

methods are not explained with sufficient clearness ; one is in doubt, for example, as to the procedure to be followed in the estimation of free acid.

In view of the fact that all references are so far as "possible to the *Journal of the Society of Chemical Industry*, to which practically all chemists and students have access," it would seem to be of doubtful expediency to introduce into this book processes there given, the results of which are open to question, such as Farnsteiner's method for the separation of oleic acid. While the writer cordially concurs in the exclusion of some tests—particularly color tests—yet he feels that it was a mistake not to have included McIlhiney's bromine test, one of the most valuable in the examination of these compounds. The omission of the satisfactory David's test for rape seed oil is also to be noted. No mention is made of corn or peanut oils, although maize and earthnut oils are carefully described ; the treatment of linseed oil is particularly satisfactory.

Mineral oils, except as adulterants, are not discussed, although a description of the flash and viscosity tests is given. The usefulness of the work would be increased were the index more complete. It is a valuable book and may be warmly recommended to those interested in the subject.

A. H. GILL.

A HISTORY OF HINDU CHEMISTRY FROM THE EARLIEST TIMES TO THE MIDDLE OF THE SIXTEENTH CENTURY A. D. With Sanskrit Texts, variants, translation and illustrations. BY PRAPHULLA CHANDRA RAY. Vol. I. London and Oxford : Williams and Norgate. 1902. pp. i-iii, a-d, i-lxxix, 1-176, 1-41. 7 plates. 8vo. Price, 12s. 6d.

The author, who occupies the chair of chemistry in Presidency College, Calcutta, has done for Hindu chemistry what Berthelot did a few years ago for Greek, Arabic and Syriac documents of the Middle Ages. His historical studies begin with the sacred books of very early, uncertain dates, and extend to about the year 1550 A. D. ; the second volume will probably bring the subject down to the present time. In the Atharva-veda, the Charaka and the Susruta, occur the earliest references to therapeutical and chemical knowledge, as well as to pharmaceutical preparations ; they date probably prior to the fifth century. In these and succeeding writings, alchemical ideas abound, mixed up with magic, sorcery, and religious rites of a debasing character. The chief of these were

known to the Arabians at an early date and furnished them with a large part of the chemical skill with which they are usually credited.

Hindu ideas concerning the constitution and properties of matter resemble in many points the philosophy of the early Greeks, and it has been suggested that the latter were influenced by Indian thought through Persia. Almost all the doctrines ascribed to Pythagoras, mathematical, religious and philosophical, were known in India in the sixth century B. C.

The invention of the processes of calcination and distillation is ascribed to the renowned and venerable Nagarjuna, one of the twenty-seven alchemists named in the *Rasaratnasamuchchaya*, a famous work of the Iatro-chemical period. Another philosopher in physical science was Kanāda who propounded a doctrine similar, in many points, to the atomic theory of Democritus; his anticipations as respects the propagation of sound and the identity of light and heat excite wonder and admiration.

The volume contains summaries of the knowledge of the ancient Hindus concerning metals, salts, alkalies (the "good" and the "bad"), and of technical arts having a chemical basis, such as the manufacture of calomel, of saltpetre, as well as of metallurgical operations.

Zinc was recognized as a metal as early as 1374 A. D., long before pseudo-Basil Valentine, and Paracelsus.

The method of treating the refuse and wastage of goldsmith's workshops is described and explained in modern chemical language.

The claim is made that the Hindus knew how to prepare mineral acids earlier than Europeans.

To analyze the work more fully in the space that can be given is impossible; the whole book shows the erudition and careful study of an accomplished scholar, not only in chemistry but in Sanskrit as well, citations being given in this language.

An appendix contains several full page plates of furnaces, copper smelting, alum manufacture, etc.; also 41 pages of Sanskrit texts and two indexes, one to proper names and one to subjects [but why separated?].

The book bears internal evidence of having been printed in Calcutta, with clear type and on good paper. The second volume will be awaited with interest, and the two will form the standard

monograph on Hindu chemistry that will be indispensable in every library.

HENRY CARRINGTON BOLTON.

**THE TESTING OF CHEMICAL REAGENTS FOR PURITY.** BY DR. C. KRAUCH, chemist to the firm of E. Merck, Darmstadt. Authorized translation of the Third Edition by J. A. WILLIAMSON and L. W. DUPRÉ. With additions and emendations by the author. London: Maclaren & Sons; New York: D. Van Nostrand Co. 350 pp. 1903. Price, \$4.50 net.

To prescribe a series of tests of chemical reagents which should be sufficiently detailed to cover their use in all sorts of highly specialized cases would be well-nigh impossible. The general and many of the special applications of the inorganic reagents and of such organic substances as are employed as solvents, indicators, or for special tests are, however, well provided for in the material which Dr. Krauch has compiled from various sources, and to which he has added the results of his own experience. For each substance the Latin name, symbol, molecular weight, and a brief description are given, and these are followed by discussions of the tests for impurities, the methods of quantitative estimation, the uses of the reagent, precautions to be observed in connection with its storage, and a description of its commercial varieties. An appendix includes the preparation of ordinary reagents and of normal solutions, a discussion of reagents and reactions in general, and a table of atomic weights [which, however, bears the date, 1890].

The translation seems to have been faithfully carried out. It may be questioned whether it would not have been preferable to add the references to English works and journals to those in other languages, rather than to substitute them, since the reader may often prefer to consult the original papers. The Lunge and Isler table for the strength of sulphuric acid at various densities is stated on page 309 to be more reliable than that of Kolb and it would seem that it should replace the latter table in this work.

To many who have found the German edition of Dr. Krauch's book a valuable assistance, this translation will need no endorsement; to others it can be recommended as a guide in determining the extent to which freedom from impurities in reagents may reasonably be expected, and in the selection of methods of testing.

H. P. T.