

Survey of volatiles in apatite from planetary materials

F. M. MCCUBBIN^{1,2}, R. H. JONES² AND C. K. SHEARER^{1,2}

¹Institute for Meteoritics, Department of Earth and Planetary Sciences, University of New Mexico, NM 87131, USA (*fmccubbi@unm.edu)

²Department of Earth and Planetary Sciences, University of New Mexico, NM 87131, USA

Introduction: The mineral apatite $[\text{Ca}_5(\text{PO}_4)_3(\text{F},\text{Cl},\text{OH})]$ is a common phosphate phase found in a wide variety of planetary materials. The crystallographic site that typically hosts fluorine, chlorine, and hydroxyl is referred to herein as the X-site, and the primary goal of the present study is to compare the occupancy of this site among a number of planetary materials from both differentiated and undifferentiated bodies using electron probe microanalysis [1].

Results: Apatites from unaltered basalts in most differentiated bodies have limited Cl abundances and variable F-OH, whereas apatites in undifferentiated meteorites are Cl-rich (Figure 1). Apatites from Mars do not fit this trend indicating they are either from altered basalts or Mars is geochemically distinct from the other differentiated bodies examined (Figure 1).

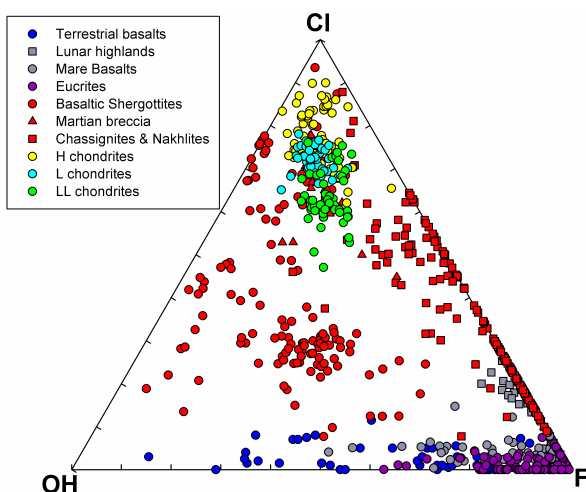


Figure 1. Ternary plot of Apatite X-site occupancy. Data from present study and from [2-4].

[1] McCubbin *et al* (2010) *Am. Min.* **95**, 1141-1150 [2] McCubbin *et al* (2012) *Geology* **40**, 683-686 [3] McCubbin *et al* (2013) *Met. Planet. Sci.* **48**, 819-853 [4] Piccoli and Candela, (2002) *RMG* **48**, 255-292