The storage capacity of Fluorine in olivine and pyroxene

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Volatile elements are known to strongly affect melting and crystallization processes in the Earth's mantle. There are numerous studies of the storage potential of water in mantle minerals but there is only scant data on storage potential of other volatile elements such as halogens or nitrogen in mantle minerals [1-3]. Here we present new experimental data on F-concentrations of olivine and pyroxene which were saturated with respect to Fluorine.

Experiments were performed at temperatures between 1300°C and 1570°C in gas-mixing furnaces at atmospheric pressure, in a piston-cylinder apparatus at pressures from 0.5-2 GPa and in a Walker-type multi anvil press at pressures up to 17 GPa. The F concentrations in olivine and pyroxene were determined by electron microprobe analysis using a multi-layer diffraction crystal, a beam current of 100nA and a voltage of 15kV. Further investigations are planned by secondary ion mass spectrometry (SIMS).

Our results indicate that olivine, related polymorphs and pyroxene can contain large amounts of F compared to OH [4]. Effects of pressure and temperature seem to be only moderate.

[1] Beyer *et al* 2012, *Earth Planet. Sci. Lett*. **337-338**, 1-9. [2] Dalou *et al* 2012, *Contrib to Mineral and Petrol*, **163**, 591-609. [3] Fabrizio *et al* 2013, *Contrib. Mineral. Petrol*. **166**, 639-653. [4] Bromiley D.W., Kohn S.C., 2007, Goldschmidt Conference abstracts.