NEW BOOKS

Higher Chemical Calculations. By A. J. MEE, M.A., B.Sc., Head of the Science Department, Glasgow Academy. Chemical Publishing Co., Inc., 234 King Street, Brooklyn, New York, 1941. viii + 184 pp. 12.5 × 19 cm. Price, $2.00.

This book, whose title is explained by the stated intention of writing a sequel to Dr. Holmyard's "Elementary Chemical Calculations," contains examples well distributed over the fields of analytical and physical chemistry. In most of the examples, integral or half-integral atomic weights are used, but in calculations of gas density by Regnault's method, seven-figure logarithms are specified. The inclusion of the *parachor*, but not the Debye–Hückel equation for strong electrolytes, is probably to be explained on patriotic grounds. An algebraic error in the statement of Raoult's law on page 81 might be misleading. The reviewer regrets that the author has chosen to retain the concept (and spelling) of "vapour density" (based on oxygen = 16), and electrolytic solution pressures computed without taking account of intermetallic contact potentials. The text constitutes a readable summary of "classical" chemical theory.

ELLIOT Q. ADAMS

The Chemistry of Organic Medicinal Products. By GLENN L. JENKINS, Ph.D., Dean and Professor of Pharmaceutical Chemistry, School of Pharmacy, Purdue University, and WALTER H. HARTUNG, Professor of Pharmaceutical Chemistry, School of Pharmacy, The University of Maryland. Planographed by John S. Swift Co., Inc., 2100 Locust Street, St. Louis, Missouri, 1941. 457 pp. Illustrated. 16.5 × 24 cm. Price, $3.80 less 20% discount.

Of all the papers on chemistry abstracted by *Chemical Abstracts*, the percentages of those made from papers appearing in the United States and in Germany have changed from 20.7 and 34.4 in 1913 to 33.5 and 13.4 in 1940. This transition has made the task of the American compiler of up-to-date texts much easier than heretofore, and his burden has been further lightened by the flood of excellent monographs which continues to pour from American presses. "The Chemistry of Organic Medicinal Products" by Jenkins and Hartung is a good example of a compilation which has taken full advantage of these modern summaries and reviews. With the praiseworthy aim of discussing the chemistry of the multitudinous organic medicinal compounds, the *materia medica* has been classified into groups according to chemical function. Thus the aliphatic, polyhydroxy, unsaturated, cyclic and aromatic alcohols, including such diverse compounds as methanol, sorbitol, farnesol, menthol, cannabinol, vitamin A, and chlorothymol, are grouped together as hydroxyl derivatives of hydrocarbons. In this way it has been possible to deal effectively with the chemistry of the compounds, their preparation and properties and at the same time to deal with the therapeutic significance and the use and modes of administration of the drugs.

The work includes many excellent tabulations and several interesting graphical representations of physical properties of series of compounds. Modern methods of synthesis are mentioned and brief accounts are given of present-day procedures for oxidation, reduction, rearrangement, degradation and the many other operations of modern synthetic chemistry. Interesting summaries are provided of the outstanding present-day work on anesthetics, the cardiac glycosides, hormones, vitamins, enzymes, cholines, phenylethylamines, amino acids, and sulfanilamides. The presentation is concluded with a useful chapter on stereoisomerism, a subject of vital interest to those concerned with medicinal chemistry. It is pleasing to see that the newer practice of designating relative configurations and rotations by the $d(\mp)$ and $l(\mp)$ notation is used and advocated in this discussion.

The text is a stimulating presentation of the role of organic chemistry in the elaboration and development of medicinal products and should be inspiring to students interested in medicine and their related professions. Its excellency is marred, however, not only by many trivial typographical errors, but by a multitude of examples of faulty expression and of the misuse of words and phrases. From the split infinitive in the opening note on the reverse of the title page to the last "in the case of" on the final page of the text, the compilation shows a magnificent disregard of the correct use of the tongue that Shakespeare spake. Any future edition should be rewritten entirely in accordance with the dictates and niceties of the English language.

C. R. ADDINALL

Quantitative Analysis. By EUGENE W. KANNING, Associate Professor of Chemistry, Indiana University. Revised edition. Prentice-Hall, Inc., 70 Fifth Ave., New York, N. Y., 1941. xx + 471 pp. Illustrated. 16.5 × 23.5 cm. Price, $3.70.

Revising this text after three years, the author states in the Preface, "The method of presentation . . . does not differ from that in the first edition. A large part of the content has been rewritten and enlarged to present a more rigorous and complete treatment of the fundamental principles of quantitative analysis." Changes or additions have been made in the sections on quantitative theory, the balance and weighing, volumetric calibrations, gravimetric analysis, solubility product and precipitation, neutralization theory, volumetric precipitations and complex formation, and oxidation–reduction theory, as well as in Part II devoted to actual analytical methods.

For the information of those unfamiliar with the book, the first 265 pages, divided into ten chapters, cover the usual topics: Fundamental Theory, Balance and Weighing. General Quantitative Considerations, Gravimetric Principles. Electroanalysis. Volumetric Analysis Prin-

ciples, Neutralization Theory, Volumetric Precipitation and Complex Formation, Oxidation–Reduction Reactions, Electrometric Methods. Part II gives in 134 pages procedures for some forty well-chosen determinations; this section is followed by an Appendix of useful tables.

The author's style is smooth and easily followed, and the sections on volumetric calibrations and neutralization theory are particularly well done. The experimental directions are given in adequate detail, with an effort to help the student anticipate possible mistakes and procedure errors. Good choice of type and design combine with excellent manufacturing to give a very attractive volume (aside from a few scattered errors and two minor objectionable style details—use of punctuation marks on centered formula lines and inconsistent omission of periods after many abbreviations).

ALLEN D. BLISS

Diffusion in and through Solids. By RICHARD M BARRER, D.Sc.(N.Z.), Ph.D. (Cantab.), F.I.C., Head of the Chemistry Department, The Technical College, Bradford; formerly Research Fellow, Clare College, Cambridge, England. The Macmillan Company, 60 Fifth Avenue, New York, N. Y., 1941. xiii + 464 pp. 158 figs. 14.5 × 22 cm. Price, $6.50.

This book is the first to appear on diffusion in condensed systems. The subject is one of considerable interest from both the theoretical and the practical points of view, but heretofore it has been disposed of fragmentarily in connection with surveys of other subjects. In the first place, there are the classical Fick law diffusion equations, solutions of which present difficult mathematical problems paralleling those encountered in the study of heat flow. Then, there are the physicochemical mechanisms by which matter is transferred through solid media. Finally, in various technical fields diffusion of one sort or another plays an important role: *e. g.*, in certain metallurgical processes, in permeation through refractories, porous and granular solids, and in the diffusion of gases and vapors through protective coatings and rubber fabrics. Certainly, there is much to be gained from an integrated account of the field as a whole, such as is offered by this book.

Solutions of the differential equations (Fick's laws) governing diffusion are presented briefly in the first chapter. For non-stationary states of flow under various boundary conditions space permits only the bare statement of the solutions plus a few remarks concerning their use. This of course fulfills the needs of later chapters, but it makes dull reading for the beginning of the book. Relegation of most of the material in this chapter to an Appendix might have been preferable.

Flow in capillary systems, *e. g.*, porous solids, refractories, and granular solids, is discussed in the second chapter. Diffusion through crystals and glasses is taken up in the following chapter. Here and in subsequent portions of the book, the author has included discussions of the solubilities of the diffusing substances, without which conversion of experimentally determined permeabilities to more rationally acceptable diffusion constants would not be possible.

Chapters V and VI are devoted to permeability, solubility, and diffusion in and through metals. Diffusion of ions and conductivity in ionic crystals, the interdiffusion of metals, structure sensitive diffusions, and migration in surface layers are discussed in Chapters VI, VII, and VIII. Chapters IX and X present experimental results and theories concerning permeation and diffusion through various organic high polymer membranes: rubber, synthetic rubber, cellulosic materials, and proteins.

There are numerous graphs and tables, and extensive bibliographies are given at the end of each chapter. Experimental methods are discussed briefly and in some cases diagrams of apparatus have been included. Experimental results and treatment of data are presented in considerable detail. The presentation is critical and, in a number of cases, the data have been recalculated and reinterpreted. On the whole, the book assumes an impartial view toward controversial interpretations, as for example in the discussion of activated sorption of gases by solids. The organization of the book is generally good; possibly an early chapter in which the various experimental methods are carefully classified and discussed would assist in the orientation of the reader at the outset, and at the same time would permit better continuity of presentation of results later on. Occasional portions of the book seem unnecessarily obscure, and could be improved by some clarification.

This monograph should be welcomed by those who may desire a casual familiarity with the subject, as well as by chemists and physicists who are directly concerned with diffusion problems in their specific fields of investigation.

P. J. FLORY

Chromatographic Adsorption Analysis. By HAROLD H. STRAIN, Ph.D., Carnegie Institution of Washington, Stanford University, California. Interscience Publishers, Inc., 215 Fourth Avenue, New York, N. Y., 1942. x + 222 pp. 37 figs. 15.5 × 23.5 cm. Price, $3.75.

This simply written volume is a useful addition to the literature of chromatography. The author wisely does not attempt the encyclopedic treatment so well given the field already by Zechmeister and Cholnoky. Instead he has produced an easily read and up-to-date book which has, in addition to these desirable features, one chapter which should be particularly useful to those employing the method. This chapter deals with the properties of various adsorbents and contains much information on the useful adsorbents which may be obtained in this country. The book deals with apparatus, methods, and applications of chromatography. The author makes many generalizations which, if they are not taken too literally, should aid the reader in choosing adsorbents, solvents and eluting agents. In the opinion of the reviewer, the author tends to generalize almost too freely at times. Thus (on pp. 14–15) the adsorbability of organic molecules is stated to be influenced primarily by the nature and the number of the polar groups in the molecules, and a list is given of the order of adsorbability of different types of compounds. The author here neglects to warn the reader of the equally important parts played by the solvent and the adsorbent, and of the really

somewhat limited usefulness of this series. There are several such over-simplifications which, however, point the necessity for further work in the field, and so have their stimulating value. The book can be recommended to any chemist or biochemist who wishes to obtain an up-to-date discussion of the chromatographic method, and is worth study by anyone who is engaged in a problem dealing with purification or separation.

HAROLD G. CASSIDY

American Cotton Handbook. By G. R. MERRILL, Professor of Textiles, Lowell Textile Institute, A. R. MACORMAC, Associate Professor, Textile Chemistry, Alabama Polytechnic Institute, and H. R. MAUERSBERGER, Technical Editor, Rayon Textile Monthly, Head of Evening Courses, Columbia University, Textile Consultant. American Cotton Handbook Company, 303 Fifth Avenue, New York, N. Y., 1941. lxxx + 1024 pp. Illustrated. 13.5 × 19.5 cm. Price, $4.80 (U. S. and Canada).

The book, which is sponsored by The Cotton-Textile Institute, opens with an account of the historical, economic and statistical background of the growing of cotton, including a critical appraisal of the results of the attempts by the U. S. Government to raise the price of cotton and benefit cotton farmers by legislative devices and by appropriations from the U. S. Treasury. The botany, agriculture and marketing of raw cotton are described. The bulk of the book is devoted to a clear, authoritative, well-written and detailed technical description of the mechanics and chemistry of the manufacture of cotton yarns and fabrics. This is followed by a chapter describing in detail the physical and chemical testing of cotton goods and another on laundering. There is a long classified bibliography of books dealing with cotton and a glossary giving definitions of technical terms. The book is profusely illustrated by good photographs and line drawings of machinery and by diagrammatic representations of weaves.

GRINNELL JONES

Solubilities of Organic Compounds. By ATHERTON SEIDELL, Ph.D., National Institute of Health, Washington, D. C. Third Edition, Volume II. D. Van Nostrand Company, Inc., 250 Fourth Avenue, New York, N. Y., 1941. 926 pp. 15 × 24 cm. Price, $10.00.

In the first volume of this Third Edition [THIS JOURNAL, **63**, 317 (1941)] the plan of arrangement was changed from alphabetical in accordance with the English names to alphabetical in accordance with the symbols of the elements. A similar change with similar advantages has now been made in this second volume devoted to organic compounds by arranging them in accordance with their increasing content of carbon, hydrogen and oxygen. The characteristic group formula is printed at the top of each page. What might be a disadvantage of this arrangement, namely, ignorance (quite excusable) of the formula of a substance whose specific name was known, is remedied by a cross-reference Name Index at the end of the volume.

This Third Edition, now complete, should continue the valuable services which the earlier editions of this compilation have performed so satisfactorily for over thirty years.

ARTHUR B. LAMB

Die Fermente und ihre Wirkungen. (2 separate volumes). Supplement, Lieferung 11 (Bd. II: Specieller Teil: Haupt-Teil XX-XXII und Sach-Register) und Bibliographie (1924–1938). By Professor CARL OPPENHEIMER, Dr. Phil. et Med. W. Junk Verlag, Scheveningsche Weg 74, The Hague, Holland, 1939. Lieferung 11. 155 pp. 20.5 × 27.5 cm. Price, 10 Dutch Fl. Bibliographie. xviii + 128 pp. 20 × 27 cm. Price, 10 Fl.

Lieferung 11 constitutes the final part of the Supplement to the author's comprehensive treatise on enzymes. The subject matter covered in this final part deals with the oxidases, dehydrogenases, peroxidases, catalases and cytochromes. Considerable space is devoted to discussions, pro and con, concerning interpretation of experimental data and views held by different investigators in this field of research. Like the earlier parts of the Supplement, this Lieferung contains an excellent array of references to the literature up to 1939. It is the reviewer's opinion that these references constitute the most valuable part of the Supplement. The discussions alluded to above are too much given to various interpretations made by different workers, and tend to confusion rather than to any satisfactory information.

J. M. NELSON

Physical and Chemical Methods of Sugar Analysis. By C. A. BROWNE, Ph.D., and F. W. ZERBAN, Ph.D. Third edition, rewritten and reset. John Wiley and Sons, Inc., 440 Fourth Avenue, New York, N. Y., 1941. xiv + 1353 pp. 332 figs. 15.5 × 23.5 cm. Price, $15.00.

By the preparation of this new edition of Browne's "Handbook of Sugar Analysis" which appeared in 1912 but has been out of print for nearly ten years, the authors have made a signal contribution to the literature of carbohydrates. The book represents a milestone in the field of sugar analysis whence one can look back at the superb achievement embodied in some two thousand publications of about fourteen hundred investigators, organic, physical, analytical and industrial chemists working in various research, technical and control laboratories throughout the world. From the viewpoint of the specialist the result is awe inspiring; from that of the average chemist it is bewildering. Take a common operation such as determination of moisture in sugars. Simple as it may first appear to the uninitiated it will loom up as a formidable task long before he has finished studying the information which the book so generously offers him on this subject. And what when, working in a control laboratory, he suddenly remembers that in determining the specific gravity of a sucrose solution he has forgotten to apply the third term correction of 0.0000000328794657176? Considering the genuine interest shown in this particular commodity by the Treasury Departments of the various national governments such a mistake might be unpardonable. However,

it is at such and similar points that the reader of the book would like to have more critical comparisons and discussions, firmer guidance and stronger recommendations from the authors whose excellent scientific reputations, born of their admirable accomplishments in this field, would make their suggestions invaluable to those with little or no experience.

The book consists of seventeen chapters with one hundred and forty-five tables in the text and an appendix of thirty-eight sugar tables. In the first three chapters sampling, determination of moisture and densimetric methods of analysis are fully described. In the next four chapters the principle and uses of refractometers, polarimeters and saccharimeters together with descriptions of diverse polariscope accessories are given with great clarity and astonishing thoroughness. Then comes in the eighth chapter a scholarly discussion of the specific rotation of sugars, followed in the ninth chapter by the presentation of the methods of simple polarization dealing mostly with difficult problems in the analysis of products of the cane- and beet-sugar industry. In the tenth chapter the authors explain the principle and intricate methods of double polarization used for determination of the percentage of sucrose when other optically active substances are present. Special problems such as determination of sugars by polarization at high temperature, by polarization before and after fermentation, by destruction of the optical activity of the reducing sugars are amply dealt with in the eleventh chapter. The contents of the next chapter are devoted to the theories and practical applications of various physical methods including determinations of viscosity, specific heat of combustion, molecular weights by measuring the osmotic pressure, freezing and boiling point of the sugar solutions, hydrogen-ion concentration, surface tension and electrical conductivity beside colorimetric, spectrophotometric and turbidity measurements. The authors give an excellent account of these properties the use of which has become of increasing importance both in general laboratory practice and in the investigation of sugars and sugar products. It would be very desirable if the chemistry departments of many of our universities would recognize this fact and would show more enthusiasm in teaching these "classical" physico-chemical methods to the prospective research and industrial chemists and chemical engineers. In the thirteenth chapter the authors discuss on one hundred pages the qualitative methods for the identification of the sugars. In describing the various ring forms of the hexoses the authors should have avoided the terms "methylene ring" for a 1,2 or ethylene oxide ring, "ethylene ring" for a 1,3 or propylene oxide ring, etc. Also, the reviewer would have welcomed reading the Weygand mechanism for osazone formation instead of the old and unsatisfactory explanation for this reaction given in every textbook of organic chemistry. Some of the richest material is accumulated in the fourteenth chapter dealing with the important reduction methods for determining sugars. It is probably this treasure-house that a casual visitor will leave empty-handed or with only a sparkling imitation, wishing that the real values were marked as such. The next chapter gives a wealth of information on special quantitative methods for determination of aldoses, fructose, pentoses and pentosans, pentoses and methylpentoses in mixtures, hydroxymethylfurfural, hexuronic acids, vitamin C, galactose or galactosan, cellulose, lignin; and it also describes the fermentation methods. It was, however, in this chapter that the reviewer could not find the rapid and elegant semi-micro method of methoxyl determination devised by Vieböck and Schwappach and modified by E. P. Clark. In the sixteenth chapter the problem of determining several sugars in the presence of one another is taken up in full detail. In the last chapter the authors discuss the practical application of the principles and methods previously described and other selected procedures used in technical sugar analysis under three main divisions of products, sugar-factory products, starch products and miscellaneous food products. The book is provided with an author index covering thirteen pages and an excellent subject index occupying forty-six pages. The print of the book is faultless and the text is apparently devoid of typographical errors. The authors deserve hearty congratulations for their splendid work which, substituting in a single volume for a small library, will be welcomed by everybody having anything to do with carbohydrates.

EUGENE PACSU

High Polymeric Reactions, Their Theory and Practice. By H. MARK, Professor of Organic Chemistry, Polytechnic Institute of Brooklyn, New York, and R. RAFF. Industrial Research Chemist, Howard Smith Paper Mills, Ltd., Cornwall, Ontario. Translated from the Manuscript by Luise Harris Weissberger and I. P. Irany. Interscience Publishers, Inc., 215 Fourth Ave., New York, N. Y., 1941. xiii + 476 pp. 49 figs. 15.5 × 24.5 cm. Price, $6.50.

This third volume of a series on "High Polymers" is divided into two nearly equal parts: Part I: General Part, and Part II: Special Part. Part I considers the general and theoretical aspects of the structure, mode of formation and reactions of addition and condensation polymers, whereas Part II is concerned with a summary of the experimental data on the preparation and chemical properties of individual polymers of both classes.

Part I begins with a detailed discussion of modern theories of valency, leading up to a definition of the bonds joining the units of high polymeric molecules. Other subjects included in this section are the general methods available for the preparation of high polymers, for the measurement of the rate of their formation and for the determination of their molecular weights. The fundamentals of reaction kinetics are discussed in considerable detail and are then applied to the problem of the elucidation of the mechanism of polymerization reactions. The thorough presentation of the theoretical aspects of various possible modes of polymerization highlights our present inadequate experimental verification for many of the predictions of theory. As is true in so many other cases, the experimental data on polymerizations is frequently capable of more than one interpretation. For example, there is still some doubt as to whether the induction periods that have been observed for many polymerizations, which are treated theoretically by the authors as an inherent characteristic of the polymerizations, are not due entirely to the presence of

traces of inhibitors or to the slow formation of a catalyst, such as a peroxide, by absorption of oxygen from the air.

Part II summarizes the data available in the literature concerning the preparation, chemical properties, structure and mechanism of formation of over one hundred and fifty individual addition polymers, as well as certain important condensation polymers and a few inorganic polymers.

As the authors point out in the preface, the present volume, in contrast to other recent treatises on polymerization, is principally "devoted to the *quantitative* characterization of the situation with the special aim of showing how far physico-chemical methods allow a quantitative description of the mechanism of polyreactions at the present time."

The general organization of the material is excellent and the subject matter is treated thoroughly and precisely. The seventeen full pages of author index (as well as an adequate subject index) indicate the extent of the literature surveyed, as does the fact that the volume contains well over a thousand references to the original literature.

This book is an extremely useful addition to the literature on high polymers and it should be in the library of every chemist interested in polymers, from either the theoretical or preparative viewpoint. The book is set up, bound and printed very well and the occurrence of some awkward constructions in the translation does not detract from its value.

CHARLES C. PRICE

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pH and Electro Titrations. The Colorimetric and Potentiometric Determination of pH. Potentiometry, Conductometry and Voltammetry (Polarography). Outline of Electrometric Titrations. By I. M. KOLTHOFF, Professor and Head of Division of Analytical Chemistry, University of Minnesota, and H. A. LAITINEN, Instructor, University of Illinois. Second edition. John Wiley and Sons, Inc., 440 Fourth Ave., New York, N. Y. 1941. ix + 190 pp. 43 figures. 15.5 × 23.5 cm. $3.00.

The first edition of this book appeared in 1931 and the second edition takes account of the progress made during the last ten years. The principal additions are as follows. Under the discussion of acids and bases several pages have been added dealing with the modern theory of solutions, and with thermodynamic and concentration constants. The theory of the salt effect in colorimetric methods for determining pH is discussed. Chapter III on "Electrode Potentials" has been rewritten and new material added, including new problems. In Chapter V the newer electron tube voltmeters are described. In Chapter VI have been added a much more extensive description of the glass electrode, a discussion of liquid junction and protein errors of the hydrogen electrode and of the salt error of the quinhydrone electrode. In Chapter VIII there is a description of direct reading conductance meters and improved methods of titrating weak acids. The summary of conductometric titrations at the end of this chapter has been brought up to date and literature references included. Three new chapters have been added dealing with polarography and amperometric titrations. A set of suitable problems is given for each of the principal topics.

This book is suitable for use in an advanced course in analytical chemistry. The theory and practical directions are well presented. The revision has been well done and there is a noticeable improvement in the paper and printing.

HOBART H. WILLARD

BOOKS RECEIVED

February 10, 1942—March 10, 1942

NORRIS F. HALL, H. T. BRISCOE, LOUIS P. HAMMETT, WARREN C. JOHNSON, HUBERT N. ALYEA, JAMES P. MCREYNOLDS, THOMAS H. HAZLEHURST AND W. F. LUDER. "Acids and Bases. A Collection of Papers." Journal of Chemical Education, 20th and Northampton Streets, Easton, Pennsylvania. 103 pp. $1.00.

Illinois Institute of Technology. Research Publications. "Molecular Spectra." Volume 2, No. 1, November, 1941. 88 pp.

OTTO H. MÜLLER. "The Polarographic Method of Analysis." Journal of Chemical Education, 20th and Northampton Streets, Easton, Pennsylvania. 114 pp. $1.00.

ARTHUR A. NOYES. "A Course of Instruction in the Qualitative Chemical Analysis of Inorganic Substances." Tenth edition, Revised and Rewritten by Ernest H. Swift. The Macmillan Company, 60 Fifth Avenue, New York, N. Y. 418 pp. $2.75.

DAVID E. PIERCE. "Chemical Engineering for Production Supervision." McGraw-Hill Book Company, Inc., 330 West 42nd Street, New York, N. Y. 232 pp. $2.50.

HENRY C. SHERMAN AND CONSTANCE S. PEARSON. "Modern Bread from the Viewpoint of Nutrition." The Macmillan Company, 60 Fifth Avenue, New York. N. Y. 118 pp. $1.75.

HUGH S. TAYLOR AND SAMUEL GLASSTONE, Editors. "A Treatise on Physical Chemistry." Third edition (in five volumes). Volume I. "Atomistics and Thermodynamics." D. Van Nostrand Company, Inc., 250 Fourth Avenue, New York, N. Y. 679 pp. $7.50.

WILLIAM MAYO VENABLE. "The Spectrum of Hydrogen." Copies may be obtained from the author, 822 North St. Clair Street, Pittsburgh, Pennsylvania. 184 pp.

FRANK C. VILBRANDT. "Chemical Engineering Plant Design." Second edition. McGraw-Hill Book Company, Inc., 330 West 42nd Street, New York, N. Y. 452 pp. $5.00.