

electropositive one in accordance with usual chemical practice. But in the case of some of the more complex compounds the order is not at all obvious (e.g.  $\text{Cu}_2\text{Mg}_2(\text{OH})_6\text{CO}_3 \cdot 2\text{H}_2\text{O}$  and many garnet and apatite structures). Cross-referencing under all the cations would be a considerable improvement.

However, these are small defects in so valuable a compilation of structural information, which is so much more accessible than it was in the first edition.

E. J. W. WHITTAKER

GARRELS (R. M.) and CHRIST (C. L.). *Solutions, minerals and equilibria*. New York (Harper and Row), 1965. xiii+450 pp. Price: 108s.

Professor Garrels's 'Mineral Equilibria' was published in 1960, and this new text is both a revision and an expansion of the earlier book. The previous restriction to low temperatures and pressures has been removed, and, together with the inclusion of new data, this has led to the text being almost doubled in length, with eleven chapters: seven of these are expanded versions of those which appeared under similar titles in 'Mineral Equilibria'.

The first two chapters aim to present fundamental thermodynamic relationships in such a way as to make them most useful for geological application. The third chapter deals with carbonate equilibria, a subject of great significance over a wide range of studies. This is followed by a new short chapter on complex ions, which gives detailed consideration to the nature of the solute in various natural waters. A short account of the measurement of Eh and pH precedes chapters on partial pressure and Eh-pH diagrams in which the emphasis is placed on the application to geological and geochemical problems. Three new chapters follow: the first, on ion exchange, is concerned mainly with the fundamentals of cation exchange and cation electrodes; a second new chapter examines the effects of temperature and pressure changes on equilibria, whilst the third, headed 'Combination Diagrams', deals with the combinations of parameters that are most suitable for the presentation of data on silicate, carbonate, and sulphate systems of mineralogical importance. The concluding chapter of the book describes the utility of mineral stability diagrams to some geological situations.

The book is written throughout with a directness and clarity of approach that leaves the reader with a much better understanding of the way in which the sophistications and abstractions of chemical thermodynamics are relevant to the practical problems found in mineral associations. For those whose interests extend beyond the material of the

text, there are extensive references both in the development of the material and at the end of each chapter. Many chapters are supplemented by examples (with answers), and there are a number of worked numerical examples within the text. Six appendixes contain up-to-date values of the relevant constants for a wide range of materials and conditions. In a preface, the authors express the hope that the expanded scope will increase the audience and the utility of the book. There seems little doubt that their expectations will be fulfilled, for, despite the limitations that any book must have in a rapidly expanding scientific field, they have provided a volume that will both teach and stimulate others to a fuller understanding of the basic problems of geochemical and geological processes.

P. GAY

PEARL (R. H.), edited and adapted by J. F. Kirkaldy. *An introduction to the mineral kingdom*. London (Blandford Press), 1966. 254 pp., 15 colour plates, 37 text-figs. Price: 25s.

The text opens with a short account of the nature of minerals, their importance in the modern world, and a glimpse at the ways of mining and preparing of minerals for use. The identification, composition, and classification of minerals is outlined in an interesting and instructive manner. Under the heading 'Flowers of the Mineral Kingdom' a brief but concise account of crystallography is given. Gem minerals and their fundamental qualities are described and atomic and synthetic minerals are discussed. A very useful bibliography and an excellent glossary are included in the work and consideration is given to the collection and after care of minerals and rocks. The illustrations are good—the coloured ones superb—and the maps are useful. This is a book which will appeal to the general reader and be of considerable interest to the specialist particularly as it has been so well edited for the British scene.

BRIAN SIMPSON

BÖRNER (R). *Minerals, rocks and gemstones*, 2nd edn. Edinburgh (Oliver & Boyd), 1966. xi + 250 pp., 16 colour plates. Price: 30s.

The book is divided into three sections:

In the first section, after a brief explanation of those properties of minerals used in the work, the general make-up of the tables is explained. In the tables the most easily determined physical properties are used, making identification of a mineral species a relatively easy operation. The tables classifying the minerals on streak and hardness are very useful. It seems doubtful if it is worth including good drawings of, for