

Synthesis and Characterization of Nano-Sized ZSM-5 Zeolite

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ABSTRACT

The nano-sized ZSM-5 zeolite with high crystallinity and yield was synthesized. The zeolite exhibited better performance in light hydrocarbon aromatization reactions than conventional commercialized micro-sized zeolites. The purity and crystallinity percentage of the synthesized ZSM-5 catalysts have been characterized by X-ray powder diffraction (XRD) data. In the present study, Rietveld refinement with the generalized spherical harmonic description for correction of the preferred orientation in powder diffraction analysis for both crystal structure refinement and quantitative phase analysis [Sitepu et al. (2005). *J. Appl. Cryst.* **38**, 158-167; Sitepu (2009). *Powder Diffr.* **24**, 315-326] has been extended to describe crystal structure and texture in all the XRD data sets of the synthesized ZSM-5 powders. The results revealed that the structural refinement parameters obtained from the Rietveld refinement with the generalized spherical harmonic description agreed well with the corresponding single crystal structure. Additionally, the generalized spherical harmonic description provides better results for the materials investigated in the present study than that of the March model. Therefore, the generalized spherical harmonic approach should be used for preferred orientation correction in XRD Rietveld analysis, for both crystal structure refinement and phase composition analyses of ZSM-5 zeolite catalysts.