

PPS022-P03

Room:Convention Hall

Time:May 26 14:00-16:30

Compositional variations of hydrothermal synthesized phyllosilicates -comparison with phyllosilicates in carbonaceous ch

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A variety of phyllosilicates exists in carbonaceous chondrites. These phyllosilicates may be formed by hydrous alteration of precursor materials including olivine and/or pyroxene. Many factors, such as temperature or oxidation-reduction condition, have an effect on occurrence of phyllosilicate mineral species and their compositions. An oxidation-reduction condition particularly has strong effect on iron partitioning in Fe metal, iron oxides and iron sulfides. Therefore, Fe content in phyllosilicates is a good indicator for the oxidation-reduction condition of the hydrous alteration.

Ozaki and Isobe (2009) carried out phyllosilicate synthesis experiments from olivine with solar abundance composition and enstatite or fayalite. Assemblage of the olivine and enstatite, or the olivine and fayalite were used to introduce initial variety of Mg/Fe compositions of phyllosilicate in the run products. Oxidation-reduction states were controlled by using ethanol solutions with different concentrations. Each starting material had been heated at various temperatures and durations.

In this study, run products made by Ozaki (2009MS) were observed with the scanning electron microscope (SEM) in detail. And the compositions of the synthesized phyllosilicates were analyzed with EDS. Finally, the compositions of synthesized phyllosilicates were compared with those in carbonaceous chondrites.

By SEM observations, phyllosilicates were found in run products of various experimental conditions. Phyllosilicates show diverse morphologies including fibrous, massive, and spongy. Compositions of the phyllosilicates in run products from the starting material with olivine and fayalite in short durations show Fe-rich phyllosilicates. Phyllosilicates produced with thick ethanol concentrations tend to homogenize compositions. And phyllosilicates synthesized at high temperature show Mg and Si-rich compositions. Long heating durations make compositions away from those of carbonaceous chondrites' phyllosilicates. Phyllosilicates in carbonaceous chondrites might be formed at temperature lower than 250 degrees C, and in short heating durations.

Keywords: Hydrous alteration, parent body, hydrous phyllosilicate, hydrothermal experiment