

A comparative study of methanol to propylene over ZSM-5 and Fe-substituted ZSM-5 catalysts

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ZSM-5 and Fe-substituted ZSM-5(Fe-ZSM-5) were synthesized, characterized, and employed as catalysts for the methanol-to-propylene(MTP) reaction. Structural and physical properties of catalysts were characterized by XRD, SEM, and BET. The acidic properties of both catalysts were measured by temperature programmed desorption of ammonia(NH₃-TPD). The reaction was carried out in a fixed bed reactor at atmospheric pressure with different reaction temperature. The NH₃-TPD results showed that the acidities of Fe-ZSM-5 catalysts were weaker than those of ZSM-5 catalysts. The methanol conversion for the Fe-ZSM-5 catalysts was slightly lower than those for the ZSM-5 catalyst. However, propylene (light olefins) selectivities for the Fe-ZSM-5 catalysts were much higher than those for the ZSM-5 catalyst at low reaction temperature. This result was in agreement with the weak acidity of Fe-substituted ZSM-5 catalyst resulting from the presence of iron in contrast to aluminum in zeolite framework.