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The role of H_2O in Martian magmatic systems

Bjorn O. Mysen,[1,*] David Virgo,[1] Robert K. Popp,[2] and Constance M. Bertka[1]

[1]Geophysical Laboratory, Carnegie Institution of Washington, 5251 Broad Branch Road, NW, Washington, D.C. 20015, U.S.A.
[2]Department of Geology and Geophysics, Texas A & M University, College Station, Texas 77843, U.S.A.

Abstract

We have estimated the water content of Mars' interior by using analyzed water contents of kaersutite inclusions from shergottites nakhlites chassignites (SNC) meteorites in conjunction with an experimentally-derived crystal-chemical model of kaersutite amphibole. This model predicts quantitatively the relationships between iron oxidation and hydrogen deficiency in the kaersutite. The H_2O content of the magma from which the kaersutites in SNC meteorites could have crystallized is in the 100–1000 ppm range. That H_2O content leads to an estimated water content of 1–35 ppm for a Martian mantle that could have been the source rock for such magmas.