

condenser has an internal diameter of about 12 mm. and the water jacket should be at least 80 cm. in length. A sampling tube (B) with stopcock is fitted as shown at the bottom of the condenser. Near the top of the condenser a thermometer is hung by a thread and pin placed in the stopper at the outlet. A vertical glass tube leads from the condenser to the absorption bottles, which are two 500cc. high-form Drechsel wash bottles. About 7.5 meters of rubber tubing is loosely coiled about the absorption bottles and all is placed in a large pail of ice and salt. The water for the condenser is passed through the rubber tube and enters the condenser at about 5°.

Twenty-five g. of alcohol is placed in the flask; the first absorption bottle contains 150 cc. of ether dried over sodium, and the second, 125 cc. The oxidizing mixture consists of 115 g. of nitric acid (sp. gr. 1.42) poured onto 60 g. of sodium (or potassium) dichromate, with the further addition of 220 cc. of water and 20 g. of sulfuric acid (sp. gr. 1.84). When potassium dichromate is used, 300 cc. of water will be required. The alcohol is heated to boiling with a small flame, the flame is then lowered and the oxidizing mixture added at such a rate that the thermometer in the condenser reads between 20° and 25°. The introduction of the oxidizing mixture usually takes about 20 minutes. Carbon dioxide is supplied from a large Kipp generator and is run in at (A) with sufficient speed to keep the contents of the flask in active motion. When all the oxidizing mixture has been introduced the contents of the flask are boiled for an additional 10 minutes or until tests at (B) show that no more aldehyde is passing over. Dry ammonia gas is passed into the absorption bottles in the usual manner, and after standing in an atmosphere of ammonia for 3 to 4 hours the crystals of aldehyde-ammonia are collected, washed, dried, and weighed; yield, 70 to 72%. At the conclusion of a run the carbon dioxide tube is slipped off, and the tube leading to absorption bottles clamped. Air pressure at (B) forces the contents of the flask from (A); fresh absorption bottles are now attached and the apparatus is ready for another run.

CONTRIBUTION FROM THE
COLLEGE OF ARTS AND SCIENCES,
FAYETTEVILLE, ARKANSAS

E. WERTHEIM

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NEW BOOKS

Kapillarchemie. Eine Darstellung der Chemie der Kolloide und verwandter Gebiete.

By Prof. Dr. HERBERT FREUNDLICH, Fellow of the Kaiser-Wilhelm-Institute für physikalische Chemie und Elektrochemie. Second fully revised edition. Akademische Verlagsgesellschaft M. B. H., Leipzig, 1922. xvi + 1181 pp. 157 fig. 24 × 15.5 cm.

I consented to review the second edition of this book within a short time thinking that it would be like most second editions—a few new added chapters and a bolstering up of the old arguments with the experimental material that has appeared since the issuance of the first edition (1909).

This particular second edition is, however, a new book with the old

skeleton only dimly showing through a wealth of new material that has been selected and arranged by a great scholar and indefatigable worker. The result is a work that is bound to exercise great influence on the progress of chemistry.

The "Leitmotiv" of the first edition was furnished by the thermodynamic relation between surface tension and adsorption as formulated by Willard Gibbs. This motive is still employed but in a greatly subdued form; in fact, in places Freundlich practically apologizes for the lack of virility of his pride of former years.

Kapillarchemie—incidentally, it is now admitted to be an unfortunate title,—is now supported by three pillars: (1) the surface tension-adsorption relation of Gibbs; (2) the kinetics of phase formation; (3) molecular kinetics. The first half of the book is devoted to the exposition of the above three points of view, constituting the physical chemical foundations of colloidal chemistry. Here is found a detailed account of the surface tension idea after the manner of the earlier edition enriched with added experimental material and strengthened by a frank acknowledgment of the limitations of the idea. There is also a discussion of the theory of gas adsorption which is based mainly on the ideas of Polanyi, a very fine section devoted to capillary electric phenomena, as well as interesting chapters on catalysis, osmotic pressure, and adsorption from solution.

The section on the kinetics of phase formation is built around the rate of crystallization work of Tamman and the late Professor R. Marc, while the chapter dealing with the Brownian motion is developed in an exceedingly able manner.

The second half of the book is devoted to a consideration of the colloidal systems themselves. Here is found Freundlich's own work on the coagulation of suspensoids which is now presented with convincing clearness. As far as emulsoid or lyophile sols are concerned, Freundlich admits his inability to find a guiding generalization. Donnan's theory of membrane equilibrium is given the place of honor, and Loeb's work furnishes support to some ideas of nebular significance.

It is impossible to present the scope of this book adequately in a short review, inasmuch as it covers all colloidal chemistry as well as many associated phenomena that are usually treated under different titles.

I should say that the greatest fault of the work is to be found in its encyclopedic character. It would seem as if the story of colloidal chemistry could be told in less than 1181 pages and with the assistance of less than 4000 references to the original literature. There is some point to Zsigmondy's idea of utilizing only the experimental material that has been through the author's hands. While it is true that Freundlich has a direct laboratory experience with colloidal chemistry that is second to none, nevertheless the weak points in the present book are invaria-

bly found where the experimental work was not under his direct supervision.

WALTER A. PATRICK

Theories of Organic Chemistry. By Dr. FERDINAND HENRICH, Professor in the University of Erlangen. Translated and Enlarged from the Revised Fourth German Edition of 1921, by TREAT B. JOHNSON, Professor of Organic Chemistry, Yale University, and DOROTHY A. HAHN, Ph. D., Professor of Organic Chemistry, Mount Holyoke College. John Wiley and Sons, Inc., 432 Fourth Avenue, New York; Chapman and Hall, Limited, London, 1922. xvi + 603 pp. Illustrated. 23.5 × 15 cm. Price \$6.00 net.

The translators of this well-known book have conferred a great benefit on teachers and students of organic chemistry in English-speaking countries. Students in the advanced courses can now be referred to Dr. Henrich's book without regard to their linguistic ability. To have this valuable book so accessible is a great asset to all those interested in the theoretical aspects of organic chemistry. Undoubtedly many chemists in this country will take advantage of the appearance of this translation to renew their acquaintance with certain phases of theoretical organic chemistry, and to learn of the most recent developments.

The various German editions are so well known that no comment is necessary on the general scope and character of the book. The American edition includes two new chapters; one on the electron conception of valence is written by Professor Arthur J. Hill, the other is Nef's own summary of his speculations as published in the *Journal of the American Chemical Society*, in 1904. The book has been further expanded in several places by the inclusion of a discussion of the work of certain American chemists.

J. B. CONANT

A Comprehensive Treatise on Inorganic and Theoretical Chemistry. By J. W. MELLOR, D. Sc. Vol. II. Longmans, Green and Company, Fourth Avenue and 30th Street, New York; 39 Paternoster Row, London; Bombay, Calcutta, and Madras; 1922. vii + 894 pp. 170 fig. 16 × 25 cm. Price \$20.00 net, each volume.

The first volume of Dr. Mellor's comprehensive treatise, covering Chapters I to XVI, was reviewed in the August number of *THIS JOURNAL*. Volume II, recently appearing, contains 4 chapters; Chap. XVII, The Halogens; Chap. XVIII, The Compounds of the Halogens with Hydrogen; Chap. XIX, The Oxides and Oxy-acids of Chlorine, Bromine and Iodine; Chap. XX, The Alkali Metals; the ammonium salts are included in this chapter. As far as can be told from this volume, the treatise is the most exhaustive work on inorganic chemistry written in the English language, and doubtless the completed work will take its place as the standard reference text. Volume II has many excellences. In the field of descriptive chemistry the treatment is very liberal, and the references to the original literature are full; an ingenious system reduces to a minimum the duplication of citations of individual papers.

Those familiar with Mellor's always interesting style will expect that even as compendious a book as a comprehensive treatise will be enlivened by his piquant pen. Such is the case, with the result that the book is interesting reading—a statement which can hardly be made of previous encyclopedic works, either by English-speaking writers or by others. The historical treatment of the halogens and alkali metals, with their compounds, is fully and entertainingly given, and the verbatim quotations from the alchemistic writings and from the earlier literature, not available in the ordinary library, are valuable as well as interesting. Characteristic Melloresque chapter headings are not missing, and certify that the author has not let his huge task of compilation depress his fine high spirit.

In the application of theoretical principles to the interpretation of the reactions of inorganic chemistry, the treatise is distinctly in advance of any other similar work with which the reviewer is acquainted. The diagrams, appearing in profusion, are excellent in form and in appropriateness, and are uniform in style, which rids the text of the confusion found in treatises where the diagrams of the original literature are reproduced with excellences and imperfections alike untouched. A deep appreciation of the sound theoretical basis of the text will not, however, free the reader from the feeling that the treatise is hardly comprehensive in matters of theoretical chemistry, as it unquestionably is in matters inorganic. The 6 pages on chemical equilibrium, good though they are, cannot be viewed as comprehensive, and the 2 pages on the partition law, omitting all reference to the work of Nernst and of other investigators in the field, are still less so.

One can regard this text as the best extant on inorganic chemistry, and yet be conscious of points in which the volume is something short of perfection. These 880 pages deserve a better index, complete enough to help a reader to find something without requiring that he know too much about it beforehand. Chemical compounds are faithfully indexed, but processes are not indexed under their own names, and are found with difficulty if at all. Another matter a little less than perfect is the occasional failure to differentiate the commercially successful method of manufacture from methods of historical interest or of small-scale value. An uninformed reader, finding on p. 497 that "the process of causticising the carbonate (sodium carbonate) with lime appears in the main to have prevailed against other proposals (for making sodium hydroxide)" would carry away a false impression of alkali manufacture; the Castner-Kellner process is not included in the chapter on the hydroxides of the alkali metals, and finds brief mention only in the chapter on the preparation of chlorine, being dismissed with the statement that "the cell is nearly obsolete."

Misprints and errors are not numerous. If the succeeding volumes are

made to equal Volume II in their completeness, the work cannot fail to be authoritative on inorganic chemistry for a long time to come.

ARTHUR E. HILL

Applied Chemistry: An Elementary Text Book for Secondary Schools. By FREDUS N. PETERS, Ph. D., Vice-Principal, Central High School, Kansas City, Missouri. C. V. Mosby Company, St. Louis, 1922. 461 pp. 72 fig. 20 × 14 cm. Price \$3.50.

This book is the result of the author's twenty-three years of experience in teaching chemistry to high-school boys and girls. Each chapter begins with a topical outline and ends with a list of rather easy review questions based on the text. The book is written in an interesting descriptive style. Several chapters are devoted to the carbon compounds, and these are placed in the first half of the book. Such chapter headings as Illuminating and Fuel Gases, Methods of Lighting, Some Leavening Agents, and Cleaning and Polishing indicate that the author has stressed the household applications of chemistry.

The book is printed on such thick, glossy paper that it presents a very bulky appearance, but in fact contains about the usual amount of material. A conspicuous feature is a lack of good illustrations, and several of those showing laboratory apparatus illustrate poor laboratory technique. Although the book contains a vast amount of useful information about things chemical, yet it possesses very little of the inductive and experimental spirit which we should like to see instilled into our American youth. On the whole, it does not seem to deserve the title "Applied Chemistry" more than any one of a half dozen of our modern texts in elementary chemistry.

N. HENRY BLACK

The Vitamine Manual: A Presentation of Essential Data about the New Food Factors. By WALTER H. EDDY, Associate Professor of Physiological Chemistry, Columbia University, New York City. Williams and Wilkins Company, Baltimore, 1921. 121 pp. 9 fig. 24 × 16 cm. Price \$2.50

Dr. Eddy's "Vitamine Manual" was one of the first books published which has aimed to treat the information on vitamins in an analytical manner. In the author's own words, he has attempted to collate the existing data in a form available to both student and layman.

It consists of 9 chapters dealing respectively with the discovery of vitamins, their chemical nature, tests for vitamins, the yeast test for vitamin B, the sources of vitamins, their chemical and physical properties, their utilization in the diet, and vitamin deficiency diseases. A bibliography is appended.

Dr. Eddy has presented the historical facts in connection with the discovery of the vitamins in a fascinating manner, but unfortunately the reader receives the impression from the occasional grandiose presentation that some of the facts were drawn from rather personal sources. Occasion-

ally there occurs a misstatement of fact which the reader readily condones in full realization of the difficulty encountered by the historian in sifting out desired important information. For instance, it is stated: “* * * in collaboration with Professors Hart and Humphrey, McCollum began a series of studies that have become classic contributions to the vitamine hypothesis.” As a matter of fact, while McCollum later did become associated with these investigators, the studies referred to were begun by Professors Hart and Humphrey on May 31, 1907, while McCollum was still a student at Yale University.

In connection with the sequence of events which led to the discovery of Vitamin A, no specific mention is made of the influence of Osborne and Mendel's work which was unquestionably of greater importance than that of Henriques and Hansen or Wilcock and Hopkins in convincingly demonstrating not only the feasibility of using the rat for nutrition investigations, but also the technique required.

It appears rather unfortunate that Dr. Eddy should so unquestionably have aligned himself with those who maintain that the beneficial results often accruing from yeast therapy demonstrate an insufficiency of Vitamin B in the human dietary. To the experimentalist, the premises which have been taken as warranting such a conclusion are not convincing.

The bibliography is extensive yet occasionally disappointing as names cited in the text sometimes do not appear and the references are general rather than specific.

There is no question but that the manual has done much and will do much to aid in the crystallization of thought and the furtherance of investigation in the domain of vitamin physiology, which apparently has been the author's main object.

H. STEENBOCK