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***Stable Isotope Geochemistry*,** 5th Revised and Updated Edition, by Jochen Hoefs, 2004; Springer-Verlag, Tiergartenstrasse 17, 69121 Heidelberg, Germany; 244 pages, 78 figures, hardcover; EUR 59.95, US$ 79.95, £ 46.00, Sfr 106.00. ISBN 3-540-40227-6.

The application of stable isotopes in geothermometry, as tracers for sources and reaction mechanisms, has now become an indispensable tool for studies of all parts of the Earth system. Particularly with the advances of analytical technology, it has been possible to solve previously unapproachable problems in geochemistry, cosmochemistry, petrology, oceanography and paleoclimatology, as well as related fields in archeology, anthropology, ecology, and the biological sciences.

The fifth edition of *Stable Isotope Geochemistry* is, like its predecessors, an introduction to the use of stable isotopes in the earth sciences. The book consists of three parts.

The first part introduces the theoretical and experimental principles including the characteristics of isotopes, isotope effects, fractionation processes, the basic principles of mass spectrometers, standards, sample-preparation methods, new micro-analytical techniques, and stable isotope variations of heavier elements. One of the main applications of isotope geochemistry, i.e. geothermometry, is addressed in the chapter on fractionation processes.

The second part introduces isotope fractionation mechanisms of the elements H, Li, B, C, N. O, Mg, Si, S, Cl, Ca, Cr, Fe, Cu, Zn, Se, Mo and Tl. The more frequently used light elements (H, O, C, S and N) are thoroughly addressed. The other light elements and the heavy elements are also dealt with because of their potential applications.

Part three introduces variations of stable-isotope ratios in nature, which include isotopic compositions of extraterrestrial materials, upper mantle and magmatic rocks, sedimentary and metamorphic rocks, as well as volatiles in magmatic systems, ore deposits and hydrothermal systems. Also covered in detail are stable-isotope variations of elements in the atmosphere, biosphere and hydrosphere, in particular, the ocean during geological history, dissolved and particulate compounds in the ocean and in freshwater. Chapter 3.12, entitled 'Paleoclimatology' is newly included, and addresses the isotopic reconstruction of the climatic conditions in the geological past using various marine and continental records.

Since the book was first published, in 1973, it has been revised and updated in 1980, 1987 and 1997. The 2004 edition contains 78 figures and 18 tables; they are valuable, complement the text, and facilitate understanding. The 43 pages of references serve as an excellent resource for the entire area of stable-isotope geochemistry. Key terms are listed at the end of the book, which enables readers to access the contents quickly. The new addition of the paleoclimatology chapter and the emphasis on the field of 'heavy' elements are particularly useful to gain an overview of fastly developing areas of research. Inevitably, a book attempting to cover all of the developing subdisciplines has some omissions. One important topic that is under-represented among the new fields of environmental science that rely heavily on isotope geochemistry is marine cold-seep carbonates. This topic is touched upon in chapter 2.4.4, (Interactions Between the Carbonate-carbon Reservoir and Organic Carbon Reservoir), but it appears to be incomplete and not up-to-date. The precipitation of cold-seep carbonates is driven by the anaerobic oxidation of methane and characterized by strongly depleted $\delta^{13}C$ (-30~-60‰ PDB). These carbonates first gained importance in the 1980's but now have been found at cold-vent sites on continental margins worldwide. Moreover, the highly significant mechanism of their formation through a consortium of bacteria and archeae has now been unraveled and thereby opens up a large field of light stable-isotope

applications. Cold-seep carbonates are an important carbon reservoir; it would be beneficial if this category were elaborated on in Chapter 2.4.4 and illustrated in Figure 21.

The book is of high quality and well printed; only very few typographical errors need to be corrected in future editions (Figure 68, p.169 and Figure 71, p. 175). It is a classical but state-of-the-art authoritative book, systematically structured, concisely written and full of much useful information. I highly recommend it to advanced undergraduate and graduate students and to researchers who wish to build an understanding of the basics of stable-isotope geochemistry and its broad potential for application in the earth sciences.

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