
Influence of Synthesis pH on Kaolinite “ Crystallinity” and Surface Properties

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Abstract: Hydrothermal syntheses were performed at various pH values and temperatures to induce variability in kaolinite defect density. Temperature of synthesis ranged from 200 to 240° C, for 21 d. Initial pH at room temperature ranged from 0.5 to 14. The starting material was a hydrothermally treated gel, with an atomic Si/Al ratio of 0.93, partly transformed into kaolinite.

Kaolinite was obtained for a wide range of pH. Although no influence of temperature on “ crystallinity” (*i.e.*, defect density) was observed, the effect of pH was important. A continuous series was obtained from a low-defect kaolinite, with high thermal stability and a hexagonal morphology for the most acidic final pH, to a high-defect kaolinite, with low thermal stability and lath shape for the most basic final pH. These variations of kaolinite properties appear related to the pH dependence of kaolinite surface speciation. Increasing pH value results in increased cation adsorption on the kaolinite external surfaces and increases in the elongation of particles.

Key Words: Defect Density • FTIR • Hydrothermal Synthesis • Kaolinite • pH • Surface Speciation • XRD

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