Book Reviews *

Lignans. Chemical, Biological and Clinical Properties. By D. C. Ayres (University of London) and J. D. Loike (Columbia University). Cambridge University Press: New York. 1990. XIX + 402 pp. $95.00. ISBN 0-521-30421-0.

Lignans have attracted considerable interest since the recognition of the anticancer properties of podophyllotoxin and some of its derivatives. As the last book on the chemistry of the lignans appeared in 1978, this book by Ayres and Loike is most welcome. The book opens with a glossary of some chemical and biological terms and techniques. However, much of the information contained here could have been incorporated into the appropriate chapters. The glossary is followed by a short introduction, which includes biosynthesis, nomenclature, and a discussion of absolute stereochemistry of lignans. A comprehensive and extremely useful registry (72 pages) of over 450 naturally occurring lignans, with biological sources and chemical structures, is given in Chapter 2. Chapter 3 is devoted to the biological and chemical properties of podophyllotoxin and some other lignans. The biological mode of action of podophyllotoxin as a microtubule inhibitor is succinctly presented as is the potential use of lignans in a wide range of therapeutic areas, such as Parkinson's disease, viral hepatitis, and as antagonsits of the platelet activating factor (PAF). Unfortunately, PAF, which is of considerable current interest, is not cited in the Index. A detailed review of the clinically important anticancer agents etoposide and teniposide is given in Chapter 4. A few diagrams illustrating the mechanism of action of these drugs at the molecular level would have improved the clarity of this chapter. Also, the definitions given (p 120) for eukaryotes and prokaryotes are incorrect.

The bulk of the book (245 pages) is devoted to the chemistry of lignans. Structure determination is covered in depth, with a well-written and detailed section on NMR spectroscopy. It is a pity that X-ray crystallography was not discussed, since this technique provides detailed stereochemical information, which can be useful in our understanding of biological activity. The biosynthesis of lignans is concisely and critically reviewed in Chapter 7, which also has a discussion on the relationship between lignans and lignins. The various methods used in the synthesis of lignans are thoroughly described in the final chapter (80 pages). For the phytochemist, there is then presented an index of botanical sources of lignans.

My main criticisms of this book concern the presentation and arrangement of the text. The structures are of varied sizes and their numbers are often difficult to locate. This reviewer would have relegated the glossary and registry to the end of the book. Typographical errors are few (e.g., the structure of 4-nitrobenzylthioinosine and the abbreviation HeLa), with only a few lapses in English usage, such as the nonrestricting pronoun "which" and of the word "affects".

Overall, the authors have done an excellent job in providing a comprehensive but readable text, which is highly recommended to chemists interested in natural products. Unfortunately, the high price tag will deter many of us from buying our own copies.

Percy S. Manchand, *Hoffmann-La Roche Inc.*

Fullerenes. Synthesis, Properties, and Chemistry of Large Carbon Clusters. Edited by George S. Hammond (Bowling Green State University) and Valerie J. Kuck (AT&T Bell Laboratories). American Chemical Society: Washington, DC. 1992. ix + 196 pp. $44.95. ISBN 0-8412-2182-0.

This book was developed from a symposium sponsored by the Divisions of Inorganic Chemistry; Organic Chemistry; Petroleum Chemistry, Inc.; Polymer Chemistry, Inc.; and Polymeric Materials: Science and Engineering at the 201st National Meeting of the American Chemical Society in Atlanta, GA, April 14–19, 1991. It consists of a Preface, an Overview by George S. Hammond, and twelve chapters. There are indexes of authors, their affiliations, and subjects.

Polymer Gels. Fundamentals and Biomedical Applications. Edited by Danilo DeRossi (University of Pisa), Kanji Kajiwara (Kyoto Institute of Technology), Yoshihito Osada (Ibaraki University), and Aizo Yamauchi (HOYA Corporation). Plenum Press: New York and London. 1991. vii + 346 pp. $85.00. ISBN 0-306-43805-4.

This book represents a collection of papers originally presented at the Symposium on Polymer Gels, which was organized and sponsored by the Research Group on Polymer Gels, The Society of Polymer Science of Japan, and co-sponsored by the Science and Technology Agency and MITI, Japan. The Symposium was held in Tsukuba Science City, Japan, September 18–19, 1989. It consists of twenty-four chapters grouped under the following headings: Fundamentals; Biologicals; Separation; Sensors and Actuators; and Drug Delivery Systems. A subject index completes the book.

Surface Science of Catalysis. In Situ Probes and Reaction Kinetics. Edited by Daniel J. Dwyer (University of Maine) and Friedrich M. Hoffmann (Exxon Research and Engineering). American Chemical Society: Washington, DC. 1992. xii + 364 pp. $59.95. ISBN 0-8412-2189-8.

This book was developed from a symposium sponsored by the Division of Colloid and Surface Chemistry at the 201st National Meeting of the American Chemical Society in Atlanta, GA, April 14–19, 1991. It consists of a preface, an introductory chapter by the editors entitled "The Promise of Surface Science in Catalysis: Success or Failure?" and twenty-one more chapters, which are grouped under the following three headings: Fundamental Concepts of Surface Reactions; Catalytic Reactions at High Pressure and In Situ Probes; and Reactions Induced by Photons and Electrostatic Fields. Author, affiliation, and subject indexes complete the book.

Language and Representation in Information Retrieval. By D. C. Blair (University of Michigan). Elsevier Science Publishers: Amsterdam and New York. 1990. xiv + 336 pp. $89.75. ISBN 0-444-88437-8.

The publishers state correctly that this is not a book for the beginner (although the beginner can gain something from it by going slowly and digesting carefully). It is concerned with the general theory and philosophy of information retrieval, rather than with specific cases. A major theme is that retrieval of information of any kind is as much limited by shortcomings in logic and concept as by physical processes. Whereas traditional indexing and even computer-assisted retrieval focus on the problem of physical access, the larger problem is generally ignored: "how documents are represented for retrieval and how inquirers ask for them". Chemists seriously concerned with management of information systems should find this book enlightening; most chemists will find that it does not address the kind of needs they commonly feel in the course of their chemical pursuits.

Peter A. S. Smith, *University of Michigan*

Protective Groups in Organic Synthesis. 2nd Edition. By Theodora W. Greene (The Rowland Institute for Science) and Peter G. M. Wuts (Upjohn). John Wiley & Sons: New York. 1991. xvi + 473 pp. $59.95. ISBN 0-471-62301-6.

As organic chemists have proceeded to synthesize molecules of increasing complexity, they have needed to devote more care to the selection of protective groups, and they have had to develop new groups and more effective methods for preparing and cleaving protected compounds. By providing essential information about this important field in a form that is relatively easy to use, *Protective Groups in Organic Synthesis* continues to render a crucial service to chemistry. The rapid development of protective group chemistry since the publication of the first edition in 1981 fully justifies the appearance of an updated edition. Like the first edition, the second edition describes protection for five major functional groups: hydroxyl, carbonyl, carboxyl, thiol, and amino. The new edition has been expanded approximately 35% by the addition of 206 new protective groups and 1500 new references, which are complete through 1989. In addition, sections on the protection of indoles, imidazoles, pyrroles, and the NH group of amides are now included. As in the first edition, an important feature of the book is the last chapter, which presents reactivity charts summarizing the sensitivity of common protective groups to 108 prototypical reagents. Unfortunately, these charts have not been updated, revised, and expanded; they are identical to those published in the first edition.

The book achieves conciseness by minimizing discussion and focusing on chemical details, but introductory paragraphs and brief comments nevertheless provide useful guidance and explanatory information. For completeness, the authors have had to include protective groups and techniques for formation and cleavage that are seldom used as well as those that are more common. While this makes the book invaluable to specialists, novices in organic synthesis will occasionally find it difficult to choose a standard, inexpensive protective group quickly and select conditions for its introduction and removal. Nevertheless, anyone who

*Unsigned book reviews are by the Book Review Editor.

does organic synthesis must have convenient access to this book.

James D. Wuest, *Université de Montréal*

Introduction to Theoretical Stereochemistry. By Viatcheslav I. Sokolov (Institute of Organo-Element Compounds, USSR Academy of Sciences, Moscow). Translated from the Russian by N. F. Standen. Gordon and Breach Science Publishers: New York. 1991. XIV + 328 pp. $80.00 (professional price). ISBN 2-88124-653-2.

This book was originally published in Russian in 1979 but has been updated to the end of 1985. A chapter on the subject of particular interest to the author—the mathematical significance of the concepts of chirality, conformation and configuration—has been supplemented by a newer chapter. The translation into English by N. F. Standen appears to be competent but the end product, although clear, is somewhat pedestrian in style. Inevitably, there are several typographical errors and quite a few erroneous transliterations of author's names, e.g., "Elial", "Prelov", and "Kertin-Hammett". Although the figures are well-done, the text is reproduced from word-processor copy and has that dot-matrix, typescript look; presumably the book would have been more expensive if set in type.

The faults of this book would appear to be more those of purpose than of execution. Being an "introduction", it offers little to the specialist but, worse, its style and content do little to induce the novice to look deeper into the subject. Being "theoretical", it offers little to the bench chemist. Being brief, it offers little depth or scholarship reading more, in many places, like a routine and uncritical "annual review". Its chief merit is that it does offer a good entry into the Russian stereochemical literature, pre-1985.

In these days of pinch-penny budgets, restricted space, and ballooning costs, when major universities need to ask whether their chemistry libraries should continue subscribing to *Beilstein*, it is necessary to say that this is the kind of book that most libraries could do without. The few specialists in theoretical stereochemistry who might want it to flesh out their personal libraries would be better advised to spend their money on more recent and more advanced works.

James H. Brewster, *Purdue University*

Reviews in Computational Chemistry. Volume I. Edited by Kenny B. Lipkowitz (Indiana University—Purdue University at Indianapolis) and Donald B. Boyd (Lilly Research Laboratories). VCH Publishers: New York. 1990. xix + 419 pp. $105.00. ISBN 0-89573-754-X.

This book is an attempt to span the emerging discipline of computational chemistry with a series of short reviews. The topics covered are diverse and include electronic structure calculations, structural databases and similarity searching, quantitative structure activity relationships, and molecular dynamics. The four chapters devoted to quantum methods cover both semiempirical and ab initio methods, including a chapter devoted entirely to basis sets. The latter is noteworthy since the nomenclature and subtleties of basis set selection can be particularly troublesome for newcomers to molecular orbital methods. My only criticism of these chapters is the significant amount of overlapping material.

A single chapter addresses force field based methods. This chapter provides an overview of molecular dynamics and free energy perturbation methods. The review thoroughly describes the mechanics of carrying out molecular dynamics and free energy perturbation simulations. One shortcoming of this section is a lack of examples describing the advantages and disadvantages of these techniques for specific applications. In short, although the computational procedures are well-described, there is little to orient the reader with respect to expected accuracy or where MD or FEP might be best applied. Perhaps this will be the subject of a later review.

Quantitative structure activity relationships are covered in two chapters. One is devoted to separations and the other to agricultural chemicals. The discussion of QSAR in rational pesticide design is particularly valuable because it describes both why and how to put QSAR techniques to work in a discovery program. I feel this discussion is just as relevant to pharmaceuticals or materials as it is to pesticides.

Finally, one of the editors (DBB) presents several "success stories" based on application of computer aided molecular design. Although limited in scope, these stories give some insight into the role of computational chemistry in industry. The editors have also compiled an appendix of current computational chemistry software and the vendors that distribute them.

In general, I feel the editors have successfully assembled reviews that touch most areas of computational chemistry. I would prefer that the book were organized so that related topics were grouped together rather than sprinkled throughout the book. Similarly, I think it would have been better organizationally to put chapters that treat a subject broadly before chapters describing more specific details of the same topic. For example, a survey of molecular modeling, which seems intended as an introduction, appears in one of the final chapters. It might be more helpful, particularly to the nonexpert, if it appeared early in the book. Nevertheless, these are relatively minor complaints. *Reviews in Computational Chemistry* is a significant addition to the computational chemistry literature and should be valuable to experts and particularly newcomers in the field.

Charles H. Reynolds, *Rohm and Haas Research Laboratories*

Reviews in Computational Chemistry. Volume II. Edited by Kenny B. Lipkowitz (Indiana University—Purdue University at Indianapolis) and Donald B. Boyd (Lilly Research Laboratories). VCH Publishers: New York. 1991. xvi + 527 pp. $125.00. ISBN 1-56081-515-9.

This book is the second volume in a series devoted to computational chemistry. Like its predecessor this book covers a wide range of topics including conformational analysis, molecular mechanics, application of molecular orbital theory to hydrogen bonding, semiempirical molecular orbital theory, electrostatic potentials, and computing molecular properties with quantitative structure activity relationships.

The chapters on force field development and conformational analysis fill a conspicuous void in the first volume. Most of the established methods for surveying conformation space are covered including systematic approaches, distance geometry, Monte Carlo, and molecular dynamics. Similarly, the molecular mechanics chapters provide an overview and history of molecular mechanics as well as some new directions in parameter development. These chapters would be excellent for any course on molecular modeling. My own experience teaching inhouse and graduate level courses is that few good reviews of these subjects are available.

As a continuation of the first volume, there are four chapters on electronic structure theory. One of the highlights of this section is a much more complete review of semiempirical molecular orbital methods. Topics covered include extended Huckel, INDO/S, CNDO/S as well as the MINDO/3, MNDO, and AM1 series of methods. Chapters are also devoted to MO calculation of hydrogen bonds and electrostatic potentials.

The remaining reviews survey graph theoretical and topological approaches to quantitative structure activity relationships. I found these reviews a useful introduction to subjects that are relatively unfamiliar to me. Finally, there is a discussion of the computational chemistry literature written by one of the editors (D.B.B.). Some of the more cited papers in computational chemistry are discussed as well as the scope and impact of many journals that publish articles in this field. Like the first edition, an appendix of software offerings and vendors is provided.

I think this collection of reviews improves on the first volume. I am pleased with the wide scope maintained in both books and the quality of the reviews. The disjointed organization I found annoying in the first volume has been corrected in the second. Reviews are grouped according to subject. Some chapters are general enough to be valuable additions to the reading list of graduate level theoretical organic courses and certainly any course devoted to molecular modeling explicitly. Most reviews in both volumes deal primarily with computational techniques rather than applications of these techniques. I think this is natural, particularly for the first volumes. But if more volumes are forthcoming, I suggest including more chapters that describe applications. It would be very interesting, for example, to see reviews describing applications of computational chemistry in chemicals, pharmaceuticals, and materials science.

Charles H. Reynolds, *Rohm and Haas Research Laboratories*

Comprehensive Chemical Kinetics. Volume 32. Kinetic Models of Catalytic Reactions. By G. S. Yablonskii (Siberian Branch of the USSR Academy of Sciences, Kysyl), V. I. Bykov and A. N. Gorban' (Siberian Branch of the USSR Academy of Sciences, Krasnoyarsk), and V. I. Elokhin (Siberian Branch of the USSR Academy of Sciences, Novosibirsk). Edited by R. G. Compton (Oxford University). Elsevier: Amsterdam. 1991. xiv + 396 pp. $237.00. ISBN 0-444-88802-0.

The authors of this book are mathematicians and chemists who are affiliated with the Siberian Branch of the Academy of Sciences of the former USSR. This text represents the culmination of a 15-year collaboration. The unifying interests of the authors and the unifying theme of the book concern the complex dynamics of catalytic reactions. The authors have presented a self-contained and very readable account of this subject. In the first chapter, a brief review of linear algebra and ordinary differential equations is presented, with applications to chemical catalysis. A fine discussion of the basic concepts of chemical kinetics, as applied to catalysis, is given in the second chapter. Then, in the remaining six chapters, the authors apply this machinery in a very logical (and I would even say elegant) way to the mathematical modeling of heterogeneous catalysis. Throughout the book, two levels of "kinetic analyses" are presented: one which might be termed "elementary" and which is aimed at consistency tests of proposed reaction mechanisms, and a second which might be termed "phenomenological" and which is conducive for math-

ematical modeling for reactor design, for example.

In order to give the reader a flavor, the topics include steady- and unsteady-state reactions, limit cycles and multiplicities of steady states, oscillations, kinetic phase transitions, slow relaxation (critical retardation effects), graph theory, and lattice gas models of surfaces. There are numerous helpful and well-chosen examples. Indeed, one chapter (Chapter 6) is devoted to an excellent analysis of the carbon monoxide oxidation reaction. The book is extremely well referenced (at least through about 1986), and it provides access to Russian references that are not otherwise very well known, as well as more familiar Western publications. To top it all off, there is also a very nice "history" of the scientific subject matter.

In summary, this book can be recommended highly. A major strength is that it will bring chemistry to chemical reaction engineers, and it will bring mathematical analysis to catalytic chemists. It could be effectively used as a text in a graduate course on chemical reaction engineering in a chemical engineering curriculum.

W. Henry Weinberg, *University of California, Santa Barbara*

Advances in Inorganic Chemistry. Volume 36. Edited by A. G. Sykes. Academic Press, Inc.: San Diego, CA. 1991. xiii + 503 pp. $90.00. ISBN 0-12-023636-2.

Volume 36, another in this long-running and well-respected series, is dedicated to Professor R. J. P. Williams on the occasion of his 65th birthday. Bob Williams is widely regarded as one of the "Godfathers" of the field of bioinorganic chemistry, hence this volume consists of 12 reviews focused in this general area. Since Professor Williams has such wide-ranging interests in how metal ions interact with biological systems, and the reviews were written by his former students and/or colleagues, the result is a rather eclectic mixture of topics. There are several articles on what this reviewer regards as "traditional" bioinorganic chemistry: Mo-, V-, and Fe-based Nitrogenase Systems of Azotobacter; Flavocytochrome b_2; The Active Site Properties of the Blue Copper Proteins; The Uptake, Storage and Mobilization of Iron and Aluminum in Biology; and Probing Structure-Function relationships in Ferritin and Bacterioferritin. A number of chapters such as the following are technique oriented: Magnetic Circular Dichroism of Hemoproteins, X-ray Absorption Spectroscopy and Structure of Transition Metal Centers in Proteins, and Direct Electrochemistry of Proteins and Enzymes. Finally, there are reviews on several topics that are less traditional but which serve to illustrate the breadth of the bioinorganic field: Inorganic Chemistry and Drug Design; Lithium and Medicine: Inorganic Pharmacology; The Extraction of Metals from Ores Using Bacteria; and Solid-State Bioinorganic Chemistry: Mechanisms and Models of Biomineralization.

In general the articles are well-written and include up-to-date references. There are also very few typographical errors. The one objection which can be made is the duplication in coverage between reviews. For example, ferritins are covered rather extensively in at least three separate chapters. Nevertheless, since this volume was not meant to be read in its entirety like a text, but rather to be consulted by those desiring a concise review on a specific topic, such duplication is not a problem. Indeed it may serve a useful function, pointing out to the specialist in one area the links the topics may have to others.

Carl J. Carrano, *Southwest Texas State University*

CHEMOMETRICS: Applications of Mathematics and Statistics to Laboratory Systems. By Richard G. Brereton (University of Bristol). Ellis Horwood: London. 1990. 303 pp. $45.00. ISBN 0-13-131350-9.

Whatever your own chemical interests, it is quite possible that recent conceptual advances in multivariate statistical techniques, as well as the computing systems for delivering those techniques, might produce a more useful information return on your own research efforts. That is the central theme of this book. And if you would like to begin exploring this possible value of chemometrics in your work, you might very well start here—even if you are already fairly knowledgeable about one or two corners of the chemometrics emporium.

Given the diversity of chemical laboratories and the stupefying effects of matrix algebra and statistical formalisms on most practicing chemists, the author chose wisely in producing an impressionistic survey rather than a rigorous textbook and in organizing his material around a few general issues in research, such as experimental design, sampling, and "signal processing" and "pattern recognition". (The last two issues are better known to most of us, more generically to be sure, as Results and Discussion.) The resulting text is unusually clear and forceful, occasionally even witty or passionate (though unfortunately the editing and production of this volume seem to have been less than painstaking). Out of necessity, a survey book never includes as much about one's favorite methods as they really deserve; yet it will be the exceptionally well informed reader who does not learn more about someone else's favorite methods here. The author also succeeds in balancing intricate relationships among a great variety of topics, both with each other and with the practical laboratory situation, and the bibliography is particularly useful in a field evolving so rapidly in different directions.

One ambitious objective—use of simple examples, spreadsheets, and graphics to better explicate chemometrics—was not completely met. The simple examples are abundant, and the graphs are helpful, but my guess is that only a few spreadsheet gurus would be willing and able to translate the condensed notations of the mathematical formulae into spreadsheet functions without at least a few examples.

Despite the speed of developments in chemometrics, and some relatively minor imperfections, this book presents such a large number of difficult and important topics with such unusual conciseness, balance, and clarity that it deserves consideration for a place on any serious chemical bookshelf.

Richard D. Cramer, *Tripos Associates, Inc.*

Enzyme Handbook. Volume 4. Class 3: Hydrolases. Edited by Dietmar Schomburg and Margit Salzmann (Gesellschaft für Biotechnologische Forschung). Springer-Verlag: New York and Berlin. 1991. xvi + 825 pp. $179.00. ISBN 0-387-53730-9.

This handbook is Volume 4 of a 10-volume set covering some 3000 enzymes. The purpose of this collection is to provide an up-to-date overview of enzyme molecular properties to aid chemists and others involved in the industrial use of enzymes. The enzymes in the Handbook are arranged according to the 1984 Enzyme Commission (EC) list of enzymes. Each handbook is a collection of enzyme datasheets generated from a computerized enzyme data bank at GBF. Volume 4 covers part of the hydrolase class (EC 3) of enzymes and includes 243 enzymes. Each datasheet is divided into 7 sections covering Nomenclature (systematic and trivial names, CAS Registry No.); Reaction and specificity (substrate specificity, inhibitors, cofactors/prosthetic groups, pH and temperature optima); Enzyme structure (molecular weight, subunits, glyco/lipoprotein); Isolation/preparation (sources, localization, purification, crystaliization, and cloning of the enzyme, if applicable); Stability (pH, temperature, solubility, storage); Cross-references to structure data banks; and Literature references from which the data were obtained.

The compilation and maintenance of an enzyme database is clearly a massive undertaking. I found that the information and references for several of the enzymes were quite out-of-date, while others were more current. Nonetheless, this handbook might be a helpful starting place for a chemist to track down an enzyme to catalyze a particular reaction under a particular set of conditions. As such, this series of handbooks would probably be a useful addition to a chemistry library, but only if it is kept up to date. The editors plan to make a computer-searchable version of the database available in the future—this would be a much more useful medium for this rapidly expanding area.

Dean R. Appling, *University of Texas at Austin*

New Methods of Polymer Synthesis. Edited by J. R. Ebdon (Polymer Centre, University of Lancaster). Chapman and Hall: New York. 1991. iv + 200 pp. $132.50. ISBN 0-412-02471-3.

This scintillating little book is the result of a need perceived by the editor when he gave a graduate course on advanced polymer synthesis. No textbook for such a course existed, so he authored two chapters and found authors for another four. The book is not intended to be an encyclopedia or handbook; it does, however, serve to bring together recent developments like group transfer polymerization, ring opening metathesis polymerization of cyclic alkenes, transformation reactions, chemical modification of preformed polymers, and terminally reactive oligomers.

The subjects are timely and well covered. There are copious references. As one interested in industrial polymer chemistry, I am gratified to see pertinent patents referenced. The topics are covered extensively and well, and when I finished reading this book, I felt the same gratification I would have felt from taking a short course on the subject.

One quibble: the price is rather high for a 200-page book, so for that reason I cannot see the book being used as a text for a course. I can, however, highly recommend it as a reference source, particularly for those who need to keep up with developments in polymer synthesis.

Frederick H. Owens, *Rohm and Haas Company*

The Science of Global Change. The Impact of Human Activities on the Environment. ACS Symposium Series No. 483. Edited by David A. Dunnette and Robert J. O'Brien (Portland State University). American Chemical Society: Washington, DC. 1992. xii + 498 pp. $99.95. ISBN 0-8412-2197-9.

This book was developed from a symposium sponsored by the Division of Environmental Chemistry of the ACS. In the Preface, the editors state that their goal in creating this volume "has been to bring together researchers who could address the major worldwide enviornmental problems, which contain some element of chemistry". The subject matter is

organized under the following headings: The Global Environment; The Atmospheric Component; The Aquatic Component; The Terrestrial Component; Global Carbon Cycle and Climate Change; and Global Environmental Chemistry Education. There are indexes of authors as well as their affiliations and subjects.

Kinetic and Thermodynamic Lumping of Multicomponent Mixtures. Edited by Gianni Astarita (University of Naples and University of Delaware) and Stanley I. Sandler (University of Delaware). Elsevier: Amsterdam, Oxford, New York, and Tokyo. 1991. viii + 358 pp. $151.50. ISBN 0-444-89032-7.

This book contains the Proceedings of an ACS Symposium on Kinetic and Thermodynamic Lumping of Multicomponent Mixtures held in Atlanta, GA, April 15, 1991. It presents reports by active researchers in this field of the progress made and problems still ahead in the efforts to lump mixtures of a vast number of components for many different applications. The chapters are grouped into the following sections: (1) General, (2) Kinetic Lumping of Multicomponent Mixtures, and (3) Thermodynamic Lumping of Multicomponent Mixtures. There is a brief subject index.

New Horizons in Low-Dimensional Electron Systems. Edited by H. Aoki and M. Tsukada (University of Tokyo), M. Schlüter (AT&T Bell Labs), and F. Lēvy (Ēcole Polytechnique Fēdērale de Lausanne). Kluwer Academic Publishers: Dordrecht, Boston, and London. 1992. xviii + 470 pp. $159.00. ISBN 0-7923-1302-X.

This publication honors the retirement of Professor H. Kamimura from the Physics Department at the University of Tokyo. As might be expected, it is more physics than chemistry. The book, with chapters by international experts, is organized under the following headings: Part I, Intercalation Compounds and Layered Materials; Part II, Two-Dimensional Systems and Superlattices; Part III, High T_c Compounds; and Part IV, Surfaces, Mesoscopic Systems and One- and Zero-Dimensional Systems. There is a short subject index.

Photochemical Technology. By A. M. Braun (Ecole Polytechnique Federale de Lausanne) and M.-T. Maurette and E. Oliveros (Universite Paul Sabatier, Toulouse). Translated by David F. Ollis and Nick Serpone. John Wiley & Sons: New York. 1991. xix + 559 pp. $220.00. ISBN 0-471-92652-3.

This text is a unique and successful effort to provide a handy and comprehensive survey of how photochemistry is practiced in a technological setting and how industry applies preparative photochemistry. It is addressed to graduate students, engineers, and scientists who have some knowledge of organic chemistry and who possess an interest in the possible applications of photochemistry to synthesis and industry.

Chapter 1 is a summary of essential photochemical principles, which one expects in an introduction to a text employing photochemistry as the basis of its subject. Chapter 2, radiometry and actinometry, is a handy summary of the terminology and experimental basis of the important, but often unappreciated practice of measuring light intensity, which is so critical and integral for determining quantum yields. Chapter 3 is an excellent review of controlling the intensity and frequency of light absorbed by a sample through light sources and filter, and Chapter 4 presents an important contribution by describing photochemical reactors, such as those involved in large-scale production.

Chapters 5–12 present examples of specific photochemical syntheses with each chapter containing sufficient mechanistic background to appreciate the scope and limitations of the methods. Synthetic chemistry is covered by photonitrosylation (Chapter 5), photochlorination (Chapter 6), photobromination (Chapter 7), sulfochlorination and sulfoxidation (Chapter 8), desulfonation and desulfonylation (Chapter 9), photohydrodimerization (Chapter 10), photooxidation (Chapter 11), and photochemical production of vitamins (Chapter 12).

In summary, for those who have an interest in information concerning large-scale preparative photochemistry and wish to learn of imaginative solutions to addressing the many problems posed in the field, this is an excellent and unique text and is highly recommended.

Nicholas J. Turro, *Columbia University*

The Enzymes. Volume XIX. Mechanisms of Catalysis. Third Edition. Edited by David S. Sigman and Paul D. Boyer (University of California, Los Angeles). Academic Press, Inc.: San Diego. 1990. ix + 459 pp. $99.00. ISBN 0-12-122702-2.

Paul Boyer has made many important contributions to biochemistry through his research. One of his major contributions to the field, however, is surely his accomplishments as Editor of the *The Enzymes*, the standard reference work in the field of enzymology. *Mechanisms of Catalysis* is an appropriate subject for Boyer's final contribution to the series because his research has been pivotal for our present understanding of enzyme mechanisms. It is an excellent book that will be useful to all workers in the field.

In Chapter one, David Hackney reviews the contributions of noncovalent interactions between enzymes and substrates that provide much of the driving force for catalysis through the utilization of binding energy to stabilize the transition state relative to the substrate(s) of the reaction. Entropy loss, or induced intramolecularity, is the most obvious mechanism for utilization of binding energy for catalysis. Increases in the Gibbs energy of the bound substrate relative to the transition state from desolvation and strain are also important. In Chapter two, Douglas Rees and David Farrelly provide an excellent and useful review of the theory and mechanism of electron-transfer reactions. Cleland writes an update of his treatment of enzyme kinetics, which includes an analysis of pH profiles and a description of several useful ancillary techniques, such as isotopic exchange, positional isotope exchange (PIX), isotope partitioning, kinetic isotope effects, and the Britton–Clark counter-transport method.

Johnson and Benkovic review the applications of mutagenesis to the determination of enzyme mechanisms and catalysis and the possibility of engineering new specificities into enzymes. Ator and Ortiz de Montellano evaluate the rapidly growing field of mechanism-based or "suicide" inactivators for different classes of enzymes. Roberta Colman describes mechanisms for site-specific modification of active sites of enzymes, including "affinity labels" and photoreactive compounds, and Creighton and Murthy provide a comprehensive review of the stereochemistry of enzyme-catalyzed reactions at carbon.

Overall this volume provides one of the most useful sources of information about enzymes in the series and is highly recommended to students and others with an interest in enzyme mechanisms. It would be particularly useful if the publishers would offer a paperback edition at a price within the reach of individual scientists, particularly students.

William P. Jencks, *Brandeis University*