

BOOK REVIEWS

Manning, D. A. C., Hall, P. L. and Hughes, C., Eds. *Geochemistry of Clay-Pore Fluid Interactions*. London (Chapman & Hall), 1993. xv + 427 pp. Price £75.00. ISBN 0-412-48980-5.

This book, the proceedings of a September 1990 meeting of the same title organized jointly by the Mineralogical Society (Geochemistry and Clay Minerals Groups) and the Geological Society, contains 17 papers arranged thematically in four groups. The first group of three papers covers experimental and theoretical characterization of mudrocks and clays. The use of small-angle scattering of X-rays and thermal neutrons to investigate particle size in dilute suspension and pore distribution in microporous solids is described, with emphasis placed on the importance of fractal geometry for interpreting results. The two other papers present data on the location of cations and properties of water in the smectite interlayer space obtained using Monte Carlo and molecular dynamics simulation techniques. Three following papers deal with natural diagenesis and weathering processes, covering the distribution and composition of authigenic clay minerals in recent sediments, diagenesis of North Sea Jurassic mudrocks, and pore fluid evolution in the Kimmeridge Clay. Experimental studies of diagenesis and weathering are covered in four papers. These deal with the advantages and disadvantages of solid-solution modelling for predicting stabilities of neoformed clay minerals, laboratory reproduction of morphological variation in petroleum reservoir clays, experimental diagenesis of mudrocks, and experimental weathering of montmorillonite in batch and mixed flow reactors. The final group of seven papers covers applications in civil and petroleum engineering. Apart from a review of the mechanisms of overpressuring, papers in this group all deal with the significance of clay-pore fluid interactions to toxic waste disposal. Topics include: clays as chemical and hydraulic barriers in waste disposal; mass transfer mechanisms in compacted clays; ground-water chemistry modelling beneath the Drigg low-

level radioactive waste disposal site, Cumbria, UK; porefluid extraction techniques for mudrocks; and porewater compositions of Plio-Pleistocene clay formations throughout Italy and of Jurassic shales and limestones of northern Switzerland.

This book is useful for a number of reasons. First, it demonstrates how important the application of modelling procedures is to our understanding of clay properties and genesis, and also provides an example of the use of fractal theory for enhancing interpretation of crystal structure data — an approach that will have to be used more frequently as the sophistication of structural probes increases. It also brings to the attention of a much larger audience some of the high-quality data on water-rock interaction generated in relation to radioactive waste disposal; previously, results of such investigations remained confidential or were reported in the 'grey literature' and thus difficult to access. The aim of the original meeting was to bring together scientists and engineers from a wide range of backgrounds, especially in the petroleum and radioactive waste disposal industries. From this book it is apparent that the techniques, skills and approaches for attacking geological problems in both industries are very similar. The original meeting was successful and the publication can be judged an equal success. Both contributors and authors are to be congratulated on this addition to the Mineralogical Society's special series.

D. J. MORGAN

Bickle, M. J. and Nisbet, E. G., Eds. *The Geology of the Belingwe Greenstone Belt, Zimbabwe: a study of the evolution of Archaean continental crust*. (Geological Society of Zimbabwe, Special Publication 2) Rotterdam (A. A. Balkema), 1993, viii + 239pp. Price Hfl. 165.00 (£61.00)

The Belingwe Belt of Zimbabwe is one of the world's classical Archaean greenstone belts and the Bickle-Nisbet duo have done much to justify

its reputation. It is perhaps best known for the magnificently preserved spinifex textures in the komatiites of the Reliance Formation and these are again well illustrated in this volume. The Belt has well developed stratigraphic relationships with the famous outcrop of a greenstone belt succession lying unconformably on top of a 3.5 Ga gneissic basement. Unfortunately, the book went to press before the radical (and unjustifiable, in my view) interpretation of Kuski and Kidd (1992) who believe that previous workers have missed a major thrust which brought oceanic crust onto older basement.

Special Volume 2 is a handsome book of over 200 pages and consists of nine chapters with a subject index and a consolidated bibliography at the end of the volume. Each chapter is lavishly illustrated with numerous tables, diagrams and figures and my main criticism in this regard is that many of the photographs are difficult to interpret and there appears to be a good deal of repetition (particularly pillow basalts).

Chapter one (Bickle, Nisbet, Martin and Orpen) is a short overview of the Zimbabwe craton and this is followed by chapter 2 (Martin, Nisbet, Bickle and Orpen) on the stratigraphy of the Belingwe Belt (with a beautiful map of the area, Fig 2.1) Chapter 3 (Bickle, Orpen, Nisbet and Martin) is a structural chapter, and deals with the important aspect of the structural evolution of the 3.5 Ga gneissic basement and the main elements of the greenstone belt itself.

Chapter 4 (Orpen, Martin, Bickle and Nisbet) deals with the rather poorly known south and south-western part of the greenstone belt. Here the lowermost parts of the greenstone belt are exposed (Hokonui, Bend and Koodoovale Formations) and a wide variety of rock types and environments is covered. These three formations are missing on the eastern side of the belt and are represented by the major unconformity. Chapter 5 (Nisbet, Bickle, Martin and Orpen) covers the sedimentology of the Brooklands Formation and the reader struggles to find exactly where this is to be found (see Fig. 2.1). The references to Lower Ngezi and Reliance and Mangeri, all of which are much higher stratigraphically, lend to the confusion.

Chapter 6 deals with the Ngezi Group (Nisbet, Martin, Bickle and Orpen) and covers the well known basal unconformity and the overlying komatiitic sequences. The chapter gives a comprehensive description (field relations, petrography, sedimentology) of the Group and is one of the longest chapters in the book. The authors of chapter 7, (Chauvel, Dupré and Arndt) discuss Pb, Sm and Nd data on the well preserved Reliance Formation ultramafic lavas. From these data

emerge some Pb isochrons and information about the range of ϵ_{Nd} for the lavas. The authors conclude that the lavas were contaminated by old sialic crust, an indication that the Reliance Formation was not typical oceanic crust. Those readers with a sense of humour are encouraged to read the acknowledgements for the chapter which essentially expresses the length of time in producing a compilation of this type.

Chapter 8 (Bickle, Arndt, Nisbet, Orpen, Martin, Keays and Renner) is a description of the geochemistry of the igneous rocks found within the belt, particularly those from the drill hole which sampled very fresh komatiites. The round-up Chapter 9 (Nisbet, Bickle, Orpen and Martin), is a concise summary of the geology and the tectonic models proposed to explain the evolution of the belt. This book is clearly a labour of love for Bickle and Nisbet. They have been associated with the Belingwe Belt for almost 20 years and are to be congratulated for their perseverance and thoroughness. There are at least another 10 greenstone belts left to be described in Zimbabwe. *On y va!*

R. W. NESBITT

Parthé, E., Ed. *Modern Perspectives in Inorganic Crystal Chemistry*. (N.A.T.O. ASI. vol. C 382). Dordrecht and London (Kluwer Academic Publishers Group), 1992. viii + 282pp. Price DM 180.00 (£62.00). ISBN 0-792-319954-0.

This collection of contributions comes from participants of a NATO advanced study institute held in June 1992. The perspectives of the title represent the views of a selection of chemists, physicists, materials scientists and mineralogists who met with the intention of providing a picture of the current state of inorganic crystal chemistry. The breadth of contributions ensures that there is much here that will be of interest to many mineral chemists. Well produced, the volume provides abundant illustrations of some of the principles, problems and particulars that engage workers in the field of crystal chemistry today.

While this book cannot claim to be a comprehensive text, it does throw up some interesting points and illustrations, often providing seasoning to the subject rather than the bare bones. For example, I'm not sure if the description of calcite as an extremely deformed perovskite structure, in the section on perovskites, sheds light on perovskites or calcite or both, but it's typical of the type of perspective that is on offer here. More generally, the book discusses symmetry relations between crystal structures, cluster chemistry, coordination chemistry and