

131.5, 130.8, 130.6, 128.7, 128.3, 127.9, 126.8, 126.6, 126.3, 105.7, 105.2, 93.2, 93.0, 90.9, 89.3.

Dynamics of Micellized Radical Pairs. Measurement of Micellar Exit Rates of Benzylic Radicals by Time-Resolved Flash CIDNP

and Optical Spectroscopy [*J. Am. Chem. Soc.* **1983**, *105*, 6347–6349]. NICHOLAS J. TURRO,* MATTHEW B. ZIMM, and IAN R. GOULD

Page 6348, column 2, first paragraph, line 4: the extrapolated values for k_{obsd} should read $(2.4 \pm 0.4) \times 10^5$ rather than $(2.4 \pm 0.4) \times 10^6$.

Book Reviews*

Macromolecular Syntheses. Volume 8. Edited by Eli M. Pearce (Polytechnic Institute of New York). John Wiley & Sons, New York. 1982. ix + 112 pp. \$32.50.

This volume maintains the same high quality of previous volumes of the series. It has lucid, detailed experimental procedures and reaction schemes, accompanied by copious cautionary notes, and contains syntheses covering a wide breadth of polymerization mechanisms and types, including both classical and novel examples of step-growth, condensation, and chain-growth addition. There are examples of anionic living polymerization and cyclopolymerizations, and solution polycondensation and interfacial polymerization techniques are described. The preparation of block, alternating, and graft copolymers using both free radical and anionic initiators, poly(imides), poly(amideimides), phosphazines, poly(L-lactide), and several polymer derivatives are presented. An interesting and useful procedure is the preparation of macroreticular polystyrene beads. This timely addition to the series can be highly recommended to anyone interested in polymer synthesis.

Richard D. Gilbert, *North Carolina State University*

Raman Spectroscopy in Biology: Principles and Applications. By Anthony T. Tu. John Wiley and Sons, New York. 1982. xvi + 448 pp. \$65.00.

This book reviews and illustrates applications of Raman spectroscopy in numerous areas of biological investigation. Included are reviews of Raman studies of proteins, nucleic acids, lipids, carbohydrates, visual pigments, iron-sulfur proteins, and heme-proteins. These reviews are organized in separate chapters and clearly illustrate the biological information available from Raman spectral measurements. Each area has an introductory section which clearly describes the molecular vibrations which are studied and describes the sensitivity of the vibrations to environment and molecular structure and conformation. The various empirical relationships which have been used to quantitate the molecular structure dependence of Raman frequencies and intensities are also described.

This book will serve as a valuable introduction to biological Raman studies for the novice and can be used by the practicing Raman spectroscopist as a review of the recent results in a diverse series of biological systems. A nice feature of this book is the brief introductory section included in each chapter which clearly describes the biological problems under study. Chapters 1 and 2, which serve as the introduction to Raman theory and instrumentation, utilize a pictorial approach which is quite effective in describing the Raman polarizability tensor.

A weakness of the book is that it does not treat Raman fundamentals and theory in any depth and only rarely critically assesses the structural conclusions which derive from the Raman studies. A book which covers the biological aspects of Raman spectroscopy so well should have placed more stress on the fundamentals so the reader would have a better understanding of the information available from Raman scattering as well as its limitations.

Sanford A. Asher, *University of Pittsburgh*

Molecular Light Scattering and Optical Activity. By Lawrence D. Barron (University of Glasgow). Cambridge University Press, New York. 1983. xv + 408 pp. \$69.50.

This book provides a unified theoretical treatment of processes originating in asymmetric response of bulk samples to left and right circularly polarized light; it covers not only natural optical rotation, circular dichroism, the Faraday effect, and magnetic circular dichroism but also Rayleigh and Raman optical activity (natural or induced by external electric or magnetic fields) and infrared vibrational optical activity.

The theory is formulated directly from a molecular light scattering

model, by considering a light beam of arbitrary azimuth, ellipticity, and degree of polarization incident upon a lamina of the molecular medium, deriving expressions for the infinitesimal changes in intensity and polarization of the beam in terms of molecular response tensors, and then integrating over a finite path. A strong feature of this approach is the common framework provided for the discussion of different processes; for example, in the section on polarization phenomena in Rayleigh and Raman scattered light, the expressions given for the Stokes parameters of the scattered wave can be used to "derive explicit expressions, in terms of dynamic molecular property tensors, for the intensity and polarization of light scattered into any direction from an incident beam of arbitrary polarization by a gaseous, liquid, or solid medium, which can be transparent or absorbing, oriented or isotropic, and also optically active". The expressions are then specialized to particular cases of interest. In several cases (e.g., for natural optical rotation and circular dichroism) a complementary theoretical treatment based on calculation of the induced polarization and magnetization of the medium is also presented. A second strong feature of the book is the emphasis on symmetry arguments, beginning in the first chapter with a short section on spatial symmetry and optical activity and continuing with a 90-page chapter devoted primarily to parity, time reversal, and the behavior of molecular property tensors under these operations. The latter chapter also includes a discussion of the irreducible representations of the permutation group of n objects (ligands) and requirements for qualitative completeness of chirality functions.

The book is well organized and very well written. The first chapter provides a survey of different optical activity phenomena, starting with Arago's 1811 observation of colors in sunlight passed along the optic axis of a quartz crystal placed between crossed polarizers, and running through the observation of electric Rayleigh optical activity in gaseous methyl chloride (Buckingham and Shatwell, 1980) and magnetic-field induced infrared circular dichroism (Keiderling, 1981). In the second chapter, the necessary background material from electrodynamics, classical optics, and molecular quantum mechanics is presented; this chapter treats Maxwell's equations, static and dynamic multipole fields, the characterization of polarized light, the Hamiltonian for a molecule in an external field, perturbation theory for molecular polarizability tensors $\alpha_{\alpha\beta}$, electric-dipole magnetic-dipole polarizabilities $G_{\alpha\beta}$, and dipole-quadrupole polarizabilities $A_{\alpha,\beta\gamma}$, Placzek's theory, and the Herzberg-Teller approximation. In the third chapter, the explicit general expressions for the polarization and intensity of light scattered by a collection of molecules are derived; this development is followed by the chapter on symmetry operations and property tensors. The last four chapters are then devoted to specific applications of the general theory to natural electronic optical activity, magnetic electronic optical activity, natural vibrational optical activity, and magnetic Raman optical activity. Chapter 5 includes a discussion of static and dynamic coupling models of optical activity, with a section on exciton coupling, and the inherently chiral chromophore model. As stated in the preface, the illustrations (e.g., in Chapter 5, sections on the carbonyl chromophore and the quadrant and octant rules, the Co^{3+} chromophore, and hexahelicene) are used primarily to "illuminate the theory rather than to give an exhaustive explanation of the optical activity of any particular system".

Consistent with the author's description of the book as a "personal view of the theory of optical activity and related polarized light scattering effects", there are certain limitations in the scope of the work. For a discussion of experimental apparatus and of the experimental challenges encountered in obtaining the spectra, the reader must turn to the references provided. The Kerr effect falls naturally within the theoretical framework developed and it is included in the discussion; but circular polarization of luminescence is treated only briefly. Correlation functions are not used in the analysis.

*Unsigned book reviews are by the Book Review Editor.

Barron's perspective nonetheless holds considerable interest. Recent advances extending optical activity measurements into the vibrational spectrum with both infrared and Raman techniques make the appearance of this book particularly timely. These methods show promise for providing interesting new stereochemical information, particularly from Raman studies of low-frequency (50–600 cm^{-1}) spectra, which carry information about deformation and torsion modes involving large regions of chiral molecular skeletons. Barron, an author of the first confirmed report of natural Raman circular intensity difference spectra (for 1-phenylethylamine; Barron, Bogaard, and Buckingham, 1973) and the first report of magnetic-field induced vibrational Raman optical activity (in ferrocyclochromic c; Barron, 1975), is in an excellent position to survey the topic.

Although theoretical in content, the book will interest both experimentalists and theoreticians. As indicated, sufficient introductory material is included to make the book suitable for independent study by a graduate student in physical chemistry, or for use as a text in a special topics course on optical activity.

Katharine L. C. Hunt, *Michigan State University*

Biological Methods of Prospecting for Minerals. By R. R. Brooks (Massey University). John Wiley and Sons, Inc., New York. 1983. xiv + 3222 pp. \$42.95.

This is an important book for both applied and theoretical workers involved in the increasingly interdisciplinary search for economic mineral deposits. It is important because of its breadth in identifying and describing the many interrelationships between traditional disciplines, rather than for its detailed treatment of any one of these disciplines. The author has met his stated aim: "... to attempt to bridge the gap between the various disciplines involved in biological methods of prospecting for minerals".

The book replaces the author's 1972 work, "Geobotany and Biogeochemistry in Mineral Exploration", published by Harper and Row. Greater attention to quantitative methods, inclusion of material on aerial sampling and remote sensing, and increased literature coverage (966 ref.) are strengths of the new book. Yet, these areas are illustrative of its limitations. The chapter on statistical methods provides 27 pages of case analyses identifying methods which have been used by different researchers, but does not provide a complete description of any of them. Treatment of non-parametric methods is sketchy and could lead a reader to underestimate the power and utility of such methods, especially where sample size is small. This chapter should not be used in place of one of the many excellent books on inferential statistics. In similar fashion, the chapters on aerial methods (10 pages) and remote sensing (17 pages) provide superficial coverage for two groups of methods of great promise. Those already familiar with such methods will find nothing new in this book, but those unfamiliar with such methods will find these chapters a useful window into several increasingly important possibilities.

The bibliography, with its extensive coverage of Russian and Finno-scandinavian literature, provides valuable access to work not widely known in the United States. It is unfortunate that the extensive literature on vegetation-site relationships for assessing vegetation productivity has been largely ignored.

C. E. Olson, Jr., *University of Michigan*

Heterocyclic Chemistry. Volume 3. A Specialist Periodical Report. Edited by H. Suschitzky and O. Meth-Cohn (University of Salford). The Royal Society of Chemistry, London. 1982. xix + 387 pp. £74.00.

"Heterocyclic Chemistry", Volume 3, with the same Senior Reporters as for Volumes 1 and 2, is as immaculately produced as we have come to expect of titles in the RSC-SPR series. The literature abstracted between July 1980 and June 1981 is reviewed. This volume is a little slimmer than its predecessors (441 and 522 pages, respectively) mainly because it does not have an author index. However, slightly more references are cited. The omission of an author index, in the interests of economy no doubt, is somewhat ameliorated by an extensive table of contents, and the maintenance of the chapter arrangement used in the previous volumes.

The chapter titles—reporters (pages, references) are: 1. Three-membered Ring Systems—T. J. Mason (48, 255); 2. Four-membered Ring Systems—T. V. Lee (13, 91); 3. Five-membered Ring Systems—G. V. Boyd, J. de Mendoza, J. Elguero, and S. Gronowitz (173, 800); 4. Six-membered Ring Systems—S. D. Carter, G. W. H. Cheeseman, and G. P. Ellis (82, 214); 5. Seven-membered Ring Systems—J. T. Sharp (26, 143); 6. Eight-membered and Larger Ring Systems—G. M. Brooke (22, 108); 7. Bridged Systems—J. R. Malpass (20, 162).

This work provides an extensive, but not comprehensive, survey of the literature in a style that will be familiar to readers of Volumes 1 and 2. It is copiously illustrated with structures and reaction schemes. These allow the reader to assimilate a large amount of information with the

least effort. The SPR series, "Heterocyclic Chemistry", offers the best secondary source of current information on heterocyclic chemistry. It affords practicing heterocyclic chemists with an excellent review of salient work on new areas of rapidly growing importance outside their immediate research field. Indeed there is something in Volume 3 for all organic chemists; for instance, many examples of the application of heterocycles in synthetic methodology are given. Teachers of organic chemistry will find the work an invaluable resource for keeping up to date. A copy should be available in all research libraries; but librarians will say "What about the cost?" You may answer, "It is coming down!" This reviewer understands that the RSC intends to produce Volume 5 from camera-ready typescript, which will result in a great saving in production time and cost. It is hoped that this step will guarantee the success of this excellent series for years to come.

E. F. V. Scriven, *Reilly Tar & Chemical Corp.*

Molecular Collision Dynamics. Edited by J. M. Bowman (Illinois Institute of Technology). Springer-Verlag, New York. 1983. xii + 158 pp. \$19.00.

This monograph is written by five authors in the area of theoretical molecular collision dynamics. The text is one in the series "Topics in Current Physics" by Springer-Verlag and it should be useful to chemists as well as physicists interested in the theory of gas-phase molecular collisions. Each of the authors is expert in the subject area of his own chapter, and collectively they provide theoretical backgrounds for a broad range of techniques used in describing atom-molecule scattering.

The introduction to the book by J. M. Bowman (5 pages, 34 references) previews topics covered in the four main chapters and points to a common purpose that ties the various chapters together. The chapter by D. Secrest (17 pages) presents a discussion of inelastic vibrational and rotational quantum collisions. This chapter outlines the various computational treatments used to examine collisional energy transfer and emphasizes the coupled-states quantum approach to describe rotational and vibrational transitions in atom-molecule interactions. Quasiclassical trajectory methods used for the computation of state-to-state energy-transfer cross sections in collisions of polyatomic molecules are given in the chapter by G. C. Schatz (35 pages). He illustrates how the various approaches which describe the bound states of polyatomic molecules can be used in trajectory calculations to obtain inelastic cross sections. The chapter by R. Schinke and J. M. Bowman (52 pages) is concerned with the theoretical aspects of rotational rainbow structure found in atom-diatom molecule differential cross sections. Experiments in which these sharp features have been observed are documented and theoretical models are developed which provide insight into these processes. The final chapter is by M. Baer (37 pages), who discusses the quantum mechanics of electronic transitions in atom-molecule interactions. He delves into the quantum theoretical approaches used to describe curve crossing phenomena and chemical reactions in the case of collinear collisions.

The material discussed in this book and the references given are up to date. This monograph should provide graduate students and researchers with an efficient way to become familiar with the current theoretical approaches used to describe molecular collision processes.

T. F. Moran, *Georgia Institute of Technology*

Advances in Infrared and Raman Spectroscopy. Volume 9. Edited by R. J. H. Clark and R. E. Hester. Heyden and Son Ltd., London. 1982. XV + 384 pp. \$112.00.

The present volume maintains the high standards of production and content established in previous volumes in the series. The book contains reviews covering five widely different experimental techniques, none of which involves conventional infrared or Raman spectroscopy. The editors are to be congratulated on their choice of topics and authors for this volume.

The first chapter, by G. H. Atkinson, is entitled Time-resolved Raman Spectroscopy (TR^2S). This technique, together with time-resolved resonance Raman spectroscopy (TR^3S), depends on recording Raman scattering rapidly. They are described in some detail. Many examples are given of the observation of transient species in solution, electronically excited states populated by pulsed radiolysis or pulsed laser excitation, and intermediates generated chemically or photochemically.

Three recent applications of FT-IR (Fourier transform infrared) spectroscopy to the study of powdered solid samples are described by P. R. Griffiths and M. P. Fuller in the second chapter. The methods involve measurement of the diffuse reflectance infrared Fourier transform (DRIFT) spectrum, the photoacoustic spectrum (PAS), and the emission spectrum of the powder. These techniques all give very low signal intensity at the detector and hence FT-IR is necessary to obtain an adequate signal-to-noise ratio.

The chapter starts with a discussion of the Kubelka and Munk theory of diffuse reflectance and a review of experimental techniques. The

combination of HPLC with DRIFT spectroscopy promises to be a powerful method for characterizing components of mixtures of non-volatile materials. The theory and instrumentation of PAS are outlined and some advantages of the method over diffuse reflectance are discussed. Infrared emission spectroscopy is only briefly mentioned. Applications of DRIFT and PAS to problems in pharmaceutical and forensic analysis, polymer analysis, surface chemistry, and coal chemistry are reviewed.

Chapter 3 by P. Esherick and A. Owyong is entitled High Resolution Stimulated Raman Spectroscopy. The authors describe experiments in which Raman spectra of gases at low pressures have been recorded with resolution as high as 0.002 cm^{-1} . Stimulated Raman spectroscopy (SRS) includes both stimulated Raman gain and inverse Raman spectroscopy. The latter was first reported in 1964 by Jones and Stoicheff, but it is only with the recent development of stable, narrow line width lasers that SRS has been applied to high-resolution gas-phase studies.

The experiments require pump and probe lasers, sophisticated optics and electronics, and a great deal of expertise. The effective scan range in a single experiment is of the order of 1 cm^{-1} . However, the spectral range from 0 cm^{-1} to above 4000 cm^{-1} can be covered. Full use of the instrumental resolution can only be realized in gases at pressures below 5 torr. Thus sensitivity problems limit the applications of the technique at these low pressures. On the other hand, SRS studies of gases in free expansion jets have given promising results. These studies are reviewed and the potential for using SRS to study short-lived species in molecular beams is also demonstrated.

Chapter 4, by R. P. Cooney, M. R. Mahoney, and A. J. McQuillan, is entitled Raman Spectro-electrochemistry. It is mainly concerned with the remarkable surface enhancement of Raman scattering (SERS) observed when certain molecules (e.g., pyridine) are adsorbed on metal electrode surfaces (usually silver). Other Raman electrochemical studies are reviewed in this chapter and non-electrochemical SERS studies are included, since these must be considered in any theoretical explanation of the effect.

A detailed review is given of experimental factors involved in the SERS phenomenon, and a summary of current theories of SERS is included. The authors make a strong case for their own belief that adsorption on surface carbon overlayers is associated with SERS for pyridine on silver electrodes. A comparison of the various theories with experimental evidence is made and it is demonstrated by a series of questions and comments that none of the current theories can account for all experimental observations.

Appended to this chapter is a glossary of surface chemical and electrochemical terms. This feature is very helpful and similar appendices would have made useful additions to other chapters in this volume.

Since electronic Raman spectroscopy (ERS) depends on low-energy electronic transitions (of the same order of magnitude as vibrational transitions), the number of systems exhibiting the effect is very limited. The final chapter, by R. J. H. Clark and T. J. Dines, reviews the theory of the electronic Raman effect and published work on ERS of transition metal and lanthanide ions in solids, transition metal hexahalide complexes, and metallocenes.

This volume provides excellent state-of-the-art reviews of areas of Raman and infrared spectroscopy in which further developments and applications are expected.

H. F. Shurvell, *Queen's University*

Dynamics of the Excited State. Advances in Chemical Physics. Volume 50. Edited by K. P. Lawley (University of Edinburgh). John Wiley and Sons, New York. 1982. vi + 667 pp. \$83.00.

This well-established series is dedicated to several aims, including serving as a "personalized learning text for beginners". While few of the present articles are at the beginning level, they generally succeed in reviewing current specialized topics in chemical physics. Rapid recent advances in laser technology permit extensive and intimate probing of excited states and, accordingly, much of this volume is devoted to laser preparation and sampling of excited states. Excited state dynamics is covered rather well, though there is no adequate treatment of molecular collision processes leading to excited states. Several of the reviews, notably Leone's on Photofragment Dynamics and Clyne and McDermid's on electronically excited states, are devoted to topics of great current interest; these authors succeed very well both in reviewing recent work and in conveying an overall impression of what is being done, how, and why. Hirst's article on excited state potential surfaces again shows just how few reliable calculations there are; it seems quite complete, though very recent work by several groups on combustion processes is missing. Quack gives a clear review of work on statistical mechanics and rate equations for highly excited vibrational states. Breckenridge and Umemoto clearly discuss collisional quenching of metal atoms. Some of the other articles seem overly specialized for this sort of review text, and there are a few points ("If fluence were the critical interaction, then one should

obtain larger net yields for longer pulses as compared with shorter pulses of equal fluence") which some readers (and this reviewer) may not fathom. Overall, the volume should be of real help to those trying to keep up with the very rapid advances in this field. (Both subject and author indices are quite incomplete, unfortunate for a review volume, and some of the proofreading errors, including undefined terms and symbols, are harmful.)

Mark A. Ratner, *Northwestern University*

Enzyme Histochemistry. By Z. Lojda, R. Gossrau, and T. H. Schiebler (Charles University [Prague] and University of Würzburg). Springer-Verlag, Heidelberg and New York. 1979. ix + 339 pp. \$41.80.

This paperback book is an English translation of a previously published German edition. Enzyme histochemistry involves morphological techniques by which the product of an enzymatic reaction is visualized in situ thereby locating the enzyme in the system of interest. In addition insight into molecular processes of single cells and their constituents may be gained by enzyme histochemical methods.

The purpose of this book is to provide a critical collection of histochemical methods to localize enzymes in such a way that non-experts will be able to evaluate a particular method. The authors checked all the cited methods personally and decided some needed modification and others should not be recommended for use. The book is organized around the following major subjects: General Considerations; Principles of Reactions in Histochemical Methods for the Detection of Enzymes; Artifacts and Control Reactions; Correlation of Histochemical and Biochemical Findings; Preparation of Tissues; Detection Methods (for hydrolases, transferases, lysases, and oxidoreductases); Short discussion of buffers used in histochemistry. One of the helpful points of this book is that important principles, techniques, and other details are emphasized by shaded type. Consequently, a quick glance at a particular section will allow the salient points to be abstracted easily.

For those chemists and biochemists who either use enzyme histochemical methods or, more likely, need to evaluate the results of other workers, this book serves as an excellent resource.

D. Allan Butterfield, *University of Kentucky*

Kirk-Othmer Encyclopedia of Chemical Technology. Third Edition. Volumes 21 and 22. Edited by M. Grayson and D. Eckroth. John Wiley and Sons, New York. 1983. Volume 21: xxvi + 968 pp. \$180.00. Volume 22: xxvi + 1002 pp. \$180.00.

These most recent additions to this important work cover from Silver to Sulfolanones and Sulfones, and from Sulfonation to Thorium Compounds, respectively. In between come reviews on such subjects as Soap, Solar Energy, Solvents, Steroids, Styrene plastics, and Sugar in Volume 21, and Sulfur, Surfactants, Tantalum, Tar, Tellurium, Terpenoids, Thiazole dyes, and Thermodynamics in Volume 22, plus many other subjects. Although the reviews are industrially oriented, they nevertheless contain a large amount of fundamental information, in many cases not so readily accessible elsewhere. The review on thiols, for example, contains tables of physical properties for a wide variety of representative mercaptans, a good review of reactions, a discussion of synthesis in the laboratory and in industry, as well as sections on toxicology, handling, and uses, and has a bibliography of 173 references. The volumes of this work are a good place to turn to for a preliminary literature survey as well as general orientation, and frequently provide the answers one seeks without recourse to other literature.

A subject index of 230 pages for Volumes 17-20, covering Peroxides to Silk, is now available.

Encyclopedia of the Alkaloids. Volume 4. By John S. Glasby (ICI Organics Division Ltd.). Plenum Press, New York. 1983. 391 pp. \$65.00.

Since publication of the first two volumes of this work in 1975 and the supplementary third volume in 1977, over 1000 new alkaloids and naturally occurring derivatives have been isolated and investigated. The present volume, covering the literature from October 1976 through December 1981, has an average of three alphabetically arranged entries per page in the 370 pages of text. For each alkaloid, the empirical formula, structure, melting point, and source are given if reported. Reference is also made to the structural class, method of structure elucidation, and occasionally to such properties as optical rotation and ultraviolet absorption. In addition, the volume contains a useful 20-page formula-name index.

Unfortunately, the work is marred by a number of incorrect or incomplete structures, e.g., on pages 11, 107, 109, 182, 183, 221, and 264. Moreover, some structures are duplicated and presented under two different names without explanation or comment, e.g., on pages 48-49 = 182-183, 51 = 132, 111 = 128, and 264 = 367. For certain compounds in which the position numbers are part of the name, skeletal numbering

would often have been helpful.

As an aid to information retrieval, a work of this type obviously has considerable value, but at a cost of nearly \$0.17 per page it should have been prepared and edited much more carefully and critically.

Albert W. Burgstahler, *The University of Kansas*

The Biochemical Basis of Neuropharmacology. Fourth Edition. By J. R. Cooper (Ph.D., Yale University), F. E. Bloom (M.D., The Salk Institute), and R. H. Roth (Yale University). Oxford University Press, New York. 1982. x + 367 pp. \$21.95; \$11.95 (paperback).

A unique property of nerve cells that distinguishes them from other cells in the body is that they possess specialized intercellular connections with other nerve cells as well as the peripheral tissues which they innervate. These are chemical connections which may be mediated by a number of neurotransmitters including, for example, acetylcholine, catecholamines, serotonin, amino acids, and neuroactive peptides. The biochemistry, physiology, and pharmacology of neurotransmission is fundamental information required for understanding brain function and is the main focus of this book.

The book's organization represents a clear and informative description of neurotransmission and neuropharmacology. It is a valuable resource for anyone interested in these areas of neuroscience but it would be especially useful for beginning students of this subject. An overall picture of the central nervous system was provided in the first four chapters and includes descriptions of the cytology of nerve cells, metabolism in the central nervous system, neurotransmitter receptors, and drugs affecting transmission. These discussions are presented in a clear, concise, and up-to-date fashion. In subsequent chapters the biosynthesis and metabolism of individual neurotransmitters are first described followed by a discussion of the molecular events which take place during neurotransmission. The actions of drugs which affect these events are very nicely presented and pathological conditions related to each transmitter system are discussed.

The chapters on receptors and cyclic nucleotides, which represent two of the most rapidly growing areas of research, are superb. An attractive feature of the book is that pertinent references have been included following each chapter. These are extremely valuable for those who wish to pursue certain aspects of the material in depth. This is definitely an excellent and most useful introductory textbook on neuropharmacology. It not only provides the knowledge basic to understanding this subject but also reveals the current trends of research in brain biochemistry.

Jean Chen Shih, *Institute for Toxicology, School of Pharmacy, University of Southern California*

Flash Photolysis and Pulse Radiolysis Contributions to the Chemistry of Biology and Medicine. By R. V. Bensasson, E. J. Land, and T. G. Truscott. Pergamon Press, New York. 1983. vii + 236 pp. \$50.00.

This book presents a good overview of the contributions of flash photolysis and pulse radiolysis of the biological sciences. It is quite readable and reasonably well referenced, therefore providing a good starting point for someone not conversant with this literature. This volume focuses entirely on the results and conclusions derived from time-resolved spectroscopic studies. The time scales of the chemical and physical processes discussed range from hundreds to microseconds to a few picoseconds. Accordingly, many different types of reaction intermediates are considered. There is, however, an almost complete lack of any discussion of the experimental techniques involved. These techniques have been reviewed extensively elsewhere and such an omission in a book of this sort is not a serious deficiency.

The introduction gives a brief discussion and comparison of different excited states and transient species produced by radiolytic and photolytic excitation and a brief discussion of the production and quenching mechanisms of these species.

The following chapter deals with tetrapyrrolic pigments, in which chlorophylls, hemoglobin, and myoglobin are given particular emphasis. This is followed by chapters on polymers, proteins and their components, nucleic acids and their components, and electron transport chain components. This book concludes with somewhat more specialized chapters on photosynthesis, vision, and drugs.

D. F. Kelley, *University of California at Los Angeles*

Biotechnology. Volume 3. Edited by H. Dellweg (Institut für Gärungsgewerbe und Biotechnologie, Berlin). Verlag Chemie, Weinheim. 1983. xix + 642 pp. \$309.00.

This series is specifically directed to biochemists, microbiologists, bioengineers, chemical engineers, and food and pharmaceutical chemists. The first section is devoted to biomass and methods of production from carbohydrates, higher *n*-alkanes, methane, methanol, and phototrophic microalgae. The chapter on edible mushrooms is of particular interest as it brings together a large amount of information on the growth of a

large variety of mushrooms, including truffles. Ethanol fermentation and the production of acetic, lactic, citric, and gluconic acids are included in the section on microbial products. Extracellular polysaccharides, amino acids, organic acids of minor importance, and microbial emulsifiers and de-emulsifiers are also included. Three chapters are devoted to microorganisms for special purposes such as starter cultures for milk and meat products and microbial soil amelioration. The final section is devoted to energy from renewable resources and deals with the economics of the production of ethanol from a variety of agricultural products and the anaerobic digestion of manures and other wastes to produce methane. An index and references are included.

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

Reactivity and Structure Concepts in Organic Chemistry. Volume 14. Silicon Reagents for Organic Synthesis. By W. P. Weber (University of Southern California). Series edited by K. Hafner, J.-M. Lehn, C. W. Rees, P. v. R. Schleyer, B. M. Trost, and R. Zahradnik. Springer-Verlag, Berlin and New York. 1983. xviii + 430 pp. \$100.00.

The author attempts to review the use of silicon reagents in organic synthesis from the viewpoint of an organic chemist. In Chapter 1, the author presents a concise summary of the chemistry of silicon. Chapters 2 and 3 center on the synthesis and chemistry of trimethylsilyl cyanide and the trimethylsilyl halides (iodide and bromide). [The use of these silylation reagents for the protection of O-H, N-H, and S-H bonds as silyl ethers is not covered in detail due to the vast number of examples of the use of silylation for this purpose.]

The use of organosilyl azides (Chapter 4) and silyl nitronates (Chapter 5) in organic synthesis is covered in detail. The preparation of these reagents is also discussed. The Peterson reaction (Silyl-Wittig) and α -silyl organometallic reactions are discussed in Chapter 6.

The rich chemistry of vinylsilanes (Chapter 7), arylsilanes (Chapter 8), and silylacetylenes (Chapter 9) is extensively covered. Numerous electrophilic reactions are discussed as well as the preparation of these versatile reagents. The use of tetraalkylsilanes (and the alkylpentafluorosilicates) and allylic silanes is highlighted in Chapters 10 and 11, respectively.

The role of silyl enol ethers in organic syntheses is covered in great detail. The electrophilic reactions of these agents are surveyed in Chapter 12. Oxidation reactions are considered in Chapter 13. Cyclopropanation reactions (Chapter 14) and cycloaddition reactions (Chapter 15) of the silyl enol ethers are also discussed. The preparation of the silyl enol ethers is covered in Chapter 16.

Chapter 17 is entitled Ionic Hydrogenations and centers on the use of organosilanes as hydride donors. Chapter 18 discusses the reduction of polar multiple bonds (ketones, imines, etc.) via hydrosilylation. The role of organosilyl halides in dissolving metal reductions is the subject of Chapter 19 whereas a series of miscellaneous reductions utilizing organosilicon reagents are summarized in Chapter 20.

Silicon-sulfur compounds and their use in organic syntheses are discussed in Chapter 21 and silicon-phosphorus reagents are discussed in Chapter 22. Silyl oxidizing agents are briefly summarized in Chapter 23. Trimethylsilyl-substituted alkoxide and amide bases are covered in Chapter 24. The final chapter focuses on the ready formation of silicon-fluorine bonds and the use of this reaction in organic synthesis for the generation of anions and for elimination reactions.

The book is well written and quite comprehensive (over 1700 articles are referenced). I would recommend it to anyone interested in the role of silicon reagents in organic chemistry.

George W. Kabalka, *University of Tennessee*

Theilheimer's Synthetic Methods of Organic Chemistry. Edited by A. F. Finch. S. Karger, Basel and New York. 1983. xxiv + 576 pp. \$319.75.

The newest volume in this classic series contains information from papers published in 1981 and the first half of 1982. It continues the well-tested policies of previous volumes, emphasizing functional group transformations and reactions of rings. The arrangement of material with prominent structural formulas and equations displayed for quick recognition to aid the scanning reader has been so successful that it has been adopted in many other works.

The value of a book of this sort is that it brings to the readers' attention valuable information that is often buried within primary publications in a way that makes it difficult to find. Here it is brought to light in an organized form. For those who prefer not to scan, the usual extremely thorough subject index (130 pp!) is provided, as well as a formula index. The enjoyable and informative little essay, titled Trends in Synthetic Organic Chemistry 1983, brings a selection of new results to the fore.

This is, of course, a library reference work, and it will be only the rare (and affluent) chemist who buys it for personal use. However, the organic chemist whose library does not have this work is poorly served.