BOOK REVIEWS

Fyfe (W. S.), Price (N. J.), and Thompson (A. B.). *Fluids in the Earth's crust* (Developments in Geochemistry, I). Amsterdam, Oxford, and New York (Elsevier), 1978. xviii + 383 pp., 225 figs., 1 coloured pl. Price Dfl 125.00 ($49.75).

The subject matter of this volume is, in the opinion of this reviewer, likely to be one of the most important fields of study in the Earth Sciences as a whole during the next decade. Whether we are concerned with the degassing of the Earth, mechanisms of heat transfer during regional metamorphism, the scavenging of useful elements from large volumes of crust and their concentration into orebodies, or the mechanical properties of crust during deformation, in every case we come back to questions of the nature of crustal fluids, their transport characteristics, and their distribution. The present volume does a valuable service by drawing attention to many of these problems.

The authors cover a wide spectrum of topics. The early chapters deal with the character and chemical behaviour of aqueous fluids from a great variety of environments, volatiles in minerals, and solution chemistry. This makes up about a quarter of the book. The second quarter is largely concerned with metamorphism, reaction rates, dehydration, and decarbonation during metamorphism, the buffering of fluid systems, and partial melting. The second half of the book deals principally with the effects of fluids on the mechanical properties of rocks and some of the physical aspects of the behaviour of rock fluids. Even diapirism merits a chapter. Finally there is a synthesis chapter in which many of the diverse threads of the story are drawn together.

The concept of the book is excellent and it is most thought provoking to have a unified treatment of subjects which are all too often regarded as entirely separate. On the other hand, the book does have a number of shortcomings. Perhaps the most serious is that which the authors could do least about. Having conceived the volume at a time when they were involved in a joint research project and, no doubt, met frequently, the book was completed after they had dispersed to different institutions. The result inevitably is that the different parts do not hang together as well as they might, and have rather different levels of approach; although it must be admitted that in an interdisciplinary volume of this kind it is very hard to define a 'uniform level'.

The final production of the book also merits criticism. For the price asked, far too many errors were missed by the proof-readers, some sufficiently serious to mislead a student who is already finding the text hard work. The publishers have in too many cases crammed too many small and complicated diagrams on to a page, or simply reduced diagrams too far.

The important thing, however, is that the book has been written. It should be widely read and should change the thinking of those who read it. The reviewer would in one respect like to change the thinking of the authors who, every time they need to show a geothermal gradient on a diagram, do so in the only way which is unquestionably wrong, i.e. by drawing a straight line!

This text is appropriate for use by final-year undergraduates and research students with a reasonable grounding in physical chemistry and thermodynamics. It should be in the library of every university.

E. R. OXBURGH

Farah (A.) and De Jong (K. A.), Editors. *Geodynamics of Pakistan.* Quetta (Geol. Surv. Pakistan), 1979. x + 362 pp., 206 figs., 6 geol. maps. Price R80.00 (+ postage).

This well-produced and well-illustrated book results from a programme sponsored jointly by the Pakistan Government and the National Science Foundation of the USA. The initial results presented here include 27 papers by 42 contributors (for details see M.A. 80-0077), of whom 29 are from outside Pakistan. The main emphases are on ophiolites, plate tectonics, and the geology of northern Pakistan.

R.A.H.

Marfunin (A. S.). *Physics of Minerals and Inorganic Materials: an introduction.* Berlin, Heidelberg, and New York (Springer-Verlag), 1979. xii + 340 pp., 138 figs. Price DM 98.00 ($53.90).

There is certainly a need at the present time in Mineralogy for texts which clarify and illustrate the many branches of physics which are currently important in the development of the subject. To be really successful they must be written sympathetically but, at the same time, the fundamental physical and mathematical concepts involved must be clearly explained. In this context Marfunin's book, which deals essentially with the electronic structure of atoms, atom clusters, and crystals, is only partly successful. The subject matter is essentially quantum mechanics and is based on group theoretical