

of chemistry needs not only careful revision, but also the rewriting of some of its chapters." Prof. Holleman has taken into account the recent advances in the subject, including the constitution of the dioses, enzymes, and particularly the applications of physical chemistry to organic chemistry—a feature which has always been noteworthy in previous editions. More attention is given to fundamentals than in most text-books, and in its present form the book is by far the best treatise for students which is available. Its use will make the subject interesting and provide a stimulus for further study.

*The Structure of Silicates.* By Prof. W. L. Bragg. Pp. 69. (Leipzig: Akademische Verlagsgesellschaft m.b.H., 1930.) 5 gold marks.

It is unnecessary to insist on the significance of this monograph from the point of view of the crystallographer. Under its somewhat uninviting title it does, however, also include much of interest to the chemist, the points of similarity and dissimilarity between the silicon-oxygen complexes which are of such importance in the inorganic world and the carbon chains and rings of organic compounds appearing clearly. Other matters of importance which are dealt with are the correct formulæ for silicates—the atomic components should be expressed on the basis of a constant number of oxygen atoms characteristic of the type of structure—and Pauling's ideas upon valence, with the not dissimilar rules for the build of structures which have been developed by W. L. Bragg and Goldschmidt. One feels after reading this book that it was a hopeless task to attempt to unravel crystal structure without the help afforded by X-rays, but that now full description of all crystals is likely to be accomplished in the not remote future.

### Engineering.

*Johnson's Materials of Construction.* Rewritten by Prof. M. O. Withey and James Aston. Edited by F. E. Turneaure. Seventh edition. Pp. xxii + 859. (New York: John Wiley and Sons, Inc.; London: Chapman and Hall, Ltd., 1930.) 30s. net.

THE application of scientific discoveries to engineering practice generally only becomes possible when new technique and new materials have been developed which make possible the application. During the last century great advances have been made in engineering, and the success achieved has in no small measure been dependent upon the finding of new materials, developments of accurate methods of testing the properties of materials under ordinary and high temperatures under static and repeated stresses, and how these properties are affected by heat treatments and manufacturing conditions. Further, the materials that are used in the largest quantities in modern engineering are irons and steels, which are subject to rapid corrosion in many atmospheric conditions, and thus

where possible such metals, as well as the timbers, have to be protected by suitable coverings.

The volume before us, after a preliminary study of the mechanics of materials, describes the machines and apparatus required for the carrying out of the many types of tests used in modern engineering practice, and then proceeds to deal with various types of structural materials in detail. Timbers, cements, concrete, building stones, structural clays, ferrous and non-ferrous alloys are discussed. Constitutional diagrams are given of the copper-zinc and copper-tin alloys, and interesting chapters are devoted to the effect of heat treatments and the form on the properties of metals. Clearly drawn diagrams illustrating these properties, and excellent photomicrographs showing the structure of metals produced by various treatments, are given. Chapters are devoted to the preservation of timbers and the corrosion of metals.

The book is excellently printed, the diagrams are clear, and the work should prove of great service to engineering students as well as to those in practice.

*Hydraulics: for Engineers and Engineering Students.* By Prof. F. C. Lea. Fifth edition. Pp. xii + 775. (London: Edward Arnold and Co., 1930.) 21s. net.

IN the course of twenty-two years, since its first appearance, Prof. Lea's work has passed through five editions, with intermediate reprints—a fact which eloquently speaks for the popularity and acceptability of the volume to students of the subject. It has grown considerably in bulk since the present writer reviewed it in NATURE in 1908, and now numbers nearly 800 pages. Designed to cover the vast field of engineering practice comprised in the modern science of hydraulics, the expansion is scarcely to be wondered at; and, indeed, in turning over the leaves, one does not find that there is any inclusion of inappropriate material or pleonasm of treatment.

Nearly a fifth of the volume is devoted to a consideration of turbine and water-wheel problems, and another important section of 130 pages is absorbed in a consideration of the subject of centrifugal and reciprocating pumps. While the subject as a whole is treated comprehensively and as analytically as one might reasonably expect in a volume which aims at serving the needs of students, it is possible, of course, to point to some matters in which there is room for inclusion of material. The treatment of flow in pipes and channels is full, but there is no mention to be found of Dr. Herbert Chatley's researches in connexion with the Whangpoo and Yangtse rivers, or more than a meagre reference to the striking conclusions in Barnes' "Hydraulic Flow Reviewed", which the present writer came across on a first perusal, but failed to trace afterwards by means of the index. Indeed, the index is a little defective on several points.

These, however, are minor details. Taking it as a whole, Prof. Lea's work is a substantial and serviceable contribution to the literature on hydraulics, and, as heretofore, will be found an extremely useful guide to the practitioner, as well