highly stereoselective, introducing four hydrogen atoms onto the same face of acenaphthene, naphthalene, and anthracene.

Acknowledgment. We thank the National Science Foundation (Grant CHE-8915573) for support of this research. J.S.Y. gratefully acknowledges the award of a David Ross Fellowship from the Purdue Research Foundation, while B.C.A. would like to thank the SERC for the award of a NATO Postdoctoral Fellowship. We also thank C. Zambrano and D. Carlson for technical assistance in obtaining the $\{^2H\}^1H$ NMR spectra and Prof. John Grutzner for helpful discussions.

(12) For a discussion of the coupling constants in molecules in this type, see: Anet, F. A. L. In *The Conformational Analysis of Cyclohexenes, Cyclohexadienes, and Related Hydroaromatic Compounds*; Rabideau, P. W., Ed.; V. C. H. Publishers: New York, 1989.

(13) The spectra of a number of isomers of naphthalene tetrachloride have been analyzed: (a) de la Mare, P. B. D.; Johnson, M. D.; Lomas, J. S.; Sanchez del Olmo, V. *J. Chem. Soc., Chem. Commun.* **1965**, 483. (b) de la Mare, P. B. D.; Johnson, M. D.; Lomas, J. S.; Sanchez del Olmo, V. *J. Chem. Soc. B* **1966**, 827. (c) de la Mare, P. B. D.; Koenigsberger, R.; Lomas, J. S. *J. Chem. Soc. B* **1966**, 834.

Supplementary Material Available: ^1H, ^2H, ^{13}C, and $\{^1H\}^{13}C$ NMR spectra of the products of hydrogenation (H_2) of acenaphthene-d_{10}, simulations of the spectra expected for cis and trans isotopomers of $C_{10}D_8H_4$ and $C_{14}D_{10}H_4$ for comparison with the observed spectra, and comparison of the ^3J coupling constants for cyclohexene and the products shown in Figure 1 (20 pages). Ordering information is given on any current masthead page.

Additions and Corrections

Effect of Allylic Substituents on the Face Selectivity of Diels–Alder Reactions of Semicyclic Dienes [*J. Am. Chem. Soc.* **1990**, *112*, 8472]. S. C. DATTA, R. W. FRANCK,* R. TRIPATHY, G. J. QUIGLEY, L. HUANG, S. CHEN, and A. SIHAED

Page 8473, Table I, entry 11: The stereochemistry of adduct **16** was reported as 100% syn when, in fact, it is 100% anti. In the discussion, in the left-hand column at the bottom of page 8474, it is correctly reported as anti.

Stereospecificity of the β-Hydroxyl Elimination from the (Hydroxyalkyl)chromium Complex $(H_2O)_5Cr^{III}$–$CH(CH_3)CH(CH_3)OH^{2+}$ [*J. Am. Chem. Soc.* **1991**, *113*, 5292]. HAIM COHEN,* ALEXANDER FELDMAN, RUTH ISH-SHALOM, and DAN MEYERSTEIN*

Page 5295, Figure 2a: The X coordinate should have the dimensions $[H_3O^+] \times 10$ and not $[H_3O] \times 10^3$.

Page 5297, Figure 5: ⊡ should be % 1-butene and ■ % *trans*-2-butene.

Molecular Recognition by Circular Oligonucleotides: Increasing the Selectivity of DNA Binding [*J. Am. Chem. Soc.* **1991**, *113*, 6265–6266]. ERIC T. KOOL

Page 6265, ref 7: The correct concentration for oligomer and template is 50 μM each.

Models of the Cytochromes *b*. 8. Two-Dimensional Nuclear Overhauser and Exchange Spectroscopy Studies of Paramagnetic "Cavity" Type (Tetraphenylporphinato)iron(III) Complexes of Planar Ligands [*J. Am. Chem. Soc.* **1991**, *113*, 8652–8657]. F. ANN WALKER* and URSULA SIMONIS

Page 8653: The definition of acquisition time A_t in the last paragraph should read $A_t = N/F$, where N is the number of real data points and F is the spectral bandwidth. Thus, for the example quoted, in the t_2 dimension, where $N = 256$, A_t is 14 ms and the digital resolution in f_2 ($1/A_t$) is 70 Hz, whereas in the t_1 dimension, A_t is 7 ms and the digital resolution in f_1 is 141 Hz. The digital resolution in f_1 was improved by zero-filling once before Fourier transformation.

*Book Reviews**

Neutron, X-Ray and Light Scattering: Introduction to an Investigative Tool for Colloidal and Polymeric Systems. Edited by P. Lindner (Institut Laue-Langevin, Grenoble) and Th. Zemb (C. E. A. Saclay, France). North Holland: Amsterdam. 1991. viii + 376 pp. $100.00. ISBN 0-444-88946-9.

This book contains the Proceedings of the European Workshop on Neutron, X-Ray and Light Scattering as an Investigative Tool for Colloidal and Polymeric Systems held in Bombannes, France, May 27–June 2, 1990. It consists of 17 papers organized under the following headings: I. Using General Principles; II. Solving Inverse Problems; III. Studying Surfaces and Interfaces; IV. Focussing on Large Scales; V. Investigating Non-Equilibrium Systems; VI. Using Light. At the end there is a dictionary of terms, an author index, and a subject index.

Cell Signalling: Experimental Strategies. Edited by Eric Reid (Guilford Academic Associates) and G. M. W. Cook and J. P. Luzio (University of Cambridge, U.K.). The Royal Society of Chemistry: Cambridge, U.K. xiv + 446 pp. £84.50. ISBN 0-85186-436-8.

This book contains the Proceedings of the Twelfth International Subcellular Methodology Forum entitled Cell Signalling Experimental Strategies, held in Guildford, U.K., September 4–7, 1990. There are 33 papers with discussions in typescript form organized under the following sections: A. The Signalling Scene, and Response Initiation; B. Cytoplasmic Transmission Systems, and Some Agonist Effects; C. Hormone Origination and Actions, Especially Insulin and Glucagon; D. Individual-Cell Studies, Especially on Ca2+; E. Fibrinolytic, Oncogenic, Junctional and Neural Phenomena; F. Location and Transit of Proteins (Besides 'PKC'). There is a subject index; affiliations of the authors are given at the headings of the papers.

Organic Materials for Non-linear Optics II. Edited by R. A. Hann (ICI Imagedata, Manningtree) and D. Bloor (University of Durham). The Royal Society of Chemistry: Cambridge, UK. 1991. £52.50. xii + 396 pp. ISBN 0-85136-397-3.

This book contains the proceedings of the conference on Organic Materials for Non-linear Optics held in Oxford, September 4–6, 1990. It consists of an Introduction by Bloor and 45 papers in typescript form organized under the following headings: Theory; Small Organic Molecules; Metal–organic Compounds; Polymers; Devices. Affiliations of authors are given at the headings of each paper. There is a subject index.

Enzymes in Industry—Productions and Applications. Edited by Wolfgang Gerhartz (Ullmann's Encyclopedia of Industrial Chemistry). VCH Publishers: New York. 1990. xvii + 321 pp. $95.00 (hardback). ISBN 0-89573-937-2.

In the course of just under 300 pages of text, various experts contribute short reviews of important topics concerning enzyme production and use. This is accomplished in an encyclopedic approach that will no doubt be found to be inadequate by researchers working in any of the many spe-

*Unsigned book reviews are by the Book Review Editor.

cific areas detailed in this concise, well-written volume that is intended for non-practitioners.

The monograph is divided into eight chapters, beginning with an introduction that includes historical aspects, an informative description about nomenclature (if you have ever wondered about how the E.C. codes came about, this section reveals it all) and a short discussion of enzyme structure. The second chapter briefly discusses the kinetics aspects associated with enzyme-catalyzed reactions as well as analytical considerations. A longer treatise on production methodology follows and gives the reader an appreciation for the engineering aspects of enzyme production. The survey of enzymes, containing brief descriptions of substrate specificities and industrial uses, that is found in chapter four is well worth the price of admission. Synthetic chemists should note the inclusion of an eight-page survey concisely describing enzymes utilized in organic synthesis, a contribution by George Whitesides and colleagues at Harvard. An additional informative survey of enzymes used in medical diagnosis follows in the next chapter. Chapter six exhaustively delineates the many uses of DNA and RNA polymerases and nucleases as well as restriction endonucleases in molecular biology. This chapter will be a useful companion to the medicinal chemist that frequently encounters biological literature containing detailed experimental descriptions of cloning techniques for the expression of large quantities of protein.

While this book is certainly sketchy at times, the comprehensive reference list covering the literature until late 1989 will lead the reader to other more detailed books and reviews on individual subjects. This can easily be the one volume for chemists to own as an inexpensive encyclopedia about the use of enzymes.

Alan Schwartz, *Hoffmann-LaRoche*

Theilheimer's Synthetic Methods of Organic Chemistry. Volume 45. Edited by A. F. Finch. S. Karger AG: Basel. 1991. xxiv + 816 pp. $877.00. ISBN 3-8055-5300-5.

The latest volume in the *Theilheimer* series includes material published in 1989 and early 1990. The traditional format, proven by long experience, is maintained, i.e., extremely condensed abstracts with many structural formulas and a logical arrangement according to the types of bonds formed or broken. If the user prefers, the information sought can be reached through the very detailed index, which in this volume is cumulative for Volumes 41–45 and occupies 274 pages. However, since the arrangement groups similar reactions together, browsing is also convenient and can even be a source of delight when one comes upon a fascinating entry that one would not have thought to look for directly.

The traditional introductory essay, Trends in Synthetic Organic Chemistry, fills six and a half pages. It highlights such subjects as molecular recognition, tailor-made catalysis, enzymatic and microbiological catalysis, metals in various roles, asymmetric syntheses, and polymer supports. It is well worth reading.

The good paper and binding are appropriate for the heavy use that such a basic literature tool will receive. The price is obviously high enough to confine purchase to libraries, but it is important to bear in mind that one is buying more than just another book: one is also buying (or, rather, helping to pay for) the very large amount of compiling that must go on continuously to produce this series. In terms of cost per use, it is quite reasonable. The only criticism of this volume is that the names of compounds, although systematic, are occasionally somewhat Germanic, especially with respect to spaces within names (e.g., "2-ethylenealcohols"), but this minor quirk does not interfere with understanding.

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

Biocoordination Chemistry: Coordination Equilibria in Biologically Active Systems. Edited by Kálmán Burger (A. József University). Ellis Horwood: Chichester. 1990. 349 pp. $98.95. ISBN 0-13-179912-6.

This volume consists of several generally well written reviews covering the coordination chemistry of biological molecules. The material is logically arranged by ligand type, beginning with a chapter on the acid–base properties of "bioligands" (Noszál), followed by chapters on amino acids (Kiss), peptides (Sóvágó), proteins (Hirose and Kidani), sugars and carbohydrates (Burger and Nagy), and nucleic acids (Lönnberg); the last chapter is limited to the simple bases, nucleosides, and monophosphate nucleotides. Each chapter focuses on binding constants and thermodynamic parameters, though some structural information is provided, and with little surprise the Irving–Williams series is mentioned frequently. The chapter on proteins provides a useful summary of thermodynamic and kinetic aspects of both metal binding and small ligand and inhibitor coordination to the well-studied proteins carboxypeptidase, carbonic anhydrase, superoxide dismutase, and transferrin. Each topic is generally well referenced up through ~1989 and a modest index is provided. While other sources of coordination chemistry data, such as *Critical Stability Constants* (Martell and Smith) for the amino acids, and individual reviews are available, this compilation of information, data, and references primarily for simple biological ligands should be a good resource for those studying the coordination chemistry of more complex biological molecules and processes.

Dean E. Wilcox, *Dartmouth College*

Monographs in Supramolecular Chemistry. Volume 2. Cyclophanes. By Francois Diederich (University of California). Edited by J. Fraser Stoddart (University of Birmingham). Royal Society of Chemistry: Cambridge, U.K. 1991. 313 pp. £55.00. ISBN 0-85186-966-1.

This book is the second of three current volumes in the Royal Society of Chemistry series. The other two in this series are C. David Gutsche's volume titled *Calixarenes* and the reviewer's contribution titled *Crown Ethers and Cryptands*. The context is important because the other two volumes in this series take a general and long view of the field whereas *Cyclophanes* is a much more current and non-general review. In evaluating such a work, we must consider the author's statement: "This monograph will not focus on the content of...previously published books, but rather, it will present the latest developments in cyclophane chemistry." The volume certainly succeeds in this goal. In just over 300 pages, it covers some of the origins of cyclophane chemistry, a variety of cyclophane complexes, hydrogen-bonded systems, cyclophanes for chiral molecular recognition, solvent, reactivity, and catalytic effects. Much of the author's own work is featured along with recent developments from most other laboratories involved in this area. Numerous solid-state structures, graphs, tables, and spectra augment the detailed text. Indeed, some portions of the volume contain nearly as much specific information as normally found in a primary research paper.

This is a fine book that meets the author's stated criteria. It will prove most useful to those partly skilled in this art who require an up-to-date survey of current cyclophane chemistry. The novice may find this volume rather more limited in historical scope and more detailed than expected, at least compared to the other volumes in the series.

G. W. Gokel, *University of Miami, Coral Gables*

Gradient HPLC of Copolymers and Chromatographic Cross-Fractionation. By Gottfried Glöckner (Technische Universität Dresden). Springer-Verlag: New York, Berlin, and Heidelberg. 1991. 210 pp. $69.00. ISBN 0-387-52739-7.

The author, self-identified as a polymer chemist, emphasizes that chromatographic separations of polymers must not be based on molecular size alone (size exclusion or MW) but must also incorporate differences in chemical composition (CC). The combination is termed chromatographic cross-fractionation (MW/CCD). Differences in chemical composition arise in copolymers because of more than one monomeric species or by chemical modification of homopolymers. CCD is achieved by gradient elution high performance liquid chromatography (HPLC).

The monograph is rich in the physical chemistry of copolymers, polymerization, and chromatographic separations. This reviewer feels that the emphasis on principles will keep the material relevant for a good many years. Mastery of the material should allow the reader understanding of the current and future literature. I was particularly impressed with the discussion of the vagaries encountered in adsorption chromatography such as the dependence of peak position on sample size and "ghost" peaks. The author has a fine appreciation of chromatography. The chapter on detectors is very good as is the chapter on quantitative evaluation and calibration.

There is an excellent discussion of the separation of specific copolymers. The final chapter on experimental problems must surely reflect some of the author's frustrations. The section listing guidelines for the selection of suitable HPLC phase systems will please the practitioner.

The book should appeal to the polymer chemist and the separations chemist. Unlike edited books, which too often consist of loosely connected and repetitious reviews of different levels of difficulty, this has a refreshing organization, continuity, and uniformity in the presentation.

The book is well-referenced including papers published in 1989. In the Springer-Verlag tradition, the type and figures are clear on excellent quality paper.

Roy A. Keller, *Fredonia State University College*

Algorithms for Chemists. By Jure Zupan (Kemijski Institut 'Boris Kidrič'). John Wiley and Sons: New York. 1989. xv + 290 pp. $87.95. ISBN 0471-92173-4.

This book is largely, in the author's words, an "Introduction to computer methods for chemists", particularly chemists who require storage and manipulation of data. The emphasis of the text and the 31 algorithms in the book is how to file, process, and handle large data sets. While most of the examples are geared to chemists, this book is intended for more general audiences insofar as it serves as an introduction to

efficient data storage and representation. In addition to this central theme, there are brief introductions to fractals and neural networks.

The book is divided into three sections: Data, Preprocessing of Data, and Data Handling. In the first, the reader is introduced to vector storage of data, storing files, and subsequent manipulation, such as file inversion. In addition to the four algorithms presented for these purposes, there are two more for sorting data (Quick and Bubble sorts, the latter of which is long outdated) and another four algorithms to generate random numbers.

The second section of the book is called Preprocessing of Data, which presents approaches to reducing data to a meaningful and interpretable form. Here one finds discussion of smoothing data, detecting and integrating peaks, computing autocorrelation functions, and curve fitting. There is an interesting section on measurement space reduction, how to keep a data set as small and informative as possible. Several other algorithms deal with fast Fourier and Hadamard transformations.

The final section is Data Handling, which discusses some manipulations of compact data sets. One example is hierarchical clustering of large sets of data and recognizing patterns therein. Another example is coding structure fragments and then storing, connecting, and retrieving them. The coding procedure used by the Chemical Abstract Service, called Morgan's algorithm, is presented here. The final chapters of this section are quite apart from the previous ones, including three algorithms to generate some basic fractal structures and a chapter introducing expert systems and neural networks.

Computational chemists who require numerical methods, Monte Carlo, or Molecular Dynamics techniques will not find much new here. However, for chemists who routinely handle large amounts of data, this book provides a nice overview of techniques for the efficient use of computers to this end.

David Leitner, *Theoretische Chemie, Universität Heidelberg*

Particle Size Distribution II: Assessment and Characterization. ACS Symposium Series 472. Edited by Theodore Provder (The Glidden Company). American Chemical Society: Washington, DC. 1991. xiv + 410 pp. $89.95. ISBN 0-8412-2117-0.

This book was developed from a symposium sponsored by the Division of Polymeric Materials: Science and Engineering at the 199th National Meeting of the American Chemical Society held in Boston, MA, April 22–27, 1990. It consists of a Preface by the editor and 25 papers in typescript form organized under the following headings: Light-Scattering Methods; Disc Centrifuge Photosedimentometry; Field-Flow Fractionation; Capillary Hydrodynamic Fractionation; Electrophoretic Characterization, Image Analysis, Fractals, and Electrozone Sensing. There are indexes of authors, their affiliations, and subjects.

Food and Packaging Interactions II. ACS Symposium Series 473. Edited by Sara J. Risch (Golden Valley Microwave Foods, Inc.) and Joseph H. Hotchkiss (Cornell University). American Chemical Society: Washington, DC. 1991. xvi + 270 pp. $59.95. ISBN 0-8412-2122-7.

This book was developed from a symposium sponsored by the Division of Agricultural and Food Chemistry at the 200th National Meeting of the American Chemical Society held in Washington, DC, August 25–31, 1990. It consists of a Preface by both editors, an introduction by Risch, and 19 papers in typescript form.

Software Development in Chemistry. Volume 5. Edited by J. Gmehling (University of Oldenburg). Springer-Verlag: Berlin. 1991. xiv + 242 pp. $69.00. ISBN 0-387-53532-2.

This book contains the contributions, presented in typescript form, of the 5th Workshop entitled Software Development in Chemistry, which took place in Oldenburg, Germany, in November 1990. The workshop was organized by the division "Chemistry-Information-Computer" of the German Chemical Society. The book consists of 27 oral and 37 poster and computer demonstrations presented by institutions from universities, chemical industries, and other scientific bodies. Applications of computers for chemical engineering, synthesis, molecular modeling, and other areas were emphasized. The number of participants was limited to 180. Owing to the political changes in Europe, scientists from the former German Democratic Republic were able to attend the meeting. There is an author index, but no subject index.

Understanding Chemical Patents: A Guide for the Inventor. 2nd Edition. By John T. Maynard and Howard M. Peters. An ACS Professional Reference Book. American Chemical Society: Washington, DC. 1991. xvi + 184 pp. $39.95. ISBN 0-8412-1998-2.

The first edition of this book, written alone by Maynard, was the end result of a short course offered to the technical staff of the Du Pont Experimental Station in 1976. The second edition, updated by Peters, is a practical guide for chemists and engineers about how to write and use patents and how to work with patent attorneys. In the Preface, Peters advises readers that although 70% may be passing in academe, in the world of patents, "a score of 90% will receive a cool reception, and anything less is unsatisfactory". There are 16 sections. Patents are listed as examples and lists of figures and tables are given. The following four sections end the book: Glossary and Abbreviations; Bibliography; Organizations Mentioned; and an Index.

An Introduction to Ultrathin Organic Films: From Langmuir–Blodgett to Self-Assembly. By A. Ulman (Eastman Kodak). Academic: San Diego. 1991. xxiii + 442 pp. $65.00. ISBN 0-12-708230-1.

A quarter of a century has passed since the publication of the classic work by George Gaines: *Insoluble Monolayers at Liquid–Gas Interfaces.* The intervening years have seen a resurgence of interest in Langmuir–Pockels and Langmuir–Blodgett films and the growth of self-assembly as a complementary technology for the construction of organized monolayer films. From time to time review articles and specialist monographs have appeared, but no single source provides a comprehensive review of subsequent progress. Ulman's book aims to fill that gap.

Gaines prefaced his monograph with the words "If I have erred, it is probably because of a refusal to accept conclusions which I feel are insufficiently supported by experimental evidence". Ulman steers a more liberal course, wherein lies both the strength and the weakness of the book. *Ultrathin Organic Films* sets out to fulfill two objectives: to provide a comprehensive overview of progress since Gaines's book and to introduce students and new researchers to the subject of ultrathin organic films. The first aim is admirably achieved. To keep the book to an acceptable length, Ulman eschewed a historical perspective and concentrated on recent research--the large majority of the 1800 references date from the last ten years. The five chapters are subdivided into carefully structured sections, each of which contains a discussion of the papers that, in the author's opinion, constitute the most important developments in that topic. Other significant papers are then described in a sentence or short paragraph. The literature coverage appears exhaustive.

As an introduction to organic monolayers and multilayers, this book is perhaps less successful. Experienced practitioners in a field can discern which interpretations are likely to be overtaken by subsequent dvelopments and which represent real advances in scientific understanding. For a neophyte it is much more difficult to distinguish between the subjective interpretations of authors and the generally accepted tenets of the scientific community, to separate the grain from the chaff. Such distinctions are not always clear in this book. The omission of an introduction conserves space but will make it difficult for a student to understand the first chapter, which assumes substantial familiarity with both Langmuir–Blodgett and self-assembled monolayers. Ulman sometimes forgets the specialized nature of the terminology used in monolayer studies: for example, "kinks" and "jogs" in hydrocarbon chains are never defined, and the word "amphiphile" is not explained until page 111.

The first chapter, on analytical tools, is the weakest in the book. Many techniques are poorly explained—the section on ATR infrared does not mention either the critical angle or the evanescent wave—and the author tends to dwell disproportionately on technical details, such as the choice of ATR substrate. The next two chapters, on Langmuir–Blodgett films and self-assembled monolayers, are much better. Ulman provides a clear exposition of the two techniques, a personal assessment of the structure of these films, and an extensive catalogue of the different systems that have been studied. The fourth chapter on molecular modelling is most welcome: both Monte Carlo and Molecular Dynamics simulations have reached a degree of sophistication through which they provide real insights into the structure and properties of monolayer films. Ulman finishes with a necessarily brief overview of practical applications. He concentrates on the nonlinear optical properties of multilayer films and summarizes other areas, such as photovoltaic devices and chemical sensors, that have been adequately covered in earlier review articles.

In summary, Dr. Ulman has provided a much-needed, encyclopaedic review of ultrathin organic films. This book will be of considerable use to researchers in the field.

Colin D. Bain, *Oxford University*

Handbook of Surfactants. By M. R. Porter (Maurice R. Porter & Associates). Blackie/Chapman and Hall: New York. 1991. ix + 227 pp. $99.50. ISBN 0-412-02491-8.

This book is rather more than a handbook, but also rather less. The first four chapters are titled as follows: General Introduction; General Approach to Using Surfactants in Formulations; Information Sources; and Use of Surfactant Theory. The information presented in these chapters is unexceptionable, although much of it is useful. Any attempt, however, to present a useful summary of surfactant theory in less than

25 pages is obviously going to be unsuccessful. On one hand, the chapter on information sources is quite up-to-date and serves as a useful jumping-off place; on the other, omitting Dialog Information Services from a list of computer data bases is clearly an oversight.

The handbook proper begins with the fifth chapter, Surfactants Commercially Available, and continues with the following titles: Anionics; Non-ionics; Cationics; Amphoterics; Speciality Surfactants; and Polymeric Surfactants. In these chapters numerous materials are listed under the following headings: Nomenclature; Description; General Properties; Applications; and Specification—with two to three pages devoted to each of the various classes. The synthetic reaction scheme is generally given, but without specification of any conditions. The actual method of manufacture is thus left for the reader to discover. Since few references are given to patents, this may call for an extensive search.

The first of two appendices deals with the nomenclature of hydrophobes and average composition of fats and oils, information which, however useful, could easily be found elsewhere. The second appendix covers ecological and toxicity requirements, which, not surprisingly, is keyed primarily to EEC requirements. An adequate index concludes the book.

Paul Becher, *Paul Becher Associates Ltd.*

Photochemistry. Volume 22. Edited by D. Bryce-Smith and A. Gilbert (University of Reading). Royal Society of Chemistry: Cambridge. 1991. xxi + 547 pp. £140.00. ISBN 0851862055.

As is the case for the preceding volumes in this series, this book thoroughly reviews the area of photochemistry during the time frame of July 1989 to June 1990. Following a brief overview of the activity in this area during the year, chapters which review physical and organic aspects of photochemistry, polymer photochemistry, and photochemical aspects of solar energy conversion are presented. By far, the greatest attention is given to organic photochemistry, the review of which covers nearly 350 of the 513 pages of the book. A careful inspection showed that each topic is covered in a complete, yet concise and readable fashion. An excellent use of structural representations and reaction sequences, especially in the organic photochemistry section, aids the reader interested in merely scanning the book for interesting and pertinent observations. Finally, the "author index" is useful for those whose use of the book is to gain a review of pertinent literature on a specific topic or by a particular researcher.

In general, this annual review of photochemistry is worthwhile reading for researchers interested in the field. Even though space and effort limitations prevent coverage of potentially related topics such as photobiology, this Specialists Periodical Report on *Photochemistry* is recommended as a reference text for students of excited state chemistry.

Patrick S. Mariano, *University of Maryland*

Statistical Thermodynamics. By M. C. Gupta (Nagpur University, India). John Wiley & Sons: New York. 1990. 404 pp. $24.95. ISBN 0-470-21151-2.

This introductory text is intended to make the subject accessible to students who are not familiar with the conceptual framework and mathematical background of other texts on the subject. It covers nearly the same material as T. L. Hill's familiar text (Introduction to Statistical Thermodynamics, Addison-Wesley, New York, 1960) but in a very different order. After introductory chapters on relevant aspects of mathematics, mechanics, and thermodynamics, the new text turns to the derivation of Boltzmann's distribution law and to its applications to systems of independent particles.

Only in Chapter 9 do we come to an exposition of the ensemble theories of statistical mechanics which, as the author tells us on page vii, "has been added on ensembles for those who wish to construct ensembles". As a result the theory of molecular partition functions, usually the core of the statistical thermodynamics course, is divided between Chapters 8 and 12. On the other hand in the new text very many detailed applications of the theory are worked out, which surely makes the text more accessible to those students whose love of mathematics knows some bounds.

In the study of applications of statistical thermodynamics in Chapters 13–20 there are a few citations of relevant research reported in the period 1961–1970. These certainly increase the value of the text. It would be even better if there were more such citations more completely described and not limited to before 1971.

It must be remarked that there are many errors in the text. To keep the example list short I limit it to pages with two errors: p 69, eq 5.28—$(\partial G_m/\partial n_i)$ should be $(\partial G/\partial n_i)$; p 69, eq 5.32—the change from multicomponent to single component is coupled to the change from number of moles to number of molecules: Why? $A = N\mu$ is wrong too; p 135, 3a—it says hc/k = 1.4388 cm^{-1} instead of 1.4388 cm K; p 135, Table 3.5 should be Table 8.5; p 296 (top)—the integral for the coordination number can have any value from zero to infinity depending on the choice of R, which is not specified; p 296 (c)—the cited water structure aspects are out of date; p 330, Figure 18.2—the Raoult's law behavior of the nearly pure A or B is missing; p 330, Figure 18.2—the figure does not correctly show the required Henry's law behavior of A or B when it is very dilute.

In summary this text has some advantages over others which may be important for the needs of the least mathematically adept students.

Harold L. Friedman, *State University of New York at Stony Brook*

Atoms in Molecules. By Richard F. W. Bader (McMaster University). Oxford University Press: New York. 1991. xviii + 438 pp. $120.00. ISBN 0-19-855168-1.

Richard Bader has long been a leader in developing and applying ways to use the electronic density and related quantities to gain insight into molecular properties. This book summarizes his and his collaborators' work over the past 30 years, focusing in particular upon the topological analyses that have led to a comprehensive and consistent model encompassing atoms in molecules, chemical bonds, and other such key concepts. This volume is a very useful and detailed presentation of that model and of the important advances in quantum molecular theory that are associated with it. However, the reader should keep in mind that even while admiring the analytical approaches that have been developed and recognizing the significance of some of their consequences, one need not share all of the interpretations that are given here, despite the rather emphatic manner in which the latter are expressed.

In order to fully follow the discussion and arguments that are presented, a good background in quantum theory and the related mathematics is needed. Some of this background is given in the text, although necessarily in an abridged form. However, most of the concepts can also be understood on a qualitative level, and much of the book is devoted to applications to chemical systems that could be of interest to a wider audience of graduate students and researchers who are concerned with the manner in which the electronic density distribution affects the bonding and other properties of molecules. There is a satisfactory subject index and literature citations at the end of each chapter.

Peter Politzer, *University of New Orleans*

Brassinosteroids: Chemistry, Bioactivity, and Applications. ACS Symposium Series 474. Edited by Horace G. Cutler (U.S. Department of Agriculture), Takao Yokota (Teikyo University, Japan), and Günter Adam (Institute of Plant Biochemistry, Germany). American Chemical Society: Washington, DC. 1991. x + 358 pp. $84.95. ISBN 0-88412-2126-X.

This book was developed from a symposium sponsored by the Division of Agrochemicals at the 200th National Meeting of the ACS, August 26–31, 1990, and an international workshop sponsored by the Federation of European Chemical Societies at the Institute of Plant Biochemistry, Halle/Saale, Germany, October 29–November 2, 1990. As stated in the Preface, "brassinosteroids, a new group of biologically active natural products, are under consideration as another class of phytohormones". They were discovered in extracts from bee-collected pollen at the USDA Agricultural Research Center in Beltsville, Maryland in 1970. The book consists of a Preface and 30 articles in typescript form organized under the following sections: History; Chemistry, Biochemistry, and Methods; Molecular Biology; Physiology: Plants and Insects; Practical Applications; and Conclusion. There are indexes of authors, their affiliations, and subjects.