BOOK REVIEWS

WYLLIE (P. J.), Editor. *Experimental petrology and global tectonics.* Amsterdam (Elsevier Publ. Co.), iv+109 pp., 38 figs. (Tectonophysics, vol. 17, no. 3, 187–97), 1973. Price Dfl. 17.50.

This special issue of *Tectonophysics* (subtitled *Geodynamics Project; Scientific Report no.* 2) contains the Proceedings of the Symposium on Experimental Petrology and Global Tectonics held at the 24th International Geological Congress, Montreal, 1972, under the auspices of the I.U.G.S. Commission on Experimental Petrology at High Pressures and Temperatures. Following a 20-page introductory review by P. J. Wyllie, there are six papers (for full titles and brief abstracts see M.A. 74–1864): the subjects covered range from the origin of some magmas in oceanic regions (I. Kushiro), the origin of andesites (A. L. Boettcher), the generation of batholiths (W. S. Fyfe), and contrasting melting relations in a pyrolite upper mantle in various environments (D. H. Green), to paired and unpaired metamorphic belts (A. Miyashiro) and blueschist metamorphism in subduction zones (W. G. Ernst). The combination of geophysics and experimental petrology provides a way for testing petrological models of the lithosphere and asthenosphere and, indirectly, of the processes of formation of lithosphere from the asthenosphere, and of its destruction in subduction zones. These invited papers give detailed results of experimental petrology on which such models must be based. R. A. H.

EDGAR (A. D.). *Experimental petrology: basic principles and techniques.* Oxford (Clarendon Press), 1973. xii+217 pp., 54 figs. Price £5·75.

To become familiar with the techniques of experimental petrology, there is no substitute for practical experience, guided by established members of the profession. The material in this book should help to shorten the early fumbling stages of the apprenticeship, which are much the worst for pupil, teacher, and equipment alike. All books of this kind that attempt to distil data and descriptions from a large number of works are open to criticism on content: there never will be a perfect selection. My main personal criticism against this book is the very sketchy and shallow treatment of phase diagrams in chapter 2. This chapter does not seem to be up to the same standard as the others and Edgar might have been wiser to have left it out altogether.

There are a number of specific points with which I disagree; the more important of these will now be dealt with in page order.

Page 26, figure 2.6 (e): there should be a temperature maximum on field boundary P_1–P_2, a small but important omission as the diagram is used to illustrate peritectic and eutectic points.

Page 28, figure 2.7 (a): there should be no field boundary between A and Ass, the single field should be labelled Ass.

Pages 74 and 75: Edgar has not made it clear that it is the e.m.f. equivalent of the

temperature of the cold junction that should be added to the measured e.m.f. to give the temperature of the hot junction.

Page 78: α should be the temperature resistance coefficient and not thermal expansion.

Page 142: Increasing pressure will, for most heating-element alloys, reduce the resistance and not increase it as stated by Edgar. The change in resistance of the heating element has nothing to do with the power requirements; the power needed to maintain a given temperature merely reflects the heat lost. Thus the increased power needed at higher pressures indicates that more heat is lost, probably due to the denser gas acting more efficiently in transferring heat to the walls of the pressure vessel.

Page 165: Edgar states that temperature gradients are much smaller in solid-media than in internally heated gas equipment. This is nonsense, the very fact that the furnace length in an internally heated vessel is commonly 9 inches or greater compared to about $\frac{3}{4}$ inch in the piston-cylinder must mean that, with a properly constructed furnace that minimizes convection, the gas apparatus will have a longer, more uniform hot zone.

Taken all round, however, Alan Edgar can only be congratulated on this book. It obviously represents a great deal of work, many of the diagrams are really outstanding and the bibliography is quite extensive. Above all it brings together a lot of material that is useful to the experimental petrologist and has previously been scattered over a wide range of literature.

D. L. HAMILTON

SAXENA (S. K.). *Thermodynamics of rock-forming crystalline solutions* (Minerals, Rocks and Inorganic Materials: Monograph Series of Theoretical and Experimental Studies, vol. 8). Berlin, Heidelberg, and New York (Springer-Verlag), 1973. xii + 188 pp., 67 figs. Price DM 48.00 ($21.70).

It is an auspicious time for the publication of this book for at present there is much active research aimed at quantifying the chemistry of mineral equilibria in order to obtain parameters such as temperature and pressure of formation. It is essentially a review volume dealing with the systematics of thermodynamics as applied to crystalline solutions, but in places new developments in the thermodynamical application are made, such as in the treatment of order–disorder in pyroxenes.

The first three chapters deal with the basic thermodynamics, regular solutions, and immiscibility in solid solution. The treatment of regular solutions is abrupt and the reader who wishes an understanding would do better to go straight to the texts of Guggenheim. Likewise, the treatment of mixing and immiscibility is in the nature of a reference source for the thermodynamic equations involved in these processes, although a few pages at the end of this chapter contain a discussion of immiscibility in mineral systems. Chapter IV is a condensed but useful review of the distribution of components between coexisting phases of both ideal and non-ideal solid solution. Chapters V and VI cover the formalities in the determination of activities; Chapters VII to X deal with order–disorder in the pyroxenes, olivines, and feldspars, with a