American Mineralogist, Volume 92, pages 1764–1767, 2007

LETTER

Hydrogen-carbonate ion in synthetic high-pressure apatite

MICHAEL E. FLEET* AND XI LIU

Department of Earth Sciences, University of Western Ontario, London, Ontario N6A 5B7, Canada

ABSTRACT

The hydrogen-carbonate ion [$(HCO_3)^-$] has been detected by Fourier transform infrared (FTIR) spectroscopy in the *c*-axis structural channel of Na-bearing type A-B carbonate apatite synthesized under conditions of high *P* (0.1–1 GPa), *T* (800–1350 °C), and $p(CO_2)$, and accounts for up to one-third of the total complement of channel carbonate. The hydrogen-carbonate ion is only loosely bound in the apatite channel, and breaks down on aging at room temperature. Volatile decomposition products are lost from the carbonate apatite structure, with CO_2 more mobile than H_2O. The mobility of small volatile molecules points to a possible role for the apatite channel in mediating acid-base reactions in restricted surficial environments and biological systems.

Keywords: Apatite, hydrogen-carbonate ion, high-pressure synthesis, FTIR spectra, CO_2 mobility, H_2O mobility