

-17.6°, which was in agreement with the value reported previously, $[\alpha]_D^{25} -18^\circ$ (c 9.9, H₂O). The ¹³C NMR of the reaction product is identical with that of L-xylose.¹⁷ The alditol-aldose mixture can be easily separated by passing through a Dowex 50 (Ba²⁺ form) column using water as eluent.¹⁸

Similar procedures were applied to compounds 1, 5, and 7. Although no side reactions were observed for each reaction, the reaction yield was 10–15% based on HPLC analysis and measurement of optical rotation. Like many other enzymatic reactions, product inhibition occurred in these reaction. To overcome this problem, we note that a column reactor can be used,¹⁹ in which the reactant is passed through the column containing immobilized

(16) It has been reported that reactions with D-galactose oxidase rarely go to completion: Schlegel, R. A.; Gerbeck, C. M.; Montgomery, R. *Carbohydr. Res.* **1968**, *7*, 193–199.

enzyme, and the product collected from the eluent is separated from the unreacted polyol,¹⁸ which is then recirculated through the column for further reaction.

In summary, this work illustrates a novel use of an enzyme for stereospecific oxidation of polyfunctional compounds in aqueous medium. The process could be useful for preparation of various unusual L-sugars from readily available polyhydroxy compounds.

(17) The ¹³C spectrum (in ppm from DSS) was essentially the same as that reported: (a) Serianni, A. S.; Nunez, H. A.; Barker, R. *Carbohydr. Res.* **1979**, *72*, 71–78. (b) Nunez, H. A.; Walker, T. E.; Fuentes, R.; O'Connor, J.; Serianni, A.; Barker, R. *J. Supramol. Struct.* **1977**, *6*, 535–550.

(18) Jones, J. K. N.; Wall, R. A.; Pittet, A. O. *Can. J. Chem.* **1960**, *38*, 2285–2294.

(19) Chibata, I. C. "Immobilized Enzymes"; Wiley: New York, 1978.

(20) (a) Klosterman, H.; Smith, F. *J. Am. Chem. Soc.* **1952**, *74*, 5336. (b) Frush, H. L.; Isbell, H. S. *J. Am. Chem. Soc.* **1956**, *78*, 2844.

Book Reviews

The Chemical Physics of Solid Surfaces and Heterogeneous Catalysis. Volume 3B. Chemisorption Systems. Edited by D. A. King (University of Liverpool) and D. P. Woodruff (University of Warwick). Elsevier Scientific Publishing Co.: Amsterdam and New York, 1984. xii + 320 pp. \$96.25. ISBN 0-444-42178-5.

This volume is one of a series of authoritative, carefully prepared reviews of areas of modern surface science. Previously published volumes have dealt with Clean Solid Surfaces (Volume 1), Adsorption on Solid Surfaces (Volume 2), and Fundamental Studies of Heterogeneous Catalysis (Volume 4). This volume addresses several important adsorption systems which have been widely studied under well-controlled conditions. The chapters are the following: 1. Metals on Metals (E. Bauer); 2. Hydrides and Oxides of Nitrogen on Metal Surfaces (R. M. Lambert and M. E. Bridge); 3. Hydrocarbons on Metals (J. C. Bertolini and J. Massardier); 4. Adsorption on Oxides (G. Heiland and H. Luth); 5. Halogens on Solids (H. H. Farrell); and 6. Adsorption on Semiconductors (R. H. Williams and I. T. McGovern).

The reviews are well written and clearly illustrated. Although the presentations assume at least a cursory knowledge of the tools, methods, and results of modern surface science, an attempt has been made to obviate barriers between the separate disciplines which contribute to surface science. For example, band bending at semiconductor surfaces, a textbook-level topic for many, is reviewed briefly to aid the general reader in understanding adsorption on compound semiconductors. This reviewer applauds the care with which the subject matter has been developed from fundamentals through discussions of specific experimental results to (where possible) formulation of general rules. More than 700 references are given, mostly published prior to 1981. A small number of more recent publications have been included as notes added in proof.

Chemisorbed species are commonly intermediates in heterogeneous catalysis, so these reviews will obviously be valuable to workers in that field. However, chemisorption systems are just as relevant to many other areas, as diverse as friction, lubrication and adhesion, and photoelectrochemical energy conversion, and this volume can be recommended to a wide audience.

Robert C. Plumb, Worcester Polytechnic Institute

The Protein Folding Problem. Edited by D. B. Wetlaufer. Westview Press: Boulder, CO, 1984. xiv + 203 pp. \$30.00. ISBN 0-86531-798-1.

Until recently, the title of this book would have led one to anticipate a discussion of the question, "can we theoretically predict protein structures from their sequences?" The focal question of the current monograph might be phrased, "what experimental efforts and interpretations of data are yielding insights and generalizations that enhance our understanding of protein folding?" This book is based on a symposium sponsored in early 1982 at the American Association for the Advancement of Science Annual National Meeting. It has eight articles discussing protein folding from a variety of perspectives. The specialized theoretical and computational discussions, which dominated this field a few years ago, are notable by their absence in this volume.

Jane Richardson gives a concise, and well illustrated, summary of our understanding of folding patterns in protein structural domains, with

some suggestions as to how domain topologies may follow naturally from folding pathways. Donald Wetlaufer discusses current evidence for the suggestion that protein folding is a modular process and that structural domains are the folding modules. In a similar vein, Sherman Beychok considers the exon structure of genes coding for proteins, and referencing data on globin genes specifically discusses the question of whether exons code for functional domains in proteins. Irwin Kuntz summarizes data from such diverse sources as calorimetry, magnetic resonance, and proton exchange in a description of our current understanding of protein thermodynamics and dynamic motion in proteins.

A description of hierarchical structure and assembly of collagen is given by Karl Piez. There are also chapters on principles of biological growth by H. R. Crane and the helical hairpin hypothesis for folding and insertion of membrane proteins by Don Engelman and Tom Steitz.

Possibly the most novel approach to protein folding is the effort of John King and colleagues to apply genetics to the problem—more specifically, to try to decipher what they refer to as the genetic code for protein folding. In this volume, they discuss specifically their work on the tail spike protein of phage P22, for which they isolate a set of "temperature sensitive synthesis" mutants—mutants whose tail spike protein is functionally defective at the nonpermissive temperature only if synthesized at the nonpermissive temperature. It is argued that such mutants are expressing temperature-sensitive defects in protein folding; it will be interesting to see what insights this approach yields for the folding problem in the future.

Overall, this book gives a highly readable presentation of several different perspectives on the protein folding problem. The articles are written to be readily accessible to individuals who are not specialists in the field of protein structure. Taken as a whole, the material in the book provides the general audience with ample background material to become involved in the controversial question of how to address the problem of protein folding.

David B. McKay, University of Colorado

Advances in Liquid Crystals. Volume 6. Edited by Glenn H. Brown (Kent State University). Academic Press: New York, 1983. xiv + 268 pp. \$80.00. ISBN 0-12-025006-3.

The general classification of liquid crystalline phases into smectic, nematic, and cholesteric is commonly known, but it deceptively suggests simpler phase behavior than is often observed. Consider these three facts. To date eight different smectic phases have been identified. The nematic phase in some systems has been observed to transform to a smectic phase on cooling, and then it appears again at lower temperatures (the "reentrant" phenomenon). It is not unusual for a pure mesogen to pass through two or three—even as many as five or six—stable fluid phases on heating between its crystalline melting temperature and appearance of the isotropic liquid.

The first and longest of the four reviews in the most recent volume of this informative series describes the fascinating phase behavior of these ordered fluids. This well-organized report was written by D. Demus and H. Sackman, who are among the foremost authorities of liquid crystalline polymorphism, in collaboration with S. Diele and S. Grande.

The second review is H. Kresse's Dielectric Behavior of Liquid Crystals, an especially important subject because of the widespread use of liquid-crystal display devices. Most of this report is dedicated to nematogens, including both their static dielectric properties as interpreted in terms of the Maier-Meier theory and their dynamic characteristics. Smectic phases, the reentrant nematic phase, and liquid crystalline polymers are included in shorter sections. The review is enhanced by many examples of observed dielectric behavior.

High-resolution NMR spectroscopy of nonmesogenic molecules and ions dissolved in liquid crystalline solvents is the subject of the third review, by C. L. Khetrapal and A. C. Kunwar. The NMR spectra of species oriented in a liquid crystalline environment are considerably more complex than those obtained with isotropic media, and they can provide more information. This report describes in a qualitative way (it contains only 12 equations) the determination from these spectra of direct spin-spin coupling constants, the anisotropies in the chemical shifts and in the spin-spin coupling tensors, quadrupole coupling constants, and geometrical parameters including bond angles and relative internuclear distances. The article concludes with a 37-page section entitled Applications, which comprises one- or two-sentence summaries of over 300 articles on the subject.

The last article, Liquid Crystals in Living Tissues, by R. J. Hawkins and E. W. April, treats skeletal muscle fibers and collagen fibrils in connective tissues as examples of ordered biological structures. While the report describes in detail the experimental evidence for the ordered aggregations in these systems, it falls short by not giving sufficient emphasis to the connection between ordering in biological systems and that in systems of synthetic mesogens.

Robert A. Orwoll, *College of William and Mary*

Diffusion of Biomass Energy Technologies in Developing Countries. Edited by F. R. Ruskin (Board on Science and Technology for International Development). National Academy Press: Washington, D.C. 1984. vii + 120 pp. \$9.25. ISBN 0-309-03442-6.

Increased oil prices have caused severe economic problems in developing countries. Not only are these countries deeply in debt but industrial and agricultural development have virtually ceased. In addition, increased consumption of firewood and charcoal is causing deforestation and erosion. This report discusses factors that influence the acceptance and diffusion of biomass-based renewable energy technologies in developing countries. It will not be of interest to chemists, but workers in appropriate technology and development will find it useful. References are included.

M. C. W. Smith, *Ann Arbor, Michigan*

Ionization Potentials. Some Variations, Implications and Applications. By L. H. Ahrens (University of Cape Town). Pergamon Press: Oxford. 1983. xi + 104 pp. \$29.50. ISBN 0-0802527-45.

This book deals largely with work published by Professor Ahrens over 20 years ago, although reference is made to two papers in preparation. Three of the 17 chapters, amounting to a quarter of the book, are essentially reproductions of original papers, but it is not clear where or when these papers were published. The ionization Potential is defined rather loosely as "the energy required to remove an electron from an atom or ion" and is described as being "a uniquely important fundamental property" without its uniqueness or relative importance being clearly discussed anywhere.

A 3-page introduction is followed by a 2-page chapter on First Ionization Potentials, Some Major Trends and Features, a chapter comprising 0.75 page of text and 2 pages of tables on The s Electron, another comprising 2 pages of text and 4 of tables on The p Electron, and others on The d-Transition Elements (7 pages) and The Rare Earth Elements (5.5 pages). Screening effects are not more than mentioned until chapter 8 (2 pages of text and 1 of tables). No mention is made of spatial distribution of electrons as a factor determining screening effects. Finkelburg (1950) is described as "one of the first to utilize the IP to determine some function of screening", and one is referred to "his Table 9" for effective nuclear charges. No mention of Finkelburg is made in the bibliography where 43 references are given. Chapters 13-15, the ones reproduced from journal articles, contain 56 references in addition to the 43 in the bibliography, but there is considerable duplication and, in at least one case, quadruplication.

A 5-page chapter (2 pages of which are tables of IP differences) on Oxidation States of Some Metals precedes the one on screening and quotes from the second edition of Cotton and Wilkinson's text: "Although ionization potentials give some guidance concerning the relative stabilities of oxidation states, this problem is a very complex one and not amenable to facile generalization". No attempt is made to explain why this is so or to take up the implied challenge. No mention of oxidation potentials is made.

Other chapters deal with Relatively Inert Elements, Cationic Forces (Polarizing Power), Heats of Hydration (only one reference is given and that to the first edition of Basolo and Pearson's book "Mechanism of Inorganic Reactions", Wiley: New York, 1958), and Stability of Metal-Organic Complexes (only ligands such as EDTA and amino acids, etc., are included). Other topics, covered in separate chapters, are structures of simple inorganic crystalline compounds, refractive indices, geochemistry, and, finally, ionic radii. There is an author index but no subject index.

Anthony Poë, *University of Toronto*

Topics in Enzyme and Fermentation Biotechnology. Volume 8. Edited by Alan Wiseman (University of Surrey, Guildford). John Wiley & Sons: New York. 1984. 179 pp. \$54.95. ISBN 0-470-20058-8.

The variety of topics in this latest volume of a series should find a wide audience. Biochemists, microbiologists, chemical, biochemical, and microcomputer engineers, as well as workers concerned with effluent treatment problems will find this book useful. The current interest in the utilization of plant material for fuel and chemicals makes the chapter on xylanases as timely one. Xylanases are widely distributed in nature and are found in bacteria, fungi, ruminants, snails, crustaceans, seeds, and a variety of invertebrate animals. The production, purification, and properties of xylanases are described as well as their mechanism of action. Also included is a list of patents relating to xylanases and their biotechnology. The second topic concerns the biological control of nitrogenous pollution in waste water. This is described as a classic example of biotechnology in action. Mechanisms and sources of nitrogenous pollution are discussed. This is followed by sections on nitrification, denitrification, and biological nitrogen removal processes. Chemical engineers should find the final chapter on computers and microprocessors in industrial fermentation of particular interest. References are included.

M. C. W. Smith, *Ann Arbor, Michigan*

Measurement of Suspended Particles by Quasi-elastic Light Scattering. By B. E. Dahneke (Rochester University). John Wiley and Sons: New York, 1983. 570 pp. \$39.95. ISBN 0-471-87289.

Quasi-elastic light scattering (QELS) is rapidly becoming a routine tool for the analysis of particle sizes and distribution of sizes. This technique had its beginnings over 20 years ago and is described by a substantial body of literature. Unfortunately, most of the literature is difficult to access because it is spread over a wide variety of disciplines. This book collects together 20 contributions that focus both on the theory and practice of QELS. The book is a written version of authors' presentations given at a symposium organized by B. F. Dahneke, held in Santa Monica, California, on February 18 and 19, 1982. The articles provided an excellent review of the field. A diverse range of QELS applications are covered. Although mathematics is an essential element of this discipline, the overall tone of the book is one of practice rather than theory. Extended and complementary methods are also discussed including electrophoretic light scattering, multi-detector methods, and dual-beam laser doppler velocimetry. Overall this book presents an excellent review and is recommended to those established or new to QELS.

R. H. Wollenberg, *Chevron Chemical Co.*

Organometallic Chemistry of Rhodium and Iridium. By Ronald S. Dickson (Monash University). Academic Press: London and New York. 1983. x + 422 pp. \$49.00. ISBN 0-12-215480-0.

This book is one in the series "Organometallic Chemistry: A Series of Monographs" (P. M. Maitlis, F. G. A. Stone, R. West, Editors). The book is a survey of the literature on the organometallic chemistry of rhodium and iridium up to about 1979. Chapter I gives a very brief survey of the general chemistry of the metals, including catalytic applications. Chapters II-IV deal mostly with the chemistry of the metal carbonyls, their derivatives, and complexes of ligands with bonding modes similar to that of carbon monoxide. Chapters V-VII deal mainly with the chemistry of rhodium and iridium complexes containing σ - and π -bonded organic ligands. This book has a number of appealing features. It is very readable and the format used leads to well-organized discussions. The author has done a good job integrating the discussions of a large number of compounds of similar structures, properties, and reactivities. These discussions include summaries of preparative routes as well as large doses of structural, physical, and chemical data. Another notable aspect of the book is the list of references which number slightly over 2000. The book contains an addendum that lists key references not only for each chapter but also for various subsections within each chapter. These key literature references cover the couple of years immediately following the period covered by the main survey.

Though an enormous amount of work has been done in this area over the last 5 years, this book would be of great value as a starting point for

anyone entering the area of organometallic chemistry of rhodium and iridium. Experienced investigators may also find this survey quite valuable.

Clifton Woods, *University of Tennessee*

The Two Faces of Chemistry. By Luciano Caglioti (Professor of Organic Chemistry, University of Rome); translated by Mirella Giacconi. The MIT Press: Cambridge, Mass., and London, England. 1983. xvi + 218 pp. \$17.50. ISBN 0-262-03088-8.

This book brings to an important subject some useful insights and a mass of information, but in a disappointing way. The two faces of chemistry are the benefits and the costs or disadvantages, which Caglioti discusses in chapters on chemistry and nutrition, health, cosmetics, petrochemicals, inorganic compounds, and energy, and in general chapters on chemistry in modern society, on the arguments about these matters, and on international efforts to curb risks.

On each topic, the book mentions the pros as well as the cons. Regarding DDT, the degree to which facts are subject to interpretation is nicely illustrated by contrasting the views of Borlaug and Illich. A typical incongruity is nicely brought out, of huge public fuss over the doubtfully harmful saccharin and cyclamates by contrast with long tolerance of tobacco, alcohol, and military ventures. Ten pages devoted to the benefits and risks of contraceptives are the most successful and useful discussion in the book. Caglioti makes the interesting point that the periodic outbursts of argument over specific issues—Minamata, saccharin, whatever—actually function as scapegoats: we readily delude ourselves that resolution of one of these accomplishes something fundamental, whereas the general societal dilemma remains entirely unresolved. But on almost all other issues, the analysis is so brief as to be little more than a collection of notes. One unsatisfactory feature that recurs in many places is the use of numbers in absence of any basis for judging their significance: what should we make, for example, of the fact that there exist 150 bacteria, 250 viruses, and 8000 fungi that cause plant diseases? or of the fact that \$20 billion is spent each year in the U.S. on canned and bottled foods? In the first case, I would want to know how many species of bacteria, viruses, fungi there are altogether; in the second, how much is spent altogether on food, before deciding what those numbers signify.

This book should be seen as a useful little source of topics and references and not as a readable discussion. Despite the provision of a glossary, few if any nonchemists will find this an easy book to read. Not only do technical terms abound, but the wording is compressed (and in places it suffers noticeably from awkwardness in translation). Making for further inconvenience are the notes, references, and bibliography: they comprise separate sections at the back of the book, the notes being referred to by alphabetical superscripts in the text and the references by numerical superscripts—I wished that the book had been provided with several marking-ribbons so that I could have quickly found the relevant notes and references as I read the text; and the bibliography is arranged by chapter, but with several sections within each chapter, making the search for a particular reference quite frustrating.

So this is a disappointing book: the mass of potentially interesting material has not been digested or organized into a readable whole.

Henry H. Bauer, *Virginia Polytechnic Institute and State University*

Progress in the Chemistry of Organic Natural Products. Volume 45. Edited by W. Herz (Florida State University), H. Grisebach (Albert-Ludwigs-Universität), and G. W. Kirby (University of Glasgow). Springer-Verlag: Wien and New York. 1984. viii + 288 pp. DM 194. ISBN 3-211-81755-7.

The current volume of this continuing series maintains the high standards of clarity, scientific accuracy, and completeness established in its predecessors. The usual format has been retained and features an excellent Table of Contents, Author Index, Subject Index, and extensive and complete bibliographies.

The first chapter, by D. A. H. Taylor, reviews the chemistry of the limonoids isolated from plants of the natural order Meliaceae. The majority of attention is focused on chemical advances subsequent to the last review in this series in 1968. However, comprehensive and extensive compound tables are provided in which each natural substance is categorized by structure type and listed with a name and source material. Discussion on biosynthetic origins and synthetic efforts are evident throughout the text.

Chapter 2 reviews progress in the chemistry of lichen substances since 1971. Authors J. A. Elix, A. A. Whitton, and M. V. Sargent systematically discuss the isolation, structure determination, and probable biosynthetic origin of these lichen metabolites. Synthetic achievements are noted where applicable.

The final chapter, by Y. Shimizu, reviews the chemistry of paralytic shellfish poisons. The occurrence and isolation of these toxins is high-

lighted. Structural features are then discussed in depth and NMR data provided in tabular form. Total syntheses and possible biosynthetic origins are delineated. Finally, the pharmacology of these shellfish toxins is covered.

This volume is a welcome addition to a distinguished review series. It is highly recommended as a valuable reference work for synthetic organic chemists and biochemists.

Michael R. Barbachyn, *Yale University*

Modern Liquid Chromatography of Macromolecules. By B. G. Belenkii and L. Z. Vilenchik (Academy of Sciences of the U.S.S.R.). Elsevier: Amsterdam. 1983. xviii + 432 pp. \$110.75. ISBN 044420754.

This is Volume 25 of the "Journal of Chromatography Library" series. The authors recommend the book for highly qualified readers with knowledge of physical chemistry, macromolecular compounds, and chromatography. However, a rigorous understanding of differential equations is also necessary if one is to fully appreciate the text. The book's seven chapters are devoted to general chromatographic theory, specific features of macromolecular separations including data interpretation and methodological problems, other uses for gel permeation chromatography, high-performance gel filtration, thin-layer chromatography of polymers, and one-phase chromatography. This is an excellent overview of many important areas of macromolecular separations. In particular, the discussion of optimization is one of the most thorough to appear in recent years. Unfortunately, the authors attempt to present in each chapter material which would normally require an entire volume. As a result, the origin of many of the mathematical relationships will be a mystery to the less experienced reader. Also, symbols used do not always conform to current recommendations. The discussion of equipment really offers nothing new, using information and figures directly from existing texts. The final chapter attempts to compare field-flow fractionation with gel permeation, which is quite inappropriate, since the two techniques operate most efficiently in different molecular weight ranges. Aside from these relatively minor complaints, the book is a valuable reference for scientists working in the field. As with most texts of this kind, the bibliography is the most useful part, although some of the references may not be readily available to all workers.

Merlin K. L. Bicking, *State University of New York at Buffalo*

Adrenoceptors and Catecholamine Action. Part B. Edited by George Kunos (McGill University). John Wiley & Sons, Inc.: New York. 1983. 327 pp. ISBN 0-471-05725-8.

This book provides a comprehensive treatment of how specific surface receptor sites—adrenoceptors—recognize and bind catecholamines and initiate a tissue response. The individual chapters are written by noted physiologists, pharmacologists, and biochemists and cover the following timely topics: structure-activity relationships of α -adrenoceptor agonists (Robert R. Ruffolo, Jr.); phosphatidylinositol metabolism and α -adrenoceptor mechanisms (James W. Putney, Jr.); release modulating adrenoceptors (E. S. Vizi); adrenergic-cholinergic interactions (William R. Roeske and Henry I. Yamamura); adrenoceptors in skeletal muscle (I. W. Rodger and W. C. Bowman); adrenergic influence on peripheral hormone secretion (James B. Young and Lewis Landsberg); adrenoceptors and central cardiovascular regulation (Henri Schmitt and Michel Laubie); adrenoceptors and the regulation of salivary gland physiology (Bruce J. Baum, Hideki Ito, and George S. Roth); and microscopic localization of adrenoceptors (Jose M. Palacios and James K. Wamsley). The topics covered in these chapters presuppose a basic knowledge of pharmacology of drug-receptor interactions, physiology of the autonomic nervous system, and biochemistry of metabolism and enzymology. This volume is mandatory reading for a researcher studying adrenoceptors or for graduate students participating in a special topics course on drug-receptor interactions or autonomic pharmacology.

Ronald T. Borchardt, *The University of Kansas*

Organic Chemistry. By Stephen J. Weininger (Worcester Polytechnic Institute) and Frank R. Stermitz (Colorado State University). Academic Press, Inc.: Orlando, FL. 1984. xviii + 1121 pp. \$31.00. ISBN 0-12-742350-1.

In selecting an organic text for a full year course, I apply the following criteria: (1) The text should be short enough to complete in 30 weeks of lecture (3 h per week). (2) The text must have problems within the chapters to test the student's grasp of the material, as well as at the end. (3) Stereochemical principles must be presented early and clearly. (4) The use of industrial organic chemistry as examples is important. (5) Diagrams and illustrations must be clear and concise. (6) The early development and continued use of Lewis Octet Theory, Resonance Theory, Acid-Base Theory, and the Periodic Table is essential. Does Weininger and Stermitz's text, "Organic Chemistry", meet these criteria? Yes, and more.

Noteworthy are the half-page insertions (small print) into each chapter of biographical sketches of famous chemists and the historical development of important chemicals and theories. The text is exceptional in its extensive use of chemical equations with the functional groups undergoing change being blocked in pink color. Biochemically important molecules and processes have been incorporated throughout for the interest of biology majors and premeds.

From the beginning, mass and charge balance is emphasized and so is the practical aspects of electronegativity. Spectroscopy is introduced early and developed throughout. Sections on nomenclature are detailed and clear. Mechanistic and synthetic aspects are balanced.

The text is not without deficiencies. The subject of hydrogen bonding deserves considerably more than one short paragraph. Yet, the authors devote a complete section to Transition State Theory and activation parameters—a subject best left to advanced courses. I would have preferred an expanded chapter on carbohydrates, including the classical structure proof of glucose (missing) with deletion of the section on orbital symmetry/energy and the Woodward–Hoffmann rules.

No matter what the students' aspirations, the study of organic chemistry should be an intellectual as well as informative exercise. Weininger and Stermitz's text is an excellent helpmate and I heartily endorse its adoption.

Fred W. Bretlbeil, III, *DePaul University*

Molecular Diffusion and Spectra. By William T. Coffey (Trinity College), Myron Evans (University College of Wales, Aberystwyth), and Paolo Grigolini (University of Pisa). John Wiley & Sons: New York. 1984. xiii + 378 pp. \$49.95. ISBN 0471-87539-2.

In "Molecular Diffusion and Spectra" some models of liquid-state dynamical properties are developed; they are rooted in stochastic and Mori–Zwanzig approaches. The book is a sequel to "Molecular Dynamics", by Evans, Coffey, and Grigolini and discusses developments since 1978.

The first two chapters are concerned with computer simulations of "pilot-project" molecules, such as dichloromethane. Simulation results for correlation function of orientation, velocity, angular velocity, force, torque, etc., are presented for "computer" dichloromethane with the purpose of providing a data base for comparison with experiments and theories.

The remainder of the book discusses theoretical developments. Chapter 3 presents Debye's theory of dipole relaxation and attempts at introducing explicit dipole–dipole coupling, such as Zwanzig's lattice model. Inertial effects and an external potential are introduced in Chapter 4, and the torsional and itinerant oscillator models, which account for the effect of other dipoles, are discussed. In Chapter 6, nonlinear equations of angular motion are discussed, as is required for more than small oscillations of the dipole under study. The manifestations of these and inertial effects in dielectric dispersion and absorption spectra are presented.

Chapter 7 turns to the construction of the nonlinear but Markovian, in contrast to Mori's original non-Markovian but linear, generalized Langevin equation. The former equation can be constructed by eliminating the bath degrees of freedom. The continued-fraction method of analyzing the latter approach is also presented. In Chapter 8 these ideas are applied to an escape over a barrier model (Kramer's model) of a chemical reaction and a model for a noise-induced phase transition. The last chapter stresses the connection between nonlinearity in reduced variable equations of motion and non-gaussian statistical behavior, and the necessity of satisfying both short time (sum rule) constraints and long time constraints if reduced models are to properly mimic simulations.

The book concentrates on presenting the author's research programs and is quite specialized in this regard. It will be of some use to those who are interested in the stochastic model approach to liquid-state problems at an expert's level. Unfortunately, there is such an emphasis on detailed calculations that it is not easy to find the places where the basic ideas are set forth.

Robert I. Cukier, *Michigan State University*

Room Temperature Phosphorimetry for Chemical Analysis. By Tuan Vo-Dinh (Oak Ridge National Laboratory). John Wiley & Sons: New York. 1984. xviii + 304 pp. \$50.00. ISBN 0-471-87884-7.

Interest in the phenomenon of room-temperature phosphorescence (RTP) has mushroomed since its introduction into the arsenal of analytical techniques in the late sixties to early seventies. This book is an

excellent guide to state-of-the-art techniques in RTP and will be of considerable use to anyone interested in luminescence phenomena, both fundamentally and as a practical analytical tool. Vo-Dinh addresses the three most active areas of RTP research, involving solid substrate, micelles, and liquids (sensitized), in a clear, logical fashion. The book admirably fulfills the author's intent of providing a guide to RTP for the prospective user, a reference source for the practicing analyst concerned with organic compounds and a tutorial for graduate students interested in RTP. Each chapter contains many recent references to the literature, which makes the book a valuable resource text. Seven appendices are included at the ends of the appropriate chapters on topics of a more peripheral nature (singlet–triplet coupling interactions, general properties of various types of lasers, solutions of differential equations of quantitative models, etc.).

The emphasis is on practical aspects of RTP, and the text is written for the potential user. The listings of suppliers of instrumentation and components, with addresses, in the instrumentation section are useful. Starting with a historical perspective on the evolution of research on phosphorescence, a description of fundamental photophysical principles follows which provides a reasonable understanding of the processes involved. The essential elements of phosphorescence, specific to room temperature techniques, are described, and the different methods are outlined through detailed discussion of the scientific literature. A section on exactly how to develop an assay, often missing in many monographs, logically links the earlier discussion of basic photophysics to the presentation of applications. A reference library of spectral characteristics of over 200 compounds provides a handy compilation, along with the accompanying discussion of spectral features by compound class, including polyaromatic hydrocarbons, nitrogen heterocyclics, and sulfur heterocyclics. Special considerations in RTP quantitative analysis, using a continuum model and statistical models for inhomogeneous media, are outlined, along with a succinct summary of calibration methods. A chapter is devoted to special measurement techniques for improved analysis which includes several new approaches on the forefront of current research such as multichannel detection and computer-based approaches (simulated synchronous, second derivative, background correction, automated analysis). The last chapter discusses several applications of RTP for study of complex systems in clinical and pharmaceutical chemistry, energy, and environmental areas. Vo-Dinh has done an excellent job of collecting information on RTP from the diverse scientific literature to provide the scientific community with a valuable, comprehensive reference book on RTP.

L. J. Cline Love, *Seton Hall University*

X-ray Crystallography and Drug Action. Edited by A. S. Horn and C. J. De Ranter. The Clarendon Press, Oxford University Press: New York. 1984. xii + 506 pp. \$59.00. ISBN 0-19-855185-1.

This monograph is the product of the ninth course of the International School of Crystallography sponsored by the Centro di Cultura Scientifica Ettore Majorana which was held in Erice, Sicily, in the spring of 1983. Its general theme is "molecular pharmacology—the study of drug action at the receptor level", various aspects of which are addressed in its 27 chapters. Introductory chapters deal with techniques and underlying principles; closing chapters deal with computer-aided drug design. The meat of the book deals with specific pharmacological systems, some from a small molecule (drug) and some from a large molecule (receptor, transport protein, enzyme) perspective. While the emphasis is on how X-ray crystallography has become an important tool in molecular pharmacology, advances in the application of theoretical chemistry (quantum calculations, molecular mechanics) to the field and briefly addressed. And while the shapes of molecular complexes dominate the discussion of interactions, the electronic properties which foster interactions are not neglected. Sadly, the work of the spectroscopists is missed.

This volume is well suited to specialists interested in particular pharmacological systems (e.g., dihydrofolate reductase inhibitors, folic acid agonists, neurotransmitters, antiepileptic drugs, opioids, neuromuscular drugs, α -adrenoceptor agonists, antihistamines, β -lactam antibiotics, steroids) and to general readers interested in molecular approaches to pharmacology, particularly their computational aspects.

The authors and editors of the monograph and organizer of the school are to be commended for issuing a timely and well-produced appraisal of the field.

George DeTitta, *Medical Foundation of Buffalo, Inc.*