Additions and Corrections

Micellar Control of Organic Reactions: Propellane Substrates as Stereochemical Probes for Micellar Binding [*J. Am. Chem. Soc.* **1987**, *109*, 7477–7483]. ANAND NATRAJAN, JOSEPH D. FERRARA, WILEY J. YOUNGS, and CHAIM N. SUKENIK*

Page 7479, Table I: The entry for the $n = 8$ *aa*-diol should list J_{S2} as 1.8 Hz, J_{S3} as 6.8 Hz, and J_{23} as 14.0 Hz. The entry for the $n = 20$ *aa*-diol should list H_2 (J_{S2}) as 2.02 (0) and H_3 (J_{S3})(J_{23}) as 1.90 (6.1) (14.5). The letters A and S as subscripts in the column headings should all be lower case (a, s) to correspond to the designations in the figures.

Isotopically Sensitive Branching and Its Effect on the Observed Intramolecular Isotope Effects in Cytochrome P-450 Catalyzed Reactions: A New Method for the Estimation of Intrinsic Isotope Effects [*J. Am. Chem. Soc.* **1986**, *108*, 7074–7078]. JEFFREY P. JONES, KENNETH R. KORZEKWA, ALLAN E. RETTIE, and WILLIAM F. TRAGER*

Page 7076: Equation 3 is wrong as written and should read as follows

$$(k_H/k_D)_{obsd} = d_3/d_2 - (d_2 + d_3)F_2$$

Due to this error the isotope effects in Table II on p 7077 should read 9.38 ± 0.91 and 11.77 ± 0.19 for the hydroxylation of the octane-*1*-$^2H_3$ substrate with microsomes and P-450b respectively and 3.43 ± 0.031 and 4.00 ± 0.018 for the respective octane-*1,2,3*-$^2H_7$ substrate. This error does not affect the conclusions of the paper.

The Separation of the Intramolecular Isotope Effect for the Cytochrome P-450 Catalyzed Hydroxylation of *n*-Octane into Its Primary and Secondary Components [*J. Am. Chem. Soc.* **1987**, *109*, 2171–2173]. JEFFREY P. JONES and WILLIAM F. TRAGER*

Page 2172: Due to an unrecognized error in eq 3 presented in a previous paper (Jones et al. *J. Am. Chem. Soc.* **1986**, *108*, 7074) the isotope effects reported in Tables I and II need correction.

Table I should now read:

Table I. The Observed Isotope Effects Associated with the Oxidation of Selective Deuteriated Octanes

	isotope effect	
substrate	microsomes	P-450b
(1,1,1-$^2H_3$)octane (d_3)	9.38	11.77
(1,1,8,8-$^2H_4$)octane (d_4)	3.43	4.00
(1,8-$^2H_2$)octane (d_2)	14.50	16.21

Table II should now read:

Table II. The Separated Primary and Secondary Isotope Effects Associated with the Oxidation of Octane

	microsomes		P-450b	
	d_3/d_4	d_3/d_2	d_3/d_4	d_3/d_2
primary	7.61	7.90	9.10	9.18
seondary	1.11	1.09	1.14	1.13

While these changes do not significantly alter the conclusions reached in this paper the rule of the geometric mean now appears to hold, and indeed the departure that was observed was due to this unrecognized source of error.

*Book Reviews**

Food Biotechnology. Edited by D. Knorr (University of Delaware). Marcel Dekker Inc.: New York and Basel. 1987. XIII + 613 pp. $99.75. ISBN 0-8247-7578-3

The contents of this book arose from a symposium "Genetic Engineering in Food Production" presented at the Annual Meeting of the Institute of Food Technologists held in 1984. The book is organised into five sections with a number of individual chapters in each.

Part one deals with the relationship between biotechnology, food production, food processing, and the nutritional quality of foods. The four chapters each give a good introduction and illustrate some differences in approach, no doubt due to the authors being based in Canada, the Netherlands, German Democratic Republic, and USA. It is quite clear that even now there is no generally accepted definition of biotechnology. Dr. Knorr as editor favors the definition put forward by the European Federation of Biotechnology.

In the second part there are reviews on the methods and processes in biotechnology, including analytical methods, fermentation processes and process control, cell culture processes, and immobilisation methods. If biotechnology is to advance, advances in all these areas are essential. Seven chapters are included here. Five chapters are in part three which is concerned with the bioprocesses for the modification and conversion of raw material. The development of new plant varieties, the isolation of functional proteins from yeast, and molecular cloning of carbohydrases are fully discussed. Part four contains four chapters dealing with the production of food ingredients and processing aids, making use of biotechnology for this purpose. Corn sweeteners, lipids, and bacterial starter cultures as well as the special cold-adapted enzymes from fish are discussed.

In the final part there are only two chapters, dealing with the regulatory aspects and a social appraisal of biotechnology.

An interesting volume, each author or group of authors has approached the topic in their own way. Each chapter has a good list of modern references, and the reader can certainly dig deeper in the topic concerned. The editor is to be congratulated on producing such a readable book from forty authors in seven countries. This volume should be on the reading list for all graduate students concerned with the applications of chemistry, biochemistry, engineering, and microbiology to food production.

I. D. Morton, *King's College (KQC)*

Biogeneration of Aromas. Edited by Thomas H. Parliment and Rodney Croteau. American Chemical Society: Washington, D.C. 20036. 1986. 397 pp. $74.95.

This book was developed from the ACS Symposium held in September 8–13, 1985, sponsored by the Division of Agricultural and Food Chemistry of the American Chemical Society at the 190th meeting. It is an excellent reference book in a very rapidly growing and interesting area covering all aspects of biogeneration of aromas. Also it could be used as a textbook but is quite expensive. The book consists of 29 chapters divided into 6 major sections—Prospectives, Analytical Methodology, Biosynthetic Pathways, Metaolism of Specific Compounds, Biogeneration of Selected Aromas, and the Summary.

The perspectives section gives a good insight into aroma and flavor from the consumer, legislative, and industry viewpoints and shows the interrelationships between all three.

The analytical section discusses most of the latest techniques used in flavor and aroma analysis like capillary GC, GC/MS, and headspace analysis. However, it neglects to discuss supercritical chromatography, which although it was in its infancy when the symposium was held could have been discussed here.

The section on biosynthetic pathways discusses the biosynthesis of

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* Unsigned book reviews are by the Book Review Editor.

cyclic monoterpenes and carotenoids along with the enzymatic degradative pathways that produce aroma compounds in mushrooms, blackcurrant, wheat, and fresh fish. Although the book only covers a small amount of the available work in this area, it covers a diverse range, which is helpful.

The metabolism of specific compounds section is concerned with monoterpenes from grapes, linalool from Botrytis cinerea, ethyl acetate from Candida utilis, 2-methoxy-3-alkylpyrazines from Pseudomonas perolens, acetaldehyde and ethanol in citrus fruit, and methanethiol from methione. Like the previous section, this is a very fast growing area so the editors did an excellent job at getting a good representation.

The section on biogeneration of selected aromas deals with the production of flavor and aroma compounds through enzymes and microorganisms. It gives some good examples as to how different compounds are produced by these techniques and how they may be used in the food industry.

The summary is very effective in summarizing the entire book and putting all chapters in perspective.

Overall, the book does a good job at selecting a wide variety of examples to cover a very broad and fast moving area of flavor and aroma chemistry and biochemistry. Definitely it is a worthwhile reference book.

Rodney J. Bushway, *University of Maine*

The Surface Scientist's Guide to Organometallic Chemistry. By Mark R. Albert & John T. Yates, Jr. American Chemical Society: Washington, D.C. 1987. xiii + 214 pp. $45.00. ISBN 0-471-01077-4

Just like most books concerning transition metal organometallic chemistry this one begins with an introduction followed by two chapters of basic material: Basic Coordination Chemistry and Overview of Coordination Ligands. The first of these two chapters describes the 18-electron rule and introduces both valence bond and molecular orbital descriptions of bonding with brief coverage of the trans effect and other incidentals. The next chapter takes us through discussions of various ligand types and it is here that this book begins to stand out as something new and different. Thus, the ligand classification begins with diatomics, substituted diatomics, and ethylene and the cumulenes, moves on through heterolefines, triatomic pseudohalogens, and related species, and finishes up with molecular fragments as ligands and atomic species. For each type of ligand the relationship between the coordination behavior in organometallic and coordination compounds is contrasted with the surface chemistry of chemisorbed species. The authors even point out for us when key relationships are missing because certain organometallic compounds have not been studied in sufficient depth or because the surface chemistry of some particular substrate has not been investigated.

Following this overview, and maintaining the new perspective developed, comes a chapter covering bonding in clusters and the relationship to surface phenomena. Using a frontier molecular orbital approach, the authors review work on monometallic, bimetallic, and triangulo-clusters as well as A-frame complexes. Analogies with monometal (or atop) sites, twofold bridging sites, threefold sites, and long bridging sites on metal surfaces are developed through the chapter.

The concluding chapter is devoted to describing the emerging applications of orbital symmetry and orbital overlap to surface band structure calculations. The density of states projection calculation is described and two example studies, the bonding of CO on Ni(100) and the bonding of H_2 on Ni(111), are discussed in detail.

The book contains many key references, including leading reviews and monographs, and even has a glossary of terms including both the language of the surface scientist and that of the organometallic chemist. There are always limitations on how much material can be included in a small book, but perhaps it would have been worthwhile to note how common or rare various structural types are. For example, the discussion of cyanide as a ligand mentions both linear (M–CN–M) and bent (as in bridging carbonyl) bridging modes without telling us that the former is common while the latter is very rare. With this exception, the discussion appears complete and fairly detailed.

This book is most valuable for the perspective it gives us on organometallic chemistry. What we need now is a companion volume entitled *The Organometallic Chemist's Guide to Surface Chemistry.*

Julian A. Davies, *The University of Toledo*

Advances in Organometallic Chemistry. Edited by O. A. Reutov (USSR Academy of Science). Mir Publishers: Moscow (Distributed by Imported Publications, Inc., Chicago). 1984. 261 pp. $9.95. ISBN 0-8285-2884-5

The preface of this volume, which is part of a series entitled *Advances in Soviet Science and Technology*, makes it clear that it is intended to introduce the foreign reader to recent accomplishments by Soviet scientists. The preface further states that the intention is to summarize the major achievements in Soviet organometallic chemistry and this it succeeds in doing. Thus anyone interested in an excellent review of the contributions made by Soviet chemists to the areas described under the eleven chapter headings will find it useful, with the reservation that there are relatively few references after 1979 and the work is not always placed in the context of work done in the rest of the world. For this reason it may be helpful to the potential reader to comment briefly chapter by chapter. The discussion in Chapter 1, on "The mechanisms of electrophilic substitution in the organometallic chemistry of non-transition elements" by O. A. Reutov, pp 13–29, centers around S_E2, $S_E1(N)$, and S_E2 i.p. mechanisms with only passing reference to work outside the USSR. Chapter 2 on "Carbon–carbon metallotropic tautomerism" by Yu. A. Ustynyuk, pp 30–72, contains many illustrative temperature dependent ^1H and $^{13}C(^1H)$ NMR spectra and extensive use is made of tables and diagrams. Significant effort is made to place the work in the context of the international scene. Chapter 3, "Solvent effects on the kinetics and mechanism of organomercury reactions," by V. S. Petrosyan, pp 73–87, provides a number of tabulations on kinetic parameters and is very readable. Chapter 4, "Carbon–group IVA element compounds with a multiple $p\pi$–$p\pi$ bond; new approaches to synthesis", by I. P. Beletskaya and N. N. Zemlyansky, pp 88–116, is clearly written, well illustrated, and has the advantage of several references as late as 1983. By contrast to most others, Chapter 5, "New method for synthesis of cationic arene complexes of group VII and group VIII metals", by M. I. Rybinskaya, V. S. Kaganovich, and A. R. Kudinov, pp 117–127, is notable for the fact that there are more non-soviet references than soviet and therefore it takes a relatively broad view of a specific topic. Chapter 6, on "Ligand exchange in ferrocene", by N. A. Vol'kenau, pp 127–151, reverts to essentially a summation of the work and outlook of one soviet group. Chapter 7, on "Organogold(I) complexes", by E. G. Perevalova and K. I. Grandberg, pp 152–174, is very well illustrated with clearly set-out sections on synthetic routes, structure, and reactivity. Useful introductions to those unfamiliar with chirality are contained in Chapter 8, on "Optically active organometallic compounds with central and planar chirality", by V. I. Sokolov, pp 175–195. The next two sections, Chapter 9, on "Homolytic reactions of addition to unsaturated tin, germanium, and silicon derivatives", by M. G. Voronkov, V. I. Rakhlin, and R. G. Mirskov, pp 196–216, and Chapter 10, on "New findings concerning liquid phase autoxidation of organometallic compounds", by Yu A. Alexandrov, pp 217–234, are fairly detailed accounts of work done in the two areas largely by the authors and their co-workers. Finally, Chapter 11, on "Some results of studies into organoaluminum synthesis", by G. A. Tolstikov, pp 235–261, sets out to and succeeds in discussing work carried out at one institute in the context of the industrial importance of organoaluminum compounds.

John E. Drake, *University of Windsor*

Fundamentals of Hot Wire Anemometry. By Charles G. Lomas (Rochester Institute of Technology). Cambridge University Press: Cambridge, New York, and Melbourne. 1986. xii + 211 pp. $52.50. ISBN 0-521-30340-0

This book indeed lives up to the promise in its preface; namely, to give "technical and practical information that otherwise could be acquired only spending many hours researching the technical literature." The author could have added that the book also contains much information that is normally acquired by interacting with experienced practitioners.

The title of the book is a bit misleading since it covers much more than just Hot-Wire Anemometry. It covers the use of hot-wire and hot-film probes for measurements of velocity, temperature, and concentration. Adequate theory is covered to give the reader a working knowledge of the devices. The author gives a plethora of information about calibration procedures, error sources, and various types of contamination that can be encountered in environments ranging from recirculating wind tunnels to measurements of salt water to measurements in mercury. The advice is occasionally so detailed that at one point the author advises wearing a safety harness while mounting a probe on a shipboard mast! Furthermore, the author covers use of commercially available probes as well as methods for making one's own probes.

In his zeal to be encyclopedic, the author does include some topics of questionable current interest and likewise omits some topics that should be covered. For instance, the author gives some passive circuits for extending the frequency response of the anemometers but neglects to give an analytical form for the step or impulse response of the probe. Given the availability and ease of use of modern operational amplifiers, it is doubtful that anyone would build a new passive compensation circuit. However in order to use the operational amplifiers, the user needs to know the form of the impulse response that is being compensated.

In the discussion of probe self-interference due to wake shedding from the probe, the author mentions that there is a wake shedding for Reynolds' numbers under 50. The book contains no graph of Strouhal number vs Reynolds' number. Nor does it mention what happens at

Reynolds' numbers above 50. The reader may be left with the impression that there is no problem for the higher Reynolds' numbers. Considering the completeness of the rest of the book, this is a curious omission. I am sure this will be corrected in subsequent editions.

The captions for figures illustrating theoretical and measured temperature profiles on hot wires lack an explanation of which of the sets of data in the graph is theory and which is measured.

Overall I think this book is a welcome addition to the toolbox of any practitioner attempting fluid mechanics measurements.

Robert V. Edwards, *Case Western Reserve University*

Nuclear Magnetic Resonance: General Concepts and Applications. By W. W. Paudler (Portland State University). John Wiley & Sons: New York. 1987. xi + 291 pp. $35.00. ISBN 0-471-83979-5

This is a revised version of Paudler's 1971 book *Nuclear Magnetic Resonance*. Chapter 2, "Chemical Shift—General Considerations", has incorporated examples from across the periodic table. Modern 1-D pulse technique including the general principles of FT–NMR are covered in 10 pages in Chapter 9. 2-D NMR, solid-state NMR, and imaging are treated qualitatively in Chapter 10 (17 pages). The remainder of the book, including references, is largely unchanged from the 1971 version. The text is non-mathematical, written by an organic chemist for organic chemists. The presentation is weak on the more physical topics. For NMR beginners, this reviewer prefers the books by Abraham and Loftus for organic chemists and Akitt for an introduction to multinuclear NMR. The book by Derome is a more practical guide to modern NMR techniques for the practising organic chemist.

John B. Grutzner, *Purdue University*

The Chemical Bond. By J. N. Murrell (University of Sussex), S. F. Kettle (University of East Anglia), and J. M. Tedder (University of St. Andrews). John Wiley and Sons: New York. 1985. vii + 333 pp. $31.95. ISBN 0471907596

This is the second edition of a book first published in 1978, which addresses a number of topics of interest to chemists who are concerned with a detailed description of the chemical bond and the consequences of this description with respect to reactivity, spectroscopy, molecular symmetry, stability, and related topics. The authors point out in their Preface to the Second Edition that there has been "...an enormous growth in the calculations of molecular electronic wave functions and energies..." since the first publication, and clearly this growth has continued to the present time. It is therefore important to recognize the value of this volume in providing a conceptual framework for such calculations, rather than presenting the latest results of such calculations in detail.

After four introductory chapters dealing with the fundamentals of the Schrödinger equation, atomic orbitals, and chemical periodicity, the idea of molecular electronic wave functions is introduced, followed by a discussion of the LCAO approximations. The relationship between symmetry and the constraints imposed on molecular orbitals is treated in a chapter that also covers symmetry operations, the meaning of character tables, and a simple discussion of energy level diagrams, followed by the concepts of hybridization and the electron-pair bond in an MO description. A discussion of the independent electron model is illustrated with examples of simple organic molecules, followed by a treatment of Hückel theory and its application to olefins and aromatic compounds.

A brief interlude covering the application of the previously developed ideas to the band theory of solids (including metals and semiconductors, treated very lightly) is followed by an introduction to perturbation calculations and the energy levels of many-electron atoms. Of primary interest to inorganic chemists are the two following chapters that deal with ligand field theory and valence bond theory, and a number of examples (O_h complexes for the former, resonance structures for the latter) are briefly discussed. The relationship between chemical reactivity and the nature of the chemical bond is examined next, including a discussion of frontier orbital theory and the Woodward–Hoffman rules and their application to a number of familiar chemical reactions. The weaker chemical forces (van der Waals, hydrogen bonding interactions, and steric effects on reactivity) are treated next, followed by a final chapter dealing with ab initio calculations, the Hartree–Fock formalism, and some comments on the application of computer programs to SCF calculations.

In addition to a subject and chemical formula and substance index, there are occasional references to the literature scattered throughout the text, but (unfortunately) there is no reference for further reading at the end of the various chapters. Since, in a number of instances, the textual treatment is of an introductory nature, such further guidelines into the literature might have been useful, and perhaps the authors will consider this in a further edition of this volume. The major usefulness of the book will be as a resource for the academic who is teaching topics related to the structure and reactivity of molecules, as well as to chemists in general who require a readable treatment of a modern description of the chemical bond and its relationship to the properties of chemical substances.

R. H. Herber, *Rutgers University*

Analytical Chemistry by Open Learning: Classical Methods: Volume 1. By Derek Cooper (North Staffordshire Polytechnic) and Chris Doran (Wirral Metropolitan College). John Wiley and Sons: New York. 1987. xxi + 373 pp. $26.95. ISBN 0-472-91363-4

This series is intended for distance learners, people who do not attend a traditional institution in a traditional way. There are however, nominated institutions—Polytechnics, Colleges etc.—in Great Britain and, it is hoped, soon worldwide, which offer tutorial and laboratory support. The level of the books is that of a senior technician and a certain amount of preknowledge is assumed.

What sets the work apart is its organization. There are 13 parts to it. Seven in Volume 1 and six in Volume 2. Most of the necessary theory is brought at the beginning of the book in parts 1 through 5. They deal solely with equilibria, part 1 quite general, 2 with acid–base, 3 with solubility, 4 with complex formation, and 5 with redox systems. These parts are largely theoretical, using the same arguments and examples as many introductory american textbooks. Compared to those the treatment is brief and the level is rather low and somewhat uneven. We are given a thermodynamic explanation for the stability of chelates but activity coefficients are barely mentioned and the concept of ionic strength is completely missing. The Brønsted–Lowry theory is nicely developed but soon thereafter a hydrolysis constant is introduced to account for the pH of strong–weak salt solutions. And expediency wins over chemistry when AgCl is used to show the influence of excess ions on solubility. But there is one feature of the book that makes even this section worth reading: A large number of self-assessment questions. Most are very well chosen, should give the student a good estimate of his degree of understanding, and have fairly extensive answers taking up the last 80 pages of the volume. This is considerably more than in standard textbooks and I believe it is worth it.

Part 6 deals with volumetric analysis in general, beginning with applications and utility. Laboratory procedures are described and explained, the use of molarity, molality, and normality in calculations is demonstrated and, in connection with error tracing, some relevant statistics are introduced. This is a useful chapter.

Part 7 is the longest and the best part of volume 1. It deals with acid–base titrations on a very practical level and quite extensively, from the choice of standards and indicators to potentiometric titrations and non-aqueous solvents. I expect that parts 8–13, contained in Volume 2 and dealing with precipitation, complexometric, and redox titrations, and with gravimetric analysis, will be similar. If this is true, the work is well worth having, not only for its intended readership of high-level technicians learning at home but also for traditional students attending a traditional institution.

F. Kasler, *University of Maryland*

Annual Review of Biophysics and Biophysical Chemistry. Edited by D. M. Engelman (Yale University), C. R. Cantor (Columbia University), and T. D. Pollard (Johns Hopkins). Annual Reviews, Inc.: Palo Alto, CA. 1987. xii + 632 pp. $44.00. ISBN 0-8243-1816-1

The goals of the new (since 1985) format of this series, viz., *Biophysical Chemistry* instead of *Bioengineering* in the title, are (from the 1986 volume) to "stress the development of new physical methods, the establishment of theoretical principles, the use of physical methods to obtain important biological results, and the use of physical hypotheses to explore and understand biological phenomena". These goals are admirably served by the 24 reviews in the present volume.

Six reviews deal with components and functions associated with membranes: a related group of four articles on ion channels by Eisenman and Dani (an overview), Yellen (potassium channel permeation), Begenisich (sodium channel permeation), and Tsien, Hess, McCleskey, and Rosenberg (calcium channel permeation); and reviews on lipids of thermophilic prokaryotes (Luzzati, Gambacorta, DeRosa, and Gulik) and on peptides with membrane affinity (Kaiser and Kézdy). Structure is a major theme of reviews on halophiles (Eisenberg and Wachtel), coated vesicles (Pearse and Crowther), and regulation of muscle contraction by troponin-tropomyosin (Zot and Potter). Physical methods are discussed in five reviews: synchrotron radiation for angiography (Rubenstein), polarized light interactions with biomolecules (Tinoco, Micklos, Maestre, and Bustamante), real space improvement of crystallographic macromolecular images (Podjarny, Bhat, and Zwick), high-resolution NMR of tissue metal cations (Springer), and NMR and distance geometry studies of DNA in solution (Patel, Shapiro, and Hare). Considerations of stability and interactions underlie reviews on thermodynamic stability of proteins (Schellman), antigen–antibody recognition (Mariuzza, Phillips, and Poljak), and metabolic reaction sequences (Srivastava and Bernhard). Dynamics and kinetics are themes of reviews on water surrounding biomolecules (Saenger), rapid reaction techniques applied to the acetylcholine receptor (Hess, Udgaonkar, and Olbricht), and spectroscopic analysis of ligand–receptor dynamics (Sklar). A strong theory flavor comes through in reviews on growth-optimizing accuracy of gene expression (Kurland and Ehrenburg), efficiency in nonlinear biochemical reactions (Ross and Schell), physical limits to sensation and perception (Bialek), and the three-state model for hemoglobin ligand binding (Ackers and Smith). The autobiographical chapter tradition of the two previous volumes in this series is continued by a conversation with Jeffries Wyman.

S. Krimm, *University of Michigan*

Nitroazoles: The C-Nitro Derivatives of Five-Membered N- and N,O-Heterocycles. By J. H. Boyer (University of New Orleans). VCH Publishers: Deerfield Branch, FL. 1986. xv + 368 pp. $79.95. ISBN 0-89573-148-7

This book represents Volume 1 of a projected series on *Organic Nitro Chemistry* under the managing editorship of Henry Feuer of Purdue University and an editorial board of international scope. It is a compendium of the syntheses, properties (chemical, physical, and some biological), and reactions of nitro derivatives of pyrroles, imidazoles, pyrazoles, triazoles, tetrazoles, oxazoles, isoxazoles, and oxadiazoles that are covered in the literature listed through Volume 98 of *Chemical Abstracts*, 1983. A bibliographic addendum from Volumes 99 and 100 is included. Related classes of nitroamines, nitrates, nitrones, nitrile oxides, and the like are also presented.

Brief statements of reaction conditions and yields (both high and miniscule) are accompanied by a complete array of structural formulas and full or partial names of starting materials and products. While similar reactions are grouped together, there is little attempt made to generalize or interpret the results. Physical properties reported include ultraviolet, NMR, IR, mass, and ESR spectral data, but not melting or boiling points. Acidic, basic, and electrochemical data, as well as results of theoretical calculations, are summarized. There are more than 1,500 literature references—apparently an excellent coverage of these aforementioned topics.

This treatise is clearly directed toward organic chemists who specialize in azole chemistry or who wish to initiate a search of the relevant literature in this area. It clearly belongs in a research library concerned with heterocyclic chemistry. Moreover, azole chemists should find it a useful volume to add to their personal collections.

LeRoy H. Klemm, *University of Oregon*

Synthesis of Natural Products: Problems of Stereoselectivity. Volumes 1 and 2. By P. Kocovsky (Czechoslovak Academy of Sciences), F. Turecek (Czechoslovak Academy of Sciences), and J. Hajicek (Research Institute of Pharmacy and Biochemistry, Prague, Czechoslovakia). CRC Press, Inc.: Boca Raton, FL. 1986. $195.00 (two volume set). Volume 1: 233 pp. ISBN 0-8493-6406-X. Volume 2: 284 pp. ISBN 0-8493-6407-8.

The goal of this two-volume series is to provide a comprehensive and systematic treatment of the synthesis of natural products from a methodological viewpoint. The organization is based on structural subunits which commonly occur in natural products, and further, by the mode of formation of strategic bonds. Literature up to mid-1984 is covered, with some important 1985 references added in proof.

Volume one begins with a general introductory section on the factors that contribute to stereoselection in bond-formation reactions. Six of the seven remaining chapters deal with the synthesis of cyclic compounds (general aspects, condensed systems, spirocyclics, bridged rings, medium/large rings, and stereoselective substitutions in cyclic systems). The final chapter describes chiral synthons for the synthesis of optically pure materials. These synthons are grouped into several categories: terpenes, amino acids, hydroxy acids, carbohydrates, and miscellaneous synthons.

Volume two begins with the synthesis of heterocyclic compounds. Again, the organization is by the mode of bond formation. For example, sections on [4 + 2] cycloadditions, [3 + 2] cycloadditions, ene reactions, etc. are presented. The largest chapter covers the synthesis of acyclic systems, with an emphasis on stereoselectivity. Modification of preexisting acyclic compounds, de novo construction, fragmentation of cyclic systems, and the use of olefins to construct acyclic compounds are the major categories in this chapter. A short chapter on the synthesis of compounds with axial chirality is followed by a chapter labeled "Divertimento", which attempts to pull together some of the concepts of the two volumes by presenting a few exemplary total syntheses.

These books are taken in part from an advanced organic chemistry course on organic synthesis. Clearly, they will be very useful for those who teach such a course. The organization by disconnection is a natural one for teaching synthesis, and the highly visual nature of the books will make it easy to use for such a purpose. The material is reasonably comprehensive and includes many references to review articles. One very useful feature is the use of complete literature citations, including the title of the paper. These factors combine to make these volumes very attractive for both researchers and teachers in organic synthesis.

William H. Pearson, *The University of Michigan*

Tin in Organic Synthesis. By M. Pereyre, J.-P. Quintard, and A. Rahm (University of Bordeaux). Butterworths: London. 1987. 342 pp. $119.95. ISBN 0-408-01435-0

In recent years, organic chemists have found organotin compounds to be increasingly useful reagents and intermediates for organic synthesis. The authors of this book are among the leaders in the field and have written an excellent and timely account of this area. Literature through 1984 and part of 1985 has been covered. A very complete index is included.

Part One of the book introduces the reader to some of the general aspects of organotin chemistry, including nomenclature, the literature of organotin chemistry, the nature of the carbon–tin and tin–hydrogen bonds, toxicity, and a very useful and practical section on the preparation of organotin reagents. Part Two focuses on synthetic applications involving tin–hydrogen bonds, particularly for reductions (i.e., of organic halides, carbon–carbon double bonds, and organosulfur, -selenium, -tellurium, and -nitrogen compounds). Part Three covers synthetic applications of the carbon–tin bond. Replacement of carbon–tin bonds by hydrogen, halogens, and heteroatoms (such as oxygen, nitrogen, and sulfur) is first presented. A lengthy and very useful coverage of the transmetallation and metallation of organotin compounds is next given, followed by a similarity extensive treatment of the formation of carbon–carbon bonds from carbon–tin bonds, primarily by transition-metal-promoted couplings. Finally, Part Four covers synthetic applications involving tin–heteroatom bonds. Examples are the use of organotin alkoxides in substitution, oxidation, and addition reactions; the chemistry of organotin enolates, oxides, esters; and the chemistry of tin–nitrogen and tin–sulfur bonds.

In general, this book is very well organized, written, and referenced. Extensive use of schemes lends itself to readability and rapid data retrieval. It will be an extremely useful reference source for organic chemists, as well as a highly readable introduction to tin chemistry for those unfamiliar with this relatively new and interesting area of organic synthesis.

William H. Pearson, *University of Michigan*

Encyclopedia of Neuroscience. Edited by George Adelman. Birkhäuser Boston, Inc.: Boston. 1987. xliv + xxii + 1308 + 42 pp (appendix) + 72 pp (indexes). $125.00. ISBN 0-8176-3335-0

Entries, in alphabetic order, are mostly from one-half to two pages long. A very few entries, such as "Morphine", are chemical, but the majority are clinical or biological, such as "Octopus brain". The content of the entries is clearly not designed for chemists, for chemical formulas are widely avoided. Under "Choline", for example, no structure is shown, and the name is incorrectly given as "2-hydroxy-*N*,*N*,*N*-trimethylethanolamine". There are no entries under "Anesthesia", or "Anesthetics", but there is one under "Anesthesiology", which does not describe specific anesthetics.

One does find numerous entries on physiological, anatomical, and behavioral subjects. These could provide a useful initial orientation for a chemist becoming concerned with neurochemistry. Each entry ends with a few references for further reading. The presentation is polished and clear, and there are numerous diagrams, drawings, and photographs. A subject index makes it easy to find a topic that might otherwise be hidden in an unexpected entry.

The Chemistry of the Metal–Carbon Bond. Volume 4: The Use of Organometallic Compounds in Organic Synthesis (a volume in the series, The Chemistry of Functional Groups, Edited by S. Patai). Edited by Frank R. Hartley (The Royal Miltary College of Science). John Wiley & Sons: New York. 1987. xiv + 1348 pp. $380.00. ISBN 0471-90888-6

This massive book is made up of contributions from 16 chemists, located in France, the UK, Australia, Japan, and the USA. Six of the 14 chapters are devoted to derivatives of main-group elements, including chapters on hydrogenation and on supported metal catalysts. The longest chapters are those devoted to organolithium compounds and derivatives of the other alkali metals, and Grignard reagents and derivatives of the other chalcogens.

The task tackled by the editors and contributors is truly awesome, and it is remarkable that any editor should be able to convince anyone to try to manage Grignard reagents in one chapter! The goal that was set was to attain reasonable rather than complete coverage, with only moderate overlap among the chapters. Coverage is through 1983 or 1984, with emphasis on the more recent work. In the case of Grignard reagents, the existence of reviews of one type or another covering the literature up to 1980 made it possible to concentrate on the 1980–1983 period.

Preparation and reactions are integrated in the chapters. Structural formulas, skilfully and uniformly drawn, are abundant and make scanning easy. Tables of examples, with yields, are common in some chapters, not in others. A full, true author index and a good subject index complete the volume.

The price may seem staggering to some, but the content is richly useful, and one colleague has already demonstrated its value by buying a personal copy.

Principles of Electroanalytical Methods. By Tom Riley and Colin Tomlinson (Brighton Polytechnic). John Wiley and Sons: New York, NY. 1987. xx + 252 pp. $19.95. ISBN 0-471-91330-8

This text is a recent addition to the series *Analytical Chemistry by Open Learning* (ACOL), a series of texts written almost exclusively by staff of polytechnic chemistry departments in the United Kingdom. Texts in this series, each designed to cover the principles of one subject in analytical chemistry, are intended for people who wish to study a topic but who, for a variety of reasons, cannot use traditional institutional courses. An appropriate target group for this text would be industrial chemists at the senior technician level desiring a basic introduction to the scope of electroanalytical chemistry. Since the text is designed for self-study, at various points throughout the text the student is directed to perform calculations, draw graphs, and answer questions. The proper response is immediately provided and discussed, along with suggested sections for review should the student have difficulty with the exercise. Additionally, self-assessment questions with space for answers and comments are dispersed throughout the text, with the authors' response to these questions provided at the end of the text. Frequent summaries are encountered throughout the text, each with a list of objectives which provides the student with a checklist of tasks he/she should be able to achieve.

The first of the four chapters in this text is entitled "Basic Principles of Solution Chemistry and Electrochemistry", consisting of 41 pages. This chapter consists of a brief but clear discussion of the fundamental ideas on the nature and properties of electrolyte solutions. The chapter concludes with an introduction to electrochemical cells. The second chapter (64 pp) entitled "Galvanic Cells" presents an overview of the usual complement of reference and indicator electrodes employed in potentiometry. This chapter does a credible job of surveying this important area. Particularly noteworthy is the discussion on the practical aspects of pH measurement, including loading errors in the measurement of potential at the glass electrode. Chapter three (81 pp) entitled "Electrolysis" presents the concepts of potentiostatic control and 3-electrode cell design, with a fine discussion on choice of electrode material, solvent, and electrolyte. This chapter then presents an introduction to several voltammetric methods. Notably absent are discussions of the powerful combination techniques of spectroelectrochemistry and liquid chromatography/electrochemistry. Also missing was any reference to ultramicroelectrodes and their unique advantages in electrochemical measurement. A particularly disturbing error was the repeated use of the term "double layer" when the diffusion (or depletion) layer was being described (p 111, Figure 3.1c; pp 162 and 163). The final chapter (14 pp), entitled "Review of Methods of Electroanalytical Chemistry", presents a classification of electroanalytical methods and, almost as an afterthought, introduces the principles of electrogravimetric analysis and coulometric methods.

Overall, this text appears to meet its stated ojbective. It is a clearly written non-rigorous (non-mathematical) presentation of introductory electrochemistry for the chemical technician. It would not be suitable for use as a modular text in a junior/senior level instrumental analysis course, although it could serve as supplemental reading for such a course. A bibliography with 12 references (to other textbooks, no references to the original literature) is provided for more in-depth treatment of individual topics. More detailed treatments are also available in two other texts in the ACOL series: *Potentiometry and Ion-Selective Electrodes* and *Polarography and Other Voltammetric Techniques*.

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Laser Photoionization Spectroscopy. By Vladilen S. Letokhov. Academic Press: Orlando. 1987. x + 353 pp. $57.50. ISBN 0-12-444320-6

This book by a leading laser scientist thoroughly reviews a wide range of techniques and applications of laser photoionization spectroscopy and will be a valuable reference and research tool. It is important to recognize that with widely tunable laser radiation, there are a huge range of different multiphoton excitation pathways. When combined with atomic and molecular beam techniques for spectral decongestion, the use of multilaser excitation schemes becomes highly selective as well. A large number of examples of pathways are presented in tutorial fashion and a detailed analysis is made in each case. Some very novel applications are presented, and a thorough and pedagogical discussion is developed on the limits of sensitivity and ultimate utility of photoionization spectroscopy. The text is interesting and articulate in tone.

The expert reader may find parts of the book highly repetitive as there has been a tendency on the part of the collaborating authors (who are acknowledged in the preface) to write their articles in isolation from the other contributors. Thus sequential multiphoton excitation schemes are discussed in exhaustive detail. However, this will certainly not be a problem for a novice to the field! It should be noted also that the limiting date in the literature cited, and in the examples discussed, is approximately 1984. For more recent important developments on two-color, tunable MPI in molecular beams, for example, the current literature must also be consulted, as there have been rapid and major developments involving both temporal (picosecond to femtosecond) and spectral (~10 MHz) resolution in the past three years. One hopes that in a future edition Dr. Letokhov will update the resource material to capture these advances, which contribute new conclusions to some long standing spectroscopy problems, and enhance the value of this worthwhile text. Nevertheless, this book reviews in a comparative way the important progress of the past 15 years of this field and has a full reference index. As such it will be an extremely useful and insightful reference source for advanced courses in laser spectroscopy, for research students and for professional scientists, both those in the field and those seeking to take advantage of the interdisciplinary avenues that lasers and beams generate.

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