

rate-determining step, inasmuch as the revised rate constant is now significantly greater than the value measured in hydrochloric acid solutions, $k_{H^+} = (1.40 \pm 0.03) \times 10^3 \text{ M}^{-1} \text{ s}^{-1}$.

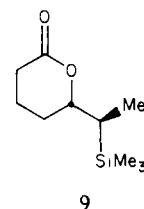
Thermolysis of 2-Methoxy-2,5,5-trimethyl- Δ^3 -1,3,4-oxadiazoline. Carbenes from Thermal Fragmentation of a Carbonyl Ylide Intermediate [*J. Am. Chem. Soc.* 1981, 103, 2473]. MICHEL BEKHAZI and JOHN WARKENTIN,* Department of Chemistry, McMaster University, Hamilton, Ontario L8S 4M1, Canada.

Page 2474, first full paragraph, left column: The last line should read "intermediates" not JA5M89Ci.

Silicon-Directed Baeyer-Villiger Reactions. Stereospecific Synthesis of Olefinic Acids and Esters [*J. Am. Chem. Soc.* 1980, 102, 6894-6896]. PAUL F. HUDRLIK,* ANNE M. HUDRLIK, GOPALPUR

NAGENDRAPPA, TILAHUN YIMENU, EDWARD T. ZELLERS, and EVELYN CHIN, Department of Chemistry, Howard University, Washington, D.C. 20059, and School of Chemistry, Wright and Rieman Chemistry Laboratories, Rutgers University, The State University of New Jersey, New Brunswick, New Jersey 08903.

Page 6895, Scheme I, structure 9 should be as follows:



Book Reviews*

Manganese Compounds as Oxidizing Agents in Organic Chemistry. By Deither Arndt (BASF AG). Translated by Chester Claff, Jr., and edited by Donald G. Lee. Open Court Publishing Co., Lasalle, Illinois. 1981. xvii + 344 pp. \$55.00.

The text of which this book is a translation and revision originally appeared in "Methoden der Organischen Chemie" (Houben-Weyl), 4th revised edition, in 1975. The date when the revision was completed is not stated, but a casual examination disclosed no references later than 1979. The translation is very smooth and offers no obstacles at all.

About half the book is devoted to oxidations by permanganate, and most of the remainder is devoted to manganese dioxide, with small sections of manganese(III) and -(IV) complex salts, manganate(V), and manganate(VI), reflecting the importance of the respective reagents. The emphasis is on practical preparative methods, and 70 experimental procedures are described. A vast amount of material has been collected and carefully organized into a very succinct text, augmented by extensive tables of reaction conditions, products, and yields. The permanganate chapter alone contains 1020 references.

There is an enigmatic 5-page section apart from the references, headed "Bibliography", which includes not only secondary literature (books and reviews), but many references to the primary literature. Perhaps they are intended to be "benchmark" papers or papers of special significance, but nothing is stated about it. The revision for the principal purpose of bringing the subject up to date has resulted in a number of new and recent citations in the reference section. The preface notes that the most important development in oxidation by manganese compounds in recent years is the use of phase-transfer techniques, allowing permanganate oxidations to be carried out in solvents in which simple potassium permanganate is not soluble (e.g., the use of "purple benzene"), and that "the updating consists primarily of a description of the use of phase transfer procedures...". Unfortunately, such a description is well hidden if it is there, for the subject is not mentioned in the very detailed table of contents, and there is no subject index to the book—only a product index. There is a List of Preparations, but none of them includes the term "phase transfer" in the title. There are, however, some references to books and journal papers that describe the use of phase-transfer reagents.

It is certainly useful to have this valuable work available in English, and at a price substantially lower than that of a volume of the Houben-Weyl series.

Chemistry, Quantum Mechanics and Reductionism. By H. Primas (Swiss Federal Institut of Technology). Springer-Verlag, New York. 1981. xii + 451 pp. \$37.50.

Though not intended to be a textbook, this monograph is a good choice for advanced students of quantum mechanics and quantum chemistry and others who are looking for perspective, challenge, and inspiration. This book discusses the nature and development of quantum mechanics and its relationship to chemistry. Primas argues that "the ultimate objective of a theory is not to determine numbers but to create a large, consistent abstract structure that mirrors the observable phenomena". He sees a

philosophical and practical need for more general theories which combine chemical theories with the pioneer (pre-1932) quantum mechanics for small systems. He believes the drive to study isolated systems may lead researchers to miss important connecting facts and holistic pictures as epitomized repeatedly with references to the Einstein-Podolsky-Rosen correlations.

Much of the book may be considered to be philosophy. Some readers will find this and the author's frequent personalized comments not to their taste. However, the value of the discussion includes the fact that it can be healthy for scientists to recognize the paradigms of their work. With numerous instances of repetition and rewording, Primas does not fail to make clear the philosophical, sociological, and psychological bases upon which theorists have in the past and do at present practice their trade. The author is lavish with references, offering an important aid to those interested in the history of quantum mechanics and the philosophy of science.

Primas is dissatisfied with the Copenhagen interpretation of quantum mechanics (epistemic viewpoint), and prefers to adopt the paradigm that understanding of the behavior of matter is possible (ontic viewpoint). Whether these viewpoints are really different is not treated satisfactorily.

To overcome the apparent inability of pioneer quantum mechanics to describe classical systems, several workers have developed algebraic, quantum logical, and other techniques. These are discussed in detail by Primas.

Theoretical quantum chemistry, Primas believes, is, in its present pioneer quantum mechanical framework, inappropriate because it does not address many of the important theoretical concepts of chemistry. He notes that chemists look to the semiempirical methods of quantum chemistry for inspiration instead, and that "the success of this craft remains a central enigma for theoreticians". He argues that, for example, detailed quantum mechanical studies of the water molecule do not tell us about the substance water or its temperature. In other words, some chemical phenomena cannot be deduced from pioneer quantum mechanics, and, moreover, classical chemical phenomena cannot be reduced to pioneer quantum mechanics. Statistical mechanics who use data from pioneer quantum mechanics may find this irrelevant. Counterintuitive suggestions are made, such as the assertion that pioneer quantum mechanics does not justifiably lead to a notion of molecular structure or the suggestion that a Hartree or Hartree-Fock approximation may be asymptotically correct in the limit of an infinite number of fermions, i.e., for large molecules. Primas provides an alternative to the Born-Oppenheimer structure concept, and one suspects research to find a asymptotically exact Hartree-like approximation is ongoing.

It is sometimes said that philosophy is like a dense woods which one struggles through, examining in detail all that is there, and that on emerging one knows nothing more than when entering. An examination of the philosophical aspects of quantum chemistry is fun, and the book is likely to be informative to theoretical and experimental chemists, but there is little to aid such researchers in what they are already doing. Perhaps the most valuable message in "Chemistry, Quantum Mechanics and Reductionism" is optimism for theory, that there is a need for new theories, and that if quantum theoreticians occasionally abandon reduc-

* Unsigned book reviews are by the Book Review Editor.

tionism and think about their potential role in interpreting and guiding experiments, they are likely to significantly improve understanding in chemistry.

A. B. Anderson, *Case Western Reserve University*

Affinity Chromatography: Bioselective Adsorption on Inert Matrices. By William H. Scouten (Bucknell University, Lewisburg). John Wiley & Sons, New York. 1981. xiii + 348 pp. \$42.50.

This book is a welcome addition to the growing number of monographs on this biochemical research technique whose application in protein purification is not yet as fully appreciated as it should be. The text is written in a readable style. The coverage of methodology includes sufficient detail to enable investigators new to this technique to prepare appropriate affinity chromatography adsorbents for themselves. A case in point is the well conceived treatment of general bioligands in Chapter 5. The literature survey for each of the 11 chapters is both extensive and up to date.

For those experienced in affinity chromatography the book will probably not be much more informative than the other monographs on this topic already on the market. The effort at formulation of the theory behind affinity chromatography will disappoint those seeking an advanced and definitive treatment of this aspect of the technique. A theoretical framework that enables one to predict the chromatographic behavior of a protein when made to interact with a given adsorbent is now greatly needed as the use of this technique becomes more widespread. Furthermore, the proposed use of the more restrictive term, bioselective adsorption, interchangeably with the term affinity chromatography is not without fault; the connotation of bioselective adsorption would, in a strict sense, have made the inclusion of the material in Chapter 5 and other sections inappropriate in this book.

Chapter 11 contains material on miscellaneous applications of affinity chromatography. This material has largely been given cursory treatment in previous monographs as in the present text. The author could have enriched this book by presenting each subtopic in this chapter in more than two or three pages, including an elaboration of the potential impact of these new developments on industrial and biomedical research.

Overall this monograph provides a well conceived coverage of affinity chromatography and would be a suitable supplementary text for graduate level biochemistry laboratory courses. It would be an invaluable reference book for laboratories engaged in protein purification.

C. Chetsanga, *University of Michigan-Dearborn*

Lecture Notes in Chemistry. Volume 7. Ion Cyclotron Resonance Spectrometry. Edited by Hermann Hartmann (Akademie der Wissenschaften und der Literatur zu Mainz) and Karl-Peter Wanczek (Universität Frankfurt). Springer-Verlag, Berlin, Heidelberg, New York. 1978. iii + 326 pp. \$13.50.

This volume contains several papers which were presented at the First International Symposium on Ion Cyclotron Resonance Spectrometry, which was held September 6-9, 1976. The volume consists of 12 chapters describing the theory, the instrumental implementation, and the applications of ion cyclotron resonance (ICR) spectroscopy. The last half of the volume describes investigations of ion chemistry by ICR techniques. At the time of its publication in 1978 this volume provided a useful introduction to the practice of ICR spectroscopy both for workers in the field and for other scientists. At the present time, however, the material in the volume is somewhat dated.

Melvin B. Comisarow, *University of British Columbia*

Coordination Chemistry Reviews: Main Group Chemistry Review 1979. Edited by D. B. Sowerby (University of Nottingham, Nottingham, U.K.). Elsevier Scientific Publishing Company, Amsterdam. 1981. vii + 467 pp. \$86.00

This volume, the second annual review of the main group elements, follows the pattern of the 1978 survey. Each periodic group is covered in a separate chapter and the six reviewers (all from the University of Nottingham) are unchanged. The largest increases over the previous volume are in group 3 (especially boron) and group 5, reflecting greater activity in these areas.

The chemistry of group 1 elements (P. Hubberstey, 49 pp) is divided into areas of which the role of the metal is unique. Ions and ion pairs, molten salts, and organometallics are discussed with emphasis on structural, spectroscopic, and synthetic aspects and reaction chemistry. Where group 2 elements exhibit similar chemistry (molten salts, crown, and cryptate complexes, for example), both are included in this chapter. Group 2 (P. Hubberstey, 24 pp) contains sections on intermetallic and organometallic complexes with a structural emphasis. Group 3 (G. Davidson, 80 pp), group 5 (M. F. A. Dove and D. B. Sowerby, 114 pp), and group 6 (M. G. Barker, 53 pp) are surveyed by element and by directly bonded heteroatom. Group 4 (P. G. Harrison, 108 pp) reviews

carbon syntheses and structural and physicochemical studies and examines the heavier elements by directly bonded heteroatom. Group 7 (M. F. A. Dove, 33 pp) surveys interhalogens, oxygen containing species, and hydrogen halides and also includes a section on hydrogen. Group 8 (M. F. A. Dove, 5 pp) is disappointing (only 20 references) and deals almost exclusively with xenon.

This volume is a useful guide to the primary literature of the main group elements. As in other surveys in this series, the subjects are covered in depth (but, as the editor readily admits, not comprehensively) and the standard of presentation is high. The format facilitates access to material, though a more complete index would be helpful.

David N. Clark, *U.S. Army, Rocky Mountain Arsenal*

Protein Degradation in Health and Disease. Ciba Foundation Symposium 75 (New Series). Excerpta Medica, Amsterdam, Oxford, New York. 1980. x + 417 pp. \$70.75 (Dfl. 145.00).

This symposium record has brought together the recent progress in proteolytic enzyme research. Many aspects of protein degradation and its control in both the intracellular compartment and extracellular space are presented. The effects of some of the enzymes on physiological and pathological states in humans indicate their possible applications in medicine. Research workers and graduate students in the proteolytic enzyme field as well as those interested in the clinical aspects of proteolysis will find this volume useful.

The book consists of an introduction, 20 topics in presentations and discussions, two general discussions, and concluding remarks. The introduction gives an amended classification of proteolytic enzymes based on their reaction mechanisms: serine, cysteine, aspartic, and metallo proteinases. There is also a particularly interesting discussion about enzymes designated cathepsins. Copious data and information on research endeavors in diverse directions and with different experimental systems from many laboratories make this publication interesting and valuable. Since the contents are not arranged in any particular order, the topics are numbered here for the convenience of this review.

Concerning intracellular proteolysis, the five topics (1-5) immediately following the introduction deal with lysosomal cysteine and aspartic proteinases and their distribution in different cell types. Cathepsin D and E (aspartic) and cathepsin B, H, L and N (cysteine) are described. Characteristics of elastase and collagenase are also presented with evidence of concerted actions between extra- and intracellular enzymes in protein degradation in tissues, regulated, in part, by changes in the microenvironment. During collagen fiber degradation, after a preliminary extracellular fragmentation, small peptides are taken into the cell and digested completely in the lysosomal system. Topics 7 and 9 discuss the selection and degradation of substrate protein by means of its (a) modification, (b) adsorption to the plasma membrane, (c) vacuole formation, and (d) internalization. One clue uncovered is nonproteolytic inactivation of the substrate protein through mixed disulfide formation. Topic 8 presents the use of selective proteolytic enzyme inhibitors to assess protein degradation mediated by the lysosomal system: leupeptin for the cysteine and pepstatin for the aspartic proteinases. Findings in culture cells are presented in Topics 11 and 12. Physicochemical procedures (microelectrode, fluorescence indicator, ionophore) were employed to measure the microenvironmental changes. Un-ionized weak bases permeant to lysosomal membrane affect the acidity. The cells possess at least two routes for degrading proteins: lysosomal or nonlysosomal proteolysis. Additionally, protein degradation can be stimulated or inhibited by hormones, second messengers, nutritional status, etc.

Topic 13 discusses the protein degradation by the nonlysosomal route. A neutral proteinase with high specificity for proteins with native conformation was isolated, associated with an endogenous inhibitor. Topics 10 and 15 deal with studies on mitochondrial proteins which have widely varied half-lives. Studies are centered on intramitochondrial protein degradation and the signal controlling the overall processes. Different rates of protein degradation are observed for the outer, inner membranes and intramembrane space during differentiation and normal cell growth. Hormones regulate and coordinate synthesis and degradation of the proteins. ATP-dependent proteinases (Topic 14), in both mammalian and bacterial cells, provide a system for studying the molecular mechanism of protein degradation requiring energy input. How the energy is utilized in the protein degradation process is not understood.

Protein degradation at the organ and whole animal levels is also included. Amino acids are found to be prime regulators for autophagy and protein degradation in the liver, mediated by the lysosomal system (Topic 16). The process is inhibited by insulin and stimulated by glucagon. Protein degradation in muscle (Topic 17) is found to be accompanied by paradoxical protein synthesis, influenced by thyroid activity. Protein degradation in diabetes (Topic 18) is found to be distinctly different from the corresponding normal well nourished cells. In the eukaryotic cells examined, degradation of cytosol proteins exhibits several striking fea-

tures. The biochemical reasons for the increased protein catabolism in diabetes are yet to be clarified.

Concerning extracellular proteolysis, Topic 6 describes the powerful serine proteinases of neutrophil leukocytes and mast cells which contain elastase, cathepsin G, and chymase. These proteinases are stored and released from the cells during phagocytosis. Macrophages, on the other hand, synthesize and secrete lysosomal acid proteinases and plasminogen activator. Plasminogen activator seems to provide a mechanism by which cells can generate local proteolytic activity (Topic 20). The plasmin generated is active against a number of physiologically important proteins and activates latent collagenase. The inhibitory mechanism of proteinase by α -1-proteinase inhibitor and other plasma inhibitors is discussed (Topic 3). The existence of a methionyl(-seryl) residue at the active site of α -1-proteinase inhibitor has been shown to afford physiological control of proteolytic activity by its own inactivation. Extracellular protein may be digested locally in the course of pathological processes. Several low molecular weight protein inhibitors of proteinases have been characterized and are suggested for possible therapeutic usage (Topic 19).

The concluding remarks summarize symposium highlights and sharply focus on many unsolved problems in proteolysis. The indices in this book, as in all Ciba Foundation Symposium publications, are excellent.

S.-C. J. Fu, *University of Medicine and Dentistry of New Jersey*

The Vocabulary of Organic Chemistry. By M. Orchin, F. Kaplan, R. S. Macomber, R. M. Wilson, and H. Zimmer. John Wiley & Sons, New York. 1980. ix + 609 pp. \$35.00.

"Long words bother me", said Winnie-the-Pooh. Since this sentiment is echoed by many students of organic chemistry (and also by more senior chemists), the authors of this vocabulary/dictionary/compendium have put together definitions (with illustrative examples) for about 1350 words and concepts. Of these, between one-third and a quarter are considered by them to be required by an average undergraduate, for whose benefit the material is arranged in 15 chapters and, within those chapters, "in a sequence that makes pedagogical sense". For use as a reference work there is also an alphabetical index.

In its content the book inevitably reflects the interests of the small group of teachers who collaborated. The longest chapter deals with 159 name reactions. Broadly speaking, the others cover quantum-mechanical and symmetry concepts, class names of chemical species, stereochemistry, separation techniques, reaction mechanisms, thermodynamics, organometallic terms, polymers, fossil fuels, synthesis gas, and industrial processes. Organic spectroscopy is a deliberate omission.

The authors' good intentions and laudable plan are evident throughout but the achievement is less uniform. While the average student will probably be helped by most of the definitions provided, many of these must not be scrutinized too closely. Some random examples of what is or may be found misleading include the notion that a counterion is associated with an ion of opposite charge, that electric dipoles are properties of bonds (and not of molecules), that the partition coefficient is a ratio of the quantities of material in two phases, that Markovnikov (1838-1904) wrote about *electrophilic* addition, that alicyclic compounds are the same as cycloalkanes (cyclohexanone?), that a dihedral angle of 0° is the same as a dihedral angle of 180° , etc. There are also many surprising omissions, e.g. annelation (which is used with a very restrictive meaning), annulenes, carbamic acid, cryptand, disproportionation (used but not defined), enzyme, extraction, guest, protecting group, retention time, semiquinone.

"A lexicographer", Dr. Johnson's dictionary asserts, "is a harmless drudge". The drudgery may even be fraught with danger: the author lays himself open to criticism from fellow-drudges and others on at least as many counts as there are entries in his opus.

Victor Gold, *King's College, London*

Advances in Free Radical Chemistry. Edited by G. H. Williams (Bedford College, University of London). Heyden & Son, Inc., Publishers, Philadelphia, Pennsylvania. 1980. ix + 323 pp. \$60.00.

Volume 6 in this continuing series is especially welcome since the previous volume appeared in 1975. The book is a collection of reviews of individual topics by well-chosen experts. In general, these reviews cover the pertinent literature into 1978. There are author and subject indexes.

Chapter 1, Rearrangement of Short-Lived Free Radicals in the Liquid Phase by Friedlina and Terent'ev, is an update of Friedlina's 1965 review of the same topic which appeared in Volume 1 of this series. The current review focuses on the developments since 1965. ESR and spin-trapping techniques have been particularly important during this period; these results have been collected along with the results of more traditional studies. The review is comprehensive and is organized in terms of the nature of the migrating groups. Chapter 2 by Minisci and Citterio is a very long discussion (659 references) of Polar Effects in Free-Radical

Reactions in Synthetic Chemistry. The term, "polar effect" is broadly interpreted to include the free radical reactions of both charged and uncharged species. As the title implies, there is an emphasis on the way in which polar effects influence selectivity patterns in preparative reactions. The majority of the review deals with substitution reactions; polar effects in addition reactions and in processes such as rearrangement and fragmentations are also discussed.

Chapter 3, The Halogenation of the Cycloalkanes and Their Derivatives by Tedder and Walton, is a sharply focused review which shows how the qualitative interplay of polar and steric effects can accommodate the variations in products, rates, and selectivities observed in these reactions. Chapter 4, The Mechanistic Role of Radicals, Ions, and Arymes in Reactions of Acylarylnitrosamines by Cadogan, tells the story of the elucidation of the complex and seemingly contradictory modes of reaction of these compounds. The tale ends with a unified description of the decomposition mechanism.

The last chapter in this volume is by B. P. Roberts and reviews The Chemistry of Phosphoranyl Radicals. The orientation is to structure and mechanism; the review summarizes both ESR and chemical studies, with particular attention to the former.

Volume 6 in this series gives useful reviews of several problems which have been with free radical chemists for a long time, clear examples of the extraordinary impact of ESR spectroscopy and, in the view of this referee, a good treatment of one of the newer directions in free radical chemistry (Chapter 5). Thus, it is a valuable and informative addition to the free radical literature.

J. A. Kampmeier, *University of Rochester*

Synthetic Peptides. Volume 5. By G. R. Pettit (Arizona State University). Elsevier Scientific Publishing Co., Amsterdam and New York. 1980. vii + 404 pp. \$109.75.

The bulk of the fifth volume in the series "Synthetic Peptides" is a systematic compilation of synthetic peptides reported in the literature during the period of January 1974 through the first week of 1976. The tabular survey includes the amino acid sequence, the identification of the last peptide bond-forming fragments, the coupling reagent, reaction solvent, yield, and purification procedures. Wherever considered reasonable, the melting point and optical rotation are also given.

The first chapter is a brief commentary on recent advances and trends in peptide chemistry such as the development of ACE inhibitors as a new class of hypotensive agents, the hypothalamus-pituitary hormones, and the endorphins as opiates. The second chapter summarizes, in the form of reactions without discussion, the progress made in the development of novel methods for synthesizing peptides by classical or solid-state techniques. The period covered is January 1975 through January 1977.

This book, like the earlier volume, is very useful as a reference source.

O. P. Goel, *Warner-Lambert/Parke-Davis*

Organic Reactions and Orbital Symmetry. Second Edition. By T. L. Gilchrist and R. C. Storr (University of Liverpool). Cambridge University Press, Cambridge, England. 1979. viii + 311 pages. \$49.50 hard cover; \$16.95 paperback.

This is a revised and expanded version of the 1972 edition which has served as a valuable introduction to concerted reactions. This edition is also an excellent introduction to perturbation molecular orbital theory for those educated before the 1970's. The authors describe criteria used to establish mechanisms, Woodward-Hoffmann theory, and various elaborations and provide a particularly excellent survey of frontier molecular orbital theory and its application to reactivity and regioselectivity in cycloaddition reactions. The book is filled with examples of cycloadditions, electrocyclizations, sigmatropic shifts, and what I call "miscellaneozations". Although on the same level of presentation as Fleming's "Frontier Orbitals and Organic Chemical Reactions", the Gilchrist-Storr volume is confined to pericyclic reactions and stepwise analogues, and a more thorough exposition of these reactions has been achieved.

K. N. Houk, *University of Pittsburgh*

Enzymes as Drugs. Edited by J. S. Holcenberg (Medical College of Wisconsin) and J. Roberts (Sloan Kettering Institute for Cancer Research). John Wiley and Sons, New York. 1981. x + 455 pp. \$59.50.

Although the concept of using enzymes for therapeutic purposes is not new, relatively few are marketed today as drugs. This book deals with the recent developments in this unique area. Chapter 1 reviews the biochemistry, pharmacology, toxicity, and clinical uses of the antineoplastic agent L-asparaginase. The next three chapters evolve as an extension of this concept to the potential application of enzymes in the depletion of amino acids and folates in cancer therapy. Discussion of the nature of human RNases and their potential uses in malignant disease follows in Chapter 5. Strategies for the use of enzymes in the treatment

of inborn errors of metabolism and in the disorders of blood clotting provide thought-provoking reading in Chapters 6–8. Experimental manipulation of cell-surface antigenicity and alterations of the complement system by enzymes, discussed in Chapters 9 and 10, enable the reader to envision potential therapeutic applications. Innovative approaches for enzyme therapy in digestive disorders and the use of superoxide dismutase in the management of inflammatory disease constitute the subject material of Chapters 11 and 12, respectively. The rest of the book is devoted to modification of enzymes to overcome problems of immunogenicity and short biological half-life.

The list of contributors is impressive and the references at the end of each chapter are comprehensive and current. This well-organized and generally well-written book provides an up to date account of research in the application of enzymes as therapeutic tools.

It would be of value to biochemists, pharmacologists, and pharmaceutical research scientists interested in the medicinal applications of enzymes.

R. Gollamudi, *The University of Tennessee
Center for the Health Sciences*

Advances in Organometallic Chemistry. Volume 19. Edited by F. G. A. Stone and R. West (The University, Bristol and the University of Wisconsin, Madison). Academic Press, New York. 1981. ix + 318 pp. \$54.50.

The first chapter (50 pages, 145 references) is on the Chemistry of Titanocene and Zirconocene by G. P. Pez and J. N. Armor. It comprises a critical, but not exhaustive, review of the synthesis, structures, and chemical properties of these highly reactive (toward oxygen, moisture, and even dinitrogen) species. The roles of these species in dinitrogen fixation, dehydrogenation of ammonia, and reactions with alkenes and alkynes are included in the discussion.

The Photochemistry of Organopolysilanes by M. Ishikawa and M. Kumada (45 pages, 107 references) is reviewed in the next chapter. The photolysis of linear, branched, and cyclic organopolysilanes introduces the general topic. This is followed by discussion of the chemistry of silylenes formed in the photolyses, and of the chemistry of silicon-carbon double bonded intermediates. This chapter provides a useful introduction to current activity in the exciting field of the reactive silicon-containing intermediates. Consideration of the novel photochemical behavior of alkynyl disilanes follows.

The chapter on Alkali Metal-Transition Metal Pi-Complexes by K. Jonas (26 pages, 62 references) is divided into three sections: alkali metal organyl-, alkali metal hydrido-, and alkali metal diorganylphosphido-nickel(O) pi-ligand complexes; dilithium-nickel-olefin complexes and transition metal-olefin and alkali-metal-transition metal-olefin complexes from metallocenes by reductive cyclopentadienyl elimination. The treatment covers preparation and a substantial discussion of structures of the complexes.

The volume continues with a chapter on Organic Compounds of Divalent Tin and Lead by J. W. Connolly and C. Hoff (31 pages, 109 references). Structure, synthesis, reactions and spectroscopic properties of pi-bonded complexes such as stannocene and its derivatives, sigma-bonded structures and transition metal complexes are discussed in sequence. This brief chapter provides a good survey of the state of our knowledge through 1979. Alkyl and aryl derivatives of divalent tin are not included in this chapter.

Novel types of Metal-Metal Bonded Complexes Containing Allyl and Cyclopentadienyl Bridging Ligands are discussed by H. Werner (27 pages, 52 references). These are compounds, many of which contain palladium atoms bonded to each other; these are in turn pi-bonded to cyclopentadienyl allyl ligands with the Pd-Pd axis parallel to the cyclopentadienyl ring, for example. Synthesis, structure, bonding reaction mechanisms, and reactivity are discussed.

A somewhat unexpected but most welcome chapter by H. Alper on Phase-Transfer Catalysis in Organometallic Chemistry (30 pages, 78 references) demonstrates how this powerful catalytic tool permeates synthetic chemistry in general. Topics include use of organometallics in stoichiometric and in catalytic reactions of organic compounds and organometallic syntheses including ligand substitutions, formation of pi-complexes, and of clusters.

M. D. Curtis and P. S. Epstein have contributed a chapter on Re-

distribution Reactions on Silicon Catalyzed by Transition Metal Complexes (43 pages, 91 references). The exchanges involve transfer, for example, of a group bonded to silicon on one silane to silicon in another silane (C/C exchange). Among others are C/H, H/D, C/Cl, and C/O exchanges. Mono-, di-, and polysilanes and siloxanes are considered and mechanisms are discussed.

The final chapter on The Application of ^{13}C -NMR Spectroscopy to Organo-Transition Metal Complexes (47 pages, 95 references) is by P. W. Jolly and R. Mynott. The selection of material for a relatively brief review of a broad topic includes monohapto alkyl complexes, olefin complexes (trigonal planar, tetrahedral, and tetrahapto 1,3-dienes), trihapto allyl metal complexes, and chiral systems.

Limitations on the length of the chapters result in treatments largely focused on work of the authors and closely related studies. This limitation is offset in large degree by the authoritative nature of the discussions.

This volume, like the others in the series, belongs on the shelves of research libraries but, at a cost of seventeen cents (U.S.) per page, is unlikely to appear on shelves of many private libraries. In any event, it constitutes a useful addition to the organometallic literature.

H. G. Kuivila, *State University of New York at Albany*

Coordination Chemistry Reviews. Volume 35. Edited by A. B. P. Lever (York University). Elsevier Scientific Publishing Co., New York and Amsterdam. 1981. 268 pp. \$89.20.

Transition Metal Chemistry Review. 1979. Part A. Edited by C. D. Garner (University of Manchester) and K. R. Seddon (University of Oxford).

For several years, The Royal Society of Chemistry has been publishing Specialist Periodical Reports—series of review volumes which provide comprehensive coverage of major areas of research. However, the series entitled "Inorganic Chemistry of the Transition Elements" was suspended with Volume 6 in 1978, and no future issues are currently being planned. The new "Transition Metal Chemistry Reviews", scheduled for annual incorporation into the "Coordination Chemistry Reviews" series published by Elsevier Scientific Publishing Company, are intended to (and do indeed) fill the resulting void in many respects.

As stated by the editors in the preface to this volume, "the principal aim of this volume and its companion (Volume 37) is to provide a reasonably comprehensive coverage of the coordination chemistry of *d*-transition elements, which appeared during late 1978 and 1979, using primary journals and Volumes 90 and 91 of Chemical Abstracts as the sources for the information". Consequently, Volume 35 contains eight chapters which review the coordination chemistry of iron (R. Davis, 40 pages, 274 references), ruthenium and osmium (K. R. Seddon, 43 pages, 269 references), cobalt (R. W. Hay, 28 pages, 221 references), rhodium and iridium (D. J. Cole-Hamilton, 30 pages, 200 references), palladium and platinum (F. R. Hartley, 67 pages, 477 references), copper (B. J. Hathaway, 42 pages, 217 references), silver (W. Ewen Smith, 5 pages, 37 references), and gold (W. Ewen Smith, 6 pages, 47 references) for the period specified. [Reviews of the inorganic chemistry of the other transition metals are to appear in Volume 37.] For each element (with the exception of Rh and Ir), the material is classified according to the formal oxidation state of the metal (usually from high to low) and further subdivided according to the nature of the ligand donor atoms involved in bonding to the metal centers (e.g., halides, cyanides, N-bonded ligands, O-bonded ligands etc.). Some additional sections which span this classification scheme (e.g., the inorganic biochemistry of iron, the photocatalytic decomposition of water by ruthenium complexes, etc.) have been included in several of the chapters. In general, publications dealing primarily with organometallic chemistry, reaction mechanisms, or spectroscopic studies are not included, although carbonyl complexes of the iron triad are considered in some detail. The volume also contains a list of abbreviations used.

The coverage of the literature appears to be thorough, and the chapters are free of glaring typesetting errors. The presentation is usually clear and concise, and in places it rises above the routine listing of the studies performed to include value judgments, constructive criticisms, and insights of the individual reviewers. In summary, this volume will be of interest and utility both to investigators active in this area of chemistry and to lecturers desiring to update course material.

Peter Legzdins, *University of British Columbia*