

The CEIE of 61 cal/mol per deuterium in *N*-methylpiperidine can be entirely accounted for, within the error limits, by zero-point energy contributions associated with the C–H stretching frequencies. In the infrared, C–D stretching bands occur at 2050 (ax) and 2160 (eq) cm^{-1} for *N*-alkylpiperidines,¹⁵ a difference of 110 cm^{-1} , corresponding to a predicted isotope effect of about 55 cal/mol.¹⁶ The CEIE may be compared with a CEIE of 25 cal/mol per deuterium and *per oxygen atom* in the 1,3-dioxane examined by Anet and Kopelovich,³ which was also largely ac-

(14) The ^1H spectrum was obtained with specific decoupling from the $\text{C}_{3,5}$ hydrogens. The C_6 hydrogens give separate signals, but one overlaps with the signal of the remaining C_2 -H, thereby introducing some uncertainty in shift and error in K and ΔG° . The observed separation of signals was 0.053 ppm at 19.5°, and the difference in axial and equatorial ^1H shifts from low-temperature spectra is 0.976 ppm.

(15) Tsuda, M.; Kawazoe, Y. *Chem. Pharm. Bull.* **1968**, *16*, 702.

(16) Calculated from the difference in the sum of C–H and C–D stretching frequencies for the 2- d_1 (ax) and 2- d_1 (eq) isotopomers, based on the assumption that $\nu_{\text{CH}}/\nu_{\text{CD}}$ is about 1.35.

counted for by stretching vibrations although an opposing contribution from bending vibrations was needed. The larger CEIE in *N*-methylpiperidine is consistent with the theory of negative hyperconjugation, since a high-lying σ^* orbital should interact more with a nonbonding orbital for nitrogen than with a lower lying oxygen nonbonding orbital. The angular dependence of the intrinsic effect is also consistent with negative hyperconjugation, wherein isotopic perturbation of a C–H bond anti to the lone pair should have a greater effect on the ^{15}N shielding than perturbation of a gauche C–H bond because of a greater effect on the vibrationally averaged electron distribution around nitrogen.^{17,18}

(17) For a discussion of intrinsic isotope shifts at ^{13}C and ^{19}F associated with negative hyperconjugation in carbanions and anilines, see: Forsyth, D. A.; Yang, J.-R. *J. Am. Chem. Soc.* **1986**, *108*, 2157.

(18) For an earlier suggestion of an effect on ^{15}N shifts due to delocalization of the lone pair to antiperiplanar C(α)H bonds, see: (a) Duthaler, R. O.; Williamson, K. L.; Giannini, D. D.; Bearden, W. H.; Roberts, J. D. *J. Am. Chem. Soc.* **1977**, *99*, 8406. (b) Duthaler, R. O.; Roberts, J. D. *J. Am. Chem. Soc.* **1978**, *100*, 3882.

Book Reviews*

Stereoselective Synthesis. By Mihaly Nogradi (Technical University, Budapest). VCH Publishers: New York. 1987. xiv + 356 pp. \$97.50. ISBN 0-89573-494-X

This is a well-written monograph dealing with the currently very active area of stereoselective syntheses. The book contains many references, but it is quite readable for students and others who wish to acquaint themselves with this very important subject. There is a good discussion of terminology, principles, and concepts in the first chapter of the book. The next chapters (8 in all) deal with practical synthetic aspects of asymmetric syntheses and review the major accomplishments over the past 15 years or so. A number of tables accompany the discussion showing yields, ee's, etc. In effect, the book reiterates what is now in the five-volume treatise "Asymmetric Synthesis" edited by J. D. Morrison. However, this is a transportable version and will inform the reader quite adequately about details on these major synthetic accomplishments. In addition to asymmetric synthetic methods, which the author confesses he is biased toward, there are numerous discussions on related enantioselective processes and sufficient mechanistic aspects to allow the reader adequate comprehension of the reactions in question.

The major stereochemical processes are covered (except enzyme-mediated reactions), which include catalytic hydrogenation, both homo- and heterogeneous, non-catalytic reduction involving chiral boranes, metal hydrides, NADH mimics, etc., as well as oxidations with chiral auxiliaries or catalysts. The major portion of the book deals with asymmetric C–C bond-forming reactions, which in the biased opinion of this reviewer is of the utmost importance. The "aldol" process, in its broadest terms, is covered and summarized quite well as is the asymmetric nucleophilic and electrophilic C–C bond-forming reactions. Pericyclic reactions of all types are addressed showing the growing importance of this process in C–C bond-forming reactions. Finally, a few pages dealing with stereoselective C–hetero bonds, including protonation of chiral carbanions, are included.

In summary, the author has made a valiant attempt to cover a vast and rapidly growing field of organic chemistry in under 400 pages, but to this reviewer's surprise, he has succeeded far beyond my expectations. By brisk and clear writing, and clearly drawn and aesthetically pleasing structures, the topic is quite easily read by experts and students alike. To be sure, many topics are scanned over quickly, but the essence is always present. This is a rather good book on which a course could be based because it leaves the instructor to fill in some of the depth omitted by the author. The only negative comment that can be made is the exorbitant

cost of the book, which will, unfortunately, put it out of the range of those who can benefit by it most.

A. I. Meyers, *Colorado State University*

Residue Reviews. Volume 97. Edited by F. A. Gunther and J. D. Gunther. Springer-Verlag: Berlin and New York. 1986. 151 pp. \$33.50. ISBN 0-387-96294-8

This is the last volume to be edited by its founder, Francis Alan Gunther, who died in 1985. The series is to be continued, but under the new title *Reviews of Environmental Contamination and Toxicology*. This volume begins with an appreciation of Gunther's contributions to pesticide chemistry.

Five reviews make up this volume, as follows: Regulatory aspects of bound residues (chemistry); 1,3-Dichloropropene; Postharvest fungal decay control chemicals; Effects of synthetic pyrethroid insecticides on nontarget organisms; Toxicology of methyl ethyl ketone.

The subject index is thorough.

Reviews of Environmental Contamination and Toxicology. Volumes 98 and 99. Edited by G. W. Ware. Springer-Verlag: Berlin and New York. 1987. Volume 98: 166 pp. \$39.00. ISBN 0-387-96448-7. Volume 99: 175 pp. \$41.00. ISBN 0-387-96498-3

These are the first and second volumes under the new Editor of the series that is a continuation of *Residue Reviews*. The nine reviews in them are as follows: Attenuation of polychlorinated biphenyls in soils; Maleic hydrazide residues in tobacco and their toxicological implications; Fate and persistence of aquatic herbicides; Organophosphorus pesticide residues in fruits and vegetables; Biological half-lives of chemicals in fishes; Propylene chlorohydrins: toxicology, metabolism and environmental fate; The pyrolysis of cannabinoids; Pesticide fate from vine to wine; Transport and transformations of organic chemicals in the soil-air-water ecosystem. The review on wine in Volume 99 is recommended to a much wider audience than just pesticide chemists. The happy conclusion is that pesticide concentrations are so highly diminished in the wine-making process that no significant toxic or organoleptic effects are to be found, but nevertheless, the knowledge that a wine began its career with grapes treated with "mancozeb", "furoxyl", and other substances with cacophonous names cannot but reduce the romantic aspects of wine appreciation.

The Editor has included a short chapter of information for prospective authors of reviews, in which he bravely offers his home telephone number as well as that of his office. It is slightly disappointing to read in this chapter that Chemical Abstracts index terms, which are designed for

*Unsigned book reviews are by the Book Review Editor

indexing rather than ease of comprehension, are specified, rather than IUPAC nomenclature, especially since CAS Registry Numbers will be given as well. Fortunately, the index uses the more readily recognized names, such as "toluidine" and "phenol".

Atmosphärische Spurenstoffe und ihr physikalisch-chemisches Verhalten. Edited by K. H. Becker and J. Löbel. Springer-Verlag: Berlin and New York. 1985. 264 pp. DM 98.00. ISBN 3-540-15503-1

This collection of fourteen typescript papers in German is intended as a source book for seminars on atmospheric chemistry. Physical chemistry is represented in the discussions of kinetics, diffusion, and aerosols. One chapter takes up sources of pollutants, others take up chemical reactions, and one treats mathematical modelling. A substantial index is included.

Carbon-13 NMR Spectroscopy: High-Resolution Methods and Applications in Organic Chemistry and Biochemistry. Third, revised edition. By Eberhard Breitmaier (Universität Bonn) and Wolfgang Voelter (Universität Tübingen). VCH Publishers: New York. 1987. 515 pp. \$135.00 ISBN 0-89573-493-1

This new edition, written 8 years after the previous one, takes into account the much increased sensitivity arising from improvements in technology in recent years. Since it is now easier and faster to obtain a ^{13}C spectrum, which will have greater sensitivity, it is not surprising that the applications of the subject have been growing rapidly.

The authors recognize the more important advances, such as computer-controllable pulse sequences, in their revision of the chapter on instrumental methods, as well as in the chapter on spectral parameters and structural properties. The subject of applications is divided into two chapters, one of which is a systematic survey of ^{13}C NMR spectroscopy of organic compounds, and the other of which is devoted to natural products. The former now includes organometallics and such subjects as carbon-phosphorus couplings. The natural products chapter first takes up the important classes of natural products, such as terpenes, steroids, alkaloids, carbohydrates, nucleosides, peptides, and porphyrins. The last part of the chapter is devoted to biosynthetic pathways, using 11 examples, such as radicinin, methyl palmitoleate, cephalosporin, and myxovirescin A.

The references for all chapters are grouped at the end, and number well over a thousand. In the revising, new references seem to have been dubbed in, using sub-letters, in some chapters, but not in others. Citations of published articles as recent as 1985 are to be found. The subject index is quite thorough.

This will continue to be a most useful book, with its abundant tables and diagrams. It is a pity that the price does not encourage individual purchase.

The Enzymes. Volume XVIII. Control by Phosphorylation. Part B. Specific Enzymes (II), Biological Processes. Edited by P. D. Boyer and E. G. Krebs. Academic Press: New York. 1987. xii + 512 pp. \$75.00. ISBN 0-12-122718-9

In these days of rampant inflation of prices for journals and books, I find that I am unable to purchase the number of books that I once did, and I have also found it necessary to cancel some subscriptions and several of my standing orders for series publications. One standing order that I could never consider suspending, however, is for the third edition of *The Enzymes*, a series that was initiated in 1970 by Paul Boyer to provide comprehensive reviews of principles of enzymology, of individual enzymes, and of regulation of metabolism by the control of enzymic processes. The eighteenth volume in the series is part of a set of two that are devoted to the consideration of the control of catalytic activity by phosphorylation of enzymes. Since it is part of this two-volume set, review of its contents must include reference to its partner (Volume 17, Part A).

The companion volume, Part A, begins with a series of reviews by luminaries in the field who consider general aspects of control by phosphorylation: the kinases and phosphatases, the nature of cascade systems, the role of calcium and calmodulin, and the recently emerging active field of tyrosine phosphorylation in viral oncogenesis and in receptor function. Part A concludes with four reviews of regulation by phosphorylation of specific enzymes of glycogen metabolism, which represent the area of metabolism for which this means of control was first elucidated. Part B, the formal subject of this review, continues with eight reviews of specific enzymes that are controlled by phosphorylation. These include enzyme systems of the glycolytic/gluconeogenic pathway, lipid metabolism, and amino acid metabolism. While all seem to be of the uniformly high quality that characterizes *The Enzymes*, I was particularly pleased to see a recent review authored by Pilakis and his colleagues on control of fructose-2,6-bisphosphate production; this has been an area of rapid development, and the up-to-date and authoritative review is welcome. The remaining six reviews are intended to reflect a more broad view of

the regulation of larger processes by phosphorylation, and they certainly serve to illustrate how the principles of covalent regulation have been adopted in biological systems that extend far beyond the realm of glycogen metabolism where they were first studied. These include brain kinases and phosphatases, regulation of receptor and of ion channels as examples of membrane phenomena that are subject to phosphorylation control, regulation of protein biosynthesis, and regulation of muscle contraction. The volume concludes with a chapter on protein phosphorylation in prokaryotic and single-celled eukaryotic organisms. The only subject that is missing from the package, an omission that is acknowledged by the editors, is protein phosphorylation in the nucleus, including modification of nuclear proteins such as histones and the lamins.

I believe that the editors should be congratulated on their selection of the authors for the reviews and for their decision to add these two fine volumes to the series.

William A. Bridger, *University of Alberta*

Analytical Chemistry by Open Learning. Electrophoresis. By M. Melvin (Robert Gordon's Institute of Technology). John Wiley & Sons: New York. 1987. xxi + 130 pp. \$19.95. ISBN 0471-91375-8

This book is one of a series concerning 29 different and specific topics on Analytical Chemistry. The present topic is that of Electrophoresis, and much of the book discusses the practical aspects of electrophoretic separations of proteins and polynucleotides. Electrophoresis is becoming increasingly important with the high level of enthusiasm for Biotechnology where the separation of peptides, proteins, and polynucleotides is critically important.

This book is written for the beginner, but it has some interesting practical tips as well. The format is based on the "Open Learning" design for what are called "Distance Learners". This means that the text is interspersed with self-assessment questions for which the answers are given in a section at the end of the book. This is an interesting and seemingly helpful format. Since the book is written at the novice level, it can be criticized for occasionally leaving out a few important details that would be confusing to a beginner. The weak explanations of isotachopheresis and disc electrophoresis are examples.

This version of the Open Learning Series has seven chapters. These include two on General Introduction to Electrophoresis and Types of Instrumental Systems. Brief but very clear chapters on Support Media Used in Zone Electrophoresis, Detection in Electrophoresis, and Factors that Affect Electrophoretic Mobility are included. The author provides a very good practical and chemical picture of the different gel media presently used in electrophoresis. Finally, two chapters are included on more state-of-the-art techniques including Immunoelectrophoresis and Two-Dimensional Techniques. It was a bit disappointing that work involving zone electrophoresis in open capillary tubes was not mentioned, since this area is rapidly dominating the area of trace analysis with electrophoresis.

This text is by necessity concise and even at times a bit superficial, but it appears perfect for the beginning chemist reaching the point of understanding separation science. Its practical discussion of separation of proteins and polynucleotides should also be helpful to any investigator beginning in these areas.

Andrew G. Ewing, *Penn State University*

High Performance Liquid Chromatography in Enzymatic Analysis: Applications to the Assay of Enzymatic Activity. By E. F. Rossomando (University of Connecticut Health Center). John Wiley & Sons: New York. 1987. xv + 253 pp. \$39.95. ISBN 0-471-87959-2

This book presents a useful method for evaluating enzyme activity. It contains six chapters. In Chapter One, the author familiarizes the reader with the fundamental procedures in assaying enzymatic activity. The second chapter treats the basic principles of high performance liquid chromatography (HPLC) and some of its practical aspects. In Chapter Three, the reader learns how to develop an enzyme assay using HPLC. Chapter Four discusses the preparation of enzymes for activity measurements. This chapter covers complex samples like organs and simpler samples like single cells. Chapter Five presents a survey of measuring many kinds of enzymatic activities by HPLC methods. The chapter is subdivided into topics such as catecholamine metabolism and steroid metabolism. Examples of specific enzymes within each subdivision are covered in detail including experimental conditions. Many chromatograms are presented, and in many cases, other curves such as activity curves are shown. It is the book's longest chapter, 108 pages. With detailed examples, Chapter Six discusses the use of HPLC in studying the activity of multienzyme systems.

Each chapter starts with an overview, and then the chapter is clearly and logically developed. The chapters end with a summary and conclusion. References and general references are provided at the completion of a chapter. The references are further subdivided by subject so that

readers may quickly find the area of their interest. An author index covers the reference sections and the text.

The author is very effective in teaching the reader the basics of assaying enzymatic activity by HPLC. Thus the book should be very helpful to the worker beginning in this area. Experienced workers should find the book a good review of the principles they use. For the experienced worker, it should be especially useful as a good reference volume with the many examples of enzymatic assays found in the fifth chapter.

Norman E. Hoffman, *Marquette University*

A Guidebook to Mechanism in Organic Chemistry. 6th edition. By P. Sykes (Cambridge University). Longman Scientific and Technical: London; co-published (U.S.A.) by John Wiley and Sons: New York. 1986. xii + 416 pp. \$21.95. ISBN 0-582-44695-3

The sixth edition of this guidebook contains 13 chapters with essentially the same headings as in the fifth edition. Despite claims of a "very thorough overall and extensive re-tune", the reviewer found relatively little change from the fifth edition. Six new topics are listed in the preface but inspection reveals that these involve only eight additional pages of text.

As one would expect for the sixth edition of a popular text (now translated into nine languages), the mechanisms are well chosen and the interpretations are essentially free of errors. One might, however, question the rationalization, in terms of precipitation of silver halide, of the electrophilic assistance rendered by silver ion to reactions of alkyl halides (p 97), and the subsequent statement (p 102) that "ionization may also be induced by Lewis acids" (italics added).

The reviewer, for reasons outlined in the first paragraph, would be reluctant to recommend purchase of this new edition by someone already in possession of the previous one. However, organic chemists (practitioners as well as students) who have not read this book should by all means purchase a copy; it is a pleasure to read, very informative, reasonably priced, and fully deserving of the excellent reviews that previous editions have obtained.

Dennis N. Kevill, *Northern Illinois University*

Organometallic Chemistry Reviews; Annual Surveys: Transition Metals in Organic Synthesis, Organic Reactions of Selected π -Complexes. Edited by R. B. King (University of Georgia) and J. P. Oliver (Wayne State University). Elsevier Science Publishers: Amsterdam and New York. 1987. 590 pp. \$200.00. ISBN 0-444-42757-0

This book includes three comprehensive reviews in the area of organometallic chemistry, focussed on papers published during the year of 1985. It includes a useful author index but no subject index.

The first review, by L. S. Hegeudus, is a literature survey of applications of transition metals in organic chemistry (269 pages, 895 references). The topics covered in 86 review papers published during this period are listed. The major section of this review covers carbon-carbon bond-forming reactions, organized according to the reaction types. Functional group preparations are discussed separately.

The second review by Laszlo Marko (132 pages, 616 references) covers research on the use of transition metals in hydroformylations, reductions, and oxidations in organic synthesis. This review provides appropriate emphasis on mechanistic aspects of this chemistry.

The third review, by George Marr and Bernard W. Rockett (154 pages, 341 references), focusses on organic reaction of selected π -complexes of transition metals. A wide range of interesting chemistry is discussed.

The potential usefulness of this book will attract chemists to encourage its purchase by their libraries, despite its extraordinary expense.

J. C. Martin, *Vanderbilt University*

Metal Clusters. Edited by Martin Moskovits (University of Toronto). John Wiley & Sons: New York. 1986. viii + 313 pp. \$49.95. ISBN 0471-89388-9

This book is a fascinating general introduction to the emerging discipline of metal cluster science, defined in the widest possible sense. Its ten chapters, all written by scientists actively involved in this area, travel from theory, through inorganic chemistry, past physical chemistry and chemical physics, ending in catalysis. Professor Moskovits metaphorically describes metal cluster research as a "cosmic dust cloud on its way to becoming a star". If so, the broad perspective adopted in this volume may well help to catalyze the process of unification.

Following a brief historical synopsis, Chapter 2 (R. C. Baetzold) provides a critical review of ab initio, X_α , and semiempirical studies of bare and organometallic metal clusters. Chapter 3 (D. H. Farrar and R. J. Goudsmit) focusses on the geometries of the metal atom frameworks in stable organometallic and metal halide complexes and the application of the Wade rules and their recent extensions. Kinetic studies of the thermal and photochemical reactions of metal carbonyl clusters

are next reviewed by A. J. Poe. Chapter 5 (J. S. Bradley) deals with organometallic cluster chemistry, with particular emphasis on reactions involving the formation and breaking of C-H, C-C, and C-O bonds. Chapter 6 (J. L. Gole) discusses gas-phase studies of bare alkali and transition-metal clusters with mass-spectrometric and laser-spectroscopic techniques. Chapter 7 (M. Moskovits) reviews the spectroscopic data obtained to date by matrix-isolation methods for metal aggregates and partially ligated clusters. The preparation, characterization, and catalytic properties of metal clusters enclosed in zeolites are then discussed by P. Gallezot. Finally, Chapters 9 (A. Brenner) and 10 (B. C. Gates) are devoted to the reactivity and catalytic properties of supported metal clusters and surface-bound organometallics. Each chapter is amply documented, with a total of nearly one thousand literature references covering work up to 1985. A general index completes the volume.

In summary, *Metal Clusters* tackles a very broadly defined subject area with the combined goals of providing a general introduction to the field and a review of recent research. Thus, it should prove a very useful addition to the library of any researcher at present or potentially interested in the study of metal clusters.

Doreen Leopold, *University of Minnesota*

Lecture Notes in Bio-Organic Chemistry: Mechanistic Models of Asymmetric Reductions. By A. Ohno and S. Ushida (Institute for Chemical Research, Kyoto University, and Mukogawa Women's University). Springer-Verlag: Berlin, Heidelberg, New York, Tokyo. 1986. 105 pp. \$15.00. ISBN 0-387-16440-5

Springer-Verlag has initiated a new monograph series: *Lecture Notes in Bio-Organic Chemistry*. The stated intent of the editors and publisher is that these monographs will enhance the spread of current knowledge in areas of on-going research in fields such as mechanistic biochemistry, biomimetic organic chemistry, biotechnological applications of enzymology, i.e., the borderline between organic chemistry and biochemistry. The first volume under this heading is by A. Ohno and S. Ushida on *Mechanistic Models of Asymmetric Reductions*. The subject of this volume must be taken in context of the title of the series. It deals exclusively with the subject of reductions involving nicotinamide adenine dinucleotide (NAD⁺) and flavin adenine dinucleotide (FAD) as apoenzymes and the extensive research using these as model systems for non-enzymic asymmetric reductions. This subject has been the major research interest of the senior author (Professor Ohno) for over ten years.

This monograph is produced directly from professionally typed text and tables and carefully prepared formulas and graphs. It is a thorough and scholarly treatment of the limited subject of mechanistic models of enzymatic asymmetric reductions, written from the viewpoint of a synthetic organic chemist. Data are given, the results are summarized, and mechanistic conclusions are drawn based on over 200 references that are cited in the bibliography. This publication is highly recommended for graduate students and research workers involved in asymmetric synthesis; in fact, it is required reading for those who are planning to study or do research in the area of enzyme-modeled reactions of all sorts. It would be more valuable if it included a subject index. The editors of the series should consider this for future volumes.

Harry S. Mosher, *Stanford University*

Applications of New Mass Spectrometry Techniques in Pesticide Chemistry. Edited by J. D. Rosen (Rutgers University). John Wiley & Sons: New York. 1987. xiv + 264 pp. \$55.00. ISBN 0-471-83280-4

Mass spectrometry is a widely used technique for structural elucidation and quantitation in organic analysis. This book, which is a collection of seventeen chapters written by thirty-two authors, provides a contemporary picture of the use of some of the more recently introduced mass spectrometric methods such as chemical ionization, field desorption, fast atom bombardment, negative ions, isomer differentiation, thermospray and other on-line HPLC/MS interfaces, and tandem mass spectrometry to pesticide chemistry. Excepting the first chapter, each contribution is divided into a short introduction, an experimental section, and a results and discussion section. The book is clearly aimed at the practicing pesticide chemist and contains little of a theoretical nature. Some background in mass spectrometry is presumed as the introductory sections are short and not necessarily detailed. The well read analyst would have little difficulty in digesting the material and is provided with sufficient information to see when and how the techniques described could be applied to typical problems encountered in the analysis of pesticides. The book also has a strong emphasis on structural elucidation and identification with little space devoted to quantitation.

This is not the type of book that is likely to appeal to the mass spectroscopist and its candidacy will be restricted to pesticide chemists who have occasion to make use of mass spectrometry. For this audience it will be a very useful purchase. Unlike many modern multi-authored texts, the book has been very well edited with a uniformity of format and

little overlap or repetition between individual chapters.

Colin F. Poole, *Wayne State University*

Light-Activated Pesticides. Edited by James R. Heitz and Kelsey R. Downum. American Chemical Society: Washington, DC, 1987. x + 339 pp. \$69.95. ISBN 0-8412-1026-8

Light-activated pesticides include insecticides, fungicides, and herbicides whose activity depends upon or is promoted by light. This area of study became important only as recently as 1970, and it is now a subject of much interest in the agricultural industry. This volume tries to be more than the proceedings of the 1986 symposium that gave rise to it, although many of the 22 typescript chapters show their origin as reports of original research. Several chapters are concerned with singlet oxygen. Sensitizers, dyes, photodecomposition, physiology, biochemistry, field testing, etc., are taken up, and it is fair to say that this book represents the most comprehensive treatment of the subject of recent date. Its usefulness is enhanced by a very thorough index.

Advances in Organometallic Chemistry, Volume 26. Edited by F. G. A. Stone (University of Bristol) and Robert West (University of Wisconsin, Madison). Academic Press, Inc.: Orlando, FL, 1986. vi + 401 pp. \$85.00/£71.00. ISBN 0-12-031126-7

This volume is a collection of six chapters written by chemists actively working in their area of organometallic chemistry.

In the first review, A. J. Deeming describes in great detail the chemistry of triosmium clusters especially of dodecacarbonyltriosmium and dihydridodecacarbonyltriosmium and selects the different methods of their synthesis, reactivities, and changes in nuclearity of such clusters. There are 504 references cited in this great review.

In the second chapter, M. H. Chisholm and J. A. Heppert review the electronic structure and the reactions of 1,3-ditungstacyclobutadienes with halogens, alkynes, allenes, isocyanide, carbon monoxide, and diphenyldiazomethane. The literature coverage is complete through 1985 (65 references).

In the third chapter, P. Powell reviews the acyclic pentadienyl anions with special emphasis on their methods of preparations and their derivatives of groups I, II, and III and of transition elements. The literature coverages includes 235 references and is complete through 1985.

In the fourth review I, Theodosiou, R. Barone, and M. Chanon review the development of using computer to study and classify reactions on the basis of their type of mechanism, rather than by organic functional group or by metal, specifically, describing the flow chart of TAMREAC (TrAnsiton Metal REACTivity) to rationalize mechanistic studies. They illustrate the use of TAMREAC with three examples: ethylene dimerization, ethylenehydroformylation and allyl-alkyl coupling reactions. The authors conclude that this approach is still in its infancy and TAMREAC is limited to mononuclear catalytic systems and the number of non-hydrogen atoms is limited to 30, and finally this approach overlooks the stereochemical features of these reactions; 131 references are cited through 1985.

P. Jutz, a significant contributor in the field of cyclopentadiene chemistry, presents in the fifth chapter a comprehensive review of π -bonding of all main group elements including synthesis, structure, and bonding. In the end of the chapter, Jutz reports the synthesis of the long awaited silicocene. The literature coverages includes 284 references.

In the last chapter, C. G. Kreiter describes in great detail the photochemical reactions of metal carbonyl complexes of group 6 and 7 with conjugated and cumulated dienes. Twenty molecular structures of different carbonyl complexes of these transition metals with 238 references are given in this great review.

In summary, a nice job for the topics covered and the diversity of topics makes this volume a worthwhile addition to this series. A subject index of 21 pages and a cumulative list of contributors in the previous volumes are included.

Sultan T. Abu-Orabi, *Yarmouk University, Jordan*

Encyclopedia of Polymer Science and Engineering, Second Edition, Volumes 7 and 8. Edited by H. F. Mark (Polytechnic Institute of New York), N. M. Bikales (National Science Foundation), C. G. Overberger (University of Michigan), G. Menges (Institut für Kunststoffverarbeitung of the RWTH Aachen), and J. I. Kroschwitz. John Wiley and Sons, Inc.: New York, 1987. Volume 7: xxvi + 818 pp. \$200.00. ISBN 0-471-80937-3. Volume 8: xxiv + 852 pp. \$200.00. ISBN 0-471-80937-3

The *Encyclopedia of Polymer Science and Engineering* has an established position in numerous academic, government, and industrial laboratories. This second edition updates that which was issued 20 years ago and provides coverage of many new topics in the remarkably prolific area of polymer science.

A review of Volumes 4, 5, and 6 has recently appeared (*J. Am. Chem.*

Soc. 1987, 109, 4432). Volume 7 has 43 entries in the Table of Contents, beginning with Fibers, Optical and ending with Hydrogenation. The topics entered include Films, Flammability, Gas-phase Polymerization, Gel Effect, Group-transfer Polymerization, Heat-resistant Polymers, and Hydrogels. Volume 8 has 25 entries in the Table of Contents (Identification to Lignin) and includes Insertion Polymerization, Intertwining Polymer Networks, Ion Exchange Polymers, Isoprene Polymers, Keratin, Laminates, and Light Scattering.

A good way to evaluate a work of this type is to thoroughly read a chapter dealing with one's own research area while searching for completeness and accuracy, and a chapter dealing with a topic in which one is not involved and thus determine the pedagogical value. A general overview can then be given more accurately.

A detailed reading of the chapter entitled "Ion Exchange Polymers", written by Robert L. Albright and Peter A. Yarnell, was undertaken as it is the area with which I am most familiar. This chapter (52 pages) contains 7 tables, 20 figures, and 196 references. It deals with most aspects of ion-exchange resins, from the fundamentals (e.g., resin synthesis) to the applied (e.g., economics). It is as thorough as a chapter in an encyclopedia can be, with its list of references through 1985 allowing a more in-depth look at the subject for the interested reader. Typographical errors are at a minimum. The chapter is well-written and is an excellent introduction to a fascinating subject as well as a source of information for those closely involved with the field.

The area of gas-phase polymerization is one for which an encyclopedia of the type under review would be expected to provide a good introduction. The corresponding chapter written by Norman F. Brockmeier does indeed provide an excellent technological perspective on the subject. It is 9 pages long and ends with a bibliography containing 9 references, seven of which are from 1983 to 1985. The coverage focuses on the Unipol polyethylene process and the BASF-Northern Petrochemical ethylene-propylene copolymer process. It is concise and well-written.

Generally speaking, the reviews range from brief treatments 8-10 pages in length to expositions upwards of 75 pages. Some focus primarily on the technology of a given subject (e.g., gas-phase polymerization), others deal more with basic science (e.g., infrared spectroscopy), and most offer a more balanced combination of fundamental concepts with practical applications (e.g., isoprene polymers). In addition to all of this, there are chapters appropriate for everyone interested in science having a few moments in which to browse (e.g., the chapters on the fine arts and the history of polymer science). The chapters are clearly of a very high caliber with few typographical errors and with chemical equations, figures, and tables that are concise and informative. This series continues to earn its place in the many reference libraries around the world.

Spiro D. Alexandratos, *University of Tennessee, Knoxville*

The Plasma Proteins, Second Edition, Volume V. Edited by Frank W. Putnam (Indiana University). Academic Press, Inc.: Orlando, FL, 1987. viii + 418 pp. \$64.00. ISBN 0-12-568405-3

As the latest in a series devoted to chronicling progress in understanding the chemistry and biology of the plasma proteins, this volume is specifically oriented toward presenting recent advances achieved through molecular biology as well as through conventional protein chemistry.

The first chapter gives a view of the genomic organization of the plasma proteins, and in so doing it sets the stage for discussion in later chapters of protein families and super families. The author gives a useful description of the role of gene duplication in the evolution of function domains in haptoglobins, the transferrins, and the complement families.

In the second chapter, the editor picks up where previous volumes have left off to provide an in-depth analysis of the mechanisms of antibody diversity as revealed through the details of primary structure made possible by molecular biology. This chapter provides an interesting update on the three-dimensional structure of the hinge region and Fc domain and the role of these structures in antigen binding. Some of the most interesting reading, however, concerned the evolution of the immunoglobulin supergene family and the evolutionary relationships between the heavy and light immunoglobulin chains and such related proteins as β_2 -microglobulin and various cell-surface receptors.

Another family of plasma proteins dealt with in this volume is that of the protein components of the plasma lipoproteins (apolipoproteins). Recent studies have provided a wealth of information on the structures and genetic relatedness of the numerous members of this family. Each of the major apolipoproteins, in turn, is discussed from the points of view of (a) properties, biosynthesis, and processing, (b) properties of the cDNA clone, (c) the gene, and (d) polymorphism. This section provides a useful compilation of the nucleotide and amino acid sequences for most of the apolipoproteins. Only a portion of the B-100 cDNA is included, since the complete sequence has only recently been reported. This chapter also presents a helpful summary of variants of apo A-I and apo

E which may be associated with pathological conditions.

Another interesting family of plasma proteins are those related to α_2 macroglobulin, for which the active site is thought to contain an internal β -cysteinyl- γ -glutamyl thiol ester. Cleavage of this thiol ester is thought to lead to the covalent attachment of nucleophiles to a Glx residue. This covalent reaction is believed to account for the stoichiometric inhibition of proteases by α_2 macroglobulin and attachment of the C3 and C4 complement factors to immune complexes and cell membrane constituents. This chapter provides fascinating insight into the genetic, structural, and functional properties of this class of plasma proteins.

A chapter on synthesis, processing, and secretion of plasma proteins provides an update on recent findings in this area of investigation. Newer aspects include a review of plasma protein synthesis in the central nervous system and an examination of acute-phase proteins. The book concludes with an update on sequences obtained for the plasma proteins, with corrections of previous errors.

Overall, this book provides a thorough reexamination of several areas through 1985 and into 1986. This is a valuable sequel to a well-regarded series for all who are interested in the plasma proteins.

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Gas Chromatography in Adsorption and Catalysis. By T. Paryjczak (Technical University of Lodz). John Wiley & Sons: New York. 1986. xvi + 346 pp. \$108.00. ISBN 0-85312-219-0

This publication is a volume in the Ellis Horwood Series in Physical Chemistry. The author, an established investigator in the field of surface phenomena, describes the application of gas-solid chromatography to this area of science. The emphasis of this book is placed on studies involving adsorption and diffusion processes, catalytic surfaces, and reactions involving these surfaces. The book follows the objective indicated by the title not only by describing the chromatographic methods and providing ample references published within the last two decades but also by providing examples of interesting studies. This publication gives an opportunity for an English-speaking reader to become familiar with the

methods and applications described to a significant extent in East-European journals.

A large portion of the book discusses chromatographic methods applied to adsorption and diffusion studies. The specific topics described in detail include investigations of the nature of adsorption, the determination of adsorption isotherms, the heat of adsorption, specific surface areas, and diffusion coefficients. The most emphasis is placed on catalytic properties of surfaces. The book covers many related subjects such as inhomogeneity of surfaces, catalyst surface acidity, adsorbate-adsorbent interactions, and catalytic reactions. The book describes, very briefly, the components of the chromatographic system, but it should not be regarded as sufficient for a reader not familiar with chromatographic techniques.

In summary, this book should be a valuable reference for physical chemists investigating surface phenomena and for analytical chemists who wish to better understand the chromatographic processes or would like to study these processes with chromatographic methods.

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Dictionary of Surfactants: English/German and German/English. By Kurt Siekmann. Springer-Verlag: Berlin and New York. 1987. 160 pp. \$39.00. ISBN 0-387-17555-5

This little cross-language dictionary is a supplement to "Surfactants in Consumer Products" (J. Falbe, Ed.). Its title is misleading, for scarcely a surfactant is to be found in it. It is actually a dictionary of terms used in surfactant chemistry and technology. The entries are mostly single words, but some are short phrases ("anti-dandruff shampoo" = "Antischuppen-shampoo"). Names of substances, processes, effects, and qualities are included. Even words that are identical in the two languages are listed (it is reassuring to find that zwitterion = Zwitterion, and vice versa). There is probably no other dictionary that provides English and German equivalents for many of the terms.