

formity with English practice. Thus (Vol. 1, p. 10) " $\alpha$  is measured upwards and the value of  $y$  is measured towards the side." Again (Vol. 1, p. 11)  $\pi$  denotes "the angle which etc." and is not used to represent the constant 3.141 . . . . The meaning of succeeding sentences (Vol. 1, p. 12) "A radius vector is always positive. Radii of curvature may be positive or negative" is a little obscure. The sign convention enables one to write apparently

(Vol. 2, p. 27)  $\frac{1}{f} = \frac{1}{v} - \frac{1}{u}$  or  $\frac{1}{f} = \frac{1}{u} - \frac{1}{v}$ , indifferently.

Any advantage accruing from the use of coloured optical diagrams is largely discounted by the fact that "it has not been found practicable to make the colours in all cases correspond with the colours of particular rays of light." There is no apparent need for a coloured illustration of a spectroscope of fairly old German design. The chapter on the determination of refractive indexes suffers from the defect inherent to a translation of a fairly old work—it is not up to date. Mercury and even cadmium humps are now commonly employed as sources of spectroscopic illumination in optical works. Such adverse criticisms as have been advanced do not detract from the value of the main purpose of the work—to facilitate optical computation. This purpose the work will undoubtedly fulfil for some time. In the meantime there is still place for a native work dealing with the current practice of optical measurement, and in addition the trigonometrical computation of optical systems—if the algebraic method has been tried and found wanting.

J. S. G. THOMAS.

THE METALS OF THE RARE EARTHS. By J. F. SPENCER. *Monographs on Inorganic and Physical Chemistry. With diagrams. Pp. x + 279. (London: Longmans, Green and Co. 1919.) Price 12s. 6d. net.*

The book commences with an interesting historical summary of the discovery of the various members of the rare earths, which is followed by an account of their occurrence in nature. Chapter III gives a useful general account of the various methods which are employed for separating the rare earths, whilst the methods of controlling the separations are described in the succeeding chapter. Three long chapters deal with the preparation and properties of the compounds formed by members of the cerium group of earths, by members of the yttrium group and by thorium, and these chapters contain various physical data, so far as they are available, of the metals and compounds. Atomic weight determinations, the position of the rare earth elements in the Periodic System and uses of the rare earths are dealt with in other chapters. The consideration of thorium along with the rare earths in the narrower sense is eminently justifiable and expedient. The whole treatment of the subject is logical and thorough and the book gives a very readable account of a difficult branch of inorganic chemistry. It can be strongly recommended to all interested in the rare earths. Reference, name and subject indexes, which seem to have been carefully compiled, greatly add to the value of the book.

The various compounds of the rare earth metals which have been singled out for detailed description have been selected judiciously, though it would have been interesting if some information had been given as to the reliance that can be placed on the formulae attributed to many of the compounds.

The book is practically free from errors, though on page 83 it is wrongly stated that the pentahydrate of cerous sulphate is stable in contact with solutions between 56° and 100.5°, whereas the solubility data given and the diagram both show that it is unstable with respect to the tetrahydrate over the whole of this range of temperature. This error is

however to be attributed to a misleading statement made on the diagram which has been borrowed from another book. The proof reading has been very carefully done and the only misprint of any consequence which has been noticed is on page 138, line 9 from bottom, where gadolinium should be substituted for terbium.

Like other volumes of the series the book is well printed.

H. BASSETT.

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