

A listing of a few of the fifteen chapters by heading will be illustrative of the subjects treated by the author. Molecular Orbitals and Microsymmetry, The Interelectronic Repulsion in M.O. Configurations, The Nephelauxetic Series, Electron Transfer Spectra, Molecular Orbitals Distinctly Lacking Spherical Symmetry (following a chapter devoted to complexes with spherical symmetry), Determination of Complex Species in Solution and Their Formation Constants, Survey of the Chemistry of Heavy, Metallic Elements. The last-mentioned chapter is a succinct treatment of oxidation states, general nature, complexes and important chemistry of the transition elements.

On the subject of identifying and interpreting the bands of *new* species of complexes the author in the concluding paragraph states that he "is willing, as far as he can, to comment on identifications made by other chemists and physicists and will be glad to see attempts at an early stage, before they are published in the public literature."

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Introduction to Nuclear Physics and Chemistry. By BERNARD G. HARVEY, Lawrence Radiation Laboratory, Berkeley, California. Prentice-Hall, Inc., Englewood Cliffs, New Jersey, 1962. x + 370 pp. 16 × 23.5 cm. Price, \$9.00 (text); \$12.00 (trade).

One of the principal aims of this book, as indicated in its preface, is to give an account of nuclear structure and nuclear reactions "in a nearly nonmathematical way," and with a minimum use of quantum mechanics. The book does this, and in a quite reasonable fashion. The first eleven chapters give an account of just about all the subjects which one would expect to see in a modern treatment of nuclear structure physics; nuclear binding energies, radioactive decay and nuclear transitions, direct and compound nucleus reactions, and fission, are all discussed and there is some account given about nuclear models and nuclear forces. The final five chapters are given over to a treatment of experimental equipment and procedures. The writing is clear, there are many useful tables and figures, and each chapter has an associated set of problems.

So far so good; taken on its own terms the book does a good job and the student who reads carefully through it will become generally acquainted with the nuclear structure field. But the reviewer is left wondering whether the qualitative approach adopted here can really produce, besides an acquaintance with, any real understanding of the subject. To take only one example, the properties of angular momentum determine to a large extent the characteristics of nuclear reactions, the selection rules in nuclear transitions and many of the general features of nuclear models. A book which does not give an adequate treatment, or assume an adequate understanding, of angular momentum (and this book does neither) must reduce in many instances to a simple listing of facts concerning nuclei and must ignore the real unity which exists between many topics. And the same criticism could be made on other points as well. There are some outstanding examples of books which, by clever physical arguments without much recourse to formal mathematical apparatus, do impart an understanding of a complicated subject; but that would be hopelessly difficult in such a large field as nuclear structure physics and this book makes no such attempt. It seems then to the reviewer that the book will be of considerable use to the student who wants a descriptive treatment of the subject but for the beginnings of a real understanding he must look elsewhere.

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Chemistry of Organic Fluorine Compounds. By MILOŠ HUDLICKÝ. The Macmillan Company, 60 Fifth Avenue, New York 11, N. Y. 1962. 536 pp. 17 × 24.5 cm. Price, \$9.50.

Books on fluorinated organic compounds have been few, sketchy or restricted to specific groups. All have treated the fluorides as highly specialized, not to say anomalous compounds, a tendency easily explained by the spectacular, overpublicized success of some commercial applications.

This book offers an up-to-date (1960 included) review of small-scale preparations and factual descriptions of the known compounds, with excellent indexing. In its treatment of the subject, it can be likened to the 1958 "Aliphatic Fluorine Compounds" of Lovelace, Postelneck and Rausch; it has the same thoroughness, good selectivity and dependability, but its range is not as restricted and it has the advantage of including a judicious coverage of the east-European literature. It specifies simple, effective preparations for most of the chemical functions.

Like its predecessors, this book is written primarily from the standpoint of compound preparation and description of their behavior in conventional reactions. It does not try to include general theoretical considerations and remains frankly descriptive, but as such it is complete, well organized, up-to-date, selective and trustworthy. If it were to be supplemented by periodical additions, it could become for a long time a handbook for the fluorine chemist, not to be needlessly duplicated or imitated.

As I see it, there is now at hand enough clearly classified factual information to require a shift of emphasis to integration of the subject, or more specifically to proper re-integration of that information into general organic chemistry. Intuitive mistakes have been made which will be hard to correct, even when understood. Fluorine is one of the halogens, but a carbon-to-fluorine bond is privileged as it is built at the same quantum level from both sides; the resemblance to a carbon-oxygen bond is insufficiently grasped; fluorinated clusters have pronounced double bond character; the balance between induction and mesomerism

in vinylic fluorides is not clear; $F_3C-C=C-A$ cannot be treated as a vinylog of F_3C-A , and the latter does not tend to undergo heterolysis as $F_3C^- + A^+$, but homolysis as $F_3C\cdot + A\cdot$.

In conclusion, I adopt Hudlický's book as my desk copy holding complete descriptive information in concise, clear, convenient form, and I wait hopefully for an entirely different, complementing approach in any future book.

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Clathrate Inclusion Compounds. By SISTER MARTINETTE HAGAN, Department of Chemistry, Mundelein College, Chicago. Reinhold Publishing Corporation, 432 Park Avenue, New York 22, N. Y. 1962. xiii + 189 pp. 13.5 × 19.5 cm. Price, \$6.50.

There has been a considerable development of interest in the chemistry of *inclusion compounds* during the past decade and this is a timely monograph dealing particularly with the class of these compounds known as the clathrates. The first chapter surveys the broad range of the inclusion compounds, giving much of the historical background and the attempts at classification, mainly from the structural point of view. The following six chapters then describe in much more detail the status of knowledge, up to about 1960, concerning the crystalline compounds formed by clathration. The literature coverage is good and the arrangement, style and presentation is excellent. There is throughout a strong emphasis on the structures, which provides a unifying theme. Indeed the reason for the existence of the clathrate compounds was quite mysterious until some of their crystal structures were determined by Powell in 1948. The more thermodynamically oriented chemist might possibly find some aspects of this presentation a little unsatisfactory. However, there is a wealth of chemical and structural information very compactly contained in this little book. The problem of relocating it, when half-remembered from a previous reading, would have been made easier had the usual index been supplemented with a formula index. Especially it is a pity not to have such an index in a book on clathrates, where part of the fun comes from their chemically unpredictable stoichiometry. Who could not help being curious about $Br_2 \cdot 8.6H_2O$?

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Supplement to Mellor's Comprehensive Treatise on Inorganic and Theoretical Chemistry. Volume II. Supplement II. The Alkali Metals. Part 1. H. V. A. BRISCOE, D.Sc. A.R.C.S., D.I.C. F.R.I.C.; A. A. ELDRIDGE, B.Sc., F.R.I.C.; G. M. DYSON, M.A., D.Sc., F.R.I.C., M.I.Chem.E., F. Inst. Pet.; and A. J. E. WELCH, Ph.D., D.I.C., Editorial Board. John Wiley and Sons, Inc., 440 Park Avenue South, New York 16, N. Y. 1961. xxxix + 1458 pp. 17 × 25 cm. Price, \$55.00.

This volume, the second supplement to "Mellor's Comprehensive Treatise on Inorganic Chemistry," covers lithium and sodium and follows the supplement which was devoted to the halogens. One or more supplements on the alkali metals are to follow. Throughout this volume, the conventions adopted for the original volume have been followed; thus under the general heading of the metals only the hydrides, oxides, hydroxides, halides, sulfides, sulfates, carbonates, nitrates and phosphates are discussed. All the other salts are described under the non-metallic element of the acid.

Each of the two elements is discussed in one chapter, with sections devoted to the various topics. Four of the first five

sections in each chapter are devoted to the metals—occurrence, preparation, uses, chemical and physical properties. This is followed by a discussion of the compounds listed above. The last three sections in each chapter pertain to the spectroscopy of the metal and its compounds, the analytical determination, and finally the biological properties.

Twenty-five experts in the various areas contributed the respective sections with complete literature review for most sections until 1955. Tables and diagrams are used liberally throughout the sections.

The physical properties discussed for the metals, for example, include structure and atomic and ionic radii, density and thermal expansion, mechanical and elastic properties, surface properties, dispersion and colloidal properties, viscosity, diffusion, thermodynamic properties, electrode and ionization potentials, electron affinity and electronegativity values and optical and photoelectric properties.

For the compounds, the preparation, physical properties, chemical properties, applications and uses, and analytical determinations are described.

The sections generally speaking are well written, logically presented, and well referenced; however, in most cases, no critical evaluation of the references is attempted in line with the policy followed in the original volumes of Mellor.

This volume is a "must" for all technical libraries.

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Organic Peroxides. By ALWYN G. DAVIES, Ph.D., D.Sc., Lecturer in Chemistry, University College, London. Butterworth Inc., 7235 Wisconsin Avenue, Washington 14, D. C. x + 215 pp. 16 × 25 cm. Price, \$9.25.

Organic Peroxides. Their Formation and Reactions. By E. G. E. HAWKINS, D.Sc., Ph.C., F. R. I. C., Distillers Company, Ltd., Research and Development Dept., Great Burgh Epsom, Surrey, Great Britain. D. Van Nostrand Company, Inc. 120 Alexander Street, Princeton, New Jersey. 1961. xiv + 434 pp. 16 × 25 cm. Price, \$12.50.

Reiche's "Alkylperoxyde und Ozonide" stood as the only book on peroxide chemistry from 1931 until the brief survey by Tobolsky and Mesrobian's "Organic Peroxides" in 1954. An up-to-date, comprehensive treatment of this subject was obviously needed.

Now we have two excellent new books on organic peroxides, both of which cover identical ground with only small differences in organization, and both of which are authored by men who are authorities in this field of specialization. Both are executed in an extremely competent fashion and the reviewer was struck immediately with the thought that there was a great need for one of these books, but not for both, and that much effort, both on the part of the authors and, even more important, on the part of the many readers, would have been saved if by some means a single book had appeared. It is a sacred responsibility of authors and publishers alike to guard the time of the potential reader in any scientific field by publishing only those books which will be the very highest quality (which these two are) and which are really needed. There is no referee system among publishers to see that unnecessary duplication will not occur, nor would we want such a system; the ultimate decision must rest with the conscience of the authors. In the present case such unnecessary duplication has arisen, and most readers (and libraries) must make a choice between these two books, since only those doing extensive research in the field of peroxide chemistry will want to read both or to use both for reference purposes.

Both books have chapters covering Hydroperoxides, Dialkyl Peroxides, Peroxy Acids, Peroxy Esters, Diacyl Peroxides and derivatives. Both have selected sections on Autoxidation and on Analysis and the Detection of peroxides. Davies treats the mechanisms of decomposition of peroxides in five separate chapters, while Hawkins covers the same material in a manner integrated with the particular peroxide being discussed. This latter treatment leads to some duplication.

Davies has achieved a more concise treatment, 215 pages with about 1,000 references, as compared to 434 pages with about 1,700 references by Hawkins. The larger number of references in Hawkins results only in part from reference to the same paper in two or more places, and there are about three hundred references in Hawkins' book not mentioned by Davies. To a considerable extent, this results from a rather careful survey of the patent literature and from a bit more emphasis on some of the industrial aspects of peroxide chemistry by Hawkins, which has been done rather sparingly, but critically, by Davies. A rapid survey of the author index of both books indicates that each has a fair number of references not in the other.

The condensation achieved by Davies has been accomplished by the generous use of tables for listing compounds and properties, by a more critical selection of literature, and by a very con-

cise style of discussion. Both books give a full theoretical treatment of the mechanisms of peroxide syntheses and decompositions; more discussion accompanies Hawkins' treatment, but the reviewer feels that Davies' treatment is the more critical. For example, Davies considers the Dakin reaction (p. 155) and proposes a mechanism not found in the literature, while this reaction is not indexed or referred to by Hawkins.

A reader of either book will receive an excellent and thorough introduction to all aspects of peroxide chemistry. Because this will be done with the expenditure of less time by reading Davies' book, this book may be the more valuable to the general student and to the person who is not doing extensive research in the field. For the person in industry working in some aspect of this field, especially along the lines of autoxidation, the somewhat more detailed discussions of Hawkins may be preferable. A person wanting to use such reviews for leading references into some particular aspect of peroxide chemistry will probably want to refer to both.

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HARRY S. MOSHER

The Chemistry of Nucleic Acids. By D. O. JORDAN, Angus Professor of Physical and Inorganic Chemistry, Univ. of Adelaide, South Australia. Butterworth, Inc., 7235 Wisconsin Avenue, Washington 14, D. C. 1960. ix + 358 pp. 14.5 × 22 cm. Price, \$10.50.

As stated by the author, this book places its emphasis on the chemistry and structure of nucleic acids. No attempt has been made to deal with biological function to any significant extent, since a rather voluminous treatise would be required. The value of the latter, in any event, would be questionable because of the rapid pace in the various areas of nucleic acid research. Fortunately, the chemistry rests on more stable ground and the author's attempt is justified. There is an overlap of material both with "The Nucleic Acids" (Editors, Chorgoff and Davidson) and "The Polynucleotides" (Steiner and Beers); however, this is not a serious matter, particularly because Jordan's treatment tends to be more critical.

Chapter 1 serves as an historical and orientative introduction. Chapter 2 deals with the isolation of nucleic acids. While this material is of value for teaching purposes, it probably cannot serve as a substitute for original literature, where other methods and details are often sought. Chapter 3 covers heterogeneity and fractionation. This is an extremely active area, and unfortunately the material is out-dated to a considerable extent. New and apparently better fractionation procedures have since been devised and are not recorded. Chapters 4-7 cover the chemistry of the nucleic acid components and should be useful to interested investigators. The isolation of purines, pyrimidines, nucleosides and nucleotides is discussed, including various chromatographic methods. The structure and synthesis of nucleosides and nucleotides is also discussed. Finally, the acid-base properties of the nucleic acid components is covered in some detail. The structure of nucleic acids begins on p. 140, Chapter 8, and continues nearly to the end, Chapter 14. The material is covered in a clear and systematic fashion. Briefly it is as follows: The internucleotide bond, Chapter 8; X-ray diffraction, Chapter 9; thermodynamics, and hydrodynamics of nucleic acids, including molecular weight, acid-base properties, viscosity and sedimentation measurements, Chapter 10. The material covered in Chapter 10, which includes much of Jordan's work, is extensive and the discussion is useful since it tends to evaluate results. Chapter 11 deals with denaturation and degradation. Here too the discussion is extensive and enlightening. Chapters 12 and 13 deal with RNA. In these chapters the author's specialty betrays itself, for much pertinent material is omitted, *i.e.*, that dealing with soluble and "messenger" RNA. Chapter 14 contains an adequate discussion of the synthetic polynucleotides. Chapter 15 represents the only attempt by the author to include biological function.

This book is well written and, despite the fact that some parts are already out-dated, it should be owned by every serious student of nucleic acids.

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The Irreducible Tensor Method for Molecular Symmetry Groups. By J. S. GRIFFITH, Fellow of Kings College, Cambridge. Prentice-Hall, Inc., Englewood Cliffs, New Jersey. 1962. ix + 134 pp. 16 × 23.5 cm. Price, \$7.50.

Almost every worker in the field of molecular quantum mechanics has at one time or another muttered to himself, "If only there existed tables of coupling coefficients for the construction