

## BOOK REVIEWS

Hochella, M. F. and White, A. F., eds *Mineral-Water Interface Geochemistry*. Washington, D.C. (Mineralogical Society of America: Reviews in Mineralogy, Vol. 23), 1990. xvi + 603pp. Price \$20.00.

The latest addition of the excellent 'Review in Mineralogy' series, published by the Mineralogical Society of America, focuses on the mechanisms of sorption and desorption occurring on mineral surfaces. The reactivity of minerals in aqueous systems is of fundamental importance in understanding geochemical cycles and has become a major new research direction through advances in surface analysis and theoretical modelling techniques.

The collection of papers put together by Hochella and White review the various mechanisms of attachment and detachment of aqueous species on mineral surfaces and provide an up-to-date account of recent work in this field. Following an overview of the subject the volume is broadly divided into four sections. The first section (Chapters 2 and 3) reviews microscopic and atomistic observations of mineral surfaces and the fundamental atomic processes that occur at the mineral-water interface. The second section (Chapters 4-8) covers sorption processes and discusses thermodynamic properties of surfaces, surface complexation and molecular adsorption models as well as the new *in-situ* methods for characterising sorbed species. Processes controlling precipitation and dissolution are discussed in the third section (Chapters 9 and 10) which includes the classical theories of precipitation and crystal growth, near-surface diffusion mechanisms and leaching processes. Finally, surficial oxidation-reduction and photo-redox reactions are reviewed in Chapters 11-14.

The 'Reviews in Mineralogy' series represents outstanding value for money and credit is due to the editors and contributors to this volume for bringing together new concepts in geochemistry and surface science. This book will be a valuable reference text for all those interested in water-rock interactions, especially those interested in weathering processes, ore formation and environmental geochemistry.

D. MATTEY

Ragland, P. C. *Basic Analytical Petrology*. New York and Oxford (Pergamon Press), 1990. xii + 369pp. Price £32.00 (hardback), £15.00 (paperback).

This is a small/medium-sized book (370 pages) but is amazing for the amount of information that is packed into it. The topics covered include phase diagrams (including Shreinemaker's construction), thermodynamics, variation diagrams, trace elements, experimental petrology, a very useful first chapter on 'basic tools' and a short (10 pages) section on igneous rocks and plate tectonics. Also the inclusion of a description of programming in BASIC underlines the wide scope of this book.

It is not surprising therefore that in most cases the reader is presented with facts and no discussion of options and therein lies the all too obvious weakness of this book. As the geological sciences are a mixture of fact and theory it would explain why the production of this type of book is barely attempted in the Geological Sciences. The author is often describing the top of the iceberg without giving any hint of the mass of material under the surface which is somewhat dangerous for inexperienced students. With a reasonable restriction on time and space it is not possible to comment on all the many and varied sections in this book so I have focused my attention on a few familiar (to me) sections, especially those on phase equilibria and volatile solubility. For instance, in chapter 5 (p. 270), we are told about the effects of H<sub>2</sub>O and CO<sub>2</sub> dissolving in silicate melts; the former depresses the melting temperature greatly while the latter has only a little effect on the melting temperatures. The explanations given for this contrasting effect are that more H<sub>2</sub>O dissolves than CO<sub>2</sub> and that the silicate melt is depolymerised by the H<sub>2</sub>O but polymerised by the CO<sub>2</sub>. A chemical reaction is presented which supports this latter. This explanation is vastly oversimplified which leads to it being misleading on the following grounds: (i) forsterite, a completely depolymerised phase melts at a *higher* temperature than albite which is a very polymerised phase therefore polymerisation and melting temperature are not necessarily linked; (ii) a consensus of whether H<sub>2</sub>O is predominantly dissolved as H<sub>2</sub>O or (OH) and thus its effect on the melt structure has not been reached; (iii) likewise the relative import-