Additions and Corrections

The Bicarbonate Proton in Carbonic Anhydrase Catalysis [*J. Am. Chem. Soc.* **1983**, *105*, 980]. Y. Pocker* and Thomas L. Deits

Page 984, legend to Figure 3: the concentration values should read $[HCO_3^-] = 0$ (●), 2.24×10^{-2} M (■), 3.25×10^{-2} M (▲), 7.56×10^{-2} M (♦).

The error is one of transcription and alters none of the data in the remainder of the manuscript, nor the conclusions reached.

Regiochemistry, Stereochemistry, and Mechanism of Addition of Trifluoroacetic Acid to (*Z*)-Cyclooctene [*J. Am. Chem. Soc.* **1984**, *106*, 1427]. J. Eric Nordlander,* Kirtivan D. Kotian, Dwight E. Raff, II, F. George Njoroge, and Jeffry J. Winemiller

Page 1428: The mean-value bars in footnote 13 are misplaced. The footnote should read:

(13) Let t_p = the time of exposure to the reaction medium of product ester formed at a given concentration of reactant **1** and t_{99} = the time for 99% completion of the addition reaction. Then

$$t_p = t_{99} - (1/k) \ln ([\mathbf{1}]_0/[\mathbf{1}])$$

$$\bar{t}_p = -(0.99[\mathbf{1}]_0)^{-1} \int_{[\mathbf{1}]_0}^{0.01[\mathbf{1}]_0} t_p \, d[\mathbf{1}] = 0.793 t_{99}$$

The correct equations were used for the calculations in the article.

Organolanthanide and Organoyttrium Hydride Chemistry. 6. Direct Synthesis and ^{1}H NMR Spectral Analysis of the Trimetallic Yttrium and Yttrium–Zirconium Tetrahydride Complexes, $\{[(C_5H_5)_2YH]_3H\}\{Li(THF)_4\}$ and $\{[(CH_3C_5H_4)_2YH]_2[(CH_3C_5H_4)_2ZrH]H\}$ [*J. Am. Chem. Soc.* **1984**, *106*, 4454–4460]. William J. Evans,* James H. Meadows, and Timothy P. Hanusa

Page 4458: Several of the coupling constants listed in the caption to Figure 4 are incorrect. The caption should read as follows:

High-field resonances of the 500-MHz ^{1}H NMR spectrum of $\{[(CH_3C_5H_4)_2YH]_2[(CH_3C_5H_4)_2ZrH]H\}$ (**5**): (a) observed spectrum in C_6D_6; (b) simulated spectrum using $^2J_{AB} = 1$ Hz, $^2J_{AC} = 7.6$ Hz, $^1J_{AY} = 15$ Hz, $^2J_{BC} = 14.9$ Hz, $^1J_{BY} = 20$ Hz, $^3J_{BY} = 2$ Hz, $^1J_{CY} = 14.9$ Hz, $J_{BB} = 5$ Hz, $J_{YY} = 3.5$ Hz, and line width = 2.9 Hz.

The coupling constants cited in the text are correct and were used in calculating the simulated spectrum.

Quantum Chemical Calculation of the Enzyme–Ligand Interaction Energy for Trypsin Inhibition by Benzamidines [*J. Am. Chem. Soc.* **1984**, *106*, 4584]. Gábor Náray-Szabó

Plots in Figures 3–5 should be corrected. It is the whole molecule rather than the C_6H_4X moiety for which the calculated electrostatic interaction (Figure 3), hydration (Figure 4), and net binding (Figure 5) energies should be plotted vs. ΔG_{exptl}. Consequently, the horizontal energy scales in these figures are in error. However, the fair correlation is maintained even if the correct values from Table III are used in the plots.

Book Reviews[*]

Homogeneous Catalysis with Metal Phosphine Complexes. Edited by Louis H. Pignolet (University of Minnesota). Plenum, New York. 1983. XVI + 489 pp. $69.50.

The field of transition-metal catalysis has undergone an incredible growth during the past decade, and industrial uses of homogeneous catalysts are increasing. This up-to-date, timely treatise by experts in the field provides an excellent survey of the techniques and methodology required to determine catalytic reaction pathways by using a case-study approach.

Following a delightful first-hand account of the history of phosphine complexes by Joseph Chatt (10 pages) is a thorough, detailed, and knowledgeable survey of mechanistic studies of catalytic reactions using spectroscopic and kinetic techniques, by C. A. Tolman and J. W. Faller (98 pages). Then, in sequence, Nancy L. Jones and James A. Ibers discuss structurally characterized transition-metal phosphine complexes of relevance to catalytic reactions (22 pp). John M. Brown and Penny Chaloner treat asymmetric hydrogenation reactions using chiral diphosphine complexes of rhodium (26 pp). Alan L. Balch discusses binuclear phosphine bridged complexes: progress and prospects (43 pp). Alan R. Sanger discusses hydrogenation and hydroformylation reactions using binuclear diphosphine-bridged complexes of rhodium (19 pp). Thomas B. Rauchfuss discusses functionalized tertiary phosphines and related ligands in organometallic coordination chemistry and catalysts (16 pp). Devon W. Meek discusses polydentate ligands and their effects on catalysis (36 pp). Robert H. Crabtree discusses cationic rhodium and iridium complexes in catalysis (17 pp). Bálint Heil, Lászlo Markó, and Szilárd Törös discuss hydrogenation reactions of CO and CN functions using rhodium complexes (21 pp). Daniel H. Doughty and Louis H. Pignolet discuss decarbonylation reactions using transition-metal complexes (29 pp). D. Max Roundhill discusses homogeneous catalysis of oxidation reactions using phosphine complexes (22 pp). T. Adrian George discusses catalysis of nitrogen-fixing model studies (31 pp). Finally, Norman L. Holy discusses polymer-bound phosphine catalysts (37 pp).

The style is uniform, enjoyable, and comprehensible throughout, and the book is well referenced (1591 references) and indexed. This book will be widely read by the organometallic community.

John H. Nelson, *University of Nevada, Reno*

NMR in Molecular Biology. By Oleg Jardetzky and G. C. K. Roberts. Academic Press, New York. 1981. 681 pages. $70.00.

The role of NMR in biochemistry, physiology, and medicine has undergone rapid expansion in the 1970's linked to advances in Fourier transform techniques and superconducting magnet technology. Drs. Jardetzky and Roberts have prepared a critical and detailed survey of biophysical NMR studies of proteins, nucleic acids, and lipid membranes. NMR studies of integrated systems of physiological or medical interest are generally not covered. This monograph is a welcome addition to texts of the last decade on the same subject by Dwek (1973) and James (1975).

While not intended as a source text on theoretical aspects of NMR, the opening three chapters (140 pages) contain a discussion of relevant theory, dealing primarily with spin relaxation and molecular motion, paramagnetic interactions, and chemical exchange phenomena. These chapters provide a critical and rather detailed review of approaches that have been used in biochemical systems. They are intended for reference as opposed to pedagogy, however, and do not convey physical content as well as other recent, more physically oriented texts. Subsequent chapters systematically review structural and dynamical studies of amino acids and peptides (Chapter 5), nucleic acid bases, nucleosides, and nucleotides (Chapter 6), peptides and proteins (Chapters 7 and 8), and protein dynamics (Chapter 11).

The characterization of enzyme mechanisms and ligand binding sites

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[*] Unsigned book reviews are by the Book Review Editor.

has been one of the most fruitful applications of NMR to biochemistry. Unambiguous assignments of resonances of critical amino acids has been achieved for a number of enzymes of modest molecular weight, and they have provided information on the structure, dynamics, and titration behavior of active sites. Among these proteins, ribonuclease, lysozyme, dihydrofolate reductase, and alkaline phosphatase have received particular attention. Work on these and a number of other enzymes is reviewed in a pair of chapters and followed by a discussion of strategies for investigating enzyme mechanisms and reaction intermediates. The emphasis of the text is directed strongly toward biophysical studies of protein structure and dynamics as well as enzyme mechanisms and protein–ligand interactions. Studies on membranes and lipids are discussed more briefly in the final chapter.

By any measure, this volume is a major contribution to the NMR and biochemical literature. It is extensively referenced with over 1700 citations and contains careful appendices of symbols, abbreviations, and notation. However, it is the critical and scholarly approach of the authors, as much as the depth of coverage, which underlies the excellence of the work. If there is an unfortunate aspect to be noted it is that the text's appearance virtually coincides with the introduction of 2D NMR methods, which appear to be displacing traditional 1D approaches very rapidly. But it is a measure of the vigor of the field that shortly after the appearance of a definitive text, the revised edition is eagerly awaited.

Robert R. Sharp, *The University of Michigan*

Bibliographic Atlas of Protein Spectra in the Ultraviolet and Visible Regions. Edited by D. M. Kirschenbaum. Plenum Publishing Corp., New York. 1984. xi + 523 pp. $95.00.

This, the third volume in an open-ended series, covers the period 1971–1980, with a few earlier references. In alphabetical order of the substrate, some 2500 citations to sources of spectra are given; the spectra themselves are to be found in them, and not in the bibliography, although the medium and other conditions are indicated. Indexes to names, to sources of the protein, and to additives, etc., are provided as an aid to access.

The Colour Science of Dyes and Pigments. By K. McLaren (Instrument Colour Systems Ltd.). Adam Hilger, Ltd., Bristol. 1983. Distributed in the USA by Heyden and Son, Inc., Philadelphia. x + 186 pp. $34.00.

This book is written for breadth rather than depth, and it brings together the various aspects of color—history, physics, chemistry, physiology, psychology, measurement—in an integrated set of chapters. It is interestingly written and provides an informative introduction to this important subject. The organic chemistry in it is generally adequate for the purpose, although a distressingly large number of structures are wrongly drawn, benzene rings being confused with cyclohexane rings, and few egregious misconceptions are evident, such as a ring structure being shown for diazomethane. Chemists who can manage to grit their teeth in the face of these transgressions should nevertheless find this book useful. There are eight pages of references and indexes of authors and subjects.

Ozonation in Organic Chemistry. Volume II. Nonolefinic Compounds. By Philip S. Bailey (University of Texas). Academic Press, New York. 1982. xix + 497 pp. $69.50.

Volume I of this two-part work was devoted entirely to olefins, and it contained most of the involved story of the mechanism of ozonolysis. This volume continues the story with acetylenes, with which far less work has been done, and aromatic systems, which have received intense attention and which show features not encountered with olefins. Heterocyclic systems are then treated. A long chapter is devoted to reactions of ozone with nucleophiles, especially nitrogen compounds, and another long chapter deals with reactions at saturated carbon sites, such as alkanes. Multiple bonds between carbon and oxygen, sulfur, and nitrogen take up a chapter, and another chapter fills in the cracks by treating organometallics, ions, radicals, etc. A short chapter on practical applications briefly reviews a very large subject, headed by water purification. It is pointed out that ozonation has advantages over the traditional chlorination method, in that it does not produce potentially carcinogenic chlorinated hydrocarbons. The book closes with a review of recent developments in the ozonolysis of olefins.

This is a very thorough book, and it is also easy to read. The subject matter is logicaly organized and critically discussed; it is put into perspective by short presentations of the historical development of each major aspect. The references, which number 1249, are all gathered at the end, a matter of minor inconvenience. The displayed structures are numbered consecutively without starting anew at each chapter, a somewhat curious feature that culminates in structure 1195 (what a marvelous opportunity for a tour de force of Roman numerals was passed up!). A welcome feature is the use of running heads corresponding to the subsections of the chapters on the right-hand pages, a substantial aid to rapid searching. Unfortunately, Roman numerals are used for both chapter numbers and subsection numbers, and their use in the running heads, in identical typeface, is a bit confusing. The index is thorough, with many cross-references.

This is certain to be a heavily consulted book, and it is likely to be the definitive work for some time to come.

Reactive Molecules: The Neutral Reactive Intermediates in Organic Chemistry. By Curt Wentrup (University of Marburg). John Wiley & Sons, New York. 1984. xi + 333 pp. $34.95.

This is a book designed for the reader who wishes to know more about reactive intermediates as a class than is presented in conventional university instruction, and it can serve as a familiarizing general reference, or as a text for classes for graduate or advaned undergraduate students. The approach emphasizes the intermediates for themselves, rather than their applications. Radicals (including diradicals), carbenes, nitrenes, highly strained ring species, and antiaromatic compounds, particularly cyclobutadienes, are described and discussed in a manner that efficiently leads to greater insight. Not only reactivity but geometry, thermodynamics, electronic structure, and methods of observation are discussed in an integrated and very perceptive manner. It is gratifying to find that the experimental basis for most of the assertions and generalizations are clealy set out. One cannot come away from this book without a deeper understanding of the fundamental nature of reactive intermediates.

Professor Wentrup is unusually careful and precise in the use of words and concepts, and it is obvious that he strongly dislikes sloppy use of them in science. Even the use of the triangle, Δ, to indicate heat, originated by Plato and used by the alchemists as a symbol for the fire element, comes under his attention. He rightly deplores the occasional misuse of the inverted triangle, ∇, for the same purpose, pointing out that it is historically the symbol for water. The opening chapter, General Principles, is worth reading by an organic chemist for its clear and simple exposition of such concepts as intermediates, estimation of thermochemical properties, resonance, and selectivity. Other concepts, such as "strain energy", are similarly examined as they are encountered in later chapters.

Each chapter has a substantial but selected list of references, some of which refer to the sets of problems that end each chapter. The problems present real situations, for which one is invited to propose mechanisms or explanations; the references provided allow one to follow up the subject as it was originally reported. The book also has lots of hard facts, many of them in the form of useful tables of such topics as ESR parameters, strain energies, bond dissociation enthalpies, and so on.

A sequel on Charged Reactive Intermediates is tentatively promised; if the present book achieves the success it deserves, the sequel will, one hopes, materialize in due course.

Houben-Weyl Methoden der Organischen Chemie. 4th Edition. Band 13, Teil 9b: Metallorganische Verbindungen Co, Rh, Ir, Ni, Pd. Edited by Adolph Segnitz. Georg Thieme Verlag, Stuttgart. 1984. viii + 1062 pp. DM 1160.00.

This latest addition to the Fourth Edition of Houben-Weyl is especially welcome, because it deals with an area characterized by intense activity in the roughly 25 years since the earlier edition. From an esoteric subject, the organic chemistry of the group of transition elements covered here, especially palladium, has blossomed out so as to become part of the main stream, not only of sophisticated synthesis of complex molecules but also of industrial chemistry. The intensive review with emphasis on preparative methods that this volume provides is extremely timely.

Cobalt and rhodium take up about one-quarter of the book each. Iridium and nickel are accorded considerably fewer pages, but palladium required 300 pages to treat its ballooning organic chemistry. Although this volume devotes its principal attention to the preparation of the organometallic compounds, the contributors (E. Lange and H.-F. Klein) and the Editor do not neglect the fact that many of them owe their importance to generation in situ as intermediates in catalytic processes. Thus, for example, 40% of the section on palladium is devoted to transformation of organopalladium compounds and presents much exciting synthetic chemistry.

The literature appears to have been covered well into 1982. References appear conveniently at the foot of each page, but there is also a supplementary bibliography of books and reviews of no less than 10 pages, organized according to subject area. Tables abound in the body of the book. The subject index gives evidence of careful thought, for unlike conventional indexes, in which compounds are listed in alphabetical order without regard to structural types, this one is subdivided first into open-chain, monocyclic, and bicyclic compounds and second into parent structures, such as Butadiene, Nickel(0) Compounds, Dicobaltirane, etc. This greatly simplifies one's search.

The great amount of beautifully organized information of such current importance should more than compensate for the extra effort that some readers may have to make to deal with the German text. The abundant equations are, of course, self-explanatory in any language, and the tables are nearly so. Although few chemists will be willing to pay the nearly $400 for a personal copy, any library serving organic chemists cannot afford to be without it.

Ionization Constants of Inorganic Acids and Bases in Aqueous Solution. 2nd Edition. By D. D. Perrin (Australian National University). Pergamon Press, Oxford and New York. 1982. xiii + 180 pp. $50.00.

The original edition of this work, published in 1969, is out of print. In this edition, the data have been augmented by new material published through 1980. In the preface, it is explained why it is seldom possible to give a critical evaluation of reported figures. Not only do methods of determination vary widely, but the reactivity of many inorganic acids introduce great complications. However, the tabulation in this book includes identification of the method used as well as references to the source. The entries are in alphabetical order, with some cross-references (hydrogen azide, however, is not cross-referenced to hydrazoic acid). The names used are not always consistent, or even those to be expected. Hydrazinesulfonic acid, for example, is listed under "hydrazinesulphuric acid", and shown as $^+NH_3NHSO_3^-$, whereas the analogous hydroxylamine compound is listed under "hydroxylamine-*N*-sulphonic acid" and shown with an incorrect structure, $NO{\cdot}NH{\cdot}OSO_2H$, and its positional isomer, shown as $^+NH_3OSO_3^-$, is listed as "hydroxylamine-*O*-sulphonate". These matters do not seriously interfere with finding desired data, however, and this book will continue to be a valuable reference work.

Electron-Molecule Collisions and Photoionization Processes. By Vincent McKoy (California Institute of Technology), Hirosi Suzuki (Sophia University), Kazuo Takayanagi (Institute of Space and Astronautical Science), and Sandor Trajmar (California Institute of Technology). Verlag Chemie International Publishers, Deerfield Beach, Florida. 1982. XVI + 244 pp. Hardcover $24.95.

This book is simply a report of what transpired at the first United States–Japan seminar. As such, it even includes a program listing the amount of time devoted to drinking coffee. Of the 36 papers included in this volume, only 12 report original research findings, and of these, 11 were by Japanese contributors. Except for these contributions, and a few other exceptions, this volume should prove to be of greatest interest to historians. Of the numerous reviews, two bear further mention. The first by K. Takayanagi dealt with data needs vs. data available in electron-molecule collision processes, while the second, by J. Bardsley, dealt with the need for electron-molecule collision cross sections in a number of applied areas. Three novel contributions that will be of interest are progress reports on difficult experiments (2) and theory (1). While most contributions bear on the title, the collection as a whole does not constitute a complete treatment of the subject. For example, no contributions on Stieltjes imaging techniques for treating photoionization are included.

Russell A. Bonham, *Indiana University*

Experimental Methods in Photochemistry and Photophysics. Parts 1 and 2. By J. F. Rabek (The Royal Institute of Technology, Stockholm). John Wiley and Sons, New York. 1982. xviii + 1098 pp. $205.00.

This two-volume set is an invaluable resource for photochemists. The books consist of a detailed and very practical discussion of the equipment and techniques that are available for the study of photochemical and photophysical processes. A listing of the titles of the chapters will illustrate the scope of the books. The chapters in Part 1 are the following: The Nature and Properties of Light; Radiometric and Photometric Units, Optical Radiation Sources, Optical Systems, Filters, Polarization Components, Light Conductors, Optical Materials, Optomechanical Components, Optical Instruments and Structures, Non-conventional Detectors, Oscilloscopes, Signal Recovery, and Instrumentation. Part 2 has the following chapters: Lasers, Optical Modulation Techniques, High-Speed photography, Ultrafast Molecular Spectroscopy, Electronically Excited States, Emission Spectroscopy, Luminescence Lifetime Spectroscopy, Flash Spectroscopy and Flash Kinetic Spectrophotometry, Photochemical Processes, Photocells and Photoreactors, Solution Filters, Radiometry and Actionometry, Testing of Light Ageing of Materials, Vacuum and Gas Techniques, and Hazards in Photochemical Research.

The two volumes constitute a unit with pagination continuing from one to the other. Thirteen appendices giving important conversion factors, spectral characteristics of glasses, and the addresses of manufacturers of the equipment discussed in the books, as well as the bibliography, references, and index, are found at the end of Part 2. The books are richly illustrated with graphs, tables, and spectra. Pictures of equipment greatly add to the usefulness of the book as a practical guide to planning laboratory work in photochemistry and make for interesting browsing. Every scientific library should include this set of volumes and many photochemists will also want to have them available in their laboratories.

Seyhan N. Eğe, *University of Michigan*

Time-Resolved Fluorescence Spectroscopy in Biochemistry and Biology. Edited by R. B. Cundall and R. E. Dale (University of Salford and Paterson Laboratories). Plenum Press, New York. 1983. xiv + 785 pp. $110.00.

"Time-Resolved Fluorescence Spectroscopy" is a compilation of 42 papers presented in March 1980 at a meeting sponsored by NATO Advanced Study Institute. The individual contributions range from 2-p preliminary notes to a comprehensive 75-p review. This diversity in authorship and format results in a volume that is frequently jerky in its presentation. Each manuscript has been edited to standardize nomenclature, but no effort has been made to eliminate redundancy among the presentations. The index is very abbreviated, making it difficult to find information about specific topics.

Despite these distractions, this is an impressive book summarizing the work of leaders in the field. Its content is substantive and highly technical, aimed at the practicing spectroscopist rather than the student (or casual reader). Emphasis is placed on experimental techniques and data analysis, although illustrative data are frequently presented. In general, the concepts and analyses presented by the various authors are sufficiently general to have enduring value. However, some topics are clearly dated and could have benefited from addenda added in proof summarizing information available since 1980.

Richard A. Harvey, *UMDNJ-Rutgers Medical School*

A Textbook of Pharmaceutical Analysis. 3rd Edition. By Kenneth A. Connors (The University of Wisconsin). John Wiley and Sons, Inc., New York, NY. 1982. X + 664 pp. $55.00.

While the third edition of this book maintains its position as one of the best texts for serious students in pharmaceutical analysis, it is disappointing that more extensive editing of previous material and the inclusion of more new material was not undertaken in this revision. Thus, while coverage has been added on immunoassays, derivative formation, statistics, and liquid chromatography, these are not extensive nor in most cases well integrated into the previous material. Discussion of the applications of pharmaceutical analysis to the current interest and need for therapeutic drug monitoring are limited, as are discussions of the newer analytical techniques that have arisen dramatically since the last revision of the book. In short, it is unfortunate that the opportunity was not taken in this edition to make a good text better.

Joseph E. Sinsheimer, *The University of Michigan*

Protein and Peptide Hormones (Benchmark Papers in Biochemistry. Volume 4). Edited by John G. Pierce (University of California—Los Angeles). Hutchinson Ross Publishing Co., Stroudsburg, PA, and Van Nostrand Reinhold, New York, NY. 1982. xvii + 458 pp. $58.00.

This volume is not a text or monograph on protein and peptide hormones, as might be guessed from the title alone. Rather, it is an annotated collection of reprints, dating back as far as 1890, which characterizes the development of the field of hormone biology and chemistry from its origins to the very recent past.

The articles are grouped into five sections, each chosen to illustrate the development of a key concept or paradigm. These five sections are concerned with (1) the development of bioassays for hormones; (2) isolation of pure hormone preparations and association of hormone activity with the substance itself; (3) sequencing and chemical synthesis of peptides and proteins and study of sequence homology; (4) studies of tertiary structure, hormone receptors, and structure/function relationships; and (5) isolation of hormone precursors and elucidation of biosynthetic pathways. Each collection of papers is accompanied by a brief but effective narrative by the editor which introduces the articles and relates them to each other and to their historical context. The comments by the editor are amply furnished with references to additional contemporary works, many of which are described in some detail, and to relevant reviews for those who desire more depth on a given subject.

These collections contain many of the papers one would expect to find there and other, perhaps more unexpected, ones, together covering a remarkably large body of knowledge in a modestly sized volume. Many of the articles make truly exciting reading; some of the earlier papers gave rise to hot controversy at the time of their publication, and it occurred to this reviewer that a few of these rebuttals might have been profitably included in this collection. One area which, in the opinion of this reviewer, is insufficiently represented is that of structure–activity relationships, conformational studies, and computerized molecular modeling of peptides and proteins. This is presently a very active area which has been pursued for some time in both academic and industrial laboratories with some noteworthy successes. In general, the collection seems to have been compiled more from the standpoint of the biologist than that of the chemist.

Such minor reservations aside, this is an interesting volume which many of us, especially those just becoming acquainted with this field and those involved in teaching about it, would be happy to have on our shelves. It will also be of interest to historians of science. The book would even lend itself well for use as a text for a graduate course, although the price may discourage such use.

David C. Roberts, *Fordham University*

A Handbook of Inductively Coupled Plasma Spectrometry. By M. Thompson (Imperial College) and J. N. Wash (King's College). Blackie, Glasgow and London (distribution in the USA by Chapman and Hall, New York). 1983. x + 273 pp. $79.95.

Geochemists in search of a concise compendium of methods for elemental analysis will find this treatise to be quite useful. The authors present analytical methods in adequate detail and show plainly the interferences to which the various approaches are subject. Further, they demonstrate that many "matrix effects" have little to do with the inductively coupled plasma (ICP) and much to do with solution chemistry. While the book does not cover the full range of application of the ICP, the approaches given for geological and hydrological samples are sufficient to give direction to users with diverse interests. References are given through 1982.

In their attempt to present a practical approach to the use of the ICP, the authors totally avoid theory, and one is hard pressed to find any equations in the book, save for a cryptic comment at the end of the preface. One finds out "how" but never "why". Thus if any difficulties are encountered in any of the methods, no guidance is given as to ways of circumventing the problems. It is stated that Rb, K, and P determinations suffer from a lack of sensitivity, but no indication is given of the reasons. Some recent methods for direct introduction of solids are ignored. Discussions of instrumentation tend toward vague generalities and are presented in a somewhat chatty tone. The list of instrument manufacturers is incomplete (which is acknowledged in the text), but it includes all those companies with large installed bases.

Few errors were noted. In Chapter 2, it is stated that detection limits for various techniques will be compared in Chapter 10. No quantitative information on this topic appears in Chapter 10. However, scattered throughout the remainder of the book are tables of detection limits sufficient to satisfy most needs. On page 44, one is led to believe that a photomultiplier can be operated at an anode current of 10 mA to 1 A! In Table 5.1, several columns of numbers are unidentified (they appear to be channel numbers from a direct reader). These are annoying, but not critical.

It is curious that a book of ICP emission methods is appearing just at the time when mass spectrometric detection (which is mentioned at the end of this work) is being recognized as in many respects competitive or superior to photodetection. After nearly a decade of commercial availability, ICP emission is coming of age. For those desirous of using the ICP to get reasonable answers without understanding how those answers are derived, this book will serve well.

Alexander Scheeline, *University of Illinois*

Topics in Stereochemistry. Volume 14. Edited by N. L. Allinger, E. L. Eliel, and S. H. Wilen. John Wiley and Sons, Inc., New York. 1983. ix + 315 pp. $95.00.

This series is devoted to in-depth articles on aspects of organic stereochemistry, and this volume continues the standard of excellence established for the series.

The first chapter, on atropisomerism, by M. Oki, speaks to hindered rotation about single bonds. While the authors define the requisite barrier to rotation to be 23 kcal/mol, there are some sidelights here that could be useful to those researchers whose interests are focussed on much smaller differences. Similarly, the second chapter, on facilitated rotation of substituted ethylenes, by J. Sandstrom, offers some insights into how substituents can stabilize the polarized transition state resulting from olefin twisting. These concepts are applicable to other polarized transition states, such as those resulting from 4 + 2 or 3 + 2 cycloaddition.

Chapter 3, On Factoring Chirality and Stereoisomerism, by H. Hirschmann and K. R. Hanson, differs markedly from the other three in not being an extended tabulation of literature results. Rather, it is an effort to conceptualize and systematize ways of considering stereoisomerism. Like the recent summation by K. Mislow and J. Sigel (*J. Am. Chem. Soc.* **1984**, *106*, 3319), which covers some of the same ground, this is not for the casual browser. There is, however, much to be gained from working through these ideas. There is, for instance, both compelling elegance and practical value to the concept that a differentially substituted olefin is chiral in a two-dimensional frame of reference.

Chapter 4, on asymmetric reductions with complexed aluminum hydrides and trisubstituted aluminums, by H. Haubenstock, is a thorough review of the subject. Rather than focussing on two or three systems that work particularly well, the author has sought to include all that has been published as having been tried. This review should prove a valuable starting place for anyone embarking on research in this area.

The editors are to be commended for maintaining the high quality of this series and for getting this volume out in such a timely fashion. Literature references extend into 1982.

Douglass F. Taber, *University of Delaware*

Liposomes. Edited by Marc J. Ostro (The Liposome Company). Marcel Dekker, New York. 1983. ix + 397 pp. $58.75.

The usefulness of liposomes as a model membrane system is now well established. Investigations concerning the membrane biochemistry such as lipid–lipid, lipid–protein interactions, transport phenomena, and ligand binding have been greatly advanced by this model system. In addition, they provide an excellent vehicle for the delivery into cells of biologically active substances. This book comprehensively reviews the advances made in liposome research since 1965 with special emphasis on applied research. The introductory chapter provides an excellent historical perspective of liposome research that is delightfully unusual in style. In subsequent seven chapters this volume summarizes research on liposomes concerning methods of preparation, interaction with cells, protein and drugs, applications in molecular biology, immunology, and chemotherapy.

The authors are well-regarded experts in their fields, and each chapter is generally well-written, well-referenced, and a specialized review of the advances and limitations of respective areas. The book has very few distractions, and the authors have wisely avoided presenting too many tables and figures from their work, which frequently happens to be the case in books of this nature. This book is a significant contribution and is recommended for researchers in biological and biomedical sciences including biochemistry, biophysics, cell and molecular biology, pharmacology, and immunology. As the editor of the book put it, I agree that this volume will be useful to investigators well versed in "liposomology" as well as to those who wish to enter the field.

S. R. Srinivasan, *Louisiana State University School of Medicine*

Mechanisms of Inorganic and Organometallic Reactions. Volume 1. Edited by M. V. Twigg (Imperial Chemical Industries P.L.C., Billingham, U.K.). Plenum Press, New York. 1983. xv + 373 pp. $49.50.

The book is the first volume of a new series intended primarily to take the place of the now defunct "Specialist Periodical Reports" on "Inorganic Reaction Mechanisms".

Part 1 deals with Electron Transfer Reactions. A. G. Lappin gives a good account of both theoretical and experimental aspects of general redox processes. Much of the data are given in extensive tabular form. As expected, the style of reporting is rather dry, yet the coverage is comprehensive and includes excited-state electron-transfer reactions and a brief mention of metalloprotein redox reactions. Chapter 2, by A. McAuley, deals with metal ion–ligand redox reactions. It is logically organized according to reactions of metal complexes with inorganic substrates and oxidation of organic substrates and of metal complexes. In addition, it provides a useful summary of the major reviews covering this field.

Part 2 reports on Substitution and Related Reactions. The reactions of compounds of the nonmetallic elements are treated by M. N. Hughes. The coverage is organized according to the main group element being substituted and includes such diverse aspects as nitrosation reactions of environmental interest, reactivity of the excited stated of dioxygen, and oscillation reactions involving bromate ion. In a relatively short yet fairly detailed discussion of recent aspects of the substitution reaction of inert metal complexes with coordination numbers 4 and 5, J. S. Coe points out that the basic features are now well established, but nevertheless, current investigations on solvent effects and determination of activation volumes are providing finer mechanistic deails for these reactions. As expected, the chapter on substitution reactions of inert metal complexes of coordination numbers 6 and above, by J. Burgess and P. Moore, forms the lion's share of the book. Coverage of the material is comprehensive and classically organized around the transition metal involved. A very useful two-page introduction helps the reader to focus on areas where significant progress has been made during the lifetime of the review, for example measurement of activation volumes and photochemical substitution reactions. The review by D. N. Hague on substitution reactions of labile complexes completes this part of the book.

Part 3 outlines the Reactions of Organometallic Compounds. Chapter 7, dealing with metal–alkyl bond fission and formation, and Chapter 8, on substitution, oxidative addition–reductive elimination, and migration-insertion reactions, are both by M. Green. The former gives a rather cryptic coverage of a topical but evolving field of endeavor; the latter contains a good cataloguing of the important studies on substitution reactions and gives a good account of the trials and tribulations encountered by those who attempted to clarify the mechanistic intricacies of oxidative–addition–reductive-elimination reactions. A. J. Deeming reviews very effectively the rearrangements, intramolecular exchanges, and isomerization of organometallic compounds. All aspects, including hydrogen and alkyl migration reactions, of rearrangements are covered. The present reviewer takes some exception to the use of tropilium to designate the η^1-, η^3-, and η^5-C_7H_7 (cycloheptatrienyl) ligand system. The reactivity of coordinated hydrocarbons is discussed by L. A. P. Kane-Maguire. The coverage here is limited to the mechanism of stoichiometric reactions; most of the studies are on nucleophilic addition and substitution, although a few examples of electrophilic attack are also listed. The last chapter, by J. M. Davidson, concentrates on the mechanism of homogeneous catalysis of organic reactions by complexes of metal ions. It starts with a well-stated scope and gives a good albeit all too short discussion of the major happenings during the period reviewed.

The book (and the series) is worthwhile undertaking and fills a need in the coverage of this important area of endeavor. The editor and reviewers are to be congratulated for the readability of the chapters and absence of significant errors. One major criticism is the delay between publication (1983) and the period covered (July 1979 to December 1980 inclusive). Especially in a rapidly expanding area such as mechanistic investigations of organometallic reactions, a three-year delay is unacceptable. It is to be hoped that future volumes will be produced more quickly.

J. Takats, *University of Alberta*

The Practice of Ion Chromatography. By Frank C. Smith, Jr. (Bio-Rad Laboratories), and Richard C. Chang (General Electric Co.). John Wiley and Sons, New York. 1983. 214 pp. $52.95.

This brief monograph treats the historical development and the experimental practice of ion chromatography (IC). The growth of the IC technique (first announced in 1975) is a consequence of its convenient application to the direct analysis of ionic species in aqueous and other media. It combines the large separative capacity of ion-exchange resins (normally of the surface sulfonated polystyrene type) with the sensitivity of conductometric detection. Background conductivity can be virtually eliminated with the addition of specially treated supressor resins, and analyses of ions at ppm concentration levels with retention times on the order of minutes are routine.

After short descriptive chapters dealing with the historical development of the technique and the design of present-day commercial ion chromatographs, the authors treat practical applications in considerable detail in chapters entitled Practice of IC, Non-Supressed IC, Applications of IC, and Methods Development in IC. A final chapter gives their judgement concerning the trend of future developments. There is essentially no treatment of the theoretical foundations of this separative technique, nor of its importance or impact in any area other than straightforward analytical application. The treatment is unabashedly practical. A great many specific examples are cited and/or described but with very little attempt to insert a unifying theme. The survey of the relevant literature is thorough, more than 400 references are cited. The book will primarily be of interest to a narrow audience consisting of analytical chemists and technicians practicing IC.

Alexander Van Hook, *University of Tennessee*

Electrooxidation in Organic Chemistry. The Role of Cation Radicals as Synthetic Intermediates. By Kunihisa Yoshida (Osaka University). John Wiley & Sons, New York. 1984. xv + 323 pp. $49.00.

This book appears virtually certain to have a major impact on organic electrochemistry in the next few years. In both concept and execution it is an excellent work, but its special impact results from its timeliness. At a time when the organic chemical industry is moving toward "cleaner" methods, such as electrochemistry, and when preparative scale electrochemical reactors which render irrelevant the traditional aversion of the synthetic organic chemist for electrochemical syntheses are becoming commercially available, a book such as this is particularly valuable. The subtitle also stresses the synthetic importance of cation radicals, which are themselves rapidly gaining status among organic chemists. The synergistic interaction of these two emerging themes imparts special power to the volume.

The book is written for the general researcher who may have no special familiarity with electrochemical methods but who may need to exploit the latter during the course of his research. As such it is a practical book, but the theory is developed with sufficient rigor and the reaction mechanisms are written with the sophistication needed to impart real authority. Chapter 1 develops basic electrochemical terminology, the theory of electrode processes, and practical approaches to selecting solvents, electrodes, etc.; Chapter 2 gives details concerning the electrochemical formation and modes of transformation of cation radicals; Chapter 3 discusses homogeneous reactions of stable cation radicals with nucleophiles; Chapters 4–7 describe respectively reactions of cation radicals to form C–C, C–O, C–N, and C–X bonds (X = miscellaneous); the final chapter discusses catalytic electron-transfer reactions. MO methods are used in Chapter 4 to rationalize some selectivities in cation radical reactions.

While the volume is clearly of great value to both organic chemists and electrochemists, potentially the most important applications of cation radicals in organic synthesis, namely in pericyclic reactions such as the recently discovered cation radical Diels–Alder, remain to be applied in the electrochemical domain and should give still further impetus to the field in the coming years.

Nathan L. Bauld, *The University of Texas at Austin*

The Sulfur Electrode. Fused Salts and Solid Electrolytes. Edited by Ragnar P. Tischer (Ford Motor Co.). Academic Press, New York. 1983. xiv + 375 pp. $68.00.

The authors of this book have provided a valuable summary of the electrochemistry of sulfur and of the properties of sulfur and its compounds that relate to electrochemical applications. A vast quantity of significant sulfur chemistry has been uncovered in the quest for an applicable battery system utilizing the sulfur electrode, and the lack of realization of this ultimate goal detracts but little from the value of the book.

Five chapters of the text report on fundamental chemical and electrochemical studies of sulfur and metal sulfides, and three chapters are devoted to descriptions of specific electrochemical cells. The latter include sufficient engineering detail that the non-engineer will appreciate the difficulty attendant to the design of a functional cell.

Both fundamental properties and applications of fused salt electrolyte systems are described, as are the solid electrolytes β-alumina and glass. Extensive and well-referenced coverage of the sodium–sulfur cell using β-alumina electrolyte comprises fully one-fourth of the text.

The entire text is an authoritative treatment, and it is appended with an updated compilation of the physical properties of sulfur and polysulfides. The book will prove particularly helpful to anyone newly venturing into these or related research areas.

Roger K. Bunting, *Illinois State University*

Manual of Laboratory Pharmacokinetics. By S. H. Curry (University of Florida) and R. Whelpton (The London Hospital Medical College). John Wiley & Sons, New York. 1983. xii + 189 pp. $21.95.

This book was written to introduce commonly used biochemical methods to beginning laboratory workers interested in biopharmaceutics, drug metabolism, pharmacokinetics, and related topics. It consists predominantly of detailed descriptions of experiments which put various methods to use. Theoretical sections are brief but to the point, and appropriate references are given. Included are experiments to illustrate the physicochemical properties of drugs, drug binding, and absorption, metabolism, disposition within the body, and excretion of drugs. The kinetic aspects of metabolism and turnover are emphasized. The experiments use radioisotopes, radioimmunoassay, selected chromatographic methods, colorimetry, spectrophotometry, and fluorescence spectroscopy. Most of the experiments can be accomplished in a half day or less. Although anyone interested in practicing the use of these methods will find this book useful, it should be especially valuable as a textbook for methods courses for graduate students.

Coy D. Fitch, *St. Louis University School of Medicine*