

Book Reviews*

Organoboron Compounds in Organic Synthesis. By B. M. Mikhailov and Yu. N. Bubnov (N. D. Zelinsky Institute of Organic Chemistry). Harwood Academic Publishers: GmbH. 1984. xxxiv + 781 pp. \$224.00. ISBN 3-7186-0113-3.

This monograph on the chemistry of organoboron compounds is a translation from the original Russian, which was first published in 1983. The book is a veritable encyclopedia of organoboron chemistry in that nearly all aspects of the chemistry of the boron-carbon bond are covered. Hydroboration is extensively covered in Chapters 2 and 3 (192 pages). Following these are several chapters covering the conversion of the boron-carbon bond to alcohols, ketones, halides, and amines (68 pages). The subsequent seven chapters deal primarily with the application of organoboranes to carbon-carbon bond formation. The remaining 40% of the book covers the synthesis and reactions of boracyclanes (132 pages), alkenylboranes, allylboranes, and alkynyl- and allenylboranes (200 pages).

Even though literature coverage for each chapter is excellent, the book is somewhat dated in that literature coverage past 1980 is almost nonexistent. However, the book is an excellent resource on organoboranes and their reactions and should prove generally useful.

Peter G. M. Wuts, *The Upjohn Company*

Methods in Enzymology. Volume 108. Immunochemical Techniques, Part G, Separation and Characterization of Lymphoid Cells. Edited by G. Di Sabato (Vanderbilt University), J. J. Langone (Baylor College of Medicine), and H. Van Vunakis (Brandeis University). Academic Press, Inc.: Orlando, FL. 1984. xxvi + 750 pp. \$69.50. ISBN 0-12-182008-4.

The explosion of knowledge in the field of cellular immunology that has occurred during the last quarter-century has been paced by the breathtaking advances in the methods and techniques which are the tools of the cellular immunologist. This excellent volume represents an attempt to prepare a compendium of the experimental procedures that have served the immunologist so well during that time. Virtually all of the tried-and-true procedures are described, in many cases by the originators and in all cases by leading experts. The coverage is both broad and current, or at least as current as is possible in the preparation of a work to which so many authors have contributed. The first five chapters cover selected surgical and engraftment procedures. The second section of 31 chapters deals with methods for separating and enriching sets and subsets of lymphoreticular cells. These include the various procedures for separating T-lymphocytes and B-lymphocytes, granulocytes, monocytes, and macrophages. There are chapters concerned with techniques for radioactive thymidine suicide and selective cytocide by use of 5-bromo-deoxyuridine and light. In addition, this section contains chapters that describe separation of cells by electrophoresis, countercurrent centrifugal elutriation, and fluorescence-activated cell sorting. In the third section of this volume, the reader will find six chapters that deal with lymphocyte surface immunoglobulins. The reviewer opines that the chapters that will attract interest especially are those concerned with patching and capping of surface immunoglobulins, the use of fluorescent antibodies to analyze surface membrane macromolecules, and the selective radiolabeling and isolation of membrane-bound immunoglobulins. The fourth and final section of the book contains 18 chapters devoted to methods for the purification and characterization of lymphocyte surface antigens; in particular, these chapters deal with antigens encoded by genes of the major histocompatibility complex of mouse, rat, and human. With one exception, the chapters that are concerned with characterization of the antigens describe methods used for protein analysis and characterization. Only in the case of the chapter concerned with rat histocompatibility antigens is there an extensive discussion of histocompatibility gene cloning. This comment is not intended as a criticism but rather as an observation that currently (within the last 2 to 3 years) the investigation of the molecular complexity of histocompatibility antigens has come to rely heavily on gene cloning, restriction mapping and nucleotide sequencing.

For no reason other than the startling rate of advancement of the field, the current major tools of the cellular immunologist are treated rather lightly in this volume. For example, the use of fluorescent monoclonal antibodies and the fluorescence-activated cell sorter has replaced (or soon will replace) the favorite "old" methods for separating and isolating subsets of lymphocytes and macrophages. Therefore, the next generation

of immunologists will find much that is written in this volume to be primarily of historical interest. Procedures, like paradigms, rise and fall; indeed, the rise of the former may contribute to the fall of the latter. Cellular immunologists, over age 40, will lament the passing of many old, familiar techniques that are described in this volume even as they re-train in the use of the new ones.

Julia W. Albright, *George Washington University School of Medicine*

Sodium Dihydrido-bis(2-methoxyethoxy)-aluminate (SDMA). A Versatile Organometallic Hydride. (*Journal of Organometallic Chemistry Library 15*). By O. Strouf and B. Casensky (Institute of Inorganic Chemistry of the Czechoslovak Academy of Sciences, Prague) and V. Kubanek (Institute of Macromolecular Chemistry of the Czechoslovak Academy of Sciences, Prague). Elsevier Science Publishers: Amsterdam and New York. 1985. 230 pp. \$72.25. ISBN 0-444-99592-7.

This book has an introduction and three main chapters covering (a) The synthesis, properties and reactivity of SDMA (also Vitride or Synhydride), (b) Applications of SDMA in Organic Chemistry, and (c) Applications of SDMA in polymer chemistry.

The chapters are thorough and well organized for ready reference. The methods for safe handling, analysis, and overall safety of the reagent are dealt with in a detailed manner as are the various syntheses.

The chapter on applications in organic chemistry accounts for 164 of the total pages and is a gold mine of concentrated information. The tables are designed to efficiently help the organic chemist choose the solvent and reaction conditions for a reduction using SDMA. The tables include solvent, temperature at which the reduction was run, reaction time, concentration of the SDMA solution (said to be an important factor), mode of addition, product structure, and yield. The authors also distinguish between isolated preparative yields and those estimated by gas/liquid chromatography. A professional feature is the instances when a different hydride is quoted as superior to SDMA.

The major utility of a hydrocarbon-soluble, relatively safe hydride reagent such as SDMA should make this book of general interest to persons and organizations engaged in hydride reductions and polymerizations.

Donald E. Butler, *Warner Lambert/Parke Davis Research*

Ion-Pair Chromatography: Theory and Biological and Pharmaceutical Applications (Chromatographic Science Series, Volume 31). Edited by Milton T. W. Hearn (University of Melbourne). Marcel Dekker: New York, NY. 1985. ix + 294 pp. \$65.00. ISBN 0-8247-2722-5.

In theory, ion-pair chromatography can be used to separate complex mixtures of both neutral and ionic compounds. However, due to its inherent complexity, it has not been considered by many chromatographers to be the method of choice. Thus, the timely publication of this book clarifies several theoretical and practical problems in ion-pair chromatography.

The book contains six chapters, all written by leading experts in the field. The first chapter is an overview of some basic concepts and a discussion of several conditional factors which affect solute retention. The second and third chapters are devoted to the theoretical aspects of the retention process. Chapter Two starts with a discussion of effects of pH on the retention of ionizable species. This is followed by a good but brief discussion of ion-pair formation in aqueous solution and four equilibrium retention models, i.e., dynamic ion exchange, ion-pair partitioning, dynamic complex exchange, and a nonstoichiometric, electrical double layer model. The authors then set out to discriminate models on the basis of experimental observations. The newly proposed "dynamic complex exchange" model, which has many characteristics in common with the "ion-interaction" model, turns out to be the preferred one.

Chapter Three takes an extrathermodynamic approach by considering that the free energy change for the retention of a particular species is composed of several terms due to functional groups. The functional group values are then evaluated and compared by using linear free energy relationships. The applications of this approach are then discussed.

The last three chapters review the applications of ion-pair chromatography although a fair percentage of theory is also blended in, particularly in Chapter Five. Chapter Four is on chromatography of pharmaceuticals, a thorough, comprehensive workman's approach. Chapter Five is a case study on amino acids, peptides, and proteins with emphasis on the control of separation selectivity. Chapter Six, ion-pair chromatography of nucleic acid derivatives, is mainly concentrated on nucleotides due to their ionization properties.

*Unsigned book reviews are by the Book Review Editor.

The coverage of literature in this book is fairly complete and up to date. As all of the authors contend that much more work is needed to explore the theoretical and practical aspects of ion-pair chromatography, this book is a valuable collection for all chromatographers, old and new.

C. Allen Chang, *University of Texas at El Paso*

Statistics for Analytical Chemistry. By J. C. Miller (Our Lady's Convent School, Loughborough) and J. N. Miller (Loughborough University of Technology). John Wiley and Sons: New York. 1985. 202 pp. \$39.95. ISBN 0-470-20128-2.

This book introduces the terminology and lists equations involved in statistical methods in frequent use in analytical chemistry. Sample problems and their solutions are presented clearly and completely.

In most of the discussion and applications, the authors neglect to derive equations or to provide background for the basic concepts. Consequently, although the laboratory scientist may find this book useful in treating experimental results, he/she should not expect to learn much about the development or limitations of statistical methods by studying the book. A wide range of topics is covered, at least superficially; these include discussions of precision and accuracy, the use of significance tests (t-test, F-test, chi-squared test), the analysis of variance, correlation coefficients, limited types of linear regression (with mention of weights and curvilinear regression), nonparametric tests, experimental design, and optimization.

A distracting, if minor flaw is the fact that the index is full of errors. One will look in vain to find several topics treated at the places indicated in the index; at least one of the cited page numbers does not exist (page 1132); and one entry indicates that least significant difference is treated on pages 90-71.

The chemical analyst may employ the book as a reference in applying statistics to laboratory data; the formulas given are generally correct and the tests seem to be properly applied. However, I do not recommend "Statistics for Analytical Chemistry" as a classroom text or as a guide for those who would learn more about the logical principles underlying statistical analysis.

Sherril D. Christian, *University of Oklahoma*

Physics of Amorphous Materials. By S. R. Elliott (University of Cambridge). Longman Group Limited: London and New York. 1984. viii + 386 pp. \$60.00. ISBN 0-582-44636-8.

The author's primary intention was to develop a textbook for the relatively new area of scientific study, amorphous materials, that would be useful for upper division and graduate students of the physical sciences and related engineering fields. A secondary objective was to present sufficient factual material, along with an adequate range of modern references, to allow for the profitable use of this book by researchers actively pursuing a study of the amorphous state. Except for a tendency to emphasize amorphous semiconductor and metallic systems, while giving relatively little space to ionic glasses, these objectives seem to have been met very nicely.

Following introductory chapters on the preparation and unique properties of glasses, the main subjects of this book are the structure, molecular/lattice dynamics, and electronic properties of amorphous materials. These topics are approached at a fundamental physics level and presented with sufficient detail and care as to be a practical introduction for the relatively advanced science and engineering student. The experimental tools that have proven applicable to structural studies of these disordered solids, such as X-ray and neutron scattering patterns, are examined for both their strengths and weaknesses. It is made clear that the complex structures cannot be fully characterized by any experimental approach and that the best information must come from the proper linking of experimental data with the predictions of structural models. Consequently, the use of structural models, such as the continuous random network model, to obtain radial distribution functions for comparison with scattering data is described.

The effect of the absence of a periodic lattice on the dynamical properties of amorphous solids is examined at a fundamental level. In particular, the complexities that arise because of the loss of the reciprocal lattice vector as a good quantum number are detailed, and emphasis is placed on the vibrational density of states being the only quantity that is a useful valid description of the vibrational excitations in a disordered solid. The extent to which such states can be approximated by using localized excitations and the methods of computing an approximate density of states are given careful consideration. In particular it is noted that the density of states often closely resembles that of the corresponding crystalline solid but with the Van Hove singularities smeared out, an indication that the short range order, which has a strong influence on the density of states, is similar in the two phases. The significance of these factors to the appearance of the infrared and Raman spectra of disordered systems, and their consequent relationship to inelastic neutron

scattering data, is analyzed.

The discussion of electronic excitations and the associated conductivity and optical properties of amorphous materials parallels the analysis of the dynamical properties. The natural comparative approach, between electronic and vibrational behavior and between crystalline and disordered solids, facilitates the presentation and should enhance the intuitive physical insights gained by the reader. Again, the density of electronic states is identified as the only valid description of the excitations so the influence of disorder on the density of states, particularly through the associated localization of excitations, is considered at length for both pure amorphous solids and solids containing chemical and induced structural defects.

In summary, with the exception of the relatively minor attention given to the properties of disordered ionic solids, this is a nicely balanced treatment of the physical properties of amorphous materials at the fundamental molecular (atomic) level. It is written with care and with an attention to detail that is valuable to a novice in the area. Though the number of students that will actually encounter this book as the text for a course in this country may be quite small, because of the lack of courses devoted specifically to this subject, the number of students of science and engineering who can potentially profit significantly from exposure to this book would appear to be large.

J. Paul Devlin, *Oklahoma State University*

Inductively Coupled Plasma-Atomic Emission Spectroscopy, An Atlas of Spectral Information. Physical Sciences Data 20. By R. K. Winge, V. A. Fassel, V. J. Peterson, and M. A. Floyd (Iowa State University). Elsevier Science Publishers: Amsterdam and New York. 1984. ix + 584 pp. \$192.25. ISBN 0-444-42358-3.

A long-standing need of the emission spectroscopy community has been filled by the publication of these reference spectra. The logarithmic scaling of spectral scans allows simple selection of lines based on signal-to-background ratios and expected detection limits. Inclusion of transparencies with background spectra recorded on the same scale as the elemental scans also facilitates use of the data. A unique aspect of the book is the documentation of major interferences. Graphical presentation of interference information is valuable in establishing the nature of an interference as well as its existence. Conditions for data collection are reported with adequate detail so that interlaboratory comparison may realistically be carried out. This seminal reference may well signal the maturation of the analytical use of the ICP.

A quibble relating to data collection is concerned with the omission of information on the time-constant of the measurement system used for broad spectral range scanning. While this can be inferred from resolution data, such a calculation should not have been necessary. Potentially more serious is the omission of data on analyte solution uptake rate, though reference to the literature can reveal approximate values expected. A comparison of background fluctuations as seen for varying time-constants, while available in the literature, could have been included as an aid to extrapolating detection limits for measurement conditions other than those shown.

No mention is made of the availability of these data in computer-readable form. Considering the lag in publication from the date of generation of the spectra, this is understandable, as economical mass storage for laboratory computers was unavailable at the time. Nevertheless, it would be desirable for future compilations to be computer accessible. Until such data are generated, however, this work will be essential for the efficient design of determinations employing the ICP as an excitation source.

Alexander Scheeline, *University of Illinois at Urbana-Champaign*

Aquametry. Second Edition. Part II. Electrical and Electronic Methods. By Donald Milton Smith and John Mitchell, Jr. (DuPont). John Wiley & Sons: New York. 1984. xii + 1352 pp. \$165.00. ISBN 0471-02265-9.

Part II of a three-volume series on aquametry, this text discusses the three principal electrical methods for the determination of water in samples. Dielometry, which takes advantage of the high dielectric constant of water compared to most organic and inorganic substances, provides sensitive, quick, and reliable analytical procedures with a wide range when compared to refractive index or density measurements. The monographs of F. Oehme are cited frequently to provide background on the early development of this technique, which measures changes in impedance of an AC circuit to determine the water content of a sample. For trace analysis or control of sample purity, dielometry compares to ultraspectroscopy and is surpassed only by the techniques of cryoscopy and gas chromatography.

Conductometric methods for moisture determinations are based on the principle that the resistance of the measuring circuit changes reproducibly with the sample water content. Conductivity, or the resistance per unit

surface area, of a sample containing dissolved solids is one example of a conductometric analytical parameter widely monitored in water handling systems to control purity. Many electrical hygrometry applications are described, such as relative humidity and dew point equipment and techniques, which measure the moisture content in gases, particularly air. Convenient tables are provided to enable the reader to locate documents published by the leading (American) manufacturers of electric hygrometric equipment.

Faraday's law is applied to the important analytical techniques called coulometric hygrometry, which use the chemical law that the electrolysis of 1 equiv of any substance always requires exactly the same amount of electricity. Systems to detect trace water quantities in samples by coulometric determination are only 30 years old, but the advent of electronics has allowed for the development of sophisticated techniques which are dependable, sensitive, and reliable. Projected studies in the field include gas analyses, elemental analyses, and organic functional group analyses by microcoulometric techniques, including coulometric hygrometry. This later technique is useful for analyses of microgram quantities of water, as opposed to milligram quantities detectable by gravimetric and titrimetric methods. A single microgram of water can be measured to 1% absolute by coulometric hygrometry.

The text is well organized with a book table of contents and four detailed chapter tables of contents. In each chapter's introduction section, tables containing pertinent equations, symbols, definitions, conventional subscripts, numerical prefixes, and abbreviations provide a convenient, time saving reference source. The authors' intent is to describe what and how, not why and where. More than 700 references are cited. This is a manual for those using or needing electrical or electronic aquametry methods for the determination of water. Numerous figures of electrical circuits, diagrams of apparatus, plots, tables, and photographs of equipment and components provide a source for analytical procedure development. The short, 17 page index could be expanded to provide more convenience for the user.

D. P. Logan, *Calgon Corporation*

Conceptual Quantum Chemistry. Models and Applications. Special Subject Issue of *Croatica Chemica Acta*. Volume 57, Nos. 5 and 6, pages 765-1674. Edited by Z. B. Maksić. The Croatian Chemical Society: Zagreb, 1984.

This is a remarkable collection of genuinely sophisticated contributions to quantum chemistry, emphasizing noncomputational aspects of the subject. There are 110 authors, 60 articles (11 reviews, 49 research papers), and about half a million words. The authors include many of the world's important workers in this field, among others Ballhausen, Bartell, Bloor, Del Re, Epiotis, Gimarc, Heilbronner, Herndon, Jug, Julg, Kapuy, Kirtman, Klopman, McWeeny, Moffat, Murrell, Nakatsuji, Orville-Thomas, Palke, Pauling, Politzer, Simonetta, Skancke, Tomasi, Trinajstić, Trindle, and Whitehead. The topics vary widely and are rarely inconsequential. The whole work is to be highly recommended to all students of the subject, especially to anyone who may have developed the misconception that quantum chemistry nowadays is merely calculation. Far from it, these papers cry out. As Professor Maksić says in his Prologue: "In chemistry, one would usually like to understand and explain the trend of changes of a particular property within a family of related molecules. This is rarely accomplished by numbers with six or more decimal places."

Robert G. Parr, *University of North Carolina*

Phase Separation in Glass. Edited by O. V. Mazurin and E. A. Porai-Koshits (Institute of Silicate Chemistry, Academy of Science of the USSR). Translated from Russian by D. D. Petrova. North-Holland, Elsevier Science Publishers: Amsterdam and New York, 1984. XI + 369 pp. \$80.75. ISBN 0-444-86810-0.

This review is a re-editing and up-dating by Mazurin and Porai-Koshits of the 1974 Russian Monograph on phase separation written by Andreev, Porai-Koshits, Filipovich, Mazurin, and Roskova. Also, information from the 1979 monograph by Milyukov and Kasymova has been included as have references to more recent literature. A new section on practical uses of metastable liquid-liquid immiscibility by Mazurin and Roskova is also added to this work.

The book begins with an historical review by Porai-Koshits of the understanding of glass structure and places the findings on metastable immiscibility into historical perspective. The second chapter by Filipovich considers the theory of immiscibility. The thermodynamics of binodal and spinodal curves are discussed, and approaches to the calculation of immiscibility are reviewed. The kinetics of separation is also covered.

Chapter III by Andreev, Porai-Koshits, and Mazurin is entitled *Methods of Studying Metastable Phase Separation*. Studies using electron microscopy, scattering and diffraction, relationship of glass properties to separation, and other methods such as mercury porosimetry and

absorption are presented. Chapter IV is a summary of the established immiscibility diagrams in oxide glass-forming systems by Mazurin, Roskova, and Porai-Koshits, and in Chapter V, Mazurin and Roskova present a section on tie-lines, reviewing the methods used for their determination and the experimental data known.

Chapter VI by Mazurin and Porai-Koshits is on the structure of phase separated glasses and deals mostly with the morphology of the separated phase. In Chapter VII, Andreev and Mazurin present a thorough review of the kinetics of phase separation. Spinodal and binodal kinetics are considered as are coarsening, glass homogenization, diffusion, and viscosity.

The *Properties of Separated Glasses* by Mazurin and Roskova is Chapter VIII and focuses on rheological and electrical properties, diffusion, chemical durability, glass transition temperature, density, thermal expansion, strength, optical properties, and crystallizability. The final chapter is the section on practical uses and discusses industrial phase-separating glasses, porous glasses, Vycor, and impregnated high silica glasses.

The book is a good review of the subject. Petrova's translation is rough in spots but does not detract from the information presented.

T. J. Rockett, *University of Rhode Island*

Nuclear Power and Public Responsibility. By L. E. J. Roberts (Atomic Energy Research Establishment, Harwell, England). Cambridge University Press: Cambridge, 1984. viii + 143 pp. \$19.95. ISBN 0-521-24718-7.

Delivered as a series of lectures in Northern Ireland, the essays comprising "Nuclear Power and Public Responsibility" state the case in favor of commercial nuclear fission for the lay reader. Its four chapters address the scientific and historical background of atomic energy, the regulation of risk exposure, the risk of accidents and the cost of safety, and radwaste storage.

The two chief merits of the book are its readability and its balanced treatment of alternative positions on the shape of the dose-response curve for radiation (pp 20-29). The author appears well informed on the nuclear industry and on international radiation standards.

Flaws in the volume fall into three main categories: errors in *logic*, questionable interpretations of *facts*, and doubtful presuppositions about *ethics*. With respect to logic, one example of inconsistency occurs when Roberts claims (p 10) that he will not deal "with the costs of nuclear power". Later, however, he spends a chapter to argue that we "must be concerned with the costs of safety measures and with the marginal cost of attaining higher standards" (p 127). Apparently Roberts believes that costs are irrelevant to making the case for nuclear power but that they are relevant as a reason to cut safety standards.

Roberts' most telling equivocation occurs after he admits that the energy equivalent of uranium reserves, if used for *fission*, amounts to less than one-half the total estimated oil reserves (p 8). Throughout the book, however, he is misleading in using the term "nuclear energy". He says we need "nuclear energy" for "future energy supplies" because oil and gas are in short supply (pp 6 and 123), a claim which is true of the *breeder*, not *fission*. Later he says we need "nuclear energy" because it is "already a developed commercial option" and a "proven technology" (pp 6 and 123), claims which are true of *fission*, not the *breeder*. Another equivocation, causing Roberts to underestimate radiation-caused cancers by a factor of 10, occurs when he tries to defend current radiation standards. He uses (pp 37 and 38) the *industry-reported level* of worker exposure (0.5 rem average annual dose) to calculate 60 (per 10⁶ persons exposed) annual excess cancer deaths, then he tries to justify the 5.0 rem *maximum legal level* of worker exposure, saying it causes only 60 excess fatal cancers.

Several times, Roberts commits the fallacy of appeal to ignorance. For example, attempting to argue (p 21) for the harmlessness of low-level radiation exposure, he claims that Colorado (with high background radiation) has lower death rates from cancer than does the Eastern seaboard (with lower background radiation). Appealing to our ignorance of the comparable effects, his inference would succeed only if all three conditions were true: (a) radiation were the only cause of cancer; (b) epidemiological studies were always carried out; and (c) such studies were always able to pinpoint a specific cause for every individual cancer. All three conditions are false.

Roberts' main questionable factual interpretations tend to arise from his selective use of evidence. For example, he promotes (p 59) the Rasmussen Report but ignores its critique by the U.S. E.P.A. and instead cites data from EPRI (Electric Power Research Institute), the largest research group funded by the U.S. nuclear-industry lobby. Likewise, Roberts ignores the AEC-commissioned Brookhaven Report, which predicted 45 000 immediate, and 100 000 later, fatalities for a worst-case nuclear accident, then he claims that 10 000 such fatalities is an "exaggerated" figure (p 77). He also says that, because of what we

learned at Three-Mile Island, the probability of such an accident happening again is "sharply reduced" (p 68), even though Rasmussen reaffirmed his earlier calculations for this type of accident and admitted, at the 1981 meeting of the N.Y. Academy of Sciences, that the probability could still be as high as 1 in 250 per reactor year (or 1 in 4 annually for all U.S. reactors).

Roberts' ethical presuppositions are perhaps more worrisome than his questionable factual interpretations. For example, he ignores the possibility of inequitable, transgenerational tradeoffs because of radwaste and says simply: "all that has been done is to move some material from one part of the earth's crust to another" (p 89). Likewise, Roberts writes: "It is anomalous and absurd that educated people should be fearful of accidents causing 10,000 or 100,000 casualties arising from nuclear power stations when the probability of such an event is so very low" (p 83). In focusing on probability, rather than on probability and *consequence magnitudes*, Roberts ignores tort law and the majority of the risk assessors who believe that consequence magnitudes help to determine risk aversion. He also assumes that risk acceptability is a matter of mathematical probabilities rather than also a matter of democratic choice. One ought to be wary of one who, without argument, both ignores the standard risk measures of his colleagues (in terms of consequences) and then calls laymen "absurd" for using those same measures.

Kristin Shrader-Frechette, *University of Florida*

The Chemistry of the Metal-Carbon Bond. Volume 2. The Nature and Cleavage of Metal Carbon Bonds. Edited by F. R. Hartley and S. Patai. John Wiley and Sons: New York. 1985. xiii + 904 pp. \$280.00. ISBN 0-471-90282-9.

Thirteen contributors have written the ten chapters in this volume, which has its own author and subject indexes. As the title implies, all manner of metals are covered, but the emphasis is on the carbonaceous part of the molecules. The subtitle might well have been "Reactions", although some are left for volumes to come. In this volume, the reactions considered are electrochemical cleavage, heterocyclic cleavage, homolytic cleavage, insertions, nucleophilic and electrophilic attack, cleavage through β -hydrogen elimination, and oxidative addition and reductive elimination. The final chapter, however, is Structure and Bonding of Main Group Organometallic Compounds.

With such an enormous subject, organization is a major problem. The editors have eschewed the transitional one of subdivision by metal in favor of subdivision by type of reaction (or property). However, in many cases, the main-group elements are dealt with separately from the transition metals. Not everyone will be pleased with this arrangement, for it necessarily scatters the chemistry of a particular metal through many chapters. However, it brings related behavior together and aids the perception of general principles.

The editors have also had the problem of keeping the size of the work to manageable dimensions. They have therefore asked the contributors to concentrate on "the most important recent developments", and on those subjects which have not been adequately reviewed in recent years. Even so, the reference lists run to several hundred per chapter, and the author index is 59 pages long. The stature of the contributors gives one confidence that the selections have been soundly made.

The quality of the production is up to the usual high standards.

Polymer Permeability. Edited by J. Comyn (Leicester Polytechnic U.K.). Elsevier Applied Science Publishers: New York. 1985. VIII + 383 pages. \$67.50. ISBN 0-85334-322-5.

As one who has worked in the field for more than 30 years I can vouch that a book of this type is sorely needed. Although uneven in some respects this is a very useful book for both veterans and those unfamiliar with the field. The reviewer would have preferred a longer chapter of introduction and mathematics but this probably is due to the modesty of the editor. Also a description of actual methods of measurement would have been helpful, perhaps in the second edition?

In addition to the introductory chapter there are two excellent chapters on the permeation of gases and vapors (C. E. Rogers) and on the comparatively new field of the so-called Case II sorption of liquids and vapors in glassy polymers (A. H. Windle).

The book also has a number of interesting chapters of specific aspects of the permeation process. These include a discussion of the role of oxygen permeation and stabilizer migration on polymer degradation (J. Y. Moisan) and of diffusion related to adhesion (J. Comyn). The permeability process as it related to packaging problems (R. J. Ashley) and for coatings and encapsulents for electronic and optoelectronic devices (M. T. Goosey) is treated in considerable detail in two separate chapters. The use of polymers for the controlled release of drugs is well

treated by J. H. Richards, and finally an excellent discussion of water transport in composites is presented by G. Marom. These specialized chapters are of considerable interest to polymer and material scientists and engineers in general. Curiously there are no chapters on the use of the permeation process for separation processes or on dyeing technology. These might, however, have been too large additional subjects to cover. The book is warmly recommended.

Vivian T. Stannett, *North Carolina State University*

Books on Applied Chemistry

A Guide to Nuclear Power Technology: A Resource for Decision Making. By Frank J. Rahn, A. G. Adamantiades, John E. Kenton, and Chaim Braun. John Wiley and Sons: New York. 1984. xiv + 980 pp. \$79.95. ISBN 0-471-88914-8.

This book is intended to provide a comprehensive description at a level suitable for "the person who has some technical background but is not a specialist in the field". It includes chapters on reactors, radiation effects, production of nuclear fuels, types of power plants, reprocessing of fuel and waste disposal, safety, economics, regulation, and proliferation of nuclear explosives. Appendices give a variety of interesting statistics and a glossary of terms.

Chemical Thermodynamics in Industry: Models and Computations. Critical Reports on Applied Chemistry: Volume 8. Edited by T. I. Barry. Blackwell Scientific Publications: Palo Alto. 1984. x + 156 pp. \$38.00. ISBN 0-632-1213-7.

The four chapters in this book are the following: High Temperature Inorganic Chemistry and Metallurgy (T. I. Barry); Aqueous Solutions of Dilute and Concentrated Electrolytes (R. H. Davies); The Contribution of Phase Equilibria Studies to Chemical Industries (J. D. Jenkins); and Industrial Uses of Equations of State (R. M. Gibbons).

Adsorption Technology: A Step-by-Step Approach to Process Evaluation and Application. Chemical Industry Series, Volume 19. Edited by Frank L. Slejko. Marcell Dekker: New York and Basel. 1985. xii + 223 pp. \$55.00. ISBN 0-8247-7285-7.

The four reviews in this industrially oriented book cover adsorption theory and models, design and testing (experimental; conceptual), and recovery of organic chemicals from waste water.

Hazardous and Toxic Materials: Safe Handling and Disposal. By Howard H. Fawcett. John Wiley and Sons: New York. 1984. xiv + 296 pp. \$35.00. ISBN 0-471-80483-5.

This book is a general and timely treatment of the problems associated with the generation and disposal of hazardous industrial waste, including the protection of personnel handling toxic materials. A special chapter is devoted to dibenzodioxins (unfortunately referred to as "dioxins") and dibenzofurans.

Developments in Reinforced Plastics. Volumes 3 and 4. Edited by G. Pritchard. Elsevier Applied Science Publishers: New York and London. 1984. Volume 3: x + 210 pp. \$44.00. ISBN 0-85334-266-0. Volume 4: x + 274 pp. \$51.00. ISBN 0-84334-305-5.

These two volumes contain reviews on recent developments in plastics. Volume 3 deals with electrical and thermal properties, surface analysis, osmosis, and stress corrosion. Volume 4 contains reviews on curing agents for epoxy resins, compressive properties of resins, thermography, applications of FTIR, and thermoplastic carbon-fiber composites.

Surface Coatings. Paints and Their Applications. Prepared by the Oil and Colour Chemists Association of Australia. Chapman and Hall: New York. 1985. vii + 490 pp. \$65.00. ISBN 0-412-26710-1.

This is a comprehensive treatise on paints, lacquers, and printing inks. It takes up rheology, analysis and testing, manufacturing processes, curing, color, deterioration, etc. Although it is written from the standpoint of industrial practice in Australia, most of the content is of general relevance.

Surfactants in Cosmetics. Surfactant Science Series, Volume 16. Edited by Martin M. Rieger. Marcel Dekker: New York and Basel. 1985. x + 488 pp. \$89.00. ISBN 0-8247-726208.

Contains chapters on macro- and microemulsions, analysis of surfactant preparations, effects on the skin, types of applications, including aerosols, and an index of surfactants giving names and chemical structures. The latter are generally correctly shown, but the typesetter was unequal to the challenge presented by the imidazolidione system.