

Wood (B. J.) and Fraser (D. G.) *Elementary Thermodynamics for Geologists*. London (Oxford University Press), 1976. xiv+303 pp., 39 figs. Price (paperback) £2.95, (boards) £6.00.

This is a book which does not live up to its title, since it does not labour the elements of thermodynamics, but immerses itself immediately in the application of thermodynamics to practical problems, which are almost exclusively in igneous and metamorphic petrology. There is no lengthy statement of classical thermodynamic concepts, and the treatment takes-off from the concept of chemical potential. The first two chapters deal with basic definitions, standard states, and activities for pure phases. This is extended in chapter three, which is largely concerned with mixing models for multicomponent solids and fluids. Chapter four becomes more applied and discusses geothermometry and geobarometry, concluding with a treatment of the recent attempts to calculate P - T conditions under which liquids are in equilibrium with mantle source rocks. Chapter five handles silicate melts, discussing too briefly the relationship between thermodynamic properties and phase diagrams involving liquid, and at too great length various mixing models for silicate liquids. Trace components are then treated and finally calorimetry and the extraction of thermodynamic data from phase equilibrium studies. Each chapter concludes with a summary statement and useful, extended worked examples.

The book is cheap and looks it. The text is a reproduction of ordinary typescript on poor-quality paper, and while the typing is carefully done, the frequent use of superscripts and subscripts (not to mention superscripted subscripts), all typed at the same size as the main characters, obscures the basic form of many of the equations, and at times is downright confusing (equation 5.46 is a good example of such a typographical *mélange*). The similarity of 'O' and 'o' also causes some difficulties. An index of reactions would be a useful addition, and the usual list of symbols used is absent.

Geologists who wish to improve their grasp of the fundamentals of thermodynamics will not find the book particularly helpful. Neither does it make much attempt to provide a petrological and petrographic framework for the equations; there is little help with the harsh reality of deciding, for example, whether a given reaction is appropriate for a particular assemblage. Its appeal must surely be to working petrologists with an established feel for the suitability and meaningfulness of particular treatments. 'Practical thermodynamics for proficient petrologists' might have been a more accurate title for this book.

There is no doubt, though, that it fulfils the authors' aim of being a 'workshop manual'. It is clearly written and covers many of the fields of petrology in which thermodynamics has made a contribution in recent years. It offers outstanding practical return for a small outlay and will be much appreciated as a handbook by those who have seen the light and wish to become more proficient in this field. I doubt, however, whether it will win many converts from the ranks of the totally uninitiated.

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