

The book is a welcome and valuable addition to the library of the senior student or practising earth scientist. It will have served its purpose if it assists in a more critical and rigorous treatment of the wealth of numerical data that at times threatens to drown geosciences.

I. L. GIBSON

JEFFERY (P. G.). *Chemical methods of rock analysis*. Second edition. Oxford and New York (Pergamon Press), 1975. xx+525 pp., 104 figs. Price £16.00.

The second edition of this book will be welcomed by many geochemists working in the field of rock and mineral analysis. Although there are no radical changes from the first edition [M.A. 72-816], which appeared in 1970, many of the instrumental methods are now more comprehensively covered. One of the strongest recommendations in favour of this book is that it describes methods of analysis in detail, with appropriate references, unlike some recent books, which have confined themselves to vague generalizations. Methods for a very wide range of elements are given. One criticism, in view of the current widespread use of atomic absorption analysis for rock analysis, is that more details could have been given of this method. The determination of aluminium by atomic absorption using the nitrous oxide flame is dismissed in only a few lines, for example.

J. N. WALSH

JONES (M. J.) Editor. *Minerals and the environment*. London (Inst. Mining and Metall.). xii+803 pp., 236 figs., 1 pl., 1975. Price £25.00.

Forty-one papers, together with discussion and authors' replies, are the proceedings of a symposium organised by the Institution of Mining and Metallurgy with the cooperation of the Institute of Quarrying and the Institution of Mining Engineers. The overall theme relates to ways of reducing and ameliorating the impact that the production of raw materials for the world's industries has on the human environment. Minerals are considered as the means by which energy is channelled to uses that raise human living standards above subsistence levels and ores in terms of their utilization and benefit/cost ratios rather than their genesis and detailed mineralogical constitution. The environment is mainly considered in relation to regions where mining, quarrying, and metallurgical extraction takes place.

Topics covered include rehabilitation of open-cast mines and mine tips, revegetation of toxic mining wastes, the role of microorganisms in the recovery of polluted areas, disposal of wastes, and control of pollution of rivers. The section relating to dust in mines and quarries deals with control and collection methods, not the mineralogy of dusts. Here, as in other parts of this volume, the environmental aspects exclude those relating to biological effects on people working in, or living in the vicinity of mining, quarrying, and metallurgical industrial establishments.

The demonstration in this well-produced and illustrated book of what can be achieved in the environmental field if money is available may have a considerable

political impact on many earth scientists. While the direct scientific impact may be limited, the value of interdisciplinary approaches stands out. D. R. BOWES

VERNON (R. H.). *Metamorphic Processes, Reactions and Microstructure Development*.

London (Thomas Murby publication of George Allen & Unwin). 1976, 274 pp., 84 figs. Price £7.60.

This book is for undergraduates, postgraduates, and research workers wishing 'an insight into some modern approaches to metamorphic petrology'. It aims to explain simply and realistically reactions and microstructures in metamorphic rocks. No effort is made to be comprehensive, on the contrary, examples are selected with a clear bias towards the author's own interests. The references, at the end of each chapter, are good and show a real appreciation of modern developments; whether they are easy to refer to in such a position rather than at the end of the book is a moot point. However, there is author index, as well as a very good detailed subject index.

The book may be divided into two parts, the first four chapters, making up half of the contents, deal with: fundamental aspects of metamorphism such as grade, facies, mineral paragenesis, temperatures and pressures and microstructures; equilibrium aspects of metamorphic reactions; kinetics of metamorphic reactions; and reactions in metamorphic rocks.

All these four chapters are good, sound appreciations of the state of the art, with good diagrams and apposite examples. However, there is little that is especially original in the approach, and it is a pity that some of the examples are not treated in more detail, particularly for the advanced reader. Ionic reactions are a case in point, for they are dealt with briefly and could well have been given greater critical treatment, as indeed could redox reactions, and hydrolysis equilibria. Some examples showing actual textures in rocks with a complete interpretation would certainly have been helpful to undergraduates and postgraduates.

The remaining five chapters deal with: stable metamorphic microstructures; deformation, recovery and recrystallization processes; examples of these processes in specific silicates; and the relationship between chemical and physical processes in metamorphism.

Here the author is very much at home, although some of the material has been covered by Spry in his book on metamorphic textures, particularly chapter six. Chapter seven is a very good modern guide to experimental work on minerals, particularly olivine and the micas. In the final chapter, which is really what the book is all about and unfortunately is rather short, the chemical and deformational aspects of metamorphism are considered together, in striking contrast to recent well-known textbooks on metamorphism where deformation has been virtually ignored. In spite of the critical comments above, which are mainly concerned with amount of detail, the author is to be congratulated on a very readable book, well illustrated and indexed, covering what must be the most entertaining and relevant part of any modern study of metamorphic rocks. I am sure the book will be read widely by undergraduates and postgraduates as well as active workers in the field. M. P. ATHERTON