

Book Reviews

Vogel's Elementary Practical Organic Chemistry. Volume 1. Preparation. Third Edition. Edited by B. V. Smith and N. M. Waldron (Chelsea College). Longman Group Limited, London. 1980. XVII + 407 pp. \$31.00.

This book is written as a textbook for the undergraduate laboratory course. Chapter I briefly, but adequately, discusses the theory of general technique used in organic chemistry, including distillation, melting, and freezing. Chapter II discusses these experimental methods in detail with emphasis on the operational technique and the proper experimental setup. Chapter III consists of detailed procedures for purification and separation methods such as distillation, recrystallization, extraction, and chromatography. It also includes a brief introduction to the modern spectroscopic methods (IR, UV, NMR). In Chapter IV (aliphatic and alicyclic compounds), Chapter V (aromatic compounds), and Chapter VI (heterocyclic compounds) detailed experimental procedures for the synthesis of 43 compounds are given. The experiments include many modern preparative methods.

This book stresses not so much the theory of experimental methods as their practical aspects. I believe this is the right direction for a laboratory textbook. The use of equipment with interchangeable ground glass joints is assumed in descriptions throughout the book. A Bunsen burner is used for heating in most of the experiments. One unique feature of this book is the inclusion of spectral data (IR, UV, NMR) for all starting materials and products. It is hoped that the student can record these spectra of his own materials and thus check their identity and purity. Although this may not be feasible at present due to the facilities involved, it will certainly help the student to practice his knowledge of modern spectroscopy in the structural identification of organic compounds.

This book, however, is not without some minor drawbacks. It has no exercises for the students to test their understanding of the experiments they are doing. It has no figure captions, which makes reading of this book more difficult. The price of this book may also be a little too high for an undergraduate textbook. Overall, this book is well edited and should be a good textbook for the undergraduate laboratory course.

Shang-Shing P. Chou, *Fu Jen University*

Advances in Polymer Science. 34/35. Cationic Polymerization: Initiation Processes with Alkenyl Monomers. By A. Gandini and H. Cheradame (Institut National Polytechnique de Grenoble). Springer-Verlag, New York. 1980. 289 pp. \$79.80.

In recent years there has been an upsurge of interest and activity in the field of cationic polymerization. This book is, therefore, most welcome since it draws together the most current data and theories on the mechanisms and kinetics of these polymerizations. Considerable discussion throughout the book is given for the evidence regarding either active esters (pseudocationic polymerization) or ionic species as the principal chain carriers for various initiating systems. Although the book is thorough and systematic in its coverage of the area, the material is presented with such an adept use of language that it is unusually pleasurable to read. Historical perspectives are occasionally included by the authors and add both to the clarity and interest of the topics discussed. While it is heavily referenced, this is not merely a review of the current literature in this field; instead, the authors comment freely and often critically on published results and are not reluctant to offer their own interpretation of the data where they feel it is justified.

The book is organized into eleven chapters, the first of which is an introduction in which the authors appraise the current state of the field and discuss areas which remain to be explored. A general chapter entitled Fundamentals follows in which each of the critical experimental parameters involved in the cationic polymerization is examined and discussed. This chapter also includes a useful section on techniques and characterization, along with the authors' advice on these topics to the investigator. The subsequent four chapters deal with the detailed discussion of the mechanistic aspects of initiation by Brønsted acids and iodine, Lewis acids, carbenium salts and related species, and bare cations. Individual chapters are also devoted to the less-well-known initiating systems, namely, electrochemical initiation, photoinitiation, initiation by charge transfer complexes, initiation from polymers, and initiation with various miscellaneous initiators. An excellent and detailed subject index is also provided.

This book will be a valuable addition to the library of any chemist involved in current research in the area of cationic polymerization.

James V. Crivello, *General Electric Company*

Faraday Symposia of the Chemical Society. No. 14. Diatomic Metals and Metallic Clusters. Edited by D. A. Young. The Royal Society of Chemistry, London. 1980. 251 pp. £23.50.

Fifteen papers are presented from a symposium at the University of Manchester in January 1980. The volume begins with a long (58-pp) review by G. A. Ozin of experimental and theoretical aspects of silver cluster nucleation. With 109 references, this lead article alone should be invaluable to chemical physicists interested in metallic clusters. The remaining papers range in length from 7 to 24 pp and cover an assortment of topics: an ESR study of diatomics CuM and AuM (M=Mg, Zn, Cd and Hg) in Ar matrices; a Mossbauer study of matrix isolated diatomic FeM (M=Mn, Fe, Co, Ni, and Cu); optical absorption and laser Raman studies of Ag_n (*n* < 10) molecules and optical studies of silver microcrystallites; absorption and magnetic dichroism spectra of matrix isolated Ag_n and Cu_n (*n* ≤ 3); gas phase production and chemistry of transition metal atoms and clusters from polynuclear metal carbonyls; a comparison of several semiempirical methods for predicting bond energies of diatomic metals and metallic clusters; a model predicting a complete table of dissociation energies of diatomic molecules from H₂ to Lr₂; application of the Miedma cellular model of heats of formation of alloys to calculation of dissociation energies of diatomic molecules and clusters of transition metals; ab initio (effective core potential) calculations on Pt₂, Pd₂, Cu₂, Ag₂, Au₂, AgAu, Ni₂C₂H₄, and Ni_n (*n* = 1, 6); MCSCF calculations of potential energy curves of ground states of Sc₂, Cr₂, Mo₂, and Ni₂; Gaussian-based LCAO-MO-SCF studies of copper clusters Cu_n (*n* = 2-5, 8, 13); SCF-X α -SW calculations on Cr₂ and Mo₂, their positively charged ions and these units coordinated by ligands; stereochemistry of dimolybdenum and ditungsten compounds with a central (M \equiv M)⁶⁺ unit; and LCAO-HFS calculations on binuclear metal carbonyls Mn₂(CO)₁₀, Fe₂(CO)₉, and Co₂(CO)₈. Sixteen pages of discussion end the volume.

Audrey Companion, *University of Kentucky*

Radioimmunoassay of Steroid Hormones. Second Edition. Edited by Derek Gupta (Universitäts-Kinderklinik). Verlag Chemie, Deerfield Beach, Florida. 1980. xvi + 256 pp. \$48.80.

This book is a compilation of 21 articles contributed by scientists who have extensive experience in the development and application of radioimmunoassays (RIA) to endocrinological research. Nearly half of the articles are devoted to basic considerations involved with the development, use, and reliability of steroid RIAs. Remaining articles contain much of the methodology needed to develop and perform RIAs for a broad range of steroids and congeners, from the sex hormone precursor, androstenedione, to the mineralocorticoid, aldosterone.

Although a somewhat short book for a continually burgeoning field, the combined material contained in the articles of this book provides a good comprehensive coverage of modern techniques used for steroid hormone RIAs. The initial article serves as a good introduction by reviewing the basic concepts and components of a steroid RIA. Several of the following articles will be very important to new investigators within the field as they deal with the methodological aspects, reliability criteria, and production of antisera. Two additional articles at the beginning of this book cover the mathematical elaboration of RIA data and a quantitative method for evaluating the cross-reactivity of antisera.

A series of succeeding articles describe RIA procedures for dehydroepiandrosterone, androstenedione, testosterone, estradiol and estrone, progesterone, desoxycorticosterone, cortisol, aldosterone, and several steroidal glucuronides. Many of these articles give experimental details on the development, performance, and application of the RIA. Several of the articles also explain how the practicability and utility of steroid RIAs may be enhanced by using them in conjunction with chromatographic techniques, which allows several steroids to be simultaneously quantified from a single biological sample.

The final three articles discuss alternate methods of labeling steroids as tracers for use in immunoassays. One very interesting article describes a viroimmunoassay for estradiol which utilizes an estradiol-bacteriophage conjugate and the plaque assay for quantification of results. The remaining articles include a review on the preparation and use of iodine-125

labeled steroids as tracers and a terse discussion on the basic concepts of enzyme immunoassays.

Overall, the articles contained in this book are well organized and referenced. Since the simplicity of the RIA procedure may disguise reasons for anomalous or misinterpreted data, the inclusion in this book of experimental details and discussions on the reliability and quality control of RIAs make it especially valuable to the new investigator. The up-to-dateness of the material should make it useful to the established investigator as well.

David S. Freeman, *College of Pharmacy, North Dakota State University*

Developments in Polymer Chemistry. Volume 1. Edited by N. S. Allen (Manchester Polytechnic). Applied Science Publishers, Ltd., London, U. K. 1980. x + 223 pp. \$42.50.

This book is number one of a series and is composed of seven chapters by experts in the field. A range of topics is covered from photophysical processes in polymers to the more applied subjects of the photochemistry of wool and various dyes. The chapter by E. D. Owen entitled Intermolecular Energy Transfer in Polymers covers energy transfer mechanisms, singlet-singlet and triplet-triplet energy transfer, photostabilization of polymers, and polymer photosensitization. Recent advances in the use of luminescence spectroscopy to investigate polymer structure and dynamics are reviewed by D. A. Holden and J. E. Guillet. Included are discussions of intermolecular effects, micro-Brownian motion, and small molecule diffusion. Photoinitiated grafting onto cellulose as well as depolymerization and cross-linking reactions are reviewed by J. C. Arthur. The processes for the development of wrinkle- and flame-resistant cotton fabrics are also described. Recent advances in the determination of Photooxidation Mechanisms in Commercial Polyolefins are covered by A. Garton, D. J. Carlsson, and D. M. Wiles. Photoinitiation, oxidation, and radical termination in vinyl polymers, e.g., polyethylene, polypropylene, and polystyrene, are discussed as well as the physical factors involved in the oxidation process in the solid state. Photodegradation and Photoyellowing of Wool are described by C. H. Nicholls. Included in this chapter are discussions of the work done to determine the causes of yellowing and the methods used to protect wool from photodegradation. J. Griffiths' chapter on azo dyes and related compounds begins with a review of the condensed phase photoreactions of these compounds. The photochemistry, including reversible reactions such as photochromism and irreversible reactions such as oxidative fading, of azo compounds in solution and in polymeric matrices is also discussed. The editor in collaboration with the late J. F. McKellar reviewed the photostability of anthraquinone dyes in man-made polymers. Studies on the effects of various substituents on photophysical and photochemical properties are included. The chapters are well written and are based predominately on current literature references.

Zack G. Gardlund, *Polymers Department, General Motors Research Laboratories*

Water in Synthetic Fuel Production: The Technology and Alternatives. By R. F. Probst and H. Gold. The MIT Press, Cambridge, Massachusetts. 1978. xii + 296 pp. \$9.95 (\$15 hardbound).

This book deals with a subject which is invoking more and more general interest as synthetic fuel production comes closer to commercial realization. It deals with the use of water in the areas of coal gasification and liquefaction, solvent refined coal, and shale oil technologies.

The first chapters deal with resource locations, general applications of water in synthetic fuel production, and the fundamental conversion processes applied to coal and oil shale. The chapter on cooling fundamentals is oriented toward demonstrating the balance between wet and dry cooling, as related to the technology currently applicable to the synthetic fuels industry. Gas production from coal is discussed in general terms, with a more detailed breakdown of the water requirements for the Synthane, Hygas, CO₂ Acceptor, Lurgi and Koppers-Totzek processes. Cooling water requirements and effluent stream qualities and quantities are also considered. Similarly, liquid and solid fuel production is covered both generally and with specific reference to the Synthoil, H-Coal, Solvent Refined Coal and Exxon Donor Solvent processes as examples of coal conversion. The Paraho Direct and Indirect and Tosco II processes are the specific examples used for oil shale pyrolysis technologies. Also covered here are the COED process and Fischer-Tropsch hydrocarbon synthesis. In situ conversion technologies are mentioned but their water requirements and effluent properties are not analyzed in detail.

Water use in mining, crushing, and disposing processes is treated in another chapter, with reference to the differing requirements for the various resource locations, grades, and processing technologies. Water treatment for reuse and disposal is oriented toward optimum use of the available water resources and is directly related to their relative availability. The final chapter uses the assumptions followed throughout the

book for water use and availability options in the major areas of the U.S. which resources will dictate to be the major synfuels development regions. It presents water requirement comparisons for the various process examples discussed in detail in the text. This is normalized to "standard" size plants for each technology and covers each of the major resource regions. As in other parts of the book, comparisons are also made on weight and energy content bases. An appendix of conversion factors is very useful in this diverse area of energy development.

Since the authors have wisely chosen to stay away, in large part, from cost estimates, this work is not as dated as its publishing date may suggest. Its coverage of current and developing technologies related to water use will ensure that its content will remain highly relevant for some time to come.

Though not of specifically chemical interest, this rather comprehensive work is likely to appeal to a wide audience, due to the rapidly increasing interest in synthetic fuels technologies. Its price is definitely in keeping with such a general interest market.

Robert Gerlach, *Exxon Research and Engineering*

Boron Chemistry. Volume 4. Edited by R. W. Parry and Goji Kodama (University of Utah). Pergamon Press, New York and Oxford. 1980. vii + 161 pp. \$49.50.

This volume contains the invited Plenary Lectures given at the Fourth International meeting on Boron Chemistry. The editors' objective is to provide "a broad and representative summary of developments in boron chemistry". The 13 lectures deal with the following areas: (1) conceptual advances in boron chemistry; (2) cluster compounds and carboranes; (3) organometallic compounds containing boron ligands, boron clusters, or carboranes; (4) boranes as reagents in organic chemistry; (5) organoboranes; (6) chemistry of the smaller boranes; (7) applications of the boranes.

The editors accomplish their review objective (480 references) when space and time constraints are considered. The lectures possess an air of authenticity with respect to soundness, emphasis, and selectivity. There is inevitable variation and compromise between breadth and depth and thus informational gaps do occur. As one or perhaps two of these papers concentrate almost solely on the recent experimental results of the authors, their inclusion here is inappropriate.

The most striking single feature emerging today is the marriage of boron and transition metal chemistry and even more the broader unifying and understanding of all inorganic chemistry. We see this in Rudolph's and Wade's papers on clusters and their relationship to respectively catalysis and model systems for predictive purposes. It is seen again in Siebert's discussion of double decker sandwiches and Gaines' and separately Felner's B₅H₉ derivatives. The metal-boron σ bond is dealt with by Bregudge, et al. There are papers on classical organoboron chemistry by Pelter, Nöth, and Spielvogel. On the theoretical side, Lipscomb provides a provocative treatment of symmetry crossing, classical intermediates, etc. Also "pointing the way" is Williams' more empirical Conservation of Chemical Shift. The book is concluded by the delightful reminiscences of Anton Burg. As a follower of boron chemistry for over 30 years, I would ask who would have guessed where it was headed?

Finally, who should read and who will purchase this book? On the positive side, I would recommend this convenient collection of minireviews (without Index) to the nonspecialist boron chemist and the graduate student who wishes an introduction to where the action is and some intuition as to where the action is headed. On the negative side, there is the availability of this information in various forms elsewhere, a situation that is aggravated by the fact that the meeting occurred in 1979. Certainly this typewritten book could have been produced and reviewed in less time. Considering cost and timing, the most likely purchasers will be the more important libraries and research organizations.

Sidney G. Gibbins, *University of Victoria*

Drug Design. Volume 10. Edited by E. J. Ariens (University of Nijmegen, The Netherlands). Academic Press, New York. 1980. xi + 434 pp. \$49.50.

The rapid developments in this field of medicinal chemistry certainly warrant the continuation of this useful series. As in previous volumes, a team of interdisciplinary contributors provides insight into the latest research areas of drug design.

This book contains nine chapters. The first serves as an introduction and gives a general overview of the procedures of drug design in the laboratory. The second chapter examines conformational considerations in the structure-activity relationships of neuroleptics. Chapter 3 discusses the design of nonpeptidic peptidomimetics and attempts to bridge the gap between bioactive peptides and their nonpeptidic analogues. Chapter 4 applies mathematical models from dynamic systems analysis to the study of antihypertensive drug action.

Polymer science has found wide application in this field. Chapter 5

discusses the use of polymers as drug delivery systems—both as physical carriers and chemical carriers of drugs. Chapter 6 discusses the development of biocompatible polymers and their use in modern surgery.

Chapter 7 reviews the design of insect repellents and provides a brief historical perspective of this area of research.

Chapters 8 and 9 discuss the use of multivariate data analysis in structure-activity relationships. The latter chapter continues the presentation of the Masca Model of Pharmacology that was begun in Volume 9.

The text is well indexed, including the contents of the previous nine volumes, and contains 994 references.

William K. Hagmann, Merck Sharp and Dohme Research Laboratories

Spectroscopic Properties of Inorganic and Organometallic Compounds. Volume 13. Specialist Periodical Reports. Senior Reporters: D. M. Adams (University of Leicester) and E. A. V. Ebsworth (University of Edinburgh). The Chemical Society, London. 1980. xv + 413 pp. \$177.25

Volume 13 of this series reviews the recent literature up to late 1979. The format is unchanged and presents eight chapters each dealing with a separate spectroscopic method. Chapter 1 is the largest and covers nuclear magnetic resonance spectroscopy. This review completely covers all of the nuclei and selected ^1H NMR studies. The chapters list over 1900 references and includes a valuable Appendix which lists the reference numbers for each nucleus. Chapter 2 discusses the recent developments in nuclear quadrupole resonance spectroscopy, and Chapter 3 discusses microwave spectroscopy. Vibrational spectroscopy is divided into four chapters: Chapter 4, Vibrational Spectrum of Small Symmetric Species; Single Crystal and Other Solid State Spectroscopy; Chapter 5, Characteristic Vibrations of Main-Group Element Compounds; Chapter 6, Vibrational Spectra of Transition Element Compounds; and Chapter 7, Vibrational Spectra of Some Coordinated Ligands. The final chapter discusses Mössbauer spectroscopy.

The elimination of the author index from this volume is partially offset by the thorough (8 pages) Table of Contents.

Wayne L. Gladfelter, University of Minnesota

Progress in Reaction Kinetics. Volume 8. Edited by K. R. Jennings and R. B. Cundall. Pergamon Press, Oxford. 1978. vii + 305 pp. \$37.50.

This volume, the continuation of an excellent series, contains five articles.

Reactions of Atomic Oxygen (O^3P) with Organic Compounds, by R. E. Huie and J. T. Herron, is a thorough coverage of the literature from 1957–1973. An introductory section gives a general background of experimental techniques for studying the reactions of ground-state oxygen atoms. More thorough is the section on results, which is divided into three parts: (1) abstraction reactions (primarily H abstraction), (2) addition to unsaturated compounds, and (3) reactions with organic free radicals. This article covers 80 pages, and 260 references are cited.

In Kinetics of Gaseous Fluorine Reactions, R. Foon and M. Kaufman have reviewed the literature through 1973. An excellent introduction will be most informative for those with little experience in fluorine chemistry, as it contains a discussion of the production, handling, analysis, and concentration measurements of both F and F_2 ; safety is also discussed. In subsequent sections the authors separately cover the elementary reactions of F and F_2 . F_2 flames, molecular beams, and chemiluminescent reactions are also discussed. In the discussion of chemical lasers the emphasis is on reactive interactions and not at all on energy transfer. Theoretical calculations of potential energy surfaces for $\text{F} + \text{H}_2$ and $\text{H} + \text{F}_2$ are discussed. This article covers 80 pages, and 376 references are cited.

E. L. Simmons' article, The Kinetics of Proton-Transfer Reactions in Aprotic Solvents, begins with an outline of the relevant theoretical bases of the field—H-bonded encounter complexes and ion pairs as well as collision theory, transition state theory, and diffusion rate theory. Experimental techniques are mentioned but not discussed. A results and interpretation section, which is illustrative rather than exhaustive, covers carbon, oxygen, and nitrogen acids. This article covers 20 pages, and 64 references are cited.

Homogeneous Liquid Phase Inorganic Oscillatory Reactions: Chemical Aspects, by D. O. Cooke, is a thorough discussion of four different reaction systems which show an oscillatory approach to equilibrium. The reactions are, (1) the cerium(III)-catalyzed oxidation of malonic acid by bromate in sulfuric acid medium, (2) the iodine/iodate-catalyzed decomposition of hydrogen peroxide, (3) the cerium(III)-catalyzed oxidation of malonic acid (or other readily iodinated organic species) by iodate and hydrogen peroxide, and (4) the thermal decomposition of aqueous sodium dithionite. Each reaction is discussed with respect to experimental procedures, mechanism, elementary steps, and conditions under

which oscillatory behavior occurs. This article covers 45 pages, and 184 references are cited.

In Mechanisms for the Photochemical Production of Hydrocarbons in Gaseous Hydrocarbon Systems, G. R. Johnston, D. R. A. Cuff, and D. Price state, "This review is designed to enable the reader to find directly the various mechanisms which have been proposed for the formation of a particular hydrocarbon as a result of photolysis of a gaseous hydrocarbon." There follows a list of several dozen hydrocarbons (up to five carbon atoms), sensibly arranged, with relevant citations and some discussion. This article covers 60 pages, and 117 references through 1974 are cited.

Clifford W. Hand, University of Alabama

Organophosphorus Chemistry. Volume 11. Senior Reporters: D. W. Hutchinson (University of Warwick) and S. Trippett (University of Leicester). Royal Society of Chemistry, London. 1980. xii + 288 pp. \$145.00.

As stated on the cover, "Specialist Periodical Reports" is a series of reviews by leading specialists in their fields which gives systematic and comprehensive coverage of the progress in major areas of research. Volume 11 reviews the literature on organophosphorus chemistry between July 1978 and June 1979. Unfortunately, the coverage of the previous 10 volumes is nowhere listed in the book, which makes it necessary to have access to all of them for a thorough literature evaluation. Therefore and because of the intended publication of annual, or sometimes biennial, volumes, ownership will be most likely restricted to major libraries. The volume is divided into ten chapters dealing with various classes of compounds and one chapter on Physical Methods, the latter being surprisingly short for the amount of work covered and the number of references cited.

With the exception of all authors being affiliated with British institutions, the chapters vary considerably in form and content. As an example, it is not obvious when a featured reaction becomes a numbered scheme. Reagents used in reactions are often symbolized for the reaction pathways and listed at the end. This, together with listing of references as footnotes—even though it facilitates quick literature recognition—makes it sometimes hard to follow the text. Disruption of the text is also caused by the small size of the book's pages.

The stated aim of comprehensive coverage appears to have been achieved for each of the chapters. More emphasis on results would have greatly improved the value of the chapter on Physical Methods.

It is interesting to note that the majority of the reported work is related to biological problems in one way or another.

Horst G. Langer, Dow Chemical USA, New England Laboratory

Theory and Practice in Affinity Techniques. Edited by P. V. Sundaram and F. Eckstein (Max Planck-Institut für Experimentelle Medizin). Academic Press Inc., London. 1979. X + 246 pp. \$21.75.

Although the title might lead some to believe this is yet another book on affinity chromatography, this is not so. Rather, this book is the result of lectures given during the International Symposium "Theory and Practice in Affinity Techniques" held at the Max-Planck-Institut für Experimentelle Medizin, Göttingen, Germany in April 1978. The lectures covered recent developments in special applications of affinity chromatography (six chapters) and special topics on affinity labeling (seven chapters). In addition, a fourteenth chapter deals with General Aspects of Immunoassay.

This book would be of interest of those investigators who already are familiar with affinity chromatography but might like to learn something about less used techniques, such as: Interfacial Salting Out and the Ligand Induced Solubility Shift-Another Affinity Technique in Purification of Proteins; Electrophoretic Affinity Elution-Analytical and Preparative Methods; Cibacron Blue-Sepharose-A Tool for General Ligand Affinity Chromatography; Perspectives in the Isolation of Nicotinic Receptors-A Survey; The Study of Enzyme Mechanisms by Affinity Chromatography; Relative Reactivities of Functional Groups on Ligands in the Synthesis of Affinity Columns.

Similarly, those investigators with a familiarity or interest in affinity labeling would be more than likely to enjoy those chapters dealing with this technique, namely: The Use of Bis(imido esters) in the Study of Multi-Subunit Proteins; Reactive Phosphate Esters as Affinity Labels for Enzymes of Carbohydrate Metabolism; The Design of Highly Specific Enzyme Inactivators; Affinity Label for tRNA and mRNA Binding Sites on Ribosomes; Affinity Labeling of Aminoacyl-tRNA Synthetases; Affinity Labeling of Tubulin by a GTP Analogue; Affinity Labeling from the Isolated Protein to the Cell.

Probably the major drawback of this relatively inexpensive book is the fact that because it was presented as a symposium in 1978 it contains cited references no later than 1977. In a rapidly growing field this translates into an absence of nearly 4 years of published papers.

Michael Mokotoff, University of Pittsburgh