

the student of books specially devoted to this subject would be greatly facilitated, whilst the plotting of the temperature as abscissa in the phase diagrams (Figs. 23 and 29) does not seem a very happy innovation.

It is a pity that the erroneous conceptions concerning the determination of the surface tension of solutions by the drop weight method are finding a place in standard text-books. Harkins' extension of Löhnstein's work on this subject might well be replaced by that of Iredale in a future edition.

The important paper of Debye and Hückel on the ionisation of strong electrolytes has been largely utilised in the second volume, and it would form a good substitute for the discussion of the erroneous hypothesis of Ghosh, to which three pages are devoted in Chapter xi. Also, in view of the ever-increasing importance of the amphoteric electrolytes, such as the proteins, a more detailed discussion of some of the electrical properties of such substances would not be out of place. In the chapter on colloid chemistry, Antonov's important rule and the alternative forms of the Gibbs' equation for non-ideal solutions might well have been included.

One of the most valuable features of the book is the inclusion of a number of experimental methods, together with a discussion on the probable and possible errors in physical chemical measurements, which serves not only to emphasise the need for consideration of the accuracy of measurements obtained in the laboratory, but also assists the student in visualising the subject both in its theoretical and its practical aspects.

Prof. Taylor, his co-workers, and the publishers are to be heartily congratulated on the production of this text-book, which, at any rate on the desk of the reviewer, will replace all others.

ERIC K. RIDEAL.

Our Bookshelf.

Atomtheorie in elementarer Darstellung. Von Prof. Dr. Arthur Haas. Pp. viii + 204 + 2 Tafeln. (Berlin und Leipzig: Walter de Gruyter und Co., 1924.) 5.40 gold marks.

DR. HAAS is a gifted exponent, with a particular talent for compression. In this book of some two hundred pages he deals with the experimental establishment of the existence of the electron, the quantum theory of spectra, the modern work on X-rays and crystal structure, isotopes, and, in short, all that fascinating body of modern work which centres round the structure of the atom. He touches on such details as the selection principle of Sommerfeld and Landé, with its inner quantum number; the metastable state of the helium atom established by Franck; and the quantum theory of band spectra. There are, of course, only a few words devoted to each of such subjects, but these words are always pertinent and well chosen, and reveal the essence of the results obtained. Bohr's work of the

last few years on the grouping of electrons in the general atom, and the interpretation of the periodic table in terms of quanta, is handled at comparative length, the periodicities revealed by the X-ray terms and the bearing of the spectra of potassium and calcium on the electron grouping in the first long period being well explained. The book concludes with an eight-page summary of its contents.

Dr. Haas is particularly concerned with the quantum theory of optical spectra, and devotes comparatively little space to the work of Rutherford and his school on scattering and disintegration, and the work of Aston on isotopes, although, of course, this is not to say that these aspects are entirely neglected. The general exposition is excellent, although the comprehensiveness of the scheme and the shortness of the book necessarily entail a certain abruptness. For a reader already acquainted with some of the fundamental methods and results of the quantum theory, but yet not a specialist in this field, the book offers a very agreeable means of revising his knowledge and extending it in certain directions. While the physicist will appreciate the review which the book affords, it is possible that the chemist and the layman, whom the author mentions in his preface, will find the simplicity which the lack of mathematics appears to lend to the book somewhat deceptive. The book has, however, many great merits: it is original in selection and arrangement of matter, concise in expression, includes very recent work, and is written with a knowledge and appreciation which are abundantly evident.

E. N. DA C. A.

Memoirs of the Geological Survey. Special Reports on the Mineral Resources of Great Britain. Vol. 28. *Refractory Materials: Fireclays. Analyses and Physical Tests.* By F. R. Ennos and Dr. Alexander Scott. Pp. iv + 84. (Southampton: Ordnance Survey Office; London: E. Stanford, Ltd., 1924.) 3s. net.

THIS report is intended to supplement volume 19, the well-known report on refractory materials. Volume 28 contains notes on the mode of occurrence of fireclays; analyses of about 250 fireclays; and the results of tests on the refractoriness, porosity, tensile strength, and contraction of about 70 clays. The refractory tests for about 50 clays are applied to Ludwig's chart with very fair success. To this it may be added that there is generally a difficulty in interpreting the fusion temperature of a fireclay. No specification is able to give clear unequivocal instructions as to when a fireclay exhibits "signs of fusion." Discrepant results by different observers show that the "signs" are interpreted differently by different men. This also may explain some difficulties encountered in the general use of Ludwig's chart.

The novelty in the report is the statement that "probably the simplest and most useful chemical method of estimating the refractoriness of fireclays such as those investigated is to determine the combined water." The evidence plotted on p. 72 is far from convincing. From this it would be inferred that a fireclay with between 5½ and 12 per cent. of combined water would have a refractoriness of cone 28; or, taken from another angle, a clay with 5 per cent. of combined water might have a refractoriness extending from cone 10 to 26! It will be necessary in the next edition to