

eliminated, by the alkaline carbonates, which give rise to a powdery and non-cohesive deposit, which does not become attached to the walls of boilers, does no damage, and does not cause explosions. This fact has been found to be true with alkaline waters whose saline residue exceeds 4 grams per liter.

(2) The absence of the alkaline carbonates, in waters whose saline residue is less than 1 gram per liter, results in the formation of hard and compact incrustations which adhere firmly to the sides of the boiler with disastrous effect, causing explosions.

(3) The encrusting power is diminished in waters strongly contaminated by the process of nitrification.

(4) In the estimation of hardness of water, as a measure of its encrusting power, its temporary hardness has a fixed value, due to carbonates of calcium and magnesium, and which, expressed as the carbonate of calcium, may easily be determined in the water by means of normal or tenth-normal sulphuric acid.

(5) The use of calcium hydroxide, at a low temperature, has the effect of precipitating the calcium carbonate, while the magnesium carbonate remains in solution.

(6) The total elimination of the encrusting constituents is accomplished in the same way, at a low temperature, by means of the addition of commercial sodium hydroxide.

The results brought about by this last method are rapid, and the expense is extremely slight.

The third volume, covering the period of 1902, is devoted exclusively to the study of the difficulties which surround agricultural conditions in Italy, and does not contain anything of particular interest to the chemist, although it contains many matters of great importance to the economist and statistician.

H. W. WILEY.

THE CONDUCTIVITY OF LIQUIDS. METHODS, RESULTS, CHEMICAL APPLICATIONS AND THEORETICAL CONSIDERATIONS. By OLIN FREEMAN TOWER, PH.D., Assistant Professor of Chemistry, Western Reserve University. Easton, Pa.: Chemical Publishing Co. 1905. 182 pp. Price, \$1.50.

This book offers a systematic survey of our present knowledge of electrolytic conductivity. The first few chapters describe in detail the standard methods of experimental procedure. In the later chapters the author attempts, as far as possible, to avoid paralleling Kohlrausch and Holborn's "Leitvermögen der Elektro-

lyte," by giving especial attention to results obtained since the publication of that work and to subjects not there treated. Among other subjects, separate chapters are devoted to transference numbers, the theory of dissociation, special applications of conductivity measurements, the conductivity of solutions of mixed electrolytes, and finally a welcome chapter on conductivity in non-aqueous solutions.

The author shows a wide acquaintance with the literature of the subject, though one serious omission must be pointed out. In summarizing the recent determinations of conductivity no mention is made of the work of Whetham on aqueous solutions at the freezing-point.¹ The author does not claim to give a complete review of work appearing after the year 1903. Thus some important investigations of more recent date, such as the research of Noyes and Coolidge on the conductivity of aqueous solutions at high temperatures, are omitted.

The author is in general careful in his statements of fact but an occasional error may be found. On page 133 it is stated that the conductivity of pure metallic oxides is not affected by the addition of other metallic oxides, while the experiments of Nernst and his students prove just the opposite conclusion. On page 40, where the value for the specific conductivity of pure water is given, the unit is the specific conductivity of mercury, and not the reciprocal Siemens unit as stated.

Unfortunately, some of the definitions and many of the theoretical discussions can hardly be regarded as satisfactory. Here vagueness of style frequently obscures the meaning. This is particularly marked in the chapter entitled "Influence of Temperature and Pressure."

However, the work is primarily a compilation of recent measurements of conductivity, many of which have been recalculated in rational units and put in tabular form, and as such it will prove a handy book of reference, especially to those who lack a reading knowledge of German. A satisfactory index is appended.

GILBERT N. LEWIS.

THE PRODUCTION OF ALUMINUM AND ITS INDUSTRIAL USE. By ADOLPHE MINET. Translated, with additions, by LEONARD WALDO, S.D. (Harv.). New York: John Wiley & Sons. 1905. Price, \$2.50.

This little volume will prove to be very entertaining to those

¹ Z. physik. Chem. 33, 344 (1900).