

up for the enzyme which becomes inactive on account of hydrolysis, and therefore apparently accelerates the action. Heating the preparations with water hydrolyzes all of the active enzyme to inactive substance but evidently does not destroy all of the inactive zymogen present originally in the castor beans as the experiments showed a small activity of this heated material after treatment with manganous sulfate. The explanation of the results described here is, therefore, not that enzyme which had been inactivated was made active again, but that the preparation which had been inactivated still contained some zymogen from which active enzyme was again obtained.

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#### NOTE.

*The Reaction between Calcium Permanganate and Ethyl Alcohol.*—The following reaction, which was found accidentally, does not seem to be known and makes a good lecture experiment for demonstrating the oxidation of alcohol to aldehyde:

If several small fragments of calcium permanganate are dropped upon a porous plate moistened with a few cc. of ethyl alcohol, there will be a bright scintillation for an instant, and then the permanganate will be observed to glow quietly and steadily. This glowing may continue for upwards of five minutes and is accompanied by the evolution of fumes which are quite irritating to the eyes and suggestive of formaldehyde, acetaldehyde and acrolein. By drawing the fumes through warm ammoniacal solution of silver nitrate, a good reduction can be obtained, though without mirror formation.

This reaction together with that of Schwersenski and Caro<sup>1</sup> may be used as lecture experiments illustrating oxidation by permanganates. The specimens of methyl alcohol and acetone at hand do not react thus: isoamyl alcohol reacts somewhat less rapidly than ethyl.

F. ALEX. McDERMOTT.

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#### NEW BOOKS.

**Essentials of Chemistry.** By JOHN C. HESSLER AND ALBERT L. SMITH. Revised edition (1912) by John C. Hessler. New York: Benj. H. Sanborn & Co. Price, with manual \$1.45, without manual, \$1.25.

The 1912 revised Hessler and Smith is an up-to-date, accurate textbook of chemistry, of convenient size, and excellent typography. The book presents a very large assemblage of facts whose relative importance is set forth by a liberal use of italics and several kinds of type. Numerous cross references inter-connect all parts of the text. Chapter XV on

<sup>1</sup> *Chem. Ztg.*, 22, 58 (1898); *Scientific American*, 1912, 225.

ionization is especially to be commended. The scope of the book is large, and the whole field is covered with unusual thoroughness.

HAROLD BISBEE.

**Elementary Chemical Theory and Calculations.** By JOSEPH KNOX, D.Sc. Lecturer on Inorganic Chemistry, University Aberdeen. London: Gurney and Jackson, 1912. 13 × 19 cm., pp. vii + 102. Price, 2 shillings.

The author gives a brief presentation of the fundamental laws studied in a course on general chemistry. The chapter on the gas laws is too brief to be of any material advantage over the usual presentation found in the best text-books. Strangely enough the subject of partial pressures is omitted entirely from the volume and thus the instructive value of many of the problems is sacrificed. In the six succeeding chapters the atomic and molecular theories and the laws of chemical combination are discussed in detail. On page 42, the author states that "hydrogen, as the lightest known gas, is taken as a standard to which all other gases and vapors are referred, and its density is taken as unity." It is to be regretted that the author does not at least adopt air as his standard (as is frequent in industrial work) if he is unwilling to accept oxygen as the modern standard of relative densities and atomic weights. Certainly there is no ground for returning to the obsolete hydrogen standard. A number of well-chosen problems are given in illustration of Dulong and Petit's Law and also for the determination of molecular weights by the freezing-point and boiling-point methods. In Chapter IX is found an excellent discussion on the several methods for the determination of formulas from percentage composition, but the reverse operation as given in Chapter X is only a repetition of what has preceded in an earlier chapter. Chapter XI, on the calculation of reaction quantities from chemical equations is undoubtedly the best chapter, and in addition contains a long list of well selected problems. The last chapter on the diffusion of gases is admirably written. The book in itself, though exceedingly brief, and lacking somewhat in logical order, contains much that will be of interest to the student of general chemistry. It is to be hoped that its use will demonstrate more clearly the great advantage that accrues from a mathematical presentation of the fundamental laws of the science, and will fix more firmly its position as a most essential feature in the teaching of general chemistry.

WILLIAM J. HALE.

**Tratto di Chimico-Fisica.** By Harry C. Jones. Traduzione Italiana del Dott. MICHELE GIUA. Ulrico Hoepli, Milano. 1913.

This elegant volume is a translation into Italian, by Dr. Giua, of the fourth and last edition of the excellent work of Professor Jones on physical chemistry. The translator has made brief additions in order to give some account of recent investigations by Nernst appearing since the English

original went to press. When the translator began to fear that his work had been to no purpose, Professor Molinari, who contributes a short preface, interested himself to recommend the translation to the important publishing house of Hoepli, whose imprint is borne by the volume.

EDWARD W. MORLEY.

**Zur Kenntnis des Negativen Druckes in Flüssigkeiten.** By JULIUS MEYER. Band III, No. 1. Abhandlungen der Deutschen Bunsen-Gesellschaft. Halle, Wilhelm Knapp. pp. 53. Price, 2.10 Marks.

A very interesting survey of the field of research in negative pressures in liquids, including a historical sketch, recent important work by the author, a number of problems for further investigation, and some possible applications to biochemistry.

D. A. MACINNES.

**Metallographie.** Ein ausführliches Lehr- und Handbuch der Konstitution und der physikalischen, chemischen und technischen Eigenschaften der Metalle und metallischen Legierungen; von Dr. W. Guertler, Privatdozenten an der Königlichen Technischen Hochschule zu Berlin; Research Associate an dem Institute of Technology zu Boston. Erster Band: Die Konstitution. Heft 1-6, pp. xii + 448. Verlag von Gebrüder Bornträger, 1909-10. Price, 3 or 4 Marks each Heft.

The author has set himself the task of writing a comprehensive treatise and reference book covering the whole field of metallography—the properties of metals and their alloys. The material included in these six pamphlets, of approximately 80 pages each, deals entirely with the constitution of binary alloys, and particularly with the equilibrium diagrams and the microstructure. After a very brief review of the history of the subject, two chapters of about 64 pages are devoted to a systematic, purely theoretical discussion of the different possible temperature-concentration diagrams for binary mixtures and to the nature of solid solutions. This is all based upon the phase rule. It is believed that the methods by which such diagrams are established might have been introduced here with profit to the reader.

Chapter IV is devoted to a critical discussion of individual equilibrium diagrams of the various possible pairs in the series of metals, Mn, Fe, Co, Ni, and Cu. Each diagram is of good size, occupying nearly a full page, is clearly printed and the concentrations expressed in both atomic percents and percentages by weight. This is followed by a similar discussion of the series Cu, Ag, Au; and in turn by the various possible pairs of the first with the second series; the first series with Pd and Pt; the second with Pd and Pt; and the binary mixtures of Ru, Rh, Os, and Ir with each other, and with each of the preceding series. In this group of thirteen metals there are seventy-eight possible binary combinations and there is a marked similarity in the type. Each pair of the whole series forms either a continuous solid solution with varying concentration, or several series of solid solutions.

Chapter V is devoted to what the author calls chemical kinetics, and treats of certain physical changes of the metals either in the solid state or changes which are produced during the passage from the liquid to the solid phase. Such topics as nucleus formation, crystallization, rate of crystallization, diffusion, the stable and metastable state are discussed.

Chapter VI, of 160 pages, composing about half of Heft 3, all of Heft 4, and half of Heft 6 is devoted to a very detailed study of the microstructure of mono- bi- and triphase equilibrium. The illustrations of diagrams and microphotographs are extremely good.

The binary alloys of Cr, Mo, W, U, V and Ti, with each other and with the metals of the group Mn, Fe, Co, Ni, Cu, Ag, Au, are treated in Chapter VII, and in Chapter VIII the group of metals Mg, Zn, Cd and Hg with each other and with the group Mn-Au.

Judging from the portion of the book already issued, it promises to be complete, accurate and authoritative. Although it is desirable to have good sized equilibrium diagrams for reference, it is believed the author has gone to the extreme and overdone a good thing. There might easily have been condensation in size, with the full page reserved for only the more important systems.

HENRY FAY.

**Mineralogy, an Introduction to the Theoretical and Practical Study of Minerals.** By ALEXANDER H. PHILLIPS, D.Sc., Professor of Mineralogy in Princeton University. New York: The Macmillan Co. 700 pp., 5 × 8. Price, \$3.75 net.

The object of this excellent text upon mineralogy, in the author's words, is "to bring together for the beginner, in concise form and under one cover, the facts and basic principles of the several branches of mineralogy, unadulterated by an excess of data. It is, therefore, not a book of reference, but takes the student along the various branches of the subject to a point from which, if he wishes to continue, he will be in a position to appreciate and to use the advanced literature and books on the subject."

In Part I, Crystallography, the thirty-two types are described, using the type names of Miers. Only graphical methods of solving the problems of crystal measurements are given. A chapter is devoted to a description of the optical properties of minerals. Part II presents the descriptive mineralogy following the order of Dana. The choice of material for Part III, Determinative Mineralogy, will be of most interest to teachers of this subject. A chapter upon the instruments, reagents, and chemical tests used in the blowpipe table for the identification of the mineral species is followed by three tables as chapters. The first table is for the determination of the more common minerals from their physical properties, the second for the determination from thin sections, while the third is a complete scheme modeled after Brush and Cornwall's determinative tables. It is hard to see what more could be done "for the beginner."

The value of the book is enhanced by the use of illustrations, although it must be said that many of these do not bring out the characteristic distinctions which they should. Heavy face type is extensively used, even to the point of omitting italics for crystal faces and indices. As prefaces to the descriptive part, the chapters upon the relation of minerals to the elements and upon the origin of minerals are very suggestive. The student's view will be much broadened by getting some idea of phase relationships and the dynamic changes to which minerals are liable. If there is a portion weaker than the rest it would seem to be the chapter upon chemical tests. The confirmatory tests described suffice for pure, simple compounds but it has been the reviewer's experience that in practice a systematic scheme of separation is necessary. It seems to be a weakness in mineralogists to believe that there is some one simple chemical test which will identify every element no matter what others may be present, whereas many cases might be mentioned, such as vanadium occurring with uranium, selenium with sulfur, aluminum with magnesium, etc., where methods of chemical separation are as essential as confirmatory tests. The thought is a natural one where minerals form the starting point of study instead of ores, rocks or heterogeneous mixtures.

It is evident that the final determinative table is the result of years of experience of the author.

ROGER C. WELLS.

**Kolloidchemie der Muskelkontraktion.** A lecture delivered by Prof. Wolfgang Pauli before the Morphologisch-physiologischen Gesellschaft in Vienna on May 13, 1912. Theodor Steinkopff, Dresden. Price, 1 M.

In this lecture, Prof. Pauli attempts to explain the electrical and mechanical phenomena of muscular contraction as the results of the setting free of small quantities of lactic acid in a peculiar complex of colloids. The reasoning in the first section of the lecture, in which the electrical phenomena are discussed, will seem questionable to most physiologists. In this section, Prof. Pauli ignores whole fields of physiological work, as, for instance, in his disregard of the masses of evidence which have been collected to show that many animal and vegetable cells, and among them the cells of striated muscle, are surrounded by semi-permeable membranes. That Prof. Pauli's own explanation is not entirely satisfactory will be evident to anyone, who tries to apply it in detail to the phenomena involved in the production of the so-called current of injury.

In his elucidation of the mechanical phenomena of contraction, Prof. Pauli is on firmer ground. His view that the production of lactic acid causes the muscle fibrils to swell at the expense of the sarcoplasmic fluid, and that shortening is the direct mechanical result of the swelling of the fibrils is essentially the same as the theory of contraction promulgated by McDougall in 1898. In recent years this theory has been supported

by a considerable body of evidence, which has been obtained from studies in the histology, physics, chemistry, and thermodynamics of muscular contraction. Although it is not yet generally accepted by physiologists, it is, nevertheless, more completely worked out, and counts, probably, more supporters than any of its competitors. The work of Prof. Pauli and his collaborators, which indicates that acidified colloids can swell rapidly and powerfully enough to account for the phenomena of muscular contraction is of very great physiological as well as physico-chemical interest.

EDWARD B. MEIGS.

**Oxidations and Reductions in the Animal Body.** By H. D. DAKIN. Longmans, Green & Co., New York, 1912. pp. viii + 135. Price,

According to the author, the object of this Monograph is to give an account of the principal chemical reactions involved in such processes of oxidation and reduction as are known to take place in the animal organism.

The oxidation and reduction in the animal body of some two to three hundred organic compounds are considered, especially from the standpoint of the molecular structure of the substance undergoing these changes.

For a time we were compelled to content ourselves with the general statement that fats and carbohydrates are oxidized in the body to carbon dioxide and water, while the proteins yield urea in addition. In 1904, however, the masterly investigations of Knoop on the fate of the aromatic fatty acids in the animal organism, gave the impetus to more thorough and systematic studies of the precise changes occurring in various organic compounds on oxidation and reduction in the animal body. The results of these more recent studies in this field are admirably presented in Dr. Dakin's monograph, and the author deserves the thanks of all investigators and students in this field for the thorough and interesting way in which the results of these investigations have been presented. The value of the work is greatly enhanced by a large number of references to the original literature of the subject, and also by reason of the fact that the principal conclusions arrived at regarding the oxidation and reduction in the animal organism of the several great classes of organic compounds are emphasized by being printed in italics.

We lay aside this interesting volume with the thought that despite the vast number of more or less isolated observations on the oxidation and reduction of organic substances in the animal organism, comparatively few generalizations of any considerable breadth and scope are possible. One thing is evident, however, and that is that the oxidative processes occurring in the living organism do not differ essentially from such oxidations as occur in the inanimate world, and that oxidations occurring in the living cell can also be accomplished *in vitro*. With many complex organic compounds, we know the manner in which their oxidation in the

animal organism is accomplished, together with the nature and character of the end products. What is not known, however, is the nature of the oxidizing agent or agents responsible for these oxidative processes; especially is this true since oxy-hemoglobin itself is only an ineffective oxidizing agent. The purpose of this volume, however, is to consider those structural changes occurring in the substances oxidized rather than to determine the nature and character of the agents responsible for the oxidation, and considering the present limitations of our knowledge of such processes, the task accomplished by the author has been exceedingly well done and the book will afford interesting and instructive reading to those interested in the phenomena of oxidation and will doubtless stimulate further research in this important field of bio-chemical inquiry.

JOSEPH H. KASTLE.

**The Simple Carbohydrates and the Glucosides.** By E. FRANKLAND ARMSTRONG, D.Sc., Ph.D. Longmans, Green & Co. 171 pp., second edition. Price, \$1.50 net.

Dr. Armstrong's treatise, which is one of the series of Monographs on Biochemistry, edited by Profs. Plimmer and Hopkins, is the best book to introduce one to the recent extensive developments in the chemistry of the sugars. These developments have centered largely around the  $\alpha$ - and  $\beta$ -forms of glucose and the other sugars and their derivatives, and have been the direct outcome of the study of the mutarotation of the sugars. The treatise is excellent in its description of the purely organic chemistry of the sugars, but it could be greatly improved by the addition of a chapter or two upon the dynamics of the mutarotation reaction and other applications of physical chemistry to the investigation of the sugars.

C. S. HUDSON.

**Practical Physiological Chemistry.** By PHILIP B. HAWK, M.S., Ph.D., Professor of Physiological Chemistry and Toxicology, in the Jefferson Medical College of Philadelphia. 4th edition, revised and enlarged. pp. 20-476. With two full page absorption spectra in colors, four additional full page color plates, and one hundred and thirty-seven figures, of which twelve are in colors. P. Blakiston's Son & Co., Philadelphia. 1912. Price, \$2.50.

Teachers and laboratory workers, in the field of biological chemistry, will welcome this new edition. The book has received a comprehensive revision and is thoroughly up-to-date. The revision has necessitated the inclusion of much new matter, but the publishers have reduced the marginal space of the page, and have thus avoided an appreciable increase in the size of the book. Ten new figures have been added, most of them illustrating apparatus of recent invention. The index has been increased by nearly five hundred references. The popularity of the book is attested by the demand for a fourth edition since 1907, the year in which the first edition appeared.

There are but few errors in the book, and these, so far as noted, are of little consequence. Van Slyke's method for estimating amino nitrogen is given in the section on urin analysis, and no mention is made of its application to the study of proteolysis. In the opinion of the reviewer this is an important omission. The new edition as a whole will meet the expectations of those now using the book.

E. V. MCCOLLUM.