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# Effects of Acidity on the Hydrothermal Synthesis of Kaolinite from Silica-Gel and Gibbsite

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**Abstract:** A comparative study is reported in which kaolinite has been hydrothermally synthesized at several pH conditions. The syntheses were carried out at 220 ° C for 3 to 10 d with distilled water or acidic solutions using a mixture of silica-gel derived from alkoxide and gibbsite with a Si/Al ratio of 1:1 as the starting material. Use of acidic solution for the synthesis promotes the dissolution of the starting materials and leads to kaolinitization at an earlier stage of the reaction. However, the rate of kaolinitization is found to be rather slow, in comparison to the reaction with distilled water. The synthetic kaolinite was characterized by X-ray powder diffraction pattern. Kaolinite synthesized with distilled water was poorly grown for direction of the stacking. For example, crystallite size along the  $c^*$ -axis = 155 Å, whereas kaolinite synthesized with acidic solution gave a higher crystallite size along the  $c^*$ -axis, such as 253 Å in the case of the synthesis with 0.1 N HCl. Hinckley index of the synthetic kaolinite was varied from 0.35 to 0.80 by the acidity of the reaction. Different kaolinitization processes are implied by differences observed in the rate of kaolinitization, which has an influence on the nature of the stacking faults of the kaolinite.

**Key Words:** Crystallite size • Crystallization • Hydrothermal synthesis • Kaolinite • pH • Stacking fault

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