Book Reviews*

Symmetry Through the Eyes of a Chemist. By I. Hargittai and M. Hargittai (Hungarian Academy of Sciences). VCH Publishers, Inc.: Weinheim and New York, NY. 1986. xii + 458 pp. $95.00. ISBN 089573-520-2. Paperback: $24.95. ISBN 0-89573-681-0

Symmetry Through the Eyes of a Chemist succeeds not only in demonstrating how central to the study of all fields of chemistry symmetry considerations are but how these same concepts of symmetry can be traced through all our cultural traditions unifying and contrasting diverse endeavors in literature, music, and art. It appears at first glance that this book may be a multi-disciplinary discussion of symmetry. However, it is definitely a chemistry book with many examples designed to aid the chemist's understanding of symmetry. The first third of the book draws upon examples of symmetry or near symmetry in nature and natural phenomena, sculpture, painting, design, music, and literature to illustrate bilateral and rotational symmetry and the combined symmetries that generate the varius point groups. The crystal and point group symmetry operations are thoroughly described in terms of molecular crystal and discrete molecular examples. Boron hydride cages and the related carboranes provide only one of the chemical families that are described in terms of point groups. The VSEPR model is used as a qualitative rationalization for the geometry of various organic and inorganic molecules, including coordination complexes which display representative symmetry.

The remainder of the book developes the necessary group theory to illustrate its use in the topics of molecular vibrations, crystalline properties, and the electronic structure of atoms and molecules including the concepts of "allowedness" and "forbiddenness" of reactions between molecules. Matrices are used to represent the various group operations and the algebraic manipulations are illustrated with very few hidden steps. The concept of antisymmetry is described with some amusing architectural and literary examples of counterpoint. The electronic structure of molecules is developed to illustrate in particular the participation of symmetry concepts in the course of chemical reactions. The symmetry relations underlying the Woodward-Hoffmann Rules and the orbital symmetry descriptions of Hoffmann and Fukui are developed to rationalize reactions in both organic and inorganic chemistry.

The topics of the last two chapters are space group symmetries and the thirty-two crystal groups. Again, each new concept is illustrated with photographic examples of nature, needlework, and drawings to thoroughly demonstrate the individual symmetry operations and how combinations lead to other symmetries. These chapters, as well as the other chapters of the book, have extensive lists of references to the primary and secondary chemical literature at the end of each chapter. Useful subject, formula, and author indexes conclude the book.

James S. Vincent, *University of Maryland Baltimore County*

Catalysis: Science and Technology. Edited by J. R. Anderson (University of Melbourne) and M. Boudart (Standard University). Springer-Verlag: Berlin, Heidelberg. 1987. x + 262 pp. $89.60. ISBN 3-540-15034-X; ISBN 0-387-15034-X

In the preface, it is noted that the whole of heterogeneous catalysis falls within the scope of this series. Interpreted literally, this 8th edition is "heterogeneous" in content, offering to the reader a wide range of subject areas. Taken as a whole, many readers will find some chapters of extreme value while other chapters might be of more limited interest. The Editors further note that no attempt has been made in this series to assemble, within a given volume, related chapters. Consequently, in preparing this review I have deemed it more expedient to briefly describe the diverse contributions provided by each of the chapter's authors.

The first chapter is appropriately titled "Historical Development of Catalytic Oxidation Processes". The authors have illustrated this development by considering three important commodities obtained via oxidation by molecular oxygen: sulfuric acid, nitric acid, and maleic anhydride. The chapter will read very slowly for the academic researcher. On the other hand, it provides a perspective of the impact of the causal chain of historical events on industrial catalysis.

In the second chapter, Mol and Moulijn cite numerous examples of catalytic metathesis of alkenes. The versatility of this reaction in producing compounds for both bulk and fine chemicals is demonstrated. Continuity within this chapter leaves something to be desired. The experienced reader would be likely to appreciate fewer examples and more interpretation. The authors acknowledge my conclusion at the very end when they say it is unfortunate that few kinetic studies have been reported.

Only J. J. Carberry could compose a treatise of such exquisite language and still retain the mathematical rigor required in treating the problems of mass and heat transfer within porous media. This chapter provides a comprehensive summary of the intervention of transport processes upon intrinsic heterogeneous catalytic reactions. To accomplish this result, Carberry has organized the contents of this third chapter in a most logical fashion. He connects the mathematical formalism with terse vignettes, sometimes with overpowering phrases. His comments, or perhaps warnings, of considering diffusion effects in zeolites are worthy of note.

In both academic and industrial catalytic research, proper reactor design for obtaining either intrinsic rate data or for use in catalyst screening is of fundamental importance. Chapter 4, prepared by K. C. Pratt, provides an excellent summary of reactor types: their advantages and limitations. The interested reader will find a diversity of salient topics reasonably dispersed throughout, ranging from pertinent literature citations of reactor applications in specific catalytic studies to commercially available reactors along with their manufacturer's address. This chapter is truly "nuts and bolts"; construction principles for each reactor have been provided and referenced extensively. In combination with the presentation of J. J. Carberry (Chapter 3), a valuable, concisely presented, practical, and fundamental contribution to the Catalytic community is found in this edition of *Catalysis: Science and Technology.*

The final chapter reviews the application of electron paramagnetic resonance spectroscopy (EPR) to studies in catalysis. Professor J. H. Lunsford provides a brief, but comprehensive, theoretical background that will allow the more interested reader to pursue the quantum mechanical formalism underlying spectra interpretation. In fact, his candid presentation summarizes virtually all that is necessary for a newcomer to the field.

The EPR technique can provide information of potential catalytic sites as well as intermediates generated under reaction conditions: its limitations are many and the author appraises them for the reader. The strategy of the remainder of the chapter is to demonstrate how EPR techniques have been used to study specific catalytic systems. Eleven types of catalytic reactions are reviewed and the salient findings are presented; fact and speculation are clearly delineated.

James A. Schwarz, *Syracuse University*

Catalysis and Surface Properties of Liquid Metals and Alloys. By Yoshisada Ogino (Department of Chemical Engineering, Tohoku University). Marcel Dekker, Inc.: New York, NY. 1987. viii + 224 pp. $79.75. ISBN 0-8247-7699-2

This book treats two rather separate subjects, catalytic reactions on liquid metals and surface properties of liquid metals. Since rather few investigations of heterogeneous catalysis on metals preceded Prof. Ogino's investigations, most of the catalytic investigations described are those of the Ogino group. On the other hand, the last 100 pages is a survey of the literature dealing with properties of liquid metals and alloys: surface tension, optical properties of the surface transition zone, and applications of electron spectroscopies, UPS, XPS, AES. The last category includes determination of surface cleanliness and the surface composition of alloys.

Not so many metals satisfy the requirements for use as a liquid catalyst; a melting point below the temperature at which catalytic activity appears, and an adequately low vapor pressure at that temperature. The catalyst of most interest so far is indium, but gallium, zinc, thallium, tin (for coal liquefaction), and tellurium have been investigated as well as a few liquid alloys. The number of different catalytic reactions investigated to date is rather small, principally dehydrogenations of alcohols and amines, of butenes, and of partially hydrogenated multiring arenes, and hydrogen transfer between alcohols and ketones. The subject is scientifically interesting. From a practical point of view, however, catalytic activities are rather low and higher temperatures have been employed, 400–600 °C, although of course such temperatures were required thermodynamically in some instances. It is doubtful that any of the catalysts described would be chosen for industrial application in competition with conventional catalysts.

The problem of the freedom of the surface from contamination is a problem in all of the work in the book. The reactor in which the reactants are bubbled through liquid metal is exceptional in that the surface is continuously regenerated. Particularly in the second section, the author gives considerable attention to the problem of clean surfaces and what can be done to prepare them, but in descriptions of catalytic work, the

*Unsigned book reviews are by the Book Review Editor.

initial degree of cleanliness of the surface is not always clear.

Robert L. Burwell, Jr., *Northwestern University*

Vibrational Spectra and Structure. Volume 16. Edited by James R. Durig (University of South Carolina). Elsevier Science Publishers: Amsterdam and New York. 1987. xvi + 445 pp. Dfl 380.00 ($190.00). ISBN 0-444-42833-X

The six contributed chapters in this volume are by Krimm, Devlin, Knoezinger and Schrems, Hamaguchi, Marichal, and Wong. In general, I found this volume on a par with previous books in this series; i.e., the information is of good quality. I thought the topics chosen were well covered except as noted below. I must say that the theme of this volume was extremely broad, and as such, certain topics which I consider to be "hot" were not included. For example, it seemed very strange to me in Hamaguchi's section that none of Zewail's or Becker's work was mentioned or referenced even though the author's work was very current. I also found it disappointing that Wong did not cover density studies of interaction induced spectra (Raman and Rayleigh). Nevertheless, the book is a solid contribution to this on-going series.

I have calculated the ratio of post-1980 references in each section to contribute some idea of the current literature status. For most of the chapters, it is nearly 50%, but with Krimm's chapter, it is only 25%. The explanation for this may lie in the degree of current interest, or it may mean few workers find it fruitful to work in this area of classical Wilson FG-matrix studies of huge molecules. Knoezinger and Schrems failed to include Saykally's exciting work on rare gas HC complexes, which uses a magnetic field scanning technique to obtain very precise frequency measurements. I found that to be a clear gap in their review.

To sum up, the volume is certainly worth having in a department library, but its cost of 43¢/page, while not greatly out of line with some current science book costs, is still staggering.

Frank G. Baglin, *University of Nevada, Reno*

Electrocatalysis for Organic Synthesis. By K. Kyriacou and A. Jannakoudakis (University of Thessaloniki). John Wiley & Sons: New York. 1986. x + 139 pp. $35.00. ISBN 0-471-81247-1

The authors offer a concise survey of "electrocatalysis". They define the aim of electrocatalysis as a way to "lower the overpotential and thus enhancing both the reaction rate and reaction selectivity."

The book has three chapters: 1. The Generalized Electroorganic Reaction; 2. Electrocatalysis from an Organic Perspective; 3. Overview of Electroorganic and Electrocatalytic Reactions of Synthetic Interest. The latter chapter comprising 75 pages is broken into General Reaction Types (functional group modification), Specific Electrocatalytic Organic Syntheses, and Industrial Status of Organic Electrochemistry.

This volume could serve as a starting point to enter the technical literature in a library. I cannot recommend it for an individual's collection.

Donald E. Butler, *Parke-Davis Pharmaceutical Research Division*

Basic Organic Chemistry: A Mechanistic Approach. By J. M. Tedder (University of St. Andrews, Scotland) and A. Nechvatal (University of Dundee, Scotland). John Wiley & Sons: New York. 1987. xii + 303 pp. $19.95. ISBN 0-471-90977-7 (paperback)

This textbook provides a one-semester introduction to organic chemistry. It looks at a few topics in depth rather than trying to be a miniature encyclopedia. The focus is on the core group of compounds and reactions covered in most introductory courses. Special emphasis is put on spectra of the compounds and mechanisms of the reactions. Interpretation of magnetic resonance and infrared spectra occupies a fourth of the book. Another fourth is devoted to explanations of mechanisms using the Lewis electron-pair model. (Molecular orbitals are not mentioned until the last few pages.) Applied material occupies a tenth of the text, primarily as chapters on naturally occurring and industrially produced organic compounds. A few high-level problems and answers are included for most chapters. There are no "drill" problems on subjects such as nomenclature. There is no study guide or lab book available.

Peter Hamlet, *Pittsburg State University*

Survival Strategies for New Scientists. By Carl J. Sindermann. Plenum Press: New York. 1987. 264 pp. $17.95. ISBN 0-306-42703-6

The third book of a trilogy, this book is written for the aspiring scientist at the graduate school or postdoctoral level; however, it can be useful to scientists at any stage in their careers.

It begins with a description of what type of educational background and character combine to make successful scientists. Subsequent chapters discuss scientific presentations, publications, and recruitment, as well as more subjective topics, such as professional ethics, student/faculty relationships, and working on committees. Whole chapters are devoted to the public image of scientists and the special problems of the female graduate student.

Sindermann describes his book as "a self-improvement handbook for scientists". Indeed, reading it forces one to be self-critical. While most of the text is aimed at those choosing to work at a college or university, it applies as well to those opting to work in a government or industrial setting. Younger graduate students will find this useful as a handbook, while its insights into scientific life will aid prospective graduate students in their decision to obtain an advanced degree.

The use of real-life examples makes this book enjoyable and easy to read. Anyone, even established scientists, can and should benefit from Dr. Sindermann's book, provided they are willing to look at themselves critically.

Charles Z. Hotz, *University of Michigan*

Electrode Kinetics: Principles and Methodology. Volume 26 of Comprehensive Chemical Kinetics. Edited by C. H. Bamford and R. G. Compton. Elsevier Science Publishers: Amsterdam and New York. 1986. xiv + 486 pp. $172.00. ISBN 0-444-42550-0

This excellent textbook is comprised of contributions by E. J. Calvo, on fundamental concepts of electrode reaction kinetics; by K. B. Oldham and C. G. Zoski, on concepts of mass transport to electrodes; by V. D. Parker, on linear sweep and cyclic voltammetry; by M. Sluyters-Rehback and J. H. Sluyters, on AC and pulse methods; and by C. M. A. Brett and A. M. C. F. Oliveira Brett, on hydrodynamic electrodes.

In this reviewer's opinion, this text represents the single most thorough and informative treatment of the subject of electrode kinetics to appear to this date. This text will be very useful in advanced-level courses on electrochemistry and it is a must as a reference in the libraries of all electrochemists. Although the mathematical involvement is intense in some sections, the authors generally have been wise in avoiding mathematical treatments that are of only secondary importance to the topics. All authors have made ample use of figures, and numerous references are provided to assist interested readers in researching the original sources.

Dennis C. Johnson, *Iowa State University*

Partition Coefficient: Determination and Estimation. Edited by W. J. Dunn III (University of Illinois, Chicago), J. H. Block (Oregon State University), and R. S. Pearlman (University of Texas). Pergamon Press: New York, Oxford, Toronto, Sydney, Frankfurt. 1986. 151 pp. $32.00. ISBN 0-08-033649-3.

This book is a collection of topical essays on the general topics of Hansch's partition coefficient P, its extensions, modifications, and applications, and the prediction and measurement of solubility in both aqueous and nonaqueous media. These quantities are of interest and importance to the biotechnology community and so it is no surprise that this volume was published in cooperation with the American Pharmaceutical Association and the Academy of Pharmaceutical Sciences. The book more often reads as though it were written for physical chemists than for biochemists, but the authors (Hansch himself regrettably absent) define most of their terminology and symbols and amply use figures, tables, and statistical documentation to clarify and extend the text. That this book was photoreproduced results in few errors in the presentation of the data. However, disappointingly, numerous Greek symbols have been left out from the text. It is acknowledged that numerous word-processing systems cannot print both Greek and conventional typefonts at the same time and that most of these omissions can be filled in from context. Nonetheless, a particularly painful example of this is all the missing π's in both the text and defining equation for π-constants the nine times they are referred to on p 22—the first time they explicitly appear in the book save a few words in the preface!

The presentation of key words for each chapter, as well as extensive author and subject indices, is useful for the expert and nonspecialist alike. However, for the latter, the absence—both in the index and in the text—of "translations" of the plethora of trivial names for complicated compounds is sorely missed. Some of the species may be recognized as rather common pharmaceuticals, e.g., ibuprofen and naproxen, but the majority are sadly essentially, obscure, at least to the reviewer. A glossary by the editors and/or authors would have been gratefully appreciated.

Joel F. Liebman, *University of Maryland, Baltimore County Campus*

Molecular Volumes in Chemistry and Biology: Applications including Partitioning and Toxicity. By J. C. McGowan (Imperial Chemical Industries, retd.) and A. Mellors (University of Guelph). Ellis Horwood, Ltd.: Chicester, UK, and Halsted Press–John Wiley & Sons: New York, Chicester, Brisbane, Toronto. 1986. 259 pp. $54.95. ISBN 0-7458-0081-5 (Ellis Horwood); 0-470-20353-6 (Halsted Press–John Wiley & Sons).

This surprisingly thin book provides a thorough treatment of the concept of molecular volume and its applications to inorganic, organic,

physical, environmental, toxicological, and bio-chemistry and is recommended to researchers and students alike in any of these fields. The authors have provided an extensive list of symbols (4 pp), collections of biochemical, physiological, and physical data (68 tables), appendices (three in number giving both code in BASIC and data for the prediction of physical and toxicological properties), and thorough referencing (578 citations, including many generally inacessible, and thus generally unknown, references), and thorough subject, formula, and author indices. The book's interdisciplinary and comprehensive character encourages the reviewer to suggest it as the text in a special-topics graduate course, or even as a rather high-priced supplement to advanced undergraduate courses in numerous chemical subdisciplines (e.g., physical chemistry for the biochemist, or biochemistry for the chemical engineer).

Joel F. Liebman, *University of Maryland, Baltimore County Campus*

CODATA Thermodynamic Tables. Selections for Some Compounds of Calcium and Related Mixtures: A Prototype Set of Tables. Edited by D. Garvin, V. B. Parker, and H. J. White, Jr. (National Bureau of Standards). Hemisphere Publishing Co.: Washington, DC, New York, London. 1987. xx + 356 pp. $69.95. ISBN 0-89116-730-7

This volume is a collection of interrelated chapters edited by three premier American chemical thermodynamicists from the National Bureau of Standards. Various chapters, written by numerous internationally recognized experts, present extensive tables of self-consistent quantities related to chemical energetics. Some are given for pure substances, e.g., the molar enthalpy of formation, the Gibbs energy function, and heat capacity, while others are for mixtures—aqueous solutions, molten salts, and alloys—such as the entropy of mixing and the activities of each component. Properties that depend on temperature, pressure, or composition are systematically presented for wide ranges of the relevant parameters. Even more valuable, however, than the tables and numerical values per se are accompanying references, evaluation, explanation, and interrelations of both the thermodynamic quantities and the numerical data. This volume is an exquisitely documented work and shows almost the current limits of science, technology, and human endurance that is needed to derive a coherent, self-consistent collection of critically evaluated data in the physical sciences. The reviewer looks forward to future volumes in the current series of tables for the rest of the periodic table. He also recommends that all of these tables be available in personal computer-readable form and earnestly hopes that they will not cost ca. $70 per element—a small price, perhaps, for excellence, but a large one for "academic amateurs" such as the reviewer.

Joel F. Liebman, *University of Maryland, Baltimore Country Campus*

Calculated Molecular Properties of Polynuclear Aromatic Compounds. Volume 29. By R. A. Hites (Indiana University) and W. J. Simonsick, Jr. (E. I. DuPont de Nemours & Co.). Elsevier; Amsterdam, Oxford, New York, Tokyo. xviii + 272 pp. $127.00. ISBN 0-444-42779-1

It is a sign of the status of theory in current chemistry when a collection of quantum-chemically calculated properties of 272 organic molecules, however large, complex, and important, is presented together in one photoreproduced volume for a series "physical science data". This reflects the comparative ease, if not absolute inexpensiveness, of computationally deriving experimentally useful and theoretically interesting quantities. In particular, the authors present values for (gas phase) heats of formation, (vertical) ionization potential (via Koopmans' theorem), electron affinity, dipole moment, and two chromatographically important "shape parameters". For completeness, for each compound, they also give the CA index name and registry number, the nuclear, electronic, and total energies, the individual charges (no symmetry constraints save usually imposing planarity), and a computer drawing of the molecular geometry.

For those legitimately worried about the accuracy of quantum chemical calculations (such as the MNDO ones Hites and Simonsick present), it is asserted that the difference of experimental and theoretical heats of formation averages 6.3 kcal/mol for the 16 polynuclear aromatic hydrocarbons for which comparison can be made. Likewise, the calculated ionization potentials, though always higher than the experimental by ca. 0.5 eV (~11 kcal/mol), show a high linear correlation ($r^2 = 0.959$) for the 60 PAH species with experimental data. It is the comparison of experiment and theory for which the reviewer faults Hites and Simonsick—he would very much prefer to have both sets of values available in this book. To assist the reader make up his/her mind, here are the authors' calculated heats of formation and the "best" experimental values for the first six hydrocarbons for which this comparison can be made: benzene, 21.203, 19.8 ± 0.1; toluene, 13.458, 12.0 ± 0.1; indene, 38.098, 39.0 ± 0.5; indane 6.349, 14.5 ± 0.4; azulene, 71.915, 69.1 ± 0.8; naphthalene, 38.130, 35.9 ± 0.3. Other properties have analogous discrepancies—e.g., the calculated dipole moments for benzene, anthracene, pyrene, and coronene are all nonzero—albeit less than 0.03 D. Are the discrepancies excessive? Only the reader can decide for him/herself. However, the reviewer recommends to the authors and publisher that they prepare a small volume to accompany the current one that gives the two sets of numbers, the calculated and the experimental, whenever such comparison can be made.

Finally, it is to be noted that the coordinates of each atom are not given although they are certainly known to the authors—indeed they could well have been put on the same line as the atom and its charge. Admittedly, this might have forced the photoreduction of the drawings. However, this would have been a small price to pay for allowing the reader to use the computed geometries to derive input structures for other related species, say of substituted PAH's, a topic of interest to numerous individuals such as the reviewer, and the authors themselves.

Should the reader buy this book? Despite all of the above caveats, Hites and Simonsick's book is the largest collection of calculated molecular properties of the PAH's and so it represents a valuable addition to the library of any individual who studies these interesting and important species.

Joel F. Liebman, *University of Maryland, Baltimore County Campus*

Organic Syntheses by Oxidation with Metal Compounds. By W. J. Mijs and C. R. H. I. De Jonge (Akzo Research). Plenum Press: New York and London. 1986. xxv + 907 pp. $115.00. ISBN 0-306-41999-8

In their preface the editors state the following: "The book is concerned with the synthetic aspects of oxidation reactions involving metal compounds, which are readily available or easy to prepare. The sequence followed in the chapters is as follows: a general introduction, a limited treatment of reaction mechanisms to serve as a basis for synthesis, and scope and limitations of the oxidant system, mostly in terms of substrate and product classes." The editors are to be commended on their success in the above effort. There are 16 chapters in the book each of which covers a particular oxidizing reagent. These are vanadium compounds, oxochromium(VI) compounds, active manganese dioxide, manganese(III) acetate, cobalt compounds, nickel peroxide, copper- and cobalt-amine complexes, ruthenium tetraoxide, palladium compounds, silver carbonate on celite, cerium(IV), osmium tetraoxide, thallium(III), lead tetraacetate, bismuth salts, and other metal compounds and peroxides. The authors of each of the chapters are recognized authorities in their area. The Table of Contents is detailed and well organized. The organization of the chapters is superb and easy to follow, and it allows one to compare reagent characteristics for a given substrate with ease. The chapters are replete with tables that give the substrate, reagent, product, yield, and relevant references. The numerous equations throughout the text are clear. There is a helpful appendix, given in table form, which gives the page numbers where one can find the information for the oxidation of organic compounds leading to specific oxidation products.

The Experimental Procedures section, found in most chapters, gives the actual laboratory conditions, found in the original literature reference, required for the oxidation of example substrates with the given reagent. This section should save workers in the area considerable literature search time.

The only serious flaw found in the text is that only for the chapter on cerium(IV) oxidations were the references as current as 1985. For all other chapters the references were less current and for most chapters the most recent references were 1981 or 1982. Nonetheless, not only workers in the area but most practicing synthetic organic chemists, both in industry and academia, will find this a very useful reference work. This book is a must for all research libraries.

Carroll W. DeKock, *Oregon State University*

Statistical Methods for Pharmaceutical Research Planning. By Sten W. Bergman (Salmon Brothers Inc.) and John C. Gittins (Oxford University). Marcel Dekker Inc.: New York and Basel. 1985. xii + 260 pp. $59.50. ISBN 0-8247-7146-X

This is Volume 67 of *Statistics: Textbooks and Monographs Series*, which contains several other titles of interest to pharmaceutical researchers. This book is intended for those professionals concerned with planning pharmaceutical and agri-chemical research. It is likely to interest chemists who wish to use statistical methods to select promising candidates from the large numbers of test compounds commonly encountered in the early speculative phase of research. Each of the four chapters deals with a major decision-making area.

The first chapter, Quantitative Structure–Activity Relationships (QSAR), is the largest. It is divided into sections covering regression analysis; classification or pattern recognition; and miscellaneous methods such as cluster analysis and some newer methods which show promise such as Harrison's method and Gittin's DAI approach. Chapter 2, Screening Procedures for Discovering Active Compounds, is restricted primarily to those techniques that are appropriate for the exploratory phase of pharmaceutical research. The authors observe that currently

little or no use is made of statistics during this initial phase, but they claim that a considerable improvement in efficiency could be made if only a small amount of attention were paid to the statistical aspects of designing preliminary screening procedures. Chapter 3, Allocation of Resources Between Related Screens, includes selection of screens to be used, sequencing of a collection, and finally resource allocation between these screens. Again the authors' intent is to generate interest in an important area which has been largely overlooked in practice. Chapter 4, R+D Project Selection Methods, attempts to deal with the complex problem of selection of projects for funding. Certainly, all research efforts are eventually limited by such factors as laboratory space and equipment, skilled personnel, and money. A variety of approaches from simple checklists to complicated mathematical treatments are discussed. Overall, this book will be most useful to those who have a working knowledge of statistical methods and their mathematical treatment, but it could provide all readers with a valuable insight into the use of statistics for screening large numbers of compounds.

Francis R. Kearney, *Parke-Davis Pharmaceutical Research*

A History of the Nomenclature of Organic Chemistry. By Pieter E. Verkade (Delft University of Technology). D. Reidel Publishing Company: Dordrecht, Boston, and Lancaster. 1985. xiv + 507 pp. $89.00. ISBN 90-277-1643-9

This book contains an English translation of the 16 memoirs authored by P. E. Verkade and published between 1966 and 1979 in the *Bulletin de la Société de France*. Verkade was Chairman of the IUPAC Subcommission on Organic Chemistry from 1934 to 1971 and had a profound influence in shaping the IUPAC rules for nomenclature.

The history of organic chemical nomenclature is covered from 1889 to 1979. This book is not a tabulation of rules and recommendations. Instead, the background, reasoning, arguments, and practical compromises that preceded the first and subsequent international proposals on the nomenclature of organic chemistry are given. The activities of the following international committees are discussed. The International Conference of Geneva for the Reform of the Chemical Nomenclature produced the Geneva Nomenclature in 1892. The International Union of Pure and Applied Chemistry in 1923 appointed the Commission for the Reform of the Nomenclature of Organic Chemistry that approved the Liège Nomenclature in 1930. At Lucern in 1936 some of the Liège Rules were modified and then adopted in Rome in 1938. The background of the revision and extension of the recommendations of the committees mentioned above by IUPAC Commission on Nomenclature of Organic Chemistry starting in 1946 is covered. Included are studies leading to Section A on hydrocarbons; Section B on heterocycles; Section C on characteristic groups containing carbon, oxygen, nitrogen, halogen, sulfur, selenium and/or tellurium; and Section D on coordination compounds, chains and rings with regular patterns of heteroatoms, organic compounds containing P, As, Sb, or Bi, organosilicon compounds and organoboron compounds. There are chapters on an 1892 proposal for naming "Functionally Complex" Acyclic Compounds by A. Combes, one on the 1913 book *Nomenclature of Organic Chemistry* by C. I. Istrati which treated the whole of the subject self-consistently, and the work of G. Siboni, who developed "an original and very curious but complicated and bizarre" nomenclature system during 1930–1935. The cooperation of IUPAC Commission of Nomenclature of Organic Chemistry with editors of Beilstein's *Handbuch der Organischen Chemie*, *Chemical Abstracts*, *Chemical Society* (*London*) and others is presented. The book has several hundred references.

Verkade's personality comes through strongly, especially in his forthright characterization of proposals and events; he had firm opinions and believed in calling a spade a spade. This book is recommended for organic chemists, chemists with an historical interest in the subject, and nomenclature specialists.

Stanley P. Klesney

Advances in Enzymology. Volume 59. Edited by Alton Meister (Cornell University Medical College). John Wiley & Sons, Inc.: New York. 1987. 483 pp. $44.95. ISBN 0-471-88012-4

This volume contains seven reviews: (1) Fibronectin by S. K. Akiyama and K. M. Yamada; (2) The Synthesis and Degradation of Chitin by E. Cabib; (3) Mechanism of Action of Glutathione-Dependent Enzymes by K. T. Douglas; (4) Enzymology of Quinoproteins by J. A. Duine, J. Frank, and J. A. Jongejan; (5) Regulation of the 2′,5′-Oligoadenylate System by Cyclic Adenosine Monophosphate-Dependent Phosphorylation by A. V. Itkes and E. S. Severin; (6) NMR Studies of the Mechanism of Enzyme Action by A. S. Mildvan and D. C. Fry; and (7) Fructose 2,6-Bisphosphate by E. Van Schaftingen.

The chapter on fibronectin describes recent advances in elucidating the structure and molecular biology of fibronectin; the molecular mechanism of fibronectin-medated cell attachment and spreading, migration, and metastasis; and the nature of cell-surface receptors for fibronectin.

The major focus of the chitin chapter is the fungal chitin synthetase, an enzyme that has been highly purified from several sources. In the following chapter the mechanisms of some eight glutathione-dependent enzymes are reviewed. The variety of roles played by glutathione and its mechanistic versatility are emphasized.

The quinoproteins are oxidoreductases that depend on the pyrroloquinoline quinone cofactor; this chapter describes the cofactor's physical and chemical properties and the mechanisms of several enzymes that utilize it. In the shortest chapter, Itkes and Severin review the mechanism of action and the biological role of 2′,5′-oligoadenylate, analyzing its interrelationship with cyclic-AMP, their mutual regulation, and their joint involvement in the control of cell growth.

The use of NMR for studying enzyme mechanisms continues to advance as the sensitivity and resolution of NMR instrumentation increase. Mildvan and Fry concentrate on work done in the last few years and focus on the mechanisms of two classes of enzymes: those that catalyze nucleophilic substitutions on phosphorus and those that polarize carbonyl groups.

Fructose 2,6-bisphosphate, discovered in 1980 by the author of this review, is a potent regulator of phosphofructokinase. The narrative describing its discovery is a brief but dramatic summary of some excellent biochemical detective work. This extensive review concludes that fructose 2,6-bisphosphate is not a metabolite, but purely a *signal* molecule which favors glycolysis and inhibits gluconeogenesis.

This cleanly edited volume presents authoritative coverage of its seven topics and will be of interest to most enzymologists.

L. J. Brubacher, *University of Waterloo*

Surfactants in Solution. Volumes 4, 5, and 6. Edited by K. L. Mittal and P. Bothorel. Plenum Press: New York. 1986. Volume 4: xx + 562 pp. $97.50. ISBN 0-306-42468-1. Volume 5: xx + 568 pp. $97.50. ISBN 0-306-42469-x. Volume 6: xx + 635 pp. $97.50. ISBN 0-306-42470-3.

These three volumes embody the proceedings of the 5th International Symposium on Surfactants in Solution, held in Bordeaux, France, July 9–13, 1984. Volume 4 consists of two parts. Part I contains papers on aggregation of surfactants and structure, dynamics, and characterization of micelles, while Part II covers papers on phase diagrams and phase behavior of surfactant solutions. Following an excellent discussion of the physical principles underlying surfactant self-association into micelles, bilayers, vesicles, and microemulsion droplets by Jacob Israelachvili, several other theoretical papers are devoted to the thermodynamics of surfactant association. These are followed by a number of papers describing experimental studies on micellar solutions using a variety of techniques: fluorescence emission, flow densitometry, neutron scattering (SANS) and X-ray scattering (SAXS), Raman scattering, quasielastic light scattering, electron spin modulation spectroscopy. Several of these investigations are concerned with the effect of additives on micellar structure, while others are concerned with the effect of variation in the chemical structure of the surfactant on micellar solution properties. Solution properties investigated include the following: critical micelle concentration, viscosity, conductivity, and cloud point. Dynamics of organic assemblies of surfactants (micelles, microemulsions, vesicles) are the subject of a review paper and are investigated in some experimental papers.

Part II contains a number of papers devoted to theoretical treatments of phase formation and phase transformations, followed by experimental papers involving phase diagram determination and investigation using such techniques as X-ray diffractometry, NMR spectrometry, polarizing microscopy, and relaxation techniques.

Volume 5 consists of Parts III, IV, V, and VI. Part III contains papers on reverse micelles, mainly sodium bis(2-ethylhexyl)sulfosuccinate in hydrocarbon solvents, studied by a number of techniques, such as fluorescence and NMR spectroscopy, electrical transient and electrical relaxation methods. Part IV is devoted to papers on micellar catalysis and reactions in micelles. Most of the papers are studies of the effect of surfactant micelles, both normal and reverse—the latter again mainly of sodium bis(2-ethylhexyl)sulfosuccinate—on such reactions as the spontaneous hydrolysis of carboxylic acid anhydrides, acyl halides, and alkyl halides, or the hydrogenation activity of cobalt boride particles, and the use of various techniques for investigations of this type.

Part V, an extensive section devoted to biological amphiphiles, starts with a review of syntheses, aggregation behavior, and applications of membrane-foaming surfactants, followed by a number of papers on phosphatdylcholine vesicles, their morphology and properties, including interactions with various substances. A number of papers are devoted to studies of interactions between biosurfactants and proteins or other biological materials, using various techniques, such as ion-selective membrane electrodes, fluorescence polarization, differential scanning calorimetry, freeze-fracture electron microscopy, and various spectro-

scopic techniques.

Part VI is devoted to monolayers and adsorption of surfactants and starts with a discussion on the construction of self-assembling monolayer structures followed by papers on the kinetics of collapse of insoluble monolayers, the theory of stabilization of surfactant films, self-diffusion in fatty acid monolayers, and properties of mono- and multilayers of cyanine dyes mixed with stearic acid. A number of papers on adsorption from solution follow, including a study of protein adsorption on alumina, interfacial properties or a function of POE chain length distribution, and surface interactions in anionic-cationic mixtures. The section (and Volume 5) concludes with two papers on the effect of surfactant interfacial adsorption on mineral flotation.

Volume 6 contains Parts VII and VIII. Part VII consists of almost 30 papers on microemulsions and reactions in them. It starts with a well-written discussion of solubilization in microemulsions by Verzano, Bourrel, and Chambu, followed by papers, both theoretical and experimental, on such topics as phase composition and structure, interfacial composition and structure, and other physical properties of microemulsions. Techniques used in these investigations include small angle neutron scattering (SANS), time domain spectroscopy, vapor pressure measurements, light scattering, ^{13}C NMR relaxation times, liquid membrane transport, luminescence quenching, electrical conductivity, and ellipsometry.

Part VIII is a collection of papers on a variety of subjects. It opens with a review of the statistical mechanics of adsorption and wetting transitions by Davis, Benner, Seriven, and Teletzke. The papers following range from completely theoretical through discussions of surfactant properties to industrial applications.

From the above, it is apparent that these three volumes cover a variety of topics and techniques related to surfactant theory, properties, and applications. The greatest number of papers address themselves to the physics of surfactant systems and techniques for such investigations. However, the range of subjects covered is so large that it is difficult to imagine anyone interested in surfactants who could not benefit from some paper in the collection.

Milton J. Rosen, *Surfactant Research Institute. Brooklyn College. CUNY*

Advances in Dynamic Stereochemistry. Volume 1. Edited by Marcel F. Gielen (Free University of Brussels). Freund Publishing House: London. 1985. 285 pp. $40.00 (paper).

This softbound book is the first volume of what is apparently intended as a continuing series. It consists of five reviews in depth. Two of them are theoretical: Mathematical Modelling of Polyhedral Rearrangements (Clare, Favas, Kepert, and May), and Nuclear Symmetry in Degenerate Isomerizations (Brocas). The other three are on experimental NMR studies: Magic Angle NMR Studies of Dynamic Metal Carbonyls (Hanson); Ligan Rotation in Monoene and Polyene Complexes of Transition Metals (Howell); and The Internal Rotation Dynamics of Polyaryl Compounds in Solution (Willem, Gielen, Hoogzand, and Pepermans). The index is curiously placed after the table of contents, and something that resembles a preface is placed on the last page. The numerous diagrams, structural formulas, and tables are well presented.

Molecular Structure and Energetics. Volumes 1, 2, 3, and 4. Edited by Joel F. Liebman (University of Maryland Baltimore County) and Arthur Greenberg (New Jersey Institute of Technology). VCH Publishers: New York. Volume 1: 1986. xiv + 360 pp. $77.50. ISBN 0-89573-139-8. Volume 2: 1987. xiii + 388 pp. $77.50. ISBN 0-89573-140-1. Volume 3: 1986. x + 385 pp. $77.50. ISBN 0-89573-141-X. Volume 4: 1987. xvi + 405 pp. $77.50. ISBN 0-89573-336-6.

It should be emphasized from the start that the present volumes are far more than a simple update of Greenberg and Liebman's *Strained Organic Molecules* published a decade ago. The editors have assembled a group of able authors to consider the field of molecular structure and energetics from the theoretical, experimental, and intuitive points of view. Whatever the emphasis of a chapter, there is typically a blending of concepts and data.

Volume 1, Chemical Bonding Models, examines theoretical and conceptual viewpoints. It contains discussions of the relative electronegativity of atoms (Pauling and Herman), isoelectronic molecules (Bent), carbenes (theory of the energetics, structure, and reactivity) (Liebman and Simons), multiple bonding to silicon (theoretical studies of structures and reactivity) (Gordon), topological relationships (King), boranes and heteroboranes (Fehlner and Housecroft), structure-electronic relationships in the solid state (Burdett), a derivation of the Schrödinger equation (Schaad and Hess), and quantum chemical reaction enthalpies (Del Bene).

Physical measurements are emphasized in Volume 2, in discussions of the importance of small structural differences (Hargittai and Hargittai), very large polybenzenoid hydrocarbons (Stein and Brown), gas-phase proton affinities (Dixon and Lias), "universality" (the relationship of heats of formation, strain energy, and resonance energy) (Liebman and Van Vechten), heats of sublimation (Chickos) (this is an unfamiliar area, whereas heats of vaporization—techniques and values—have been reviewed elsewhere, most recently by Majer and Svoboda), experimental thermochemistry (Wiberg), thermochemical structural analysis (Pihlaja), and the energetics of organometallics (Skinner and Connor). Extensive lists of ΔH_{subl} and $\Delta H_f°$ of organic compounds update (through 1984) the Pedley-Rylance tables of 1977.

Volume 3, Studies of Organic Molecules, considers hydrazine-hydrazine radical cation electron-transfer reactions (Nelson), stabilization and destabilization of aromatics and antiaromatics (G. R. Stevenson), structural limitations in cyclic alkenes, alkynes, and cumulenes (Johnson), fluorinated organic molecules (bond energies, conformation, ring strain, and heats of formation of fluorinated alkanes, cycloalkanes, alkenes, alkynes, allenes, and aromatics; the perfluoroalkyl effect) (Smart), substituent effects on the structure and energies of strained organic molecules (σ- and π-bond effects on bond lengths and strain in small rings) (Greenberg and T. A. Stevenson), and generation of long carbon-carbon bonds in strained molecules by through-bond interaction (Osawa and Kanematsu). Liebman's chapter on macroincrementation reactions considers what might be called "thermochemistry by surmise". This would be deplored if injected surreptitiously into an experimental thermochemical argument, but since $\Delta H_f°$ is unknown for >99.9% of organic compounds, systematic, well-understood estimation techniques are essential to the study of chemical energetics.

Volume 4 is titled *Biophysical Aspects* and contains chapters on a synthetic serine protease partial model (Katz) and the conformation of linear proline-containing peptides (Anteunis and Sleeckx). Nine other contributions will be of interest to a wider audience than the biophysics community: reactivity indices of polycyclic aromatic hydrocarbons (Greenberg and Darack), ionic hydrogen bonds (thermochemistry, structure, and solvation) (Meot-Ner), theoretical calculations of hydrogen bonds (Deakyne), empirical resonance energies of acyl and carbonyl derivatives (George, Bock, and Trachtman), theoretical calculations of electronic substituent effects (Topsom), substituent effects in α-substituted carbocations (Charton), three-dimensional molecular modelling by computer (very recent software for personal computers is, of course, not covered) (Gund and Gund), and structure-biological activity relationships (the references go to 1984, and unfortunately do not include some interesting correlations with the Taft-Kamlet solvatochromic parameters) (Hansch). Liebman completes the volume with "Are Proton Affinity Values Intuitively Plausible?", a discussion of simple methods of estimating gas-phase PA values.

Perhaps the most impressive feature of these volumes, aside from the wide scope and generally high quality of the writing, is the interaction between chapters. The chapter authors are aware of related material in other chapters and make frequent reference to it, to the benefit of the reader. The editors are to be congratulated for fostering this unusual effort. One suspects that libraries will have considerable difficulty keeping *Molecular Structure and Energetics* on the shelf.

Richard Fuchs, *University of Houston*

Radiation Chemistry: Principles and Applications. Edited by Farhataziz (Texas Women's University, Denton) and Michael A. J. Rodgers (University of Texas, Austin). VCH Publishers: New York and Weinheim. 1987. 641 pp. $95.00. ISBN 0-89573-127-4.

The purpose of this book is to present a detailed overview of radiation chemistry, including physical foundations such as interaction of radiation with matter, description of typical experimental systems, and applications in biological systems and industrial processes. In order to accomplish this ambitious plan, the editors selected as author of each individual chapter a scientist actively engaged in research in the area in question. The first eight chapters are concerned with fundamental topics, including the interaction of radiation with matter, formation of reactive intermediates including electrons, ions, radicals, and excited molecules; and theoretical aspects including track models, diffusion kinetics, and theories of the solvated electron. The next eight chapters discuss radiolysis of various types of chemical systems including gases, water, and aqueous solutions, organic liquids, colloids, and organic solids, alkali halides, and synthetic polymers and biopolymers. The final four chapters concern applications to such areas as biochemistry and radiobiology, radiolysis of microorganisms and mammalian cells, and industrial radiation processing including sterilization. In order to avoid the dullness and sterility of merely presenting a catalog of papers published and literature references, the authors of each chapter present a brief summary of key aspects of their topic, along with a detailed discussion of a few actual systems selected from the literature of the field. In a few instances, the limitations thereby imposed may have been too severe. For example, it would have been

interesting to read about the chemistry of crystalline salts other than the alkali halides. On the whole, however, this approach was quite successful; the entire volume achieves much better uniformity of style and depth than usually seen in edited works of this type. The book should be useful both as an introduction for new workers in the field and as a convenient reference for experienced investigators or workers in other areas of chemistry or of radiation research.

Robert J. Hanrahan, *University of Florida, Gainesville*

Radicals in Organic Synthesis: Formation of Carbon–Carbon Bonds. By Bernd Giese (Technische Hochschule Darmstadt, FRD). Pergamon Press: New York. 1986. 294 pp. Hardcover: $50.00. ISBN 0-08-032493-2. Paper: $25.00. ISBN 0-08-032494-0.

This book is designed to provide the reader with the background information needed to successfully apply free radical reactions to problems in organic synthesis. The first two chapters introduce basic mechanistic principles underlying most types of free radical reactions (addition, substitution, elimination, rearrangement, and electron transfer). Rate requirements for successful free radical chain reactions are presented in a manner that is extremely palatable, and the importance of FMO interactions in radical additions is discussed. Chapter three provides numerous examples of intermolecular aliphatic carbon–carbon bond formation using free radical reactions. A number of methods for generating carbon-centered free radicals are introduced in a well-organized manner. Chapter four focuses on intramolecular variants of many of the reactions introduced in chapter three. Many of the examples are taken from approaches to natural products or substructures thereof. The stereochemical and regiochemical trends observed in radical cyclizations are discussed. Chapter five presents a *potpourri* of methods for constructing carbon–aryl and carbon–heteroaromatic bonds via free radical processes. Chapter six provides a collection of methods for generating free radicals and refers the reader to pages in the preceding chapters where specific examples can be found. The primary literature is heavily referenced throughout the book and good author and subject indices are provided. This book is highly recommended for addition to any chemistry library collection and would be a valuable addition to the personal library of any synthetic organic chemist.

David J. Hart, *The Ohio State University*

Inorganic High Pressure Chemistry: Kinetics and Mechanisms. Studies in Inorganic Chemistry 7. Edited by Rudi van Eldik (Institut fur Physikalische und Theoretische Chemie, Johann Wolfgang Goethe-Universitat). Elsevier Science Publishers: Amsterdam, Oxford, New York, and Tokyo. 1986. x + 448 pp. US $112.00/Dfl. 280.00. ISBN 0-444-42692-2

First, for the uninitiated, what exactly is high pressure? (The title is potentially misleading to those interested in chemical reactions in the centers of cells as opposed to in the centers of stars.) In this case the subject of the work concerns volumes of activation and measurement of reaction kinetics among inorganic, organometallic, and bioinorganic complexes reacting in the milli- to nanosecond time range and at pressures up to 300 MPa (about 3 kbars). These measurements of the volumes of activation along with recent innovations in instrumentation allowing measurement of rapid kinetics permit reconstruction of the reaction-volume profile, which is of use in understanding and defining the reaction kinetics.

In the preface, the editor states that as of 1978 only about 170 volumes of activation had been measured; however, by 1983, an additional 360 determinations had been published, and by 1985, 200 more were added in the literature. Thus, one of the principal uses of the book becomes readily apparent in that it documents current activity in a field where growth has been exponential and facilitated by innovations in modern instrumentation. The editor further states that, although previous review articles exist on the subject, this monograph is the first book devoted solely to the topic.

The 8 chapters (and authors) are the following: High pressure kinetics: fundamental and experimental aspects (van Eldik); Solvent exchange reactions (Ducommun and Merbach); Substitution, isomerization and related reactions of octahedral complexes (van Eldik); Substitution, isomerization and related reactions of four-coordinate complexes (Kotowski and van Eldik); Electron transfer reactions (Swaddle); Photochemical and photophysical processes (Ford); Bioinorganic systems (Heremans); and High pressure kinetics: concluding remarks (van Eldik).

Points of view may seem constrained and controversy non-existent, as the book's editor solely authored 46% and coauthored an additional 13% of the pages, keeping the author representation of the discipline rather small. Few debates arise among this small, relatively inbred group of authors.

To those new to the field of inorganic high-pressure chemistry, the introductory chapter is both welcome and necessary in providing a general treatment of fundamental theory of high-pressure kinetic and thermodynamic studies, general instrumentation used, data treatment and interpretation, and the correlation with other physical and kinetic parameters. Subsequent chapters provide detailed mechanistic interpretation of several different systems ranging from 4- and 8-fold complexes to bioinorganic systems. The approach used throughout the work is an interpretation of pressure dependence of rate constants based on a simplified version of the transition-state theory. In the final chapter, containing concluding remarks, Eldick candidly discusses limitations or modifications of the approach, although it is difficult to determine whether his viewpoint is well balanced and representative of all researchers in the discipline.

Finally, the book is well-printed and readable, although a ragged right-edge text would have been preferable, especially in a work containing large words that force significant gaps in word spacing of the right-justified text. The volume contains useful separate author and subject indexes, as well as sub-heading indexes at the beginning of each chapter. References are current as of 1985. As a minor annoyance, reference call-outs in the text are by number from the non-alphabetical reference list, a very minor space-saving feature. I would have preferred call-outs with names and dates and an alphabetical reference list, providing greater convenience to those familiar with the literature or searching for a specific reference.

James R. Herring, *U.S. Geological Survey, Denver*

Computer Aids to Chemistry. Edited by G. Vernin and M. Chanon (NCSR, France). John Wiley and Sons: New York. 1986. 375 pp + subject index + author index. $49.95. ISBN 0470-20338-2

The editors state that their purpose is to illustrate by example the utility of a computer in assisting the chemist. They have done so in this collection of papers with a distinct European style and focus, prepared by an international set of authors.

Each of the eight chapters provides an historical perspective of the specific topic as the growth of the utility and methodology is traced from basic principles to current applications. The topics covered are Organic Syntheses, Teaching, Graphics in Education, Kinetics, Multivariate Data Analysis, Crystallography, Mass Spectral/Chromatography Database, and Online Information Access.

Because of the growth in hardware, software, and creative applications, the focus on mainframe applications may seem out-dated to chemists working in the specific areas, but the discussion and often unique perspective on the topics make this book useful to a wide audience.

There is no critical review of the computer techniques discussed in each chapter, but the description and references for each are quite valuable. The detailed subject and author indices finish out this excellent sourcebook.

Thomas R. Hockswender, *PPG Industries*

Volumes of Proceedings

Photochemistry and Photophysics of Coordination Compounds. Edited by H. Yersin and A. Vogler. Springer-Verlag: New York and Berlin. 1987. xi + 343 pp. $59.20. ISBN 0-387-17808-2

This softbound volume of typescript papers is the result of a symposium held in Bavaria in 1987. The many papers in it are grouped as follows: Metal-centered Excited States; Photophysics and Photochemistry of Cr(III) Complexes; Excited State Properties of Tris-2,2′-Bipyridine Ruthenium(II) and Related Complexes; Photoredox Processes; Organometallic Photochemistry; and Methods, Applications, and Other Aspects. No subject index.

Fundamentals of Diffusion Bonding. Edited by Yoichi Ishida. Elsevier Science Publishers: Amsterdam and New York. 1987. xiv + 512 pp. $161.00. ISBN 0-444-42877-1

The symposium that gave rise to this volume was organized to extend basic knowledge of interface joining, especially that between metals and ceramics. It was held in Tokyo in 1985. The papers fall into five groups: Fundamentals of Metal–Ceramic Interfaces; Fundamentals of Interface Systems; Chemical State of Interfaces; Mechanical Properties of Interfaces; and Diffusion Bonding in Japan. The subject has become important because of the increasing use of ceramic–metal assemblies in modern technology, such as in electronic devices. The transcripts of discussions are included, but there is no subject index.

Measurement, Evaluation and Prediction of Phase Equilibria. Edited by H. V. Kehiaian and H. Renon. Elsevier Science Publishers: Amsterdam and New York. 1986. xiv + 502 pp. $133.25. ISBN 0-444-42652-3

Selected papers from the Second International IUPAC Symposium on Vapor–Liquid Equilibria in 1-Alkanol + *n*-Alkane Mixtures (Paris, 1985) are collected in this volume, along with papers from a symposium that immediately followed it, on Critical Evaluation and Prediction of Phase Equilibria in Multicomponent Systems. The 33 papers are re-

produced from typescript. Unfortunately, there is no index.

Advances in Elastomers and Rubber Elasticity. Edited by Joginder Lal and James E. Mark. Plenum Press: New York. 1986. x + 444 pp. $79.50. ISBN 0-306-42472-X

The 27 typescript papers in this volume are the fruit of an ACS symposium held in 1985. Some of the papers are interpretive reviews, and some are reports of original research. The topics range from fundamental to applied, with emphasis on the latter. It is interesting to see that progress is still being made in the search for superior materials for automobile tires, for example. The index is excellent.

Detection and Data Analysis in Size Exclusion Chromatography. Edited by Theodore Provder. American Chemical Society: Washington, D.C. 1987. x + 308 pp. $69.95. ISBN 0-8412-1429-8

A symposium on the title subject was held at the National ACS Meeting in New York in 1986. From it was developed this volume of 17 papers. Four of them are classified under General Considerations, seven under Detection, and six under Data Analysis. The emphasis of the symposium was on the characterization of complex polymers, a subject that has assumed increased importance in recent years because of its relevance to legislative action concerning release of materials into the environment. The subject index is quite thorough.

Field Metallography, Failure Analysis, and Metallography. Edited by Michael E. Blum, P. Michael French, Raymond M. Middleton, and George F. Vander Voort. ASM International: Metals Park, Ohio. 1987. xvi + 584 pp. $65.00. ISBN 087-170-299-1

This volume records the presentation made at a meeting held in Boston in 1986. The typescript papers abound with fascinating photographs of metal surfaces, many of which might easily be mistaken for a biological subject. The papers fall into six groups: Field Metallography and Fractography; Metallography in Failure Analysis; Corrosion and Hydrogen Embrittlement; Microstructural Characterization; Metallographic Preparation; and Metallography of Stainless Steels. Instead of an index, the reader is presented with a list of the prize-winners from the 1986 International Metallographic Exhibit.

Advances in Standards and Methodology in Spectrophotometry. Edited by C. Burgess and K. D. Mielenz. Elsevier Science Publishers: Amsterdam and New York. 1987. xii + 404 pp. $95.00. ISBN 0-444-42880-1

The first joint meeting of the UV Spectrometry Group of the U.K. and the Council for Optical Radiation Measurements of the U.S.A. was held in Oxford in 1986. The introductory paper is a fascinating study of the historical development of colorimeter analysis and quantitative molecular spectroscopy, by D. T. Burns. It is amazing to read how much was done, and how well, as early as the 17th century. The typescript papers fall into these groups: basic concepts; high-accuracy spectrometry; standards and calibration; modern instrumentation arrays and lasers; and Fourier-transform and IR spectroscopy. Ten poster abstracts are also included. The 5-page subject index completes the volume.

Peptides 1986. Edited by Dimitrios Theodoropoulos. Walter de Gruyter & Co.: Berlin and New York. 1987. xix + 684 pp. $178.00. ISBN 3-11-010687-6

The 19th European Peptide Symposium was held in Greece in 1986 and gave rise to the many typescript papers in this volume. The subjects fall into four classifications: methodology of synthesis; physical studies; biologically active peptides; and miscellaneous (including structural investigation). A 4-page subject index is included.

Progress in Terpene Chemistry. Edited by D. Joulain. Editions Frontieres: Gif-Sur-Yvette, France. 1986. 452 pp. $50.00. ISBN 2-86332-045-9

The symposium on which this book of proceedings is based was held in Grass, France, in 1986. The papers are concerned with industrial synthesis and applications of terpenes, stereoselective synthesis of terpenoids, new terpenoids from natural sources, and spectroscopic methods for structure determination. Two of the contributions are plenary lectures, by W. Oppolzer and P. Teisseire, respectively. Poster presentations are also included. The 25 pages devoted to a list of participants with their addresses would have been better used for a subject index.

Nucleic Acids Symposium Series Number 18. Edited by Jiri Beranek et al. IRL Press Ltd.; Oxford and Washington, D.C. 1987. vii + 276 pp. $55.00. ISBN 1-85221-047-8

This collection of a large number of short papers contains a remarkable array of typescripts, ranging from the evidently ancient using worn ribbons, to fuzzy dot-matrix and clear laser printers. The papers stem from a symposium held in Czechoslovakia in 1987. There is no indicated order in the Table of Contents, and there is no subject index. However, most of the papers are concerned with synthesis in some aspect.

Protein Structure. Molecular and Electronic Reactivity. Edited by R. Austin et al. Springer-Verlag: New York and Berlin. 1987. xi + 521. $49.00. ISBN 0-387-96567-X

Papers grouped in six categories (Protein Structure and Microconformations, Dynamics of Protein Structure, the Role of Protein Structure and Reactivity, Charge Exchange in Proteins and Model Systems, Charge Separation in Photosynthetic Reaction Centers, and Applications) make up this volume of proceedings of a conference held in Philadelphia in 1985. One of the papers is provocatively titled "Why in the Hell are We Here?" In addition, there is an appendix of abstracts of other papers, a list of participants with their addresses, and a subject index.

Scanning Tunneling Microscopy. 86. Edited by N. Garcia. Elsevier Science Publishers: Amsterdam and New York. 1987. xv + 417 pp. $195.00. ISBN 0-444-87048-2

The first international conference on the title subject, held in Spain in 1986, gave rise to this volume of proceedings, which is nicely set in type. There is no subject index.

Design of New Materials. Edited by D. L. Cocke and A. Clearfield. Plenum Press: New York and London. 1987. viii + 370 pp. $69.50. ISBN 0-306-42604-8

In 1986, the Fourth Annual Industry–University Cooperative Chemistry Program Symposium was held at Texas A&M University. The 16 typescript papers in this volume constitute the proceedings. Both theoretical and experimental papers are included, and the index is substantial.

Quantum Chemistry Symposium No. 19. Edited by P.-O. Löwdin. John Wiley & Sons: New York. 1986. 754 pp. $112.95. ISBN 0-471-84879-4

The International Symposium on Solid-State Theory, Scattering Problems, Many-Body Phenomena, and Computational Quantum Chemistry, held in Florida in 1985, produced the large number of papers reproduced in this soft-bound volume. The titles do not seem to be organized in the Table of Contents, and there is no index, so one has to do some work to find a desired topic.

Fossil Fuels Utilization. Environmental Concerns. Edited by Richard Markuszewski and Bernard D. Blaustein. American Chemical Society: Washington, D.C. 1986. viii + 381 pp. $74.95. ISBN 0-8412-0990-1

The late Robert Schoenfeld would not have been pleased with the title of this book, which he would have considered an example of extermination of prepositions ("Utilization of Fossil Fuels" is more elegant). The titles in the Table of Contents would have bothered him even more, for there one finds such expressions as "limestone dual alkali system performance", which are not easy on the intellectual digestion [Schoenfeld[1] called them *Hauptwortkombinationenzusammensetzungsbedürforis* (Schoenfeld, R. *The Chemist's English*; VCH Publishers: New York, 1985)]. If one penetrates beyond these concerns, however, one finds 29 papers arranged in four groups: Precombustion Removal of Pollutants; Emission Study and Control During Combustion; Postcombustion Cleanup; and Characterization, Chemistry, Transport, and Effects of Combustion Effluents. They are heavily devoted to problems of flue gas and its clean-up, and the effects of emissions on the atmosphere. The focus seems to be primarily on coal, which is, of course, a greater source of sulfur compounds and fly ash than are oil or gas. Well indexed.

Dietary Fiber. Basic and Clinical Aspects. Edited by George V. Vahouny and David Kritchevsky. Plenum Press: New York and London. 1986. xvi + 566 pp. $79.50. ISBN 0-306-42028-7

The 1984 symposium from which the papers in this volume come was concerned with all aspects of the title subject, and most of the content is clinical. However, there is included some material on analysis, carbohydrates, fermentation, and intestinal biochemistry. Indexed.