

## Book Reviews

**Organic Synthesis by Means of Transition Metal Complexes.** By JIRO TSUJI (Tokyo Institute of Technology). Springer-Verlag, Berlin-Heidelberg-New York. 1975. x + 199 pp. \$27.90.

This is the first in a series of volumes entitled, "Reactivity and Structure Concepts in Organic Chemistry". The formation and reactions of  $\sigma$  bonds involving transition metals are the major areas covered in this monograph. Professor Tsuji has organized the volume in a functionally logical manner, beginning with an extensive section on the formation of  $\sigma$  bonds to metals, and then treating the chemistry of these  $\sigma$ -bonded species in three shorter chapters covering general reactivity patterns, insertion reactions, and cleavage reactions. To the synthetic organic chemist, this arrangement should be considerably more useful than the more "conventional" classifications (*e.g.*, by metal or by substrate-type).

One goal of the book is to demonstrate how synthesis involving transition metals may be dissected into a number of simple, fundamental chemical transformations. These latter are grouped by type within the framework described above, and numerous examples are provided, primarily from the synthetic organic literature through early 1974. One of the most useful features of this treatment is the author's attempt to provide sufficient mechanistic information to enable the reader to evaluate the applicability of the model reactions to other systems. It should be pointed out, however, that this is not a textbook as such and does not go into much detail concerning the more basic concepts of transition metal chemistry such as oxidation state determination or application of the effective atomic number rule. Indeed, the explanation of coordinative saturation and unsaturation in connection with the oxidative addition reaction may well mislead one lacking prior acquaintance with the field; nevertheless, the mechanistic discussions should prove to be useful in a practical sense.

A great many useful topics are covered in this volume. The section on metal-hydrogen bond formation provides an excellent overview of the applications of homogeneous hydrogenation, especially with regard to selectivity considerations and asymmetric induction. A short but highly representative section on metal carbonyl anion chemistry augments an extensive discussion of metal-carbon bond formation by oxidative addition. Areas where structure-reactivity studies are less complete, *e.g.*, competitive insertion reactions of alkenes and carbon monoxide, are well covered, but the information is less likely to be of extrapolative value to the organic chemist. The chemistry of nickel, palladium, and platinum, an area of special interest to the author, is extensively and expertly treated; this does not, however, result in the neglect of other transition metals that have found use in synthesis. Rather, in selecting his examples, Professor Tsuji has used adherence to general reaction patterns and utility in synthetic applications as his major criteria.

The large quantity of information contained in this book (over 600 references are cited) may lead to some initial difficulty in finding specific items of interest. Many of the chapter sections are large and contain scores of diverse reaction examples without any subheadings to help orient the reader. In addition, the index primarily lists specific compounds, rather than reaction types, a distinct disadvantage when one is interested in quickly scanning for examples related to a given synthetic transformation, *e.g.*, alkylation, reduction, etc. Nevertheless, the organic chemist who takes the time to familiarize himself with the layout and contents of this book will find it a comprehensive and valuable guide to a rapidly growing area of synthetic chemistry.

Neil E. Schore, *University of California, Davis*

**Spectroscopic Properties of Inorganic and Organometallic Compounds. Volume 8.** Edited by N. N. GREENWOOD (University of Leeds). The Chemical Society, London. 1975. xii + 543 pp. \$68.50 (£25).

This book is the eighth volume of the series published annually as part of the Specialist Periodical Reports by The Chemical Society. Volume 8 reviews the literature published during 1974 in which various spectroscopic techniques are used in studies of inorganic and organometallic compounds. The format of Volume 8 is identical with

that of previous volumes. As expected, the major portion is again devoted to NMR and vibrational studies. The subjects surveyed include one chapter on spectroscopy (all isotopes) (B. L. Shaw), one chapter each on nuclear quadrupole resonance (J. H. Carpenter), microwave (J. H. Carpenter), and Mössbauer spectroscopy (R. Greatrex), and four chapters on various aspects of vibrational spectroscopy (D. M. Adams, S. R. Stobart, M. Goldstein, G. Davidson).

Volume 8 has been shortened somewhat compared with Volume 7. According to Editor Greenwood, increasing costs and the continual increase in the number of papers published each year has necessitated the omission of some references. For example, those papers in which "proton NMR spectroscopy is used solely to assist in the characterization of compounds" have been omitted. The absence of these papers by no means detracts from the collection of NMR papers reported by B. L. Shaw. If anything this chapter is more compact, easier to read, and strengthened by the omission of these papers. With the spiraling increase in the number of publications each year, we must accept that at some time it becomes unrealistic to survey all papers pertaining to a single subject in a series such as this. Discretion, however, must be used in these decisions. Such is the case for Volume 8. The authors are to be commended for taking the initiative to keep Volume 8 to a manageable size. One noticeable deletion, however, is the Appendix in which additional references to the vibrational spectra of metal carbonyl complexes are tabulated.

I have found Volume 8, as I have found the previous volumes, an invaluable, informative reference source. The high standards established by previous volumes are maintained and Volume 8 continues to serve the primary function for which the series was designed. While the cost is a bit high to purchase for private libraries, this and the previous volumes are books that no reference library should be without.

Thomas G. Attig, *University of Kentucky*

**Essays in Biochemistry. Volume 11.** Edited by P. N. CAMPBELL (University of Leeds) and W. N. ALDRIDGE (MRC Toxicology Unit). Academic Press, New York, N.Y. 1975. xi + 189 pp. \$8.75.

Volume 11 of this series consists of four reviews. In the first, "The Complex Carbohydrates of Mammalian Cell Surfaces and their Biological Roles", R. C. Hughes examines methods for localizing membrane surface carbohydrate and the composition of these compounds. He then surveys known or postulated roles for surface carbohydrates, these roles including antigenicity, surface receptor stimulation, cell adhesion, and hepatic recognition of asialo-glycoproteins. The possible involvement of glycosyl transferases in these latter two phenomena is discussed in some detail.

C. C. F. Blake's chapter, entitled, "X-Ray Studies of Glycolytic Enzymes", discusses first how the phase problem is solved for these proteins. The current states of crystallographic studies of the 13 glycolytic enzymes are then detailed one by one. Space group and unit cell information is cited, and excellent drawings and photographs of models help one to visualize peptide folding and subunit packing. Especially interesting are the tertiary structural homologies, apparent among a number of the glycolytic enzymes, which are discussed at the conclusion of the article.

"A Biochemical Approach to Some Problems of Environmental Pollution" by Stanley Dagley provides a survey of the chemical pollution problem in general and of the biochemical pathways of pollutant degradation in particular. Special attention is paid to the biological activation of oxygen, to the degradation of benzenoid compounds including lignin, and to the abilities and inabilities of individual microorganisms to perform specific single degradative steps.

The final article of the volume, "Spectroscopic Probes of Membrane Structure" by Derek Marsh, contains a general outline of membrane structure. Its particular strength, however, is excellent and thorough examination of the motions, rotational, lateral, and conformational, of the various types of membrane components as revealed by spectroscopic methods. It focusses on NMR and ESR techniques and is

particularly interesting in its summary of the membrane fluidity and permeability gradients these methods reveal. Fluorescence depolarization and fluorescence quenching receive mention, but dye bleaching and fluorescence correlation methods are not discussed.

This book, while retaining a subject index, omits the useful author index which previous volumes in the series contained.

**B. George Barisas, St. Louis University**

**Fluidization Technology. Volumes 1 and 2.** Edited by DALE L. KEAIRNS (Westinghouse Corp.). Hemisphere Publishing Corp., Washington, D.C. 1976. Vol. 1: xiii + 466 pp. Vol. 2: xiii + 608 pp. \$75.00 both volumes.

These volumes comprise the Proceedings of the International Fluidization Conference held at Pacific Grove, Calif., in June 1975. They are separated roughly into papers dealing with fundamentals, Volume 1, and processing and applications, Volume 2.

A striking feature of these volumes is the tremendous diversity of views represented in the 77 printed papers. This is perhaps the main virtue of published conference proceedings, especially in this field of study. The few textbooks on fluidization tend to be extremely personal accounts of the authors' own viewpoints. It is no surprise then that other, previous, fluidization conference proceedings remain the best resource for researchers in the field. I am thinking here of the Symposium on Interaction Between Fluids and Particles (1962), the Eindhoven proceedings (1967), and those of the meeting at Toulouse (1973). It is clear that "Fluidization Technology" will serve as an invaluable record of a truly international conference of experts. It is a must for libraries desiring a complete collection on fluidization. (It is not clear if a single volume may be purchased, an option which would appeal to individuals interested primarily in either fundamentals or applications.)

The first volume contains four sections entitled Bubble Phenomena, Gas Exchange and Fluid Bed Modeling, Liquid Phase Fluidization, and Three-Phase Fluidization. Volume 2 is likewise divided into four parts entitled Fluidized Bed Performance with Intervals, Solids Mixing and Transport, Fossil Fuel Processing, and (curiously) Application. The papers appearing in each section appear to be appropriately chosen, with only a few exceptions. There is a full list of attendees of the conference, and an informal preface gives these volumes a sense of presence. A welcome feature is a complete index for each volume.

The authors were apparently given instructions to prepare typewritten, camera-ready, short versions of their full manuscripts. The intent was presumably to keep the size manageable and the publishing time short. For the most part, the editors have succeeded in meeting these objectives. The text is notably devoid of typographical errors and the appearance of these proceedings less than a year after the conference is admirable and serves to enhance their topical value. The length of the papers is curiously uneven, however: the shortest paper is one page plus a figure; the longest is some 54 pages.

It is impossible to give a full synopsis of the technical content in this limited space, but it is this reviewer's opinion that the field, like these volumes, is still divided into two camps. Researchers tend to study either well-posed fundamental problems or device-specific applications. There is a hearty band of modelers attempting to bridge the gap, and the indications are that the gap is indeed narrowing. These volumes are an indispensable chronicle of that evolution.

**George M. Homsy, Stanford University**

**Theory and Applications of Molecular Paramagnetism.** Edited by E. A. BOUDREAU (University of New Orleans) and L. N. MULAY (Pennsylvania State University). John Wiley & Sons, Inc., New York, N.Y. 1976. x + 510 pp. \$35.

The title of this book is so sweeping that it came as something of a surprise to find it deals almost exclusively with static susceptibility measurements on metal ion complexes: no magnetic resonance or Mössbauer, no magneto-optics or superconducting detectors, no free radicals, metastable triplets, spin labels, etc. Still, the editors have chosen a coherent, well-defined subject. Ignore the title and press on.

The book opens with a brief review of Van Vleck's classic (1932) expressions for the susceptibility of an isolated ion in terms of its field-dependent eigenvalues. All that remains, then, is to find these

eigenvalues. The authors outline the procedure, within the crystal field approximation, in a systematic way for transition ions, rare earths, and actinides. This is followed by a discussion of small exchange-coupled clusters, a survey of some "recent advances", and a useful closing chapter on units and definitions.

The level of exposition is casual and sketchy, without much concern for theoretical niceties (on p 33 the many electron atom is calmly asserted to be a "central field problem"). The absence of group theory prevents any formal spin-Hamiltonian theory, and the brief survey of operator equivalents is probably too concise for anyone not already familiar with the technique. Discussion of the Jahn-Teller effect is limited to a line on page 107, where we find that "any configuration which has a degenerate ground state will distort so as to remove the degeneracy". The trouble with this is not so much that the statement is inaccurate (the orbital degeneracy is exchanged for a vibronic one), but that no attempt is made to put it in perspective with the counter examples that fill the book. Covalency effects and time reversal are mentioned more or less in passing.

In fairness, the book is not meant to be a comprehensive treatise on theory. Its great virtue is the vast array of experimental results, tables of data, and literature references. As an example, one of the chapters on transition ions has over 400 citations. (And at that I could not find anything on heme proteins—life is short.) The role of the theory seems to be to provide a minimum framework to hang it all on. More complete reviews are available for all these topics (with the possible exception of the very thorough treatment of clusters), and these are conscientiously cited throughout.

It is hard to pinpoint an audience for this book. It is not really suitable for students except as a good source for illustrative examples, and most workers in the field will prefer the books already on their shelves. Casual readers can find livelier and less erratic treatments. As a literature guide though, it rates four stars. Since this was presumably the editors' main goal, it is probably sufficient to count their work a modest success.

**David L. Cowan, University of Missouri**

**Critical Stability Constants. Volume 4. Inorganic Complexes.** By R. M. SMITH and A. E. MARTELL (Texas A&M University). Plenum Press, New York, N.Y. 1976. xiii + 257 pp. \$29.50.

Formation constants and corresponding enthalpy and entropy values are compiled, complete with details of temperature and ionic strength, for metal ion complexes involving 65 of the most commonly encountered or important inorganic ligands. The compilation covers the literature through 1974 and is unique in that the values compiled represent the authors' selection of the most reliable among those reported. The compendium provides a valuable service to those who for lack of expertise or time prefer to depend on others more qualified to make judgments concerning quality and reliability of published equilibrium data. Attesting to the thoroughness of the compilation, a list of 22 inorganic ligands with references is provided for less common ligands considered but not included in the tables.

In undertaking the difficult task of critical selection of those values that should stand the test of time from among the many and often discordant published data, the authors have set forth and have been guided by criteria that are both reasonable and practical. They have recognized the inevitability of making arbitrary judgments in certain cases and therefore have included certain values (placed in parentheses) for which the evidence to exclude on the basis of stated criteria is not strong. As further assurance that no gross neglect or oversight be committed, they included literature citations for questionable values or for values at conditions markedly different from those of the tables under a special heading.

Organization of the tables is efficient and systematic, enabling easy access to sought-for values. Careful reading of the Introduction section is advisable, however, for a clear understanding of compilation notations (especially bibliography symbols) and for information concerning special details, such as units, assumptions, corrections, conversions, and calculations.

A strength as well as a possible source of criticism of the compendium is its extensive bibliography. Although a vital and indispensable part of the whole, the bibliography section occupies considerable space (45% or 114 pp), more than necessary perhaps for convenience of legibility over saving of cost.

**Alfred A. Schilt, Northern Illinois University**