

THE MANUFACTURE OF CYANIDES.

The Cyanide Industry Theoretically and Practically Considered. By R. Robine and M. Lenglen. Translated by J. Arthur Leclerc, Ph.D., with an appendix by C. E. Munroe, Ph.D. Pp. xi+408; illustrated. (New York: John Wiley and Sons; London: Chapman and Hall, Ltd., 1906.) Price 17s. net.

THE stimulating effect on industrial research caused by the prospect of immediate material gain is strikingly illustrated by the progress of the cyanide industry. Until cyanide of potassium was applied to the treatment of gold ores, comparatively little interest was taken in its manufacture. The consumption amounted to about fifty tons a year only, and the old expensive and wasteful methods of obtaining it from ferrocyanide which had been made by the use of nitrogenous organic substances were deemed sufficient for the purpose. When the demand was rapidly growing in the 'nineties there was a rush of investigators to discover new and cheaper methods of manufacture. A fair amount of success was attained, and some thousands of tons of cyanide are now produced annually in Great Britain and Germany and sold at one-third the former price. The older processes have been abandoned and new ones introduced, and, although some doubt still remains as to the future of the industry, the field for useful research has been narrowed, and once again offers little attraction to the chemical "pot-hunter." Comparatively little cyanide is produced in France, however, and apparently it was the apathy of their fellow-countrymen on the subject which induced MM. Robine and Lenglen to write the book which has just been translated.

The authors divide their book into four parts, of which part iii., on the methods of manufacturing cyanide compounds, is alone of any real importance.

Part i., occupying sixty-five pages, deals with the chemistry of cyanogen and its derivatives. It contains no correct statement that does not appear in ordinary text-books of chemistry, and is distinguished by an extraordinary number of misprints or misstatements, such as "cyanogen does not unite directly with hydrogen," "it [cyanogen] becomes a liquid at 20°.7 under ordinary pressure," and "If the cyanide contains chlorides, the method [of estimation of cyanide by means of silver nitrate] is not accurate." There are no references to the sources of information, and the whole section seems to have been drawn up in a perfunctory way.

Of even less value is part ii., which occupies twelve pages, and is on "The Present Condition of the Cyanide Industry." None of the information given in this part appears to be of later date than 1901, and some of the tables of figures end in 1896. The tables refer mainly to France, but there is a list of works producing cyanide compounds which applies to the whole world.

Part iii. occupies 213 pages, and gives a clear account of a very large number of methods of manufacture, most of which, as the authors are careful to point out, have never been successful on an industrial scale.

All the chief cyanide compounds are dealt with, and separate chapters are devoted to the manufacture of cyanides, ferrocyanides, ferricyanides, and sulphocyanides. Sulphocyanides and, to a less extent, ferrocyanides owe their importance to their use in the preparation of cyanides, but the authors devote most attention to the interesting direct synthetic processes of making cyanides from carbon and nitrogen or ammonia.

The fixation of atmospheric nitrogen is a fascinating problem which is likely to continue to exercise the minds of chemists, and the translator, as an agricultural chemist, expresses the daring hope that the publication of this volume will result in the solution of the problem on an industrial scale. It is, of course, well known that cyanides are formed in blast furnaces, and many attempts have been made to apply this knowledge, beginning with Bunsen's special furnace, which was built in 1845. In most of the later processes, atmospheric nitrogen, freed from oxygen by passing it over heated metals or by distilling liquid air, has been passed over carbides of metals heated in electric or other furnaces, but although some progress has been made, the cyanide industry still continues to depend on more round-about chemical actions. One of these is the synthesis of sulphocyanide by the action of ammonia on carbon bisulphide in the presence of a base such as lime, followed by the reduction of the sulphocyanide by means of carbon, metals, or hydrocarbons.

Illuminating gas and its residues constitute a source of cyanide which has not been fully exploited. The authors anticipate that in the future a large proportion of the required cyanides will be obtained from gas works, and estimate that in France alone 4,000,000 tons of coal used annually in the manufacture of illuminating gas could be made to yield cyanide compounds worth from eight to twelve million francs, all of which is now lost. In other countries, however, the matter has not been overlooked, and it is certain that the illuminating gas used in the world could be made to yield far more cyanide than could possibly be disposed of, unless new uses for cyanide should be discovered. The progress of the cyanide industry is checked rather by well-founded fears of overstocking the market than by the neglect by manufacturers of their opportunities or by the need of fresh sources of supply.

In part iv., which occupies twenty-seven pages, there is an adequate account of the use of cyanogen compounds, and this is followed by an appendix of seventy-one pages. Here a digest is given of the United States patents relating to cyanide processes for the recovery of the precious metals. No doubt the list is fairly complete, but it has nothing to do with the main subject of the book, and does not contain any reference to patents relating to the manufacture of cyanides. However, as it shows the activity of the consumers of cyanide, it may be taken as a tonic by disheartened manufacturers, who, after all, are probably more interested in markets than in chemical formulas.

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