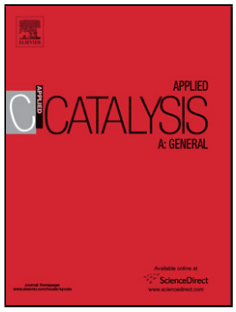

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Synthesis of isosorbide from sorbitol in water over high-silica aluminosilicate zeolites

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Abstract:

Dehydration of sorbitol to isosorbide in water was studied using various types of aluminosilicate zeolites as heterogeneous catalyst. Among the zeolite catalysts tested, the ***BEA**-type aluminosilicate zeolite (beta) showed a remarkably high catalytic performance; especially, beta zeolite with the Si/Al ratio of 75, designated as beta(75), gave an isosorbide yield as high as 80%. We have found that the three-dimensional large pore structure is favorable for enhancing the diffusion of sorbitol and the products. In addition, beta with a low Al content exhibited a higher catalytic activity than that with a high Al content, despite the small number of acid sites. The reason for this high catalytic activity is ascribed to hydrophobicity of the catalyst surface. Hydrothermal stability is another critical factor in determining the catalytic performance. The influence of reaction parameters such as temperature and the catalyst amount was investigated. The beta(75) proved to be reusable without loss of activity after calcination at 550 ºC.

KEYWORDS: Dehydration, Hydrophobicity, Isosorbide, Sorbitol, Zeolites