Knoevenagel Condensation over Nitrogen-Incorporated ITQ-2 Zeolite with Large External Surface Area

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The basic properties of nitrogen-incorporated ITQ-2 were investigated together with those of MCM-22 (framework type MWW), ZSM-5 (MFI), Y (FAU), and mesoporous aluminosilicate SBA-15. It was found that nitrogen incorporation on the crystallite surface of delaminated zeolite ITQ-2 is more favorable due to the presence of abundant terminal silanols which is more easily substituted by nitrogen. Nitrogen incorporated ITQ-2 exhibits outstanding catalytic activity in Knoevenagel condensation between various aldehydes and ethyl cyanoacetate, regardless of reacting molecular size. This suggests that the catalytic reactions on the external surface of zeolites are more active than that on the internal surface due to the absence of spatial constraints and diffusion limitation.