

as well, for we all have much to learn from the great master of our science.

W. A. N.

STUDIEN ZUR KENTNISS DER ABHÄNGIGKEIT DER VISCOSITÄT DER FLÜSSIGEN KÖRPER VON DER TEMPERATURE UND VON IHRER CHEMISCHEN CONSTITUTION. By Alexius Batschinski. 101 pp. 17 × 25 cm. Moscow. 1901.

Though large enough to be a monograph, this is really a reprint of a journal article. The author has previously called attention to the fact that with most liquids the product of the internal friction into the absolute temperature is a constant. Data are given showing the application of this law to one hundred and forty-four different substances. In general, the agreement is good ; but anhydrides, acids, alcohols and water form exceptions. These are all substances which we consider as polymerized in the liquid state.

WILDER D. BANCROFT.

THE EXPERIMENTAL STUDY OF GASES. By MORRIS W. TRAVERS, D.Sc. New York : The Macmillan Co.

Dr. Travers' book confines itself to methods of experiment which have been useful in researches on the properties of gases and to a description of some of the more important of such researches. It does not contain lecture experiments, nor instruction for beginners. In the selection of topics, it is well balanced, and as complete as can fairly be demanded of its 320 pages ; chapters on mercury pumps, on stop-cocks and other connections, on the collection and storage of gases, on reading instruments, and on calibration, have their due place. The chapters on the preparation of pure gases, on gas analysis, and on the determination of densities, are interesting and satisfactory, as are those on the relation of temperature, pressure, and volume, on vapor pressure and critical constants, and on specific heat.

The most interesting chapters, naturally, are those which have more or less to do with the newly discovered gases. That entitled "The Gases of the Helium Group" describes the method used in isolating argon, and that afterwards used to obtain it in considerable quantity, and narrates the steps which led to the discovery of helium, neon, krypton, and xenon. A chapter on the liquefaction of gases explains all the new principles which have been utilized and the new processes which have been used in liquefying gases since the time of the experiments of Pictet and of Cailletet. Here is found a clear account of Hampson's machine for liquefying air ; it is stated that this machine will

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