



Effects of Synthetic Conditions on Structure of Nanocrystal Zeolite Y From Vietnamese Kaolin

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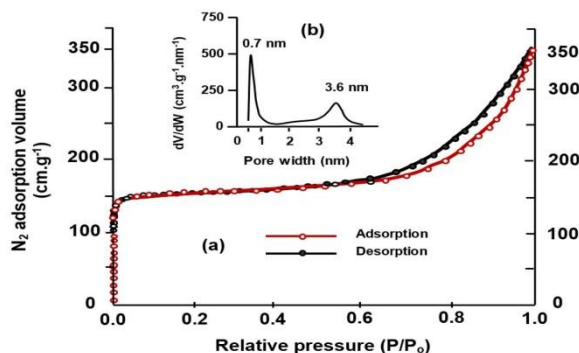
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ABSTRACT

In this paper, synthetic parameters affecting the crystal size, bulk density and structure of nanocrystals zeolite NaY from Vietnamese kaolin at ambient pressure such as feedstock pretreatment, the $\text{Na}_2\text{O}/\text{Al}_2\text{O}_3$, $\text{SiO}_2/\text{Al}_2\text{O}_3$, $\text{H}_2\text{O}/\text{Al}_2\text{O}_3$, $\text{EDTA}/\text{Al}_2\text{O}_3$ and $\text{NaCl}/\text{Al}_2\text{O}_3$ ratios were investigated. Characterizations including XRD, TEM, FT-IR, TPD- NH_3 showed that the water molar ratio strongly affected to the crystal size of the zeolite Y. Decrease of water content in the gel sharply reduced the crystal size of zeolite Y. The $\text{Na}_2\text{O}/\text{Al}_2\text{O}_3$ also had strong effect on the crystal size of nano zeolite Y. The too low value of the $\text{Na}_2\text{O}/\text{Al}_2\text{O}_3$ molar ratio was not a favourable environment for the dissolution of precursors and the creation of SBU in the crystallization. In contrast when the ratio of $\text{Na}_2\text{O}/\text{Al}_2\text{O}_3$ was too high, the generated nanosized crystals were partially dissolved. The optimum $\text{Na}_2\text{O}/\text{Al}_2\text{O}_3$ ratio was 3.5 to obtain the smallest crystal size of 20nm. EDTA and NaCl could also be used to control crystal size. Results from ^{27}Al -NMR and bulk density confirmed that synthetic parameters had strong effects on the crystal size and bulk density. However among other synthetic parameters, just $\text{SiO}_2/\text{Al}_2\text{O}_3$, $\text{Na}_2\text{O}/\text{Al}_2\text{O}_3$ and $\text{NaCl}/\text{Al}_2\text{O}_3$ molar ratios had strong effect on the nature of aluminum sites in the as-synthesized materials. Optimum synthetic parameters would generate most tetrahedral aluminium sites which were expected structure of good catalysts.

Graphical Abstract:



Keywords: Zeolite, Nano crystals, Crystallinity, Crystal size, Kaolin.