

to distinguish between the carbonyl groups of **11** by taking advantage of the well-known phenomenon that sodium borohydride reduction of sterically hindered succinic anhydrides occurs at the *more* hindered center affording a  $\gamma$ -lactone.<sup>14</sup> In the event, reduction of **11** gave a syrupy hydroxy acid, which required 1 week for lactonization, thereby making it possible to prevent the process of acetylation to **12b**. However the 360-MHz <sup>1</sup>H NMR spectrum of the lactone showed it to be **13**<sup>10</sup> (see critical data in Scheme II), indicating that it was the *less* hindered carbonyl group that had been reduced.

In the suggested mechanism for the chemoselective reduction of succinic anhydrides to lactones, the surviving carboxyl group is chelated.<sup>15</sup> The opposite course obtained which **11** can therefore

be rationalized by the process depicted in **14**.

In summary, a wide variety of functionalized annulated furanoses are readily obtainable from "diacetone glucose" (**1**), the stereo- and regiochemistries of which appear to be determined by the 1,2-*O*-isopropylidene ring exerting control either as a steric (as in **3** → **4** and **9** → **10**) or electronic (as in **5** → **6** and **11** → **12a**) device.

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## Book Reviews

**Carcinogenesis: Fundamental Mechanisms and Environmental Effects.** Edited by Bernard Pullman, Paul O.P. Ts'o, and Harry Gelboin. D. Reidel Publishing Co., Dordrecht, Holland/Boston, U.S.A./London, England. 1980. viii + 592 pages. 120.00 DFL.

The book is a compendium of papers given at the 13th Jerusalem Symposium on Quantum Chemistry and Biochemistry held April 28–May 2, 1980. There is a distinct biochemical flavor to this book, undoubtedly as a result of the symposium subject matter, but there is enough biology to make the contents interesting even to biologists. Each of the 47 chapters was written by different, often multiple, authors many being undisputed leaders in their fields. In spite of such diversity of authorship, the contents of the book revolve around only a few key questions concerning the metabolism of carcinogens and the chemical interaction between carcinogens and DNA. An additional theme is whether the response of the cell to the presence of adducts or ligands on DNA might be an element in the overall mechanism of carcinogenesis.

In the sense of the sharpness of the focus and the breadth of knowledge contained in it, this book stands as a milestone in this field. It will be of interest to biochemists as well as biologists—those interested in mechanism as well as those interested in methods. While the premise of the book is undoubtedly that damage or repair of DNA is of major importance in carcinogenesis, there are several chapters on promotion *in vivo* and *in vitro* in recognition that carcinogenesis may extend beyond DNA damage. There is a short "key word" index at the end of the book and each chapter is well referenced.

Fredric J. Burns, *New York University Medical Center, Institute of Environmental Medicine*

**Advances in Physical Organic Chemistry. Volume 17.** Edited by V. Gold and D. Bethell. Academic Press, London. 1980. viii + 518 pp. \$84.50.

This volume of an established and valuable series presents five reviews of rather widely different topics: M. J. Perkins on spin trapping (64 pages); John L. Kice on mechanisms and reactivity of organic oxyacids of sulfur and their anhydrides (117 pages); Anthony J. Kirby on effective molarities for intramolecular reactions (96 pages); F. De Jong and D. N. Reinhoudt on stability and reactivity of crown ether complexes (155 pages); Toyoki Kunitake and Seiji Shinkai on catalysis by micelles, membranes, and other aqueous aggregates as models of enzyme action (75 pages).

The chapter by Perkins on spin trapping extends somewhat other reviews of this technique whereby a transient, reactive free radical undergoes addition to a diamagnetic compound to produce a more persistent radical which lends itself to more ready detection and identification. This review emphasizes the chemical and spectroscopic features which must be considered when utilizing the technique and includes a number of applications with emphasis on mechanistic and kinetic information which may be extracted by this method.

Kice's chapter on the organic oxyacids of sulfur reviews an expansive field including sulfenic (RSOH), sulfinic (RSO<sub>2</sub>H), and sulfonic (RSO<sub>3</sub>H) acid derivatives. Separate sections dealing with the corresponding anhydrides or mixed anhydrides are included because of the distinctive chemistry exhibited by these derivatives.

The review of effective molarities by Kirby addresses in a quantitative

manner the efficiency of intramolecular catalysis. The effective molarity is defined as the concentration of the catalytic agent required to make the intermolecular reaction go at the observed rate of the intramolecular process; effective molarities can range from zero to 10<sup>16</sup> M. Extensive, critical tabulations classified according to reaction mechanism make this review particularly informative.

The longest review is that by De Jong and Reinhoudt dealing with the physical organic chemistry of crown ether complexes with metal cations, protonated amines, arenediazonium salts, and neutral molecules. Topics include the thermodynamic and kinetic stabilities of complexes, spatial arrangement and electron density at the binding sites, solvent effects, anion effects, chiral recognition, and chemical reactivity of complexes.

Kunitake and Shinkai's chapter on micellar catalysis begins with a discussion of the various aqueous micellar aggregates. The catalytic action of these aggregates is then presented in relation to enzyme catalysis; the underlying theme is the hydrophobic effect.

Although this volume is considerably longer than preceding volumes, the diversity of topics and price will be unappealing to most potential individual subscribers. It is imperative, of course, for libraries and other institutions to sustain their holdings of this series.

Wayne C. Danen, *Kansas State University*

**Analytical Applications of FT-IR to Molecular and Biological Systems. Proceedings of the NATO Advanced Study Institute, Florence, Italy, August 31–September 12, 1979.** Edited by James R. Durig. D. Reidel Publishing Co., Hingham, MA. 607 pages. \$68.50 (hardcover).

Fourier transform infrared (FT-IR) spectrometers have two significant advantages compared to their dispersive relatives—the increased sensitivity associated with the various improvements of signal-to-noise of the interferometric measurement, and the improved photometric accuracy and general convenience of use of the small instrumentation computer usually built in to the spectrometer. Since the costs of FT-IR spectrometers are dropping to the levels of conventional machines, it seems probable that FT-IR will become the normal mode of operation within the next few years. This book is then particularly timely. It contains 26 didactic articles grouped under the headings Instrumentation and Theory (four articles), Techniques (eight), and Applications (fourteen). It provides a very convenient entry to the FT-IR area, and its literature.

As the editor indicates in his preface, the articles are pedagogical and are, with exceptions, neither sufficiently complete or critical to qualify as review articles. Within this constraint, the articles are well written and generally have the right mixture of theory, experimental background, results, and cookbook details. The range of subjects covered is very wide, including Hadamard spectroscopy, matrix isolation techniques, industrial applications, polymers, inorganic species, surface and crystal phenomena, and conformational analysis. The stress in the title on analytical applications is misleading. Only a fraction of the articles are related to component identification or measurement; for example, seven pages suffice for Chromatography and FT-IR Spectroscopy. The "Biological" of the title has a similar relation to content; 15 pages suffice to review spectra of proteins, and elsewhere biology receives another reference or two in passing.

This book should be most useful to those teaching graduate courses

in spectroscopy. It could also be helpful to researchers to whom FT-IR is new and who want a general introduction to the scope, opportunities, and complexities of the field. The catholic coverage of topics makes the book generally useful as a reference source to all interested in infrared applications. There are both subject and author indices.

David Cowburn, *The Rockefeller University*

**Organic Synthesis with Palladium Compounds.** By Jiro Tsuji (Tokyo Institute of Technology). Springer-Verlag, Berlin, Heidelberg, New York. 1980. xii + 207 pp. \$49.50.

This slim volume is packed from cover to cover with a wealth of information concerning the use of palladium compounds in organic synthesis. Its style is very terse, and it reads more like an organized, detailed catalogue of what has been done in the field rather than an in-depth monograph. Typical entries consist of one or two lines of text, three references, and an equation... then on to the next reaction. As such it is very concentrated reading, with little analysis or mechanistic discussion, and no explanation of a number of unusual and puzzling transformations. Its coverage of material is quite complete through the year of 1978, and it has 993 references. Because of this, it is an excellent update on what has happened since the publication of Maitlis's excellent two-volume set on the organic chemistry of palladium in 1971.

The book begins with a brief presentation of the sources of palladium compounds used in organic synthesis, then proceeds to a consideration of the organic chemistry of palladium. This topic is divided into two areas. The first is broadly called Oxidation Reactions with Pd<sup>2+</sup> Compounds and comprises all the chemistry in which palladium(II) effects a chemical transformation and is reduced to palladium(0) in the process. These include the important reactions of nucleophilic attack on palladium(II)-olefin complexes including the commercially important Wacker process, nucleophilic attack on  $\pi$ -allylpalladium complexes, the chemistry of chelating olefinpalladium(II) complexes, and the synthetically important cyclometallation (*ortho*-palladation)-insertion chemistry of palladium(II). Many of these processes are catalytic in palladium(II) provided a suitable reoxidant is supplied.

The second area treated is called Catalytic Reactions, which is a bit confusing, since most of the reactions treated in the first section were also catalytic reactions. This section covers the catalytic reactions involving palladium(0) complexes. Since these need not be reoxidized to generate the active catalysts, they fall outside the scope of the first section. This section presents catalytic carbonylation reactions, the extensive palladium(0) catalyzed telomerization of dienes, and the use of the telomers to synthesize insect pheromones, steroids, and macrocycles, among others, allylic alkylation and amination of allyl acetates, ethers, alcohols, and amines, Heck arylation of olefins, and transmetalation processes involving organomercurials, stannanes, and zirconates. Most of these processes are very useful for organic synthesis, and again their coverage in this book is quite complete.

In summary, this is a valuable source book for chemists engaged in and conversant in organopalladium chemistry, and provides an excellent entry into the vast literature of this field. It presumes a knowledge of the fundamental organic chemistry of palladium, and might be difficult to follow for those who are new to the field. In conjunction with any of a number of books which present a more leisurely but less current treatment of the field, it will provide a comprehensive view of organic synthesis with palladium.

L. S. Hegedus, *Colorado State University*

**Photosynthesis: Physical Mechanisms and Chemical Patterns. IUPAB Biophysics Series. Volume 4.** By R. K. Clayton (Cornell University). Cambridge University Press, London. 1980. xiv + 281 pp. \$32.50 hardcover and \$11.95 paperback.

As the author remarks in his preface, photosynthesis is a multifarious and complex subject. However, this new volume, like Clayton's other books on photosynthesis, is clearly written with many figures and reaction schemes that help the reader quickly develop an understanding of each topic. Coverage of both green plant and bacterial photosynthesis is a very delightful feature of the book. Subject-by-subject comparisons of plant and bacterial photosynthesis provide a type of overview that has been lacking in most earlier general texts on photosynthesis. Physical chemical aspects receive emphasis throughout, with only minor effort being placed on biological concepts or the subject of whole plant processes.

The book is divided into four parts. Part I follows an historical outline through developments leading to contemporary photosynthesis research. The Van Niel hypothesis of photosynthesis, as a photochemically driven oxidation-reduction process, is shown to have been a fundamental breakthrough that is a basis for modern concepts. An interesting digression considers how the historical Emerson-Warburg controversy over quantum efficiency can be understood in view of present knowledge. Ample chemical structures and information on absorption spectra and

chemical characteristics of essential pigments and electron donors, carriers, and acceptors also make this part of the book a helpful reference in understanding experimental methods presented throughout other sections.

Part II describes the membranous structures that support photosynthesis in green plants and bacteria. One subsection includes many quality photomicrographs of chloroplasts, photosynthetic bacteria, and bacterial chromatophores. Using these illustrations along with the text, one can easily visualize how these structures relate to the physical and chemical processes of energy and charge transfer that are discussed. The technique of difference absorption-spectroscopy is presented in sections describing how it has been used to understand charge transfer. Various proposed arrangements of antenna pigments and reaction centers are discussed from the point of view of development of improved isolation methods. Evidence for the tripartite model is presented and analyzed clearly as are possible mechanisms for control of quantum distribution between the two photosystems in green plants.

Part III is devoted to details of photochemical charge separation in reaction centers, electron transport, and proton movement across the membranes of photosynthetic bacteria and plants. Current reaction schemes are presented with descriptions of how they explain much current experimental data. What they fail to explain is also pointed out and this gives the reader a valuable perspective of research areas that may be active in the future.

Part IV presents the relationship between ATP formation and electron and proton transport. The chemiosmotic theory is described from the aspect of its all encompassing nature in the phosphorylation process of biology. A subtle point is made that, for all we know about phosphorylation, chemical and physical details of the coupling factor mechanism for ATP formation are still obscure. The metabolic cycles for carbon fixation are briefly presented with experimental methods that were involved in their discoveries. The problem of photophosphorylation is discussed in terms of the biochemical nature of the enzyme RuBP carboxylase.

This book would be suitable for upper-level undergraduates and graduate students. There are many digressions at appropriate points throughout the text that give essential details of the following subjects: optics, oxidation-reduction reactions and energetics, molecular physics, absorption and fluorescence spectroscopy, and the theory and methods involving polarized light. Significant literature is well referenced at the end of each chapter. The author's lucid writing and broad perspective and insight also make this volume valuable for specialists in the field.

P. A. Jursinic, *USDA, Northern Regional Research Center*

**Ultrafiltration Membranes and Applications.** By Anthony R. Cooper (Dynapol). Plenum Press, New York. 1980. xiv + 707 pp. \$75.00.

This large volume contains the proceedings of a symposium of the same name held at the 178th National Meeting of the American Chemical Society in Washington, D.C., September 11-13, 1979, sponsored by the Division of Colloid and Surface Chemistry. Reflecting the high level of interest in this field, the meeting was very well attended. Forty-three full-length papers and eight more abstracts are contained in the book, and the contributors list reads like an international "who's who" in ultrafiltration (UF).

Actually, the roots of UF go back to the 1920's and 1930's, but it was not until the development of asymmetric or "skinned" membranes, first for reverse osmosis (RO) and then for UF, beginning in about 1960, that UF experienced a rebirth. By the mid to late 1960's a budding UF industry was launched and that industry continues to grow today. It is fitting that one of the modern pioneers of that industry, Alan S. Michaels, presented the keynote paper.

While the focus of the symposium was clearly on UF, other membrane applications, including RO, dialysis, plasmapheresis, a membrane-based artificial pancreas, and the use of membranes as substrates for growing tumor cells, were described, and are presented in this proceedings volume. In some cases, of course, it is difficult to classify the applications as clearly either UF or RO.

Among the many topics covered in this book are these: fundamentals of UF, including transport theory and boundary layer effects and their control; new UF membranes and membrane morphology, including preparation methods, new materials, and hollow fiber membranes; new approaches to membrane separations, including electroultrafiltration of proteins, and metal ion removal by complex formation with polymers followed by UF; numerous industrial separation applications such as the treatment of tannery wastes, oil emulsions, electrocoat paints, and dye-house and other textile wastes; food applications, including concentration of dairy products, vegetable proteins, and fruit juices; and biological and medical applications such as pyrogen removal, separation of proteins and other macromolecules, hemofiltration, and UF membrane-enzyme reactors.

We have only one minor complaint. The book was produced by the photo-offset process, and it was apparently not deemed practical to make significant editorial changes. Some of the foreign papers are therefore in something less than the King's English. This objection notwithstanding, we found this a most valuable and up-to-date book. Every serious membranologist will want to have it in his or her library for study and reference.

H. K. Lonsdale, *Bend Research, Inc.*

**Rheology of Polymers.** By G. V. Vinogradov (Institute of Petrochemical Synthesis, Moscow) and A. Ya. Malkin (Institute of Plastics, Moscow). Mir Publishers, Moscow, and Springer-Verlag, Berlin. 1980. xii + 468 pp. \$58.00.

The rheological properties of polymers play a key role in determining how these materials behave during fabrication and use. Hence, polymer chemists should have at least a basic understanding of these properties and their relation to polymer structure. However, this knowledge is not easily acquired since, on the one hand, rheology is inadequately (and frequently, incorrectly) treated in polymer textbooks and courses and, on the other hand, rheology books generally do not contain the combination of phenomenological theory, molecular theory, and data which would be useful to the polymer chemist. This volume, written by two prominent Soviet rheologists, could help to supply this need in addition to providing a textbook and survey of an important part of polymer rheology, the linear and nonlinear viscoelastic properties of those macromolecular materials which flow. Separate chapters are devoted to the rheological properties of fluid filled-polymers polymers and to the uniaxial extension of viscoelastic fluids, two topics of great current interest.

The phenomenological theory is given in considerable detail. Although the presentation assumes a familiarity with tensor notation, if not with tensor analysis, this need not discourage readers without this background; they can gain much, even without a thorough grasp of those sections using tensors. The physical ideas behind, and the important equations of, molecular theories are given. Rheological properties of a wide variety of polymeric systems are presented and discussed in relation to theory and to their composition and structure.

This volume is a translation of an augmented and updated revision of the original Russian work published in 1977. The English is sometimes awkward but, for the most part, this does not interfere with comprehension. Some words are misused (e.g., *inverted* for *inverse*, *successive* for *successful*), I had to reread a number of sentences several times to discern their meaning, and there were a few whose intent I could not unravel at all.

There are a number of cases where terminology and symbols differ from those commonly used in the rheological literature. Particularly serious are those for the dynamic compliances and the storage modulus which lead to awkward formulas and seem to be the cause for several errors in the text, e.g., the  $\delta$  defined on page 56 is not, as stated, the phase difference between stress and strain unless  $G_{\infty}$  is zero, nor is it equal to the  $\delta$  used on page 58.

As is almost unavoidable in a work of this scope, a number of errors and inconsistencies have crept into the text. On page 20, it is incorrectly stated that measures of strain must "satisfy the important requirements of additivity of two successive strains" but on page 26, the Cauchy-Green strain is introduced which does not comply with this requirement. On page 174, it is correctly pointed out that a certain procedure is "not reliable for a number of reasons" but on page 177 that very procedure is recommended.

Hershel Markovitz, *Carnegie-Mellon University*

**Energy, The Biomass Options.** By Henry R. Bungay (Rensselaer Polytechnic Institute). John Wiley and Sons, New York. 1981. ix + 347 pp. \$29.95.

After devoting over 300 pages to a discussion of energy from biomass, the author states that no alternate energy source is as cost-effective as conservation. Nevertheless, this book contains a large amount of practical information that will be of interest to the general reader as well as the specialist. The following topics are discussed: biomass feedstocks, potential products, thermochemical processes, biological concepts, anaerobic digestion, fractionation and pretreatment, fermentation, photobiological processes, costs, and environmental impacts. Two appendices, references, and an index are included.

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

**Chemistry in Two Dimensions: Surfaces.** By Gabor A. Somorjai (University of California at Berkeley). Cornell University Press, Ithaca, New York. 1981. 575 pp. \$48.50.

In this volume, Somorjai has not only provided a well-written introduction to both the fundamental concepts and experimental methods of

modern surface science, but has also critically compiled a valuable and much-needed depository for a large body of published data on a variety of extensively-studied model systems. The book's title is, perhaps, misleadingly broad, since the author deals almost exclusively with metallic surfaces. The important, but less tractable, subject of metal oxide surfaces, for example, is barely touched upon. This shortcoming does not, however, detract seriously from the book's usefulness, both because of the widespread applications of metals and alloys to important catalytic and surface processes and due to the relatively straightforward extension of many of the expounded principles to nonmetallic surfaces.

Following a brief introduction to selected terminology and the concept of surface free energy, a comprehensive survey is provided of the experimental methods that are commonly employed in modern surface studies. The presentation is usefully organized according to the types of surface properties measured, rather than the theoretical principles underlying the techniques, with considerable space devoted to the information obtainable from electron diffraction and photoelectron spectroscopy studies. Succeeding chapters examine the important topics of surface composition, using surface segregation in binary alloys as a model, and the structure and ordering of clean metal surfaces, including reviews of reconstruction/relaxation phenomena and the applicability of stepped, high-Miller-Index surfaces to investigations of the comparative behaviors of distinguishable types of surface structures. This information is then logically integrated into an exhaustive treatment of the structure and bonding of adsorbate monolayers on surfaces, with particular emphasis on the influence of surface structure and irregularities on the ordering of adsorbed species. Supplementary to the textual material are several lengthy and well-documented tabulations that present a large array of published data on the structure and ordering of numerous adsorbates on metal surfaces.

After dealing with the transition topic of energy transfer in gas-solid interactions, as regards adsorption/desorption phenomena and elementary surface processes, the author turns to a discussion of the principles of surface-catalyzed reactions. Unfortunately, only relatively cursory treatment is given to the concepts of active sites, kinetic expressions, surface intermediates, and reaction mechanisms. The value of this chapter, however, lies principally in the very extensive tables that summarize a wealth of reported kinetic data for several hydrocarbon reactions, primarily hydrogenolysis, hydrogenation/dehydrogenation, isomerization, and dehydrocyclization, occurring on virtually every transition metal and numerous binary alloys. The book closes with three chapters in which Somorjai focuses on specific topics that reflect his personal research contributions in the field of heterogeneous catalysis, viz., platinum-catalyzed conversions of hydrocarbons, carbon monoxide hydrogenation on metal catalysts, and the photocatalytic dissociation of water on strontium titanate-based catalysts.

This book would, I feel, serve as an excellent and very readable introductory textbook for a senior- or graduate-level course in surface chemistry, although it must be supplemented by externally-supplied problems and exercises since none have been included by the author. In addition, the more than 150 pages of tabulated experimental data will make this an invaluable reference volume for researchers in the fields of surface science and heterogeneous catalysis.

Michael P. Rosynek, *Texas A&M University*

**Defense and Recognition II. A. Cellular Aspects. B. Structural Aspects.** Edited by E. S. Lennox (MRC Laboratory of Molecular Biology, Cambridge). Volumes 22 and 23, respectively, of *International Review of Biochemistry* edited by H. L. Kornberg (University of Cambridge) and D. C. Phillips (University of Oxford). University Park Press, Baltimore, 1979. ix + 278 and ix + 222 pp, respectively. \$29.50 each.

Dr. Lennox, as guest editor for these two volumes, explains that the appearance of "Defense and Recognition II" as separate volumes was "a result of exigencies of publishing and has nothing to do with its content" and that IIA and IIB "complement each other and should be considered as a unit". As an updating of the first edition edited by Dr. R. R. Porter, this collection illustrates by comparison with the 1973 version the coming of age of immunochemistry as a respectable science with an established theoretical base, and the continued striving of adolescent immunobiology for the sophistication enjoyed by its more mature sibling. The exigencies of publishing fortuitously have grouped the collection of immunochemical subjects in Volume 23 where, as an unusually scholarly work, they are bound to be consulted throughout the 1980's, indeed, into the next century. The cellular aspects in Volume 22 will remain as an important historical document to remind us of how immunologists viewed their biology in the late 1970's, and should certainly remain as a guide to the interpretation of the literature of the seventies, but there are indications even now that should a third edition of "Defense and Recognition" make its appearance in 1985, its cellular aspects would demonstrate how immature immunobiology still was in 1979.

Eugene D. Day, *Duke University Medical Center*

**Diet and Resistance to Disease. Advances in Experimental Medicine and Biology. Volume 135.** Edited by Marshall Phillips and Albert Baetz (U.S.D.A. National Animal Disease Center, Ames Iowa). (U.S.D.A. National Animal Disease Center, Ames, Iowa). Plenum Press, New York. vii + 220 pp. \$32.50.

The papers in this volume will be of interest mainly to physicians, dieticians, and workers in veterinary science and nutritional immunology. The topics covered are: ascorbic acid, vitamin E, selenium, dietary folate, vitamin B<sub>12</sub> and methionine/choline deficiency, B vitamins, zinc, copper, iron binding proteins, iron deficiency, and protein malnutrition.

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

**Topics in Enzyme and Fermentation Biotechnology. Volume 5.** Edited by Alan Wiseman (University of Surrey). Ellis Horwood Ltd., Chichester. 1981. 359 pp. \$89.95.

The contents of this book will be of interest to biochemists, microbiologists, chemists, biochemical engineers, and workers in the food, brewing, textile, and pharmaceutical industries. Each topic is discussed thoroughly and extensive references are to be found at the end of each chapter. For example, 133 pages are devoted to various aspects of immobilized coenzymes. The next chapter provides useful information on large-scale enzyme extraction and recovery. This is followed by two chapters concerned with the properties, biogenesis, and fermentation of the cyclic decapeptide antibiotic, gramicidin S, and papain and other constituents of *Carica papaya* L. An overview of alcohol dehydrogenases is to be found in the last chapter. An index is included. It is always a pleasure to review the books in this series as they are informative and well written.

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

**Nutrition and Environmental Health: The Influence of Nutritional Status on Pollutant Toxicity and Carcinogenicity. Volume II. Minerals and Macronutrients.** By Edward J. Calabrese (Environmental Health Program, Division of Public Health, University of Massachusetts). John Wiley and Sons, New York. 1981. xvi + 468 pp. \$45.00.

The contents of this book will interest environmental and occupational health specialists, environmental epidemiologists, toxicologists, biochemists, oncologists, regulatory personnel, and nutrition scientists. The first five chapters are devoted to discussions of calcium, copper, iron, selenium, and zinc and their interactions with cadmium, fluoride, lead, strontium, and plutonium as well as organic substances such as benzene, aflatoxin, dimethylnitrosamine, and other substances and elements. The effects of cobalt, iodine, magnesium, manganese, molybdenum, phosphorus, potassium, and sulfur are discussed in Chapter six. How protein, amino acids, fats, carbohydrates and related compounds, dietary fiber, and synthetic antioxidants interact with pollutants make up the remaining six chapters. An index and references are included.

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

**Quantitative Toxicology (Selected Topics).** By V. A. Filov (N. N. Petrov Institute of Oncology, Leningrad), A. A. Golubev and E. I. Liublina (Institute of Industrial Hygiene and Occupational Diseases, Leningrad), and N. A. Tolokontsev (Institute for Socioeconomic Problems, Leningrad). John Wiley and Sons, New York. 1979. xvii + 462 pp. \$32.50.

The first edition of this book was published in the USSR in 1973. The present English-language edition consists of a translation of the 1973 edition and addenda to seven of the eight chapters. Chapters 1, 2, and 6 stress the complexity of the interactions between toxic substances, living organisms, and the environment they coexist in. This perspective is exceedingly interesting and often lacking in toxicology texts. Chapter 2 contains a useful discussion of the "toxic action zone" and its utility in establishing safe levels of toxic substances in the industrial environment. Chapters 3, 7, and 8 discuss the distribution of nonelectrolytes and describe structure-toxicity relationships which aid in the prediction of toxicity parameters. Chapters 4 and 5 deal with pharmacokinetic modeling and accumulation. Chapter 4 and its addendum provide about one-third of the text. There is substantial emphasis placed upon quantitating the absorption, distribution, and elimination of toxic substances using mathematical modeling and a statistical approach to data analysis. This is the first book to provide such information as it applies to toxicology. The author of this chapter, however, used somewhat confusing nomenclature for some of the pharmacokinetic equations. The treatment of multicompartiment kinetics is particularly problematical, and at times misleading. Recent developments in physiological pharmacokinetic modeling are mentioned in the addendum, but not covered in sufficient detail. A toxicologist new to kinetic modeling may wish to refer to standard pharmacokinetics texts for a clearer description of the phenomena involved. The original 1973 edition relied quite extensively on the Russian literature in toxicology. The addenda, however, overcome

this deficiency by providing a substantial number of references to research in the United States and Western Europe. This text is a unique contribution, the first of its kind, and should be a useful reference for anyone working in the area of toxicology. Although the perspective is primarily from Russian researchers, it is interesting to note that the Russian standards for maximum allowable concentrations of toxic substances are more stringent than those of the United States.

William A. Wargin, *University of North Carolina*

**Isotopes in Organic Chemistry. Volume 5. Isotopes in Cationic Reactions.** Edited by E. Bunzel and C. C. Lee. Elsevier Scientific Publishing Company, Amsterdam and New York. 1980. xiv + 234 pp. \$73.25.

The four articles which comprise Volume 5 of the series "Isotopes in Cationic Reactions" are concerned with the use of isotopes, primarily as tracers, in the study of reactions which involve cations in the reaction mechanism. In Chapter 1, C. C. Lee provides a quite detailed review of the (usually degenerate) rearrangements of triarylvinyli cations. The review contains several corrections to published work and illustrates the utility of carbon isotopes in the study of degenerate rearrangements. Since the review concludes that vinyl cations are quite similar to analogous saturated cations, the work reviewed by Lee will be of interest to those concerned with ion pairing effects in carbocation chemistry, as well as to those whose interest is primarily with vinyl cations in particular. Chapter 2 is a discussion of the Pummerer and Pummerer-type reactions by S. Oae and T. Nukata. There has not been much use of isotopes in the study of these reactions and the emphasis in the review is more centered on stereochemistry as a mechanistic probe than on isotopes (although the use of oxygen isotopes in several instances is noted). The review suffers from the absence of a concluding discussion of when the reaction is intramolecular and when it is intermolecular. Although the title of Chapter 3 by R. M. Roberts and T. L. Gibson is Applications of Isotopic Labeling to the Study of Friedel-Crafts Reactions, it is mainly concerned with the chemistry of rearrangements of the cationic electrophile prior to a Friedel-Crafts alkylation reaction. This chapter also illustrates how essential the use of isotopic tracers in degenerate and near-degenerate reactions is. There is also a discussion of rearrangements of alkylbenzenes catalyzed by Lewis acids and a useful discussion of cyclopropyl-type cations, which occur often in these reactions. The final chapter by D. L. H. Williams and E. Bunzel is concerned with rearrangements of aromatic cations in which the positive charge is located on a heteroatom attached to the ring or on the ring itself. Some 11 different reactions are discussed and the uses of isotopes other than of carbon and hydrogen are highlighted. This review is particularly effective in illustrating the value of isotope and isotope effects in mechanistic studies.

This volume of the series is different from the preceding volumes in that the main emphasis is on reaction mechanism, rather than on isotopes. There are only a few examples of the use of isotope effects in the book and the use of isotopic tracers, while essential to most of the material reviewed, is accorded a secondary position to discussion of mechanism. Consequently, the book is really four separate works which will be important to researchers with interests in the particular areas reviewed. However, the book is not likely to be of general interest to workers who study other reactions by the use of isotopes. The references cover the literature through 1978 with a few references (usually to the author's work) in 1979 and there are 566 literature citations in all. There is also a short subject index but no author index.

Thomas. H. Cromartie, *Stauffer Chemical Company*

**Laser Spectroscopy, Basic Concepts and Instrumentation. Volume 5. Springer Series in Chemical Physics.** By W. Demtröder (Universität Kaiserslautern). Springer Verlag, New York and Berlin. 1981. xiii + 694 pp. \$35.00.

This is a textbook aimed at providing an introduction to the enormous and rapidly expanding field of laser spectroscopy. The book concentrates on time-independent spectroscopy but also includes one chapter on time-resolved techniques. The author has done a remarkable job of compiling such a large body of information in digestible form and the book should be of great value both to beginners and to practitioners of laser spectroscopy interested in other aspects of the field. Wisely, since several excellent texts already exist (for example, Yariv's "Quantum Electronics"), details of laser operation are kept to a minimum and emphasis is placed on those fundamentals directly related to applications. The first seven chapters contain useful problems although curiously the contents page lists problems for only two chapters. The book concludes with a brief discussion of some industrial and medical applications of laser spectroscopy.

In summary this is a very useful book and should be of value in a good many laboratories.

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