

begin to deliver liquid air in four minutes from the time of starting it. A method is fully described by which liquid hydrogen may be obtained without great difficulty. A chapter entitled "The Manipulation of Liquefied Gases" will be thought by many to be the most interesting in the book. It treats of the separation of gases in a mixture by fractional distillation. One such separation was that by which, from a hundred liters of atmospheric nitrogen, there was obtained a residue containing ten per cent. of neon and helium; in the air, there is but one or two parts of neon in a hundred thousand, and perhaps a tenth as much helium. Another such separation is that of fifteen liters of argon; diagrams make clear the course of the experiment, by which, after two final distillations at the temperature of liquid hydrogen, neon was obtained in quantity sufficient for the determination of its density. A third such fractional distillation was that applied to liquid air, by which krypton and xenon were obtained; the course of this experiment is also made clear by the aid of diagrams. A proper end of this subject is made by the chapter on spectrum analysis, which contains convenient tables, as well as a map, of the spectra of the new gases.

The reading of proofs was careful; no misprints have been noted more serious than Hildebrand twice for Hillebrand, and Gimmingham for Gimingham. Errors of fact are few and unimportant. Names of journals not published in England are cited somewhat carelessly; the Smithsonian Contributions to Knowledge appear as Proceedings of the Smithsonian Association, and the *Annales de Chimie et de Physique* is referred to in five different ways.

Dr. Travers' connection with the first workers on the new gases was so intimate, and his own part in some of the work was such, that he is especially well fitted to write this volume, which is a very welcome addition to scientific literature.

EDWARD W. MORLEY.

THE MANUFACTURE OF PAINT. BY J. CRUICKSHANK SMITH. London: Scott, Greenwood & Co. 1901. 200 pp. Price, \$3.00 net.

This author seems to know very well the kinds of machinery in use in England for making the cheaper grades of paint, and the illustrations are intelligently chosen and well executed. It is difficult for an American paint manufacturer to believe that modern high-class paint machinery has not yet found its way

into English factories, but very likely it is true. The only American machine described is one of the earlier forms of water-cooled mills; and the practical, technical points which one would like to find in a book of this sort, such as the values of different styles of dressing millstones for various kinds of work, the points of excellence to be aimed at in making particular paints, the nature and effect of the vehicles used, and the like,—such things as these are very scantily touched upon. It seems remarkable that no mention is made of the practice of mixing oil with wet white lead without preliminary drying, a practice of great commercial importance. In general, the information conveyed to the reader seems to be of the sort obtainable from the makers of paint machinery, rather than from experts in paint manufacture; accurate and useful as far it goes, but lacking in real knowledge of the subject. The book is one which should be of interest and use to the beginner but is not complete enough to serve the advanced manufacturer.

A. H. SABIN.

LEÇONS SUR LA THEORIE DES GAZ. L. BOLTZMANN : traduites par A. GALLOTTI. Paris : Gauthier-Villiers. 1902. Price, 8 francs.

Boltzmann is one of the three great mathematicians to whom the development of the kinetic theory of gases is mainly due. The present volume contains a translation of the first half of his lectures, originally published in 1896 and 1898, and gives a systematic account of the mathematical results attained by the joint labors of Maxwell, Clausius and Boltzmann.

Professor Gallotti's translation is clear and accurate ; some sentences are even more perspicuous than in the original. Professor Brillouin has furnished an historical introduction and some comments on certain steps in the mathematical discussions of the author.

EDWARD W. MORLEY.

THE MANUFACTURE OF MINERAL AND LAKE PIGMENTS. BY DR. JOSEF BERSCH. TRANSLATED BY A. C. WRIGHT. London: Scott, Greenwood & Co. 1901. 476 pp. Price, \$5.00 net.

This admirable book was evidently written by a thorough chemist who is also a practical color-maker. Not many technical points escape mention and the book is valuable not only for reference but for daily use. The chapters on "Black Pigments," "Vermilion," and "Ultramarine," are especially valuable, as presenting an intelligible account of processes on which very little practical information is available.