ENHANCED CATALYTIC PERFORMANCE OF Ni/SBA-15 TOWARDS CO_2 METHANATION VIA P123-ASSISTED METHOD

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Abstract

This study focused on the enhancement of catalytic performance of Ni/SBA-15 towards CO_2 methanation via P123(PEG-PPG-PEG triblock copolymer)-assisted impregnation method. The pysical and chemical properties of the catalysts were characterized using XRD, BET and FTIR, meanwhile the catalytic performance of catalysts towards CO_2 methanation were evaluated using stainless steel fixed bed reactor. The presence of coke on the surface of catalysts was characterized using TGA analysis. XRD and BET results revealed that the dispersion of Ni particles on the surface of SBA-15 were improved with P123 (Ni/SBA-15(P123)) as compared to without P123 (Ni/SBA-15). FTIR analysis revealed that P123 enhanced the formation of metal-support interaction (Si-O-Ni) through the substitution of O–H with O–Ni. Ni/SBA-15(P123) exhibited higher activity, better stability and less carbon formation owing to its smaller metal particles, stronger metal-support interaction and more homogenous metal dispersion, which altered the properties of catalyst towards an excellent catalytic performance. This study provides new perspective on the beneficial effect of P123-assisted impregnation method in the enhancement of catalytic performance of Ni/SBA-15 towards CO_2 methanation.

Keywords: Ni/SBA-15; CO_2 methanation; P123; Ni dispersion

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