Good examples are given in which one β-diketonate ligand may bond simultaneously by two considerably different modes, to two different metal atoms within a single molecule.

This monograph provides a needed addition to the Inorganic Chemistry Concepts series and should serve as a useful secondary reference text to be called upon in any senior undergraduate or entry-level graduate course in advanced inorganic or organometallic chemistry, and as such, it should be acquired by any Chemistry library. Its combination of high cost and narrowness of focus may possibly limit individual interest from researchers in the field. It may find its greatest use from persons working in allied areas, who are seeking a limited, but rigorous, introduction to the coordination chemistry field.

David A. Owen, *Murray State University*

Neuromethods. 6. Peptides. By Alan A. Boulton (University of Saskatchewan), Glen B. Baker (University of Alberta) and Quentin G. Pittman (University of Calgary). The Humana Press Inc.: Clifton, New Jersey. 1987. v + 489 pp. $69.50 US/$79.50 export. ISBN 0-89603-105-5

In the preface, one of the editors, Quentin G. Pittman, states that "It is hoped that this book will provide the interested reader with a better appreciation of the various approaches and their relative strengths and weaknesses in the study of peptide actions and peptidergic neurons". In reviewing this volume, we asked the question "Is this goal achieved?". As with so many multi-authored volumes, the caliber and structure of the various chapters are highly variable. Some are excellent critiques of current methodology and provide the novice and the experienced investigator with an appreciation of technique (e.g., "Neuropeptide Receptors" by Dorsa and Baskin; "Peptide Release" by Bayon). Others are reviews of an area of research, though lacking in methodologic detail ("Peptide Action" by Magistretti; "Peptide Receptors" by St-Pierre). Finally, some more appropriately belong in other collections, as the chapter on "Molluscan Models" by Lukowiak and Murphy.

This book is one of a series that will find greater application in a library rather than on an investigator's book shelf. Unfortunately, few investigators are able to provide the insight that results from the *application* of multiple techniques to the same problem. As a result discussion of advantages and disadvantages of particular approaches is often based on conjecture rather than experimental evidence.

In conclusion, the book partially achieves its stated goal. Its value will be highly dependent on the purpose of the individual reader and his/her background.

Ernest J. Peck, Jr., *University of Arkansas for Medical Sciences*

Synthesis of Fused Heterocycles. By G. P. Ellis (University of Wales). John Wiley & Sons: New York. 1987. xii + 660 pp. $288.00. ISBN 0-471-91431-2.

This book is the latest addition (Volume 47) to the series *The Chemistry of Heterocyclic Compounds* edited by E. C. Taylor. It departs from the usual pattern of treating a given heterocyclic system in extensive detail, and instead it takes synthesis of an array of related systems for its topic.

The arrangement is according to the pairs of functional groups (on a parent nucleus) that are to be part of the cyclization process to build the second ring. The first ring (the parent nucleus) may be carbocyclic or heterocyclic. To cover all the combinations requires no less than 107 chapters, the titles of which range from "Acetal or Aldehyde and Amine" to "Ring Nitrogen and Thiol or Lactone Thiocarbonyl". However, the needs of those whose focus is on a specific ring system are met by an Index of Ring Systems, 42 pages long, with the systematic names of parent ring systems listed in alphabetical order. There is also a General Index.

The content of the book is designed for easy visual recognition, with prominent structural formulas and succinct text. Much of the information is given above and below the arrows of the equations (reagents, conditions, yields); the text differs from that in a volume of Theilheimer's *Synthetic Methods* by being more general, describing the process, scope, and variations, rather than giving specific experimental details.

The 2027 reference citations are gathered at the end; they make an impressive group! Although most of them are from the period 1970–1986, the earlier literature is accessible with the help of the many reviews (articles, chapters, and books) that are cited. This book is certain

to be a heavily used resource, and chemists engaged in heterocyclic synthesis will have to have it made available to them.

Liquid–Liquid Equilibria. By J. P. Novák, J. Matouš, and J. Pick (Institute of Chemical Technology, Prague). Elsevier Science Publishers: Amsterdam and New York. 1987. 321 pp. $100.00. ISBN 0-444-98975-7.

This is a compact, but comprehensive, survey of the thermodynamic treatment of liquid–liquid equilibrium in binary and multicomponent non-electrolyte solutions. There is an introductory section which describes the thermodynamics and the usual empirical equations. That is followed by separate sections for binary systems, and for ternary and multicomponent systems, which go into substantial detail about the determination of parameters in the empirical relationships. The section on ternary and multicomponent systems also contains material on the possible patterns of phase behavior and on the estimation of equilibrium concentrations in the absence of direct experimental information.

This book should be useful to anyone who has to deal quantitatively with liquid–liquid equilibrium. There are numerical examples in the text that illustrate the principles as they are explained. Lengthy mathematical expressions have been relegated to Appendices, where they belong. The text is heavily documented by 402 references dating up to 1986. My principal criticism of the book is that the translation often includes awkward constructions that occasionally left me wondering what the authors had meant.

John A. Zollweg, *Cornell University*

Preparative Polar Organometallic Chemistry. Volume 1. By L. Brandsma and H. Verkruijsse (University of Utrecht, The Netherlands). Springer-Verlag: Berlin, Heidelberg, and New York. 1987. xiv + 240 pp. $45.00. ISBN 3-540-16916-4.

This book is a jewel that should be available to every chemist who needs experimental procedures for metalations. The first chapter is a discussion of the preparation and handling of Group I and II organometallic reagents and includes descriptions of useful laboratory apparatus. Chapter 2 is a brief overview of a wide variety of electrophilic substitution of polar organometallic compounds. The heart of the book is in chapters 3 through 6, which provide detailed experimental procedures combined with practical advice for metalations, mainly lithiations, which give olefinic, allenic, heterosubstituted, heteroaromatic, and aromatic organometallic compounds. The procedures, which are from or checked by the authors, show a notable concern for experimental work and provide valuable practical advice. For example, the internal reaction temperatures are followed and appropriate procedures for carefully controlling temperature are described. The indices and the appendix are well designed for rapid access to pertinent information. While the cases covered are specific, the procedures are representative and should be broadly applicable.

The book provides a strong reminder that chemistry is an experimental science. Understanding of the fact that small changes in experimental conditions can lead to major changes in the course of these reactions is still at an early stage and the successful application of this chemistry often depends on detailed experimental directions. Brandsma and Verkruijsse have made an important contribution to the use of these and related reactions.

Peter Beak, *University of Illinois*

Inorganic Mass Spectroscopy. Edited by F. Adams, R. Gijbels, and R. Van Grieken (University of Antwerp). John Wiley & Sons: New York. 1988. xi + 404 pp. $65.00. ISBN 0-471-82364-3.

There have been very few books written on inorganic mass spectrometry, although the contrary is true for organic mass spectrometry, so a book with this title should be welcomed by inorganic chemists. This will probably not be the case because the title is somewhat misleading to those who regard themselves as belonging to the mainstream of inorganic chemistry. A more informative title might have been the following: Mass Spectrometric Trace Analysis of Inorganic Materials. Indeed, the description on the cover flap states that the volume "provides the analytical, material, and mass scientist with a comprehensive range of current spectrometric techniques for sensitive elemental trace analysis...". The book is Volume 95 of the Wiley Interscience series in: *Chemical Analysis: A Series of Monographs on Analytical Chemistry and Its Applications*, edited by J. D. Winfordner; thus it is aimed primarily at analytical chemists, mass spectrometrists, and the whole range of material scientists.

The contributors provide a very nice introduction to modern methods in inorganic trace analysis, such as secondary-ion mass spectrometry (SIMS), glow-discharge mass spectrometry (GD), laser-microprobe mass spectrometry, inductively coupled plasma mass spectrometry (ICPMS), and an older very well recognized technique that is still in the forefront of analytical methods, spark-source mass spectrometry (SSMS). These techniques, along with a historical survey of the mass spectrometry of inorganic solids, a survey of recent trends and future methods in mass spectrometry in general, and a detailed discussion of one technique, isotope-dilution mass spectrometry, make up the chapter titles.

The eight chapters are written by the editors and other specialists in the various fields and are well documented in a total of 1179 references. The presentation, in general, provides a good balance between the basic physical principles, some aspects of the instrumentation required, and applications. Indeed it may well be the best balance of these three aspects of mass spectrometry since R. W. Kiser's *Introduction to Mass Spectrometry and Its Applications*, published in 1965 by Prentice-Hall.

In spite of this reviewer's misgivings about the title (the book clearly does not address inorganic chemistry in the same respect as M. R. Litzow and T. R. Spalding's: *Mass Spectrometry of Inorganic and Organometallic Compounds*; Elsevier, 1973), it nevertheless provides a very fine description of the present state of mass-spectral inorganic analysis. Chemistry and related area libraries should consider this book an essential purchase; similarly, specialists in a range of fields will find it a very worthwhile addition to their personal libraries.

Lawrence Barton, *University of Missouri—St. Louis*

Evolution of Size Effects in Chemical Dynamics. Part 1. Advances in Chemical Physics. Volume LXX. Edited by I. Prigogine (University of Brussels and University of Texas) and Stuart A. Rice (University of Chicago). John Wiley and Sons: New York. 1988. IX + 556 pp. $100.00. ISBN 0-471-62784-4.

This volume of *Advances in Chemical Physics* is the first in a two-part volume that provides an overview of modern theoretical and experimental approaches aimed at understanding time-dependent effects in small to moderate sized systems. The systems examined range in size from the atomic scale to large cluster systems.

Part 1 consists of ten review articles by prominent researchers in chemical dynamics. The discussions cover a broad range of topics ranging from classical dynamical theory to quantum dynamics and experimental probes of intramolecular vibrational relaxation. The first chapter, by Jortner, Levine, and Rice, serves as an introduction to the volume. The authors discuss a 1981 review article in which they expressed a hope that a microscopic description of dynamics would increasingly influence our understanding of the time-dependent properties of large systems. They then go on to give an overview of progress in this area by citing current research concerning the transition from the microscopic, molecular picture to larger systems, for example, the dynamics of phase changes in clusters. This introductory article is followed by nine reviews on special subjects. Eight are largely theoretical and one experimental.

R. S. Berry and J. L. Krause discuss independent and collective motions in atoms and molecules. They argue that often two-electron atoms may exhibit highly collective molecule-like behavior, while some molecules in highly excited states may exhibit largely independent particle motions. They conclude by suggesting that new theoretical methods are required to study few-body systems, both atomic and molecular, which deviate from the traditional independent electron picture of atoms and the normal mode oscillator picture of molecules. R. D. Levine then presents a review of a new method used to characterize transition rates in molecules. This method obtains information concerning dynamics by examining fluctuations in spectral intensities. It is useful when a large number of states are accessible, for example, in a low-resolution experiment or for a larger system where the density of states is very high.

The next chapter, by R. B. Gerber and M. A. Ratner, concerns the application of self-consistent-field methods to the study of vibrational energy levels and vibrational relaxation in polyatomic molecules. In the SCF approximation, each vibrational mode moves in the effective field due to all of the other modes. The authors present both quantum mechanical and semiclassical results. J. Kommandeur discusses the photophysics of pyrazine as a useful model for the comparison of theoretical and experimental results. He points out that the "size" of the system is a relative term based on the type of experiment that one performs.

S. Mukamel reviews recent theoretical efforts to describe lineshapes of four-wave mixing and spontaneous Raman and fluorescence spectra for polyatomic molecules in condensed phases. A detailed description is given of the nonlinear response function required to describe the four-wave mixing behavior, and extensive comparisons to experimental spectra are presented. D. M. Wardlaw and R. A. Marcus then discuss the statistical theory of unimolecular processes. A review of the RRKM theory is presented and followed by applications to experimental systems. They conclude with a short discussion of the dynamical basis of statistical theories, namely the importance of highly mixed quantum states and classical chaos.

P. M. Felker and A. H. Zewail review experimental work on intramolecular vibrational relaxation (IVR) in beam-isolated molecules. They largely discuss recent advances in picosecond time-resolved spectroscopy as a tool for examining rates of vibrational relaxation in polyatomic molecules. They also present a theoretical background for the description of vibrational coherence and IVR. P. Brumer and M. Shapiro discuss chaos and reaction dynamics, both from a classical and quantum mechanical viewpoint. They first examine indicators of classical chaos in Hamiltonian systems and then discuss several model systems that have been studied theoretically. They then present a detailed discussion of the relation of classical to quantum chaos by comparing classical phase space distributions to the quantum mechanical Wigner–Weyl representation. D. J. Tannor and S. A. Rice conclude the volume with an article concerning coherent pulse sequence control of product formation in chemical reactions. They present a theoretical discussion of a novel method for controlling chemical reactivity; a wavepacket dynamics is utilized to study the effect of multiple, short-duration pulse sequences on product formation.

This volume presents a good introduction for chemists and physicists interested in modern methods of molecular dynamics. It is largely weighted toward discussion of novel theoretical methods used in the description of vibrational and reaction dynamics of small to moderate sized molecular systems. The title is somewhat misleading in that there is not a great deal of discussion of the size dependence of the dynamics. Rather, the title is implicit in that the dynamics of systems of size between the most simple three-body systems and macroscopic systems are discussed. The book makes it clear that a wide range of methods, statistical, classical, and quantum mechanical, is both useful and necessary in describing systems intermediate between microscopic and macroscopic.

Thomas L. Beck, *Los Alamos National Laboratory*

Plant Molluscicides. Edited by K. E. Mott (World Health Organization). John Wiley and Sons: New York. 1987. xi + 326 pp. $75.00. ISBN 0-471-91228X.

The considerable progress in recent years in the development of both effective antischistosomal drugs and rapid, low-cost parasitological diagnostic techniques has not been matched by advances in control of the snails that are intermediate hosts of schistsomiasis. Many of the 74 developing countries where this disease is endemic cannot afford the foreign exchange purchase of the single approved chemical available for snail control and there is thus much interest in developing local plant sources of molluscicides. *Plant Molluscicides* is a collection of papers presented at a meeting of the Scientific Working Group on Plant Molluscicides of the UNDP/World Bank/WHO Special Programme for Research and Training in Tropical Diseases, held in Geneva in 1983, which summarizes efforts in the US, Europe, and the Peoples Republic of China toward a practical phytochemical molluscicide. The 12-chapter volume deals with a variety of topics relevant to that goal, including geographical distribution, toxicological screening, and growth and production of molluscicidal plants as well as field evaluation of molluscicides. Several chapters contain data on plant screening and there is some overlap in the material in these contributions. The 40 or so molluscicidal phytochemicals, primarily terpenes and saponins, known at the time of this conference are reviewed in a chapter by Henderson, Farnsworth, and Myers and modes of action are discussed by Duncan. The unfortunate delay in publication of this volume has required an update chapter by Hostettmann and Marston on the phytochemical molluscicides. Fortunately, this is a well-documented contribution with emphasis on active saponin and tannin materials. At this time, it appears that the saponins show the most promise for application. To date, about 100 molluscicidal natural products have been identified and discovery of new active phytochemicals remains fertile ground for exploration. The book will be worthwile reading for interested natural products chemists.

Michael D. Bentley, *University of Maine*

Studies in Physical and Theoretical Chemistry. Volume 55. Semiconductor Electrodes. Edited by Harry O. Finklea (West Virginia University). Elsevier Science Publishers: Amsterdam and New York. 1988. xxii + 520 pp. $179.00. ISBN 0-444-42926-3.

In the past 15 years, interest in semiconductor electrodes has burgeoned. Fueled originally by the ability of photoelectrochemical cells (PEC's) to mediate solar energy conversion, research involving semiconductor electrodes, the key element of PEC's, now reflects a more general interest in the physicochemical properties of interfaces. Semiconductor/electrolyte interfaces, possessing chemically tunable electrooptical properties, have proven to be especially attractive candidates for research.

The present volume provides an introduction and reference handbook for this field. In the former case, the editor has provided an admirable overview of semiconductor electrochemistry in the first chapter. Concepts and terminology that are employed by photoelectrochemists are described in a concise, lucid manner that recognizes the interdisciplinary nature of the field.

Succeeding chapters focus on individual electrode materials that have dominated studies involving PEC's: titanium dioxide and strontium titanate; iron oxide; oxides of tin, indium, and tungsten; silicon and germanium; cadmium chalcogenides; gallium phosphide; gallium arsenide; indium phosphide; and dichalcogenides of molybdenum and tungsten. The individual chapters are written by active, respected researchers, who provide not only thorough, critical literature reviews (through 1985) but important practical information on electrode materials: sources and syntheses of compounds, electrical contacts, etchants, effects of crystallographic orientation, characterization techniques and their interpretation, etc.

In short, with its blend of introductory and reference material, this volume should serve the needs of both newcomers to the field of semiconductor electrochemistry and researchers seeking a comprehensive, critical sourcebook.

Arthur B. Ellis, *University of Wisconsin—Madison*

Electronic Magnetic Resonance of the Solid State. Edited by John A. Weil (University of Saskatchewan) Michael K. Bowman (Argonne), and John R. Morton and Keith F. Preston (National Research Council). The Canadian Society of Chemistry: Ottawa. 1987. xiv + 675 pp. $88.00 in Canada; $120.00 Canadian or $90.00 US outside Canada. ISBN 0-921763-00-X.

This is the first volume based on symposia held at annual conferences of the Canadian Society for Chemistry, the title symposium having been held in Saskatoon in June 1986. The contributions of 43 research groups at the cutting edge of EPR spectroscopy are presented in the form of short review articles. The topics run the gamut from specific materials-science applications of the latest EPR and ENDOR techniques to some intriguing and exciting advances in methodology. Included in the former category are helical magnet systems, free radicals associated with irradiated purines, amino acids, and DNA, zeolites, metal impurities in fossil-fuel sources, polyacetylene, rare-earth impurity ions, and point defects in semiconductors—indeed a broad survey, which effectively illustrates the versatility and lure of EPR/ENDOR in studies of materials. Recent key developments of magnetic resonance techniques that are reviewed include multifrequency (RF to far-IR) EPR, pulsed EPR and ENDOR, optically detected magnetic resonance (ODMR), 2-dimensional time domain EPR, and EPR imaging.

The occasional user of conventional CW EPR techniques will be impressed by the rapid development of EPR in recent years. For such scientists contemplating a more active and up-to-date involvement in the field, this volume will serve as a useful starting point. Although many of the theoretical sections (for example, those concerning anisotropic spin systems, or structural distortion around S-state ions) are quite comprehensive, the reader will usually find it necessary to consult the extensive list of references for details regarding instrumentation and actual implementation of the various techniques. The book will undoubtedly be of benefit to leaders in the field as well as by virtue of the breadth of topics covered. In addition, the generality of many of the theoretical discussions presented in the reviews will ensure their utility to magnetic resonance researchers for years to come, even in anticipation of continued advances in EPR methods and application.

Steven G. Greenbaum, *Hunter College of the City University of New York*

Quantities, Units and Symbols in Physical Chemistry. By I. Mills (University of Reading), , T. Cvitaš, N. Kallay, K. Homann, and K. Kuchitsu. Blackwell Scientific Publications: Oxford, UK. 1988. ix + 134 pp. $31.50. ISBN 0-632-01773-2.

This book has been prepared by the Commission on Physicochemical Symbols, Terminology and Units of the Division of Physical Chemistry, IUPAC. It is a substantially augmented version of the manuals of symbols and terminology that have been prepared previously by the Commission, most recently in 1979 (*Pure Appl. Chem. 51*, **1979**, 1–41).

The utility of symbols is generally recognized by chemists. It would be difficult to do without such symbols as "Na" or "→". On the other hand, this book demonstrates that one cannot assign symbols to physicochemical quantities that are both simple and unique, because there are too many of them. In the book, about 500 names of quantities have been grouped into 15 tables and a commonly used symbol is given for each, or in some cases more than one. In most cases, when appropriate, a defining equation is given as well, and the base or coherent SI unit for the quantity. There are many footnotes, usually to clarify ambiguities or to point out exceptions or pitfalls. One table of mathematical symbols is included, as well.

The book also contains brief sections on SI and other units of mea-

surement, and on the problem of comparing calculations done with SI units with those obtained with certain other systems of units. Quantities and units are complementary aspects of the same subject, and it is quite appropriate to discuss them together. However, the information on SI units is easily available in a large number of other sources, and the number of non-SI units mentioned is relatively small.

Finally, there are tables of fundamental particles and constants, of atomic weights, and of naturally occurring nuclides. The pertinence of this material is questionable. All of it is potentially useful, but what is the rationale for including this and excluding other information? It looks to this reviewer as if just enough information has been added to make the thickness of the book look more "respectable" in relation to the price. If that was the aim, the publisher has not succeeded. I would recommend that the library get a copy of this book, but I would not buy a copy of it for myself, or even have an employer buy a copy for me, because I anticipate that I would not use it often enough.

Is the information "authoritative"? Over the years, many chemists have spent a great deal of time discussing the information contained in this book. To ignore it is to deprive oneself of the benefit of a lot of specialized expertise. On the other hand, the tradition of science is to reject authority. Every scientist is free to study Nature in his or her own way and, if the results are then to be reported in a journal, the responsibility is the author's and the editor's, jointly, to make the article as clear and as easy to understand as possible. Most editors do not prescribe a standard list of symbols, and I believe that, in general, this is a wise policy. On the other hand, the author who consults this book will likely make life easier for the editor and for the readers, as well as for himself. In the preface, the Chairman of the Commission states that "the style has been...changed towards [making this] a manual of advice and assistance [instead of] a book of rules". I believe that most users will welcome this approach, and that it will enhance the utility of the work.

George Gorin, *Oklahoma State University*

Methods of Enzymatic Analysis. Volume XI. Antigens and Antibodies 2. Edited by J. Bergmeyer and M. Grabl. VCH Verlagsgesellschaft: New York. 1986. 508 pp. $155.00. ISBN 0-89573-241-6.

Volume XI is the second of two monographs on enzyme-immunochemical techniques. This series provides detailed descriptions of enzyme-related analytical methods using a cook-book-like design. As a continuation of the previous volume that was devoted to enzyme immunological methods for the diagnosis of viral, allergic, and autoimmune diseases, the newest volume in this series presents enzyme-immunological assays relevant to the diagnosis of a variety of bacterial, chlamydial, fungal, and parasitic infections. In addition, methods for the detection of some plant viruses are presented. Although certainly not a complete selection, this book gives state-of-the-art enzyme-immunological methods for the most important analytes within these disease groups. It will be of great help for the reader to establish easily the methodology in his own lab. Hence, it is a great bench-book in the most positive sense. With respect to the rather specialized analytical areas covered, a less general title would have been more appropriate for these two volumes.

Each immunological assay is presented in a clearly structured and organized form in a separate chapter. Every chapter starts with general information about the analyte, including information about the disease, a listing of alternative analytical methods and reference substances. The assay procedures are presented in a very detailed form. The principle of the method is presented clearly, ensuring that even the nonexperienced reader will be able to follow and understand the experimental details. A detailed listing of equipment and reagents, precise information about the preparation and stability of solutions, information about the selection of assay conditions, detailed assay instructions including reaction and pipetting schemes as well as information on the method validation, reproducibility, and specificity will allow the reader to quickly establish the described procedures in his own laboratory. More specialized procedures such as antibody or antigen productions are generally described as an appendix. Selected references, given at the end of each chapter, are extremely helpful to the reader who wishes to obtain more information about particular topics or alternative analytical approaches.

A disadvantage of these and other immunological assay collections is the dependence on purified antigens, monoclonal or polyclonal antibodies that are not readily available to the public. First, most of the characteristics of the assay, such as sensitivity, specificities, or statistical properties depend on properties of the antibodies employed. Secondly, the necessity to product antibodies might discourage more clinically oriented workers to apply the described successful techniques. The high praxis-relevant value of this series would be even increased if more participating authors could state in the next edition that the necessary antibodies will be distributed to the interest reader.

Overall this edition provides an excellent collection of successful methodologies written from experts for clinicians/immunologists/analytical chemists concerned with the enzyme-immunological detection of bacterial, fungal, viral, and chlamydial infections.

G. Hochhaus and J. H. Perrin, *University of Florida*

Reactions of Acids and Bases in Analytical Chemistry. By A. Hulanicki (University of Warsaw). John Wiley & Sons: New York. 1987. 308 pp. $122.95. ISBN 0-470-20246-7.

As implied by its title, this book treats acid–base equilibria in buffers and titrations for both mono- and polyprotic systems. While the book is fairly traditional in approach, the author is to be commended for the systemization of the treatment of equilibria, dispensing with older terminology such as "hydrolysis constants", etc., and treating all equilibria in terms of straightforward acid–base conjugate equilibria.

The book opens with a brief introductory chapter followed by one on strong and weak acids and bases, levelling versus differentiating solvents, and indicators. Chapter 3 deals with the calculation of pH in solutions of acids, bases, and buffers, and Chapter 4 with the theory of titrations.

The final two chapters have little in common with the previous chapters or with analytical chemistry. The author does not seem as comfortable discussing proton affinities, the effect of structure and charge, and alternative acid–base "theories" (which are all *definitions* except for the hard–soft acid–base theory), and it was here that I found a few errors: perchloric acid is *not* the strongest known acid, liquid sulfur dioxide is *not* known to ionize to form SO^{2+} and SO_3^{2-} ions, and soft–soft, *not* hard–hard, acid–base interactions are often explained in terms of π-donors and π-acceptors.

This book is clearly written and has good selections of problems (with solutions) at the ends of chapters, and I think that I would enjoy teaching equilibria from it. Yet it is difficult to find a place for it in any course in an American university. Much of this material is covered in the treatment of equilibria in the general chemistry course. The more advanced material fits into a traditional quantitative analysis course. However, this book would not serve as a single textbook for either in view of its narrow scope and its very high price. Nonetheless, I am pleased to have a copy on my bookshelf, and I think chemists and their students should have access to it in their departmental libraries.

James E. Huheey, *University of Maryland*

The Structure of Surfaces II. Volume 11 of the Springer Series in Surface Sciences. Edited by J. F. van der Veen and M. A. Van Hove. Springer-Verlag: New York, Berlin, and Heidelberg. 1988. xv + 626 pp. $65.00. ISBN 0-387-18784-7.

Volume 11 is comprised of selected papers based on presentations made at the Second International Conference on the Structure of Surfaces held at the Royal Tropical Institute in Amsterdam, June 22–25, 1987. The 100 papers, each about 6 pages in length, are well representative of the scope and progress currently being made in this extremely rapidly developing field.

Topics covered address both experimental and theoretical aspects and include scanning tunneling microscopy (STM) phenomena, surface relaxation and reconstruction, surface phase transitions, the formation and structure of epitaxies, and the morphology of defect-containing and disordered surfaces. Individual headings are reserved for structural studies of metal alloys and for both clean and adsorbate-covered semiconductors. Single-crystal transition-metal surface structures are also well represented, as are studies of adsorbate-induced reconstruction and adsorbate geometry.

The book is hard bound and for conference proceedings, the quality of printing is generally, although not uniformly, very high. No subject index is included.

Marjorie A. Langell, *University of Nebraska, Lincoln*