

"Clays, Their Occurrence, Properties and Uses," by Dr. H. Ries (John Wiley and Sons, New York, 1914), is an excellent book which touches only lightly on the technology of clay wares. It is best adapted for the advanced student who has had sufficient preparation in the sciences to secure the largest benefit from its pages.

"The Pottery Industry" (U. S. Department of Commerce, *Miscellaneous Series 21*, 1915) contains a wealth of material on the technology, economics, and other phases of the pottery industry in this country, England, Germany, and Austria. It is largely statistical.

"Burning of Clay Wares," by Ellis Lovejoy (T. A. Randall and Co., Indianapolis, Indiana, 1920). The treatment of the subject is very thorough. A large amount of space is given to the discussion of kilns, their construction and operation. It is a very useful book.

"The Collected Writings of Herman Seger," translated by the American Ceramic Society (Chemical Publishing Co., Easton, Pa., 1902), is a collection of papers on the technology of clay wares which are of value to one who has had an adequate preparation in the sciences.

The U. S. Bureau of Standards, the U. S. Bureau of Mines, the U. S. Geological Survey and many state Geological Surveys publish frequent papers dealing with clays and clay products.

Glass and Glass Manufacture

By E. W. Washburn

During the war much publicity was given to the subject of optical glass. Important as such special glasses are, however, they form an almost insignificant portion of the whole glass industry, which in 1920 numbered 369 factories in the United States.

As an introduction to the subject of glass technology, Marston's excellent little book, "Glass and Glass Manufacture" (Sir Isaac Pitman and Sons, Ltd., New York), may be recommended. This work, after a short historical introduction, discusses in simple nontechnical language the main facts concerning the physics and chemistry of glass and glass making, together with a description of the manufacturing processes as carried out in England and on the Continent. American methods are, however, not touched upon by Marston, and unfortunately there is not as yet any book on the subject which can be recommended as giving an adequate discussion of American methods. The nearest approach to such a book may perhaps be found in the material included in Fettke's "Glass Manufacture and the Glass Sand Industry" (Topographic and Geological Survey of Pennsylvania, *Report 12*, 1919), and Palmer's "The Glass Industry" (U. S. Bureau of Foreign and Domestic Commerce, *Report 60*, 1917). The latter publication contains an excellent bibliography of 460 selected titles dealing with glass.

The most up-to-date and scientific treatise in the English language on glass technology is probably Rosenhain's "Glass Manufacture" (Constable and Co., Ltd., London, 1919).

The physical properties of glass and their application to the manufacture of glass apparatus and instruments are discussed by Hovestadt in his "Jena Glass," translated by J. D. and A. Everatt (Macmillan and Co., New York, 1902).

Vitreous Enamels

By C. W. Parmelee

"Materials and Methods Used in the Manufacture of Enamelled Cast Iron Wares," by H. F. Staley (*Technologic Paper 142*), and "Enamels for Sheet Iron and Steel," by J. B. Shaw (*Technologic Paper 165*), both published by the U. S. Bureau of

Standards, are the most useful discussions of the subjects which we have.

"Raw Materials of the Enamel Industry," by Julius Grünwald, translated by H. H. Hodge (Chas. Griffin and Co., Ltd., London, 1914), and "The Theory and Practice of Enamelling on Iron and Steel," by the same author and translator (Griffin and Co.), should also be mentioned.

"Enamels and Enamelling," by Paul Randau, translated by Chas. Salter (Scott Greenwood and Son, London, 2nd Ed., 1912), contains some material relating to special enamels for watch dials, jewelry, etc., which are not discussed in the books previously mentioned.

Refractories

By E. W. Washburn

It has been said that the "future industrial success of any country will largely depend upon the extent to which it develops high-temperature processes." Refractory articles, crucibles, retorts, fire brick, furnace parts, etc., are a prime necessity to all high-temperature manufacturing processes. The metallurgical industries, the gas and coke industry, and all of the ceramic industries are large consumers of refractory products.

Searle's "Refractory Materials, Their Manufacture and Uses" (Lippincott and Co., Philadelphia, 1917) is the most recent book in this field, but deals more particularly with British practice. Havard's "Refractories and Furnaces" (McGraw-Hill Book Co., New York, 1912) is especially valuable for its treatment of metallurgical refractories. Ross's "Silica Refractories" (U. S. Bureau of Standards, *Technologic Paper 116*) gives a good description of the chemistry and manufacturing methods of this important group of refractories. A survey of the field with reference to the scientific problems which it presents is given in National Research Council *Circular 3* (National Research Council, Washington, 1919).

Cements, Limes and Plasters

By R. K. Hursh

"Constitution of the Hydraulic Mortars," H. LeChatelier, translated by J. F. March (McGraw-Hill Book Co., New York, 1905). The researches of this author, published first in 1877, represent some of the most significant work in the studies of the constitution of portland cement. He introduced microscopic methods which have since become of great importance in the investigation of this field. The work is now largely of historical interest.

"Manufacture of Hydraulic Cements," by A. V. Bleining (Bureau of Survey of Ohio, *Bulletin 3*, 4th Series, 1904). The nature of the raw materials and the properties of natural and pozzolana cements are taken up in the first chapters of the report. A resumé of the previous investigations into the nature of portland cement, the methods of compounding cement mixtures, and experimental studies on the limits of composition by the author are followed by a discussion of manufacturing and burning processes and equipment and methods of testing the finished cement.

"The Chemistry and Testing of Cement," by C. H. Desch (Longmans, Green and Co., New York, 1911). This book includes a brief history of the development of calcareous cements, a discussion of the materials used, the chemical components and the mineral constitution, the processes of setting and hardening of lime, plaster, and calcareous silicate cements, the physical properties of portland cement, and of concretes and artificial stones. Reference is made to the earlier work of the Geophysical Laboratory of the Carnegie Institution, but con-