

is an activated process in the vapor-bathed film.

The significance of the experiments in Figure 1C-E is that voltammetry that can be understood (at least to a first order) with a simple electron diffusion model is observable in the absence of an electrolyte solution. This opens a variety of possibilities for probing how electron-transfer events depend on their environment. An obvious requirement of the experiment is that the electroactive

material be a good ionic conductor. However, two redox couples are not strictly required since one can, for instance, start with an Os(III/II) mixed-valent film.⁷

Acknowledgment. This research was supported in part by grants from the Office of Naval Research and the National Science Foundation.

Book Reviews*

Neurobiology of the Trace Elements. Volume 1. Trace Element Neurobiology and Deficiencies. Volume 2. Neurotoxicology and Neuropharmacology. Edited by Ivor E. Dreosti and Richard M. Smith (CSIRO, Adelaide, Australia). Humana Press, Inc.; Clifton, NJ. 1983. Volume 1: xix + 354 pp. \$49.50. Volume 2: xix + 300 pp. \$49.50.

It is possible to distinguish among several classes of "essential" nutrients. At one extreme is O₂, so vital to our survival that intake occurs involuntarily, 24 h per day. At the other extreme are the required trace elements. Although essential, the consequences of a deficiency or excess of such a nutrient are slow to develop and proper intake appears to have been left to chance. We do not seem to be able to detect low dietary copper or high dietary lead and adjust our diets accordingly as we do for other essential elements of our diet, such as water or calories. A corollary of this is that it is difficult to determine a proper dietary level of such elements. Thus, it is fortunate that Drs. Dreosti and Smith have provided us with a comprehensive review of the current literature on the relationship between the trace elements and the nervous system. The two-volume work contains chapters on such elements as aluminum, cadmium, cobalt, copper, iodine, lead, manganese, mercury, selenium, and zinc. A chapter on lithium also is included because of the use of this element in pharmacotherapy for affective disorders. These chapters will serve as a useful resource for anyone wishing to explore the impact of a particular element on the functioning of the nervous system. The volume concludes with a helpful though all too brief attempt by the authors to provide a summary. Also noteworthy is the integration provided in the excellent chapter by Weiss on Behavioral Toxicology of Heavy Metals.

The authors of these chapters understandably focus on what is known—the roles of these trace elements in certain biochemical reactions and the overt consequences of too much or too little. However, as we move toward defining acceptable intake limits for these elements, we must pay some attention to what we do not know, as well. The nervous system has a facility for compensating for insults. Thus, many neurological disorders that appear late in life undoubtedly were initiated many years earlier but remained hidden from clinicians for years due to such compensation. A related problem, touched on by Weiss, is that imbalances that occur during development may not be manifest as overt dysfunction until later. These problems make the establishment of casual relationships difficult. If ingestion of a lead paint chip during infancy leads to a lowered IQ as measured 6 years later, how does one establish a safe exposure level? Hopefully, some of the future investigations into the neurobiology of trace metals that are stimulated by these volumes will help to shed light on such issues.

Michael J. Zigmund, *University of Pittsburgh*

Annual Reports on Analytical Atomic Spectroscopy. Volumes 10 and 12. Volume 10: Edited by M. S. Cresser (University of Aberdeen) and B. L. Sharp (Macaulay Institute). Royal Society of Chemistry: London. 1980. xii + 329. £36.00. Volume 12: Edited by M. S. Cresser (University of Aberdeen) and L. Ebdon (Plymouth Polytechnic). Royal Society of Chemistry: London. 1983. x + 404 pp. £45.00.

This book is the 12th in a series which review exhaustively the field of atomic spectroscopy. Volume 12 contains 2492 citations, including conference abstracts, published during 1982. Volume 10 (1980) has 1782 citations. The books are divided into four major chapters: Atomization and Excitation, Instrumentation, Methodology, and Applications. In addition, there are tables of New Books, Reviews, Meetings, Patents (Volume 10, only), References (complete citation plus the title and author's affiliation), Author, and Subject Indexes.

"ARAAS" is more than a mere listing of citations. The authors are remarkably well organized and provide cross-references to material which appears in other sections. The real value of "ARAAS", however, lies in

it style. The authors summarize research accomplishments in a clean, easy-to-read manner which could not be reproduced by any computerized data-base listing. The presentation and analysis allow the reader to determine the real value of the research with regard to his or her specific need. Major concepts are underlined in the text, and the "signal-to-noise" ratio is high—all the 1982 references in my subspecialty were cited.

The narrative portion of the book has been reproduced from type-written material (new in Volume 12), but the legibility is quite good. Many of the applications are presented in type-set tables sorted by matrix (primary key) and analyte (secondary key). These tables contain sufficient information for the practicing chemist to determine if the method is likely to be usable for the intended application.

"ARAAS" is highly recommended for researchers and industrial users. The cost is approximately the same as 2-3 computerized literature searches, but it is far more useful.

Scott R. Goode, *University of South Carolina*

Studies in Organic Chemistry. Volume 15. Ozone and its Reactions with Organic Compounds. By S. D. Razumovskii and G. E. Zaikov (Academy of Science of the USSR). Elsevier Science Publishers: Amsterdam and New York. 1984. xiv + 480 pp. \$100.00.

This monograph has two redeeming virtues. It brings notice to the extensive and often overlooked Soviet literature on ozone chemistry. It also devotes much attention to kinetic studies, as expected from the authors' research interests. These foci will be useful to an expert who can place the work into a large perspective. However, for a general reader, the monograph may be perilous. The survey of the non-Soviet literature is incomplete. Even some landmark reviews are not cited. The treatment of the solution ozonolysis reaction mechanism is some 10 years out of date. A section dealing with gas-phase kinetics mistakenly includes some liquid-phase reactions. In summary, this is a place to learn what the Soviet scientific community has done and thinks about organic ozone chemistry as of about 1975. However, it cannot be regarded as a comprehensive or critical survey.

The numerous typographical errors, spelling errors, punctuation errors, and the largely hand-drawn reaction equations in this photoreproduced volume give it an unprofessional and irritating appearance. It is apparent that the publisher undertook little editing (perhaps none), a circumstance that is unacceptable given the origin of the authors. It should be noted that this is the translation of "Ozon i Ego Reaktivnaya i Organicheskimi Soedineniyami". The translator is not identified and the date of the original work is not given.

Robert L. Kuczkowski, *University of Michigan*

Macromolecules. Volume 1. Structure and Properties. Volume 2. Synthesis, Materials and Technology. Second Edition. By Hans-Georg Elias (Michigan Molecular Institute, Midland, Michigan). Plenum Press: New York. 1984. xiii + 1342 pp. ISBN 030641077X. Volume 1: \$65.00. Volume 2: \$95.00. ISBN 0306410850.

The two volumes are a comprehensive introduction to polymer science suited to a graduate level course or for self-study as an introduction to the field. A good understanding of organic and physical chemistry at the undergraduate level is assumed.

The arrangement of the topics and their development is very organized. In Part 1 of Volume 1, on structure, there is an introductory chapter and following chapters on the constitution, configuration, and conformation of polymers. The final chapter in this part is on supermolecular structures. In this latter chapter, the techniques used to examine the crystalline and/or amorphous nature of polymers are discussed. Part 2 covers solution properties. The beginning chapters are theoretical, covering solution thermodynamics, transport phenomena, and molar mass distributions. The last and largest chapter in this part discusses techniques used to determine molar mass distributions. Part 3, the last part

*Unsigned book reviews are by the Book Review Editors.

to Volume 1, covers the solid-state properties of polymers in an analogous manner with chapters on transition states, mechanical properties, interfacial phenomena, electrical properties, and optical properties.

The second volume encompasses organic polymer chemistry. In part 4 on synthesis and reactions, following the pattern of Volume 1, the mechanisms of various types of polymerizations are discussed (seven chapters). The final two chapters discuss copolymerization and reactions of macromolecules, respectively. Part 5, on raw materials, discusses specific polymers. There is a well-written chapter on raw materials which illustrates in narrative and tabular form the economic and political aspects of natural resources for synthetic polymers. This is followed by four chapters on synthetic organic polymers, three chapters on natural polymers, and one chapter on inorganic polymers. The final part of Volume 2 discusses the technology of polymers.

The chapters are clearly written. The discussions are thorough yet succinct. Each chapter ends with references specifically linked to the topics in the chapter. The references cited are extensive and they appear to be current in 1983. There are no problems given with any of the chapters to serve as a self-test. If these volumes were used as a text for a polymer science course, problems would obviously need to be generated by the instructor. It should be noted that if these volumes are used as a text and six or more copies utilized, the cost is less than \$40.00 per volume. Both volumes would be needed if the topics suggested by the Division of Polymer Chemistry for a polymer course are to be covered. However, regardless whether these volumes are used as a text for such a course, it should be recommended that they be available to students.

Adriane G. Ludwick, *Tuskegee Institute*

Hormonal Proteins and Peptides. Volume XI. Gonadotropic Hormones. Edited by C. H. Li (University of California, San Francisco). Academic Press: New York. 1983. XVI + 188 pp. \$42.00. ISBN 012-447211-7.

The relationship between structure and function of gonadotropic hormones is extensively reviewed by M. R. Sairam, methods of gonadotropin assay is covered by J. Ramachandran, mechanism of action of gonadotropins is surveyed by P. J. McIlroy and Robert J. Ryan, and the immunobiology of gonadotropins is thoroughly discussed by C. S. Sheela Rani and N. R. Moudgal. The bioassay of hormones by *in vivo* methods is usually tedious and slow. *In vitro* assays for gonadotropins followed rapidly after Rodbell's use of enzymatic procedures for dissociation of adipose tissue into viable fat cells. Methods for isolation of functional cells from adrenal glands and testes have been developed for gonadotropin assay. Lutropin (LH) and human choriogonadotropin (hCG) have been assayed by Leydig cells, isolated from testes by use of collagenase. This is a very sensitive method, detecting 0.1 mIU of human menopausal gonadotropin (hMG). As in all biochemical literature, extensive utilization of abbreviations is used here and many times the reader has to spend time searching for definitions. A list of abbreviations would be very useful in all texts of this type. This *in vitro* bioassay has been very useful in structure function studies of LH and hCG. Effects of isolated α and β units, carbohydrate content, and species differences have all been studied. Lutropin exerts an effect on adenylate cyclase activity after it has been captured by the protein receptor sites on the Leydig cell membrane. Adenylate cyclase catalyzes formation of cAMP which in turn increases phosphoproteins which stimulate steroidogenesis with increases in production of testosterone. With the availability of LH, hCG, FSH, etc., extensive studies of modification of the amino acids in the gonadotropins in both α and β units, and interactions of subunits, receptor proteins with hormone have been evaluated. Lysines, tyrosines, methionines, arginines, histidines, cystine, and tryptophan have all been modified. Cross-linking and proteolysis have also been studied with their effects on hormone activity. The carbohydrate moiety apparently has a most profound effect on solubility of the gonadotropin, which is a glycoprotein. The carbohydrate moiety aids in secretion, stability, micro-molecular interaction with membrane receptors, and even maintenance of the membrane itself. Methods, both enzymatic and chemical, have been used to study deglycosylation and effect on hormonal activity.

Mechanism of action has been discussed in regard to receptor binding, adenylate cyclase activation, and cyclic AMP-dependent phosphorylation. Kinetics, thermodynamics, and number of binding sites have all been investigated along with the relationship of hormone specificity and structure of gonadotropin. The β -adrenergic-sensitive adenylate cyclase has three distinct protein components: the catalytic moiety (C), the nucleotide regulatory protein (G/F), and the hormone receptor (R). When GTP is bound to the regulatory protein it binds and activates the catalytic subunit. Two protein kinases exist and appear to be under differential hormonal regulations. With the availability of high-titer antisera to gonadotropins, another approach is available to study their physiological action. Rather than using the hypophysectomized animal, the antisera for the gonadotropins can be used to neutralize a specific activity, and thus study the mechanism of hormone action. The actions

of gonadotropins have been studied on the ovary in relationship to follicular development, periovulatory events, and corpus luteum development. According to the two-cell theory of steroidogenesis, androgen precursors are produced in one cell type and converted to estrogens by aromatization in another cell type. The gonadotropins are also active in stimulating steroidogenesis in testicular tissue. Thus antisera to gonadotropins have been investigated as potential antifertility agents; however, effective, safe, economical agents are not available as yet.

Paul Melius, *Auburn University*

Analysis of Neuropeptides by Liquid Chromatography and Mass Spectrometry. By Dominic M. Desiderio (University of Tennessee Center for the Health Sciences). Elsevier Science Publishers: New York. 1984. xviii + 235 pp. \$63.50. ISBN 0-444-42418-0.

The stated objective of this book, which is Volume 6 of the "Techniques and Instrumentation in Analytical Chemistry" series, is to "describe novel, recently developed analytical techniques which can be used to effectively measure peptides, where those methods have the distinct advantage of retaining maximum structural information". As the title suggests, the emphasis here is on high-performance liquid chromatography (HPLC) and mass spectrometry (MS) applications to provide this information.

Following a short introductory chapter, Chapter 2 focuses on neuropeptides, providing a brief background of neuropeptide function, distribution, and degradation. Particular emphasis here and in the remainder of the book is placed upon opioid peptides. Both this chapter and Chapter 3, which presents methods and problems of biochemical sampling of endogenous peptides, are suitable as introductory material for the uninitiated.

Chapter 4 is devoted to reversed-phase HPLC and provides a succinct overview of methods and limitations of this technique for the isolation of peptides. A major underlying theme of this book is the degree of molecular specificity obtainable through different analytical techniques applied to the complex mixtures extracted from whole tissues. Chapter 5 presents the basic principles of complementary analytical procedures for achieving such molecular specificity with the major emphasis being placed upon radioimmunoassay and radioreceptor analysis.

The final three chapters, which constitute half of the total text, discuss the principles of mass spectrometry and its application to peptides. It is in these chapters that the major strength of this book lies. Thorough and up to date descriptions of the various types of mass spectrometry are presented, and impressive examples of the use of these techniques in combination with preliminary HPLC purification for the qualitative and quantitative determination of specific neuropeptides from whole tissue are described. The author clearly demonstrates the high degree of molecular specificity obtainable by this approach.

As a whole, this book is well-conceived, well-written, and mercifully devoid of typographical errors. While a more complete treatment of HPLC would have been beneficial, there are numerous monographs to provide this information. In summary, this text should be of great interest to those workers involved in the isolation and characterization of neuropeptides.

Henry I. Mosberg, *The University of Michigan*

Organometallic Chemistry. Volume 12. Specialist Periodical Reports. Edited by E. W. Abel and F. G. A. Stone. Royal Society of London: London. G.B. 1984. 498 pp. \$147. ISBN 0-85186-601-8.

Volume 12 in this venerable series surveys the organometallic literature for the year 1982. Following an organization similar to that of previous volumes, the organometallic chemistry of both the main group and transition metals is covered in a total of 16 chapters written by authorities in the respective areas. Biological aspects are specifically deferred to Volume 13. Chapters 1-7 cover the non-transition elements according to group (including a special chapter on carboranes), while chapters 8-15, dealing with the transition metals, are organized according to ligand types and special topics—i.e., metal carbonyls, complexes containing metal-metal bonds, substitution reactions with group V and VI ligands, σ -bonded complexes, π -complexes of hydrocarbons, π -Cp, π -arene, and related complexes, and homogeneous catalysis. Chapter 16 covers diffraction studies. This organization is reasonably standard and generally works quite well. A complete and useful author index concludes the volume.

The explosive growth of this field coupled with practical space considerations has required these review chapters to be concise and non-critical. While this is understandable, it is unfortunate that space limitations have resulted in the exclusion of numerous references from the main text and their collection with titles only in bibliographies at the end of several chapters. Perhaps two volumes, e.g., main group and transition metals, should be produced annually covering the field.

It is impossible here to review each of the chapters individually, but

a few comments, both specific and general, are appropriate. In general, the literature coverage appears to be quite complete, and the various chapters are usefully organized, well-written, and edited. Occasionally (as in Chapter 4 on the silicon group), the paucity of molecular structures and equations reduces considerably the clarity and rapid-scanability of the text. The transition-metal chapters are structurally and mechanistically oriented with a limited emphasis on synthetic applications (except for the chapter on homogeneous catalysis). Chapter 16 provides exceptionally useful tables of X-ray structural data on no fewer than 1120 compounds! Selected data are given for compounds listed by formula and types of bonds (including metal-metal bonds) followed by a discussion highlighting selected structures.

Volume 12 of this series, like its predecessors, is a highly desirable addition to the practicing organometallic chemist's library—an effective weapon to help combat the ever-burgeoning literature of this field. The cost, unfortunately, may discourage many from purchasing it for their personal libraries.

Kenneth M. Nicholas, *University of Oklahoma*

Nouvelles recherches dans le domaine des composés macromoléculaires. By E. Ceausescu (*Académie roumaine des sciences*). Pergamon Press: New York. 1984. X + 451 pp. \$72.00 (£45.00). ISBN 0-08-0307256.

This is the French version of a book written in Rumanian and published in 1981. It reports the main research results obtained by Dr. Ceausescu and her co-workers from 1976 to 1981.

The main theme of this book is the study of elastomers. It is divided into six chapters: (1) solution polymerization with complex (Ziegler-Natta and others) catalysts, (2) solution polymerization with organolithium catalysts, (3) polycondensation elastomers, (4) modified elastomers, (5) structure-property relationships of elastomers, and (6) their characterization in solution.

The main contribution of this book is in the area of polymerization. Efforts have been made to better understand the mechanism of Ziegler-Natta and organolithium catalysts. For example, an interesting relationship has been established, by electron spin resonance, between the catalytic activity and the number of paramagnetic centers of the catalyst. This relationship was further confirmed by conductivity measurements.

The authors have then studied various aspects of a large number of elastomers, including polyisoprene, polybutadiene, polypentenamer, poly(ethylene-co-propylene), poly(styrene-*b*-butadiene), and polyurethan. This book is not intended to be a textbook for students, but it may be useful to the industrial chemist willing to broaden his experience in the area of elastomers.

Robert E. Prud'homme, *Laval University*

Group Theory in Spectroscopy (With Applications to Magnetic Circular Dichroism). By S. B. Piepho (*Sweet Briar College*) and P. N. Schatz (*University of Virginia*). John Wiley and Sons: New York. 1983. XXV + 634 pp. \$80.00 ISBN 0-471-03302-2.

This is a very fine book and makes an excellent reference for either an experimental or theoretical spectroscopist. A wide range of subject matter in both spectroscopy and group theory is covered, with strong emphasis on MCD spectroscopy.

Piepho and Schatz always start each new subject at a very basic level and then step by step build up to a level which is useful in modern research. Each section is presented carefully and in sufficient detail for the reader to truly understand the material.

A very strong point in this book is that it actually *teaches* the irreducible tensor method for molecular point groups in a complete and detailed fashion. All the necessary material for most applications is included. This book adheres to Butler's phase conventions (P. H. Butler, "Point Group and Symmetry Applications: Methods and Tables"; Plenum Press, 1981) and explains clearly the use of Butler's Tables. Butler's book, which is very complete, is not an easy book to understand, even for the initiated. This book is.

"Group Theory and Spectroscopy" divides into three parts. In chapters 1-7, a careful discussion of the theory of spectroscopy is presented starting at basics and continuing up to second-order effects. Vibrionic spectroscopy and magnetic circular dichroism are especially well treated. Chapters 8-13 give a compact, but complete, introduction to group theory and the use of group theory in spectroscopy. This section has many useful worked out examples, such as the calculation of spin-orbit matrix elements for octahedral complexes using double group symmetry.

The third section, comprising chapters 14-23, introduces the theory and application of the irreducible tensor method for molecular point groups. It features a gentle introduction to the chain-of-groups approach used by Butler. Examples are given on how to calculate matrix elements by using the most efficient techniques—without actual construction of many electron wave functions.

This is an excellent resource book for the serious scholar interested in understanding spectroscopy.

Notker Röscher, *Technische Universität München*
Michael C. Zerner, *University of Florida*

Continuous Culture. Volume 8. Biotechnology, Medicine, and the Environment. Edited by A. C. R. Dean (*University of Oxford*) and D. C. Ellwood and C. G. T. Evans (*Center for Applied Microbiology and Research, Porton Down*). John Wiley and Sons: New York. 1984. 322 pp. \$84.95. ISBN 0-470-20042-1.

Of the 20 chapters included in this book, three will be of interest to chemists. These describe the microbial production of polyhydroxybutyrate, lipids and solvents, and chemical feed stocks. Six chapters are devoted to pathogenic organisms and oral bacteria. A variety of other topics are covered, including phototrophic microorganisms, sulfur bacteria, and biological activity in waste water. References are included.

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

Reagents for Organic Synthesis. Volume 11. By Mary Fieser. John Wiley and Sons: New York. 1984. 669 pp. \$45.00. ISBN 0471-88628-9.

This work continues to be a bargain in terms of the ratio of content to cost. The present volume, which contains material from the literature of 1981 to mid-1982, continues the format and approach of its predecessors. In short entries, from acetic anhydride (its use in the Pummerer synthesis of γ -butenolactones) to zirconium propoxide (its use in internal Michael additions brings about greatly increased stereospecificity), it describes in words and structural equations practical innovations and gives the references. Access to specific information is provided by the usual three indexes (reagents, authors, and subjects).

When a given reagent has been dealt with in an earlier volume, the reference is given at the beginning of the entry. This is indeed helpful. However, those who use this work regularly urgently need a cumulative index to the whole set, for the work involved in searching eleven individual indexes is great enough to be a deterrent. There should be a good market for such an index, considering the large number of owners of personal sets.

Polymers in Nature. By W. A. MacGregor (*University of Manitoba*) and C. T. Greenwood (*University of the South Pacific*). John Wiley and Sons: New York. 1981. ix + 391 pp. \$64.95. ISBN 0-471-27762-2.

The wide-ranging book was written as a text for undergraduate students in "chemistry, biochemistry, agricultural chemistry, and related subjects", but it assumes a good knowledge of introductory organic chemistry and has value as a reference of first resort. It begins with extraction, purification, and molecular size and shape and then takes up in separate chapters proteins, nucleic acids, polysaccharides, rubber and lignin, and finishes with a chapter on inorganic polymers: graphite, silicates, clays, etc. Each chapter includes a selection of secondary literature for further reading. There is a substantial index, but the absence of running heads on the pages is an annoying inconvenience.

Non-Benzoid Conjugated Carbocyclic Compounds. By Douglas Lloyd (*University of St. Andrews, Scotland*). Elsevier Science Publishing Company, Inc.: New York. 1984. XVI + 439 pp. \$100.00. ISBN 0-444-42364-X.

The present book is a substantially expanded version of an earlier one by the same author entitled "Carbocyclic Non-Benzenoid Aromatic Compounds" which appeared in 1966. Although the claim by the author that the present publication "... a totally new book, and not a new edition of the previous one..." is to some extent justified, the book nevertheless shares many common characteristics with its predecessor. Thus, while the order in which the subject matter is covered has been rearranged, expanded, and updated, the depth and philosophy of treatment have remained unchanged. Although some critical discussion is offered, the value of the present book lies more in the fact that it offers workers in this area a relatively up-to-date account of the considerable research that has recently appeared in the literature.

The first chapter, entitled Aromaticity and Aromatic Character, consists of a brief and rather superficial account of aromaticity, and it is likely to prove helpful only to those who are essentially unfamiliar with the subject. Of the 38 references cited, only one refers to work that appeared since 1980.

The remaining chapters (Chapters 2-8) are presented through a common format involving a brief introduction followed by separate sections dealing with the preparation, structure, physical properties, and chemical reactions of the species under consideration. The first of these chapters (Chapter 2) is entitled Derivatives of Cyclopentadiene, and it would be fair to say that with a few exceptions, e.g., deletion of ferrocenes, this chapter is essentially an updated version of the one that ap-

peared in the 1966 book. Of the 273 references cited, about a dozen refer to work that appeared since 1980.

The next chapter (Chapter 3), entitled Derivatives of Cycloheptatriene, deals with tropylium salts, tropones, and tropolones, as well as other systems structurally related to these compounds. The chapter concludes with two very brief sections, one on cycloheptatrienyliidene and the other on cycloheptatrienide anions. About two dozen of the 391 references cited refer to work which appeared since 1980.

The next two chapters (Chapters 4 and 5) deal with derivatives of cyclopropene and cyclobutadiene and are essentially updated versions of their counterparts in the 1966 version of the book. Both chapters contain about 200 references with a dozen or so referring to post-1980 literature. The last three chapters are entitled Derivatives of Cyclooctatetraene and Cyclononatetraene (Chapter 6), Annulenes (Chapter 7), and Bicyclic and Polycyclic Compounds (Chapter 8), and although they also deal with material discussed in the 1966 book, their scope and extent of coverage is much more comprehensive. This is especially true of the last two chapters. Chapter 6 contains 93 references, Chapter 7 has 283 references, and Chapter 8 has 327 references. A somewhat larger number of very recent references have been included in these chapters. Finally, the book concludes with a relatively brief but adequate Subject Index.

The present publication will undoubtedly prove useful to those intimately involved with the subject matter.

G. B. Trimitsis, *University of Pittsburgh at Johnstown*

Molecular Aspects of Toxicology. By D. E. Hathway. The Royal Society of Chemistry: London. 1984. xv + 304 pp. \$50.00. ISBN 0-85186-068-0.

In his introduction, the author correctly states the need for books that will serve to integrate the inherently fragmented, highly complex multidisciplinary science of toxicology. Unfortunately, in the view of this reviewer, integration is precisely what "Molecular Aspects of Toxicology" fails to accomplish.

The book consists of a total of 14 chapters divided into seven major sections—Toxicity, Relation between Dose and Effect and Time, Metabolism, Pharmacogenetics, Biochemical Lesions, Chemical Carcinogenesis, and Toxicant Allergy. Although each chapter contains a good deal of information on a wide variety of specific toxicants and concepts relating to molecular toxicology (structure-activity relationships, risk assessment, pharmacokinetics, mechanisms of toxicity, etc.), little or no attempt is made to integrate the subject material or to point out threads of commonality. The reader is frequently left with a jumble of largely unrelated pieces of toxicological information that focuses more on describing specific examples than on attempting any interpretation. Few, if any, basic principles of fundamental importance to molecular toxicology are discussed (e.g., absorption, distribution, pharmacokinetics, metabolism, excretion, or target site interactions), and while "the book does not claim to replace the primary sources of toxicological information", it makes no attempt to provide references to the many excellent books and reviews where this information can be found. The author apparently assumes that the reader is already familiar with the fundamentals of the various topics considered.

Thus, a discussion on "the receptor as an enzyme" (Chapter 4) turns out to be a very brief summary on the effect of physostigmine on acetylcholinesterase and readers of the section on "structure activity considerations" (Chapter 2) are immediately submerged in a complex, largely hypothetical explanation of parabolic plots in terms of contributions from two inversely related parameters. Similarly, a section on the mode of action of organophosphates (Chapter 9) is restricted to a discussion on the differences in acute toxicity between dogs and rats, and the chapter on metabolism (Chapter 5) consists of a series of descriptions of specific metabolic pathways for a variety of selected pesticides and industrial chemicals with almost no discussion of the enzymes involved. What appear to be complex metabolic pathways can be more easily understood if the reader is aware of the fact that only a limited number of enzymes are involved and that metabolism is dictated by the physicochemical character and functional group composition of the chemical concerned; the actual type of compound (drug, pesticide, industrial chemical) is irrelevant.

Indeed, the book contains several statements that imply that drugs should somehow be considered differently from pesticides and/or industrial chemicals in relation to their biological interactions with living organisms. It is simply not true, for example, that drugs are inherently more specific or selective in their action than pesticides or that drugs are agonists and toxicants antagonists in their action with receptors (Chapter 5). Either beneficial (pharmacological) or adverse (toxicological) biological effects may result from agonistic or antagonistic target interactions, and any distinction between the two is purely arbitrary. Throughout the book, it is frequently difficult to distinguish between statements that constitute established scientific fact and those that reflect

the author's personal opinion. Certainly, not all toxicologists would subscribe to some of the statements on human carcinogenic risk (Chapter 1).

There is no question that the book contains useful information. Unfortunately, because of the poor organization of subject material, the information is often hard to find and difficult to interpret unless the reader is already well-versed in the subject area concerned. The advantage of having the references placed at the foot of each page throughout the text is tempered by the fact that many are outdated. It is also unfortunate that the references are restricted to toxicant interactions in mammalian species.

The nature of the intended target audience for the book remains unclear. It is unlikely to find much use as a general teaching text and will probably be of little value as a reference text for toxicologists. It may prove a useful reference for non-toxicologists with primary training in chemistry or the physical sciences although most of the material in the book can be found elsewhere in a more readable form.

C. F. Wilkinson, *Cornell University*

Specialist Periodical Report. Spectroscopic Properties of Inorganic and Organometallic Compounds. Volume 16. Edited by G. Davidson (University of Nottingham) and E. A. V. Ebsworth (University of Edinburgh). The Royal Society of Chemistry: London. 1984. xiv + 363 pp. \$106.00. ISBN 085186143-1.

This is the latest volume in a well-respected series of annual reports, which covers the spectroscopic literature pertaining to inorganic and organometallic complexes from late 1981 to late 1982. The organization of this volume is the same as that of Volume 15, with the following topics receiving coverage (the numbers in parentheses refer to the number of pages devoted to each subject and the number of references cited, respectively): Nuclear Magnetic Resonance Spectroscopy, by B. E. Mann (130, 2539); Nuclear Quadrupole Resonance Spectroscopy, by K. B. Dillon (19, 120); Rotational Spectroscopy, by S. Cradock (14, 190); Characteristic Vibrations of Compounds of Main-group Elements, by S. Cradock (21, 308); Vibrational Spectra of Transition-element Compounds, by G. Davidson (25, 350); Vibrational Spectra of Co-ordinated Ligands, by G. Davidson (53, 412); Mössbauer Spectroscopy, by S. J. Clark, J. D. Donaldson, and S. M. Grimes (87, 690); Gas-phase Molecular Structures Determined by Electron Diffraction, by D. W. H. Rankin and H. E. Robertson (14, 55).

Unlike some of the earlier volumes in this series, Volume 16 contains very little critical discussion by the authors. This is a necessary but unfortunate consequence of the fact that more papers are published each year, and the size of the volume would become unmanageable if critical discussions were included. One possible solution would be to move the section on Nuclear Magnetic Resonance Spectroscopy to the annual Specialist Periodical Report on Nuclear Magnetic Resonance. This would allow the other sections to expand and include more of the discussion and critical review which were central to the earlier volumes.

Notwithstanding the shortcomings, the authors of this volume have done an admirable job of condensing a huge amount of information into eight short but comprehensive articles. I recommend this book for institutional libraries.

John R. Bleeke, *Washington University*

Wilson and Wilson's Comprehensive Analytical Chemistry. Volume 12. Part C. Emanation Thermal Analysis and Other Radiometric Emanation Methods. By V. Balek (Czechoslovak Atomic Energy Commission) and J. Tolgysey (Slovak Technical University). Elsevier Science Publishers: Amsterdam and New York; Akademiai Kiadó: Budapest. 1984. xv + 304 pp. \$80.75. ISBN 0-444-99659-1.

The name "radiometric emanation methods" is used in this book to refer to a group of methods based on the measurement of radioactive gas release from solids. Because temperature is most often the experimental variable, the first part of the title refers to the most commonly used of these methods, ETA. The first four chapters, about half the book, discuss the theoretical aspects of the methods. Techniques for incorporating the gas into the solid and the variables which affect the rate of gas release are the topics covered in these chapters. Chapter 5 covers instrumentation. Applications of ETA are reviewed in the last three chapters.

Anyone interested in transformations in the properties of solids will find something of interest in Chapter 6. The measurement of surface area, porosity, defects, phase transitions, catalytic activity, and reactions in solids are all covered in some detail. Chapter 7 reviews the application of radiometric emanation to analytical chemistry. The determination of some natural radioelements and a variety of air and water pollutants and the use of "kryptonates" as end point indicators are reviewed. Because of the hazards of working with radioactive gases, the methods discussed are not likely to displace methods routinely used in the laboratory, but they have found applications in unusual circumstances such as in the

space shuttle. The last chapter reviews "technical applications" such as the measurement of temperature profiles in jet engine turbine blades; corrosion rates; properties of cements, ferrites, and nuclear fuel ceramics; and the fixation of radioactive waste.

This book is not a lab manual for the beginner. The authors have assumed a Ph.D. level working knowledge of chemistry and nuclear and solid-state physics on the part of the reader. However, with that caveat the book seems to be a complete resource on the topics discussed. Anyone interested in the properties of the solid state or in a uniquely different analytical chemistry technique will find this a worthwhile reference book.

L. D. Hansen, *Brigham Young University*

Wilson and Wilson's Comprehensive Analytical Chemistry, Volume 12. Part D. Thermophysical Properties of Solids. Their Measurements and Theoretical Thermal Analysis. By J. Sestak (Czechoslovak Academy of Sciences). Elsevier Science Publishers: Amsterdam and New York; Academia: Prague. 1984. xix + 440 pp. \$103.75. ISBN 0-444-99653-2.

The title of this book is somewhat misleading since it is solely concerned with the measurement of thermophysical properties and any actual discussion of properties is incidental. The purpose of the book is to define the theoretical framework underlying the various methods of thermal analysis. There are no descriptions of actual instruments anywhere in the book. This should be considered as a strength and not a weakness since it makes the theory universally applicable to all instruments. The author has not slighted the realities of making measurements, however; these are included as the heart of the theory presented.

The book contains three chapters on fundamental principles of thermodynamics and three chapters on the fundamentals of kinetics. These chapters cover a number of topics which are not usually found in books on thermodynamics and kinetics but which are important in thermal analysis. Some examples of the subjects treated are surface energy and nucleation, thermodynamics of glasses, diffusion in solids, and non-isothermal kinetics.

This book is directed to the already skilled practitioner of thermal methods of analysis. It deserves careful reading by that audience.

L. D. Hansen, *Brigham Young University*

Smectic Liquid Crystal: Textures and Structures. Edited by G. W. Gray (University of Hull, UK) and J. W. G. Goodby (AT&T Bell Laboratories, USA). Heyden and Son, Inc.: London and Philadelphia. 1984. xxvi + 162 pp + plates 1-124. \$75.00. ISBN 0-9914000-0-3.

The authors indicate in their Preface that "this book is intended as a practical and useful experimental guide to the texture and classification of smectic liquid crystals of different polymorphic types". While the newcomer to the field is kept in mind, the book is hoped to be an essential volume to academic and industrial researchers in physical and organic chemistry, physics, device and electronics engineering, and biology. This book should prove to be extremely useful especially in establishing the nomenclature of phases which has been confusing in the past. Despite the great effort made by the authors, however, the identification and classification of new liquid crystalline materials will probably still be confusing even with this piece of work at hand.

Each chapter is introduced by a short "historical" introduction. The structure and texture of smectic phases A to I are discussed in Chapters 1-9. Sufficient literature summaries have been presented. Additionally, discussions are presented on the bilayer smectic A phase, the theory of smectic C phase and the chiral smectic C phase, the chiral smectic F phase, and the structure of the "chiral" smectic G phase in the respective chapters. A section, in each chapter, on Identification and Classification describes the microscopic textures, the potential for miscibility studies, and examples of X-ray diffraction patterns of each smectic phase. Ease and/or difficulty of phase characterization by DSC or DTA have been summarized at the end of this section in each chapter.

The last chapter of the book, Chapter 10, is devoted to new developments in phase classification and structure. The areas covered are hexatic and crystal smectic phase (with particular emphasis on B phases, anti-phase behavior and the role of bilayers in smectic A, B, and C phases), ferroelectric phases (chiral smectic C and other chiral tilted phases) and structural features of smectic phases which includes a summarizing figure and tables designed to function as aides memories.

The last part of the book contains a section on photomicrographs (consisting of 124 plates) of samples of smectic phases. The pictures also consist of examples of nematic, cholesteric, discotic, and "blue" phases in order to provide coverage and comparison of typical textures of smectic and other phases. The authors point out that the samples were main-

tained within a temperature range over which the phase in question is thermodynamically stable. Several pictures that illustrate the textural changes that occur as one phase type develops from another with change in temperature are also included.

In the reviewers opinion, this book is a sure welcome but others like it will probably be essential since knowledge concerning smectic phases is developing continuously. Perhaps the section on identification and classification might have been expanded more. This reviewer certainly would have been delighted to see a chapter on polymeric and/or oligomeric liquid crystals since the liquid crystalline state is hoped to give rise to materials that may be processed easily for structural and engineering applications.

Yitbarek H. Mariam, *Atlanta University*

Chemical Analysis, Volume 68. Room Temperature Phosphorimetry for Chemical Analysis. By Tuan Vo-Dinh (Oak Ridge National Laboratory). John Wiley & Sons: New York. 1984. xviii + 304 pp. \$50.00. ISBN 0471-87884-7.

This book is the latest addition to the prestigious "Chemical Analysis" series of monographs on analytical chemistry and its applications. Room temperature phosphorescence (RTP) is a relatively new analytical method which has mushroomed in popularity because of its simplicity, cost-effectiveness, considerable selectivity, and good sensitivity. The book is intended to provide a basic introduction to the photophysical principles and practical details of the different RTP techniques with solid substrates, micelle solutions, and sensitizer liquid solutions. Throughout the nine chapters, the knowledge and experience of the author are well reflected in a thorough, logical, detailed, and clear treatment. The book is very readable.

The book opens with a discussion of the fundamental principles, which provides the necessary concepts for an understanding of phosphorescence mechanism. The second chapter explains the observation of RTP in various media. The three further chapters give detailed descriptions of RTP instrumentation, methods, and experimental procedures. Guidelines are included to help a new user make practical decisions. The sixth chapter is valuable even to the specialist, as it presents the RTP spectral characteristics of about 200 organic compounds and the RTP spectra of some 29 polynuclear aromatic hydrocarbons, nitrogen heterocyclics, and sulfur heterocyclics. The next chapter is a very good account of the fundamental concepts of quantitative and qualitative RTP analyses. The eighth chapter describes advanced measurement techniques such as time resolution, multichannel detection, synchronous excitation, second derivative, and selective heavy-atom perturbation. The last chapter gives a comprehensive review of the various applications of RTP alone and in combination with chromatography.

This book contains all the recent advances in RTP. It is a valuable addition to every analytical chemist's library and a useful textbook for a graduate course.

Edward P. C. Lai, *Carleton University*

Theory of Symmetry Changes at Continuous Phase Transitions. By J. Kociński (Warsaw Technical University). Elsevier Science Publishers: Amsterdam and New York. 1983. viii + 283 pp. \$72.25. ISBN 0-444-99658-3.

The title of this book is an accurate description of its contents. All discussions of this topic start from the material in the chapter on second-order phase transitions in L. D. Landau and E. M. Lifshitz, "Statistical Physics" (Pergamon, 1958). Readers unfamiliar with the subject might well read this chapter before looking for Professor Kociński's book.

The book is entirely on the formal theory of continuous phase transitions with applications entirely confined to the working out of symmetries. The references seem relatively complete, and this includes material from unpublished Polish theses. What relevance does this book have to the phase transitions of interest to chemists? Rather little, since most observed phase transitions are first order. For these, as Landau and Lifshitz point out, any change of symmetry is allowed and no theory of symmetry applies. Even for such continuous transitions as do exist, many chemists will be more interested in the results of specific models than in abstract principle.

There is a bad error in the section of the book which deals with determining the symmetry of *molecular* vibrations. In this section, the author has apparently used E. B. Wilson, J. C. Decius, and P. C. Cross, "Molecular Vibrations" (McGraw-Hill, 1955), but misconstrued it. The reader should consult the original.

Herbert L. Strauss, *University of California*