minutes. On standing, the lower solution will contain all of the copper and zinc together with a small amount of ferric chloride. Draw off the lower solution, precipitate the copper with hydrogen sulphide, oxidize with a little bromine and precipitate the small amount of iron. The solution is then ready to determine zinc by any approved method. As many zinc ores contain lead, the effect of sulphuric acid was determined. An excess of 3 cc. had no effect on the separation as long as hydrochloric acid was present. In the presence of lead it is better to separate the lead as lead sulphate before making the ether separation, otherwise lead chloride is liable to clog the cock of the separatory funnel. This single separation is very rapid and more effective than a double basic acetate or triple ammonia separation. The separation of the alkaline metals and aluminum from large amounts of iron, as in the complete analysis of iron ores, is made in the same manner as the above. It has the advantage of rapidity and accuracy, and avoids the excessive amount of salts which are always present when basic acetate or ammonia separations are made. H. C. BABBITT.

NEW BOOKS.

THE MINERAL INDUSTRY: ITS STATISTICS, TECHNOLOGY, AND TRADE IN THE UNITED STATES AND OTHER COUNTRIES TO THE END OF 1901. Founded by the Late RICHARD P. ROTHWELL. Edited by JOSEPH STRUTHERS, PH.D. Vol. 10, xxx + 932 pp. New York and London: The Engineering and Mining Journal (Inc.). 1902. Price, $5.00.

This valuable annual publication has appeared since 1892, and is a treasury of information for those interested in the economic side of chemistry and metallurgy. A somewhat extended account of the contents of the present volume would seem, therefore, to be not out of place here.

The total value of the mineral and metal output for 1901 was $1,372,826,102. Among these products pig iron takes the lead, then follow bituminous and anthracite coal, copper, clay products, gold, iron ore, crude petroleum, stone for building, silver, lead, ferromanganese, cement and natural gas in the order named.

It is stated that there has been a falling off in the production of bauxite, but the total consumption was greater than that of 1900. The Pittsburg Reduction Company is erecting a large plant at

Saline County, Arkansas. A large deposit has been discovered in California.

In the manufacture of aluminum the costs are as follows: Energy, 5 cents; alumina, 6 cents; electrodes, 2 cents; chemicals and stores, 1 cent; labor and superintendence, 3 cents; interest and maintenance, 3 cents; total cost, 20 cents. By the use of the Hall process for refining, the cost of alumina is expected to be 2 cents per pound. This saving, with the consequent reduction in price, is a matter of considerable importance and will enable the metal to be sold at a considerable decrease in price. Two noteworthy changes have been made in the corundum industry during 1901. One, the manufacture of an artificial corundum, and the other the development of corundum deposits in Gallatin County, Montana. Cryolite was imported by the Pennsylvania Salt Manufacturing Co. to the extent of 5,383 tons. The value is stated to be $80.00 per ton. The total production of Greenland cryolite was in 1900, 8,960 metric tons.

The sole producer of aluminum in the United States is the Pittsburg Reduction Company, of Niagara Falls, N. Y., and the production for 1901 was 7,150,000 pounds. The metal has been introduced largely in electrical work in place of copper. New works for the production of this material have been established at Shawinigan Falls in Canada. Experience in the use of aluminum as a conductor has shown that it does not resist exposure as well as copper. The metal is now sold at a price of 33 to 37 cents per pound for 99 per cent. metal.

Of the total 523,000 metric tons of ammonium sulphate produced during 1901, 66,000 tons belong to the United States. This is an increase of over 2,000 tons and is mainly accounted for by the increase in the number of by-product coke ovens now operated.

Three hundred short tons of arsenious oxide were made during 1901 by the Puget Sound Reduction Co., Everett, Washington. This is the only producer in the United States. The product is satisfactory in quality and likely to meet the local western demand. It is possible that the producers may be able to have the tariff changed so as to increase the domestic price for arsenic, in which case it may be possible to carry this product around Cape Horn for the New York market at a profit.

An interesting history of the asphalt industry is given by A. W. Dow.

The production of barytes was 49,070 short tons. The use of this material has increased considerably in the manufacture of barium oxide by the Bradley and Jacobs process at Niagara Falls. This increased amount of barium dioxide is used in the manufacture of hydrogen dioxide, and of lithophone.

During the year, the production of crude carborundum was more than doubled, and the consumption for 1902 shows a large estimated increase. This material is to be of considerable importance in the manufacture of window glass in continuous sheets, by a process now being worked out by parties interested in the glass industry.

The production of Portland cement during 1901 has shown a marvelous increase. Foundations for houses, sidewalks, curbs, cement floors for fire-proof buildings, and the like constitute the source of the largely increasing demand. Over 7,000,000 barrels were made in Pennsylvania and nearly 13,000,000 in the United States.

An interesting account of fire-clays and their manufacture into refractory materials is given by Heinrich Ries. A valuable article on the by-product coke industry is contributed by F. Schniewind, and there is an article on gas producers and gas engines by William Kent.

The Neill process for leaching copper ores does not seem to have passed the experimental stage. The chief difficulty connected with its use seems to lie in the fact that the precious metals are not extracted by sulphurous acid. In other respects the process seems to be quite satisfactory.

There is a valuable article on progress in the electrolytic refining of copper by Titus Ulke, and another on the treatment of slimes from the electrolytic refining of copper by Robert L. Whitehead and a very valuable detailed account of the manufacture of blue vitriol by Ottokar Hofmann. Progress in electro-chemistry and metallurgy is covered in a report by John B. C. Kershaw.

There is a valuable, though rather brief article on commercial hydrofluoric acid by Karl F. Stahl, who has installed at Pittsburg

an admirable plant for the production of this very disagreeable and dangerous chemical.

There is a report on progress in gold milling by R. H. Richards and another on the cyanide process by J. S. C. Wells.

The manufacture of artificial graphite at Niagara Falls has increased enormously, 2,500,000 pounds having been produced in 1901 as against 860,000 pounds in 1900. The production of graphitized electrodes especially has shown a very large increase.

During the last few years there has been a marvelous increase in the production of pig iron and steel in the United States. In 1901 there were 16,000,000 tons of pig produced, and of steel over 13,000,000 tons. Of this, nearly 9,000,000 tons were Bessemer and over 4,000,000 open-hearth. The iron ore production was nearly 29,000,000 tons, to which the Minnesota mines contributed over 11,000,000. This year the production from this source seems likely to be very greatly increased.

An article on modern improvement in the manufacture of pig iron by John Birkinbine gives a clear view of the changes in recent practice.

There are articles on white lead manufacture by Parker C. McIlhiney, and recent improvements in lead smelting by H. O. Hofman.

Manganese ores for the production of ferromanganese are obtained from Colorado, Georgia, Virginia, Belgium, Brazil, Canada, Chili, Colombia, Cuba, France, Germany, Greece, India, Italy, Japan, Java, Russia, Sweden, and Spain. There is an article on the Nicopol manganese district in southern Russia by Frank Drake.

The production of natural gas and its use as a fuel and as a source of power in gas engines receives attention in an article by F. H. Oliphant.

Under cyanides from atmospheric nitrogen, allusion is made to the Bradley-Jacobs patent, which consists in coking barium carbonate and small coal. This porous mixture is next converted in the electric furnace into barium carbide. By passing nitrogen gas over this, cyanide is formed.

Rare elements are treated by Victor Lenher, and under the contact process of sulphuric acid, the article by R. Kneitsch, which recently appeared in the *Berichte,* is fully translated.

It would take up too much space to give anything like a full résumé of the contents of this interesting digest of progress. I must content myself with calling attention further to excellent articles on zinc, pyritic smelting, metallography, mine timbering, alloys as solutions, ore dressing, liquefied carbonic acid gas and magnetic separation. The volume ends with a number of statistical tables. EDWARD HART.

INORGANIC CHEMISTRY, WITH THE ELEMENTS OF PHYSICAL AND THEORETICAL CHEMISTRY. BY J. I. D. HINDS, PH.D., Professor of Chemistry in the University of Nashville. New York : John Wiley and Sons. 1902. 8vo. viii + 566 pp. Price, $3.00.

The book, as stated in the preface, is intended to supply a rather complete text-book on inorganic chemistry for colleges and universities, and a handy reference book for all students and teachers of chemistry. Opinions should not differ widely as to how well the author has accomplished either of these objects. As far as the former is concerned, the method adopted is almost entirely that of the most objectionable style of dogmatic instruction: laws, hypotheses, definitions are laid down in axiomatic fashion, with scarcely a hint of the broad experimental basis on which they have actually been developed; structural formulas are used from the very beginning with never a word as to the facts which led to their introduction and use; much effort is expended towards making methods of calculation go by rule rather than by reasoning. The reviewer has looked in vain, repeatedly, for the fundamental laws of definite and multiple proportions (!). A discussion of them is promised on p. 57 but diligent search in all but the later chapters of the descriptive part and in the index failed to lead to their discovery!

In a word, not one particle of the beauty of the inductive method, to which chemistry owes its successful development and all its fascination, is left. The student is asked to accept, to believe; his faith and memory are appealed to and cultivated at the expense of his faculty of reasoning and his power of judging at first hand. It is a source of wonder to the reviewer whether any student's interest in chemistry can survive this method of instruction, and how any inherent power of inductive reasoning from fact to hypothesis and law can escape positive destruction. It is con-