

## Book Reviews

**Viscosity and Diffusivity. A Predictive Treatment.** By JOEL H. HILDEBRAND (University of California—Berkeley). John Wiley & Sons, Inc., New York. 1977. xii + 109 pp. \$9.50.

This book collects together 13 papers by Joel Hildebrand and his collaborators, 12 of which had been previously published in various journals in the years 1971–1976. The papers are concerned with the viscosity and mutual diffusivity of organic, inorganic, and metallic liquids and their mixtures. Some experimental data is reported, but the main underlying theme of these papers is a search for simple expressions to describe the effects of composition, temperature, and density on the fluidity and diffusivity. Hildebrand shows that both of these properties are linearly related to the free volume function,  $(V - V_0)/V_0$ , for a wide variety of systems. For a variety of gaseous solutes diffusing in a given solvent, it is also shown that  $D\sigma^2$ , where  $\sigma$  is a molecular "diameter", is nearly constant.

The book will be most useful to physical chemists and chemical engineers interested in correlating and interpolating (and, to some degree, extrapolating) viscosity and diffusivity data; the expressions are simple and easy to use. The text is enlivened by quotations and by statements that are "impertinent, but also pertinent". Thus the author makes clear his disenchantment with models in which mathematics (rather than physics) is used to provide the conceptual model, and criticizes several of the simpler model approaches to transport properties.

Keith E. Gubbins, *Cornell University*

**Inflammation and Anti-Inflammatories.** By E. ARRIGONI-MARTELLI, Wiley/Halsted, New York. 1977. 343 pp. \$30.00.

This book represents the attempt by a pharmacologist to give an overview of the whole area of anti-inflammatory agents and immunosuppressive drugs. The first half of the book deals with the background, biology, immunology, and experimental methods for the study of anti-inflammatory agents and immunosuppressive drugs. Because of the limit of space and the extreme complexity of the subjects that are covered, the first part of the book is obviously very simplified. The references provided, however, are reasonably comprehensive in leading the reader into the more important aspects of these areas. Obviously, because this area is at the forefront of some rapidly changing research, many of the concepts presented here will be modified from month to month. However, the background as presented in this book is reasonably good for understanding the activity of the specific drugs discussed in the second half. The second half discusses specific agents in detail with a good compilation of the activity of these drugs in model systems and in humans from many sources. It is this part of the book which is its greatest strength and provides its most important *raison d'être*.

While the book is obviously too simplified to be of use for those people who are actively engaged in research in this area, it provides a good source of information and orientation for people who are only peripherally involved in studying these drugs. It also would provide a good supplementary text for medical students and for graduate students in pharmacology or medicinal chemistry. Because of sloppy editing in some places, certain tables and figures are unnecessarily confusing. However, a little careful digging by the reader will usually straighten out the confusion.

David J. Herzig, *Warner-Lambert/Parke-Davis Research Institute*

**Methods of Experimental Physics: Spectroscopy. Volume 13. Part B.** Edited by DUDLEY WILLIAMS. Academic Press, New York. 1976. xv + 364 pp. \$49.50.

This is the final part of a two-section treatise. Four chapters are devoted to topics in molecular spectroscopy. This includes a chapter on Infrared (D. Williams), Far Infrared and Submillimeter Wave Regions (D. Oepts), Microwave (D. R. Johnson and R. Pearson, Jr.), and Radio Frequency Dielectric Relaxation Spectra (J. B. Hasted). Two final chapters on recent developments have also been added dealing with beam foil excitation spectroscopy (C. L. Cocke) and tunable laser spectroscopy (M. R. Querry).

These discussions emphasize the experimental aspects of the disciplines. They are detailed, specific, and contain an attractive balance between past, current, and future instrumentation and techniques. A section on applications fills out most chapters and includes many attractive illustrations of spectra. Experienced researchers can profit from the reviews. However, they should be especially valuable to new investigators requiring a more technical introduction to their area.

Robert L. Kuczkowski, *University of Michigan*

**Heme and Hemoproteins. Handbook of Experimental Pharmacology. Volume 44.** Edited by F. DE MATTEIS and W. N. ALDRIDGE. Springer-Verlag, Berlin. 1978. xv + 449 pp. \$87.40.

The editors of this book aimed to provide a critical assessment of the present state of knowledge of heme metabolism, with emphasis on the mechanisms by which xenobiotics affect that metabolism. The volume consists of eleven authoritative chapters, well organized and focused on the central theme. The first chapter is "The Biosynthesis and Degradation of Heme", by G. H. Tait, an excellent current review of the overall biochemistry of heme. In the second chapter, K. W. Bock and H. Remmer give an interesting and useful short summary of "Induction of Hepatic Hemoproteins". The third chapter is a summary of present knowledge of "Inhibition of Liver Hemoprotein Synthesis", by T. R. Tephly. Chapter 4, by F. De Matteis, is about the "Loss of Liver Cytochrome P-450 Caused by Chemicals", a summary of the effects of  $\text{CCl}_4$ ,  $\text{CS}_2$ , peroxides, and metals on liver cytochrome P-450. Chapter 5, also by F. De Matteis, is on the induction of "Hepatic Porphyrins" by drugs and antibiotics; this theme is continued in Chapter 6, "Porphyria Caused by Hexachlorobenzene and Other Polyhalogenated Aromatic Hydrocarbons", by G. H. Elder, in Chapter 7, on "The Effect of Chemicals on Hepatic Heme Biosynthesis", by G. S. Marks, and in Chapter 8, "Pharmacogenetics in the Field of Heme Metabolism: Drug Sensitivity in Hereditary Hepatic Porphyria", by J. D. Maxwell and V. A. Meyer. In Chapter 9, D. P. Tschudy describes "The Influence of Hormonal and Nutritional Factors on the Regulation of Liver Heme Biosynthesis". The "Effects of Drugs on Bilirubin Metabolism" is reviewed by H. L. Rayner, B. A. Schachter, and L. G. Israels in Chapter 10. And finally, the mechanism of toxicity of lead is reviewed in Chapter 11, "Toxic Effects of Lead, with Particular Reference to Porphyrin and Heme Metabolism", by S. Sassa.

This volume is a well-organized, comprehensive, and up-to-date review of the effects of drugs and foreign compounds on heme metabolism. It will be of particular use to pharmacologists, environmental chemists, and biochemists. The book has a practical and pharmacological orientation to its subject and should find its greatest use among experimental pharmacologists and toxicologists, as the Editors intended.

Howard S. Mason, *University of Oregon, Health Sciences Center*

**Mixing and Excess Thermodynamic Properties: A Literature Source Book. Physical Science Data 1.** By J. WISNIAK and A. TAMIR (Ben Gurion University, Israel). Elsevier, Amsterdam. 1978. xlvii + 935 pp. \$109.50.

Properties of mixing and excess thermodynamic properties are useful in the development of solution theories, data prediction, and the design of separation equipment. This book provides an organized literature reference source for data published on mixing and excess properties between 1900 and 1977. The introduction reviews the various theories, fundamental relationships, and definitions. The systems covered include nonelectrolyte solutions, electrolyte solutions, and metallic or alloy systems. Most of the volume is taken up by a listing of the many mixture systems and pertinent references, which number nearly 6000. Data are not given.

This book will be useful to the scientist needing information on mixtures, but it will be of little use to others as it is primarily a source book which assists one in locating specific data in the literature.

Lawrence E. Nielsen, *Science Consultant, Redmond, Oregon*

**The Chemistry of Cyclo-octatetraene and its Derivatives.** By G. I. FRAY (University of Bristol) and R. G. SAXTON (Repton School). Cambridge University Press, New York. 1978. x + 492 pp. \$69.50.

In his foreword to this text, W. Baker stresses the fact that a reference book on the title subject has long been needed "to lay the foundations of a real knowledge of the chemistry of this hydrocarbon". To this end, the authors have summarized in three chapters the investigations of this remarkable substance as originally described in 1300 literature references.

The first chapter, which is entitled "Cyclooctatetraene" and covers 78 pages, documents the synthesis, physical properties, and chemical reactions of the parent molecule, specifically thermolysis, photolysis, oxidation, reduction, free radical processes, polymerization, carbonylation, cycloaddition, and behavior toward metals. The second chapter (84 pp) is a similar survey devoted to substituted derivatives of the ring system. The final chapter, which comprises more than half the book (212 pp), aims to document "Further Reactions of Compounds Derived from Cyclooctatetraenes". Its scope is particularly broad and voluminous, serving to incorporate all work tangentially related to the main topic.

The most impressive quality of the book is its completeness. An appendix collecting material up to the end of 1976 has been included and cross-referenced on a page-by-page basis with the original text. Extensive use is made of illustrations which will facilitate matters for those who simply wish to scan. Unfortunately, the words between the formulas are noncritical. Rather, one is presented essentially with a catalog of chemical phenomena to which he can assign lesser or greater importance as he individually sees fit. Granted that a critical and readable evaluation of this enormous field would have been difficult to write, such a format would have left a much greater impact on the reader.

As matters stand, one has a dictionary of findings in cyclooctatetraene chemistry. As an aid to those working in the field, the text will prove invaluable. Those who are interested in locating specific items of interest will also be well served. However, the mode of presentation does not render the text suitable for the neophyte or for use in a special topics course at the graduate level.

Leo A. Paquette, *The Ohio State University*

**Modern Methods for Trace Element Analysis.** By MAURICE PINTA. Ann Arbor Science Publishers, Inc., Ann Arbor, Mich. 1978. xi + 492 pp.

This book is intended as a guide to the selection of the most suitable methods for determination of trace elements in a variety of materials, chiefly biological, geological, and environmental. It includes chapters on molecular and atomic fluorescence, emission spectrometry and atomic absorption (flame and nonflame), X-ray fluorescence, and activation analysis. There are sections on fundamentals, instrumentation, procedural details, and tables of practical applications in each chapter. Eleven appendices contain additional information. Approximately 1050 references are given. The book should be useful to anyone working in the field.

Unfortunately, its value is diminished by the many errors in translation, by omission of many valuable references to readily available monographs and important recent work, and by a rather uncritical selection and arrangement of data. For example, Chapter 2, Emission Spectroscopy, has been given the general subtitle "Elementary Theoretical Concepts" by the translators: it was intended only as the title of the first section, three pages long. Much of the material was taken from Pinta's "Detection and Determination of Trace Elements" (Dunod, Paris, 1962) with more modern material added such as the various plasma sources, the laser-spark microprobe, and nitrous oxide-acetylene flame emission, but without deleting much that is obsolete. The diagrams of grating spectrograph mountings do not include the Ebert or Czerny-Turner, now so widely used. Tables presenting comparisons of detection limits by various emission methods (pp 39, 54, and 57) give at least three different values for each of the elements aluminum, calcium, iron, manganese, and sodium, and two different values for several others, by flame emission. Only those on page 57 can be considered modern. Titles of tables and references to sources of the data in them are often inadequate. Of the 65 references in Chapter 2, five are from 1975, the latest, and two from 1974. The shortcomings of this chapter are in some measure corrected by the rather extensive tables of applications (112 entries) in Chapter 3, classified as to sample type, but not in any discernible order within each type.

Similar observations may be made about other chapters in the book. It is regrettable that the high standards of Pinta's earlier books are not maintained in this one.

E. E. Pickett, *University of Missouri*

**The Chemical Bond.** By J. N. MURRELL (University of Sussex), S. F. A. KETTLE (University of East Anglia), and J. M. TEDDER (University of St. Andrews). John Wiley & Sons, New York. 1978. xii + 310 pp. Hardback, \$27.50; paperback, \$11.50.

To write a new book on a subject so amply written upon as the chemical bond, an author should have a characteristic pedagogical outlook. Such an outlook is clearly present in this text, although the exact nature and advantages of the approach cannot be given a satisfactory discussion in a short review. Unlike the more technical "Valence Theory", by the same authors, "The Chemical Bond" is intended for undergraduate students and initiates and, quite surprisingly, manages to get on with the topic of bonding in less than 50 pages without either presupposing a large body of prior knowledge of quantum theory or condensing the basic theory to the point that it becomes unreadable or banal. This is accomplished by limiting the emphasis placed on the mathematical methods of quantum chemistry, with a proportionately greater emphasis placed on the actual results of the subject—the properties of molecules. However, the reader is not kept in the dark as to how such properties are calculated; the descriptions of the calculations are often more qualitative than otherwise and are tailored to an audience more interested in results than method. As such, some of the ordering of topics is unique to a book on bonding. Perturbation theory is not treated until two-thirds of the way through the book—significantly, just before the treatment of ligand field theory. Special topics include a chapter on band theory of polymers and solids, a chapter on quantum theory of reactivity and reaction rates, and a chapter on intermolecular forces. The writing style is clear and unadorned and the subject matter far more up to date than in most introductory texts on bonding. One might argue the relative merits of the approach employed here, but the book deserves consideration by all teachers of chemical bonding.

J. W. Warner, *University of Michigan*

**Pharmaceutics of Solids and Solid Dosage Forms.** By JENS T. CARSTENSEN. John Wiley & Sons, Inc., New York. 1977. \$18.50.

This book is a result of a fourth year Pharmaceutics course taught by the author at the University of Wisconsin College of Pharmacy. In the Preface, the author suggests that the book would aid teachers and researchers in the area of pharmaceutical solids. The text, particularly the detailed laboratory experiments, would be very helpful to a teacher wishing to offer a similar course. The principles of dosage formulation and manufacturing, illustrated by these experiments, should assist the pharmacy student in questions relating to drug availability from various generic products. As to the active researcher in the field of pharmaceutical solids, this reviewer feels that the text would be of more limited value.

The subjects treated begin with several selected basic concepts of solids, followed by chapters on particle size and dissolution of solids. A brief chapter on the Biopharmaceutics of Solids is inserted. A review of powder milling and blending then leads into a discussion of capsule and tablet processing. Stability in the solid state completes the subjects treated. The final chapter is devoted to the series of laboratory experiments dealing with the above subjects.

Each chapter considers a wide range of subjects in a relatively brief manner. Understanding by the reader would require prior information (presumably obtained in the two earlier courses in the program sequence). For each topic, the author provides a brief discussion and presents the equation to be used in subsequent problems. An illustrative problem with a solution generally follows. Although the author usually defines the variables and their units, he does not use dimensional analysis in the actual problem solving. The student is therefore not apt to appreciate that the answers are dimensionally correct. Extensive test questions, many with answers, complete each chapter.

Joseph C. Samyn, *Warner-Lambert/Parke-Davis*

**Advances in Experimental Medicine and Biology. Volumes 86A (Protein Crosslinking: Biochemical and Molecular Aspects) and 86B (Protein Crosslinking: Nutritional and Medical Consequences).** Edited by MENDEL FRIEDMAN (U.S.D.A. Western Regional Research Laboratory). Plenum Press, New York. 1977. Vol. 86A: xix + 760

pp. Vol. 86B: xx + 740 pp. \$59.50 each volume.

These volumes contain, along with additional invited papers, the Proceedings of a Symposium on Nutritional and Biochemical Consequences of Protein Crosslinking sponsored by the Protein Subdivision of the Division of Agricultural and Food Chemistry of the American Chemical Society which was held in San Francisco in 1976.

Each volume contains a table of contents, an index, and about 40 papers. The papers are written by well-known experts in the field, and the volumes, for the most part, give good coverage to the field of protein crosslinking, although the effect of crosslinking on the properties of enzymes barely is considered. Most of the papers in Volume 86A can be classified as dealing with one or more of the following areas: (1) the importance of thiol disulfide reactions in the folding of proteins and the role of disulfide crosslinks in stabilizing protein conformation; (2) the preparation of bifunctional reagents and their reactions with proteins; (3) protein crosslinking using ionizing radiation, UV light, or heat; (4) use of enzymatically catalyzed reactions to crosslink proteins; (5) determination of structures of supramolecular complexes using crosslinking agents and affinity labels; (6) methods for the determination of amino acid derivatives which form during certain crosslinking reactions.

Most of the papers in Volume 86B deal with the chemistry and alteration in nutritional value of food protein associated with alkali treatment, heat treatment, or other processing. The chemistry of the Maillard browning reaction also is discussed in detail. Studies of the crosslinked regions in elastase and collagen, studies of the effects of penicillamine on collagen and elastin, and correlations between aging and crosslinking also are presented in this volume.

Researchers actively working in the subject areas contained in these books probably would find them useful additions to their libraries.

Jules A. Shafer, *The University of Michigan*

**Megawatt Infrared Laser Chemistry.** By ERNEST GRUNWALD (Brandeis University), DAVID F. DEVER (Macon College), and PHILIP M. KEEHN (Brandeis University). Wiley/Interscience, New York, 1978. xii + 107 pp. \$15.00.

The area of laser-induced chemistry has experienced nearly explosive growth in the past several years, particularly in the study of infrared photochemistry produced by irradiation of gas-phase systems with high-power CO<sub>2</sub> lasers. Professor Grunwald's monograph is meant to serve as an introduction to this research area for the non-specialist. Although it fulfills this function admirably, its publication is symptomatic of a somewhat unfortunate trend in this field, which will be considered later in this review.

The book displays the authors' evident enthusiasm for its subject matter. There are introductory discussions of the CO<sub>2</sub> laser itself, infrared "dose" and intensity measurements, and molecular energy transfer processes. The concluding chapter reviews a number of laser-induced chemical reactions, comparing them with thermally or catalytically induced processes. Naturally enough, the authors cite numerous examples from their own work on the photochemistry of CFC<sub>13</sub>, CF<sub>2</sub>Cl<sub>2</sub>, and CHFCl<sub>2</sub> under long-pulse, high-pressure conditions. One point which I was pleased to see emphasized was that the infrared energy deposited in the sample is the controlling variable in the laser-induced chemistry, and that careful measurement of this quantity is necessary. The book also includes brief appendices listing infrared laser line frequencies for CO<sub>2</sub>, HF, DF, and some other systems (which would be useful for those not possessing either the "CRC Handbook of Lasers" or the "Table of Laser Lines in Gases and Vapors"), and some properties of optical materials.

One problem with preparing a book of this nature, dealing with a rapidly evolving research area, is that by the time it is published, a number of stated conclusions may have to be revised in the light of new results. Thus, for example, it is stated (pp 8, 61) that the primary step in the infrared photolysis of CFC<sub>13</sub> is elimination of Cl<sub>2</sub> to produce the carbene; but Lee has shown in his beam experiments that it is actually breaking of the C-Cl bond, with :CFCl arising from secondary dissociation of ·CFC<sub>12</sub>, and that no Cl<sub>2</sub> is formed directly. Also, only the CH<sub>3</sub>F-sensitized chemiluminescent decomposition of tetramethyldioxetane is mentioned (p 79), and not the more recent results of Haas and Yahav on the direct, laser-induced process. It is also unfortunate that some of the work reported from Soviet laboratories (bromination of pentafluorobenzene, reaction of BCl<sub>3</sub> with acetylene) is mentioned with no indication that other workers have been unable to reproduce their results.

The book itself consists of 88 pages of text (including halftone photographs of a CO<sub>2</sub> laser and a postdoctoral research associate!), plus appendices. One must question the judgment of the Wiley-Interscience group in encouraging publication of this review as a separate text. A much more appropriate format would have been as one chapter of an edited volume, either in laser applications or in new techniques in chemistry. This points up the problem alluded to earlier, that is, the tendency to set up "laser chemistry" as a separate field, isolated from the mainstream of chemical research, by publishing specialized reviews or even separate journals in this field. It is to be hoped that, as this area of research matures, it will rather be seen as one of a number of tools at the chemist's disposal for the synthesis of new substances and the study of chemical reaction dynamics.

Jeffrey I. Steinfeld, *Massachusetts Institute of Technology*

**Chemistry and Action of Herbicide Antidotes.** Edited by F. M. PALLOS and J. E. CASIDA. Academic Press, New York, 1978. viii + 171 pp. \$11.50.

This timely and important book was assembled from the contributions of 21 participants in a symposium of the same title, held at the 173rd National Meeting of the American Chemical Society in New Orleans, La., on March 24, 1977.

The title, "Chemistry and Action of Herbicide Antidotes" would be equally appropriate if one substituted the term, "herbicide antagonists", "herbicide safeners", "anti-herbicides", or "crop protectants" for the term "herbicide antidotes". This is an updating of an exciting, emerging field devoted to increasing the selectivity of herbicides. Herbicide antidotes have gone from experimental curiosities in 1947 to practical reality in 1969.

The "father of herbicide antidotes" is identified as Otto L. Hoffmann, of the Gulf Oil Chemicals Co. whose interest was aroused originally in a greenhouse filled with tomato plants treated with 2,4-D analogs. An accident led to the development of an apparently lethal concentration of 2,4-D fumes, but on closer inspection, those plants treated with 2,4,6-T appeared normal. It was concluded that an antagonistic relationship existed between 2,4-D and 2,4,6-T. The first practical breakthrough was reported in 1969 when he showed that 1,8-naphthalic anhydride could totally antidote a lethal rate of EPTC on corn.

Otto Hoffmann contributed the first chapter entitled "Herbicide Antidotes: From Concept to Practice". The book is then further divided into five additional parts devoted to reports of structure-activity relationships; comparative activity, selectivity and field applications; physiological actions, metabolism and effects on herbicide metabolism. Part Six is a summary by J. E. Casida entitled, "Herbicide Antidotes: Progress and Prospects".

This is an important book for all plant scientists interested in agriculture and a "must" for plant physiologist/biochemists and weed control specialists.

C. C. Still, *Cook College, Rutgers University*

**Herbicides and Fungicides (The Chemical Society, Special Publication No. 29).** Edited by N. R. MCFARLANE (Shell Research Ltd.). The Chemical Society, London, 1977. xi + 141 pp. \$15.00.

This is a monograph, edited by N. R. McFarlane of Shell Research Ltd., representing the proceedings of a symposium arranged jointly by the Fine Chemicals and Medicinals Group of the Industrial Division of the Chemical Society and the Pesticide Group of the Society of Chemical Industry. The meeting was held at University College, Bangor, Wales, September 15th to 17th, 1976, and was designed to bring together investigators involved in pesticide research and development to permit discussion on the factors affecting the activity of herbicides and fungicides. The publication is composed of 13 contributions from 22 authors. Contributed papers deal with the future of pesticides, the mode of action of well-known herbicides and fungicides, penetration and translocation of herbicides and fungicides in plants and membranes, inorganic glasses and slow release herbicides and fungicides, and a theoretical discussion of structure-activity relationships.

The approach is generally biophysical with early papers presenting historical and current perspectives of the general areas, a central group of papers dealing with current experimentation, and the final papers more theoretical in aspect.

The book should be of value to those involved in teaching or research and development in the pesticide area.

C. C. Still, *Cook College, Rutgers University*