
Formation of Phyllosilicates and Zeolites from Pure Silica-Alumina Gels

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Abstract: The hydrothermal aging of pure silica—alumina gels in presence of 10 ml of 0.1 N sodium hydroxide solution at 175, 150 and 130° C for 8– 30 days led to the synthesis of zeolites and the phyllosilicates, beidellite and kaolinite. The solution was neutralized by a partial hydrolysis of the gel which readily reorganized into a prezeolitic material. At pH values ≥ 9 , with 300 or 600 mg of gel, it evolved towards the crystalline zeolites *P* and *S*, with low surface area (7– 100 m²/g) but high exchange capacity (300– 475 m-equiv./100 g). With gel amounts of 600– 2400 mg, and pH values of 8– 5.5, the prezeolitic material provided rows of O—Si—O—Al—OH which recombined to form the phyllosilicate structures. Surface area increased (170– 325 m²/g) but exchange capacity decreased (100– 250m-equiv./100 g). The results obtained by various techniques (XRD, DTA, IR) indicated a moderate degree of crystallinity of these phyllosilicates; in addition, X-ray powder diffraction suggested that *hk* bands were the first to develop.

The positive results obtained with a 0.40 ratio Al₂O₃ gel compared with the negative results obtained with 0.30 or 0.50 Al₂O₃ gels indicate that the gel composition is very important for the formation of phyllosilicates under the experimental conditions.

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