

Book Reviews*

Photodissociation and Photoionization. Advances in Chemical Physics. Volume LX. Edited by K. P. Lawley (Edinburgh University). John Wiley and Sons: New York. 1985. ix + 474 pp. \$69.95. ISBN 0-471-90211-X.

This is Volume 60 of the well-known series edited by Prigogine and Rice. The nine chapters range in length from 30 to 70 pages, and each reviews one relatively narrow segment of the subjects of fragmentation and ionization caused by light absorption. Both single-photon and multiphoton processes are represented. The international character of this research is reflected in the affiliations of the 13 contributors, who hail from universities and research institutes in the USA, USSR, Canada, UK, Japan, and Israel.

There are three chapters on photoionization topics. The chapter on Multiphoton Ionization of Gaseous Molecules (Reisler and Wittig) is a succinct critical review of recent developments in the field of MPI that will be of interest to chemists. A review of Photoionization in Non-Polar Liquids (Yakovlev and Lukin) focuses on ionization processes in solutions of molecules with low gas-phase ionization potentials in nonpolar electron nonattaching liquids, especially aspects far removed from normal intermolecular charge-transfer processes. The chapter on Photoelectron Spectroscopy of Excited States (Kimura) covers multiphoton ionization photoelectron spectroscopy, including spectra for atoms and small and large molecules. The basis for the technique and experimental considerations are also clearly summarized.

Three more chapters deal with reviews of certain selected experimental areas of photodissociation. The extensive review of Laser Isotope Separation by the Selective Multiphoton Decomposition Process (McAlpine and Evans) not only covers the principles of isotopic enrichment using laser sources, but also compares LIS using MPD to conventional enrichment processes for hydrogen isotopes, and examines selective MPD as a way of separating isotopes of other atoms (C, B, S, Os, U, Cl, Mo, and Se). Only for ^{13}C and sulfur isotopes are MPD processes currently competitive with conventional enrichment schemes. The chapter on Predissociation of Polyatomic van der Waals Molecules (Janda) is essentially a progress report on van der Waals molecule predissociation dynamics, concentrating on experimental rather than theoretical studies. The review of Ion Photofragment Spectroscopy (Moseley) covers results obtained using gas-phase, trapped ion, and fast beam techniques and complements a similar review by Leone in 1983 for neutral species.

The remaining three chapters cover various theoretical aspects of photodissociation processes, including the Franck-Condon Principle in Bound-Free Transitions (Tellinghuisen), Theoretical Aspects of Photodissociation and Intramolecular Dynamics (Brumer and Shapiro), and Quantum Theory of Molecular Photodissociation (Balint-Kurti and Shapiro). These chapters review aspects of the theoretical base necessary to analyze and interpret highly resolved photodissociation data. An extensive author index and adequate subject index round out the volume, as is usual for books in this series.

Harmon B. Abrahamson, *University of North Dakota*

Ion-Selective Electrode Reviews. Volume 6. By J. D. R. Thomas (UW-IST). Pergamon Press: New York. 1985. v + 271 pp. \$96.00. ISBN 0-08-033201-3.

This book is the sixth volume of a set that is dedicated to review articles on the development and application of ion-selective membrane electrodes. In this particular volume, reviews are presented that specifically deal with the following topics: (i) evaluation of automation equipment that uses ion-selective electrodes as detectors; (ii) biosensors that use enzymes or microorganisms as the biocatalytic component; (iii) electrodes for determination of drug-type substances; (iv) coated wire electrodes; and (v) in vivo applications of ion-selective field effect transistors (ISFETS). The final section of this volume, as is customary for this series, lists titles of recently published papers and monographs on the subject of membrane electrodes and related sensors.

Criteria for effective evaluation of automation equipment that include ion-selective electrode detectors are presented by Professor Sachs. Criteria are established for clinical analyzers that have become popular in hospitals for analysis of blood samples. Professor Sachs argues that the currently available commercial units are being accepted as "black-boxes" by the clinical community. This blind acceptance is unfavorable and could result in serious errors. In an attempt to educate clinical users of this equipment, a strategy for evaluation of the instrumentation is detailed.

A review of amperometric and potentiometric biosensors which use immobilized enzymes and microorganisms to supply the required biocatalytic activity is presented by Professors Karube and Suzuki, who are pioneers in this field. Their review details a number of innovative biosensors that have been developed in their research laboratory. For each biosensor, details concerning construction, operation, maintenance, response characteristics, and any special considerations are presented.

Professors Cosofret and Buck present a review on the use of membrane electrodes for the determination of drug-type substances. In their review, 47 different drug-type materials are listed and methods for their measurement with membrane electrodes are detailed. For many of the substances, potentiometric titrations are described with a membrane electrode to detect the endpoint. In other cases, electrodes with sufficient selectivity for the drug-type substance are employed in a more direct assay.

Coated wire ion-selective electrodes are the subject of a review by Professors Cattrall and Hamilton. Discussions of electrode construction methods, theory of response, addition of a thermodynamically reversible internal reference system, and electrode systems for numerous cationic and anionic species are presented. Finally, progress in the areas of immunosensors and biosensors that use a coated wire approach is reviewed.

The final review is written by Dr. McKinley and Professors Houtchens and Janata. This review summarizes in vivo applications of ion-selective field-effect transistors (ISFETS) for clinical analyses. Discussions of the basic operation, theory, fabrication, and application of these devices are included. Applications presented deal mainly with the use of ISFETS to directly and continuously monitor calcium, potassium, and hydrogen ions in animals during in vivo experiments. Finally, comments concerning the future of ISFET technology for in vivo sensing and a discussion of currently impeding problems with this technology are presented.

Mark A. Arnold, *University of Iowa*

Comprehensive Chemical Kinetics. Edited by C. H. Bamford, the late C. F. H. Tipper, and R. G. Compton (University of Liverpool). Elsevier Science Publishing Company Inc.: New York. 1985. xiv + 288 pp. \$98.25. ISBN 0-444-42441-5.

The effective kinetics of chemistry carried out in industrial reactors is generally influenced if not controlled by the rates of mixing and heat transfer. Thus the quantitative treatment of the couplings between chemical kinetics, heat and mass transfer, and fluid mechanics is of fundamental importance in chemical reactor design and operation. This book provides a good introduction as well as some advanced treatment of these aspects of chemical kinetics in practical systems. Chapter 1 (by J. A. Barnard) summarizes basic information underlying chemical reactor design, including thermodynamics, chemical kinetics, and heat, mass, and momentum transfer. Chapter 2 (by J. A. Barnard) discusses idealized reactor types including batch and continuous, tubular reactors with and without axial dispersion, and stirred tank reactors. Mathematical treatments of different types of reaction sets, such as parallel, consecutive, and combinations of these, are presented in Chapter 3 (by B. W. Brooks) along with a discussion of parameter estimation, reaction selectivity, and reactor choice. Chapters 4 (by W. J. Thomas) and 5 (by S. P. S. Andrew) discuss catalytic and noncatalytic heterogeneous reactions with emphasis on diffusion and reaction in porous solids, factors that determine catalytic selectivity, and systems involving gas-liquid, liquid-solid, and liquid-liquid interfaces. Techniques for predictive modeling of nonideal flow in chemical reactors are discussed in Chapter 6 (by S. P. Waldram). The book is a well-integrated and scholarly treatment of the subjects.

J. B. Howard, *Massachusetts Institute of Technology*

Drugs and the Pharmaceutical Sciences. Volume 26. Drug Dynamics for Analytical, Clinical and Biological Chemists. By B. J. Gudzinowicz, B. T. Younkin, Jr., and M. J. Gudzinowicz (Rhode Island Hospital and University of Texas System Cancer Center). Marcel Dekker: New York. 1984. vii + 176 pp. \$39.75. ISBN 0-8247-7239-3.

This monograph is aimed at analysts working in clinical and analytical chemistry and toxicology who are performing therapeutic drug monitoring. It is intended to be a basic primer on drug dynamics. It is divided into five chapters: Drug administration and routes of entry (4.5 pages); principals of drug absorption and distribution (31 pages); pathways and factors influencing biotransformation (34 pages); drug elimination (25

*Unsigned book reviews are by the Book Review Editor.

pages), and mechanisms of drug action (34 pages). The material in each chapter is a selective distillation of information available in more detail elsewhere. No new material or new concepts are presented, but this is consistent with the text's aims. Chapter 2 has a very clear and useful treatment of drug-protein binding.

The section on enzymatic systems for drug biotransformation in Chapter 3 is treated mathematically. It could benefit from graphical descriptions of the important events and how these relate to actual drug levels. The section on pathways of drug biotransformation gives examples, using single-step or multistep chemical reaction diagrams, of 77 specific transformations. This listing of specific transformations will be a useful feature.

Chapter 4 on drug elimination is an overview of classical pharmacokinetics. It contains 58 equations and only 7 figures. I think the intended reader would benefit from fewer equations and more graphical aids to understanding important concepts. For example, one figure shows a kinetic (compartmental) model for the metabolism and excretion of diethylpropion. It has 29 steps; I question the value of listing all the differential equations that describe this model. What is the lesson?

Mechanisms of Drug Action, Chapter 5, begins with a consideration of the basic physicochemical processes leading to the drug-receptor complex. This discussion leads into the theories of drug action (occupancy, rate, induced-fit, and macromolecular perturbation). The development is clear and easy to follow. Again, more graphical and visual aids would have promoted better understanding and integration of the different concepts. The concluding section, characterization of drug effects, is well-done but is short on specific examples to illustrate the important points. The subject index is above average.

The text does meet the objectives stated in the preface. It would have been improved if the authors had provided listings of in-depth review papers and chapters in other texts that the reader could consult for more in-depth discussion of a specific topic. Original references are useful, but considering the targeted reader, it would have been useful to have a brief menu of additional reading. An analyst would expect to be able to use this book not only as a primer but also as a key to the literature.

Another weak point is the limited attention given to intra- and interindividual variability, the effects of sex and age, and the effects of disease states.

C. Anthony Hunt, *University of California, San Francisco*

Methods of Vitamin Assay. Fourth Edition. Edited by J. Augustin (University of Idaho), B. P. Klein (University of Illinois), D. Becker (SCI-TEK Laboratories), and P. B. Venugopal (Vedal, Inc.). John Wiley & Sons: New York. 1985. xvi + 590 pp. \$97.50. ISBN 0-471-86957-0.

The fourth edition of this reference continues in the tradition of previous editions and presents updated methods of vitamin assays. The first six chapters deal with topics of a general nature and include method choice and development, biological assays, microbiological assays, chromatographic assay of vitamins, automated vitamin analysis, and sampling for vitamin analysis. Although all of these topics are well-covered, this reviewer was especially pleased to see the excellent treatment of such timely subjects as method and data validation, time and cost factors, and safety features as found in the first chapter.

The remainder of the book is devoted to analysis of 15 vitamins. A monograph is included for each of the vitamins and sections on general considerations, methods available (except for vitamin A), analytical methodology, application of methods, and literature cited are presented. The section on analytical methodology is very complete and topics such as principles, equipment, reagents, procedure, and calculations are given. The procedure portion of each monograph is given in complete detail and in a stepwise fashion. A technician with little training could easily conduct the assays and complete the calculations following these instructions.

As in most areas of sciences, the field of vitamin assay is undergoing rapid change. This book presents the most recent of modern analytical methods employed in vitamin assays, as well as established methods, and is highly recommended for all scientists involved in vitamin assays.

Adelbert M. Knevel, *Purdue University*

A Guide to Practical Radiochemistry. Volumes 1 and 2. Edited by An. N. Nesmeyanov (USSR Academy of Sciences). Translated from the Russian by G. Leib. Mir Publications: Moscow, U.S.S.R. 1984. Distributed by Imported Publications, Inc.: 320 West Ohio Street, Chicago, Illinois 60610. First U.S. release, October 1985. Volume 1: ix + 312 pp. \$9.00. Volume 2: x + 446 pp. \$9.00. ISBN 0-8285-2888-8.

This is a remarkable book on radiochemistry written by several members of the staff of the Radiochemistry Department of the Moscow State University in collaboration with members of the Electrochemistry and Analytical Departments, as well as the Institute of Physical Chemistry

and the Institute of Geochemistry and Analytical Chemistry of the USSR Academy of Sciences. This collection of experiments, each accompanied by a short theoretical introduction, deals with main branches of radiochemistry included in the general radiochemistry curricula and a number of other practical courses taught at the Moscow State University. The 83-page general introduction contains basic concepts, excellent discussion on safety conditions, and general rules for work with radioactive isotopes: for example, a description of the design of radiochemistry (hot) laboratories, several convenient tables showing the mean annual permissible concentration (APC), annual maximum permissible entry (MPE), maximum permissible content (MPC) in air of working premises, decontamination procedures, and so on. Chapters 1 through 6 (Volume 1, Part I) deal with the topics such as liquid-liquid extraction, chromatographic methods, electrochemistry, and isotope exchange. Chapters 7 through 9 (Volume 1, Part II) contain experiments in hot atom chemistry, preparation of artificial radioisotopes, and autoradiolysis. Chapters 10 through 15 (Volume 2, Part III) cover the analyses of important individual elements, such as Tc, U, Th, Ra, and Rn and their daughters, Np, and Pu. Chapters 16 through 19 (Volume 2, Part IV) summarize the use of radioactive isotopes in chemical research: for example, synthesis of labeled compounds, use of isotopes in chemical analysis, and the determination of physicochemical constants, reaction mechanisms, and kinetics. A total of 159 experiments are included in this book: it begins with experiment 1.1 "extraction of uranyl nitrate from aqueous solution" and ends with experiment 19.8 "use of the emanation method for investigating solid-phase transformations". About 75 percent of 206 references cited in this book are from Russian journals. This book is carefully organized, well written, expertly edited and translated, and readable. It contains a huge amount of useful information not only for radiochemists but also for anyone who is interested in the use of radioactive isotopes in a wide variety of research areas: nuclear engineering, health physics, biology, geology, and environmental sciences. Publication of the English translation of this excellent book has to be considered as quite timely, when an urgent need for increased international cooperation is being felt by many people from all over the world in regard to the safety of nuclear industry.

P. K. Kuroda, *University of Arkansas*

Annual Reports. Volume 80. 1983. Section C: Physical Chemistry. The Royal Society of Chemistry: London. 1984. xiv + 418 pp. \$95.00. ISBN 0-85186-852-5.

This edition of the *Annual Reports* maintains its high standard of presenting excellent reviews of a variety of topics in physical chemistry. Approximately 60% of the present volume is devoted to various topics in spectroscopy, including nuclear magnetic resonance, nuclear quadrupole resonance, mass spectrometry, and photoelectron and Auger spectroscopy. The section on nuclear quadrupole resonance is largely theoretical, while the review of mass spectrometry focuses on the physical-chemical aspects of the method. The remaining sections cover a wide range of applications in their particular areas.

The review of electrochemistry is very comprehensive, including sections on in situ spectroscopy of electrode surfaces as well as bioelectrochemistry. The technological importance of radiation chemistry in the nuclear and environmental fields is particularly stressed in the review of radiation chemistry, while the section on organic photochemistry covers the general areas of electron-transfer processes and low-temperature matrix isolation techniques. The review of dispersions of interacting colloidal particles is restricted to colloidal dispersions of solid particles at finite concentrations.

As in previous volumes in this series, several of the reviews in the present edition are continuations by the same authors, while others are reviews of more specialized topics. Among the reviews planned for the next volume will be a section on thermodynamic and kinetic studies of electrolyte solutions. Hopefully, this review will cover high-temperature aqueous solution chemistry, a topic of very great technological importance at the present time.

This volume is highly recommended both for the general reader as well as for specialists in specific areas of physical chemistry.

M. H. Lietzke, *University of Tennessee*

Annual Reports on the Progress of Chemistry. Volume 81. Section A: Inorganic Chemistry. Senior Reporter: J. D. Donaldson (The City University, London). Royal Society of Chemistry: London. 1984. xiv + 416 pp. \$101.00. ISBN 0-85186-160-1. (Available from the ACS.)

This annual volume follows essentially the same format as last year. The book is organized by groups, with successive chapters on the alkali and alkaline earth elements, boron, other elements in the boron group, the carbon and nitrogen groups, the oxygen group, and the halogens and noble gases. The transition elements are divided into five chapters. The titanium, vanadium, chromium, and manganese groups are covered in one

chapter. The following chapter covers iron, cobalt, and nickel, while the next chapter covers ruthenium, osmium, rhodium, iridium, palladium, and platinum. Copper, silver, gold, zinc, cadmium, and mercury are then covered, followed by a single chapter on the lanthanides, actinides, scandium, and yttrium. The volume ends with chapters on radiochemistry and inorganic dispersion technology.

Needless to say, any volume of this length can only cover the highlights of an area as broad as inorganic chemistry over a period of 1 year. Nevertheless, this book contains approximately 3000 citations for the year 1984 and will certainly prove useful to the practicing inorganic chemist.

Dennis S. Marynick, *The University of Texas at Arlington*

Diffusion: Mass Transfer in Fluid Systems. By E. L. Cussler (University of Minnesota). Cambridge University Press: Cambridge and New York. 1985. xii + 525 pp. \$24.95 (paperback). ISBN 0-521-29846-6.

Professor Cussler has written an excellent text, which should serve several levels of audience and each of them well. The book is written with care, giving attention not only to precision in treatment but also treating precisely those elements of the topic that beginning students find difficult and that advanced students are often deluded into believing they understand. The writing style is informal—almost conversational—and is very effective in leading the reader from one level of sophistication to the next. In the hands of a good teacher, this should be an excellent text for an undergraduate course for chemical engineering students. One could easily use the book as the foundation for a graduate course in the topic, as well.

The text is divided into four major sections. The first treats fundamental ideas of steady and unsteady diffusion, including convective diffusion. In the second section, diffusion coefficients are defined and theory and measurement of diffusion coefficients in a variety of fluids, of varying degrees of physicochemical complexity, are discussed. The third section introduces mass transfer coefficients, their correlation, and their estimation from film and boundary layer theories. In the final section the coupling of diffusion with chemical reaction, and with membrane transport, is discussed and illustrated.

In all chapters a wide variety of examples is presented from areas such as bioengineering, food science, and electrochemistry, in addition to traditional areas of chemical engineering. This is a very positive feature of the text, since it introduces students to a wide range of areas of technology often ignored in traditional courses for want of good example problems.

In summary, this is an outstanding example of a text written by an expert in the field, who cares as much about teaching the topic as he does about generating the research upon which recent progress in understanding mass transfer is based.

Stanley Middleman, *University of California, San Diego*

Molecular Electromagnetism. By A. Hinchliffe and R. W. Munn (University of Manchester). John Wiley and Sons: Chichester and New York. 1985. x + 252 pp. \$44.95. ISBN 0-471-10292-X.

It is the intention of this book to present and develop the theory of electromagnetism in a manner that is aimed at molecular applications. The book is written as an advanced undergraduate or introductory graduate course for students of molecular electromagnetism. The text assumes a previous exposure to the elementary principles of electricity and magnetism; however, the treatment is comprehensive and self-contained and therefore does not rely on outside supplements.

The book is divided into three sections. The coverage includes a brief review of the basic theories of electricity and magnetism (Section A), electromagnetic properties of materials (Section B), and finally a discussion of the interrelationship between quantum mechanics and electromagnetism (Section C). Each section contains several chapters, and at the end of each chapter there are some exercises for the student on the material that has been presented. The first section on basic electromagnetism is a compressed summary of the relevant physical principles of electricity and magnetism. The treatment encompasses Maxwell's equations and a discussion of magnetostatics, electrostatics, and induction, as well as brief introduction to relativistic considerations. The second part of the text is a discussion of some of the general applications of these basic theories. This section discusses electric, dielectric, optical, and magnetic properties. The material in this section is extremely compressed and as a result some topics receive only glancing consideration. The third section of the text is the focus of the previous two sections and applies the theories of electricity and magnetism on a molecular level within the constraints of quantum mechanics. This part of the text discusses basic quantum mechanics, electronic transitions, absorption and emission of radiation, the electromagnetic components of the Hamiltonian operator, and calculation of molecular properties. The text also includes two appendices; one briefly discusses vector calculus and the other lists some useful quantities. There is a partial list of solutions and hints to

the exercises that appear at the end of each chapter and there is an 8-page index at the end of the book.

The authors could have improved the pedagogical impact of their text by including more problems and exercises that directly apply the theoretical principles to molecular systems. Nevertheless, the authors have accomplished their goal of producing a concise and self-contained text for students of molecular electromagnetism.

Charles J. O'Connor, *University of New Orleans*

Organotransition Metal Chemistry. By A. Yamamoto (Tokyo Institute of Technology). John Wiley & Sons: New York. 1986. xvi + 455 pp. \$39.95. ISBN 0-471-89171-1.

This engagingly written book was developed from a course of lectures given to graduate students. The original version, in Japanese, was not just translated but was substantially revised, expanded, and brought up to date. An introductory chapter provides orientation by giving some history, describing the arrangement and purpose of the other chapters, and then defining "organometallic" rather thoroughly.

The second chapter is a review of introductory concepts of coordination chemistry, and Chapter 3 takes the reader deeper into the subject by focussing on carbon-metal bonding, especially as manifested in complexes. In Chapter 4, the author introduces the reader to preparative methods and describes a representative variety of organometallic complexes. Experimental techniques are then introduced in Chapter 5, with emphasis on handling air-sensitive substances.

Whereas the foregoing chapters are for the nonspecialist and are effective in bringing one to the level necessary for understanding specialized subjects, the remaining four chapters plunge more deeply into the subject, and accordingly they have more extensive lists of references and have useful potential for specialists as well. They deal with synthetic reactions, polymerization, catalysis (including biologically active catalyst systems), etc.

Throughout the book, the author is sensitive to the need for definitions of new terms; this fact is gratifying to readers who so often encounter in other books the sudden appearance of new terms with the assumption that every reader will know what they mean. Structural formulas, very clearly drawn, abound. The text is easy to read; in fact, it draws the reader into the subject. Here and there, to spark one's interest, are interspersed some irreverently titled "intermezzos", such as "The man who brought sex into chemistry". The index does not let the reader down; it is thorough.

At a time when organometallic chemistry has been and still is undergoing such joyful efflorescence that those who have not been part of the pall-mall race despair of catching up, it is most welcome to find one of the participants willing to reach back and lend a hand to those who would like to join in, or at least understand what it is all about. This book is sure to be widely read and enjoyed.

Reagents for Organic Synthesis. Volume 12. By Mary Fieser (Harvard University). John Wiley & Sons: New York. 1986. 643 pp. \$47.50. ISBN 0-471-83469-6.

This latest volume in what has become an open-ended series maintains the good features of its predecessors: lots of succinct, practical information on recent developments (1983 and 1984) in a format that is easy to use. The reagents are taken up in alphabetical order (common usage names, not CAS indexing code-names), sometimes several to a page, sometimes several pages to a reagent. One can expect to find how to make the reagent (in loose terms) or where it can be bought, what it is good for, and where to seek complete details. The entries run from Acetic Anhydride-Ferric Chloride to Zirconium carbene complexes, and both organic and inorganic substances are included.

As with previous volumes, one can profit from just browsing, even if one does not feel a need to look up any particular subject. It is thus a secondary function of the book to help one keep abreast of the field, and it would be a rare chemist who would not learn something new and useful from a casual perusal of the pages. For the serious information retriever, however, three indexes are provided: type index; subject index; and author index. At less than 8¢ a page, it can be highly recommended for personal purchase.

Organic Syntheses. Volume 64. Edited by A. S. Kende. John Wiley & Sons: New York. 1986. xv + 308 pp. \$27.50. ISBN 0-471-84742-9.

This hard-bound library edition of this ever-useful series is worth considering for personal purchase even by those who receive the paperback version free of charge by virtue of membership in the Organic Division of the ACS, since it is more durable and has the great advantage of being indexed (cumulatively for Volumes 60-64). An innovation, the publication of the next collective volume covering 5 years instead of 10, is announced, however, and one might wish to wait for it, except that no date for its appearance is mentioned.

The content of Volume 64 consists of 32 preparative procedures that have been independently checked. The selection is highly varied, although conversions from or into alkenes are prominent. No less than three methods for introducing a hydroxyl group α to a ketonic carbonyl are given. The text is in uniform typescript, not quite so nice as in the older, typeset volumes. The difference seems to be most noticeable in the Table of Contents, which is markedly more difficult to scan. This effect is at least partly due to the format, in which the submitters' names are printed before the names of the preparations, and the latter are squeezed into a column of half-page width, and thus require several lines for each.

A list of accepted procedures that have not yet been checked is given at the back; copies of them in unedited form are offered for an addressed envelope bearing sufficient postage.

Condensed Imidazoles, 5-5 Ring Systems. By P. N. Preston (Heriot-Watt University). John Wiley & Sons: New York. 1986. ix + 411 pp. \$125.00. ISBN 0-471-88384-0.

This is a volume in the series "Chemistry of Heterocyclic Compounds" edited by A. Weissberger and E. C. Taylor. It surveys 51 ring systems, differentiated by the number and kind of heteroatoms in addition to the two imidazole nitrogens, such as fuoroimidazoles, imidazooxazoles, etc. For all of these ring systems, the known data are presented with the thoroughness characteristic of the series, with abundant structural formulas and tables. A most welcome feature is a short introduction in which the organization is set out so as to enable one to locate the place in which a desired ring system is taken up. The introduction also specifies the period in which the literature was surveyed (*Chemical Abstracts*, Volumes 53-97) and mentions some other related reviews. As usual, full author and subject indexes are included.

Mechanisms and Regulation of Carbohydrate Transfer in Bacteria. By Milton H. Saier. Academic Press Inc.: Orlando, FL. 1985. 209 pp. \$39.00. ISBN 0-126-14780-9.

Since the early studies by Roseman and his colleagues on the group-translocation mechanism for carbohydrate transfer by bacteria, a large number of studies in this field have been reported. Many have originated from Dr. Saier and his colleagues. He is thus particularly well placed to review the various mechanisms that are now known to permit bacterial transport of carbohydrates. The result is a very readable and moderately priced volume.

In the eight chapters of the book, Dr. Saier has expanded and updated an earlier review on the topic. In so doing, he has included a large number of studies covering a number of complex uptake and transport mechanisms. Yet, the book, despite containing much relatively new scientific material, is easy to read, and in the view of this reviewer it is essential for ACS members who are involved in teaching and research in microbial physiology in general and transport processes in particular. It also fills a gap in the review literature available to post-graduate and advanced-undergraduate students.

After a short introductory chapter which sets the scene for the succeeding chapters, the author presents a detailed discussion of the five major mechanisms of carbohydrate transport: facilitated diffusion, proton symport, sodium symport, active transport, and group translocation. These are exemplified by the uptake of glycerol, lactose, melibiose, maltose, and mannitol, respectively, in *Escherichia coli*. The differences between the nonstereospecific hydrophilic protein pore for facilitated diffusion of glycerol, the cation cotransport associated with carrier-mediated mechanisms, and the specific active transport system for maltose are clearly explained. In Chapter 3, the phosphoenolpyruvate:sugar phosphotransferase mechanism of group translocation in various Gram positive and Gram negative bacteria is fully discussed. One deficiency in this chapter is the limited range of bacteria considered; various species such as the photosynthetic prokaryotes and the spirochaetes have been ignored.

Chapter 4 considers the mechanisms of inducer exclusion, including regulation of transport by membrane potential, by intracellular sugar phosphates, and regulation of carbohydrate uptake by the phosphotransferase system. It includes recent biochemical evidence for the role of glucose Enzyme III in allosteric regulation and its mechanism of binding to the lac permease protein as well as direct regulation of glycerol kinase. In the next chapter, the mechanisms of adenylate cyclase regulation in Gram negative bacteria are discussed, indicating the way in which various energy sources can function in this. This chapter is very relevant to the major aspects of the book, as adenylate cyclase promotes the high cAMP levels which in turn interact with cAMP regulatory protein and promote transcription of the genes responsible for the various enzymes involved in carbohydrate metabolism. Chapter 6 discusses the involvement of protein kinases in the regulation of carbohydrate transport

and metabolism, a significant recent discovery which is clearly presented. This is followed by a consideration of exogenous induction of certain carbohydrate permeases in bacteria. In a brief final chapter, the author attempts to classify carbohydrate permeases and the mechanism of carbohydrate in enteric bacteria. In all, this is a very readable book which should be on the shelf of anyone interested in the mechanisms of transport.

The presentation of the book is good. Diagrams are clear and mainly sufficient, while there is an excellent bibliography, although in a field receiving so much current attention, this will inevitably soon need updating. The index is short but adequate.

Ian W. Sutherland, *Edinburgh University*

Catalysis of Organic Reactions (Chemical Industries Series. Volume 18). Edited by John R. Kosak. Marcel Dekker Inc.: New York. 1984. 504 pp. \$75.00. ISBN 0-8247-7153-2.

There is a clear division of the topics into three sections: homogeneous catalysis, heterogeneous catalysis, and selected topics.

At the beginning of the first section, a rapid incursion into the enzyme field provides the chemical catalysis researchers a synthetic view of the synthesis capabilities of more than 2500 enzymes discovered to date. The topic then shifts to homogeneous catalysis, in five contributions: synthesis of heterocyclic compounds, with an interesting report on the development of a commercial process for producing 2-vinylpyridine from acrylonitrile and acetylene over a borinato-cobalt catalyst; asymmetric hydrogenation of prochiral olefins, with an emphasis on the usefulness of the "quadrant theory" for predicting the preferentially formed enantiomer; vicinal glycol esters from synthesis gas with special attention to the critical features of synthesis; metal clusters as thermal and photogenerated catalysts, with proofs of the activity of clusters (and not their fragments) in several reactions; homogeneous metal-catalyzed homologation of benzyl alcohol to phenethyl alcohol, studied on a wide variety of transition-metal complexes and particularly on cobalt complexes.

A dozen of the papers deal with heterogeneous catalytic processes. Several articles describe the various approach adopted by industrial researchers for characterizing, catalyst testing, and data collecting in the most reliable way. CO hydrogenation for production of linear olefins over iron matrix catalysts, preparation of aryl nitrones using Urushibara catalysts, and a new and improved synthesis of isouquinolidine are some of the catalytic processes described and discussed in this section.

In the last section, processes for caprolactam production are fully reviewed with mention of ammoxidation as a possible alternative route. A schematic example of a rapid up-scaling from laboratory to industrial scale operation is given in the report on the catalytic decomposition of formic acid in acetic acid medium. Readers may be questioning the presence of papers related to computer-based file systems or to "personal computer" use for thermodynamic modeling of catalytic processes; however, for people heavily involved in industrial catalysis research, these things are not trivial at all.

In all the papers, pertinent references and fairly satisfactory technical details are given. It is worth mentioning that the authors are rather timid in providing "advanced" theoretical considerations, and this is probably due to a current and understandable behavior in the industrial community. And this is why I strongly recommend this book: "the technical know-how is the best cement for theory and industrial production".

R. Le Van Mao, *Concordia University*

Survey of Drug Research in Immunologic Disease. Volume 6. Noncondensed Aromatic Derivatives. Part V. By Vassil St. Georgiev (Rochester, NY). S. Karger AG: Basel and New York. 1985. X + 586 pp. \$208.75. ISBN 3-8055-3962-2.

This is Volume 6 in the series of world literature on drugs that are supposed to possess immunologic properties. The book contains six chapters on noncondensed aromatic derivatives. Each chapter starts with the structure, preparation (schematically), and a short description of the biological properties of a compound with references. The drugs that show considerable biological activity have been discussed in detail at the end of each chapter. Some of such drugs are ibuprofen, loxoprofen, flurbiprofen, ketoprofen, fenoprofen, and fenbufen, and their derivatives. More than 500 drug molecules belonging to phenylpropionic, phenylalkanoic, biphenylalkanoic, and cycloalkyl-substituted phenylalkanoic acids have been included in this book. This could be a valuable reference book for chemists and pharmacologists who require a quick survey of key characteristics of noncondensed aromatic compounds known for their potential as drugs, immunomodulators, or antimicrobial agents. The biological activity cross index at the end of the book makes direct visual retrieval easy. A pharmaceutical chemist should have access to it.

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