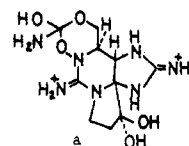


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trogen will change this character, which explains the faster deuterium exchange and the slightly pronounced IR carbonyl absorption of **1** in comparison with saxitoxin. Also, the fairly large chemical shift differences of the ^{13}C 's in **1** and **2** are attributable to the anisotropic effect on the N-O function.

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- fully heteroatomic substitution would be expected to show a signal at $\sim 100\ \text{ppm}^6$ which is not the case.
- (19) The amount of **12** was too minute for further characterization.

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Book Reviews

Porphyrins and Metalloporphyrins. Edited by KEVIN M. SMITH (University of Liverpool). Elsevier Scientific Publishing Co., Amsterdam. 1975. xxiii + 910 pp. \$114.50.

This ambitious volume is a timely and much enlarged revision of Falk's 1964 work of the same name. There are 19 well-written review articles organized around eight general themes surveying the literature through 1974. The first section written by the editor is a succinct outline of the structure and synthesis of porphyrin compounds and serves well as an introduction to the book and the topic. An important biological perspective is supplied by chapters on the biosynthesis (A. R. Battersby and E. McDonald) and oxidative cleavage of heme (P. O'Carra). The coordination chemistry of porphyrins is dealt with in considerable detail (J. W. Buchler; P. Hambright). The chapter on metalloporphyrins of unusual structure (M. Tsutsui and G. A. Taylor) has many large and strikingly informative molecular structures. The section on molecular structure has chapters reviewing X-ray crystallographic results (J. L. Hoard), mass spectroscopy (K. M. Smith), NMR (H. Scheer and J. J. Katz), and vibrational spectra (H. Bürger) related to porphyrins and metalloporphyrins. The section on electronic structure contains chapters on Mössbauer spectroscopy (P. Hambright and A. J. Bearden) and ESR spectroscopy. Taken together the two sections on porphyrin and metalloporphyrin spectroscopy are a valuable reference. Several chapters on the chemical reactivity of porphyrins deal with reversible and electrochemical reactions, reactions of the molecular periphery (J.-H. Fuhrhop), photochemistry (F. R. Hopf and D. G. Whitten), and photosynthesis (D. Mauzerall and F. T. Hong). The short chapter on structural analogs (A. W. Johnson) is very informative.

Anyone actively pursuing porphyrin chemistry will find the most useful chapter in the book to be the last, "Laboratory Methods" (J.-H. Fuhrhop and K. M. Smith), for here are over 100 pages of preparative methodology pertinent to these compounds with many hints and comments which are likely to be found nowhere else.

The only difficulty with the book is the lack of an author index and a rather modest subject index. Although these shortcomings are compensated in part by a highly detailed Table of Contents, it is difficult to find a particular result quickly.

This is a very valuable and readable book for the general reader as well as the specialist. This reviewer found "Porphyrins and Metalloporphyrins" to be highly popular with his colleagues and students. Indeed, it has often been difficult to locate as a result. When retrieved for the purposes of this review, its dust jacket was tattered, its spine was well creased, and it fell open to several particularly topical sections.

John T. Groves, *The University of Michigan*

Terpenoids and Steroids. Volume 7. J. R. HANSON, Senior Reporter. The Chemical Society, London. 1977. x + 349 pp. 25.00 (\$50.00).

This volume, the latest Specialist Periodical Report on terpenoids and steroids, covers the literature from September 1975 to August 1976. The subject matter is divided into chapters on monoterpenoids, sesquiterpenoids, diterpenoids, triterpenoids, carotenoids, and polyterpenoids, biosynthesis, steroid properties and reactions with a new section on steroid partial synthesis, and steroid total synthesis, each chapter being the province of a separate reporter or reporter team. The arrangement makes it reasonably simple to locate references to a particular topic. Nevertheless, the absence of a subject index is somewhat of a handicap as, for example, when this reviewer wished to locate references to sesterpenoids, a topic apparently not covered in this volume. Chemists interested in terpene and steroid alkaloids must look elsewhere for full coverage of the literature.

Some of the reporters have approached their task more critically than others; this reviewer particularly enjoyed R. B. Yeats' refreshingly discriminating review of the current monoterpene literature. Volume 7 seems relatively free of mistakes, unlike Volume 6 which suffered from an abundance of typographical errors. Its acquisition is, of course, a must for every group engaged in terpene or steroid chemistry.

Werner Herz, *Florida State University*

Physical Methods of Chemistry. Part VI: Supplement and Cumulative Index. Edited by ARNOLD WEISSBERGER and BRYANT W. ROSSITER (Eastman Kodak Company). John Wiley & Sons, Inc., New York, N.Y. 1977. xi + 323 pp. \$22.95.

The work under review is the sixth and last part of the volume on physical methods. It is intended for those who are familiar but not experienced in the techniques of sedimentation, viscometry, and/or mass spectrometry and who are considering the use of these techniques.

The first chapter, "Determination with the Ultracentrifuge" by G. Kegeles, D. A. Yphantis, and R. L. Schneider, is a 61-page introduction to the theory and application of sedimentation techniques. It covers sedimentation velocity and diffusion, band (zonal) sedimentation, transient state determinations, and sedimentation equilibrium, including density gradient techniques. Starting with a brief introduction covering Stokes law and the Svedberg equation, this work emphasizes the mathematical basis of each application. The most useful feature of the work is its discussion of when or when not to employ a particular technique. It is replete with warnings for the novice. In particular, the Johnston-Ogston effect, wherein one macromolecular solute perturbs the sedimentation coefficient of a second, is very well explained, as is the problem of chemically reacting solutes. The review function of the chapter (178 references) has been integrated unobtrusively into a smooth, readable text. The only deficiency found was an absence of pictures illustrating Schlieren and interference optics, and of graphs (save one) showing examples of the radial dependence of concentration or mass of solute. The chapter is well-suited to those familiar, but inexperienced, with ultracentrifugation, before attempting their first sedimentation experiments with organic or biopolymers.

The second chapter, "Determination of Viscosity" by J. F. Johnson, J. R. Martin, and R. S. Porter, is a 65-page introduction to the measurement of viscosity and its applications. The chapter emphasizes the theoretical basis for the various types of viscometers (capillary, cone and plate, concentric cylinder). Illustrations of these, brief descriptions of several other viscometers, and a number of charts and graphs are particularly of interest. The authors consider the effects of various factors on the viscosity of liquids such as temperature, pressure, and shear. Two pages deal with the viscosity of gases, followed by a discussion of dynamic viscometry. Two classes of dynamic measurements are considered; the first, vibration techniques, is developed mathematically in terms of complex variables whereas, the second, relaxation techniques, is discussed more descriptively. Finally, some space is devoted to the viscosity of dilute solutions of macromolecules. Again a mathematical approach is taken to the measurement and the determination of molecular weight and dimensions. Brief sections on elongation velocity and stress measurements are also included.

The third chapter, "Principles of Mass Spectrometric Instrumentation and Techniques" by J. Roboz and E. Chait, is an excellent 90-page introduction to mass spectrometers and their use. It covers the various types of mass analyzers, ion sources and their applications, detection and recording systems, vacuum considerations, and sample introduction systems. Some space is devoted to analytical methods, the basis for selection of a particular technique, and computerized systems. The references are extensive (183 plus a general bibliography consisting of 7 entries) and well integrated into the text. The chapter reads smoothly, and, though no discussion of spectral interpretation is included, it is recommended to the person interested in using mass spectrometry as an analytical tool.

Margaret Johnson, Frederick Johnson, *The University of Michigan*

Organometallic Chemistry Reviews; Annual Surveys: Silicon-Tin-Lead. Volume 4. Edited by D. SEYFERTH (MIT) and R. B. KING (University of Georgia). Elsevier Scientific Publishing Co., Amsterdam—New York. 1977. i + 547 pp. \$54.70.

This useful survey covers the literature for 1975 on the organometallic chemistry of group 4B elements, with the unfortunate exception of germanium, in six chapters. Four are devoted to silicon: Synthesis and Reactivity (J. Y. Corey), Reaction Mechanisms (O. W. Steward), Bonding and Structure (Paul Ronald Jones), and Application to Organic Synthesis (S. S. Washburne). The remaining chapters are devoted to tin (P. G. Harrison) and to lead (J. Wolters). The coverage of the literature appears to be thorough; the presentation is generally clear, concise, and, at certain points, constructively critical.

The extensive literature of organosilicon chemistry has necessitated a breakdown into four chapters, and the mode of dissection is a useful one, for it represents, as an alternative to other possible modes, the

way in which chemists approach their discipline. A striking aspect of the silicon coverage is the rapidly expanding use of organosilicon compounds as reagents in organic synthesis. This subject occupies a quarter of the material on silicon, a fact which will undoubtedly broaden interest in the volume. Other organometallic derivatives of this group are also being recognized as potential synthetic intermediates.

Most chapters are essentially free of typographical errors, but some which do appear force the reader to stop in order to identify the error. The book has an author index, but no subject index.

Henry G. Kuivila, *State University of New York at Albany*

Stereo-differentiating Reactions: the Nature of Asymmetric Reactions. By YOSHIHARU IZUMI and AKIRA TAI (Institute for Protein Research, Osaka, Japan). Academic Press, New York, N.Y. 1977. x + 334 pp. \$29.50.

The molecules of nature are chiral. Thus, their laboratory and industrial syntheses require reactions which conserve and extend the chirality present in precursor molecules. However, the imagination and skill of experimental organic chemists in finding such reactions have far outstripped the ability of theoretical organic chemists to consolidate and interpret their results.

Izumi and Tai have attempted to redress this balance in a book which undertakes three basic tasks: (1) to present a thorough and rigorous treatment of the physical and mathematical foundations of isomerism and optical activity; (2) to utilize their concept of "stereo-differentiation" to classify known asymmetric reactions and to thereby provide a means for their logical study; and (3) to describe some of the experimental means available for the study of such reactions.

Izumi and Tai criticize—to this reviewer justly so—the rather vague manner in which the terms stereospecific, stereoselective, and asymmetric reactions have been used. As an alternative they propose that reactions which are capable of producing an enantiomeric excess of a chiral compound be termed stereo-differentiating reactions. This is not merely a change in names; it is a change in emphasis. Rather than concentrating on chirality in the product alone, they focus on the effect of chirality in the substrate, reagent, reaction medium, or catalyst on the stereochemical course of the reaction. They distinguish enantio-differentiating reactions (in which the substrate molecule need not be chiral) and diastereo-differentiating reactions (in which substrate chirality controls the stereochemistry). They subdivide these (following current stereochemical classifications) into reactions which differentiate prochiral faces (as in aldehydes or unsymmetrical ketones), prochiral tetrahedral groups (such as CH_2XY center), or chiral centers. Using this categorization, they review in considerable detail a great number of example reactions.

Following this review they present the few models available for predicting the direction of such reactions. They also discuss polymerizations, enzyme reactions, and absolute asymmetric reactions (which chiral physical forces such as polarized light provide the differentiation). The final empirical section ably discusses the methods, problems, and prospects for the investigation of stereo-differentiating reactions. The experience of these two pioneering investigators makes this an especially rich section.

In addition to these empirical sections there are a complete and authoritative treatment of stereochemical nomenclature, a thorough mathematical treatment of chemical symmetry and group theory (including Plova's method for isomer enumeration), and the theory of optical activity. Good author and subject indexes are provided.

However, there is a consistent problem with the book: the authors, editor, translator, and publisher seem to have failed to consider the reader and his interest. A synthetic organic colleague who received this book for review gave it to me because wading through the group theory in Chapter 2 was too tedious. After wading through it myself, I discovered that most of it was irrelevant to what followed. The book is much more readable if pages 16–56 are skipped until after chapter 8; a glossary of symbols would also have helped. Furthermore, the book is liberally sprinkled with translational and typographical errors. While most such errors are minor, others affect the substance of the presentation.

This book has a great deal to offer the practicing organic chemist. It does not treat particular reactions in as much detail as Morrison and Mosher's "Asymmetric Organic Reactions", but the precision of Izumi and Tai's categories, the care with which they interpret the differentiating ability of reagents and reactions, and their carefully

selected references (alas, mostly pre-1974) make this book unique. They have also brought together in one source theoretical material on isomerism and on optical activity which is available separately elsewhere. Research libraries will certainly want to add this book to their collection, and graduate students and researchers will find that it rewards serious study.

Jack E. Leonard, *Texas A&M University*

Formation of Synthetic Fibers. By ZBIGNIEW K. WALCZAK. Gordon and Breach, New York, N.Y. 1977. xii + 338 pp. \$35.00.

The book is presented in the form of an interdisciplinary approach to introduce the technology of synthetic fiber formation and processing from the polymer melt. For the reader who is involved in research and development in the manufacturing of synthetic fibers, the book is a good source of information in the field. Its enormous number of references (843) should satisfy both scientists and engineers in fiber science and technology. This is especially true for those who have a special interest in European references—literature or patent.

The book contains technical data, schematic graphs, and mathematical equations for practical applications. However, detailed illustrations in the book are for polyolefin and poly(ethylene terephthalate) (PET) fibers. Other synthetic fibers such as nylon and cellulose are only briefly mentioned.

The author uses a question-and-answer format to present the subject. This type of writing is certainly instructive to nonspecialists interested in the structure, rheology, and properties of high polymers, especially those used in synthetic fiber production.

P. Y. Liu, *General Electric Company*

Problems in Physical Chemistry. By I. M. RITCHIE (University of Western Australia), R. A. CRAIG and P. J. THISTLETHWAITE (University of Melbourne). John Wiley & Sons, Inc., Sydney-New York. 1975. vi + 170 pp. \$7.95.

This relatively inexpensive paperback book has been prepared to give students practice in applying the principles of physical chemistry to a wide variety of problems. It is an unusual collection in several ways. The first part (110 problems) consists of standard exercises grouped into eleven chapters such as Acid-Base Equilibria, Kinetics, etc. Answers, but not solutions, are given for all of these. The second part (87 problems) is much more challenging and illustrates the application of the same principles to more realistic situations which a practicing chemist might encounter. The area of chemistry is not identified, information from more than one area is frequently required, judicious approximations must be made in some cases, and the reader will have to consult some handbook of numerical data for most of the problems. Detailed solutions are provided for all of the problems in this part.

It is a pleasure to recommend this book to faculty and students alike, as a very useful supplement to any of the standard textbooks used in undergraduate physical chemistry.

J. E. Mark, *University of Cincinnati*

Chemistry and Physics of One-Dimensional Metals. Edited by HEIMO J. KELLER (Heidelberg University). Plenum Press, New York, N.Y. 1977. viii + 426 pp. \$45.00.

This volume contains lectures presented at a NATO Advanced Study Institute held at Bolzano, Italy, in August 1976. It comprises 17 articles written by a total of 25 authors. Notwithstanding its title, this book deals with compounds and processes in the real tri-dimensional world, with emphasis on unidirectional properties of anisotropic organic, inorganic, and polymer compounds. Among these, a great deal of attention is given to organic charge-transfer salts such as TFF-TCNQ, to metal-chain inorganic compounds, and to the $(\text{SN})_x$ polymer. Presentations may be found on the basic physics of all these materials, chemical and physical aspects of the organic metallic state, charge density waves, electronic phase transitions and collective states, superconductivity, chemical aspects of synthesis and conformation of anisotropic compounds, and comparison of columnar organic and inorganic solids. Increased activity in this field has been motivated by the detection of high electrical conductivity in TFF-TCNQ, and by hopes of developing high-temperature superconductors. This volume points out the strong interdisciplinary nature of the field and the beginnings made in the very complex chemistry and physics involved. The recurring theme of high-temperature superconductivity in anisotropic compounds has, however, been very controversial. Readers

should also consult other sources to acquaint themselves with the presently accepted experimental situation on superconductivity of these compounds.

David A. Micha, *University of Florida*

Gmelin Handbuch der anorganischen Chemie. Ergänzungsband zur achte Auflage. Molybdän. System-Number 53. Teil B1. Verbindungen mit Edelgasen, Wasserstoff und Sauerstoff. Wasserfreie Antimon-, Wismut- und Alkalimolybdate. Teil B2. Verbindungen von Molybdänoxiden mit Oxiden anderer Metalle. Edited by KURT SWARS. Springer Verlag, New York, N.Y. Part B1: 1975. viii + 241 pp. \$224.00. Part B2: 1976. xxxvi + 320 pp. \$300.10.

These two volumes relate to the same general aspects of molybdenum chemistry and thus are logically reviewed together.

Part B1 is the first volume of a supplementary series dealing with the compounds of molybdenum. Absorption and desorption phenomena involving the noble gases and hydrogen with elemental molybdenum are described (20 pp). A subsequent chapter (143 pp) deals with molybdenum and oxygen. The system Mo-O is first described in terms of adsorption, desorption, oxidation of the metal, and the phase diagram, followed by thermodynamic data for the formation of δ -solid solution, MoO_2 and solutions of O_2 therein, MoO_3 , and other oxides. The molecular structures, formation and preparation, physical properties, and electrochemical and chemical properties of the stoichiometric oxides MoO_2 and MoO_3 are covered in great detail, with the inclusion of a wealth of physical data. The intermediate oxides Mo_4O_{11} , $\text{Mo}_{17}\text{O}_{47}$, Mo_5O_{14} , Mo_8O_{23} , Mo_9O_{26} , and $\text{Mo}_{18}\text{O}_{52}$ are described, particularly in terms of syntheses and crystal structures. After a brief treatment of antimony and bismuth molybdates (12 pp), the remainder of the volume is devoted to the alkali metal (IA) molybdates. A detailed chapter on molybdenum oxide bronzes (22 pp) is followed by descriptions of the syntheses and properties of all known anhydrous alkali metal and ammonium molybdates(VI) and isopolymolybdates(VI). Syntheses, physical properties (especially molecular structures), and chemical characteristics are emphasized. Coverage is comprehensive, with literature surveys complete through mid-1974.

Part B2 extends the discussion of the anhydrous reaction products of molybdenum oxides with metal oxides, begun in Part B1, to the elements of periodic groups IIA, IIIA, IIIB, IVA, IVB, VB, and Cr. Reaction products termed molybdates are those for which the crystal lattices are, or probably are, composed of molybdenum-oxygen groups. A few compounds, particularly of the group IIA elements, contain Mo(IV) or Mo(V), but most are Mo(VI) derivatives. The volume is concerned primarily with solid-state characteristics and is an unparalleled summation of physical properties and constants, phase diagrams, and crystal-structure data. The longest chapter (113 pp) is devoted to the anhydrous molybdates of Sc, Y, La, and the lanthanides, in particular because of the ferroelastic and ferroelectric properties of metastable $\text{Ln}_2^{III}(\text{MoO}_4)_3$ ($\text{Ln} = \text{Pr to Ho}$) and the laser characteristics of $\text{M}^I \text{Ln}^{III}(\text{MoO}_4)_2$ doped with a second Ln^{III} ion. Double molybdates(VI) with IA, IIA, IIB, and IIIA elements are also covered in this chapter and related compounds of the type $\text{Ln}_2\text{Ge-MoO}_8$ ($\text{Ln} = \text{Pr, Nd, Gd, Tb, Dy, Ho, Er, Yb}$) in a later chapter. Mixed oxide systems involving the IVB and VB metals and chromium are described in detail in somewhat shorter chapters. The usual Gmelin order of presentation is followed throughout. Literature coverage is complete through 1974 and is supplemented by many more recent references.

Therald Moeller, *Arizona State University*

Gmelin Handbuch der anorganischen Chemie. Achte Auflage. Blei. System-Number 47. Teilen A2a and A2c. Vorkommen. Edited by ISA KUBACH and WOLFGANG TÖPPER. Springer Verlag, New York, N.Y. Part A2a: 1976. vi + 280 pp. \$255.70. Part A2c: 1975. iv + 185 pp. \$175.20.

These two volumes deal with the cosmochemistry and geochemistry of lead and are directly related to each other. Although published earlier, Part A2c follows A2a in presentation of material.

Part A2a covers, in sequence, the cosmochemistry and the geochemistry (through isotope geochemistry, geochemical character, and abundance) of lead; Part A2c concludes the geochemistry of lead. Within each volume, every topic is discussed in great detail, with the usual Gmelin thoroughness in literature coverage and citations. Although each volume is self-contained, the two are sufficiently inter-

dependent that both are necessary for complete coverage of the occurrence of this element. Literature closing dates: A2a, end of 1975; A2c, 1974.

Part A2a presents the cosmochemistry of lead via abundance in the solar system; distribution, type of occurrence, and isotopic composition in meteorites; present in impactites and tektites; and distribution, abundance, and origin on the moon. After a brief treatment of the geochemical cycle of lead, an extensive and detailed section on crystal chemistry deals with the coordination of lead in minerals, types of occurrence in minerals, the lead contents of minerals (in great detail), lead isotopes in minerals (in particular, galena), and lead as a trace element in minerals. Part A2a concludes with discussions on isotope geochemistry as related to lead evolution and general geochemical character. The latter topic is continued in Part A2c in terms of detailed treatments of lead in sedimentary and metaphoric cycles. Part A2c concludes with extensive discussions of lead in the hydrosphere and atmosphere.

These volumes will be most useful to geologists, mineralogists, and geochemists. Because of their very specific nature, they will be less useful to inorganic chemists in general except as excellent references for specific items.

Therald Moeller, *Arizona State University*

Gmelin Handbuch der anorganischen Chemie. Ergänzungswerk zur achten Auflage. Band 16. Nickel-Organische Verbindungen. Teil 1. Edited by MARIANNE DRÖSSMAR-WOLF, ULRICH KRÜERKE, and ADOLPH SLAWISCH. Springer Verlag, New York, N.Y. 1975. vi + 419 pp. \$305.40.

Part 2, which follows this volume in coverage of the organo-nickel compounds, was published in 1974. An inclusive index for the two volumes will appear subsequently.

Part 1 deals only with mononuclear compounds within which organic ligands are bonded to the nickel atom through one or two carbon atoms. Compounds containing only CN, CNO, or CNS as C-containing donors are not included. Contrary to the usual Gmelin order of presentation, compounds are arranged first in terms of the types of organic ligands, with the number of carbon atoms participating in the bonding of the ligand being significant. The symbolism mL_n and D_n is used, in which L represents a neutral ligand (olefin, C_6H_6) or one of the $C_5H_5^-$ type, D represents a ligand such as NH_3 or PR_3 , m is the number of Ni-C bonds, u the number of electrons donated, and n the number of ligands in the compound. Where different ligands are present in a single compound, that compound is listed under the ligand that forms the largest number of Ni-C bonds (i.e., largest m). Wherever possible, formulas are so written that bonding of the ligands to Ni atoms and bonding of groups within the ligand are clearly evident. In general, only those compounds that have been isolated or defined by data are included. Reactions not carried out in the absence of air and under nitrogen or argon are clearly identified.

Within this framework, the discussion includes alkane; alkene; alkyne; aromatic; carborane; carbonyl; mixed carbonyl with phosphine, substituted phosphine, phosphite; isonitrile; carbene; cyanoethylene; and a few other complexes. The volume is rich in infrared, nuclear magnetic resonance, and crystallographic data. Literature citations are very extensive, with coverage complete through 1973 and in many cases through mid-1975. The exacting Gmelin standards of organization, completeness, clarity of presentation, and attractiveness of publication are fulfilled.

No worker interested in the coordination chemistry of nickel can afford to be without access to this volume. To others, the volume represents a useful reference source.

Therald Moeller, *Arizona State University*

Analytical Applications of NMR. By D. E. LEYDEN and R. H. COX (University of Georgia). Wiley-Interscience, New York, N.Y. 1977. ix + 456 pp. \$27.50.

The title of this book might be slightly misleading as only two chapters (6 and 7) out of a total of seven deal with quantitative analysis. The book is clearly of interest to more than just those people who wish to use NMR as a tool to decide how much of one substance is contained in a sample. The authors have stated in their preface that they wish to allow each chapter to stand alone; e.g., it should not be necessary to read Chapter 2 (Theory) in order to appreciate Chapter 3 (Experimental Instrumental Aspects). To a certain extent this has been accomplished; e.g., Chapter 5 (C-13 NMR) can be appreciated

without complete appreciation of the topics of Chapter 2. But, as in any technical subject, it is clear that more can be gained when reading a section on applications if the section on theory has already received attention.

The general approach is descriptive, rather than physical or mathematical. To be sure the usual equations (Bloch equations, etc.) are presented in the theoretical chapters, but the approach is to describe the form and net effect of changes in parameters of such equations rather than to derive or algebraically interrelate the equations. Thus the "stand-alone" property of each chapter can be achieved. The authors' research fields support this approach; one author (R.C.H.) is an organic chemist who has published on NMR applications and on the use of lanthanide shift reagents. The other author (D.E.L.) is an analytical chemist who has published on X-ray analysis and on NMR studies of protonated nitrogen compounds. Thus the approach to writing this monograph has been from the standpoint of applications in a variety of research settings.

Chapter 5, C-13 NMR, has been developed with the aid of a large number of tables of chemical shifts of organic compounds; this is most appropriate. Chapter 7, on examples of analytical investigations, includes many interesting components. The first part outlines the way in which NMR can be used to study organic functional groups; this is organized group by groups (hydroxyl, carbonyl, olefinic, etc.). Next an industrial applications section is evolved describing use of NMR in each of polymers, pesticides, pharmaceuticals, coatings, foods, etc. Finally, basic research problems that have been solved by NMR are outlined; these include the areas of biological molecules and kinetics.

In summary, this book should be very valuable. It contains information valuable in all types of NMR-related research. The book also could be used as the text for an NMR course taught in any way other than that of a course for physical chemists. The C-13 chapter is timely and up to date. The chapter on interpretation (Chapter 4) is thorough, but succinct. Each chapter is supplemented by a large number of references that are up to date. This monograph should be a valuable resource to many chemists.

Terence C. Morrill, *Rochester Institute of Technology*

Macromolecular Syntheses. Volume 6. Edited by JAMES E. MULVANEY (University of Arizona). John Wiley & Sons, Inc., New York, N.Y. 1977. xii + 116 pp. \$19.50.

This volume is a continuation of the excellent series devoted to the description of synthetic methods for the preparation of polymers and monomers. The format is in the manner of "Organic Syntheses" with the inclusion of ample procedural notes, alternate syntheses, and a check of procedure by other polymer chemists. Usually physical properties such as solubility, molecular weight, GPC chromatogram, TGA, and special data are given for the polymers.

The syntheses reported in this volume include a wide range of procedures. Condensation (polyester), ring opening (5-nylon), coordination (polyethylene), and free-radical (monodisperse polystyrene latices) polymerizations are described as well as less common or exotic methods (γ -ray initiation, polymerization through the carbonyl group, Diels-Alder polymerization). Methods for preparing polymers with special pendent groups (thiol, amino) or end groups (carboxyl) are also given.

Robert A. Patsiga, *Indiana University of Pennsylvania*

Isotopic Studies of Heterogeneous Catalysis. By ATSUMU OZAKI (Tokyo Institute of Technology). Kodanasha/Academic Press, Tokyo—New York. 1977. viii + 239 pp. \$25.00.

The book is a succinct and authoritative account on the use of isotopes in heterogeneous catalysis. Two areas in which the use of isotopes has played an important role, namely, (a) determination of catalytic pathways and (b) elucidation of rates of individual reaction steps, are treated in much detail. For (a), the book reviews all the major reactions of hydrogenation, isomerization, disproportionation, and oxidation of hydrocarbons, of hydrogenation of nitrogen and nitrogen compounds, of dehydration and dehydrogenation of hydroxyl compounds, and of olefin disproportionation, Fischer-Tropsch and methanol synthesis. For (b), information on the rate of elementary steps of hydrogen, oxygen, and nitrogen transfer is summarized in view of determining the rate of the individual transfer step in important reactions: olefin hydrogenation, acetylene hydrogenation, and NH_3 synthesis.

There are additional chapters on generalized kinetics of isotope exchange reactions, and isotope effects as kinetic tools, and a brief summary on analytical methods for isotopic compounds.

Several books are available on the use of isotopes in reaction kinetics and several monographs have been written on the application to heterogeneous catalysis. However, the combination of topics chosen, which reflects the long-standing research interests of the author, who has played a dominant role over the last 20 years in the application of isotopes to heterogeneous catalysis, makes this book novel and unique. A strength of the book is an excellent and complete bibliography updated to 1976. Unfortunately, the book contains what seems to be an excessive share of misprints. Otherwise the production of the book is excellent, the inclusion of numerous diagrams being especially valuable. The book represents a welcome and important addition to the literature in heterogeneous catalysis. It is particularly useful to research workers in the field of heterogeneous catalysis and in related areas as well as those working to know the essential basic principles of isotope applications to catalytic kinetics.

G. Parravano, *University of Michigan*

Dielectric Spectroscopy of Polymers. By PETER HEDVIG (Research Institute for Plastics, Budapest, Hungary). Halsted Press (John Wiley & Sons), New York, N.Y. 1977. 432 pp.

This is a clearly written, copiously illustrated treatment of applications of dielectric spectroscopy to synthetic polymers in the solid state. Results from other techniques, especially differential scanning calorimetry and mechanical response measurements, are integrated in the text. General principles are interwoven with references to experimental results on real systems; the data (more than 150 figures) have not been allowed to obscure the principles being illustrated.

The author begins with a concise survey of the theory of dielectric spectroscopy and of the structures and structural transitions to be found in solid polymers. Both formal and phenomenological models are presented; the author makes clear his preference for the latter. The chapter on techniques gives detailed descriptions (down to block diagrams of electronics) of equipment useful in different frequency ranges. The utility of measurements made with a programmed series of different temperatures is emphasized. A chapter on pure polymers opens the survey of experimental results, data consistently being referred back to the phenomenological models already alluded to. The study of systems of industrial importance is not neglected. Further chapters treat the effects of plasticizers and fillers, observations on crosslinking processes (vulcanization, curing), and studies of aging in different circumstances. The text closes with figures giving relaxation times (as a function of temperature) characteristic of structural and conformational transitions of some 31 polymers. References (more than 500, of which perhaps one-fourth are to Russian and Eastern European sources) are completed through 1972.

George D. J. Phillips, *University of Michigan—Ann Arbor*

Inorganic Chemistry. By K. F. PURCELL (Kansas State University) and J. C. KOTZ (State University of New York, College at Oneonta). W. B. Saunders Co., Philadelphia, Pa. 1977. xix + 1116 pp. \$25.95.

This is a text appropriate for an advanced undergraduate or graduate level course in inorganic chemistry. It provides a good coverage of modern inorganic chemistry with an order of topics which provides a logical progression from basics to specific areas of current interest. Topics are covered in considerable depth with the discussion of the relative energies of s and d orbitals being exceptionally good (including graphs of surface probabilities). Still, the reader is not overburdened with mathematical treatments. Extensive footnoting and referencing takes this volume beyond the realm of a text and into that of a reference. Study questions are dispersed throughout the chapters.

The theoretical and descriptive aspects of inorganic chemistry are not artificially separated but are well integrated with many specific examples of the chemistry of the elements being used to illustrate theoretical concepts. Even some pictures of reaction apparatus and various types of spectra are included which gives the volume an experimental flavor. Since the chemistry of the various elements are not covered in individual chapters, the compound index proves to be very useful.

This being a modern inorganic text, over 40% of the volume is devoted to coordination chemistry and organometallics. A chapter on biochemical applications is included. Every instructor of inorganic

chemistry courses will want this text on his/her shelf. However, it has come on the market at a time when there are several other recent, good texts available which will provide considerable competition.

Richard A. Potts, *University of Michigan—Dearborn*

Adverse Effects of Environmental Chemicals and Psychotropic Drugs. Volume 2. Neurophysiological and Behavioural Tests. Edited by M. HORVATH in collaboration with E. FRANTIK (Institute of Hygiene and Epidemiology and Charles University Medical Faculty of Hygiene, Prague, Czechoslovakia). Elsevier, Amsterdam and New York. 1976. xvi + 334 pp. \$39.75.

This book is the second volume of a series of monographs concerned with chemically induced functional changes and especially with their quantitative assessment. This volume is the direct result of the Second Workshop on Functional Toxicity Evaluation and is devoted to functions of the nervous system and behavior.

The book contains a total of 36 papers including an introductory address (by Professor Janda, Charles University Medical Faculty of Hygiene, Prague) and the editor's foreword. The papers are organized in the following three sections: (I) Human Studies on Drugs and Environmental Chemicals (16 contributions), (II) Functional Toxicity Tests in Animals (17 contributions), and (III) Addenda to the Survey of Laboratories contributing to the cooperative effort initiated by the I.A.O.H. Study Group on Functional Toxicity (addenda to the survey published in the first volume, 1973, pp 253–292).

Each section has been presented by experts in environmental toxicology, epidemiology, and industrial hygiene, and each author realistically achieves his stated goals with a relatively simple approach. The variety of papers presented in this book indicates that the study of behavior and nervous functions is capable of solving practical problems in different aspects of environmental and occupational health. The workshop and this resulting volume appear to have accomplished the desired goal: presenting the research worker in the field with an overall view of methodological experience with functional toxicity tests, especially behavioral and neurophysiological tests, adapted from the field of environmental and industrial toxicology.

This book will serve as a useful guide and reference source to those engaged in research in these areas and would be a valuable addition to any research library.

V. M. Sadagopa Ramanujam, *University of Texas*

Progress in Theoretical Organic Chemistry. Volume 2. Applications of MO Theory in Organic Chemistry. Edited by I. G. CSIZMADIA (University of Toronto, Canada). Elsevier Scientific Publishing Company, Amsterdam and New York. 1977. xiv + 640 pp. U.S. \$69.50/Dfl. 170.00.

This volume has emerged from the first Theoretical Organic Chemistry meeting held in Tenerife, Canary Islands, June 13–26, 1976. It is a most welcome addition to the highly regarded series "Progress in Theoretical Organic Chemistry". The cross section of theoretical organic chemistry presented here is strongly computationally oriented and emphasizes ab initio methods.

This book contains a total of 47 papers including introductory and concluding remarks by Professors Mulliken and Mangini, respectively. Inbetween there are 45 papers distributed over the following five sections.

Section A: "Molecular Geometry and Theoretical Stereochemistry" contains 10 contributions ranging from the stereochemistry of stable molecules, radicals, and molecular ions, through hydrogen bonding and ion solvation to mathematical analyses of energy hypersurfaces.

Section B: "Reactive Intermediate and Theoretical Reaction Mechanisms" consists of 13 papers dealing with theoretical studies of organic reactions such as base-catalyzed hydrolysis, protonation, epoxidation, and electrophilic addition to double and triple bonds.

Section C: "Theoretical Photochemistry and Theoretical Spectroscopy" contains 13 papers starting with a qualitative configuration interaction treatment of thermal and photochemical organic reactions, followed by papers on ab initio treatments of photochemical intermediates and a consideration of the role of Rydberg and valence-shell states in photochemistry. The field of spectroscopy is represented by papers on the electronic spectra of carbonyl and thiocarbonyl compounds, photoelectron spectroscopy, optical rotatory dispersion and NMR.

Section D: "The Electron Pair Concept in Terms of Localized MO

and Geminals" consists of six papers dealing with analyses of methods for the determination and characterization of localized MO and discussions of correlated electron pair functions.

Section E: "Special Topics" contains three papers dealing with miscellaneous topics including the application of statistical physics in treating molecular interactions with their environments, a theoretical treatment of the field of natural products, as well as an introduction to information theory in organic chemistry.

Each section has been presented by scholars expert in a particular area of theoretical organic chemistry. The topics are covered in a detailed manner emphasizing the major recent advances in MO theory. The style and format of the book are excellent which make it very clear and readable. In some articles references are somewhat limited, but, in general, they are quite adequate.

In summary, this volume strikes a good balance in both range of topics and depth of coverage and is a book which will serve excellently as a reference source for advanced students and for investigators in the area of MO theory.

V. M. Sadagopa Ramanujam, *University of Texas*

Analytical Chemistry. Second Edition. By G. D. CHRISTIAN (University of Washington). John Wiley & Sons, Inc., New York, N.Y. 1977. xvi + 648 pp. \$16.95.

This is an excellent text for nonchemistry majors who are preparing for careers in the life sciences or applied chemistry. It covers essentially all of the important analytical techniques, certainly all that are commonly employed in such fields. Based upon the premise that breadth of knowledge is generally more useful than depth of understanding to those who would simply employ the techniques of modern analytical chemistry, the book strikes a very reasonable balance between theory and practice. In spite of the necessarily abbreviated nature of the book, there is a surprising amount of basic information and important detail packed within its many sections. This should stimulate the serious scholar without discouraging the more casual student.

In its second edition the book has benefited from more careful editing and has grown by 140 pages to include new chapters on non-aqueous titrations and drug analysis. There are expanded or new sections in many of the chapters. For example, the chapter on gravimetry has been much improved in content as well as in clarity. All of the experiments have been reorganized, 8 were eliminated, and 14 new ones have been added. Although five chapters had to be deleted to make room for needed revision, the overall value of the book as a text has been improved.

It would be easy to fault this book in any context other than its intended purpose. Inevitably, brevity may elicit confusion, and lack of detail may invite rote learning. These are pitfalls for anyone who would know the forest before the trees. Christian has carefully blazed a clear trail for those who would explore the forest without getting lost in the brush.

Alfred A. Schilt, *Northern Illinois University*

Modern Methods of Chemical Analysis. Second Edition. By ROBERT L. PECSOK (University of Hawaii), L. DONALD SHIELDS (California State University, Fullerton), THOMAS CAIRNS (U.S. Food & Drug Administration, Los Angeles), and IAN G. MCWILLIAM (Swinburne College of Technology, Melbourne). John Wiley & Sons, Inc., New York, N.Y. 1976. xviii + 573 pp. \$16.95.

The authors of the first edition, with the assistance of two new collaborators, have enlarged the scope of their novel analytical text to include chapters on flame spectroscopy, X-ray methods, spark source spectrometry, metal ion complexes, statistical treatment of data, data processing, automatic analyzers, process analyzers, and process control. Regrettably, the chapter on kinetics and that on structural effects on acidity have been deleted from the second edition. The net result is a much improved text, one that not only has retained its special strengths but has grown to keep pace with the ever increasing emphasis on instrumental methods of analysis.

For the most part, the authors' objective of reaching a "middle level depth" has been achieved admirably. Like the first edition, the style and clarity of presentation of the second edition makes for a very readable book. With its emphasis on practical aspects, the book should prove popular with students, technicians, and those who seek both comprehension and useful knowledge to successfully employ the methods and to interpret the results. Sadly missing, however, are

criteria that would guide the reader in selecting appropriate methods for any given problem.

An especially strong point of the book is the elegantly concise manner in which it covers the interpretation of various types of spectra, particularly NMR and mass spectra. Another appealing feature is the clarity of presentation of fundamental principles in topics on phase changes, separations, electromagnetic radiation, and mass spectrometry. A number of important areas are less thoroughly covered than others. Rather superficial treatment is given to statistics, metal ion complexes, coulometry, and polarography. A wealth of timely information is provided on data processing, process analyzers, and process control.

Worthy of its title, the second edition of "Modern Methods of Chemical Analysis" merits serious consideration as a text in advanced level courses for nonchemistry majors or in intermediate level courses for chemistry majors. It is a book that this reviewer enjoyed reading in both editions.

Alfred A. Schilt, *Northern Illinois University*

Chromenes, Chromanones and Chromones. Edited by G. P. ELLIS (University of Wales). John Wiley & Sons, London. 1977. 1196 pp. \$100.00.

This book is the 31st volume in the series "The Chemistry of Heterocyclic Compounds", and contains 21 chapters on various aspects of the chemistry of chromenes, chromanones, and chromones. Included in the work are chapters on halochromones, nitrochromones, aminochromones, ketonic chromones, 2,4-chromandiones, 2,3,4-chromantriones, chromone carbonitriles, bischromones, and bichromones, as well as sections on 2*H*- and 4*H*-1-benzopyrans, 3-chromanones, and 4-chromanones. In addition, the chapters which describe general methods for preparation of chromones and naturally occurring chromones are particularly useful for those who wish to enter the field.

The survey, current through the middle of 1976, is an excellent addition to previous volumes in this series. The material is well presented and is easy to follow both by chemical formula and by typescript. The text contains a tremendous amount of information including discussion of the pharmacological activity of some of the general classes of compounds.

The author and subject indexes are quite extensive and tables of compounds given throughout the text are also well presented.

I believe this book is a necessary addition to libraries of those working in the area; unfortunately, the price probably will prohibit its purchase by many others.

James M. Cook, *University of Wisconsin—Milwaukee*

Advanced Organic Chemistry. Part A: Structure and Mechanisms. Part B: Reactions and Synthesis. By FRANCIS A. CAREY and RICHARD J. SUNDBERG (University of Virginia). Plenum, New York, N.Y. 1977. Part A: xxvi + 583 pp. \$12.50. Part B: xxiii + 521 pp. \$12.50.

When one considers that most of the current texts for a first-year college course in organic chemistry run about 1000–1100 pages the fact that this Advanced Organic Chemistry text is about the same size makes one wonder about the definition of the term "advanced". Actually, the field of organic chemistry is so immense that a book on advanced organic chemistry of 1000–1100 pages can merely scratch the surface. The text by Carey and Sundberg does this admirably in Parts A (Structure and Mechanisms) and B (Reactions and Synthesis). In Part A the chapter headings include the following: 1. Chemical Bonding and Molecular Structure; 2. Stereochemical Principles; 3. Conformational and Other Steric Effects; 4. Study and Description of Organic Reaction Mechanisms; 5. Nucleophilic Substitution; 6. Polar Addition and Elimination Reactions; 7. Carbanions and Other Nucleophilic Carbon Species; 8. Reactions of Carbonyl Compounds; 9. Aromaticity and Electrophilic Aromatic Substitution; 10. Concerted Reactions; 11. Photochemistry; and 12. Free-Radical Reactions. In Part B the headings are: 1. Alkylation of Carbon via Enolates and Enamines; 2. Reactions of Nucleophilic Carbon Species with Carbonyl Groups; 3. Addition Reactions of Carbon–Carbon Multiple Bonds; 4. Reduction of Carbonyl and Other Functional Groups; 5. Organometallic Compounds; 6. Cycloadditions and Unimolecular Rearrangements and Eliminations; 7. Aromatic Substitution Reactions; 8. Reactions Involving Carbenes, Nitrenes, and Other Electron-Deficient Intermediates; 9. Oxidations; 10. Multistep Syntheses;

and 11. Synthesis of Macromolecules. In each chapter the important and interesting aspects are pinpointed with numerous examples, problems, and references for those who wish to become more expert in the area. Errors are at a minimum.

To this reviewer it seems regrettable that relatively little attention was paid to the following items: ipso nitration, phase-transfer syntheses (not indexed), and the advantages of the uses of bis anions. Also that no coverage was given to normal and pseudo-ester formation of γ -keto acids, quinones, unsaturated carbenes, and reactions proceeding by spirocyclic mechanisms. With the exception of the above-mentioned topics the book is a gold mine of information and can be highly recommended to those who wish to increase their understanding of advanced organic chemistry.

Melvin S. Newman, *The Ohio State University*

Advances in Physical Organic Chemistry. Volume 14. By V. GOLD (Kings College; London) and D. BETHELL (University of Liverpool). Academic Press, London. 1977. viii + 374 pp. \$31.25.

This volume contains four reviews of topics which are of fundamental importance to those interested in the rates and equilibria of organic reactions. The review of solvolytic reactions by Bentley and Schleyer focusses on the Winstein ion pair mechanism, α -deuterium isotope effects, and the ionizing power of solvents as well as the electrophilic and nucleophilic roles that solvents play. A discussion of the correlation of solvolysis rates is also presented. The review is selective and critical rather than encyclopedic. Pross' review of the reactivity-selectivity principle has an initial theoretical discussion followed by examples chosen from proton transfer, solvolysis, carbene, electrophilic aromatic substitution, and free radical reactions. Ample attention is paid to the other factors, such as solvation, which tend to make clearcut examples of the principle difficult to find.

The third section of the book is a review by Buncl and Wilson of the physical-organic chemistry of reactions in Me_2SO . The burgeoning interest in the study of reaction rates in this solvent is documented with particular attention to proton-transfer reactions. The last article, by Michael Blandamer, deals with the kinetics of organic reactions in aqueous solution. The structure and properties of water and aqueous solutions are discussed with regard to their effect on reaction rates.

D. J. Hupe, *University of Michigan*

Lasers in Chemistry. Edited by MICHAEL A. WEST (The Royal Institution, London). Elsevier, Amsterdam. 1977. xi + 437 pp. \$69.50.

This is a remarkable book from three points of view: (1) The 78 papers in it were first presented at a meeting in June 1977, and the book itself was circulated for review within the following three months. (2) The fast turn-around time was achieved by photographic reproduction of typed manuscript pages, with the attendant handwritten formulas, change of type font from one paper to the next, right margins unjustified, typing errors, etc. Nonetheless, what should be a rather ugly collection of papers is, in fact, very pretty. The publishers have done an excellent production job on this book. (3) The price of \$69.50 each puts this book out of reach of almost anyone without access to a secured bank loan. Indeed, the Publisher told me that the book is intended for sale to libraries and corporations, rather than individuals.

The conference, largely among European scientists, covered seven general categories: laser light scattering, gas analysis, atomic and molecular spectroscopy, isotope separation, infrared photochemistry, fast photochemistry and photophysics, and advances in laser instrumentation. Each category is introduced by an authoritative "review", which is brief indeed, but serves as a convenient jumping-off place. Following these are over 70 papers, longer than abstracts but shorter than full-length journal articles. Even at this late date (January 1978), it is likely that many of the papers in this book are more current than those in the latest journals. Taken together, they constitute a physical chemistry supermarket in which the shopper is certain to find many, many interesting ideas for new experiments using lasers. The book is strong on techniques which represent state-of-the-art timeliness and is sure to stimulate anyone who will browse through it in the next year. However, the book's value to the scientific community will fade rapidly, because its strong points are time and innovation, rather than completeness and deep analysis.

It must have been a very exciting meeting.

M. B. Robin, *Bell Laboratories*

Semiempirical Methods of Electronic Structure Calculation. Part B: Applications (Modern Theoretical Chemistry. Volume 8). Edited by G. A. SEGAL (University of Southern California, Los Angeles). Plenum Press, New York and London. 1977. xvii + 308 pp. \$39.50.

This book, the eighth member of an outstanding series on contemporary theoretical chemistry, surveys the wide range of applications of semiempirical methods to chemistry and chemical physics. Along with its companion volume on theory (Part A, Vol. 7), it provides a comprehensive appraisal of the present scope of semiempirical methods. While some familiarity with standard molecular orbital and semiempirical methods is assumed, expressions for particular properties and formalisms for special applications are, in general, developed in the chapters concerned. Well indexed (Subject/Author/Molecules) and extensively referenced (through 1975), it is not only a good reference work but also an excellent key to the literature.

This volume begins with a discussion by M. C. Flanagan, A. Kormornicki, and J. W. McIver, Jr., on the exploration of ground-state potential energy surfaces with emphasis on locating minima and transition states, and on extracting thermodynamic information from these surfaces. INDO, MINDO/2, MINDO/3, and ab initio calculations are compared with experimental values for geometry, reaction energies, and activation parameters. R. L. Ellis and H. H. Jaffé deal with the electronic structure of excited states of organic molecules. Methods for constructing excited-state wavefunctions (including configuration interaction and MC-SCF) are compared for various semiempirical schemes, and expressions for properties such as spin-orbit coupling and photoelectron cross-section are developed in the ZDO approximation. Examples are drawn from CNDO/2 and CNDO/S calculations. In the chapter on photochemistry, J. Michl presents a thorough discussion of the suitability of model Hamiltonians (Hückel, ZDO, PRDDO, etc.), and wavefunctions derived from them by SCF and CI techniques, for the investigation of potential energy surfaces of excited molecules. A number of applications to phototautomerism and electrocyclic reactions are presented.

Approximate methods for calculating the electronic structure of inorganic complexes are reviewed by C. J. Balhausen. While crystal field theory is still the prime tool for the interpretation of electronic spectra, ligand field methods using CNDO, INDO, and $X-\alpha$ approximations are becoming increasingly important. In the section on nuclear and electron magnetic resonance, D. L. Beveridge develops expressions for magnetic shielding, spin-spin coupling, electron-nuclear hyperfine coupling, and the differential g -tensor for the ZDO approximation, both in terms of sum-over-states perturbation theory and as energy derivatives for finite perturbation theory. Tabulations of INDO and MINDO results demonstrate the extent to which semiempirical methods can be used to calculate magnetic resonance parameters. R. P. Messmer discusses some approaches to solid-state problems using molecular clusters. While EH and CNDO methods have been used, the $X-\alpha$ approximation shows the greatest promise for studies of bulk properties and surface adsorbate interactions. Approximate methods for electron-molecule scattering are discussed by D. G. Truhlar in the final chapter of this volume.

H. Bernhard Schlegel, *Carnegie-Mellon University*

Advanced Organic Chemistry: Reactions, Mechanisms and Structures. Second Edition. By J. MARCH (Adelphi University). McGraw-Hill Book Co., New York, N.Y. 1977. xv + 1328 pp. \$27.00.

After nearly ten years, an updated and somewhat expanded version of this classic advanced organic text is most welcome. As in the original edition, the author has done an admirable and thorough job of covering the breadth and depth of modern organic chemistry. Apart from deletion of chapters on instrumental methods of structure determination and nomenclature and the addition of a new chapter on photochemistry, the structure of this second edition is essentially the same as that of the first.

The text is divided into two parts with nine and ten chapters, respectively. The first four chapters treat the structure of organic compounds with extensive coverage of bonding and stereochemistry. The next five chapters cover general aspects of reaction mechanisms along with major reactive intermediates. Part Two is devoted entirely to organic reactions and is organized into individual chapters according to major reaction types, with discussion of over 600 different reactions.

The major strengths of this text is its balanced coverage of structures, mechanisms, and reactions and the extensive reference to the

literature. Besides comprehensive referencing to "Organic Synthesis" and pertinent review articles and books, over 6000 references to the original literature are given.

This book is not only a valuable text for students of advanced organic chemistry but a source of reference to practicing organic chemists. Furthermore, at this price it is a bargain and belongs on the shelf of every science library and in the personal collection of every serious organic chemist.

Peter J. Stang, *The University of Utah*

Industrial Wastewater Management Handbook. Edited by HARDAM S. AZAD (NUS Corp. Rockville, Md.). McGraw-Hill Book Co., New York, N.Y. 1976. xix + 527 pp. \$27.50.

This comprehensive handbook will be appreciated by chemical and civil engineers as well as others concerned with monitoring wastewater quality. It is divided into two main categories, the first being directed to fundamental concerns such as legislation and standards, monitoring, industrial wastewater treatment technology, and equipment. Section Two deals with specific industries and includes chapters on water pollution control in the food, paper, chemical, petroleum, metals, and power generation industries. References and tables of guidelines and standards are included.

M. C. W. Smith, *University of Michigan*

Contemporary Quantum Chemistry. By J. GOODISMAN (Syracuse University). Plenum Publishing Co., New York, N.Y. 1977. x + 376 pp. \$12.50 (paper), \$32.50 (hardcover).

"Contemporary Quantum Chemistry" furnishes an unusually readable introduction to the application of quantum theory to atoms and molecules. Designed as text for an advanced undergraduate course in physical chemistry, the absence of difficult mathematics and mechanics allows the book to be used alternatively as a supplement to introductory physical chemistry texts. After an initial ambitious discussion of the classical wave equation, about 100 pages is spent on exact solutions of the Schrodinger equation, with the remainder of the book covering atomic and molecular structure, molecular symmetry, and a final chapter on time-dependent theory and spectroscopic applications. The discussion of molecular symmetry is particularly good for this level, as the author ignores abstract group theory and proceeds directly to the application of theory of representations to molecular problems. Some of the mathematical reasoning is specious, if not actually wrong, but shortcuts are always well motivated and are subsidiary to physical content. Of particular interest are the discussions of numerical solutions to the differential equations encountered, usually absent at this level, supplemented by problems applicable to a small computer. In short, the book makes introductory atomic and molecular theory thoroughly accessible to students on the undergraduate level and early graduate level in fields other than physical chemistry.

J. W. Warner, *University of Michigan*

Classical Kinetic Theory of Fluids. By P. RÉSIBOIS and M. DE LEENER (Free University, Brussels). Wiley-Interscience, New York, N.Y. 1977. 406 pp. \$29.50.

This volume aims to present a self-contained and complete treatise on the nonequilibrium statistical mechanics of simple fluids. The development is thematic rather than historical and the subject is divided into four main areas.

The first section considers the theory of probability and stochastic processes by examining the classical problem of Brownian motion.

It ends with a fundamental solution of the general Fokker-Planck equation and a discussion of Gaussian random processes. Section B introduces the one-particle distribution function and uses stochastic assumptions to derive the time evolution of this function. The Boltzmann equation is solved for systems of dense hard spheres using Enskog's method. We are introduced to general distribution functions in the third section of the book, and a microscopic study of the non-equilibrium process leads to a derivation of the generalized kinetic equation. The highlight of this section is a formidable discussion of the problems in the density expansion of transport coefficients. The final part of the book is devoted to the language of the autocorrelation function, its calculation, and its relation to the macroscopic observables in experiments on dense fluids.

It is difficult for a book of this size, which covers such a wealth of material, to be completely self-contained and since this an area of current research with an extensive literature one would have liked to see a more complete and specific bibliography.

The four major parts of the book are subdivided into short self-contained sections, and the overall effect is often that of a set of good lecture notes. This makes continuous reading difficult but the style is excellent for intermittent sampling and browsing or the independent study of one particular area. The level of mathematical knowledge required to follow the text is higher than that suggested in the preface. Although the more rigorous arguments have been gathered in a series of precise appendices the overall approach is uncompromisingly mathematical, making this a book for the specialist and research worker rather than the student.

The bulk of this text is concerned with the various kinetic equations describing the dilute gas and the dense fluid. The relations between these equations are carefully explored and the highly technical solutions for the few tractable cases are sketched for the interested reader. However, the real success of the book is the description of the time correlation function. There is a readable account of linear response theory, and the connection between the Van Hove function and neutron scattering results is well explained. The discussion of the autocorrelation formalism leaves the reader with a useful overview of the field.

D. J. Tildesley, *Cornell University*

Biological Roles of Sialic Acid. Edited by ABRAHAM ROSENBERG and CARA-LYNNE SCHENGRUND (Pennsylvania State University). Plenum Press, New York, N.Y. 1976. xviii + 375 pp. \$32.50.

This volume provides an extensive overview of the chemistry, biochemistry, and physiology of sialic acid as a constituent of biological compounds. The book's organization into chapters that are independent and yet interrelated by cross referencing provides a compendia of source materials. The reader is introduced to sialic acid through a detailed treatment of its chemistry and distribution in nature. This basic information is extended to the metabolism of sialyl compounds under physiological and pathological conditions. Anabolic and catabolic enzymatic reactions involving a large spectrum of sialic acid containing compounds are described thoroughly with special emphasis on the biochemistry of specific sialidases isolated from a wide variety of sources. The presumptive biological roles of sialic acid, due to its position as the terminal sugar moiety of circulating and cell surface glycoproteins and glycolipids, are presented in all their diversity. Although few general principles emerge, a compilation of these concepts is useful to the reader, providing an outline to the present "state of the art" in sialic acid related research.

Richard J. Stockert, *Albert Einstein College of Medicine*