BOOK REVIEWS

Rollinson, H. R. *Using Geochemical Data: Evaluation, Presentation, Interpretation.* London (Longman Scientific and Technical), 1993. xxvi + 352 pp. Price £24.99. ISBN 0 582 06701 4.

Numbers are the ammunition of the geochemist. How to handle them wisely is the purpose of this manual. It guides and cautions the user on how to get the best from his or her igneous, sedimentary or metamorphic geochemical data, and begins by evaluating the raw geochemical data from the current analytical methods — from XRF and INAA to ICP-MS and ion microprobe (Chapter 1).

The statistical procedures necessary for handling large databases are systematically considered in Chapter 2. Bivariant plots are strongly criticized on the grounds that they should really be multivariate. Cautionary notes are given on the use of the Pearce element ratio diagrams, and the 'constant sum' problem is explained.

The longest chapters, 3 and 4, are on the uses of major and of trace and rare earth element data respectively, including classification, plotting variation diagrams and modelling. These will be the two most thumbed chapters, as they give advice on the question 'which plot to use?'. Tables of normalizing factors and of the mineral/melt partition coefficients for basalt, andesite, dacite and rhyolite liquids are compiled, and plots given of enrichment factors during melting processes.

Tectono-magmatic discrimination diagrams ('is it OIB or OIT or ORG or what?') are explained in Chapter 5, and the 'cookbook' approach is criticized. Chapter 6 is on using radiogenic isotope data: isochrons, model ages, blocking temperatures, mineral and whole-rock ages, recognition of HIMU, PREMA and other conceived mantle sources; and on interpreting epsilon values. The final chapter on the use of stable isotope data for O, H, C and S is particularly clearly explained, even to providing such useful O–C plots as Fig. 7.19 for carbonates with both PDB and SMOW scales shown.

The seven chapters make a well-balanced, clearly written account of how to deal with geochemical data for the more common rock types. The less common types such as the small partial melt mantle products, which arguably are the most telling compositions for igneous rock genesis, receive little mention unfortunately. The contents list makes a useful synopsis of the book and the index is thorough, but the reference list stops at 1990.

Students, researchers, academic and industrial professional geologists will need to have this manual at their elbow when dealing with geochemical data, and the price is fair. Borrowing it from the library will not be enough.

M. J. Le Bas

Jones, G. C. and Jackson, B. *Infrared Transmission Spectra of Carbonate Minerals.* The Natural History Museum and the National Museums of Scotland, London and New York (Chapman & Hall), 1993. 256 pages (unnumbered), 116 spectra. Price £75.00. ISBN 0 412 54650 7

A real need exists for a reliable compilation of infrared spectra of minerals (and, indeed, inorganic compounds in general). This book fills a small but important part of this gap, in that it is a compilation of the Fourier Transform infrared spectra of 109 carbonate minerals, arranged alphabetically, and indexed by mineral name and chemical class, but not by absorption maxima. It is printed on acid-free stiff paper and wire bound between hard protective covers. The first impression that the spectra are detachable to yield a 'card' index is erroneous – the pages are not removable, and the descriptions on the reverse sides would be found to refer to the next card.

The samples used were carefully selected, using a number of criteria including purity and homogeneity, and the identities of most confirmed by X-ray powder diffraction and by a compositional check using a scanning electron microscope with energy-dispersive X-ray analysis. Some very rare species have been included.

The spectra were recorded in transmission mode, using a Fourier Transform infrared spectrometer, and reproduced over the 4000–225 cm^{-1}

range. In five cases, where multiple sharp absorptions are poorly reproduced in this format, the relevant part of the spectra are also reproduced in an expanded wavenumber format. The spectra were measured in KBr pressed discs, a blank KBr disc being used in the automatically subtracted background measurements. The instrument was suitably purged and 50 'scans' were acquired for each spectrum, at a resolution of 2 cm^{-1}. A 'peak-pick' program was used to produce (after editing) tables of absorption maxima.

The spectra suffer from the usual problem with FTIR spectra in that their wavenumber linearity and short format results in lateral compression of the 'fingerprint' region, even though the scale length is doubled from 2000–225 cm^{-1}, and that they lack a fine grid. The tables of absorption maxima and the five expanded spectra help to make up for this. The reviewer feels that more expanded spectra would have been helpful, in particular those of the leadhillite polymorphs.

Each spectrum is accompanied by a 'windowed' text page with species and specimen details, including specimen and spectrum number, source, XRD number and compositional data, as well as 'peak' (absorption maxima) table, notes and references.

The spectrum of coalingite given is dominated by chrysotile absorptions from matrix contamination, the strong carbonate stretching absorption near 1400 cm^{-1} showing only weakly. The authors do note that this spectrum differs from the literature version, which latter has to stand for the time being as standard. A different sample from the specimen must have been used for XRD.

The layer-lattice hydroxides with interlayer carbonate, such as the hydrotalcite and manasseite groups are notoriously difficult to study, being prone to variable interlayer population (due to their tendency to alter on keeping, and to ion-exchange), to preferred orientation effects, and a tendency to be intimately mixed with contaminants. The spectra given of the polymorphs manasseite and hydrotalcite are, as expected, closely related, but with differences, but those given of their iron analogues sjögrenite and pyroaurite are identical despite their different XRD patterns. A sampling mismatch is likely here, perhaps both minerals are present on one (or both) of the specimens sampled. The reviewer has run the spectra of a number of carefully sampled 'pyroaurites' over the years, some of which have been checked by XRD; these spectra vary considerably and the reviewer is still not certain what the 'correct' spectrum of pyroaurite looks like! The reviewer has no reliable sjögrenite and has to rely on the poor literature spectra.

In summary, this is an excellent and carefully compiled book, with few errors, filling a useful space in the vast gap in published spectra.

R. S. W. BRAITHWAITE

C. Klein and C. S. Hurlbut Jr. *Manual of Mineralogy* (after James D. Dana) 21st Edition, 1993. John Wiley and Sons Inc., 681 pp. £22.95 plexicover, £62.00 cloth.

In writing this review I feel much as I imagine a test pilot might when called to evaluate a new version of an aircraft with an established and good reputation. There is little doubt that it handles well; the crucial question is how it compares with earlier marks of the type. There is hardly need to comment on the credentials of this book. James D. Dana's *Handbook of Mineralogy* first appeared in 1848 and, with his *System of Mineralogy*, became a firm favourite both with the student and the professional mineralogist. If authoritative information were needed, one could turn with confidence to 'Dana'.

The crucial question for the reviewer is how this 21st edition differs from and compares with the 20th edition published in 1985. The format and general arrangement of the book remain as before. The first nine chapters deal with the concepts, principles, and techniques of mineralogy and they are followed by three long chapters devoted to systematic and descriptive mineralogy. Chapter 14 deals with mineral assemblages and serves as an introduction to petrology, and the book concludes, as did the 20th edition, with a chapter on common gemstones. The new edition is nearly 100 pages longer than its predecessor; it contains much that is new and parts have been rewritten and rearranged.

The authors state in their Preface that they "..... have again striven to achieve a balance between concepts and principles on the one hand and the more systematic and descriptive treatment of mineralogy on the other". They have been most successful.

The first two chapters cover the history of mineralogy, literature sources, instrumentation, and the morphology of crystals. They are essentially similar to those of the earlier edition, though they have been updated and several new illustrations are included, reminding one that the appearance of scientific instruments seems now to date almost as rapidly as that of the motor car. The 32 classes of symmetry receive systematic treatment and the techniques for the stereographic projection of crystals are explained. I am pleased that this has been retained, for it is becoming a