

Five cc. containing varying numbers of cc. of 0.1 *M* hydrochloric acid and the rest water, were added to a solution consisting of 10 cc. of a 25% serum, and 50 cc. of a 10% cane-sugar solution. The control solution differed from this by having the same volume of water in place of the 10 cc. of serum solution.

All the inversions took place in Non-sol glass bottles at 37°, unless otherwise stated. The solutions were always preserved with toluene.

The invertase was obtained from yeast by the method of Nelson and Born.¹ The enzyme and substrate solutions were always warmed to 37° before mixing. The enzyme activity was stopped, and mutarotation effect due to the invert sugar was overcome by means of sodium carbonate as recommended by Hudson,² except in the case of solutions containing serum or egg albumin. When the latter were present, it was not necessary to add the sodium carbonate, since the reagent added to remove the protein seemed to have the same effect.

The serum and egg albumin in most cases were removed from the solutions before the latter were examined in the polariscope, by a slight modification of the method suggested by Kumagai.³ Ten cc. of the solutions were introduced into a 150 cc. Erlenmeyer flask containing 18 cc. of a 10% sodium acetate solution. Two cc. of a ferric chloride solution were then added and the mixture heated on the water bath for six minutes and filtered hot. The clear filtrate was allowed to cool and its rotation determined.

The serum used in these experiments was prepared by centrifuging fresh, defibrinated sheep's blood.

NEW YORK, N. Y.

NEW BOOKS.

A Text-book of Inorganic Chemistry. Edited by J. NEWTON FRIEND. Vol. VIII.

The Halogens and Their Allies. By GEOFFREY MARTIN AND E. A. DANCASTER. Pp. xviii + 337. Philadelphia: Lippincott, 1915. Price, \$3.00.

In order of publication, this is the second volume of the nine into which this text-book is divided (for review of Vol. I, see *THIS JOURNAL*, 37, 1641 (1915)). In many ways, the high standard of the first volume is maintained. After a concise introduction, the halogens and manganese, and their compounds with the nonmetallic elements, are described. Numerous references to the literature are given. **Manufacturing processes** are discussed in detail, with figures of the plant used. The familiar lecture experiments are also fully described, and are illustrated by cuts. Numerical data are abundant and appear as a rule to be judiciously se-

¹ *THIS JOURNAL*, 36, 393 (1914).

² *Ibid.*, 30, 1564 (1908).

³ *Biochem. Z.*, 57, 380 (1913).

lected as well as complete. In this volume, however, the high standard of accuracy, completeness, theoretical knowledge, and sound chemical sense, attained in the first volume, is by no means maintained. Thus sulfuric acid is reduced by hydrogen iodide to sulfur dioxide instead of to hydrogen sulfide, and potassium iodide performs the feat of acting upon phosphoric acid to give K_3PO_4 . In connection with the union of hydrogen and iodine, no data are given, and the valuable quantitative work of Bodenstein, with its interesting conclusions as to the reversal of the sign of the heat of reaction, is not mentioned. It is also stated that iodine unites directly with sulfur, selenium and tellurium, although at least four investigations have shown that iodine and sulfur form neither compounds nor solid solutions, and only tellurium forms an iodide. The most serious defects are in the sections on chlorine. The fact that in the action of chlorine on water hydrochloric acid and hypochlorous acid are formed is indeed mentioned, but the extent of the reaction is not described. On the contrary, chlorine bleaches by forming nascent oxygen and light liberates this oxygen, but has no effect on chlorine hydrate. Surely the point of view, that hypochlorous acid is decomposed by light, and is not present in chlorine hydrate, if mentioned, would have cleared up this mystery. The authors even seem to think that hypochlorous acid is a myth, for they speak of the solution of chlorine monoxide as "what is known as hypochlorous acid," and as something that "must be regarded as an aqueous solution of $HClO$." Naturally, therefore, they do not perceive that, in the distillation of dilute hypochlorous acid, the strongest solution comes off first, because the Cl_2O is expelled. Again, the fact that chlorine monoxide, when led into hydrochloric acid, gives chlorine gas, is stated without the explanation that hypochlorous acid is formed and that the latter reacts vigorously with hydrochloric acid to give chlorine. Bleaching powder is given as a mixture of two salts, instead of a mixed salt, and the various ways of obtaining hypochlorous acid from it, such as by adding half an equivalent of nitric acid, or by treating calcium carbonate with chlorine water, or by leading excess of chlorine into bleaching powder suspended in water, are stated without explanation, and the two last are accompanied by uninformative equations, in which chlorine instead of the acids is the active substance. Finally the fact that a given weight of chlorine in the form of hypochlorous acid has twice as much bleaching power (*sic.* capacity is intended) as the same weight of chlorine in bleaching powder is "explained" by equations which avoid the real explanation. In a descriptive reference book, bare facts may be given, but this work claims to be a text-book, and a text-book must be coherent and rationalized. The remaining seven volumes are all by different authors, so that it is to be hoped that, in quality, these will resemble Volume I rather than Volume VIII.

ALEXANDER SMITH.

Ueber das periodische System der chemischen Elemente. By ALOIS BILECKI. Buchholz & Diebel, Buchdruckerei J. Feitzinger, Troppau, 1915.

This is a brief treatise of 21 pages concerning an always interesting topic. The author points out the lacks in the tabular presentations of the periodic system and prefers the well-known Crookes double helix, modifying this curve somewhat. He finds that a number of elements have atomic weights which are approximately whole multiples of the number 1.86 (which he calculates as half the "theoretical atomic weight" of helium, based on the atomic weight of xenon and the losses by emanation of radioactive elements), and he indicates other approximately constant differences in other groups of elements. At the end is an appendix presenting useful tables and plates depicting some of the properties of the elements recorded and plotted in relation to their atomic weights. He is apparently unfamiliar with some of the earlier work of others,¹ but considering the enormous amount which has been written on this subject, this is not surprising.

T. W. RICHARDS.

Handbuch der Mineralchemie. Bd. II, 8, Bogen (21-30). By DOELTER, *et al.* Dresden and Leipsic: Theodor Steinkopff. Price, M. 650.

A treatment of the alkali alumino-silicates, the most important of which are the alkali members of the feldspar and mica groups. Important as the micas are, the chemical knowledge of them is tremendously hampered by their complexity, so that, while no little labor has been expended in the study of them, the data on their syntheses and alterations are often unintelligible. Without any guiding hypothesis which may serve, even temporarily, to unify the material, it seems perfectly clear to the reviewer that the only sound method an editor can follow is to make the text concise and append a complete bibliography. But here, and quite frequently in other portions of this book, diffuseness in writing and looseness in construction are the rule. The reviewer confesses to repeated efforts to extract the wheat from the chaff, but even one deeply interested in the subject rarely reads one of these volumes without a feeling of aimless floundering in a hopeless jungle.

E. T. ALLEN.

Electrische Spectroanalyse Chemischer Atome. By J. STARK. Leipzig: S. Hirzel. Price, M. 6.

The discovery was made by Stark, and independently by Lo Surdo that the hydrogen lines broke up into groups when the glowing gas was subjected to the powerful electrical field of a specially designed vacuum tube in a manner analogous to the splitting up of lines in a magnetic field (Zeeman effect). The effect has been found for only a very few elements at the present time, however. Prof. Stark's book gives a history of the discovery and a very complete account of such observations as have

¹ "The Faraday Lecture of 1911," *J. Chem. Soc.*, 99, 1214 (1911), etc.

been made up to the present time. It is, in brief, a comprehensive monograph on the Stark-Lo Surdo effect, and has little or nothing to do with chemistry.

R. W. WOOD.

A Handbook of Colloid Chemistry. By DR. WOLFGANG OSTWALD. English translation from the third German edition by Dr. Martin H. Fischer, assisted by Dr. Ralph E. Oesper and Dr. Louis Berman. Philadelphia: P. Blakiston's Son & Co. 275 pp. Price, \$3.00 net.

This work of the younger Ostwald was the most complete work on colloids we had yet seen. It dealt with the subject in a typically German scientific manner. The whole field was divided into many parts and each part was thoroughly considered by itself.

The translation is a good one. After a general description of the colloid state, there follow chapters on the relation between the physical state and other properties, on the energetics problems, on the concept of colloid chemistry, and there are two very complete chapters on mechanical or physical properties of colloid systems, such as osmotic effects, Brownian movement, diffusion, electric migration, dialysis, etc. Probably the best feature of this work, compared with others on the subject, lies in the introduction of the energy concepts to the colloid state, particularly with reference to surface-tension effects.

The translation will doubtless bring the material so thoroughly collected and digested by Ostwald within the ken of American investigators in widely different parts of natural science. The work, as written, does not appear the particular narrow province of the chemist, but belongs obviously to the physicist, biologist and scientist in general. It is only to be regretted that so long a delay was necessary for an English translation—seven years. It is a reflection on us Americans that we do not show more ready appreciation of foreign work, but we owe the translators a debt of gratitude that we now have this recognized text-book on the subject.

W. R. WHITNEY.

The Rare Earths, Their Occurrence, Chemistry and Technology. By S. I. LEVY, B.A., B.Sc., A.I.C. Longmans, Green & Co., 1915. Pp. 342, v-xiv. Price, \$3.00 net.

"The present work is intended to give a general but fairly comprehensive account of the rare earth group. In accordance with general usage, the elements zirconium and thorium have been included, though these are now recognized as falling outside the limits of the rare earth group proper." Titanium is also included, and substantial reasons for such inclusion are given.

With some judgment the work has been divided into three parts (see below), but in view, "however, of the occurrence of considerable quantity of monazite within the British Empire, * * * * * stress has been laid on the technical aspect, * * * especially developed as regards the production of monazite and the incandescent gas mantle industry * * * ."

The preface indicates some special pleading. This, however, is not to be found fault with, especially if it promotes Sir Boverton Redwoods' ante bellum "Wake Up England" idea, for in spite of the brilliant individual investigations on the "submerged third" by the distinguished British *savants*, the Empire has shown in reflected light as far as the industrial development of the rare earths is concerned.

For a "hurry-up job," the work has been pretty well done, but of course such carries with it certain blemishes (pp. 221 and 243). Temperature factors have been ignored in places (p. 252) and lack of knowledge of original publication is shown in some instances (p. 253, metallic thorium).

The three parts are: (1) occurrence, which is concerned with the nature of the minerals and their mode of occurrence; (2) the chemistry of the elements, wherein the general properties and methods of separation of the different groups are considered; (3) technology, which takes up the incandescent mantle industry involving the treatment of monazite, the manufacture of mantles from cotton and ramie and artificial silk, its production and use in the mantle industry. The work ends with a consideration of the other technological uses of the cerium and yttrium elements, zirconium and thorium, with the industrial applications of titanium and its compounds.

A short introduction by the renowned Sir William Crookes gives the book a stamp of authority. It is certainly a clear exposition of the "Rare Earths" in English, if one keeps in mind the reservation animadverted. One could not but wish that it had partaken somewhat less of some foreign characteristics of certain European nations in neglecting work done in America.

The point in nomenclature, *re* titanous and titanic compounds, referred to on p. 226 is well made and prompts the reviewer to call attention to doing away entirely with the terms *-ous* and *-ic* in all chemical literature. The use of such terms is effete. Why not say titanium dichloride, trichloride, tetrachloride? Iron dichloride and iron trichloride?

Every library of chemistry should have a copy of this book.

CHAS. BASKERVILLE.

The Rare Earth Industry. By SYDNEY J. JOHNSTONE, Senior Assistant, Scientific and Technical Department, Imperial Institute, London. Royal Octavo XII. 136 pp. 42 illustrations. New York: Appleton & Company. Price, \$3.00 (7s, 6d, net).

This interesting book is the second of a series of six Manuals of Chemical Technology issued by the Appletons and edited by Geoffrey Martin. The object of these Manuals, as the editor expresses it, is "to give concise but sufficient information concerning the manufacture and utilization of certain chemical products, whose exploitation has been hitherto but little developed in this country" (England). Eight chapters cover the following

subjects: The Thorium and Cerium Industry, Titanium, Zirconium, Tantalum and Niobium, Tungsten, The Incandescent Glow Lamp Industry, Uranium and Vanadium; while a ninth chapter by Alexander S. Russell upon the Industry of Radioactive Substances completes the volume.

The author has succeeded in his purpose of making the book to be "essentially of a practical nature," and has wisely confined himself to the industrial applications of the Rare Earths, and has only dealt with the pure chemistry of these substances to a sufficient extent to insure a proper understanding of the nature and properties of the materials dealt with. The explanation for including these various elements under the head of "Rare Earths" is that it is almost impossible to discuss their utilization in a satisfactory manner without including some account of certain other metals, which are even now technically related, and the reader will be in hearty sympathy with this classification. Each chapter contains a very satisfactory bibliography which shows the extensive literary research of the author, together with a valuable classified list of the English patents upon each subject.

The chapters on the Thorium and Cerium Industry, and Tungsten and the Incandescent Electric Lamp Industry are particularly valuable and extremely well written. They deal with these respective subjects quite comprehensively from the preparation of the ore to the finished product; and while the description of the mantel-making industry is decidedly colored with the English point of view and practice, it is nevertheless extremely interesting. Both these chapters give detailed costs of manufacture, which add materially to their value. The 42 illustrations are all found in these chapters and they are extremely well chosen, describing principally apparatus and manufacturing processes. The chapter on Radioactive Substances treats this subject in a very complete manner—both historically and scientifically, as well as technically. This chapter is from the pen of Mr. Alexander A. Russell, and very appropriately closes this interesting and practical manual.

H. S. MINER.

Air, Water, and Food, from a Sanitary Standpoint. By ALPHEUS G. WOODMAN AND JOHN F. NORTON. Fourth edition, revised and rewritten. New York: John Wiley & Sons, Inc.; London: Chapman & Hall, Limited, 1914. 248 pp. 17 illus. Price, \$2.00.

Since the third edition of this work, one of the authors, Mrs. Ellen H. Richards, has died and a change of authorship is noted in the fourth edition. The book has been thoroughly revised and brought up-to-date, many parts of it being entirely rewritten to include the results of recent investigations and to present the point of view regarding some phases of the subject which has been brought about since the earlier editions.

The chapter on air and that on ventilation in the previous edition have been combined in this edition into one chapter entitled "Air and Health,"

and the subject matter has been entirely rewritten to include the more recent contributions to this important subject. In the chapter on analytical methods for air, more emphasis has been laid upon the determination of humidity and dust, and the descriptions of some of the older methods which have largely fallen into disuse have been omitted.

The chapter on the relation of water to health has been entirely rewritten and brought up-to-date, especially with reference to the bacteriological aspects of this question. The analytical methods for water have been revised and some modifications and improvements made; a somewhat more logical order has been followed in describing the different methods. More detailed explanations are given of some of the reactions involved. Short paragraphs on the bacteriological examination of water and sewage have been added, as have descriptions of the methods for determination of sulfates and putrescibility.

Under the analytical methods for food, the subject matter relating to milk has been entirely rewritten. New material has been added on the variation in composition of milk, some of the analytical methods have been omitted and others have been greatly modified. Comparatively little change has been made in the analytical methods for other foods, but in some instances new methods have been added and slight modifications of others have been made.

Some changes in the arrangement of the tables have been made. The bibliography also has been extended and brought up-to-date.

H. L. LANG.

Journal of the Association of Official Agricultural Chemists. Published Quarterly for the Association by the Williams and Wilkins Company, Baltimore. Five dollars per annum for non-members.

This journal, the first number of which has recently appeared, fills a place of importance in the literature of agricultural chemistry; the need for it has been felt for many years. It offers a proper medium for the publication of a large amount of matter which could not well be given space in any one of the existing journals, but which is of the highest interest and importance to chemists connected with experiment stations or food control laboratories.

Official methods of analysis, revised from year to year, find a place here as will also the reports of the proceedings of the annual convention of the Association of Official Agricultural Chemists. There are also reports from other official laboratories and it is probable that cities as well as the states will find this the most convenient organ for the publication of work relating to municipal control.

The journal is well printed on heavy paper; the numbers which are out make a good impression.

J. H. LONG.