Relative Nucleophilicity of Common Nucleophiles toward Sulfinyl Sulfur. Comparison of the Relative Reactivity of Different Nucleophiles toward Sulfinyl vs. Sulfonyl Sulfur [*J. Am. Chem. Soc.*, **98,** 4259 (1976)]. By JOHN L. KICE* and LAWRENCE F. MULLAN, Department of Chemistry, University of Vermont, Burlington, Vermont 05401.

Some text was omitted. On page 4262 in the last paragraph of text *preceding* the Discussion, the line (four lines from the bottom) which ends ". . , it is almost certainly reliable" should be followed by the following text:

"to within a factor of 2, so that it seems certain that the true"

before one has the line beginning "value of k_{OH}^{SO} . . . ".

Exciplex Photophysics. III. Kinetics of Fluorescence Quenching of α-Cyanonaphthalene by Dimethylcyclopentene-1,2 in Hexane [*J. Am. Chem. Soc.*, **98,** 4706 (1976)]. By DESMOND V. O'CONNOR and WILLIAM R. WARE,* The Photochemistry Unit, Department of Chemistry, University of Western Ontario, London, Ontario N6A 5B7, Canada.

The captions for Figures 3–8 were interchanged. The correct captions follow:

Figure 3. Corrected fluorescence spectra of α-cyanonaphthalene + dimethylcyclopentene-1,2 at −22 °C.

Figure 4. Exciplex-monomer fluorescence ratio vs. [dimethylcyclopentene-1,2].

Figure 5. Comparison of experimental and calculated λ_1.

Figure 6. Comparison of experimental and calculated λ_2.

Figure 7. Arrhenius plots of k_3, k_4, k_p. Open circle values were taken from paper 1.

Figure 8. Arrhenius plot of k_3/k_4. The four high-temperature points were taken from paper 1.

Multiple Metal–Carbon Bonds. 5. The Reaction of Niobium and Tantalum Neopentylidene Complexes with the Carbonyl Function [*J. Am. Chem. Soc.*, **98,** 5399 (1976)]. By RICHARD R. SCHROCK, Central Research and Development Department, Experimental Station, E. I. du Pont de Nemours and Company, Wilmington, Delaware 19898.

Page 5400, column 1, line 47. The sentence should read: "... Since **1** is electron deficient (10 valence electrons) ...."

Additions and Corrections [*J. Am. Chem. Soc.*, **98,** 4691 (1976)].

Page 4692, column 1, line 6. The sentence should read: "We are indebted to Dr. Walter K. Duerksen for pointing out this error."

Book Reviews

Foundations of Ultracentrifugal Analysis. By HIROSHI FUJITA (Department of Polymer Science at Osaka University). John Wiley & Sons, New York, N.Y. 1975. xviii + 459 pp. $25.95.

This is Volume 42 in the "Chemical Analysis" series. The theoretical contributions which have played a key role in the development of ultracentrifugal methods are described in a logical and coherent manner. Each method is developed with a thorough, rigorous mathematical treatment; however, the discussion often deals with problems of particular interest to the experimentalist such as the ways and conditions in which a theoretical relation is compared with experimental data to evaluate the parameters contained in it.

Nearly all of the important experimental methods are backed with solutions to their respective differential equations. Methods of obtaining approximate solutions are elucidated along with the working equations derived therefrom which are often employed in sedimentation analyses. The experimentalist will learn what may or may not be done in actual analyses employing the ultracentrifuge.

The fields of biochemistry and molecular biology have both contributed to and benefited from the theoretical and experimental aspects of ultracentrifugation in a major way. The author cites many instances in which macromolecules of biological origin are studied including two chapters on methods of investigating chemically reacting systems: one by sedimentation transport, the other by sedimentation equilibrium. Density gradient sedimentation equilibrium, one of the newest techniques of analytical ultracentrifugation, received adequate coverage to benefit those investigating DNA and other nucleic acids.

This treatise is an effective and timely update of a previously published monograph by the author, "Mathematical Theory of Sedimentation Analysis" (Academic Press, New York, 1962). It retains the thoroughness of this eminently qualified author.

Robert L. Schneider, *Eastman Kodak Company*

The Dynamics of Spectroscopic Transitions. By J. D. MACOMBER (Louisiana State University). John Wiley & Sons, Inc., New York, N.Y. 1976. xxiv + 332 pp. $19.95.

Books on spectroscopy generally fall into two categories: those that present rigorous treatments of the theory behind spectra and those that provide qualitative discussions with the help of collections of spectral data. Surprisingly, this monograph does not fit either category, and is certainly a welcome change from the traditional tutorial approaches to spectroscopy. The most outstanding feature is the extensive use of physical explanations to accompany the development of theoretical expressions that are needed to interpret the experimental observations.

This book is aimed toward the advanced undergraduate, graduate students, and research scientists using spectroscopic techniques. It starts from elementary principles and gradually builds up to advanced topics such as lasers, coherent magnetic resonance, and self-induced transparency. Because of the systematic development of the topics, the reader is not left with a feeling of an incomplete discussion. And, because of the judicious use of a minimum of mathematics, the reader is not overwhelmed by lengthy equations, which may have obscured the significance of the physical concepts involved. Particularly impressive is the frequent use of well-conceived illustrations, most quite original, and this undoubtedly is the key to the overall eloquence of the presentation. One such example is the electron probability density plots as a function of time to illustrate the physical process of radiation of the first Lyman line in hydrogen atom.

As is indicated by the title, this book follows a time-dependent approach rather than the usual static approach of energy levels and arrows. Such an approach does not readily lead to an understanding of the location of spectral lines, but does provide the badly needed insight into the dynamics of the actual interactions. Furthermore, the time-dependent features are necessary to describe the coherent phenomena that have gained much importance and interest in recent years. In this respect, this monograph is valuable to scientists not too familiar with time-dependent effects of radiation. In particular, those in the areas of NMR, EPR, and lasers can obtain an excellent introduction from it.

From a pedagogical point of view, the problems included at the end of each chapter are most helpful. Historical material now and then gives the reader a feel for how things developed, and an occasional interjection of humor keeps the reading easy. It is, however, probably not advisable to learn quantum mechanics and elementary electromagnetic theory using this as the only text. The chapters on these

topics are more review in nature, but do supplement other more formal treatments by showing the physical significance of the mathematics. All things considered, this may be a reasonable text for a spectroscopy course at the beginning graduate level.

In summary, this is an excellent monograph which should be useful to a large number of scientists with widely different interests, and is something that should be on the shelf of everyone in spectroscopy.

Edward S. Yeung, *Iowa State University*

Thermometric Titrations. By J. BARTHEL (University of Regensburg). John Wiley & Sons, Inc., New York, N.Y. 1975. 209 pp. $19.95.

This monograph is Volume 45 in the Chemical Analysis series edited by Elving and Winefordner. The present book consists of eight chapters by the author covering general principles and details of applications together with a ninth chapter on instrumentation by R. Wachter. There is a comprehensive subject index of 8½ pages but no author index. The table of contents is amp detailed and the writing is clear and concise. Diagrams and tables are carefully prepared. References to the literature are grouped at the end of each chapter. They are extensive and appear to be complete through 1973 although one or two 1974 citations are also present.

An indication of the subject content is given by the following topical breakdown of chapters and their respective lengths: (1) thermodynamic and electrochemical principles (23 pp); (2) analysis of titration curves (32 pp); (3) methodology for sensitivity and accuracy (21 pp); (4) acid–base (21 pp); (5) nonaqueous solvents (15 pp); (6) precipitation (14 pp); (7) redox (8 pp); (8) complexation (24 pp); (9) instrumentation (41 pp).

From the preceding comments it should be clear that this book will not only be useful to the practicing analyst but also will serve as a valuable reference source for the experimental chemist in general. It is comparable in both quality and subject matter to the earlier monograph by G. A. Vaughan (Thermometric and Enthalpimetric Titrimetry, Van Nostrand–Reinhold Co., London, 1973). The principal difference between them is the arrangement of topics. The latter monograph divides its 255 pages into only five chapters: (1) Theoretical Aspects, (2) Practical Aspects, (3) Inorganic Reactions, (4) Organic Reactions, and (5) Scope and Applications. Its references are also comprehensive and appear complete through 1971. They are grouped together after the last chapter in contrast to the book here reviewed.

S. T. Zenchelsky, *Rutgers University*

Introduction to Modern Biochemistry. Fourth Edition. By P. KARLSON (University of Marburg). Translated by C. H. Doering (Stanford University). Academic Press, New York, N.Y. 1975. xiii + 545 pp. $15.95.

The primary objective of this book is to present a comprehensible "introduction to biochemistry and a survey of the existing facts and concepts". As such, the text is not an all-inclusive reference work, but rather a teaching book intended to convey the basic principles without excessive detail that may confuse the beginning student. With the scope of modern biochemistry and the rapid advance of this field, the preparation of such a book is a formidable task. The author, however, succeeds reasonably well in achieving his objective: providing a comprehensive and readable survey, while avoiding the excessive oversimplification and overgeneralization of concepts common to such shortened textbooks. The text, which contains 23 chapters, has been extensively revised since publication of the last English edition (1967). A number of chapters have been completely rewritten, and a greater emphasis has been placed on the regulation of metabolism and on the structure and function of membranes. The text is intended for students with some organic chemistry background, and Chapter 1 is a brief review of chemistry concepts. Chapters 2 through 4 cover amino acids, peptides, and proteins, while Chapters 5 and 6 deal with the basic character of enzymes and coenzymes. Nucleic acids and protein biosynthesis and metabolism are surveyed in Chapters 7 and 8. Chapter 9 discusses porphyrins and hemins. Chapters 10 and 11 analyze biological oxidation and the citrate cycle. The major types of acyl and isoprenoid lipids, and biological membranes, are covered in Chapters 12 through 14. Chapter 15 reviews simple sugars and introduces glycolysis, gluconeogenesis, and the pentose phosphate cycle. The chapter on photosynthesis (16) also describes the assimilation of nitrogen. Glycosides, oligo- and polysaccharides, and their metabolism are discussed in Chapter 17. The remaining six chapters are devoted to topochemistry of the cell, regulatory mechanisms, hormones, mineral metabolism, nutrition and vitamins, and the biochemical function of major organs.

The nature of the text imposes certain limitations. Treatment of each topic is lucid, but necessarily brief. Occasionally, the text reads like an encyclopedia, with major entries followed by one or two paragraphs on each subtopic. Biochemical techniques are mentioned in the appropriate chapters, but, except for the section on proteins, this aspect receives little emphasis. The author does an adequate job of arranging and integrating the material, but many instructors may prefer a different order of presentation of concepts. Some chapters could be brought more up to date, but this shortcoming does not detract from their teaching value. The brief bibliographies after each chapter, and notes within the text, provide access to more detailed information. However, more comprehensive bibliographies would be very useful to the student. The book contains numerous clear illustrations that are particularly valuable in a teaching text. Cross-referencing is very good and an excellent subject index is provided. A list of common abbreviations is included in the Appendix.

In general, the text is well written (and translated), is very well illustrated, and should be readily comprehended by students with some background in organic chemistry. The author has done a good job in assembling a vast body of information and has produced a textbook well suited for use in a survey-type biochemistry course.

Rodney Croteau, *Washington State University*

Surface and Colloid Science. Volume 7. Electrokinetic Phenomena. Edited by EGON MATIJEVIC (Clarkson College). Wiley-Interscience, New York, N.Y. 1974. xiv + 356 pp. $24.75.

Survey books in colloid and surface science are badly needed. Many applied research problems, not to mention many basic ones, depend for their solution or understanding on knowledge of the field. Yet all too seldom are students indoctrinated. We are indebted to this series, as well as to a few others, which contribute so greatly to an ever-expanding area of science. Here, a splendid translation (provided by a A. Mistetsky and M. Zimmerman) of the recent work of the Russians S. S. Duklin and B. V. Derjaguin is presented. Derjaguin's contributions are well known and respected in several subfields over a long period of time, but Dukhin is a newly risen star whose publications mainly date from 1960.

There are three chapters. In the first, Dukhin reviews the history of the development of the concepts of the mechanism of electrophoretic phenomena and of the structure of the micelle. The beginnings occurred in the early 1800's. The notions of now classical double layer structures are explained and the problems persisting are indicated.

In the second long chapter, the equilibrium double layer and electrokinetic phenomena are examined in detail. Electrosmosis, electrophoresis, capillary electrical problem, surface conductance and electrical properties of suspensions are some of the phenomena examined in detail. This survey, a collaboration of the two authors, is truly a *tour de force*, for there are 684 references referred to in this chapter alone.

The third chapter by Derjaguin and Dukhin deals with the nonequilibrium double layer and electrokinetic phenomena. The authors have contributed greatly to our understanding of the polarization of the double layer and the determination that can be derived from this study. More will be heard from their interest in these matters.

A. C. Zettlemoyer, *Lehigh University*

Fracture of Brittle Solids. By B. R. LAWN (University of New South Wales) and T. R. WILSHAW (University of Sussex). Cambridge University Press, New York and London. 1975. ix + 204 pp. $22.00 (cloth); $10.95 (paper).

Griffith in his classic 1920 paper developed a thermodynamic theory of failure based on the concept of a total energy balance. By assuming that surface energy is expended to form new fracture surfaces, Griffith's energy balance led to the remarkable discovery that in order to propagate an existing sharp crack a critical far field stress would have to be exceeded. The importance of the discovery was that according to linear elastic analyses sharp cracks have theoretically infinite stress concentration factors and will propagate under any load according to the traditional engineering failure criteria. Yet according to the Griffith criteria the crack is stable until a critical far field stress is exceeded. This concept provided a new basis for understanding ma-

terial failure and explains how and why the theoretical strength of a material is greatly reduced by flaws and defects.

The prime objective of this book is to present an integrated view of brittle fracture theory as it has developed in various disciplines using Griffith's concept as the building block. Contrary to the title, a part of the book addresses near-brittle and nonbrittle materials for which the dissipation is readily computed. It is directed primarily toward the materials scientist rather than the engineer, and emphasis is placed on understanding the basic principles of the Griffith concept rather than on mathematical detail or problem solving.

The book opens with a review of the work of Griffith and his contemporaries. Next, crack nucleation and formation is briefly discussed, citing mostly mechanisms leading to the origin of flaws in different materials. The remaining three-fourths of the book deals with crack propagation from three viewpoints: continuum, microstructural, and atomistic. Topics include linear and nonlinear crack-tip stress fields as well as dynamic and kinetic processes in fracture.

The book is well written and organized. I highly recommend it to the materials scientist who is looking for an understanding of brittle fracture or an introduction into the field of fracture mechanics. However, the book is of little value to the engineer interested in applying the Griffith concept of failure to problems in continuum elasticity.

Richard J. Farris, *University of Massachusetts, Amherst*

Chemical Oceanography. Volumes 3 and 4. Edited by J. P. RILEY and G. SKIRROW. Academic Press, London, 1975. Vol. 3: xviii + 564 pp. $47.00. Vol. 4: xviii + 363 pp. $32.25.

These volumes in the second edition version of "Chemical Oceanography" bring the discussion of the analysis of seawater up to date (to 1973) and also include discussions of topics which have come to importance since the first edition. The topics considered in these volumes are somewhat more specialized than those in Volumes 1 and 2, but very adequately fulfill the editors' intentions to provide an up-to-date, broad coverage of topics in the field.

Volume 3 contains four articles: Deuser, on "Reducing Environments"; Goldberg, on "Marine Pollution"; Burton, on "Radioactive Nuclides"; and Riley, on "Analytical Chemistry". Deuser's article contains an excellent summary of the controls on the development of oxygen deficiency in the open oceans (a situation considered unlikely to occur at all until recently), and also provides a cogent review of the development of and dynamics in anoxic basins. Goldberg's chapter covers most of the important topics in marine pollution, including transport processes and the sources for various types of pollutants. In a field that is changing extremely rapidly, the chapter is already out of date, but does provide a good analysis of older data. Burton's chapter summarizes the data on long-lived nuclides very well, and includes a discussion of the geochronology of deep ocean sediments. Perhaps the best portion of that discussion covers the nuclide data used for estimation of deep-water mixing rates. In terms of its breadth of application, Riley's chapter is the most important in Volume 3. He provides an excellent and critical review of the methodologies available for analysis of all classes of compounds in the sea: major and minor elements, micro-nutrients, and organics. Summary tables are of great help.

Volume 4 also contains four chapters: Whitfield, on "Electroanalytical Chemistry"; McIlhenny, on "Extraction of Economic Inorganic Materials"; Booth, on "Seaweeds in Industry"; and Youngken and Shimizu, on "Marine Drugs". This volume fulfills the editors' desire to discuss various economically important aspects of chemical oceanography in the series. The choice of topics to achieve this end is noteworthy, as it covers a very broad spectrum of topics and applications. I was somewhat puzzled by the inclusion of Whitfield's chapter in this volume, and felt it could have been coupled more advantageously with Riley's chapter on "Analytical Chemistry". Whitfield's chapter includes a brief summary of the principles behind the different types of electrochemical techniques applicable to seawater. He then provides very concise and clearly written discussions of potentiometry, polarography, and stripping techniques, including for each: a summary of basic principles for each technique, a discussion of modern hardware, and an evaluation of results obtained. The summary table at the end of the chapter, which includes methods, precisions, and references, is most useful. McIlhenny's article briefly reviews techniques for fresh-water production from seawater, as well as various techniques for extraction of major salts. Booth's contribution provides a brief account of the major compounds produced from seaweeds, as well as short sections on the chemistry and uses for several compounds. Youngken and Shimizu have organized their chapter around particular classes of compounds. Each section reviews the organisms known to contain various compounds within the class, and considers the most important uses for these compounds. A table at the end of the chapter summarizes, by phyla, the occurrence of most known compounds. This table might have been more useful if brought up to date (it was reproduced from a 1969 publication) and if it had provided a listing of major references.

The latter three articles in Volume 4 cover relatively specialized fields in their infancy. Thus, at first glance, they appear less satisfying than other chapters in the series covering older, better documented topics. These chapters are important, however, in illustrating the "state of the art" and in providing basic information to researchers in the other fields of oceanography.

All of the chapters in Volumes 3 and 4 are well written, and concisely summarize our knowledge in important fields of chemical oceanography up to mid-1973. In addition, each volume has a set of 37 tables in an appendix, which provide data on the most commonly used physical and chemical parameters in seawater. While these volumes likely will not have the general appeal of Volumes 1 and 2, the editors have done an admirable job in summarizing and focusing attention on several important new topics, and have superbly discussed the modern art of chemical analysis in seawater. The volumes represent important contributions to the field and will be of great use to researchers in a wide variety of marine related endeavors.

Conrad D. Gebelein, *University of California, Santa Barbara*

Hydrogen Bonding by C–H Groups. By ROBERT D. GREEN. John Wiley & Sons, Inc., New York, N.Y. 1974. ix + 207 pp. $24.50.

This excellent small book appears carefully prepared, clearly written, well indexed, and extremely well organized. It includes a discussion of a wide variety of physical techniques, and extensive tables to literature sources.

The book is not designed as a textbook, but rather as a reference for the research chemist. It should be of interest to persons interested in the general areas of hydrogen bonding and molecular interactions, whether or not their specific interest lies in C–H hydrogen bonding. Since this subject is not discussed to any extent in standard works on hydrogen bonding, I would recommend this book for college and university libraries.

The author's use of "donor" and "acceptor" are opposite in sense to the way they are used in some other references; however, the use is consistent throughout, and is easily adapted to.

One type of C–H hydrogen bonding that appears to be omitted is that by hydrogens on carbons alpha to a positive nitrogen. Interested readers might like to note work on cholinergic compounds (P. Pauling in "Structural Chemistry and Molecular Biology", A. Rich and N. Davidson, Ed., W. H. Freeman, San Francisco, Calif. 1968, p 555 ff, and references therein) or work on tetramethylammonium ion salts (K. M. Harmon, I. Gennick, and S. L. Madeira, *J. Phys. Chem.*, **78,** 2585 (1974)), which appeared after this book was published.

Kenneth M. Harmon, *Oakland University*

Theoretical Chemistry. Volume I. Quantum Chemistry. Senior Reporter: R. N. DIXON (University of Bristol). The Chemical Society, London. 1974. vii + 162 pp. £6.00

This is the first volume of another series within the Chemical Society's Specialist Periodical Reports. This volume is divided in four reports or chapters: Calculation of Spectroscopic Constants, Direct Minimization Methods in Quantum Chemistry, Valence Bond Theory, and Harmonic and Anharmonic Force Field Calculations.

Chapter 1 considers the calculation of those constants measured in high-resolution gas-phase work for diatomic and polyatomic molecules but emphasizing diatomic molecules. Most of the review refers to ab initio calculations although there is some mention of work with semiempirical wave functions. Rotational, vibrational, spin–orbit, Λ-doubling, spin-splitting, magnetic (only very briefly) and hyperfine interaction constants, and transition probabilities are the constants discussed.

The second chapter includes a discussion of algorithms for search for minima both by derivative methods and nonderivative methods and their implementation. A discussion of direct methods (somewhat longer than that for search methods) is given.

The third report reviews Valence Bond Theory. It describes the construction and manipulation of antisymmetric wave functions. The

application of group theoretical techniques to both permutational and spatial symmetry is given. Results of recent ab initio VB theory applications are reviewed. The computation of VB matrix elements is discussed and extensions of VB theory are indicated.

The fourth (and last) chapter on Harmonic and Anharmonic Force Field Calculations is mainly concerned with the analysis of data on the force field obtained from high-resolution spectroscopy. Following the definition of force constants is a short discussion of the theory and interpretation of diatomic molecule vibration–rotation spectra and then an appropriately more expanded discussion of polyatomic molecules. The polyatomic section discusses the different coordinates (internal, normal, etc.) and their relationships and use in analysis of the force field. Lastly, results for a number of small molecules are discussed.

The reviews in this volume are clear, compact, and convenient providing useful overviews. The first three reviews will be of primary interest to those interested in quantum chemical calculations. Since VB calculations can yield accurate potential surface results, this section may be quite useful to a number of interests. The last review or chapter will be of greatest interest to vibrational spectroscopists.

R. M. Hedges, *Texas A&M University*

The Analysis of Detergents and Detergent Products. By G. F. LONGMAN (Retired). John Wiley & Sons, Inc., New York, N.Y. 1975. 587 pp. $33.00.

This publication will be a valuable aid to the analytical chemist as well as the formulator of cosmetic products. The book has a great variety of information with well-documented references.

An area in need of some amplification is Chapter V, "Separation of Components of Mixed Detergents". This chapter covers ion-exchange and column chromatography. Specific reference is made to the use of an alumina support as a separating agent for column chromatography. We have found that silica gel provides a broader range of separation for the analysis of detergent products. In "breaking down" various products containing surfactants, a broader range of polarities is often encountered. Alumina is not adequate for effecting efficient separations for these product types. Alumina was commonly used with the advent of sulfonates. I believe it will be found that the majority of references today refer to silica gel or magnesium silicates used as solid supports for effecting separation.

The Analytical Department of R&D at Avon will use the information presented by Longman as a reference for analyzing specific ingredients in competitor shampoo formulations. This book will be a valuable adjunct to our existing data and experience in this field.

Richard Kaplan, *Avon Products, Inc.*

Electrochemical Data. Part I: Organic, Organometallic, and Biochemical Substances. Volume A. By LOUIS MEITES and PETR ZUMAN (Clarkson College of Technology). John Wiley & Sons, New York, N.Y. 1974. xi + 727 pp. $35.95.

This is the first of a series of volumes compiling electrochemical data which are expected to appear at about annual intervals. The immensity of the task is hinted at by the limitations placed on this current volume which is restricted to data published from 1960 through 1971 about organic, organometallic, and biochemical molecules (part II will cover inorganic substances) containing less than twelve carbon atoms. Volume B of Part I, the next volume expected, will extend this information to molecules of twelve or more carbon atoms. Subsequent volumes will also extend the time period covered in both directions.

This compilation does not cover data obtained from techniques, such as conductometry and dielectrometry, which do not consider the electrical double layer or electrode reactions. Also excluded are potentiometry, potentiometric and other titrations, and electrography. These exclusions are quite logical and do not detract in the least from the usefulness of this work. The techniques covered are polarography, voltammetry, controlled potential coulometry, and their very many (over 50) extentions and closely related techniques.

An amazing amount of information is listed for over 2000 compounds. Among these data are: solvent, supporting electrolyte, electrodes, technique used, and other pertinent experimental parameters used to obtain the data; course and mechanism of half-reactions including rate and equilibrium constants for associated chemical reactions; characteristic potential, e.g., $E_{1/2}$ for polarography, peak or half-peak potential for voltammetry, etc; response constant, e.g., diffusion current constant for polarography, etc; n value; electrokinetic data; final product; and an estimate of the reliability of the data.

The compounds are listed by empirical formula in the main data table, alphabetically in a supporting table which includes synonyms and trivial names, and by functional groups in another table. Also indices of solvents, techniques, and indicator electrodes employed are given. Hence, a search, for example, of electrochemistry in acetonitrile is easily performed by finding acetonitrile in the index of solvents employed. Complete literature references are provided, but for many purposes enough information is given so that the original works will not have to be consulted.

The arrangement of the data in this work is a marvel of organization. Nevertheless, the user must be prepared to spend a few minutes reading the preface and the introduction to the tables. This is, however, more a delight than a chore.

The extremely small print and wide margins employed in the descriptions to the tables must be criticized.

It is hoped that the appearance of future volumes will be timely.

Stewart Karp, *C. W. Post College of Long Island University*

Modern Pharmacology. Volume 1: A Guide to Molecular Pharmacology–Toxicology. Part I, Edited by R. M. FEATHERSTONE (University of California, San Francisco). Marcel Dekker Inc., New York, N.Y. 1973. xv + 425 pp. $29.50.

This volume is a refreshing departure from the current genre of largely unedited monographic series which seems to be flooding the market these days. It substantially fulfills the intent outlined by the late Dr. Featherstone in his preface. In that it does, it stands as a commendation of the assiduity so typical of Dr. Featherstone in his endeavors.

The book begins the discussion of molecular pharmacology and toxicology quite reasonably with a presentation of membrane phenomena. The first two chapters set the style well by evaluating methods for modeling cell membranes and for studying transport processes. Chapter 3 deals extensively with ultrastructural studies of cellular membrane systems. Unfortunately the authors of Chapter 3 rather overdo in a somewhat redundant fashion the topic of the endoplasmic reticulum at the expense of some valuable contributions of electron microscopic technique to other areas.

An excellent analysis of current methodology relating to the isolation and characterization of pharmacological receptors is presented. Strengths and weaknesses as well as interpretive view points are discussed for each method. This is followed by a well placed perspective on the significance of homologous series studies in SAR.

The treatise on the analgesic receptors unfortunately tends to deviate from the overall style of the book. This chapter lapses into a largely review-style format of SAR studies from which it is difficult to extract much meaning. Some of the more definitive investigations on the nature of the analgesic receptor and method for its study that appeared between 1970 and publication have not been dealt with. The chapters on the *d*-tubocurarine receptor, allosteric effects of drugs, acetylcholinesterase, and enzyme kinetics, on the other hand, seem well integrated and consistent with the stated intent of the book. Overall, the book represents a useful addition to the libraries of graduate students and their educators in the biomedical sciences.

Robert E. Larson, *Oregon State University*

Drug Actions on Cholinergic Systems. By R. W. BRIMBLECOMBE (Smith Kline and French Laboratories Ltd.). University Park Press, Baltimore, Md. 1974. x + 226 pp. $29.50.

In this treatise Dr. Brimblecombe neatly leads one by the hand through a rather comprehensive discussion of cholinergic pharmacology. The historical evolution of research in the area is methodically developed by analysis of the literature up to 1971. The void in review of the brief but fertile period between 1971 and publication causes the text to suffer to some extent. Nevertheless, a rather complete survey of the descriptive research on the effects of drugs on peripheral and central cholinergic sites is provided. The author makes very little attempt to go into the nuances of the molecular pharmacology of cholinergic receptor isolation and identification. This is probably justified in that a number of treatises in the latter vein have recently appeared. The book has particular value for beginning pharmacology graduate students as well as for medical and pharmacy students or others with peripheral interests in the area. It is analytically developed, well referenced, and easily read and understood by almost anyone.

Robert E. Larson, *Oregon State University*

Radiochemistry. Volume 2. Senior Reporter: G. W. A. NEWTON. The Chemical Society, London. 1975. 248 pp. £13.00.

This book represents a good coverage of Nuclear Recoil Chemistry in Gases and Liquids, Recoil Chemistry of Solids, Transactinide Elements, and Radioanalytical Chemistry topics. These topics cover a wide area in nuclear chemistry. Each subject in the book is well balanced and material is treated in a critical manner by the authors. Minor important points usually not discussed in other textbooks are emphasized here. The literature search is as thorough as it can be. The chapter on Radioanalytical Chemistry provides a great potential in terms of its application. This book will be very useful, especially to radiochemists.

J. C. Laul, *Battelle Northwest*

Physical Chemistry. An Advanced Treatise. Edited by H. EYRING, D. HENDERSON, and W. JOST. **Volume VII. Reactions in Condensed Phases.** Edited by H. EYRING (University of Utah). Academic Press, New York, N. Y. 1975 xxii + 794 pp. $58.00.

This volume was preceded by six others entitled: Thermodynamics, Statistical Mechanics, Electronic Structure of Atoms and Molecules, Molecular Properties, Valency, Kinetics of Gas Reactions (in two parts). It is scheduled to be followed by four more: Liquid State (two parts), Electrochemistry (two parts), Solid State, Mathematical Methods (two parts). The chapters and their authors of Volume VII are: Theory of Reaction Rates in Condensed Phases (S. H. Lin, K. P. Li, and H. Eyring); Methods for the Estimation of Rate Parameters of Elementary Processes (S. W. Benson and D. M. Golden); Use of Correlation Diagrams for Interpretation of Organic Reactivity (J. Michl); Perturbation of Reactions by Substituents (E. Grunwald and J. E. Leffler); Mechanisms of Inorganic Reactions of Solution (R. G. Pearson and P. C. Ellgen); Kinetics of Free Radical Reactions (E. S. Huyser); Heterogeneous Catalysis (M. Boudart); Reactions at Surfaces (M. E. Wadsworth); Chemical Annealing Reactions in Solids (A. G. Maddock); Reactions of Solvated Electrons (M. S. Matheson); Isotopes as Probes in Determining Reaction Mechanisms (L. D. Spicer and C. D. Poulter); Nucleation in Liquid Solutions (M. Kahlweit); Radiation Chemistry in Condensed Solutions (A. Mozunder and J. L. Magee). There are also an author and a subject index, and a complete Table of Contents to all volumes in the treatise.

I had not seen any of the earlier volumes, and it was not without some trepidation that I agreed to review this one. However, it turned out to be a pleasant surprise: although the chapters are uniformly written at a high level and use is freely made of mathematical descriptions and developments, almost all of them are easily understandable to laboratory practitioners of the art. None of the authors have described their topics in purely theoretical terms, and throughout this volume one finds the formalisms tested and matched with experimental results.

There is little duplication of material (parts of the Matheson and Mazunder-Magee chapters overlap); on the other hand, I was a bit disappointed by some omissions. There is virtually nothing on very fast reactions; one looks in vain for mention of stopped-flow, flash, jump or matrix isolation techniques. Another sour note is that throughout, there are very few references beyond 1972, which doesn't exactly square with the prefacial remark: "The aim has been to present a broad picture of current developments . . .". Thus, there is no mention of subjacent orbitals, mixed valence complexes, reactions in solids and other topics that have become major areas of new interest in recent years.

However, these caveats are minor ones. This volume is sure to become one of the standard sources of instruction as well as reference for all students and practioners of the art of kinetics of reactions in solution. While the entire Treatise is probably out of range of the pocketbook of most of them, this volume should be high on the kineticist's shopping list.

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Organic Photochemistry. By J. M. COXON (University of Canterbury, N. Z.) and B. HALTON (Victoria University of Wellington, N. Z.). Cambridge University Press, London. 1974. vii + 196 pp. $5.95.

This book is directed at the undergraduate or beginning graduate student seeking a brief introduction to organic photochemistry. The book is clearly written and presents numerous examples, limited mainly to the reactions of olefins, ketones, and enones. No attempt is made to cover photochemical kinetics, photophysical processes, or advanced theories of photochemical reactivity. Thus the serious student of photochemistry is advised to pursue one of the more advanced texts in the field. This book is similar in scope and content to "Molecular Reactions and Photochemistry" by DePuy and Chapman (Prentice-Hall, 1972). Both books present the Woodward-Hoffmann rules for concerted pericyclic reactions. The Coxon and Halton book is more current and contains more references to the photochemical literature.

This book can be recommended as a good introduction to organic photochemistry. Its principal shortcoming is the absence of quantum yield and kinetic data for specific reactions. Complex reactions such as the di-π-methane rearrangement are difficult to fully rationalize without such data. Much of the material can no longer be considered up to date. For example, exciplexes are mentioned only briefly. There are also several errors of interpretation, including the incorrect explanation of solvent effects on the Norrish Type II reaction (p 61) and the inclusion of the Barton pyrrolidine synthesis (p 185), which was retracted in 1965.

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Lasers. A Series of Advances. Edited by A. K. LEVINE (Richmond College) and A. J. DEMARIA (United Techologies Corporation). Marcel Dekker, Inc., New York, N.Y. 1976. x + 329 pp. $29.75

"Lasers" is the fourth volume of a series of critical reviews designed to evaluate the progress made in a rapidly broadening field. It is rare to find such a volume which may be read and understood even by people not acquainted with the most recent literature, and yet is fairly comprehensive and up to date. One of the major values of the present volume is that any second-year graduate student with reasonably basic knowledge of how lasers work will understand a reasonable fraction of the articles. At the same time I am hard pressed to identify important current areas of research or papers which are excluded within each of the topics covered.

The first chapter covers progress in Nd:YAG lasers. An incredibly detailed description of how such lasers work, leading to the current problems involved in improving performance, is combined with a wealth of technical information and critical comments which would be extremely useful to a scientist contemplating the adoption of a Nd:YAG laser in his research.

Chapter 2 examines progress toward development of single frequency lasers, and although somewhat brief still manages to be thorough and informative. Once again considerable pains are taken with a clear but valuable introduction to the topic.

The third chapter involves helium-neon lasers and comprehensively reviews the state of knowledge of collision processes and populating mechanisms, topics which have been vastly enriched through studies of He-Ne lasers.

The last chapter involves optical parametric oscillators and is perhaps one of the clearest descriptions of how such oscillators work. Considerable mathematics are involved, and the author unfortunately at times does not thoroughly explain the physical significance of a derived result. However, this is a difficult, at times subtle topic, and the insights, numerical estimates, and physical explanations provided by the the author would be quite valuable to the novice in this area.

A word should be added about the bibliographies, which are exhaustive, and thus quite valuable as reference sources. Their value to the novice would have been enhanced if titles had been included, or if they had been subdivided by topic.

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Oxidation of Petrochemicals: Chemistry and Technology. By THEODORE DUMAS and WALTER BULANI (University of Western Ontario, Canada). Halsted Press/Wiley, New York, N.Y. 1974. xi + 186 pp. $18.75.

This book provides a mixture of theoretical and applied information on the aspects of the oxidation of petrochemicals. It contains much in the way of reaction mechanisms, rate of formation charts, and schematic diagrams of processes. Reaction temperatures, pressures, times, types of catalysts, and other practical data are given for optimization of processes. The book is divided into five chapters with the first presenting an overview of the subsequent chapters. The other chapters compare detailed accounts of many manufacturing processes with emphasis on economic factors. This book does not pretend to be all inclusive; however, it does list extensive references for further reading in the various areas covered. It is a must for anyone who works in the field of organic oxidation chemistry.

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