

Phase selection controlled by sodium ions in the synthesis of FAU/LTA composite zeolite

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Abstract. Zeolite faujasite (FAU), Linde type A (LTA) and FAU/LTA composite have been synthesized using tetramethylammonium cation (TMA⁺) as template, by adjusting only the concentration of Na⁺ ions in the initial solution (1.00 Al₂O₃ 4.36 SiO₂ : 2.39 (TMA)₂O : β Na₂O : 249.00H₂O). Na⁺ ions alter the phase composition of the product more than TMA⁺ or OH⁻ ions. When Na₂O concentration [Na₂O] increases from 0.024 to 0.168, the product gradually changes from pure FAU to pure LTA via the formation of FAU/LTA composite with increasing LTA fraction. Interestingly, the induction periods of FAU and LTA in the FAU/LTA composite zeolite ([Na₂O] is 0.072) are both 13 h, quite different from the induction periods of their individual pure phases—45 h for FAU and 4 h for LTA. During the crystallization, the LTA/(FAU + LTA) fraction in the composite zeolite decreases in a nearly linear fashion. Scanning electron microscopy, thermogravimetry and differential thermal analysis indicate some difference between the properties of the FAU/LTA composite zeolite and of the mechanical mixture.

Keywords: FAU, LTA, Composite zeolite, crystallization, sodium concentration

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