Book Reviews*

Advances in Catalysis. Volume 31. Edited by D. D. Eley, H. Pines, and P. B. Weisz. Academic Press, New York. 1982. 351 pp. $52.50.

This volume of the well-established series lives up to expectations, with all four contributions concerning hot areas of research in heterogeneous catalysis.

Nonacid Catalysis with Zeolites is reviewed by I. E. Maxwell (Koninklijke/Shell Laboratorium, Amsterdam), and special emphasis is given to oxidation of CO, alkanes, and alkenes, as well as nitrogen and sulfur compounds, hydrogenation/dehydrogenation, polymerization of alkenes, carbonylation/hydroformylation, and Fischer/Tropsch synthesis of alkanes. A chapter summarizing general conclusions on activity, selectivity, or stability of zeolite catalysts and future prospects rounds off the interesting survey.

Characterization and Reactivity of Mononuclear Oxygen Species on Oxide Surfaces by M. Che (Université de Paris) introduces solid-state ESR and discusses the different oxygen species on oxide surfaces based on the results of this measurement technique.

Sulfur Poisoning of Metals by C. H. Bartholomew (University Provo, Utah) and P. K. Agrawal (Georgia Institute of Technology, Atlanta) deals with metal–sulfur bonds on surfaces, the effect on the adsorption of other molecules as well as on catalytic activity and selectivity, and last but not least, the ways of catalyst regeneration.

Methanol Synthesis by K. Khier (University Bethlehem, Pennsylvania) provides a summary on copper metal, zinc oxide, and mixtures thereof up to the quaternary stage. The concluding chapter elaborates upon mechanistic studies and intermediates involved.

Altogether, this is a quite recommendable book with its well over 800 literature citations. Not only the specialist will benefit from reading this book but also the lecturer or the graduate student looking for nicely presented examples of heterogeneous catalysis.

Hans Bock, *Universität Frankfurt*

Magnetic Atoms and Molecules. By William Weltner, Jr. (University of Florida). Van Nostrand-Reinhold, New York. 1983. xiv + 422 pp. $42.50.

This encouragingly thick volume is a timely study of the geometric, electronic, and spin structure of atoms and molecules with one or more unpaired electrons. It is also a high-level textbook on both the theoretical and experimental aspects of electron spin resonance (not to be confused with electron paramagnetic resonance, cf. pp 219–221) as applied to neutrals and ions in both the gas phase and in matrices. The book starts with the general question of an atom in a magnetic field and presents a thorough discussion utilizing both quantum and classical physics. This chapter, like those that follow, is filled with equations for which key steps in their derivation and understanding are usually given. After the chapter on atoms, Weltner organizes the species of interest by ever-increasing spin multiplicity, i.e., doublets and triplets, and in a catch-all chapter on high-spin proceeds through nonets. For a chemist more concerned with structure than spectroscopy such as the reviewer, this means that some normally related species species are separate while normally disparate species are treated together. In this regard, this book is complementary to many others where all diatomics are together, then triatomics, etc., and so should be a highly useful addition to the library of practicing physical chemists and chemical physicists regardless of research speciality. (Many species discussed should also entrance the more classical inorganic and organic chemist; e.g., CsO and CsF_2—are these divalent cesium?— and the quintet, m-C_6H_4-(C-C_6H_5)$_2$. However the reviewer anticipates that the reading may be rather tough for most of these latter individuals.)

Four additional features make this book highly useful. The first is an extensive use of figures, e.g., Zeeman levels and allowed $\Delta m_S = \pm 1$ transition values of the zero-field-splitting parameter for a plethora of classes of species, e.g., $^5\Sigma$ (Figure V-10) and "real-life" spectra, e.g., Fe^{3+} in a crystalline powder of $NH_4CoEDTA$ (Figure V-22). The second is a collection of extensive tables (over 50) found both in the text and in the appendices. For example, Table C-2 "$^2\Sigma$ molecules: diatomic fluorides and chlorides" contains for each species MX, the trapping matrix, $g_\parallel$, $g_\perp$, $A_\parallel$, $A_\perp$, S_{iso}, A_{dip}, a_s^2, and $a_{p,d}^2$, a brief comment, and the journal citation. For more complicated species, e.g., doublet pyramidal tetraatomic radicals of the type XO_3, there are corresponding tables (in this case C-20) with even more parameters and descriptors. The appendices alone should encourage the reader to acquire this book. There is also an extensive bibliography of both other books (23 entries) and journal articles (ca. 450). Weltner reads and writes extensively. Finally, there is both a subject and an author index that greatly simplify the use of the book. In summary, the reviewer thanks Weltner for this addition to the scientific literature and also thanks the publisher for making this monograph available to more than the narrow research practitioner by opting for an affordable price.

Joel F. Liebman, *University of Maryland Baltimore County*

Reactive Intermediates. Volume 3. Edited by R. A. Abramovitch. Plenum Press, New York. 1983. xiv + 630 pp. $59.00.

It is the intention of the editor of "Reactive Intermediates" (not to be confused with another series with the same title edited by M. Jones, Jr., and R. A. Moss) to provide at irregular intervals up-to-date reviews in relatively new areas of reactive intermediates.

The third volume contains a review of the chemistry of selenium and tellurium atoms (J. R. Marquart, R. L. Belford, and L. C. Graziano). The chapter includes methods of generation, chemical reactions, and, when appropriate, comparisons with analogous reactions of oxygen and sulfur. The known chemistry of these species is extremely limited, and the bulk of the review consists of tabulated data of bond dissociation energies of selenium and tellurium diatomics together with rate data for additions to multiple bonds.

Four chapters deal with various free radical intermediates. These include a chapter entitled Homolytic Aromatic Substitution by Alkyl Radicals (M. Tiecco and L. Testaferri) which covers both synthetic and mechanistic aspects of this increasingly important area of chemistry; Radical Reactions of Silanes (J. W. Wilt), a comprehensive review of silicon-centered radicals including methods of formation, spectroscopic properties, configurational stability, and reactions; Phosphoranyl Radicals (W. G. Bentrude), an intriguing class of tetracoordinate phosphorus-centered radicals reviewed with an emphasis on spectral properties and dynamic stereochemical behavior; and Synthetic Applications and Reactivity of Alkoxyl Radicals (P. Brun and B. Waegell), a timely report summarizing important synthetic methods that involve alkoxyl radicals. This review includes remote functionalization of cyclic and polycyclic alcohols via $Pb(OAc)_4$ oxidations. Bridgehead olefins (G. Szeimies) have been reviewed in a very concise and informative chapter. A final chapter, on Vinyl Cations (Z. Rappoport), attempts to unify and emphasize certain aspects of this area that were not covered in a recent comprehensive book on this subject published in 1979.

The editor has been successful in his choice of topics. The articles are well written and tightly organized. The review provides a valuable introduction to selected areas and timely updates of more mature topics of reaction intermediates.

Kenneth J. Shea, *University of California, Irvine*

Fragrance Chemistry. The Science of the Sense of Smell. Edited by E. T. Theimer. Academic Press, New York. 1982. xiii + 635 pp.

This book is intended as an introduction to the chemistry of odorous molecules. There are 16 chapters, each authored by specialists in their respective fields and written in an instructional fashion. Each chapter is relatively short and provides access to a delightful range of topics, some of which include Physiology of Vertebrate Olefactory Chemoreception, Odor Theory and Odor Classification, and Odor and Stimulant Structure. In these chapters, one finds the organization of smells into various modalities (sweaty, malty, fishy, etc.), attempts at correlating odor and chemical structure, and a discussion of the current theories of olefactory neurophysiology. In the section on the analysis of fragrance materials, it is refreshing to note that there are no satisfactory substitutes for the trained nose, a fact that makes individuals possessing such talents in high demand.

The chapters that follow contain discussions of classes of compounds that are of commercial importance in the fragrance industry. These include the Monoterpene and Sesquiterpene Alcohols, Violet Fragrance Compounds, The Fragrance of Jasmine and Sandalwood, Natural and Synthetic Musks, and the Fragrance of Ambergris. Each chapter provides information regarding the sources of these materials, the chemical composition, isolation, and, in many cases, synthesis of either natural or synthetic derivatives. It can serve, therefore, as a useful source for important synthetic targets.

I found this book informative and very enjoyable reading. It clearly satisfies the intended objective of the editor and provides the reader with a very accessible introduction to the business of fragrant and not so

*Unsigned book reviews are by the Book Review Editor.

fragrant organic compounds.

Kenneth J. Shea, *University of California, Irvine*

The High Nitrogen Compounds. By Frederic R. Benson (ICI Americas, Inc.). John Wiley and Sons, New York. 1984. viii + 679 pp. $125.00.

Chains of three or more nitrogen atoms have had a special fascination ever since Peter Griess' discovery of triazenes in 1859. In the ensuing score of years and a century, compounds with chains as long as ten nitrogen atoms have been characterized. They may all be considered as derivatives of parent hydronitrogens, open chain or cyclic, very few of which are known unsubstituted. Although high-nitrogen compounds have been the subject of several chapter-length reviews, this is the first book to be entirely devoted to them and to include both cyclic and acyclic structure in its scope.

The author's purpose is to describe the nature of high-nitrogen compounds, including the many types that have been found to exist, their physical, chemical, and biological properties, and their uses. The treatment he gives is intended to be "illustrative and representative but not exhaustive". The book begins with a chapter of book length in itself: The High Nitrogen Population—Existence, Structures and Thermal Stability, in which compounds from the triazanes to azotetrazoles are systematically surveyed, with not less than 1215 references. Another chapter deals with physical and physicalchemical properties, including structural parameters, thermochemistry, explosive properties, acidity and basicity, and spectroscopy. A short chapter is devoted to uses, from inhibition of corrosion, through plastics, textiles, photography and reprographics, and explosives, to lamps and vacuum tubes. Another short chapter covers agricultural and pharmaceutical uses and toxicity. The book closes with two substantial chapters, on Reactions and on Synthesis. The subject index is 17 pages long, but it is not as thorough as one might wish; for example, the Curtius rearrangement of acyl azides cannot be found under any of the first three key words, but it is listed under Azides, acyl (and even then, the principal page numbers are not given under "Curtius"). Diphenyltriazene is found only under the name "diazoaminobenzene", unlike the many other specific triazenes indexed under "Triazene". Futhermore, its rearrangement to aminoazobenzene is not indexed under the product or either name for the substrate, but under "Triazenes, diaryl".

With the large amount of information to be presented, it is not surprising that interpretation is highly limited, and critical discussions should not be expected. Such matters as the controversial mechanism of cyclization of aryl azides bearing unsaturated ortho substitutents are not treated, for example. On the other hand, tables of data abound, and structural formulas are abundant and clear. The organization of the chapter on syntheses, which is divided into "formation of N,N bonds" and "cyclization with intact nitrogen chains", makes it rather difficult to find out how to make a desired type of compound and has led to some unfortunate omissions. For example, although several methods to make aryl azides are to be found, inconveniently scattered, the real work-horse method, reaction of diazonium salts with hydrogen azide, is not mentioned in the chapter on synthesis and is not included in the index. It appears in the book only in connection with the decomposition of pentazoles, without indication of its preparative importance. Similarly, there is no reference of synthesis of acyl azides in the index, and if it is included in the text, it is well hidden. In spite of these deficiencies as a reference work, this book is valuable as a wide-ranging introduction to an intriguing area of chemistry.

Survey of Drug Research in Immunologic Disease. Volume 3. Part II: Noncondensed Aromatic Derivatives. By V. St. Georgiev (Pennwalt Corp.). S. Karger AG, Basel. 1983. x + 582 pp. $293.50.

This work is somewhere between an encyclopedia and a dictionary, for it consists of a series of succinct entries for specific compounds. For each is given the structural formula, the preparative route, and the biological activity, with emphasis on effects on the immune system. Key references are included. The arrangement is according to structure, and this volume covers halo compounds and nitrogen-containing compounds. The literature cited comes from a wide range of sources, including patents. Synthetic schemes are presented with enough detail to be instructive; conditions are included, as well as all reagents. The utility of this work is greatly enhanced by four indexes: author index; chemical subject index; biological subject index; and biological activity cross index. The last is especially useful, for by its means one can start with a given type of activity—say, anti-inflammatory—and find set out in clear structural formulas the types of structures and the specific compounds that have been found to possess it. That is, one does not need to go back to a page in the text for such basic information, for it is there in the index, along with the page number where more detail may be found.

This book is an excellent tool for reference, but it is also valuable for general orientation. Much can be learned by browsing in it. The layout makes direct visual retrieval easy. Chemists even remotely concerned with pharmaceutical chemistry should have access to it.

Organic Reactions. Volume 30. Edited by W. G. Dauben. John Wiley and Sons, New York. 1984. ix + 579 pp. $54.50.

The trend in this classic series continues in the direction of smaller numbers of longer chapters. Volume 1, still useful after 44 years, contained 12 chapters, whereas this newest volume has but 2. This must be at least in part due to the greater experimental productivity of chemists that has developed out of new methods and instrumentation. Even so, one cannot help but be impressed by the sheer size of a chapter 456 pp long: Photocyclization of Stilbenes and Related Molecules, by F. B. Mallory and C. W. Mallory. It is the tabular survey of reported examples that produces the size; it takes up two-thirds of the chapter. Although it is a chapter that will particularly delight the phenanthrene chemist, it also contains much for those who find their pleasure amongst heterocycles.

The other chapter is Olefin Synthesis by Deoxygenation of Vicinal Diols, by E. Block. It surveys a subject that originated in 1963 with the discovery of the desulfurative fragmentation of dioxolanethiones by phosphines, and it has grown to embrace a wide variety of heteroanalogues of 1,3-dioxolanes, with capabilities for stereospecific synthesis. The tabular survey occupies 42 pp.

The mix of mechanism, scope, and experimental method that has been successful from the inception of this series is continued. Cumulative author and chapter/topic indexes guide one to the content of the previous 29 volumes, and a brief index to this volume supplements the Table of Contents.

Chemistry of Heterocyclic Compounds in Flavours and Aromas. Edited by G. Vernin (National Centre of Scientific Research, Marseilles). Ellis Horwood Limited, Chichester. 1982. 375 pp. $89.95.

The first chapter of this book deals with the origin of the precursors which react to generate the compounds responsible for the sensations of taste and smell. While it is virtually impossible to do justice to this topic for all foods, it does provide a resonable number of examples and introduces the reader to the many processes which lead to these flavor compounds, i.e., fermentation, thermal processing, etc.

Chapter 2 reviews the various classes of heterocyclic compounds present in foods which, with the extensive references at the end of the chapter, provides an excellent review for those readers interested in this field. Chapter 3 discusses the mechanisms of formation of these heterocyclic compounds, while Chapter 4 offers an excellent review of the synthetic methods used to prepare these compounds.

Chapter 5 elaborates upon the use of computers to suggest or predict potential structures which might arise from the combination of simple substrates. This chapter is primarily of theoretical interest since food systems are far more complex, containing hundreds of compounds which may interact with each other. All of the examples given involve no more than three initial substrates.

Chapters 6 and 7 deal with isolation and identification, respectively, as applied to the field of flavor research, while Chapter 8 completes the book with a discussion of food legislation in both the United States and the European community and the differences between them.

Overall, this is an excellent book for anyone involved in the flavor industry, whether they are synthetic or analytic chemists, researchers, or those responsible for making decisions involving our food system. This volume would make an excellent work for a special topics course in either the food science or graduate chemistry curriculum; however, the price may exclude this possibility.

W. N. Zeiger, *McCormick & Company, Inc.*

Circular Dichroic Spectroscopy: Exciton Coupling in Organic Stereochemistry. By N. Harada (Tohoku University, Japan) and K. Nakanishi (Columbia University). University Science Books, Mill Valley, CA. 1983. xiii + 460 pp. $32.00.

The 12 chapters in this book cover the theory and application of circular dichroic spectroscopy to some organic molecules. The first chapter reviews basic spectroscopic principles in a language understandable to an organic chemist and introduces the reader to the coupled oscillator theory which is developed into a general exciton chirality method by the authors. The subsequent 8 chapters apply the exciton chirality approach to a large variety of organic molecules containing electronic transitions of chromophores suitable for a theoretical interpretation. The first 9 chapters seem to be written with an admitted slant toward organic chemists and contain a convenient source of circular dichroism data to demonstrate the usefullness of this method for determining the absolute configurations of some organic compounds. The last 3 chapters and part of the Appendix are completely devoted to a theoretical understanding of the oscillator theory and require some familiarity

with quantum mechanics. The authors seem to have successfully bridged the gap between theory and experimental data by analyzing many circular dichroism spectra of organic and bioorganic molecules from their laboratory as well as others with the exciton chirality method.

This book is a valuable asset for a better understanding of chiroptical properties of some organic systems and should serve to stimulate interest in an old research area still governed by a large degree of empiricism.

Albert M. Bobst, *University of Cincinnati*

The Fischer Indole Synthesis. By Brian Robinson (University of Manchester). John Wiley & Sons, Inc., NY. 1982. xi + 983 pp. $200.00.

Professor Robinson has indicated in his Preface that this work is intended to be "a fully comprehensive survey of the present state of knowledge concerning the Fischer Indole Synthesis". Such a survey has long been needed and sought, and Robinson's work serves the purpose most admirably. He further declares his intention "to emphasize the three main features of the reaction ... its development, the clarification of its mechanism ... and the utilizability of it and its extensions in the synthetic process". Again, he has been fully successful. He has made use of his critical faculties in assessing whether certain questionable examples of the reaction should be included, but otherwise he has tried to "refer to all known examples of the reaction which have been published" from its discovery to 1981. References at the end of the volume, at a crude guess, number 2200–2300.

If all of this gives the impression of a monumental work, the impression is correct. It is remarkable, in fact, that it was accomplished in just over 800 pages of actual text and tables. But some sacrifices have been made, doubtless in the interest of saving space, which often make this a difficult book to read. The need to search through preceding pages to find a structure whose number appears in a formula sequence or in the text itself is time consuming and often frustrating. The practice of citing references in the text by authors' name rather than by number does serve to give credit where it is due, but it also injects numerous interruptions into what would otherwise be a smoothly written narrative. Furthermore, the absence of reference numbers makes it all but impossible for the reader to locate in the book the treatment of one or more specific papers by any author. Although the index appears to be quite satisfactory, an index of tables would have been welcome; the very extensive Tables 31–33 should prove exceptionally useful to those who may wish to know whether a certain arylhydrazine or ketone moiety has been studied or what reagents and conditions have been employed. They and other useful tables would be more readily accessible via an index.

Although casual observation might suggest that Professor Robinson has served as an extraordinarily capable reporter but little more, more careful reading discloses that he has exercised a keen critical ability in an uncommonly subtle and unobtrusive style. His purpose has been to show not only what has been done but also what remains to be done, and this, too, he has achieved without resorting to polemics.

Some of the foregoing observations suggest that this is not a book for the casual reader, and it probably was not intended to be so. But whether a student or an investigator wishes to know a little or a lot about the Fischer Indole Synthesis, it is located between the covers of this book, it has been reported accurately, and it is located in context. These qualities make the book a treasure, and I commend it as such.

Robert B. Carlin, *Carnegie-Mellon University*

Chemical Mutagens: Principles and Methods for Their Detection. Volume 8. Edited by Frederick J. deSerres (National Institute of Environmental Health Sciences). Plenum Press, New York. 1983. xiv + 386 pp. $45.00.

Toxic chemicals in our air, food, and water demand much of the attention of the public, media, and scientific community, but an equally serious, though less visible, threat is posed by chemicals that cause genetic damage. As stated in the Introduction to the first contribution to this volume, "the central issue in genetic toxicology is whether environmental agents are inducing mutations in people and thereby pose a threat to human health". The nine working papers in this volume (a tenth publishes the Council of European Communities Amended Directive on Dangerous Chemical Substances) cover a wide range of topics in this continuously changing discipline. Contributors from five nations represent each of the major players in this field—government, industry, and academia. As the title suggests, the major emphasis here is on human effects, primarily the detection, rather than the mechanism, of mutation.

Because different chemicals can produce variable proportions of the different types of genetic injury, it is hardly surprising that no one analysis has proven adequate for the detection of all mutagenic substances. Methods discussed here include detection of genetic damage at specific loci (genetic and nongenetic sites), on entire genomes, and on cellular morphology. The well-referenced chapters cover detection of mutagenic effects in human populations, use of intact cellular activation systems as mutagenic assays, prediction of heritable mutations by the mouse spot test, reexamination of the bone marrow micronucleus assay, measurement of recessive mutations in mice, chemically induced changes in mammalian sperm, and mutagenesis in cultured hamster–human hybrid cells. Of special interest to the chemist are chapters on structure–mutagenic activity relationships for monocyclic aromatic amines and a comprehensive literature review tabulating the known genetic toxicology of some known and suspected carcinogens.

Unfortunately, the narrow language of the specialist limits the potential audience. The eighth volume of this series will find its greatest use as a sourcebook for geneticists and environmental pollution toxicologists concerned with the chronic and insidious insults to human genetic integrity.

David N. Clark, *IIT Research Institute*

Basic Chemical Thermodynamics. 3rd Edition. By E. B. Smith (Oxford University). Clarendon Press, Oxford. 1982. xii + 160 pp. $21.95 (cloth); $9.95 (paperback).

This brief, clearly written introduction to basic chemical thermodynamics is listed as publication 31 of the Oxford Chemical series. The only significant change between the second and third edition is the addition of a 27-page chapter entitled The Molecular Basis of Thermodynamics. The first 8 chapters, their exercises, and 33 problems are little changed from the second edition.

The early chapters introduce mechanical equilibrium, physical and chemical equilibriums, and the factors that effect equilibrium. The determination of thermodynamic quantities, the Gibbs energy change, and free energy functions are discussed and applied to equilibrium problems. Ideal solutions and ideal gases are well covered. Non-ideal solutions and gases are briefly introduced, and the concepts of activity and fugacity are applied to a few simple systems. Heat and work are defined consistent with $\Delta U = q + w$. SI units are stressed with volumes in m^3 and pressures in N m^{-2}. Pressure units of atm and mmHg are retained in some exercises and problems.

The new chapter on the molecular basis of thermodynamics is a welcome addition. The first part of the chapter maintains the informal logic of the earlier chapters, but the last part of the chapter is not as successful. The treatment of ideal gas partition functions, molar thermodynamic functions in terms of the molecular partition function, and their application to equilibrium are covered in 12 detailed pages.

Overall, the book is a successful introduction to chemical thermodynamics. The author's goal "to give the beginner some familiarity with the concepts of thermodynamics and a knowledge of thermodynamics he will use in the laboratory" is well met. Chemistry majors in the USA would find the trauma of physical chemistry reduced if they would take the time to read the book prior to starting their junior/senior course in the subject.

H. Lawrence Clever, *Emory University*

Topics in Current Chemistry. No. 90. Plasma Chemistry II. Edited by S. Vepřek (University of Zürich) and M. Venugopalan (Western Illinois University). Springer-Verlag, New York. 1980. 121 pp. $46.80.

This book consists of two review articles of almost equal length but on quite different subjects. Indeed, it is hard to imagine two much more disparate topics within the general area of plasma chemistry.

The article on Plasma Chemistry of Fossil Fuels by M. Venugopalan, U. K. Roychowdhury, K. Chan, and M. L. Pool (Western Illinois University) describes the effects of low- and high-frequency discharges, arcs, and plasma jets on coals, petroleum and petroleum byproducts, and natural gas. The objective of much of the work described has been to find ways of processing fossil fuels into useful organic chemicals or of purifying substances (e.g., desulfurizing petroleum). Consequently, most of the article is devoted to a summary of essentially empirical observations (equipment used, experimental conditions, substances formed). While a short final section makes some comments on problems and general features of the work described, the review is otherwise generally uncritical; this reticence is perhaps understandable in view of the evident complexity of much of the underlying physics and chemistry. The literature has been extensively surveyed, and there are 313 references up to 1978. This article will be of value to the industrial chemist or technologist seeking a clear overview of work related to the processing of fossil fuels. However, the organic or physical chemist interested in, e.g., the structure or basic chemistry of coal- or petroleum-related substances, will, I feel, find little to attract his or her attention.

The second article, Kinetics of Dissociation Processes in Plasmas in the Low and Intermediate Pressure Range, is by M. Capitelli and E. Molinari (University of Bari, Italy). It is largely devoted to modeling the dissociation of diatomic molecules, especially hydrogen, in weakly ionized plasmas. However, applications to the dissociation of carbon dioxide, ammonia, and simple hydrocarbons are also briefly described.

Electron energy distributions are calculated by solving the appropriate Boltzmann equation, while the dissociation and recombination kinetics are treated by a master equation approach. The predictions of the models are compared with experimental data, where available. A large part of the work described comes from the group at Bari which has, indeed, contributed much of the research in this area. The authors keep close to plasma studies and do not relate their models to the many master equation studies which have been made of thermal and laser-induced dissociation processes. The article includes 77 references up to 1979. This well-written account will be of interest to chemists and chemical physicists, especially those concerned with fundamental aspects of chemical reactions and molecular energy transfer processes in plasmas, and nonequilibrium problems in chemical kinetics.

John E. Dove, *University of Toronto*

Monte Carlo Applications in Polymer Science (Lecture Notes in Chemistry 27). By Wolfgang Burns (Technical University, Berlin), Ioan Motoc (Chemistry Research Center, Timisoara, Romania), and Kenneth F. O'Driscoll (University of Waterloo). Springer-Verlag, Berlin, Heidelberg, New York. 1981. ii + 180 pp. $16.20.

Monte Carlo calculations offer the polymer chemist a convenient, often simple, method for simulating complex chemical and physical phenomena. They are applicable to problems that can be formulated conceptually but not in readily soluble mathematical terms. Unfortunately, many polymer chemists do not appreciate the simplicity, scope, and power of Monte Carlo calculations. The presently considered book may help to correct this. It consists of four chapters, written by three individuals who have done substantial Monte Carlo programming. Chapter 1 describes the Monte Carlo method, the generation of random numbers, and the accuracy of Monte Carlo calculations. Applications of the Monte Carlo method to chemical problems, including the distribution of solvent around biopolymers, modeling of polymer modification reactions, modeling of linear and nonlinear step-growth polymerizations, and calculation of the homogeneity of copolymers are covered.

Chapter 2 is devoted entirely to calculations of monomer-unit-sequence distributions in copolymers and terpolymers prepared by either reversible or irreversible polymerization processes. The related problem of stereosequence distribution calculation is also discussed. Chapter 3 concerns the calculation of polymer chain conformations, end-to-end distances, radii of gyration, etc. These chapters contain introductory material showing non Monte Carlo approaches to some of these problems and in some cases the results of the various approaches are compared.

Chapter 4 contains FORTRAN listings of various Monte Carlo programs generated by the authors and sample output. Unfortunately, the programs contain limited documentation and they call subroutines that are often unexplained ASSEMBLER routines or unlisted FORTRAN subroutines. ASSEMBLER programming is also dispersed among some of the programs, without comment or explanation. In spite of these limitations, the reader can learn much about Monte Carlo programming by working through these programs.

If this book had a more elementary introduction, it could be recommended as an introductory text. It is more advanced than this, but readers wanting to begin Monte Carlo programming can utilize references cited in this work for introductory information. This book has been carefully prepared and it certainly meets the objectives of the "Lecture Notes in Chemistry" series.

H. James Harwood, *The University of Arkon*

Chemical Demonstrations. By Bassam Z. Shakhashiri (University of Wisconsin). University of Wisconsin Press, Madison. 1983. XXIV + 341 pp. $20.00.

This book is presented as Volume I, the first in a series of lecture demonstrations for chemistry. It contains directions for the presentation and interpretation of 81 lecture experiments. Of these, 45 deal with thermochemistry, 11 with chemiluminescence, 14 with polymers, and 11 with color and equilibrium in metal ion complexes.

The system used for classification of the demonstrations described is based on *prominent observable phenomena.* This excellent idea is used in the table of contents and throughout the text.

For each of the demonstrations presented, there is a descriptive title followed by (1) a very brief summary of the experiment, (2) a detailed materials list, including amounts of chemicals, and an apparatus list, including specifications as to size, (3) a step-by-step account of the procedure to be used, (4) an explanation of hazards involved, (5) a discussion of storage or disposal of chemicals produced, and (6) a discussion of the reactions demonstrated and their meaning.

Items 4 and 5 are supported by a list of sources of information on hazards and disposal (page XXIV). In addition, many demonstrations in the text include information on hazards and, or, disposal. In item 6, explanations may be very brief, or in some cases, very detailed. In any case the explanations section is supported by references listed in the text.

Section 1 (pp 3–132), Thermochemistry, for the most part consists of well-known and often-used demonstrations. In this section there are few specific references crediting the origin or source of the demonstrations. A general list, Sources Containing Descriptions of Lecture Demonstrations, is given on pages XXII and XXIII, but this list fails to mention (a) H. F. Davidson, "A Collection of Chemical Lecture Experiments", The Chemical Catalogue Company (1926), (b) Paul Arthur, "Lecture Demonstrations in General Chemistry" (International Chemical Series), McGraw-Hill (1939), and (c) specific citation of the Demonstration Abstracts section (prepared from the *Journal of Chemical Education* (1924–1959)), to be found in Alyes and Dutton, "Tested Demonstrations in Chemistry", 6th ed., pp 53–139. Section 1 concludes with a list of demonstrations considered by the authors as too hazardous for public presentation.

In Section 2, Chemiluminescence, and in later sections, the plan for presentation of the demonstrations is the same as in Section 1. However, in these later sections and especially in Section 2, the paragraphs devoted to "discussion" are more detailed and are supplied with a more useful list of references than the discussions in Section 1.

This book, and this proposed series, is a welcome addition to the chemical demonstration literature. One might hope to see a more thoughtful listing of references to prior art in future volumes.

L. Carroll King, *Northwestern University*

The Physics and Chemistry of Color: The Fifteen Causes of Color. By Kurt Nassau (Bell Laboratories). John Wiley & Sons, New York. 1983. xi + 454 pp. $43.95.

Nassau presents an extensive treatment of the origin and nature of color, discussed largely from the dual vantage points of chemistry and physics but with solid components of history, poetry, biology, and esthetics added in. He presents in a logical fashion 15 causes of color: incandescence, gas excitation ... transition metals in a ligand field, organic molecules, ... interference and diffraction, each in its own chapter. The book is explicitly intended as both a monograph and a textbook "requiring no specialized knowledge since all concepts are discussed". Regrettably, though not surprisingly, this last promise is not fulfilled—the reviewer believes there is no way for the unknowledgable or even forgetful to proceed from the rudiments of atomic structure (e.g., "The simplest atom ... consists of a negatively charged electron in orbit around a nucleus composed of just one proton, having a single positive charge" (p 384)) to the mechanisms of fluorescence and phosphorescence (p 403), Orgel diagrams (p 414), and Brillouin zones (p 423). While these topics are admittedly put in appendices, they are but invitations to more extensive treatments. The reviewer feels, why bother? Even for a refresher or review for the reader they are too brief. There are also a disproportionate number of errors in chemical structures and nomenclature, most notably of organic compounds in Chapter 6. These errors are the dual responsibility of the author and the publisher—it is the latter's duty to have an interdisciplinary book such as this read by both an organic chemist and chemical physicist (if not also an inorganic chemist and solid-state physicist) prior to setting the book in print. Indeed, this suggests that this book could be used as a textbook in a graduate physical chemistry course for organic chemists who want a rather qualitative understanding of modern physical chemistry and physics. Cleaning up the organic chemistry would allow this book to be used by physical chemistry and physics students to learn some "colorful" aspects of modern organic and inorganic chemistry. Nassau has written a pretty book and an interesting one—will the publishers please clean it up in the next printing to also make it more useful?

Joel F. Liebman, *University of Maryland Baltimore County*

Diuretics. Chemistry, Pharmacology, and Medicine. Edited by Edward J. Cragoe, Jr. (Merck Sharp and Dohme). John Wiley & Sons, New York. 1983. xviii + 694 pp. $80.00.

This addition to a new series of monographs, entitled *The Chemistry and Pharmacology of Drugs*, covers, quite comprehensively, the development of diuretic agents since the early 1960's. The book is directed at medicinal chemists, biologists, and physicians interested in agents affecting renal function.

A brief introductory chapter by Dr. Cragoe giving some perspective on the historical and clinical significance of the diuretic class of compounds is followed by Chapter 2, Basic Principles of Renal Physiology and Pharmacology, by Edward H. Blaine (Merck). This succinctly written overview serves as a basis for understanding the basic mechanisms of action of the diuretics discussed in the remainder of the book.

The remaining ten chapters are devoted to an in-depth treatment of both experimental and clinically useful diuretics. The medicinal chemistry background of the editor and the two other authors contributing to this section, Richard C. Allen (Hoechst-Roussel) and Robert L. Smith

(Merck), is quite evident in the way the chapters are organized as well as in their content. The diuretics discussed are categorized according to chemical structure, and the bulk of the text is devoted to a rather extensive description of structure–activity relationships. The chapters are rich with tables of the relative activity of homologous series of compounds. Additional well-referenced comments on the pharmacology of the most active agents or those investigated clinically are presented. Allen begins this series of chapters with an excellent, comprehensive (124 pages with 722 references) treatment of sulfonamide-related diuretics. Seven of the remaining nine chapters were authored by Cragoe and include discussions of diuretics of the (aryloxy)acetic acid, pyrazine, and various heterocyclic families as well as a "catch-all" chapter of various diuretic compounds defying categorization into one of the major chemical subclasses. Dr. Cragoe's knowledge of and experience in the development of diuretic agents comes across nicely in these well-written chapters that contain a significant number of references to his original studies. The two remaining chapters, 2-Aminomethylphenols: A New Class of Saluretic Agents and Endogenous Agents Affecting Kidney Function: Their Interrelationships, Modulation, and Control, were authored by Smith. The latter of these, describing the basic functions and recent approaches to pharmacological intervention of the ADH, prostaglandin, renin-angiotensin, and kallikrein-kinin systems, provides an excellent introduction into these currently popular research areas.

In summary, this is destined to become a classic reference book on the medicinal chemistry of diuretics and should prove particularly invaluable to those actively engaged in the development of new diuretic agents.

Thomas J. Mangner, *The University of Michigan*

Solid Phase Biochemistry. Analytical and Synthetic Aspects. Edited by William H. Scouten (Bucknell University). John Wiley and Sons, Inc., New York. 1983. xiv + 779 pp. $75.00.

This book is Volume 66 in the series "Chemical Analysis: A Series of Monographs on Analytical Chemistry and its Applications (Edited by P. J. Elving and J. D. Winefordner; I. M. Kolthoff, Editor Emeritus). The editor, Dr. Scouten, states in the preface that this book is to provide an introduction and review of solid-phase biochemistry. Indeed, it does this quite well. Subjects covered include affinity chromatography (particularly using immobilized dyes, borate, or nucleic acids), affinity electrophoresis of glycoproteins, immobilized enzymes, immobilized enzyme electrode probes, solid-phase peptide and DNA synthesis, immobilized cells, the activation of polysaccharide resins by CNBr, immobilized protein moification reagents, and the utilization of controlled pore glass. The chapters on immobilized enzymes, affinity chromatography on immobilized dyes, and peptide synthesis are particularly good. Overall the book is well written, and the subjects are presented such that they could be understood easily by somebody with a background that might be expected of a first-year biochemistry graduate student.

"Solid Phase Biochemistry" is an excellent reference book for beginning and intermediate researchers alike. It has a good balance of general information on advances in the field and of specific strategies and methodologies employed in solving particular problems. Each chapter is well referenced; the entire book contains almost 3000 references.

H. N. Bramson, *The Rockefeller University*

Adsorption on Metal Surfaces: An Integrated Approach. Edited by J. Bénard, with, as co-authors, Y. Berthier, F. Delamare, E. Hondros, M. Huber, P. Marcus, A. Masson, J. Oudar, and G. E. Rhead (Université Pierre et Marie Curie). Elsevier Scientific Publishing Company, Amsterdam and New York. 1983. x + 338 pp. $83.00.

This book is the unusual product of a collective effort by the members of the Laboratory of Surface Physical Chemistry of the National School of Chemistry at the Pierre and Marie Curie University in Paris. This is indeed a rare treat at a time when edited books have become the norm and consist all too often of a loosely connected collection of heteroclite chapters by authors who hardly know each other's work, write in different styles, and work for an indifferent editor who does not see the forest for the trees. Thus the book of Professor Bénard, who has headed this laboratory for more than 20 years and steered it early and successfully into the age of ultra-high-vacuum and electron spectroscopies, is a rare treat, almost in the spirit of the French textbook series in mathematics attributed to a mythical Bourbaki but actually also a collective work. The anomaly of the effort of Bénard et al. is even more singular if viewed in the conventional context of surface science, which I consider frequently as science in a vacuum, because so many workers in the field are virtuosi of an instrument but play solo exclusively, totally oblivous of the scientific orchestra around them. But in the book of the Bénard school, written with an unusual uniformity of style, the methods of surface science are brought to bear on adsorption, equilibrium, structure and kinetics, surface composition, epitaxial growth, interfacial phenomena, surface diffusion, catalysis on single crystals, electrochemical surface properties, grain boundaries, contact, adhesion, and friction. What a menu! Yet, with eight collaborators listed on the front page but not at the head of any of the ten chapters, this rich fare is offered in only 338 pages of highly readable copy. Anyone interested in knowing what has happened to surface chemistry since 1960 must look at this book. It is difficult to resist the temptation of reading it.

M. Boudart, *Stanford University*

Chromatographic Analysis of the Environment. Second Edition. Revised and Expanded. Edited by Robert L. Grob (Villanova University). Marcel Dekker Publishers, New York and Basel. 1983. X + 724 pp. $95.00.

This book provides an excellent overview of the complexity of the environmental analytical problem and the various chromatographic tools that are available to the analyst. The book is organized into four parts—air, water, soil, and waste pollution—with each part including a chapter on gas, liquid, and thin-layer chromatography. In addition, there are chapters on chromatographic theory, environmental sampling and preparation of standards, ion-exchange methods, and paper chromatography.

This reviewer is pleased to see a separate chapter on environmental sampling and preparation of standards. The difficulty of executing these two tasks properly is what differentiates environmental from the other disciplines of analytical chemistry. The increase in the frequency with which environmental analytical data appear in both private and government litigation and regulatory actions forces the analyst to accomplish the difficult task of producing results that are truly "representative" of the bulk sample, which more often than not is in a dynamic situation. No matter how precise the instrumental portion of the analysis is, the results are useless if the sampling protocol was faulty. This chapter also addresses the problems encountered in producing reliable standards for dynamic and static air analysis and the equally difficult task of generating reliable low-level (nanogram and picogram range) standards for soil and water analysis.

The chapters that address the different types of chromatography in the various environmental matrices present many specific examples of techniques along with comprehensive tables that will enable the researcher to compare various methods and choose the best technique for a specific problem. The chapters on liquid chromatography illustrate the dual role that this technique plays in environmental analysis, i.e., both sample cleanup and preparation and component detection can be accomplished with HPLC.

The contributors to this edition are from the academic, private, and government disciplines, providing a broad perspective on environmental chromatography.

Considering the large amounts of both time and funds currently allocated to environmental analysis and the rapidity with which new protocols are being developed and implemented this new edition should be well received by all environmental professionals.

Paul S. Epstein, *Environmental Research Group, Inc.*