

graphs, mostly of good quality. Unfortunately, the text contains many inaccuracies and in places it is quite misleading. The book has a pleasing appearance and is well produced, which makes its defects the more regrettable.

A. C. B.

WEDEPOHL (K. H.), editor. *Handbook of Geochemistry*. Vol. II/2. Berlin, Heidelberg, and New York (Springer-Verlag), 1970. iv+667 pp., 105 figs. Loose-leaf binder: Price DM 212, U.S. \$58.30 (Subscription price DM 169.60, \$46.70).

The second instalment of Volume II of this massive work is in no sense self-contained. Supplied like Volume II-1 in a fairly stout loose-leaf binder, 7 cm in thickness, it contains several almost complete chapters on the geochemistry of individual elements, together with a few odd sections of others, and some revised versions of individual pages (mostly lists of references) already supplied in Volume II-1. The recipient's first task, therefore, is to spread the contents of both loose-leaf binders systematically over the floor, carefully substitute the few revised individual pages for the corresponding originals (as detailed in a page of instructions given with Volume II-2) and redistribute the various chapters, in order of atomic number of the elements, between the two binders.

Each complete chapter will comprise the following standard sections: A-Crystal chemistry; B-Isotopes in nature; C-Abundance in cosmos, meteorites, lunar materials, and tektites; D-Abundance in rock-forming minerals (phase equilibria), minerals; E-Abundance in common igneous rock types; F-Behaviour in magmatogenic processes (pegmatites, gas transport, ore deposition, etc.); G-Behaviour during weathering and alteration of rocks; H-Solubilities of compounds that control concentrations of the element in natural waters; adsorption processes; valence states in natural environments; I-Abundance in natural waters and in the atmosphere; K-Abundance in common sediments and sedimentary rock types; L-Biogeochemistry; M-Abundance in common metamorphic rock types; N-Behaviour in metamorphic reactions; O-Relations to other elements, economic importance, etc. A comprehensive reference list is appended to each chapter.

Taking the first two instalments of Volume II together, information for some 43 elements is approaching completeness: Li, Be, C, O, Na, Mg, K, Sc, Fe, Ge, As, Rb, Cd, Sn, Sb, Cs, Y, La and R.E., W, Re, Pt metals, etc., Hg, Bi, Th, and U. Only three chapters—Fe, Sn, and Hg—are absolutely complete.

Enough of the work is now available to permit some real assessment of its ultimate worth and, although the treatment of individual elements naturally varies both in thoroughness and in emphasis, it is clear that on completion we shall have a standard reference work of inestimable value. The standard format of the layout for each chapter is logical and fits the treatment of most elements well: it is easy to turn quickly to the right place to find any particular piece of information. Some chapter sections are very brief indeed—generally where adequate data are still lacking or where the section is only marginally relevant to the element concerned.

The variable approach of different authors to their task—even within the standardized framework for each element—leads to some patchiness in treatment, but in general a satisfactory coverage is achieved, as in the excellent chapters dealing with the alkali metals and also in the cases of most of the less abundant elements where adequate quantitative data exist. The problem of treatment of ‘major’ elements is on the whole more difficult: the chapter on Mg in the present instalment happens, reasonably enough, to place greater emphasis on the occurrence of this element in waters, sediments, and low P — T environments in general than in igneous and metamorphic environments. A useful feature in this chapter is the recognition that for some purposes Mg^{2+} and Fe^{2+} must be considered together, but, while some phase diagrams are given for systems involving Mg sulphate, carbonate, and chloride, the reader must turn to other standard sources for oxide and silicate systems.

The chapter on oxygen (which was included in the first instalment of this volume) includes a first-class discussion of its isotope geochemistry, phase diagrams for some oxide systems, a good section on natural waters and the atmosphere, and a discussion of oxygen fugacity in natural systems, concluding with a short extra section on the experimental measurement and control of this parameter.

Treatment of the less abundant elements obviously varies greatly with the volume of available knowledge of their geochemistry; some authors compress most of their information into tables, while others are inclined to be more discursive. It is thus perhaps pointless to single out any particular chapters for comment, but that dealing with Sc is typical of the more useful ones. One matter brought home clearly by scanning through these volumes is still the relative paucity of data for many elements in metamorphic rocks and metamorphic reactions. Great efforts have clearly been made to keep the literature reference lists up-to-date at publication so far as possible. Most lists end in 1967 or 1968: a few include papers published or in press in 1969.

The work is clearly and attractively printed; there are some obvious misprints, but not enough to matter seriously. The loose-leaf format has its drawbacks, and the volumes do not easily lie flat when opened. As a work of reference the Handbook will quickly prove indispensable, and every geochemical library will need it. It is a rather expensive investment for the private subscriber.

E. A. VINCENT

FAST (J. D.) *Entropy*. London (Macmillan), 1970. xii+339 pp., 77 figs., 26 tables. Price £2.00 (paper).

The appearance of this revised and enlarged second edition of Fast's well-known work on entropy brings relief to those oppressed by the growing weight of thoroughly unreadable books on thermodynamics. The writer has achieved extreme clarity of expression without oversimplification or loss of rigour, making this one of the very few books in the field that can be read with pleasure by the non-specialist reader. The text is also remarkably free of infelicities of translation (from the Dutch original).

The first three chapters deal with the entropy concept in classical thermodynamics, its statistical significance, and its applications (some of which have obvious minera-