
Structural Characterisation of Kaolinite:NaCl Intercalate and its Derivatives

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Abstract: Kaolinite:NaCl intercalates with basal layer dimensions of 0.95 and 1.25 nm have been prepared by direct reaction of saturated aqueous NaCl solution with well-crystallized source clay KGa-1. The intercalates and their thermal decomposition products have been studied by XRD, solid-state ²³Na, ²⁷Al, and ²⁹Si MAS NMR, and FTIR. Intercalate yield is enhanced by dry grinding of kaolinite with NaCl prior to intercalation. The layered structure survives dehydroxylation of the kaolinite at 500° – 600° C and persists to above 800° C with a resultant tetrahedral aluminosilicate framework. Excess NaCl can be readily removed by rinsing with water, producing an XRD 'amorphous' material. Upon heating at 900° C this material converts to a well-crystallized framework aluminosilicate closely related to low-camegieite, NaAlSiO₄, some 350° C below its stability field. Reaction mechanisms are discussed and structural models proposed for each of these novel materials.

Key Words: FTIR • Intercalate • Kaolinite • NaCl • NMR • Structure • Synthesis • XRD

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