

In-situ spectroscopic observation of transformation of monohydrocalcite in aqueous solutions

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Monohydrocalcite ($\text{CaCO}_3 \cdot \text{H}_2\text{O}$; MHC) is metastable phase of calcium carbonates. Synthesized MHC in laboratory transforms to calcite or aragonite within several hours or days. On the other hand, MHC was found in the deep sediments formed several hundreds of thousand years ago in the Lake Hovsgol. In order to elucidate the reason of different transformation rate, it is necessary to understand the transformation behavior of MHC quantitatively.

Munemoto and Fukushi (2008) examined the mechanism and rate of the transformation of MHC. They conducted batch aging experiments of the suspension of MHC at several temperature. After the some reaction intervals, the solid phases were separated from the solution. The solid phases were dried and served from mineralogical examination by using X-ray diffraction. However, there are two limitations for their experiments. Firstly, the time interval of the solid phase collections was 120 minutes at 25 °C. Therefore, the time resolution is not enough. Secondly, the possible artifacts arising from the drying processes was inevitable.

Attenuated total reflectance infrared spectroscopy (ATR-IR) enables to the in-situ time resolved observation of the transformation of MHC in aqueous solution. The present study aims to develop the observation system and to clarify the transformation behavior of MHC by using the observation system.

Keywords: monohydrocalcite, in-situ spectroscopic observation