

half hours, gave a very fair yield of ester, have combined to satisfy the writer's curiosity.

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## NEW BOOKS

**Oxidation-Reduction Reactions in Inorganic Chemistry.** By ERIC R. JETTE, Ph.D., Assistant Professor of Chemistry, Washington Square College, New York University. The Century Company, 353 Fourth Avenue, New York, 1927. xvi + 152 pp. 10 figs. 13 × 19.5 cm. Price \$1.10.

The author has discussed oxidation-reduction equations from two viewpoints: the "valence-change" and the "ion-electron" methods. The principles behind this book have been developing gradually since the publication of Ostwald's "Grundlinien der Anorganischen Chemie" about thirty years ago and have been taught from the electronic point of view in certain technical schools and colleges even before Alexander Smith in his "General Chemistry for Colleges" in 1914 brought out a scheme for balancing such equations. In recently published modern textbooks more than fifty per cent. of the equations discussed and studied are of the oxidation-reduction type. The author has attempted to explain these changes and methods of balancing equations for the student who has not had physical chemistry, the qualitative rather than the quantitative side being emphasized.

Topics discussed are: oxidation-reduction in relation to atomic structure; balancing equations of non-ionic type (valence change type) and those in aqueous solutions (ion-electron type); cell reactions and activity of metals; effect of hydrogen-ion concentration applied to manganese and nitrogen reactions; application of the ion-electron method to insoluble and weakly dissociated compounds, and the formation of complex ions in reactions in which oxidation-reduction changes take place. The book contains four appendices: the thermodynamic basis of the ion-electron method; in tabular form all common oxidizers and reducers, the main products of their oxidation-reduction action and notes on conditions of their reaction; oxidation-reduction potentials; a table of ionization constants of weak inorganic acids. References to the literature are given at the ends of chapters.

The book will appeal to students who wish to round out their cultural chemistry course, to advanced students in inorganic chemistry and to students of qualitative analysis. All teachers interested in modern ways of presenting inorganic chemical facts will be interested in reading this book.

EDWARD MUELLER

**The Making of a Chemical.** A Guide to Works Practice. By E. I. LEWIS, M.A., and GEORGE KING, M.Sc. John Wiley and Sons, Inc., 440 Fourth Avenue, New York. 288 pp. 27 figs. 22.5 × 14.5 cm. Price \$4.00.

Every teacher of chemistry has been called on to give advice to the young student who is trying to decide on his career. A composite picture of such a student would show a young man of 19 or 20 who has taken one or two courses in chemistry with interest and some degree of success. But he also enjoyed his work in biology and in geology and economics. He finds it hard to decide whether he wants to become a physician, a mining engineer, a business man or a chemist, and he has rather vague notions of the probable nature of his work if he does decide to become a chemist. To such a man this book may be very helpful. It gives an insight into the problems to be met by a research chemist in a factory, the methods of attack, and the tools to be used. It makes it clear that success or failure will be judged by the results as shown in the cost records. It gives much sound advice as to the college training which will be most helpful to the young industrial chemist and as to many of the problems likely to be encountered at any early stage of his industrial career.

Although this book may serve as an interesting and useful introduction to chemical engineering, it is not suitable for use as a textbook in courses in industrial chemistry or chemical engineering. It has neither the systematic description of chemical processes or chemical commodities to be found in Thorp's "Outline of Industrial Chemistry" nor the quantitative discussion of chemical engineering principles and apparatus to be found in Walker, Lewis and McAdams.

GRINNELL JONES

**Physikalisch-chemische Grundlagen der chemischen Technologie.** (Physico-Chemical Principles of Chemical Technology.) By DR. GEORG-MARIA SCHWAB. Verlag von Otto Spamer, Leipzig, 1927. 130 pp. 32 figs. 25 × 18 cm. Price: unbound, RM. 10; bound, RM. 12.50.

The author in his preface says: "What the technical chemist requires in a small book on physico-chemical technology is not the description of technical processes with the addition of the appropriate physico-chemical principles and considerations of varied character. He would certainly rather be instructed systematically in the physical chemistry which is needed by him and thereby see for himself how the technology has applied these principles or can apply them. This method of presentation is also suitable for the use of students. The splendid achievements of chemical industries and their current demands show that our colleges have done well to emphasize pure science after the manner of its old masters and thus ensure that factory practice will be learned in the factory."

The chief subjects covered are: Atomic Structure, Radioactivity and Molecular Structure (26 pages); Colloids (23 pages); States of Aggre-

gation and the Phase Rule (25 pages); Thermodynamics and Chemical Equilibrium (27 pages); Velocity of Reactions, Catalysis and Metastable Equilibrium (13 pages); Electrochemistry (19 pages); Photochemistry (6 pages).

The varied subjects are discussed clearly but very briefly. Some industrial applications are mentioned rather than explained in detail. It seems to the reviewer improbable that an industrial chemist not already familiar with the theories discussed would be able to obtain sufficient instruction from this little book to make the applications for himself.

GRINNELL JONES

**Biochemical Laboratory Methods for Students of the Biological Sciences.** BY CLARENCE AUSTIN MORROW, Ph.D., Late Assistant Professor of Agricultural Biochemistry, University of Minnesota. John Wiley and Sons, Inc., 440 Fourth Avenue, New York, 1927. xvii + 350 pp. 29 figs. 2 charts. 15 × 23.5 cm. Price \$3.75.

The author has based this excellent manual upon a laboratory course that has been given for a number of years in the Division of Agricultural Biochemistry at the University of Minnesota. The experiments have been selected with the idea of providing the student of the biological sciences thorough laboratory training in plant chemistry as well as an introduction to biochemical research methods. From this standpoint the author has succeeded admirably. The chapter on the colloidal state (Chapter I) is comprehensive and the experiments provide an excellent opportunity for training in technique. Chapter II is concerned with the physical-chemical constants of plant saps. Chapter III is devoted to the determination of hydrogen-ion concentration and to buffer action. A method is included for determining the buffer values of wheat flour extracts. The chemistry of proteins is dealt with in Chapter IV. In addition to the usual qualitative color reactions, this chapter contains directions for the isolation of natural plant proteins, the preparation and synthesis of amino acids, and methods employed in the analysis of protein. Chapters V, VI, and VII are devoted to the carbohydrates, glucosides, and fats and fat-like substances, respectively, and include such useful methods as the quantitative estimation of lignin in wood (p. 241), the preparation of pectin from grapefruit rind (p. 236) and the extraction of sitosterol from corn oil (p. 267). Methods for studying enzymes, particularly those of plant origin, are outlined in Chapter VIII. Chapter IX deals with plant pigments, including chlorophyll and carotinoid pigments, flavone and flavonol pigments and an experiment on the anthocyanin pigments. The following topics indicate the scope of some of the experiments: Extraction of chlorophylls *a* and *b* (p. 307); determination of carotin in butter fat (p. 317); determination of xanthophyll in egg yolk (p. 318).

The book contains an abundant bibliography, the references pertinent to the subject of each experiment being cited at the end of that experiment.

Dr. Morrow's book should be useful both to the student and investigator, and will be welcomed as an important contribution to the teaching of biochemical laboratory methods.

MEYER BODANSKY

**The Microbiology of Cellulose, Hemicelluloses, Pectin and Gums.** By A. C. THAYSEN AND H. J. BUNKER. Humphrey Milford, Oxford University Press, London, England, 1927. viii + 363 pp. 23 figs. 14 × 22 cm. Price 25s. net; \$8.50.

This book of 363 pages, 23 text figures and 662 references, assembles in a convenient and logical unit much information of decided importance to agriculture and industry. While the bibliography is not complete it gives a general idea of the present state of the microbiology of cellulose and related substances.

Part I, pp. 3-23, deals with the nature of cellulose, hemicellulose, pectin and gum. Part II, pp. 27-158, is given over to a description of the organisms responsible for the destruction of cellulose and its associated substances.

On p. 37 it is stated that Bredemann's classification of *Cl. Pasteurianum*, *Pl. pectinovorum* and *Gr. pectinovorum* "as one species and grouped by him under the name *Bac. amylobacter*, A. Meyer and Bredemann. . . . is substantially correct." Because of decided differences both in morphology and physiology recent investigations have shown it unwise to group these organisms under one head. The ability of these anaerobic butyric acid forming bacteria to ferment pectin is emphasized repeatedly, for example, p. 37 and p. 162. According to Beijerinck, who worked with 15 cultures, only one fermented pectin vigorously, and in a later paper by Donker 10 anaerobic cultures were studied and only one was found to ferment pectin. Other granulose positive butyric acid forming microorganisms do not cause retting. In regard to the isolation of the so-called *Bac. amylobacter* the authors state on p. 38 that this organism is "one of the most difficult types to isolate in pure culture." Recent reports on this subject show that under anaerobic conditions and in the presence of the proper medium, isolation of these organisms is quick and comparatively easy.

The authors question the use of *Lactobacillus* for non-spore-forming bacteria of the lactic acid group on p. 42. However, this term as first used by Beijerinck (1901) referred to the "active lactic ferments of bacilliary form which produce levo-active acid" and at present is widely used for this great group of microorganisms.

In Chapter IV concerning the Actinomycetes no mention is made of the important papers of C. Drechsler, *Bot. Gaz.* 67, 65-83 and 147-168, (1919), and the book of R. Lieske, 292 pp, 112 fig., Leipzig, 1921, while

the classification of Orskov which deals largely with the pathogenic forms is used as a basis of grouping of these organisms.

While the systematic description of the microorganisms, pp. 27-158, will be found helpful to certain workers in this field, the reviewer believes that too much space is given to needless descriptions of the numerous fungi and actinomycetes which are found growing on cellulose. These descriptions are hardly sufficient in themselves for the identification of the organisms.

Part III, pp. 161-309, deals with the decomposition of gums, pectin, hemicelluloses, and cellulose. In the list of products of a typical fermentation of starch by the acetone butyl alcohol organisms, p. 162, no mention is made of ethyl alcohol, although it is well known that this substance makes up about 4 to 5% of the fermentation products.

In the section on ensilage and spontaneous heating of plant materials, pp. 222-238, it is stated that "it is largely on the content of these polysaccharides (cellulose and hemicelluloses) that the nutritive value of the finished silage depends." This statement is incorrect. Certainly consideration should be given to the nutritive value of starch and organic acids as well as the proteins of silage. In the description of the making of silage, no doubt the authors have tried to give representative conditions in Great Britain; quite different methods, however, are followed in America. No mention is made of a somewhat analogous fermentation, the making of sauerkraut.

The statement on p. 275 that "The sapwood, therefore, and particularly that part of it which is produced during spring, is generally more readily attacked than the thick-walled heartwood" is hardly justified by observations. The results of tests show that spring wood is more readily attacked than summer wood. Again, on p. 277, "ring scale or cubical rot" are used as synonyms although these are quite different terms. A general estimate of the loss of timber through rotting has been given by R. H. Colley, in *Science* 61, 107-109(1925), and is no doubt more accurate than the figures quoted from Acree, p. 280, in 1919.

The whole monograph could be condensed without loss of subject matter and with considerable gain in coördination of the material. In spite of these criticisms the book brings together in convenient form a great mass of valuable information. It is well written, fully indexed and has beautiful illustrations. For all interested in the general field of applied microbiology it will be found a useful reference book.

E. B. FRED