

with migration of the indole moiety to any appreciable extent, then should be represented by 15.

Acknowledgments.—We are greatly indebted to Professor K. Biemann for the determination and interpretation of the mass spectra. We also wish

to acknowledge stimulating discussions with Professor G. Buchi and Dr. F. A. Hochstein.

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RECEIVED SEPTEMBER 18, 1961

BOOK REVIEWS

Pyridine and its Derivatives. Part Two. Edited by ERWIN KLINGSBERG, American Cyanamid Company, Bound Brook, New Jersey. Interscience Publishers, Inc., 250 Fifth Avenue, New York 1, N. Y. 1961. x + 576 pp. 16.5 × 23.5 cm. Price, \$37.50; subscription price, \$32.50.

This is the second of a four volume series on pyridine in the over-all series on the "Chemistry of Heterocyclic Compounds" edited by Arnold Weissberger. The pyridine volumes are edited by Erwin Klingsberg and the present volume contains chapters on Quaternary Pyridinium Compounds and Pyridine N-Oxides by Elliot Shaw, Alkylpyridines and Arylpyridines by Leon Tenenbaum, Halopyridines by Holly Mertel, Organometallic Compounds of Pyridine by Harry Yale, and Nitropyridines and Their Reduction Products by Renat Mizzoni. The literature appears to have been reviewed carefully through about 1957 with occasional references to work as recent as 1960.

As indicated in Professor Lauer's review of the first volume, recently published in this Journal, the literature covering heterocyclic chemistry is expanding at such a rate that exhaustive reviews of this nature are especially valuable and are gratefully received by the practicing organic chemist, even though gratitude is tempered by the high price tags attached to the volumes.

Volume one in the pyridine series was especially impressive by the imaginative way in which the over-all chemistry of pyridine and pyridine N-oxide was handled. Although the reviews in Volume two appear to have been prepared in a thorough and competent fashion, the originality of approach present in volume one is missing. Nevertheless volume two is a valuable addition to the reference library of anyone interested in pyridine chemistry.

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Radiation Damage in Solids. By DOUGLAS S. BILLINGTON and JAMES H. CRAWFORD, JR. Princeton University Press, Princeton, New Jersey. 1961. xi + 450 pp. 16 × 24 cm. Price, \$12.50.

This book is a desirable addition to any general library which contains much material on radiation effects. The suitability of its inclusion in a more limited, personal library is a matter of some question. The favorable features, as well as many of the unfavorable, are summed up in the authors' own preface. However, the unfavorable features do not appear to be recognized as such by the authors.

After an introductory chapter, a theoretical survey presents in very condensed form the content and conclusions of several review articles. In its present position the theoretical presentation is insufficiently detailed for value (although it is a good guide to the literature) and so terse as to prove a stumbling block for the reader possessed of the notion that it is desirable to understanding of the remainder of the text.

The balance of the book is rather spotty. Good, short essays of variable length are interspersed with material reminding of a class of annual review which attempts coverage of the subject matter without undue commitment by its author. The chapter on relation between structure and

properties is very readable; that on semi-conductors is superior to other parts of the book, doubtless because of the personal early involvement of one of the authors; the practical problems associated with uranium are interestingly discussed. However, in general, one gathers the impression (heightened by such juxtapositions as the treatment of radiation-affected silica gel catalyst at the end of a chapter on alloys) that the authors have unselectively presented all they know.

In cases where this reviewer has some personal acquaintance with details of the subject matter, he is impressed by the errors, by the manner of their presentation and by strange omissions. Some startling statements include an *obiter dictum* on radiation effects in organic solids (p. 82), a curious presentation of the mechanism of the Fricke dosimeter (p. 91), an extensive misconception of the early history of radiation damage studies (pp. 5, 395, 396), an erroneous discussion of the application of heavy-charged-particle accelerators "in the early days of the Manhattan Project" (p. 85), and the expressed notion (p. 5) that the terms "Wigner effect" and "discomposition," both originally suggested by this reviewer, are wholly synonymous. In view of the fact that the book is concerned about technological matters and does mention radiation-induced energy storage, omission of all reference to a possible thermal catastrophe, predicted by Szilard and unhappily demonstrated at Windscale, is rather notable.

The typography is exceptionally good, with only minor examples of bad usage (*cf.* p. 225) and but very few errors of spelling. It is unfortunate that the name of Van de Graaff is misspelled in its only three appearances in two different ways. Doubtless a second edition of this book will ultimately appear. When it does, it will be improved by many second thoughts of the authors.

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Technique of Organic Chemistry. Volume I. Physical Methods of Organic Chemistry. Part III. Third Completely Revised and Augmented Edition. ARNOLD WEISSBERGER, EDITOR. Interscience Publishers, Inc., 250 Fifth Avenue, New York 1, N. Y. 1960. xii + 849 pp. 16 × 23 cm. Price, \$24.50.

It is a striking indication of the growing dependence of organic chemistry upon more and more exotic physical techniques that a new and completely re-organized edition of this work should follow so soon the earlier edition. The volume at hand is Part III of a new Volume I; it deals with some topics covered in the earlier Volume I, Parts II and III, published in 1949 and 1954, respectively, together with some topics that have come into prominence, with respect to organic applications, in the intervening time.

The various branches of optical spectroscopy are now given expanded treatment in four chapters entitled, Spectroscopy and Spectrophotometry in the Visible and Ultraviolet (West), Infrared Spectroscopy (Anderson, Woodall and West), Colorimetry and Photometric Analysis (West), and Determination of Fluorescence and Phosphorescence (Wotherspoon and Oster). It is a question as to whether in these chapters the authors have not effected compromises

with respect to rigor of the theoretical treatment, up-to-dateness of instrument design, or practical interpretation of data that fall short of achieving a minimum level of sophistication. The subject, Light Scattering, appears in wholly new form as a separate chapter (Oster).

For organic chemists, the timeliness of the chapter, Optical Rotatory Dispersion (Klyne and Parker), will be a focal point of interest. The general discussion is very brief; most of the chapter is taken up with a survey of data. The chapters Polarimetry (Heller and Fitts) and Streaming Birefringence (Scheraga and Signer) have been extensively revised and new chapters have been added on the Kerr Effect (Lefevre and Lefevre) and Determination of the Faraday Effect (Waring and Custer). Altogether these five chapters provide more information on applications of polarized light than is available to the organic chemist in any other single source.

The two concluding chapters, Measurement of Dielectric Constant and Loss (Powles and Smyth) and Dipole Moments (Smyth), have changed little since the earlier edition.

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Les Réactions entre Ions Positifs et Molécules en Phase Gazeuse. Application à la Chimie des Rayonnements.

By J. DURUP, Docteur ès Sciences. Gauthier-Villars, 55, quai des Grands Augustins, Paris VI, France. 1960. 78 pp. 15.5 × 24 cm. Price, broché, 14 Nf; cart., 17 NF (\$3.75).

In this short monograph, the reader will find an interesting introduction to the subject of ion-molecule reactions. The early work, the experimental approaches and the quantum and classical theories are reviewed briefly. The bibliography extends to the end of 1959. The available information concerning about two hundred reactions is summarized and classified in an extensive table. Applications to radiation chemistry are discussed in the last chapter.

About one third of the book deals with theoretical considerations mainly about energies and mechanisms. Endothermic or highly exothermic processes are shown to have low probabilities. The author develops interesting ideas of his own without confusing his contributions with those of others.

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The Encyclopedia of Microscopy. Edited by GEORGE L. CLARK, Research Professor of Analytical Chemistry, Emeritus, University of Illinois, Urbana, Illinois. Reinhold Publishing Corporation, 430 Park Avenue, New York 22, N. Y. 1961. xii + 693 pp. 18 × 26 cm. Price, \$25.00.

This book is arranged in encyclopedia style, in double columns with 26 large topics and numerous subtopics in alphabetic order, and with cross references under most of these, but with no index.

It reminds one of a gigantic symposium of symposia, with papers that include reviews, some systematic and correlated developments in textbook style, and highly specialized reports on personal researches or novel instruments. As is inevitable in symposia, the level and scope of the papers vary widely, and the allocation of space is certainly open to question; for example, kidney ultrastructure gets as much as electron optics, and 4 pages are devoted to the ultrasonic absorption "microscope," a device which can detect a 25 μ energy-absorbing discontinuity but is hardly an image-former.

To a considerable degree, the general emphasis is on "appreciation" or potential application, rather than concrete techniques that might be followed by the user. On the other hand, there are many striking illustrations of micro-radiography and electron microscopy, somewhat slanted in the direction of biology. The editor contributes about 15 pages on various topics.

Chemists will be interested in sections on Lyophobic Colloids (20 pages), Refractometry (40 pages, 247 references,

but little on microscopical methods), Resinography (12 pages) and on General and Industrial Microscopy. Chemical Microscopy occupies over 50 pages, with major reference to precipitation reactions for a variety of drugs. The portion on morphology and birefringence avoids the correlation between these which is essential for intelligent and reliable description.

For those who like to read encyclopedias this one should be fascinating, but the alphabet is a poor guide for systematic study. Even much digging about in the table of contents may lead to very spotty information, as compared with what is accessible in fewer words, in more prosaic and orderly books. If the microscopist has studied these in his own field, then he may find the "Encyclopedia" a valuable supplement on selected topics, and a suggestive sampling or preview of what is new or "far out" in the ever-expanding horizons of techniques applied to ever-decreasing details of structure.

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Proceedings of the Symposium on Active Networks and Feedback Systems. New York, N. Y., April 19, 20, 21, 1960. Microwave Research Institute Symposia Series. Volume X. Edited by JEROME FOX, Assistant Editor, MARTHA CROWELL. Interscience Publishers, Inc., 250 Fifth Avenue, New York 1, N. Y. 1961. xxiv + 658 pp. 15.5 × 23 cm. Price, \$8.00.

It is a treat indeed to find a nostalgic paper reminiscing about the early thoughts and developments in the field of feedback amplifiers theory. It is especially welcome if it is authored by one of the communication field's pioneering theoreticians, H. W. Bode. This article and two others constitute a presentation of the state of the art and future trends in the proceedings of the symposium on Active Networks and Feedback Systems.

Bode's article, "Feedback—The History of an Idea" takes us back to 1923 and discusses the need for distortion-free repeaters which had existed in the telephone industry at that time and described Black's early invention of feedback amplifiers which helped satisfy the need. The author then discusses the work of Nyquist and MacColl and others and views the wartime marriage of feedback amplifier theory and automatic control. He states that "This marriage has lasted 20 years; perhaps an amical divorce is in order."

The remainder of the articles on Feedback Networks and Systems, however, do not indicate that this divorce is imminent. In fact, the only paper on the subject of adaptive control "AN Appraisal and Critique of a Class of Adaptive Systems" by I. M. Horowitz seems to indicate that there are a few cases where ordinary feedback is not just as effective as a much more costly and complex computer controlled or adaptive system.

Some of Bode's original work on multiloop feedback amplifiers is very lucidly explained by J. H. Muligan, Jr., in terms of transistor amplifier models and general matrix parameters. In the simple analysis of feedback systems the unilateral "block box" is used. However, for a more realistic approach non-reciprocal bilateral elements should be used. In his article on "Signal Transmission in Non-reciprocal Systems," he treats the concepts of return ratio and return difference for a general system matrix and shows the great utility of these ideas. Since many process control systems are multivariable, there is no doubt of the fruitfulness of applying these concepts in the analysis and synthesis of the control of multivariable systems. Process control systems usually have "plants" which are distributed in nature so that non-rational transfer functions develop. In particular, there is usually a distance velocity or dead period lag. A. Papoulis briefly treats this subject and gives stability limits. He apparently has ignored the great quantity of material on this subject, since no bibliography appears.

Since the introduction of the tunnel diode, negative resistance has become another basic active circuit element. Reports of research in this area constitute the main interest of the group of papers concerning active networks.

Non linear and time-varying systems constitute the remainder of this collection of papers. The control engineer