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Effect of ZSM-5 seeds in the synthesis of SAPO-34 catalyst in methanol to light olefins

Ahmad Jafari Zangelanlo,[a] Jafar Towfighi Darian[a*] and Marzieh Hamidzadeh[b]

[a]Department of Chemical Engineering, Faculty of Chemical EngineeringTarbiat Modares University , Tehran, Iran

[b]Petrochemical Company, Petrochemical Research and Technology Company, Tehran, Iran

[*] E-mail:Towfighi@modares.ac.ir

SAPO-34/ZSM-5 catalyst has been synthesized by using different amounts of processed ZSM-5 seeds at 100°C in order to control the selectivity of light olefins and increase the lifetime. The catalytic properties and performance of SAPO-34/ZSM-5 were different compared to conventional SAPO-34. The synthesized samples were characterized using XRD, FESEM, FTIR, BET, and NH3TPD. The effect of seed amount did not follow the same trend in the entire tested range. The XRD results showed that with the addition of seed, the crystallinity and size of the crystallites increased, at the same time, an increase in the particle size was observed in the FESEM images. The SAPO-34/ZSM-5 catalyst with 6.25wt% seeds, which has the smallest crystallite size in catalysts with seeds, showed the highest stability (700 min) and selectivity to light olefins (89.84%) compared to other samples; Also, according to the results obtained from NH3TPD analysis in this sample, the strength of strong acid sites and the amount of total acidity is less than other samples, which has reduced the formation of coke and longer lifetime of this sample.

Keywords: Methanol to light olefin, ZSM-5 seeds, SAPO-34, SAPO34/ZSM-5

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