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Investigating the effect of crystallization temperature in the synthesis of SAPO-34 catalyst in the process of converting methanol to light olefins.

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The reaction of methanol to light olefins is a non-petroleum process to produce light olefins[1]. In hydrothermal synthesis, investigating the effect of temperature is of significant importance[2]. In this study, the crystallization temperature was investigated in the synthesis of the SAPO-34 catalyst. For this purpose, by changing the crystallization temperature with a molar ratio of $1Al_2O_3$:P_2O_5:1TEAOH:1MOR:$70H_2O$, 4 samples were synthesized in 27 hours. To accurately check the characteristics of the synthesized catalysts, XRD, BET, FESEM, and NH_3-TPD analyses were used. In the end, the performance of the synthesized catalysts in the MTO process at 425℃ and WHSV=2.8 h^{-1} temperature was checked. The results showed that the crystallization temperature affects the specific surface area, morphology, particle size, and acidic properties of the SAPO-34 catalyst. The sample prepared at a temperature of 175℃ with the highest crystallinity, small particle size, high specific surface area, and suitable acidity had the highest selectivity of 82% with a lifetime of 280 minutes in the MTO process.

Keywords: conversion of methanol to olefin, catalyst, SAPO-34, crystallization temperature

References

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