

$C_6H_{10}O_4 \cdot H_2O^7$: C, 43.88; H, 7.37; OCH_3 , 18.9. Found: C, 44.40; H, 7.21; OCH_3 , 18.3). Direct comparison of the oxidation product with a specimen of the dialdehyde (m.p. 99–101°, $[\alpha]^{25}_D +137^\circ$ (*c*, 1.0 in water); found for $C_6H_{10}O_4 \cdot H_2O$: C, 44.48; H, 7.20) prepared in the described manner from

(7) Maclay, *et al.*,⁶ observed that the molecule of water indicated by the analysis could not be removed by subliming the substance *in vacuo* at 65°, and hence refer to it as "water of constitution." This view is borne out by our finding that the infrared spectrum (Nujol) of the dialdehyde lacks a carbonyl band in the 6 μ region. It is clear, therefore, that in the solid state it exists in the lactal form VIIIb rather than in the dialdehyde form VIIIa.

α -methyl-6-deoxyglucopyranoside^{6,8} left no doubt about their identity (no melting point depression; identical infrared spectrum). These results, besides completing the proof for structure I for mycosamine, permit assignment of the D-configuration to carbon atom 5. The stereochemistry of the remaining asymmetric centers is under investigation.

(8) J. Compton, THIS JOURNAL, 60, 398 (1938).

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RECEIVED AUGUST 16, 1957

BOOK REVIEWS

The Principles and Applications of Polarography and other Electroanalytical Processes. By G. W. C. MILNER, M. Sc., F.R.I.C., A. Inst. P., Atomic Energy Research Establishment, Harwell. Longmans, Green and Co., Inc., 55 Fifth Avenue, New York 3, N. Y. 1957. xxvii + 729 pp. 15 × 22 cm. Price, \$17.50.

The polarographic literature has become so extensive that one must admire anyone who has the patience to prepare a comprehensive review of it, especially when his work has to compete with well-established books in the same language. However, three significant features of Milner's book distinguish it from other books on classical polarography. Firstly, the book covers the literature up to the end of 1955 whereas the coverage stops five years earlier in the book of Kolthoff and Lingane (see also Zuman's recent book, in German, on applications to organic chemistry and biochemistry). Secondly, Milner's book contains chapters contributed by J. E. B. Randles (University of Birmingham) in which the polarographic theory is presented from the point of view of electrochemical kinetics. Lastly, a large number of procedures are given for practical applications, especially in inorganic chemical analysis.

The book includes 29 chapters divided in four parts: theory and methodology, inorganic and organic polarography, and amperometric titrations. Controlled-potential electrolysis and coulometric methods are covered at the end of part one.

Fundamentals are discussed in Chapters 3 to 5 written by Randles. These chapters cover an excellent discussion of the classical theory of diffusion currents, a treatment of current-potential curves, and the best survey of phenomena related to polarographic maxima this reviewer has read in English. The analysis of current-potential curves is based on current ideas in electrochemical kinetics and definitely departs from the usual treatment involving solely equilibrium considerations (Nernst equation). This most welcome change from the conventional presentation may prove a little disconcerting to some readers who will not find some of the derivations they have become accustomed to. An original method is presented for adaptation of the equation for irreversible waves for the plane electrode to the dropping mercury electrode. Unfortunately, the rather rigorous treatment of this problem by Koutecky is only cited and not discussed at all although the analysis of experimental irreversible waves by this method is very simple.

Dr. Randle's contribution is excellent but it is written at a level which may deter practical analytical chemists—who will probably constitute the great majority of readers—from gaining the full benefit from its reading. In particular, examples of the application of theory to the analysis of reversible and irreversible waves would have helped some readers.

Some newer polarographic methods are covered in Chapter 7: derivative and differential polarography, oscillographic

polarography (by Randles), new types of electrodes, and polarography in non-aqueous media. The coverage of the different voltammetric methods related to polarography is not up-to-date, and does not stress fundamentals. The omission of square wave polarography, which was developed at Harwell (1952), is quite surprising in a book written by someone from the same institution. (The author points out in the preface the significance of the method in trace analysis but that is all.) Rotated electrodes are only mentioned briefly in Chapter 7 and fundamentals are not covered.

The coverage in the descriptive part seems critical and complete. Half-wave potentials are listed in the text but, in general, are not summarized in tables at least in the inorganic part. Numerous applications to practical inorganic analysis are discussed in detail.

There is a detailed subject index but no author index.

In conclusion, this book will prove valuable to those interested in the applications of polarography. Readers with their primary interest in fundamentals will find the chapters by Randles on the theory of current-potential curves most stimulating.

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The Condensed Chemical Dictionary. Fifth Edition, completely revised and enlarged by ARTHUR AND ELIZABETH ROSE, State College, Pennsylvania. Reinhold Publishing Corporation, 430 Park Avenue, New York 22, N. Y., 1956. xix + 1200 pp. 16.5 × 23 cm. Price, \$12.50.

The title page of the new Fifth Edition describes the Condensed Chemical Dictionary as "a reference volume for all requiring quick access to essential data regarding chemicals and other substances used in manufacturing and research, and to terms in general use in chemistry and the process industries." On the jacket we find the statement: "Here, indeed, is a *practical* book for busy chemists, engineers, consultants, purchasing agents, executives—for anyone in any line of activity who needs a convenient source of accurate, up-to-date chemical information."

A moderately careful inspection of this dictionary indicates that these descriptions are accurate. This is a reference work more suited to the needs of the industrial chemist and chemical businessman than to those of the research worker. As such, it represents an excellent effort on the part of the editors and should find widespread utility.

The dictionary section contains over 30,000 entries arranged on 1200 double-column pages. The typography and layout are very good. Each main heading is in boldface with the second and following lines of descriptive material indented below it. Liberal use of sub-headings and appropriate paragraphing within entries make for ease of searching

and good readability. Footnotes in boldface on each page explain the meaning of superscript numerals and asterisks.

Preceding the main section are the following: (1) numerical and alphabetical listings of 355 manufacturers (with addresses) whose trade-marked products appear in the Dictionary, (2) information on laws governing transportation of explosives and other dangerous articles, (3) safety information, particularly with respect to requirements for warning labels, and (4) an explanation of the arrangement of entries in the Dictionary.

Most of the main headings in the Condensed Chemical Dictionary consist of names of chemicals and chemical products. Three kinds of name are used: systematic chemical names, common or trivial names, and registered trade names. The systematic chemical nomenclature is generally accurate, up-to-date, and in line with *Chemical Abstracts* principles. However, a chemical compound is usually entered under what appears to be its best known industrial name with other names immediately following it in parenthesis. In some cases, this preferred name is the systematic name, in others it is a coined or common name. In either event, the alternative names are also entered as cross references. Systematic names are not inverted as in *Chemical Abstracts*, i.e., nitrobenzene rather than benzene, nitro-. Registered trade names of chemical products are entered using initial capitals and quotation marks for emphasis. The manufacturer of each trade-marked product is indicated by a superscript number referring the reader to the above-mentioned numerical listing of companies which appears at the beginning of the book, and the chemical identity of the material is given in most instances. The coverage of trade names is remarkably well up-to-date.

Information about products includes physical properties such as melting point, boiling point, solubility, specific gravity, refractive index, and, less frequently, surface tension, vapor pressure, viscosity and flash point. For commercial chemicals one finds a note indicating a natural source or the materials used in manufacture, as well as specifications, grades, containers and shipping regulations. Line formulas of pure compounds are given, but these often lack good arrangement. For example, unsaturation, is not clearly indicated (butadiene is shown as $\text{CH}_2\text{CHCHCH}_2$), and formulas for organic ring compounds in some cases are actually misleading (*N*-methyl-2-pyrrolidine is shown as $\text{C}_4\text{NH}_6\text{OCH}_3$). For a dictionary of this type, line formulas are certainly worthwhile, but only if they are well constructed.

In addition to chemical products as we ordinarily think of them, the Dictionary lists a variety of words and phrases having chemical connotations. Among these are names of minerals and other products from natural sources, names of processes and equipment, physical and chemical laws, and many other scientific terms. Generally speaking, these are well handled although some of the definitions of chemical terms such as "distillation," "alkylation" and "Henry's Law" leave something to be desired. The problem here is to present definitions which are scientifically correct and well expressed, yet are meaningful to the non-professional or semi-technical user of the dictionary.

All in all, the Condensed Chemical Dictionary gives one the impression of an up-to-date, accurate compendium of general chemical information.

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Chain Reactions. An Introduction. BY F. S. DAINTON, Professor of Physical Chemistry at the University of Leeds. Methuen's Monographs on Chemical Subjects. General Editors: H. J. Emeleus, F. R. S. and D. W. G. Style, B.Sc., Ph.D. John Wiley and Sons, Inc., 440 Fourth Avenue, New York 16, N. Y. 1956. xv + 183 pp. 13 × 19 cm. Price, \$2.90.

This book is tightly organized. Chain reactions are reviewed in a systematic, if very terse, fashion. Neither liquids nor gases are neglected and the coverage of polymerization reactions and explosions is remarkably broad for a small text. Essentially, it appears to be an extension of notes arranged in orderly fashion, perhaps for presentation in more detailed lectures or, as another possibility, as an abbreviated record of the author's views of a subject in

which he has done much reading, thinking and research. He presents chain reactions as a particularly useful device for putting the reader in touch with many of the fundamental theoretical developments in reaction kinetics. The text therefore has particularly salutary value for a lecturer in that field who might tend to treat chain reactions as a sort of second-order perturbation of an otherwise clean subject. This little book may also help to acquaint the research worker in kinetics with reaction types with which he might be otherwise unfamiliar. However, the book is unlikely to be of much use to a student studying for his examinations. Its brevity makes demands on the knowledge, persistence and patience of the reader not conducive to fast reading or to fast study. Infelicities of expression do abound and, while the number of outright errors may be small, the number of statements which must be read and interpreted with a generous and sympathetic view is uncomfortably large, particularly in the opening chapter. Some of the typographical errors also create inconvenience for the reader. The symbols employed in the book seem to have been adopted almost at random without consideration of their utility for pedagogic purposes; the reading of the second of two chapters on mathematical treatment is thus made unnecessarily difficult. A curious example of such unconstraint is in an equation for the radiolysis of water which either (incorrectly) purports to employ *G* values in expression of a stoichiometric relationship or is simply overladen with unnecessary symbols.

In spite of these criticisms the reviewer heartily recommends this little text as a useful adjunct to the libraries of both the serious teacher and the serious research worker in the field of reaction kinetics.

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Out of the Test Tube. The Story of Chemistry. Fifth Edition, Revised and Expanded. By HARRY N. HOLMES, Ph.D., LL.D., Oberlin College. Author of: *Have You Had Your Vitamins?* *General Chemistry*; *Laboratory Manual of General Chemistry*; *Introductory College Chemistry*; *Outline of Qualitative Analysis*; *Introductory Colloid Chemistry*; *Laboratory Manual of Colloid Chemistry*; *Strategic Materials and National Defense*; co-author of *Elements of Chemistry*. Emerson Books, Inc., 251 West 19th Street, New York, N. Y. 1957. x + 313 pp. 16 × 23.5 cm. Price, \$4.50.

A book for the layman who is interested in finding what chemistry is about, and especially for the student just making his first acquaintance with the subject. Written in a breezy and often humorous vein, it carries the reader swiftly through the early history of chemistry, and on to the stories of several of the elements and to the applications of organic chemistry in many fields.

Each chapter contains a tremendously interesting and thrilling collection of accounts of the development of various chemicals, their effects and applications. Along with these are fascinating anecdotes of the discoverers and research workers who made these developments possible. The collection is heterogeneous and wide sweeping. Too often one has the feeling that an animated discussion is dropped too soon, before the entire story is told. Perhaps in this lies some of the charm of the book, for it whets one's interest for further reading along similar lines.

In spite of the recent revision, there remains the impression that the story is still largely that of chemistry prior to World War II, and that the tremendous chemical progress and expansion of the last fifteen years has been slighted. Many recent discoveries and industrial developments of outstanding importance are merely mentioned, although a notable exception is the chapter on atomic power which is well handled.

This book cannot help but increase the interest in chemistry of those who read it, and for many it will serve as an enjoyable interpretation of chemistry as it touches the lives of us all.

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