Book Reviews

Advances in Photochemistry. Volume 10. Edited by J. N. PITTS, JR. (University of California), G. S. HAMMOND (University of California), and K. GOLLNICK (Universität München). John Wiley & Sons, New York, N.Y. 1977. ix + 475 pp. $29.50.

This volume of "Advances in Photochemistry" continues the series tradition of useful and definitive reviews. The contents of this volume are "Vapor Phase Photochemistry of the Neutral Oxides and Sulfides of Carbon", by S. V. Filseth (57 pp, 129 refs); "Photolysis of Saturated Alcohols, Ethers, and Amines", by C. von Sonntag and H.-P. Schuchmann (87 pp, 295 refs); "Excitation and Deexcitation of Benzene", by R. B. Cundall, D. A. Robinson, and L. C. Pereira (73 pp, 288 refs); "Primary Photoprocesses of Organo-Transition Metal Compounds", by C. R. Bock and the late E. A. K. von Gustorf (90 pp, 262 refs); "Intramolecular Proton Transfer in Electronically Excited Molecules", by W. Klöpffer (48 pp, 94 refs); and "Excited State Behavior of Some Bichromorphoric Systems", by F. C. De Schryver and N. Boens (106 pp, 245 refs). With two exceptions, each chapter cites references into 1975. The most recent reference in Klöpffer's review was published in 1973 and De Schryver and Boens appended a list of 21 papers (mostly of 1976 vintage) which have appeared since the review was written. This volume also contains a six-page index and a cumulative index to titles previously published in the series.

As is indicated by the chapter titles, this volume is devoted to critiques of the photochemical behavior of different classes of molecular substrates. The chapters by Filseth and by Cundall et al. have used extensive spectroscopic and photophysical information to provide the context for discussion and interpretation of photochemical results. Cundall et al. have provided a very instructive and extensive critique of the photophysics of benzene. The remaining chapters emphasize photochemical reactions and product yields. While all the contributions to this volume represent serious efforts to critically assess the areas of photochemistry reviewed, the chapter by von Sonntag and Schumann has an especially strong emphasis on the historical context and includes some 19th century citations. The chapter by Bock and von Gustorf includes material on most classes of metal complexes but emphasizes metallo carbonyls and heavy metal polypyridyl complexes. The chapter on excited-state proton transfer appears to be careful and critical, while the last chapter presents an impressive collection of elegant organic photoreactions including compilations of yields and illustrative mechanistic discussions.

This volume will be of interest to most practicing photochemists. It will be a valuable reference to any chemist with an interest in the topics reviewed.

John F. Endicott, *Wayne State University*

Sulfur, Energy, and Environment. By BEAT MEYER (University of Washington). Elsevier Scientific Publishing Co., Amsterdam and New York. 1977. xii + 448 pp. $39.00.

This is an important, timely, and readable book. As high quality energy sources dwindle, the necessity to exploit lower quality fossil fuels increases and those generally consist of high-sulfur residual oils and coal. Tighter restrictions than existed in the past now exist on permissible levels of sulfur-containing emissions, and the use of higher sulfur fuels means that persons involved in energy production and the enforcement of air pollution regulations need to be able to inform themselves on sulfur, sulfur-containing substances, and the technology for desulfurizing fuels and/or combustion products. Persons involved in the food industry and agriculture or regulation thereof, where substances used as preservatives and pesticides have an uncertain impact on human health, may find the discussion of sulfur based preservatives and pesticides informative.

This book is intended as a guide to the voluminous and scattered literature on sulfur and some of its compounds. The aim, rather than to be a comprehensive review, is to give an interpretive overview of various aspects of sulfur and to provide a useful bibliography in each area. The 15 chapters consist of (1) an introduction, (2) a history, (3) properties of elemental sulfur, hydrogen sulfide, sulfanes, and polysulfides, (4) analytical chemistry, (5) occurrence and sources of sulfur, (6) the sulfur cycles, (7) sulfur production, (8) recovery from combustion gases, (9) environmental control and legislation, (10) medical use and health effects, (11) sulfur in agriculture and food, (12) industrial uses of sulfur and its compounds, (13) sulfur polymers, (14) sulfur-containing materials (man made), and (15) future trends. There is a bibliography, author index, and subject index. The references cover a wide time span and include many recent studies. An especially strong point is that there are references to company technical bulletins and brochures, to government reports, to handbooks, and to other engineering data sources as well as to more conventional scientific journals. This reflects the intent of the author to write a book of broad utility and appeal, in which attempt he has been highly successful.

Misprints abound, but not many of them will seriously mislead the reader. The book contains a wealth of chemical, technological, economic, and even cultural information, and one hopes that the price will not discourage individual purchasers and the less affluent libraries.

David W. Emerson, *The University of Michigan–Dearborn*

Atlas of Steroid Structure. Volume 1. Edited by WILLIAM L. DUAX and DORITA A. NORTON (Medical Foundation of Buffalo, Buffalo, N.Y.). Plenum, New York–Washington–London. 1975. xiii + 572 pp. $49.50.

This book is a reference book on all that anyone would want to know about the three-dimensional structures of steroids. The contents are a marvelous and well-organized collection of ball-and-stick diagrams of steroids, computed from coordinates that have been derived from x-ray data, and lists of the dimensions of the steroids. Thus the book is suitable for organic chemists, biochemists, biologists, and endocrinologists, interested in fitting structural data into the context of their own research.

The Atlas is dedicated to D. C. Hodgkin, J. D. Bernal, and I. Fankuchen, who pioneered diffraction studies of crystalline steroids in the 1930s. It is also a tribute to Dorita Norton who envisioned such a volume long before her untimely death. The bulk of the design and preparation of the Atlas has been the work of W. L. Duax and his co-workers in Buffalo.

This first volume covers 103 steroids (estranes, androstanes, and pregnanes) including the important natural steroids estradiol-17β (three determinations), testosterone (six determinations), progesterone, cortisol, and aldosterone. In addition, there is a short introduction on crystallographic methods, steroid classification, and conformational analysis.

Approximately four pages are devoted to each steroid. The first page contains the formula, the reference, some data on the crystals, and two views of the steroid, one from above the four-ring structure and the other a side view. The second page contains atomic coordinates, bond lengths, interbond angles, and conformation angles. The third page contains a view along the best plane through the ring system so that deviations from this plane are indicated. In addition, ring conformations, angles at ring junctions, and distances between functional groups are listed. The latter may be very useful for biologists and biochemists interested in steroid-receptor geometry. The last page contains diagrams of the molecular packing and information on hydrogen bonds and short intermolecular contacts.

This Atlas is an excellent model of the way structural results can be presented to the noncrystallographer. It is a painless way to learn about steroid structure and is an essential reference resource for those who work in this area and for libraries covering the fields of chemistry and biology. Volume 2 is now in preparation.

Jenny P. Glusker, *The Institute for Cancer Research*

Highlights of Alicyclic Chemistry. Volume 2. By LLOYD N. FERGUSON and D. R. PAULSON (California State University). Franklin Publishing Co., Palisade, N.J. 1977. 288 pp. $44.00.

The expressed purpose of the authors is to give the student of alicyclic chemistry an overview of the field and the most important references. The examples are chosen to show the utility of a particular synthesis or to point to the scope of a particular rearrangement. It is claimed that a conscious attempt has been made to include some of the latest literature.

The book includes chapters on nomenclature (2 pp!), methods of ring formation, ring expansion, ring contraction, ring opening, and skeletal rearrangements.

The book utilizes examples to make most of its points, and thus consists mainly of formulas, with discussion held to a minimum. Many of the examples are taken from the natural product field.

The book covers many topics rather superficially that have been covered in many other texts. For example, in the synthesis chapter, the aldol condensation, Dieckmann cyclization, Friedel-Crafts reaction, etc., are covered, yet unfortunately, almost nothing is said about the many elegant and versatile new methods to form carbon-carbon bonds which have been developed in the last few years. In fact, less than 15% of the references in the book are taken from the past five years.

One wonders what real value this book will have, considering the vast number of books on alicyclic chemistry already available. It does not appear to be suitable as a textbook. It may prove valuable for a reader wanting an overview of a subject about which he knows little, and visual retrieval of information is easy for the browser, but it is too limited to be of much value to research workers in the areas covered.

John N. Marx, *Texas Tech University*

Liquid State Chemical Physics. By R. O. WATTS (Australian National University) and I. J. MCGEE (University of Waterloo). John Wiley & Sons, New York, N.Y. 1976. xiii + 334 pp. $24.95.

Capabilities for the meaningful theoretical study of liquids are evolving rapidly. This book provides a well-structured, thorough review of the advances in this area up to 1976. The presentation is lucid and the mathematical rigor is kept to a sensible level. The balance between theory and results is also very good. The bountiful literature references (ca. 700) are a treasure that should not be passed up by researchers in this field.

The book begins with a discussion of intermolecular forces and potential functions. A clear derivation of the statistical mechanics of fluids is complemented by a chapter on the theory of time-dependent processes. Both integral equation and perturbation theory methods are presented. Naturally, in this context the Monte Carlo and molecular dynamics approaches to computer modeling of liquids are also discussed. In this one instance, the mathematical presentation makes the theory seem more complicated than necessary. Following chapters focus on the theoretical and experimental description of the structure of liquids and the determination of thermodynamic properties. Examples center on noble gas liquids. Excellent comparisons are made between the results using different theories and a variety of potential functions. The penultimate chapter covers the recent computer simulations of water and aqueous ionic solutions. Finally, limited coverage of liquid metals and molten salts is provided.

Overall, this book is an important contribution that will be well received by all chemists and physicists interested in the theoretical treatment of condensed phases. The level and quality of presentation make the book suitable as the basis for a special topics or one-semester course at the beginning graduate level.

William L. Jorgensen, *Purdue University*

Gmelin Handbook of Inorganic Chemistry. Volume 43 (Boron Compounds. Part 12). By INGEBORG VON WILUCKI (Gmelin-Institut, Frankfurt am Main, West Germany). Edited by KURT NIEDENZU (University of Kentucky) and KARL-CHRISTIAN BUSCHBECK (Gmelin-Institut). Springer-Verlag, Berlin. 1977. iv + 306 pp. $290.90. In German, with Table of Contents and marginal keys in English.

The present volume is the fourth part of the Gmelin series on carboranes (the first three sections were previously published as Volumes 15, 27, and 42) and is the twelfth Gmelin book on the general topic of boron chemistry. This volume, together with the previously published third carborane section, deals with the icosahedral $C_2B_{10}H_{12}$ species (*o*-, *m*-, and *p*-carborane) and their C- and B-substituted derivatives, an area which includes thousands of known compounds. Included in the latest book are C-substituted derivatives involving oxygen-, sulfur-, silicon-, germanium-, phosphorus-, arsenic-, antimony-, bismuth-, and transition metal-containing functional groups; C-substituted derivatives containing exo-polyhedral rings; B-substituted species; and the recently discovered $(CH_3)_4C_4B_8H_8$ system.

Like its predecessors in the Gmelin carborane series, this book is designed as a comprehensive source of information for workers in this field or in closely related areas. The style of writing is spare and efficient, and there is little introductory or explanatory material which would be useful to nonspecialists. However, the book fulfills its basic encyclopedic function very well. The organization is such that entries for specific compounds prepared up to the end of 1975 can be located with reasonable facility in the text and tables, even by readers whose command of German is minimal. A high level of accuracy is maintained, and this reviewer found no glaring errors. The absence of subject and author indexes is a drawback, as is the practice of grouping references together at the ends of the main sections where they can be found only by leafing through the book; this arrangement also leads to duplication of individual references numerous times. However, the listing of articles from foreign journals together with their translated versions is a considerable aid, especially when dealing with the Russian literature. The inclusion of numerous tables of information including preparative routes, NMR, UV, IR, crystallographic data, melting points, and other data, greatly enhances the utility of the book and constitutes a primary reason why anyone working in the carborane or borane fields should have access to it.

The stratospheric price will restrict purchases mainly to libraries and research groups, but in terms of its up-to-date, comprehensive character, this volume together with its three predecessors provides an excellent reference source for the field of carborane chemistry.

Russell N. Grimes, *University of Virginia*

Introduction to Computer Programming for Chemists. T. L. ISENHOUR (University of North Carolina) and P. C. JURS (Pennsylvania State University). Allyn and Bacon, Boston, Mass. 1972. x + 325 pp. $6.25.

This relatively short paperback book gives a remarkably complete survey of the fundamentals of computer programming. The programming language is Fortran IV, and all of the programs used as examples were chosen to be of particular interest to chemists.

Part I consists of two short chapters of general introductory material (the structure of a typical digital computing system, programming flow charts, etc.), and a longer but concise presentation of the basics of Fortran IV. The second part contains 45 worked examples, progressing in difficulty. Each consists of a discussion of the problem posed, a suitable flow chart and Fortran program for its solution, comments on program statements of particular interest, and illustrative input data and results. The student is urged to use these programs by running them on a computer, first as is and then with various modifications in order to learn new techniques. Many of the examples presented are quite interesting, They include plotting graphs with a line printer, Monte Carlo calculations, organic synthesis, matrix inversion, numerical integration, and numerical solution of differential equations. Part III consists of eight useful Appendixes on topics such as job processing, a glossary of computer terms, program optimization, and trouble shooting. The book concludes with a bibliography and subject index.

Anyone working through this material will have gained a great deal of expertise in Fortran programming and will probably have learned some useful chemistry and mathematics as well.

J. E. Mark, *University of Cincinnati*

Structure and Properties of Polymers. H. V. BOENIG (St. Louis). Georg Thieme Publishers, Stuttgart, and John Wiley & Sons, New York-Toronto. 1973. x + 283 pp. $19.50.

There is a great deal of useful information in this book with regard to structure-property relationships for polymeric materials. Unfortunately, however, many important concepts of relevance are discussed either inadequately or in a confusing manner. There are, in fact, numerous misconceptions which could seriously mislead a reader not already knowledgeable about polymers.

It is simply not possible to recommend this book, particularly since there are a variety of other books which provide a more authoritative and more easily understood treatment of essentially the same material.

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