
 BOOK REVIEWS

Principles of Radiation Dosimetry. By G. N. WHYTE, National Research Council, Ottawa, Canada, and Queen's University, Kingston, Ontario. John Wiley and Sons, Inc., 440 Fourth Avenue, New York 16, N. Y. 1959. vii + 124 pp. 15.5 × 23.5 cm. Price, \$7.00.

As the applications of ionizing radiation increase, so the need also increases for technologists in chemistry and related fields to make radiation measurements or to assure themselves of the adequacy of radiation dosage measurements made by others. Fulfilling the proper experimental conditions for adequate measurements of this type is often a surprisingly stringent and complicated task, much more so than one could easily assume from the apparent simplicity of the dosage unit, the rad, in which such measurements are usually reported.

The book under review assumes an elementary but quantitative knowledge of physics, and is concerned primarily with the interaction of radiation and matter and in developing the physical principles involved in measuring radiation dosage from external X-ray and γ -ray sources. It is in no sense a handbook on measurement techniques. Rather it serves, as far as actual measurement methods are concerned, as a commentary upon various experimental techniques for characterizing radiation sources and measuring radiation doses from them. It points out strong and weak points of various radiation measuring procedures and collects information, not otherwise easy to come by, on conditions that must be fulfilled to make adequate measurements. It is a book that deserves wide distribution and use.

Useful but less thorough discussions are given of radiation measurements of neutrons and external charged particle beams. Internal radiation sources are not discussed. The bibliography is limited almost entirely to English language sources.

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Einführung in die Elektronentheorie Organischer Verbindungen (Introduction to the Electronic Theory of Organic Compounds). By GEORG KARAGOUNIS, Apl. Professor für Physikalische Chemie, an der Universität Freiburg I. Br. Springer-Verlag, Heidelberger Platz 3, Berlin-Wilmersdorf, Germany. 1959. 195 pp. 13.5 × 20.5 cm. Price, DM. 24.—

This little paper-back book is based on a series of lectures delivered by the author in the recent past at the University of Freiburg.

Instead of being an introduction, it is in fact a rapid survey of such topics, among others, as: The Photoelectric Effect and the Dual Nature of Light; The Bohr Atom and Its Inadequacies; Quantum Theory; Wave Mechanics; Resonance; Molecular Orbital Theory; Hybridization; Color and Constitution; Chemical Reactivity from the Standpoint of Electron Theory; Nuclear Magnetic Resonance and Chemical Structure.

The author is skillful in presenting the mathematical background needed to understand the various topics, and he is at his best in showing the applications to chemical concepts. However, it must be borne in mind that his lecture audiences had the necessary prerequisites in physics, mathematics and chemistry to be able to follow his discussions. The reader must be similarly prepared or be willing to study the books recommended by the author.

Inconsistencies in the book can be adduced to absent-mindedness, haste or careless proof-reading. For example, in a number of structural formulas, nitrogen is represented with five equivalent valence bonds, and benzene derivatives at times are pictured as simple hexagons. On page 164 two formulas are not clearly identifiable, and the distribution of charge on the atoms is omitted.

Terseness is to be expected in so small a volume, but to state merely that hydrazobenzene rearranges into benzidine

without an explanation, is poor exposition. The treatment of chemical theory shows many evidences that the book is a somewhat expanded version of the author's lecture notes. Footnote 3, page 135, is obviously an informal notation which was not meant to be copied as written.

A generation or so ago when a German scientific work appeared with the word *Einführung* in its title, one could be fairly certain that it would be a solid, two or three volume work. Professor Karagounis owes the public the pleasure of reading such an *Einführung* in die Elektronentheorie Organischer Verbindungen.

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LOUIS SATTLER

Aromatic Substitution. Nitration and Halogenation. By P. B. D. DE LA MARE, M.Sc. (N.Z.), D.Sc. (Lond.), Reader in Chemistry, University College London (University of London), and J. H. RIDD, B.Sc., Ph.D. (Lond.), Lecturer in Chemistry, University College London (University of London). Academic Press Inc., 111 Fifth Avenue, New York 3, N.Y. 1959. vii + 252 pp. 16 × 25.5 cm. Price, \$9.00.

Aromatic substitution is treated in all beginning and advanced organic texts and treatises, but, with a few exceptions, the treatments are usually perfunctory, mainly qualitative, and tend to stress essentially orientation and substituent effects. There has been a decisive need for a monograph which would present the actual development in the field, not its status of twenty years ago or an idealized picture of orientation. Such a book has now been written, and the reader is assured an up-to-date version of aromatic substitution, because the authors, both at University College London, have worked actively in the field and have made significant contributions to its advancement.

There is so much material to be covered that actually only two substitution reactions have been chosen for discussion—nitration and halogenation—a wise choice, when a choice had to be made, because these have been the most thoroughly studied kinetically, mechanistically and with regard to substituent effects. However, a mere listing of these two reactions does not do justice to the contents of the book. Of the 18 chapters, seven are devoted to these two reactions, and include separate chapters on preparative methods, mechanisms, substituent effects, nitrosation and substituting agents in halogenation. Two earlier chapters discuss the qualitative electronic theory and methods for investigating reaction mechanisms, the latter with particular emphasis on substitution. Chapters 11 to 15 deal with aromatic rearrangements, and with nitration and halogenation in biphenyl and related compounds, in bi- and polycyclic systems, in non-benzenoid aromatic hydrocarbons and in heterocyclic compounds. Chapters on electrophilic displacements of groups other than hydrogen in nitration and halogenation, molecular-orbital calculations of aromatic reactivity, and linear free energy relationships in direct substitution reactions conclude the book.

The book's most outstanding feature is not only its up-to-dateness in terms of coverage (the literature is covered through 1958), but its thoroughly modern point of view and the stress on quantitative and on kinetic results, whenever these are available. There is a minimum of unnecessary speculation, and very often the need for further investigations is pointed out. One becomes aware of the fact that here is a field where there exists much qualitative information, but relatively little precise quantitative data, although such data are being accumulated at a faster rate now than at any time in the preceding two decades. The book is not meant to be exhaustive or encyclopaedic, and there is no unnecessary padding, to which a field with so many qualitative observations lends itself, but a remarkable amount of work of current interest is covered. Topics such as the structure of the transition state in different substitution reactions, the significance of kinetic isotope effects, the possible intervention of complexes in substitution, certain

kinetic ambiguities in defining the substituting agent, the use of various acidity functions, the status of molecular-orbital calculations with regard to relative reactivities of polynuclear systems, the difference in reactivity between charged and uncharged reagents, the various modifications of the Hammett equation, are all of current interest in the field and receive intelligent and critical attention.

Most readers will probably find little to disagree with; therefore, whatever questions may be raised will presumably regard the emphasis given to different topics. Some may think, for instance, that preparative details do not quite belong in this book, or that some treatments are rather short. On the other hand, some discussions, such as the one on methods for the investigation of substitution mechanisms, or the discussion of structural effects in halogenation or of substitution in biphenyl, are the best that have been written on these subjects in recent years. One can only hope that the authors will decide to follow this book with one that will cover the remaining substitution reactions, particularly in view of some of the more recent work on deuteration, diazo-coupling and the Friedel-Crafts reaction.

The book is written in very clear and precise language; its make-up is of the high standard that one has come to expect from its publishers. It is an excellent and informative book, which should satisfy those who work in the field and appeal to those who wish to become acquainted with its present status. It should also go a long way toward stimulating renewed interest in the many and varied problems connected with aromatic substitution.

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Proceedings of the Symposium on Electronic Waveguides. New York, N. Y., April 8, 9, 10, 1958. Microwave Research Institute Symposia Series. Volume VIII. Edited by JEROME FOX, Assistant Editor, MARTHA CROWELL. Interscience Publishers, Inc., 250 Fifth Avenue, New York 1, N. Y. 1958. xix + 418 pp. 15.5 X 22.5 cm. Price, \$5.00.

Electronic Waveguides is the eighth of the volumes reporting the proceedings of the Symposium sponsored by the Microwave Research Institute of the Polytechnic Institute of Brooklyn. These volumes all have proved to be most useful, not only to specialists in the field of interest covered, but to others seeking an introduction to the topic.

The term Electronic Waveguides is not one widely used and, in fact, originated with the Microwave Research Institute and therefore deserves an explanation. As used here, it has the very broad interpretation of including all the physical situations where propagating electromagnetic waves interacting with free or nearly free electrons or ions in a space that is usually, but not always, clearly delineated by physical structures.

The book, in addition to the foreword and a very brief summary of a round-table discussion on future electron tubes and solid state devices, is composed of twenty-six different articles by different authors. These can be characterized, in general, as falling in two groups, (a) those which concern electrons, plasma and field interaction in specific devices, such as travelling wave tubes, magnetrons, etc., and (b) those which deal with the interaction of electron beams, plasmas and wave propagation in different media without reference to any special device.

As is usual in books of this type, an attempt is made to present some rather simple pictures of the devices for which electronic wave-guide phenomena are important. Thus, we have the articles about travelling-wave tubes and new microwave devices, both of which are very readable and give some insight to the physical basis of operation to the person without experience. However, as is also usual, it is also quickly necessary, for understanding, to go beyond these simple models and develop material which either requires considerable experience or effort to comprehend. Most of the other articles are of this nature, and are written by specialists very well qualified to write on their subjects. No effort is made by most of these authors to provide extensive bibliographies of their subject, but the book as a

whole provides a good reference to the literature on this subject.

It is not any easy task to edit and present in book form the work of a number of different authors, and this task has been skillfully accomplished to the end that we have here a unified and inclusive treatment of a field that is bound to become of increasing technical and scientific importance. This book is important both as an introduction to this field, and as one indicating the scope and techniques that are used to attack problems of great technical difficulty.

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BOOKS RECEIVED

December 10, 1959–January 10, 1960

ROGER ADAMS, Editor-in-Chief. "Organic Reactions." Volume 10. John Wiley and Sons, Inc., 440 Fourth Avenue, New York 16, N. Y. 1959. 563 pp. \$12.00.

R. P. BELL. "The Proton in Chemistry." The George Fisher Baker Non-Resident Lectureship in Chemistry at Cornell University. Cornell University Press, 124 Roberts Place, Ithaca, N. Y. 1959. 223 pp. \$4.75.

J. O'M. BOCKRIS, J. L. WHITE AND J. D. MACKENZIE, Edited by. "Physicochemical Measurements at High Temperatures." Academic Press, Inc., 111 Fifth Avenue, New York 3, N. Y. 1959. 394 pp. \$13.50.

E. F. GALE. "Synthesis and Organisation in the Bacterial Cell." CIBA Lectures in Microbial Biochemistry. John Wiley and Sons, Inc., 440 Fourth Avenue, New York 16, N. Y. 1959. 110 pp. \$3.50.

MARTIN J. KLEIN, Edited by. "Paul Ehrenfest. Collected Scientific Papers." Interscience Publishers, Inc., 250 Fifth Avenue, New York 1, N. Y. 1959. 632 pp. \$13.75.

WILLIAM D. LOTSPEICH. "Metabolic Aspects of Renal Function." Charles C Thomas, Publisher, 301-327 East Lawrence Avenue, Springfield, Illinois. 1959. 214 pp. \$7.50.

W. G. PALMER. "Valency: Classical and Modern." Second Edition. Cambridge University Press, 32 East 57th Street, New York 22, N. Y. 1959. 244 pp. \$5.50.

PAUL PASCAL, Edited by. "Nouveau Traité de Chimie Minérale." Thome XVIII. "Complexes du Fer, du Cobalt et du Nickel." Masson et Cie., 120 Boulevard Saint-Germain, Paris 6, France. 1959. 944 pp. Broché, 9.500 fr.; cartonné toile, 10.700 fr.

E. H. ERICH PIETSCH, Editor. "Gmelins Handbuch der Anorganischen Chemie. Alphabetische Folge zur Systematik der Sachverhalte." Verlag Chemie, G.m.b.H. (17a) Weinheim/Bergstr., Pappelalle 3, Germany. 1959. 109 pp. Kart. DM. 30.—; Geb. DM. 35.—.

F. SMITH AND R. MONTGOMERY. "The Chemistry of Plant Gums and Mucilages and Some Related Polysaccharides." ACS Monograph No. 141. Reinhold Publishing Corporation, 430 Park Avenue, New York 22, N. Y. 1959. 627 pp. \$18.00.

H. W. THOMPSON, Edited by. "Advances in Spectroscopy." Volume I. Interscience Publishers, Inc., 250 Fifth Avenue, New York 1, N. Y. 1959. 363 pp. \$12.50.

K. L. WOLF. "Physik und Chemie der Grenzflächen." Zweiter Band. "Die Phänomene im Besonderen." Springer-Verlag, Heidelberger Platz 3, Berlin-Wilmersdorf, Germany. 1959. 360 pp. DM. 58.—.