

AlOH sites in the epidote structure (Strens, 1965, 1966; Burns and Strens, 1967), and of the Al site in viridine (Strens, unpublished). These distortions stabilize the Mn^{3+} ion by 15 to 20 Kcal/mole relative to Mn^{3+} in an undistorted octahedral site. Similar crystal-field effects may be expected in compounds of Cr^{2+} and Cu^{2+} , and to a smaller extent with other transition-metal ions.

The concentration of Ti^{3+} in titanaugite may be a more complex process. Titanaugites are commonest in high-temperature silica-deficient rocks, in which the replacement of Si by Al is greatest. Charge compensation then requires replacement of Mg by a trivalent ion, and size considerations suggest that this should be Fe^{3+} or Ti^{3+} rather than Al (compare stability of acmite, instability of jadeite at low pressures).

Oxygen partial pressure will also be critical in determining the activities of Mn^{3+} and Ti^{3+} , but it follows from the discussion above that minerals containing 'Mn₂O₃' and 'Ti₂O₃' have not necessarily crystallized within the stability fields of these oxides.

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BOOK REVIEWS

KING (L. C.). *Morphology of the earth* (2nd edition). Edinburgh (Oliver & Boyd), 726 pp., 247 figs. Price: 105s.

Professor King's book has undergone only minimal revision in its new edition, the most important changes amounting to a few additional paragraphs in certain sections. The subject matter, layout and figures are almost identical to those of the 1962 edition, and the over-all

number of figures remains exactly the same. Unfortunately, the popular morphology maps of the ocean basins have not been brought fully up to date and appear sparse of information when compared with Heezen and Tharp's and Menard's recent physiographic diagrams.

Five years, it seems, have not altered Professor King's ideas on geotectonics. His well-known views on a low-density upper mantle zone rich in volatiles as the cause of 'cymatogeny' and orogeny are restated in the new edition. As before, in using gravity data to support his ideas King fails to make a clear distinction between Bouguer and isostatic anomalies. His explanation of the cause of large negative anomalies in terms of low-density mantle is unconvincing, and the numerous recent seismic studies relevant to this interpretation are not discussed. The chapter on 'mobile welts', hardly modified, appears inadequate now that Aubouin's authoritative discourse on geosynclines has entered the literature.

Professor King is more convincing when discussing landscapes than when reinterpreting geophysical results. And the major part of his book remains a masterly account of the nature and evolution of continental scenery with a detailed, yet worldwide coverage. Perhaps the most important single aspect of *Morphology of the earth* is that it reveals geomorphology as a vital branch of geology, equal in status to other intrinsic branches of the science.

It may be argued that the close similarity of the first and second editions merely reflects the excellence of the first edition. The publishers, in their notes on the dust-cover, should have taken this line rather than claim a degree of revision and up-dating that has not occurred.

M. BROOKS

MASON (BRIAN). *Principles of geochemistry* (3rd edition). New York, London (Wiley), vii+329 pp. Price: 75s.

This is the third edition of a book that has probably become a standard students' text on geochemistry. The present edition differs very little in size and content from the second edition of 1958. Although the price increase from 64s. to 75s. is rather disproportional to the change in subject matter, it is presumably justifiable on the grounds of increased costs. The format, order of treatment of topics, and sometimes page-numbers are the same as the previous edition. Chapters 1 and 2 (Introduction and The Earth in Relation to the Universe) remain essentially unaltered but Chapter 3 (Structure and Composition of the Earth) has