

Book Reviews*

Agrochemistry of the Soils of the USSR. Edited by A. V. SOKOLOV. International Scholarly Book Services, Inc., Portland, Ore., 1974. Volga Region: v + 381 pp. \$28.00. Far East: iii + 355 pp. \$25.00.

These two volumes constitute a detailed survey of the relation between productivity of the various soils and the type of fertilizer used; the emphasis is agricultural rather than chemical.

Dispersion of Powders in Liquids. Second Edition. Edited by G. D. PRATT. Wiley/Halsted, New York, N.Y. 1973. xiv + 418 pp. \$25.00.

The first edition of this work appeared in 1969; for this new edition, the contents of the chapters have been updated, and the organization has been altered. As before, most of the chapters are contributed by chemists from British industries, with two from British universities and one from the U.S. The objective of the work remains unchanged: to present the fundamental principles of colloid and surface science as they are involved in dispersions of powders and liquids, and to relate them to the technology of the principal users—the paint, ink, plastics, pharmaceuticals, paper, and ceramic industries. Special attention is given to dispersions of pigments.

Experiments in Thermometric Titrimetry and Titration Calorimetry. By D. J. EATOUGH, J. J. CHRISTENSEN, and R. M. IZATT (Brigham Young University). Brigham Young University Press, Provo, Utah. 1973. vii + 122 pp. \$1.95.

This softbound, photo-offset laboratory manual consists half of experiments and half of a discussion of the techniques and handling of the results. It is evidently designed primarily for use in an undergraduate course; it might also serve as a reference to others in need of a practical introduction to the subject. There is no description of specific apparatus, however, and the use of the manual must depend significantly on auxiliary information provided orally. An extensive bibliography is included.

Industrial Waxes. Second Edition. Volumes I and II. By H. BENNETT (B. R. Laboratory, Miami Beach). Chemical Publishing Co. Inc., New York, N.Y. 1975. Vol. I: xiii + 413 pp. \$19.50. Vol. II: 323 pp. \$19.50.

This work contains a large amount of essentially pragmatic information on waxes as materials rather than as chemicals. Much emphasis is given to properties and specifications, and particularly to solubility and compatibility. The author writes for those who have little knowledge of chemistry, and in many instances gives no structural information. As an example, carnauba wax is given extensive treatment, commensurate with its importance, but its principal components are not identified more precisely than "85% alkyl wax acid esters".

Volume I is devoted to natural and synthetic waxes, and Volume II to compounded waxes and technology. Each volume has its own index; together they constitute a practical handbook with tabular or graphic data on almost every page. Although the sources are often cited, much of the information is given without attribution, so one cannot readily assess its reliability or currentness. With respect to this new edition (the first was published in 1963), the author states that the basic data "has been retained with some deletions, additions, and corrections", and that entirely new practical formulas are given in the section on formulations. There is a useful appendix of trademark products identified by manufacturers.

An Introduction to the Chemistry of Rocks and Minerals. By MAX B. PERRIN (Havart College). Wiley/Halsted, New York, N.Y. 1975. vi + 97 pp. \$5.95.

This little book is intended for use as a textbook on the applied science of geochemistry. It can thus equally bring geology to the chemist or chemistry to the geologist, and it does so in a pleasantly readable fashion. It touches on the composition and structure of the earth, on rocks and minerals, phase rule, crystal chemistry, mining, and ore concentration. The examples are largely British. It is too short a book to serve as a useful reference but is suitable for orientation to the field.

* Unsigned book reviews are by the Book Review Editor.

Introduction to Materials Science. By B. R. SCHLENKER. John Wiley & Sons, New York, N.Y. 1975. xx + 364 pp. \$12.50.

This is a technically oriented book at the elementary level. It makes interesting reading for general information on the industrial uses and characteristics of materials, but does not convey significant chemical information.

Methods of Experimental Physics. Volume 2. Second Edition: Electronic Methods. Edited by E. BLEULER (Pennsylvania State University) and R. O. HAXBY (Iowa State University). Academic Press, New York, N.Y. 1975. Part A: xiii + 425 pp. \$34.00. Part B: xvii + 524 pp. \$39.50.

The first edition of this work, published over a decade ago, was written as vacuum tubes were giving way to solid-state electronic devices. That transition is now essentially complete and has been accompanied by another revolutionary technological development, integrated circuits. These changes have led to comprehensive revision of the original edition. Nevertheless, Part A still contains a chapter on vacuum tubes, as well as chapters on passive linear circuit elements and networks, semiconductor circuit elements, gas tubes, rectifier circuits and power supplies, amplifiers, oscillators, and nonlinear circuits. Part B is nearly half made up of a multicomponent, multi-authored super chapter on "measurements". It contains similar chapters on microwaves, miscellaneous electronic devices, feedback control systems, and noise in electronic devices. Each volume has its own author index and a really good subject index.

Physical Methods in Heterocyclic Chemistry. Volume VI. Edited by A. R. KATRITZKY. Academic Press, New York, N.Y. 1974. xvi + 301 pp. \$28.50.

With this volume, the series is completed. Five techniques not covered in earlier volumes make up the content: uv photoelectron, microwave, and ESR spectroscopy, fluorescence and phosphorescence, and thermochemistry. Relative to the methods covered earlier, these are more recent in application to heterocyclic compounds. As with earlier volumes, the contributed chapters are authoritative, contain much tabulated information, and have extensive bibliographies. The hope expressed by the editor that these reviews will save researchers much time and effort will surely be fulfilled. An additional increment of help could have been provided by giving the date up to which each author searched the literature. This information was stated in the preface to Volumes I and II ("to the beginning of 1962") but was thereafter omitted.

In addition to an author index, this volume contains a 45-page cumulative subject index for the complete series.

Rapeseed. Edited by L.-A. APPELQVIST and R. OHLSON. Elsevier, New York, N.Y. 1973. x + 391 pp. \$60.00.

Rapeseed oil ranks next among oilseed crops after soy bean, cottonseed, peanut, and sunflower seed oils, and thus is of major importance as a source of food. The editors believe that its potential has been overlooked in discussions of the world food situation and have compiled this collection of edited chapters to bring the matter to the fore. Several of the chapters, among them those on chemical constituents and analysis, are of direct concern to chemists. A series of appendices provide useful information in table form; it is rather surprising, however, to find two pages devoted to Centigrade-Fahrenheit conversion, as well as a nomograph for interconversion of gallons and liters, miles, and kilometers, etc. The bibliographies are extensive.

Energy: Resource, Slave, Pollutant. By R. S. ROUSE and R. O. SMITH (Monmouth College). Macmillan Publishing Co., Inc., New York, N.Y. 1975. xviii + 520 pp. \$12.95.

Energy. Volume I. Demands, Resources, Impact, Technology, and Policy. By S. S. PENNER and L. ICERMAN (University of California, San Diego). Addison-Wesley Publishing Co., Inc., Reading Mass. 1974. xx + 373 pp. Cloth binding, \$14.50; paper binding, \$8.50.

With the present mood of relevancy, books on energy are to be expected and, as a reviewer, it seemed to me that it would be interesting to compare the approaches used in these two books. However, in spite of the fact that both are intended as text books, the manner of presentation and the audiences to which they are directed are vastly different, the former (Rouse and Smith) being directed toward a general physical science class and the latter (Penner and Icerman) being directed toward a senior or possibly graduate level course.

Rouse and Smith approach the perennial problem of making science interesting to the nonscientist by structuring the subject around the obviously relevant topic of energy. The authors appear to have a rather good grasp of the overall problems of energy needs and utilizations, and they use various aspects of the subject to introduce the appropriate scientific topics. For instance, astronomy is introduced in the second chapter entitled "Spaceship Earth" and atomic and molecular structure is introduced in Chapter 5 which is titled "Fossil Fuels are Molecules". Perhaps the general mood is best illustrated by the following paragraph from Chapter 2:

"Suddenly, in the late twentieth century, after centuries of scientific and technological achievement, man has suddenly struck a discord in the 'music of the spheres'. Will he now be able to establish a harmonious relationship with his environment? The answer probably lies in the complex considerations of energy and energy flow in the ecosphere. Where does it come from? How much is there? How do we use it? Once used, where does it go?"

Whereas the book by Rouse and Smith presupposes no science background, that by Penner and Icerman is oriented toward the well-prepared scientist. It is the first volume of a three-volume set of lecture notes and suffers somewhat from the fact that it is a bound collection of typewritten pages. However, this should not deter the prospective reader. Volume I deals with the most important questions of energy planning and contains an impressive collection of pertinent data taken from up-to-date sources. Volumes II and III are to deal with new energy technologies. With meticulous attention, the authors discuss in Volume I such topics as demand, resources, consumption, cost evaluation, efficiencies, and environmental impact of energy utilization, the ultimate direction of the book being indicated by the title of the last chapter, "A Commentary on U.S. Energy Policy and Resource Development". It is here that the authors propose their own long-range energy program. In addition to its intended use as a textbook, I feel this book would be of considerable value to anyone interested in the long-range problems of energy utilization.

Each in its own way and to its chosen audience, these books have achieved their intended goals.

M. C. Day, *Louisiana State University*

Buffers for pH and Metal Ion Control. By D. D. PERRIN (Australian National University) and BOYD DEMPSEY (University of New South Wales). Chapman and Hall Ltd., London. 1974. 176 pp. \$11.50.

This book is meant to serve as a practical manual for scientists whose work involves pH or metal ion buffers. In an attempt to make the information that is necessary for the preparation of suitable buffers more readily available and usable, the authors have gathered buffer information from a variety of literature sources, compiled it, and added complete discussions to its use.

The first third of the book deals with the theory of buffer action and applications and limitations of buffers. The authors cover general and special applications such as biochemistry, spectroscopy, polarography, and chromatography. Practical limitations from chemical and biological effects are discussed.

A section on metal ion equilibrium and buffers is included to aid the reader in designing metal ion buffers of known pM values. Chapter 5 shows how new pH-buffer tables can be constructed and, as an aide, small computer programs, tables, and calculation examples are included. The authors widen the scope of the book by covering pH buffers for nonaqueous solvents and describing zwitterionic buffers recently developed for biological use.

To round out these various topics the book contains many useful data collected in numerous tables and appendices, such as pK values for possible buffer acids and bases, commonly used buffers, thermodynamic data of possible buffer substances, nonaqueous pH buffer systems, and compositions of buffers for special applications.

This book would be a helpful source of information to any scientist who requires pH or metal ion buffers having predetermined values.

L. T. Dodd, *Eastman Kodak Company*

Drug Design. Volume VI. Edited by E. J. ARIENS (University of Nijmegen). Academic Press, New York, N.Y. 1975. xvii + 364 pp. \$39.50 (£18.95).

This publication continues a series of monographs on medicinal chemistry and is the sixth volume devoted to developing rational approaches to drug design.

The first chapter, "Diphenhydramine Derivatives: Through Manipulation toward Design", is by A. F. Harms, W. Hesper, W. Th. Nauta, R. F. Rekker, H. Timmerman and J. de Vries. It reviews the synthetic routes to structures of the diphenhydramine type, with an extensive tabulation of structures known and their pharmacological uses. A profile of the biological activity of diphenhydramine is presented along with the classical approaches of structural manipulation used to attain active structures. A detailed analysis of the physicochemical conditions required for activity in the diphenhydramine area and a discussion of relevant metabolism conclude this chapter. The next chapter, "The Design of Antiradiation Agents" by D. L. Klayman and E. S. Copeland, discusses the nature of radiation damage and theories of protection. Chemical radioprotective agents are covered by chemical class, and other applications of antiradiation drugs are offered.

In the third chapter, S. Okamoto and A. Hijikata present a "Rational Approach to Proteinase Inhibitors" covering lysine and arginine homologs as proteinase inhibitors as well as peptide inhibition of proteinases and coding, decoding, and noise in proteolytic reactions.

R. E. Counsell and R. D. Ice review "The Design of Organo-Imaging Radiopharmaceuticals" in terms of essential properties required, design concepts, and finally an organ-by-organ treatment of the current status in imaging agents.

Rather complementary to this is "Design of X-ray Contrast Media" by H.-J. Herms and V. Taenzer. The uses, chemistry, toxicology, and pharmacology of radiographic contrast agents are presented along with the risks of X-ray contrast diagnosis and a section on new drug design.

The final chapter by G. S. Hartley, "Agricultural Pesticides: Chemical and Physical Methods of Formulation", discusses pesticides in the environment and systemic pesticides in agriculture as well as the effects of physical and chemical formulation on effectivity.

The general approach of the book is one of the rationales behind current "drug" design and, as such, is likely to be valuable to many workers outside the particular field under review.

K. T. Douglas, *Duquesne University*

Computers in Chemistry and Instrumentation. Volume I. Computer Fundamentals for Chemists. Edited by J. S. MATTSON (University of Miami), H. B. MARK, JR. (University of Cincinnati), and H. C. MACDONALD (Koppers Co.). Marcel Dekker, Inc., New York, N.Y. 1973. xi + 345 pp. \$25.25.

This book is a collection of short articles by several authors, covering the subjects of analog computers, digital circuitry, programming languages, simulation, analog response by digital computers, interfacing, and learning machines. The introductory chapter is appropriately entitled "Introduction to Computers".

The stated goal of this volume is to "present, in a simple and concise manner, the basic general principles and theories that are necessary for the chemist to read, digest and apply the more specialized material discussed in the volumes on specific applications . . .". This goal is accomplished in the introductory chapter, and in the chapters on digital circuitry, programming languages, and interfacing.

The rest of the articles tend to go into more detail than one would expect in an introductory volume, and would probably require previous background or further reading to achieve good comprehension of the material presented.

James T. Frazer, *Eastman Kodak Company*

Advances in Carbohydrate Chemistry and Biochemistry. Volume 31. Edited by R. STUART TIPSON and DEREK HORTON. Academic Press, New York-San Francisco-London. 1974. ix + 416 pp. \$38.50.

The latest volume of "Advances in Carbohydrate Chemistry and Biochemistry" contains a well-balanced selection of interesting topics that are either reviewed for the first time or are updated reviews of subjects discussed in earlier issues. The volume consists of seven chapters and an obituary article on H. G. Fletcher, Jr., an eminent American chemist noted for work on nucleosides and amino sugars. Volume 31 is divided equally between monosaccharide chemistry and polysaccharide chemistry (three chapters each). The last chapter, "A

Bibliography of Crystal Structures of Carbohydrates, Nucleosides and Nucleotides, 1973" by G. A. Jeffery and M. Sundaralingam, a compilation of crystallographic data for reference purposes, is a continuation of a chapter in Volume 30.

Chapter 1, "Deamination of Carbohydrate Amines and Related Compounds" by J. M. Williams, is an update of two chapters published in 1946 and 1958 in the same series. This chapter deals with the interesting reactions that occur when amino sugars are treated with nitrous acid and the effect of structure, configuration, and conformation of the intermediate on the course of the reaction.

Chapter 2, "The Reaction of Ammonia with Acyl Esters of Carbohydrates" by M. E. Gelpi and R. A. Cadenas, deals with the mechanism of the formation of 1,1-bisacetamido derivatives during the Wohl degradation and related reactions. The authors, in collaboration with Professors Deulofeu and Deferrari, have published several papers on this subject.

Chapter 3 by R. R. Watson and N. S. Orenstein, the last of the monosaccharide chapters, is entitled "The Chemistry and Biochemistry of Apiose". Apiose, a branched sugar first isolated some 70 years ago from parsley, occurs commonly in plants, either in the form of a glycoside or as a component of polysaccharides. The metabolism and biosynthesis of apiose is interesting and its chemical synthesis challenging.

The first of the three chapters on polysaccharides is "The Specific Degradation of Polysaccharides" by B. Lindberg, J. Lonngren, and S. Svensson. The authors discuss the relative stability of the glycosidic bonds in polysaccharides. The differences in the rate of hydrolysis have been used to selectively hydrolyze polysaccharides into oligosaccharides.

Chapter 5, "The Chemistry and Interactions of Seed Galactomannans" by I. C. M. Dea and A. Morrison, is of current interest. Galactomannans have the unique property of altering the characteristics of gels. They do not form gels themselves but may strengthen the gel-forming properties of other polysaccharides. They have also been found to react with milk protein, plant lectins, and protein antibodies.

Chapter 6 is entitled "The Interaction of Homogeneous, Murine Myeloma Immunoglobulins with Polysaccharide Antigens". C. P. J. Glaudemans discusses the interaction between homogeneous murine myeloma immunoglobulins and carbohydrate polymers and shows how carbohydrate chemists can use this specific reaction to elucidate the structure of murine myeloma immunoglobulins as well as of polysaccharides.

The editors, R. S. Tipson and D. Horton, are to be commended for their efforts in keeping the "Advances" at the high level one has become accustomed to expect. This series, one of the most successful of the "Advances" published by Academic Press, is a reading must for all carbohydrate chemists, biochemists, medicinal chemists, food chemists, etc. Unfortunately, it is a sign of the times that in recent years the price of each successive volume in this series has had to be increased.

Hassan S. El Khadem, *Michigan Technological University*

Annual Reports on the Progress of Chemistry. Volume 71. 1974. Section A: Physical and Inorganic Chemistry. By R. P. BELL (University of Stirling) and D. W. A. SHARP (University of Glasgow). The Chemical Society, London. 1975. xv + 370 pp. \$22.00.

No matter how specialized a chemist may become, he needs to be aware of key developments in associated fields; this volume serves the purpose admirably for the busy professional in any area of physical science.

This is a typical review volume with the advantage of brevity of expression imposed by editorial requirement. In most instances, chapter authors have limited references to about 100, with the result that only key papers are cited, in contrast to the more complete bibliographies in domestic publications of similar kind. Excellent use is made of each page, with somewhat smaller type and narrower margins than most American publications; however, these differences in no way detract from the readability.

Of particular interest to inorganic chemists is the information on ab initio calculations on small molecules (Chapter 2), that in Chapter 6 on the thermochemistry of organometallic compounds, and the whole of Chapter 7 on thermodynamics of inorganic substances; all these are in the Physical Chemistry section. Analytical chemists will benefit from the discussions of atomic and molecular photoassociation (Chapter 3) and the data on high-pressure chromatography and

spectroscopic and photochemical studies included in Chapter 8 on high-pressure chemistry. Chapters 6 and 8 also contain valuable information for the organic chemist. Part II on Inorganic Chemistry is a rich lode for inorganic chemists, but organic specialists should profit from reading Chapter 12 on transition metal carbonyl, organometallic, and related compounds, particularly those data on carbene and carbyne compounds. The "classical" inorganic chemist will find it awakening to note that 21 pages of text and 40 references are devoted to boron in Part II, whereas nickel is allotted only six lines and two citations!

The volume is crisply written and carefully produced. Where necessary for clarity of presentation, excellent line drawings and valuable tabular data are given. Pertinent references are included as footnotes on each page of text rather than at chapter ends; this is an advantage to the fast reader provided the citation is not previously given, in which case a bothersome search may be necessary. A spot check of some 30 references revealed no errors. As is often the case with review volumes, this book has no subject index; it does include a 25-page author index which one suspects may serve as a sort of "Who's Who" in British Physical and Inorganic Chemistry.

This is in every way an excellent review volume which should certainly be acquired by every university library and at least scanned by every member of the chemistry faculty.

Herschel Frye, *University of the Pacific*

Introduction to Bioelectrodes. By CLIFFORD D. FERRIS (University of Wyoming). Plenum Press, New York, N.Y. 1974. xii + 243 pp. \$19.50.

Bioelectrodes are the interface between biopotential sources and electrochemical/electronic measurement and are thus likely to be imperfectly understood by specialists in either biology or electrochemistry. This compact volume will answer that need and that of the student or researcher seeking rapid access to biopotential measurement technique.

This distillation from bioengineering courses taught by the author is offered in a terse and informative style ten chapters in length. In the first of these, the most common electrode materials are introduced along with cautions regarding toxicity, corrosion, and stability. Ac electrode polarization, especially how it differs from dc polarization and becomes more significant at low frequencies, is considered in the next chapter along with an appropriate mathematical development of transfer and ac polarization equations and application of Fricke's law. Because of space limitations, the latter will be pretty rough going for a true beginner, a phenomenon apparent also in later mathematical expositions. Chapter Three is a good review of problems related to electrode polarization with examples of predictions based on the Nernst equation, perhaps a justified oversimplification at this level. Basics of voltammetry and the linear diffusion equations for the spherical and cylindrical electrode configurations are introduced here as well. The next chapter on microelectrodes explains the essential intricacies of electrode preparation embracing the many types commonly used of metal, glass, or electrolyte, or combinations of these. Following a section on pulling and filling pipets, the problems of artifact signals from the recording system and electrode noise are carefully reviewed.

A fine exposition of standard electrochemistry of half-cells and reference electrodes is presented in Chapter Five, although the distinction between concentration and activity is not consistently clear and inaccuracies exist in the glass electrode illustration. A lucid chapter on ion specific electrodes follows. Up to date in its coverage, it includes discussion of the recent and interesting antibiotic electrode with a Na^+/K^+ selectivity of 3800:1. Chapter Seven is a good introduction to preamplifiers covering essential aspects of their dynamic and transient response, gain, bandwidth, and risetimes with specific attention being given to the special problems of input from microelectrodes. Various types of inputs are compared and pulse transformer use for stimulus isolation is explained. Excluding electrochemical electrodes, Chapter Eight discourses on specialized electrodes for stimulus and recording only. Many interesting constructions are described from conforming or endoesophageal electrodes to those for chronic recording. The discussion on the anodized tantalum electrode with integral field-effect transistor should be most valuable to those concerned with elimination of the need for electrode paste, corrosion from body chloride, or electrode lead-wire noise. The next chapter deals with signal analysis and filtering techniques starting with a mathematical discussion on signals as functions of time or of fre-

quency, and on the basis of Fourier analysis applied to periodic and, as far as it goes, aperiodic functions. The importance of the signal and noise frequency spectrum in respect to extraction of signals from noise is discussed ranging from the simple filters to the complex Fourier comb filter as well as over averaging and switching/adding techniques. To compensate for the rightful omission of detailed statistical analysis or digital computer methods, a select group of references is provided. Actually an appendix, Chapter Ten covers some important practical matters such as measurement of electrode tip area and potential, shielding in EKG measurements, surface drying of preparations, etc.

This volume is an example of that efficiency and clarity of communication often exhibited by the experienced teacher. The compactness is enhanced by the many clear and well-chosen diagrams and illustrations, and there are a minimal number of minor errors (for example, platinizing solution is not normally made from H_2PtCl_2) in this carefully proofread book. A more detailed index might, however, enhance the utility of future editions. Priced perhaps a bit high for the casual reader, this small book would be yet a valuable addition to the library of the serious student or researcher in need of an introduction to biopotential measurement methods.

Bruce B. Graves, *Eastern Michigan University*

Semi-Empirical Self-Consistent-Field Molecular-Orbital Theory of Molecules. By J. N. MURRELL and A. J. HARGET (School of Molecular Sciences, University of Sussex). John Wiley & Sons, Inc., New York, N.Y. 1972. ix + 180 pp. \$13.95.

This book is primarily an introduction to semiempirical quantum chemical techniques, written to the level of a practicing experimental chemist. It begins with a discussion of the Hückel method and its shortcomings, in order to give motivation for moving on to more rigorous and expensive methods. The methods discussed, in order, are Pariser, Parr, Pople; CNDO; INDO; MINDO; and NDDO. In contrast to Pople and Beveridge, "Approximate Molecular Orbital Theory" (McGraw-Hill, 1970), the discussion of semiempirical methods in the present volume holds mathematics to a minimum. SCF theory is developed in an appendix, and *ab initio* methods are never looked at *per se*. Despite this, approximations are stated explicitly with good heuristic development. The results of different semiempirical methods are compared with each other, as well as with experiment and *ab initio* methods.

The various possible types of applications of semiempirical methods are examined. The applications of semiempirical methods include the problems of aromaticity, chemical reactivity, hydrogen bonding in the water dimer and HF, carbonium ion structure, and reaction surfaces. The differences between the applications examined in the present volume and those examined by Pople and Beveridge reflect that the present volume was written for chemists in nonphysical disciplines, and two years after Pople and Beveridge. Thus, less time had to be spent trying to justify the methods.

A separate chapter has been devoted to Magnetic Resonance Spectroscopy, and to the application of semiempirical techniques to this method. The theoretical development of expressions for the quantities calculated is complete and well written. Taking a full, separate chapter to discuss these methods seems warranted because of their general interest and applicability.

The review of the development and applications of CNDO, INDO, MINDO, and NDDO is necessarily complete only through 1971. While this book was originally important for this review, and its bibliography, both have become long out-of-date. In spite of this, we feel that this book still provides an excellent introduction to the semiempirical methods, and gives a good feel for their versatility. It provides a starting point for the chemist who feels he may need tools finer than Hückel in his research and wishes to find where to look.

H. H. Jaffé, J. A. Singerman, *University of Cincinnati*

Toxicology of Insecticides. By F. MATSUMURA (University of Wisconsin). Plenum Press, New York, N.Y. 1975. xvii + 503 pp. \$27.50.

The greatest asset of this book is its comprehensive scope. In this single volume are well-organized, well-written chapters on general principles of insect toxicology, classification of insecticides, modes of action of insecticides, metabolism of insecticides by animals and plants, entry of insecticides into animal systems, dynamics of insecticide movement in the animal body, movement of insecticides in the environment, environmental alteration of insecticide residues, effects of pesticides on wildlife, and hazards to men and domestic animals.

The bibliography appears to be reasonably extensive through 1971 or 1972, with a sprinkling of 1973 and 1974 citations. The author states in the Preface that "the book . . . is designed for use by graduate students and the general scientific community rather than those already expert in the field". This book is well conceived and well constructed for such an audience.

Michael M. Martin, *University of Michigan*

Topics in Current Chemistry, Volume 57. Cyclic Compounds. Edited by F. BOSCHKE. Springer-Verlag, Berlin-Heidelberg-New York. 1975. 143 pp. \$25.40.

With Volume 57 of this series the subject of cyclic compounds is taken up. Two comprehensive and well-written reviews are presented. The first on the "Structure and Reactivity of Cyclopropenones and Triafulvenes" by Eicher and Weber covers derivatives of cyclopropene having an exocyclic double bond. The second article, "The Higher Annulenes", by Sargent and Cresp, reviews the fully conjugated macrocyclic ketones. Both reviews start with a brief theoretical introduction followed by the sections on the synthesis, reactions, and physical properties.

These reviews, which cover the literature up to August of 1974, will certainly be of interest to workers in the field.

Eugene LeGoff, *Michigan State University*

Molecular Structure by Diffraction Methods, Volume 3. Edited by G. A. SIM (University of Glasgow) and L. E. SUTTON (University of Oxford). The Chemical Society, London. 1975. xiv + 514 pp. \$71.50.

This volume is one of a continuing series of Specialist Reports published by the Chemical Society to provide a systematic and comprehensive review coverage of progress in the major areas of chemical research. In the subject volume, 17 reporters exhaustively review not only x-ray diffraction studies of single crystals, ranging from rare earth compounds to proteins (papers published in the period April 73-March 74), but also electron-diffraction analyses of gas-phase structures (April 73-Aug 74) and neutron-diffraction studies of crystalline solids (April 73-Sept 74). The emphasis throughout is on results, although the section on electron diffraction includes chapters on apparatus and on methods of incorporating known structural information in parameter refinement.

The reporters are to be commended for the coverage they have provided. The volume is packed with information pertaining to all aspects of molecular structure, and as such is an unusually valuable reference.

Regretably the volume includes only an author index; however, subjects of interest can generally be located fairly readily by reference to the detailed list of chapter and section headings. The high price is more than offset by the unusually high density of information.

B. W. Matthews, *Institute of Molecular Biology
University of Oregon*

Thermal Analysis: Comparative Studies on Materials. Edited by H. KAMBE (University of Tokyo) and P. D. GARN (University of Akron). John Wiley & Sons, Inc., New York, N.Y. 1974. x + 326 pp. \$17.50.

The book contains a series of 17 papers (nine from the United States and eight from Japan) presented at a Joint U.S.-Japan Seminar, sponsored by the U.S. National Science Foundation and the Japan Society for the Promotion of Science and held at The University of Akron, 8-11 April 1974. Most of the papers appearing in the book are the original manuscripts which were prepared for the seminar, but some were amended in response to questions at the seminar.

It is well known that the discipline of thermal analysis has grown very rapidly in independent fields of study, and different practices have developed for each particular method, owing largely to the wide applicability of the numerous techniques. The series of papers describes the present state of the art in the more important thermal analysis techniques available today. While the general theme of the seminar was that of comparative investigations of new materials, some more general discussions, particularly concerning recent developments in nonisothermal kinetics, have been included together with some reports on new studies on old materials. Techniques vary from laser flash calorimetry to the more conventional thermogravimetric analysis.

The book would have limited use as a textbook on thermal analysis, but would be useful as a library reference volume on selective thermal analysis techniques.

D. Colin Phillips, *Westinghouse Research Laboratories*

Fortran IV in Chemistry. By GRAHM BEECH (The Polytechnic, Wolverhampton). John Wiley & Sons, Inc., New York, N.Y., 1975. x + 303 pp. \$23.50.

As indicated by the title, this book explores the use of Fortran IV as a programming language for applications of the computer to assist in the analysis of chemical data and the exposition of chemical principles. It gives fairly detailed descriptions of a representative number of Fortran IV programs along with their listings which, with some modification, can be adapted for use at institutions with access to a modest-sized computer with a Fortran IV compiler. Taking into account the great increase of interest and effort toward the use of computer assisted techniques in science teaching at the undergraduate level, the book attempts to bring together a number of developments and programs suitable for adaptation in the chemistry classroom and laboratory.

The use of Fortran as the programming language is based upon its widespread use, popularity, and ease of transferability of programs written at different institutions. Familiarity with Fortran and basic chemical principles is assumed. As might be expected, the material is most suitable for courses in physical and analytical chemistry, although there are programs that have instructional applications in other chemistry courses. The author does not attempt to use the language for tutorial purposes at the general chemistry level for which other program languages are more suitable.

The programs in the book were developed for use with a JCL 1903A (one of the popular series used in the United Kingdom) which has a 48K-word core storage capacity and uses batch processing exclusively. However, most of the programs will run on 32K and many on less than 16K and do not require use of magnetic tape or disk files. A more serious problem is the variety of Fortran features not standardized, especially with older computers. A table is included which summarizes the important differences between the ICL 1900 computers and ANSI Fortran IV recommendations for standardization. A number of features used in the book have been proposed for adaption to ANSI Fortran and the trend appears to be in this direction. Several peculiar features used that may cause problems with adoption to different systems are discussed.

The author introduces in Chapter 2 a number of useful, universal routines covering statistics, some aspects of calculus, and the fitting of experimental data to analytic functions. Some feeling for elementary statistics, simple calculus, and the properties of matrices and determinants is presumed. A number of useful Fortran programs and subroutines are developed which can be applied to problems discussed in other parts of the text. For specific examples, the theory is briefly developed (references are often given), and special features of the program are described as well as some directions for inputting data into the program. The Fortran statements as well as a sample output are listed for each example. Only a limited number of numeric methods are covered, those serving to aid in the development of other programs later on.

Successive chapters cover a wide variety of applications from treatment of kinetic and thermal data, multicomponent analysis, end point detection in potentiometric titration, to calculations in theoretical chemistry and complex treatment of converting instrumental data to useful digital values. There is also an interesting chapter on tutorial or "dry-lab" applications in which programs can simulate or model chemical systems as well as treat hypothetical or literature data. Examples are given in kinetics, thermodynamics, statistics, and spectroscopy.

The last chapter explores the literature for more information on the subject of computers which, although brief, is far ranging and a valuable summary of other sources of information on the subject. Since any book is limited in the examples and problems studied, the author concludes with a review of several general areas in which the computer has been applied to chemistry. These include the computer as a general teaching aid, general laboratory computing, experimental design and optimization, quantum chemistry, simulation of chemical and physical processes, and representation and manipulation of chemical information. An extended but not complete list of references is given for each of these divisions.

Finally in addition to hints and answers to problems given at the end of many chapters, there is an appendix describing and listing a contour plotting program for a CALCOMP plotter.

Although one might quarrel with the selection and organization of the examples given in this book, it does give a good cross section of the type of problems and situations in which the computer can be

useful as an aid in teaching chemistry and processing chemical information. The programs are reasonably well described and can be immediately used with minor modifications on most modern computing systems. The book is also particularly useful as a source of problems and ideas and contains many references to further sources of information. It is an excellent attempt to bring together in one volume a summary of current progress in the use of digital computers in chemistry for educational purposes.

Ralph Powell, *Eastern Michigan University*

Advances in Quantum Chemistry. By PER-OLOV LÖWDIN (Uppsala University). Academic Press, New York, N.Y. 1975. x + 304 pp. \$42.00.

This is another helpful volume in the well-established series edited by Per-Olov Löwdin. The articles included are "Utilization of Transferability in Molecular Orbital Theory" by Brian O'Leary, Brian J. Duke, and James E. Eilers, "A Series of Electronic Spectral Calculations Using Nonempirical CI Techniques" by Sigrid D. Peyerimhoff and Robert J. Buenker, "Time-Independent Diagrammatic Approach to Perturbation Theory of Fermion Systems" by J. Paldus and J. Cizek, "Coupled-Channel Studies of Rotational and Vibrational Energy Transfer by Collision" by William A. Lester, Jr., and "Theory of Low Energy Electron Scattering by Complex Atoms" by R. K. Nesbet.

The article by Peyerimhoff and Buenker was of special interest to this reviewer. They discuss the role of ab initio electronic structure theory in the understanding of the electronic spectra of molecules, with special emphasis on systems with 12 valence electrons, i.e., formaldehyde, thioformaldehyde, ethylene, HNO, and molecular oxygen. Buenker and Peyerimhoff's use of an individualized configuration selection scheme, followed by an energy extrapolation procedure, is certainly one of the brighter recent developments in theoretical chemistry. Also very welcome are the reviews by Lester and by Nesbet, who clearly outline significant recent developments in their respective areas of collision theory.

Henry F. Schaefer III, *University of California, Berkeley*

Advances in Physical Organic Chemistry. Volume 11. Edited by V. GOLD (University of London) and D. BETHELL (University of Liverpool). Academic Press, London. 1975. viii + 410 pp. \$33.00.

This volume contains five contributions: Physical Organic Model Systems and the Problem of Enzymatic Catalysis by T. H. Fife; Charge Density-NMR Chemical Shift Correlations in Organic Ions by D. G. Farnum; The Norbornyl Cation: A Reappraisal of its Structure Under Stable Ion Conditions by G. M. Kramer; Nucleophilic Aromatic Photosubstitution by J. Cornelisse, G. P. de Gunst, and E. Havinga; and Alternative Protonation Sites in Ambident Conjugated Systems by M. Liler.

The individual chapters are generally well written by experts in the field and measure up well to the usually high standards of this series. References to the original literature are through 1973 and usually selective rather than exhaustive. It clearly belongs in all libraries and, if it were not for the price, in individual collections.

Peter J. Stang, *University of Utah*

Surface and Defect Properties of Solids. Volume 4 (A Review of the Recent Literature Published up to April 1974). M. W. ROBERTS (University of Bradford) and J. M. THOMAS (University College of Wales), Senior Reporters. The Chemical Society, London. 1975. 255 pp. \$38.50.

This volume continues the series of "Specialist Periodical Reports" on surface chemistry being published by the Chemical Society, and contains six articles. The first is a critical review of various spectroscopic techniques applied to intrazeolitic transition-metal ion complexes, by R. Kellerman (Xerox) and K. Klier (Lehigh). These authors also discuss the preparation and properties of these complexes. Next is a review of the steam re-forming of hydrocarbons by J. R. Ross (Bradford), including a complete discussion of the various catalysts (and possible mechanisms) used in these reactions. The third article is by R. Joyner (Bradford) and M. Roberts (Bradford) on the application of Auger electron spectroscopy in surface chemistry. After a good discussion of the elements of Auger spectroscopy, they go on to discuss various experimental results and end by commenting briefly on the reasons why x-ray and uv photoemission may become more important than Auger spectroscopy in the near future. After these articles, there are three articles on defects. R. Smallman (Birming-

ham) and R. Dobson (Birmingham) discuss the behavior of metal lattice vacancies during oxidation, particularly the evidence for the injection of point defects. J. Chisholm (British Museum) discusses crystallographic shear planes in silicate structures. (A crystallographic shear plane is a shear defect first encountered in metal oxides where the metal:oxygen ratio changes without altering the oxygen packing, thus making possible large departures from stoichiometry without a high density of vacancies or interstitial atoms.) Finally, L. Hobbs (Harwell) reviews in great detail the recent advances in the use of transmission electron microscopy for observing *extended* defects in alkali halides.

I found these articles to be interesting and informative. The level is such that a graduate student in chemistry as well as a more advanced researcher will find this volume very worthwhile.

Robert Silbey, *Massachusetts Institute of Technology*

Films on Solid Surfaces. By J. G. DASH (University of Washington). Academic Press, New York, N.Y. 1975. 273 pp. \$26.00.

In a preface the author indicates that this book was written for "physical and biological scientists working in fields involving physical adsorption and surface science". As a biologist accustomed to dealing with systems in which the interfaces are dominated by the physicochemical properties of water, this reviewer's initial skeptical reaction to a monograph devoted exclusively to the physical properties of gases on solid surfaces was understandable. However, Dash has presented a concise, readable review of recent experimental and theoretical developments in the field of gas adsorption, so that the formal relationship between solid/vapor systems and those containing fluid interfaces has become more obvious.

The organization of the book is developed logically with an introductory sequence of chapters in which the atomic basis of adsorption, contemporary experimental techniques for solid surfaces, and an introductory review of statistical thermodynamics of adsorption are presented. The analysis of surface phases in the latter section, while skillfully presented, might benefit from an expanded discussion of the phase rule as it pertains to surface phenomena.

Following these introductory chapters, the remainder of the book is devoted to the analysis of a number of systems: thermodynamics of noninteracting monolayers, imperfect gases and phase condensation, solid phases and melting phenomena, epitaxial monolayers, heterogeneous films, and superfluidity.

The book is suitable as an introductory text for graduate students in physics and physical chemistry who wish an overview of developments in the analysis of intermolecular forces in surface phenomena. It should be noted that the phenomena of general interest in surface science—heterogeneous catalysis, membrane properties, corrosion, lubrication, etc.—are not treated. Perhaps in a future edition of this book the author may also wish to include a discussion of these problems in the light of some of the recent theoretical developments of intermolecular forces across fluid interfaces.

N. L. Gershfeld

Laboratory of Physical Biology, National Institutes of Health

Methods of Hormone Analysis. Edited by H. BREUER, D. HAMEL (University of Bonn), and H. L. KRÜSKEMPER (University of Düsseldorf). Georg Thieme Verlag, Stuttgart/John Wiley & Sons, New York, N.Y. 1975. xxv + 520 pp. \$30.00.

Determinations are described in 58 short chapters for about 40 hormones in biological samples. There is an additional chapter on the "Statistics of Parallel-Line Assay". There are over 60 contributors with extensive experimental experience in clinical chemistry and endocrinology as authors of these chapters.

Each chapter is an independent monograph for a given procedure, usually with extensive reference to the literature but with no direct cross references to other sections of the book. Methods range from bioassays to gas chromatographic and spectrophotometric procedures with a strong emphasis on radioimmunoassays. In general, the monographs follow a similar format. After a brief introduction as to background and principles, there is a detailed description of the procedure, including required materials, equipment, and calculations. This is usually followed by a discussion of the assay including its reliability. Also usually included is either reference to or a listing of normal and pathological values.

The editors mention in the preface of the book the problem of evaluation of hormone methods because of the wide variety in methodology of the increasing number of procedures being published. They

state that "From the abundance of these methods, we have here compiled those procedures that are internationally recognized as valid standard methods in clinical chemistry and experimental endocrinology". However, there is no description given of how this selection was made. Thus it appears that the reader is dependent upon the experience of the authors of individual chapters and their review of the literature in this regard. It would have been helpful to have more comparisons of methods, including comparisons to bioassays and biological responses.

The editors' objective, also expressed in the preface, of having monographs presented so that methods can be followed directly has been accomplished and is an important contribution of this book.

J. E. Sinsheimer, *The University of Michigan*

Graphic Representations of the Periodic System During One Hundred Years. by EDWARD G. MAZURS. The University of Alabama Press, University, Ala. 1974. 251 pp. \$15.00.

This book is the second edition of a book published in 1957 entitled "Types of Graphic Representation of the Periodic System of the Chemical Elements". It consists of 143 pages of text and tables and 108 pages of bibliography. It is, itself, an elaborate classification scheme for forms and formulas used for periodic tables over the 100 years since Mendeleev's 1869 contribution. Various geometric designs including spirals, helices, cones, lemniscates, block diagrams, foldouts, etc., are illustrated. The discussion advocates tables based on electronic structure and includes a mathematical expression of the periodic law, $t = n + l$, where t is the ordinal number of periods and n and l are the usual atomic quantum numbers. The author makes a great deal of the difficulties in correct placement of transition elements, lanthanides, and actinides occasioned by irregularities in ground-state electronic structures such as $3d^5 4s^1$ for Cr instead of $3d^4 4s^2$, and shows how physical and chemical properties still are factors in arranging elements in tables. For most chemists the standard long form of the periodic chart based primarily on numbers of electrons in incomplete s ; p ; s and d ; or s , d , and f orbitals serves very well, and arguments over placement are of purely historical or semantic interest. One other error of content is the assignment of 4 as the principal valence of cerium which is usually trivalent.

The author seems to prefer tables in which periods end with alkali and alkaline earth metals. This makes it simpler to apply the mathematical law stated above but will probably not gain wide acceptance or appeal to most chemists, who prefer the noble gases at the end of periods.

This book should be useful to historians of science. Its use would be simplified if the index referred to page numbers as well as classification numbers for the tables referred to and literature references.

G. P. Haight, *University of Illinois, Urbana*

Rubber and Rubber Elasticity. Edited by A. S. DUNN (Manchester). John Wiley & Sons, New York, N.Y. 1974. vii + 211 pp. \$12.50.

This book consists of the proceedings of a special symposium held at the University of Manchester in 1974 to honor, and to mark the retirement of, Professor L. R. G. Treloar, who has contributed a great deal to the field of rubber elasticity over the past several decades. It contains a dozen papers by 19 of Professor Treloar's friends and colleagues, and a contribution by Treloar himself, most of which might be of some interest to those concerned with the elasticity and viscoelasticity of rubber and of other elastomeric polymers. The volume is No. 48 of the *Journal of Polymer Science: Polymer Symposia* series.

The fundamental principles of elasticity as seen from the molecular point of view, so important and so often in controversy, are given little or no attention. Nothing is said of chain statistics, chain geometry, chain flexibility, rotational barriers, non-Gaussian chains and networks, network statistics, thermoelasticity, swollen networks, the front factor, composite networks, interpenetrating networks, crystallization under stress, and a host of other subjects. In short, this book offers little to those interested in polymer chain (and network) theory and interpretation.

The book, however, does offer phenomenological fare. Listed in the contents are articles entitled: Butadiene-Propylene Alternating Copolymers, Polyphosphazene Elastomers, Morphology and Physical Properties of Polyether-Ester Thermoplastic Elastomers, Influence of Curing Systems on the Properties of Natural Rubber, Dynamic Viscoelastic Behavior of Polybutadiene Networks, Factors Influencing

the Strength of Rubbers, Elasticity of Uncrosslinked Rubbers, Hysteresis in Rubber Vulcanizates. The articles are generally short and of limited scope; several are research papers rather than reviews of the field.

My respect for Professor Treloar notwithstanding, I would have to say that this volume does not conform to my image of a book entitled "Rubber and Rubber Elasticity". Rather, it is a collection of short papers, which will be of interest to those concerned with the aforementioned subjects. Two very brief review articles therein of a more general nature do not alter this opinion. Perhaps it would better have been published as "Proceedings of . . . , et cetera", so that the title would more accurately reflect its contents.

Kenneth J. Smith, Jr., *State University of New York
College of Environmental Science and Forestry*

A Step-by-Step Approach to Elementary Organic Synthesis. By M. PAUL SERVÉ (Wright State University). Ann Arbor Science, Ann Arbor, Mich. 1975. ix + 322 pp. \$10.00.

The book is organized mainly by compound class, devoting a chapter to each of the commonly encountered functional groups covered in a one-year introduction to organic chemistry. There are also chapters on condensation reactions and other carbon-carbon bond forming reactions.

Each chapter generally begins by listing procedures for synthesizing a particular type of compound with brief comments on limitations, orientation if applicable, etc. Next is a section which gives numerous worked syntheses, in which a synthesis problem is presented and worked step by step. A question and answer approach points out to students the type of logic required to work the synthesis. (E.g., Are carbons added during synthesis? What is the exact relationship between starting material and product?) Each step is shown individually and each reaction involved is referenced when it has appeared in a previous chapter. Each chapter concludes with a number of unworked synthesis problems, whose answers appear in the back of the book.

The selection of syntheses is good, ranging from straightforward to moderately complicated. This book should be of definite value to students who have trouble with synthetic problems. It points out the exact changes in structure involved, which though instinctive to a small core of gifted students is not always obvious to many others. The student who is willing to work at it will have ample opportunity to receive the practice and drill from this book which is so helpful in developing skill and understanding of organic synthesis.

One weakness of this book is a complete absence of all mechanistic considerations. For example, rearrangements are never mentioned even though they are often a factor in selecting or avoiding a particular synthesis route.

John M. Sullivan, *Eastern Michigan University*

Organic Chemistry. By T. W. GRAHAM SOLOMONS (University of South Florida). John Wiley & Sons, Inc., New York, N.Y. 1976. xxiii + 1056 pp. \$19.95.

Professor Solomons, in the preface to this text, indicates intentions to include "a clear and unified development of important concepts . . . an early presentation of important functional groups . . . a broad and logical presentation of subsequent topics . . . an emphasis on bioorganic chemistry . . . a modern and easily understood treatment of molecular orbital theory . . . extensive use of resonance theory", etc. I believe that he has succeeded quite well in accomplishing these goals, in a text which is exceptionally readable and thorough.

The text basically follows a functional group approach with "tool area" chapters located at appropriate points—stereochemistry relatively early (Chapter 7) and structure determination (Chapter 14) at a point prior to the chapters in which heteroatom functional groups are discussed. Specific further comments on spectroscopic methods appear in subsequent chapters as applicable, with the exception of the chapter on "Alcohols, Phenols and Ethers" where such material could have been included profitably.

The chapters which highlight basic organic chemical structure and reactivity are very carefully done and are significantly up to date, both

in use of terminology and in inclusion of useful concepts and reactions of relatively recent vintage. Discussion of particular topics often reveals the author's awareness of the kinds of difficulties and questions students generally experience. To cite an example: very explicit comments keep properly distinguished the use of the words "clockwise" and "counter-clockwise" as they apply to polarimetry, as opposed to their use in arriving at appropriate (*R*) and (*S*) designations of configuration. With great regularity as I scanned the text carefully, I found myself asking the question, "Yes, but what about . . .?", only to find a well-stated answer soon thereafter.

Five chapters are labeled as "Special Topics". The first three of these include, in each case, a variety of isolated subjects which could have been parts of the preceding chapters; the subsections of each such special topics chapter are unrelated to each other, so that any or all of them could be excluded from the coverage of a course without affecting understanding of later material. The final two "special topics" chapters, Chapter 23 on "Lipids" and Chapter 26 on "Nucleic Acids: Protein Synthesis" appear to me to be different from the first three. Their content provides a logical survey of these two areas, as do intervening chapters on "Carbohydrates" and "Amino Acids and Proteins". Chapters 23–26 therefore provide a suitable introduction to biochemistry, stressing structure, in vitro reactivity and biological significance. In vivo processes are noted to a limited degree.

Comments of biological significance are not limited to these final chapters, however. In earlier chapters there are included a number of very well chosen examples of circumstances in which basic organic chemical reactivity is reflected in metabolism. The number of such examples is not great, but those included do make *useful contributions* to the relevant subjects and clearly are not just "thrown in" in order to motivate students with interests in life sciences.

A very substantial number of problems and exercises are provided, many dispersed throughout the chapter content, where they provide opportunity for thought and practice on material just covered in the text. The end-of-chapter problems are well related to content as well and require a high level of competence from the very beginning. Many are more challenging than standard review questions, but they do not seem to require the over-sophistication questions of that sort in some texts demand.

Other useful features of the text include reaction summaries at the ends of relevant chapters, a chapter-by-chapter bibliography of selected readings in other texts, monographs and periodical literature (compiled at the end of the text), and limited answers to selected problems. A thorough solutions book for all problems also has been published.

In general, then, I would strongly recommend this text for a full-year course for majors and others in courses which provide a modern and thorough coverage of the subject. I believe that Professor Solomons has provided a very excellent alternative to standard texts for this market.

Robert R. Winkler, *Ohio University, Athens*

A Foundation for Quantum Chemistry. By A. R. DENARO (Liverpool Polytechnic). Halsted Press/John Wiley & Sons, Inc., New York, N.Y. 1975. 159 pp. \$10.95.

Despite its title, this book turns out to be an undergraduate textbook rather than a monograph on "foundations". Yet it can hardly be called a quantum chemistry text, for it contains no material on molecules (nor for that matter on any atoms beyond hydrogen). The standard soluble problems—box, barriers, rotor, oscillator, and H-atom—are treated along standard lines, the primary distinction being an unusual emphasis on the elementary mathematical steps. However, it is difficult to imagine a reader who could realistically aspire to mastery of this book's material, but not be impatient with its excessively deliberate style. Thus, in one instance (p 94), the author employs seven equations to show that $d^2/d(cx)^2 = 1/c^2 d^2/dx^2$, while in another (p 153) he uses eight equations to differentiate e^{-ax^2} !

At its best the book is workmanlike, but the reviewer could think of no reason to prefer it over available books aimed at a similar audience.

Frank A. Weinhold, *Stanford University*