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# Thermal decomposition, gas phase hydration and liquid phase reconstruction in the system Mg/Al hydrotalcite/mixed oxide: A comparative study

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### ABSTRACT

The thermal decomposition of a synthetic Mg/Al hydrotalcite and the subsequent hydration of the calcined products in the presence of water vapor at 30 °C were studied by in situ XRD. A comparative study between the gas phase hydration and reconstruction of calcined hydrotalcite in Na<sub>2</sub>CO<sub>3</sub> solution at 25 and 70 °C was investigated. TG coupled to a mass spectrometer was used to study the thermal behaviour of synthetic hydrotalcite. SEM images were taken to show the layering and size of crystals. Thermal decomposition of hydrotalcite led to the formation of a dehydrated intermediate phase at 200 °C, followed by crystalline MgO formation at 450 °C. Hydration of calcined hydrotalcite in H<sub>2</sub>O/N<sub>2</sub> resulted in the formation of broad patterns of the meixnerite phase after 2 h. This phase retained its structure even after 52 h exposure to water vapor. Reconstruction of the calcined products in carbonated water at 25 and 70 °C resulted in intensified patterns of the hydrotalcite phase. Due to the different structural and compositional properties of the layered products obtained by different chemical reactions of the mixed oxide phase a clarification of nomenclature for all phase transforming steps is proposed.