

Synthesis and Characterization of MFI Zeolites Containing Iron and its Application in MTO Reaction

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The methanol-to-olefin (MTO) reaction has been extensively studied because of the price fluctuations of lower olefin products obtained from alternative carbon sources, instead of pyrolysis of naphtha. In the MTO reaction, the distribution of the product and catalyst deactivation can be affected by the structure, particle size and acidity of the zeolite. In particular, the deactivation of the MTO reaction is due to the formation of coke in the pores and channels by the active acid sites of the zeolite. This critical coke deposition can be suppressed by removing strong acid sites. We have shown that iron atoms are incorporated into the framework of MFI zeolites to obtain weak acidity than aluminosilicate MFI zeolites. MFI zeolites with controlled Si/Fe ratios have been synthesized using tetrapropylammonium bromide (TPABr) as the structure directing agent. The physicochemical properties of the catalysts were investigated by XRD, N₂ adsorption, SEM, EDX, XPS and NH₃-TPD analysis. The catalytic activity of MTO reaction was probed under the condition of 673 K with 1.2 h⁻¹ WHSV.