

Effect of the acid strength of MFI zeolites on propylene selectivity in methanol-to-propylene

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Three MFI zeolites (i.e., H-[Al]-ZSM-5, H-[Fe]-ZSM-5 and H-[Al, Fe]-ZSM-5) with the same acidity and the different acid strength were prepared by hydrothermal synthesis and their physicochemical properties were characterized with TPD, N₂ adsorption, XRD, SEM and XANES. Due to the difference in the electron-acceptor properties between Al³⁺ and Fe³⁺, the acid strength decreased with the incorporation of Fe³⁺ into the framework. The acid strength of the catalysts followed the sequence of H-[Fe]-ZSM-5 < H-[Al, Fe]-ZSM-5 < H-[Al]-ZSM-5. The reaction was carried out in a fixed bed reactor at different reaction temperature with various space velocities. The effect of acid strength on the propylene selectivity in MTP was compared in three different MFI zeolites.