

with a thorough investigation of the source of the water, to ascertain the possibility of contamination, continuous or intermittent. Then, and then only, if everything be satisfactory, we may be justified in speaking of safety and of freedom from risk; but where either bacteriological, microscopical, or chemical examination is unsatisfactory, the inquiry into the history of the water must be most careful and complete, and a guardedly-expressed opinion given only after a full consideration of the bearing of the one upon the other."

It is gratifying to read such positive statements with regard to the analysis of water for sanitary purposes because it is too frequently the case that either the chemist, bacteriologist, or the microscopist, or each of these, places undue value upon his results. Quite frequently all three forms of examination are necessary to form a definite idea as to the relative purity of a water. The author's long experience as an analyst and medical officer of health renders his opinion in this respect all the more valuable.

D. H. BERGEY.

A TREATISE ON CRYSTALLOGRAPHY. BY W. J. LEWIS, M.A., Professor of Mineralogy in the University of Cambridge. Cambridge University Press. 8mo. 604 pp. Price, 14 shillings, net.

This is one of the most pretentious treatises on this subject which has appeared in the English language. The important, and, from a crystallographic standpoint, historic chair which the writer holds, has naturally given to his work a decidedly conservative tone, from which many modern students will differ.

There are ten chapters (140 pages) dealing with the general geometric properties of crystals; seven chapters (300 pages) on the different systems; one chapter (100 pages) on twin crystals; and two short chapters on "divers notations" and goniometers, respectively.

The chapter on the formation of crystals is fragmentary and altogether too brief. The same is to be said of the chapter on "the law of constancy of angle." "Symmetry" is introduced clumsily but illustrated satisfactorily. The chapter on "axial representation" is somewhat labored; many of the points could have been just as satisfactorily proved by less cumbersome geometrical proof. The heavy Euclidean methods are tedious. The chapter on zone-indices and relations of zones is well stated, and,

didactically, is perhaps the best chapter in the book ; the chapter on the "anharmonic ratio" is also well done. Two chapters on crystal drawings and projections are satisfactory except for some more roundabout proofs, and the omission of all reference to gnomonic projection—an omission much to be deplored, for a projection which shows all zones as straight lines, instead of great circles, is surely worthy of the crystallographer's best attention.

The chapter on "The Systems" is unphilosophically written and, from a non-English point of view, indefensible. No attempt is made to explain clearly the philosophy of the matter. No clear proof is given why only 32 classes of forms (Groth's) are possible, and no satisfactory explanation of the peculiarities of the systems is attempted. The fact that Dr. V. Goldschmidt<sup>1</sup> has *proved* the unscientific nature of Groth's classification, and that the optical, thermal, electric as well as geometric properties of crystals all point to the six commonly accepted systems as the bases, the units, the fundamentals of crystal classification,—all this is overlooked. The old notion of making rhombohedral crystals into a seventh system is revived, although none of the physical properties of such crystals differentiate them from the hexagonal system ; and further yet, Miller's axes of reference are retained instead of substituting the Bravais, which are universally conceded as better and more logical. This is one of the worst examples of unwise conservatism in the book.

The seven chapters on the systems are thoroughly and conscientiously worked out. Particularly praiseworthy are the large number of actual specimens described as examples, most of these being descriptions of crystals in the Cambridge Museum. The concrete examples thus furnished are a great help to understanding the text, besides being valuable crystallographic data in themselves.

The long chapter on twinning is lucidly written, and enriched by drawings and data concerning many interesting specimens from the Cambridge collections. It is the best chapter in the book.

Taken altogether, it is a good exposition of old-school crystallography, with the addition of Groth's classification, rather unskilfully presented. The details of crystal forms, calculations,

<sup>1</sup> *Ztschr. Kryst.*, January, 1899.

twins, etc., are well done, and the book is chiefly valuable to the advanced student for this information. For beginners, or as an introduction to the main principles of crystallography, it is unsuited, for it is not sufficiently didactic in tone nor clear in presentation, while making the primary error of misconceiving the fundamentals of crystal classification.

The paper, type and drawings are first class, the binding rather frail, and the uncut edges an abomination.

JOSEPH W. RICHARDS.

BEGINSELEN DER SCHEIKUNDE. Door M. C. SCHUYTEN. Antwerpen. 1889. pp. 110. 8 vo.

The author of this little volume, who is professor at the Institute for Higher Studies in Brussels, as well as at the Technical School of Antwerp, has prepared for elementary classes a book on the rudiments of inorganic chemistry including chemical analysis. Naturally, in so small a compass some topics have to be treated superficially; thus spectrum analysis is dealt with in one page and three lines; half a page is given to the properties useful in determining minerals, and this is followed by a table giving the names, composition and chief properties of 84 minerals.

In the preface the author explains that he has adopted the sound principle to "go from the known to the unknown." The book is excellently printed, a variety of types assisting comprehension. The few illustrations are sectional. Questions are introduced to aid teacher and pupil.

H. C. B.

THE KINETIC THEORY OF GASES. Elementary Treatise with Mathematical Appendices. BY OSKAR EMIL MEYER. Translated from the second revised edition by ROBERT E. BAYNES. London, New York, and Bombay: Longmans, Green, & Co. 1899. xvi + 472 pp. 8vo. Cloth. Price, 15 shillings.

The first German edition of this treatise appeared in 1877, the first half of the second edition in 1895, and the second half in 1899. We have in the book before us the translation of the complete second edition.

In this revised edition the general plan of the first edition has been followed. The book is divided into three parts, together with six mathematical appendices. The subjects treated are as