

Structural effect of Ni/SBA-15 by Zr promoter for H₂ production via methane dry reforming

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ABSTRACT

5 wt% of Ni/SBA-15 supported with numerous Zr loading (1e7 wt%) were produced using sol-gel technique at 60 °C. The influence of Zr promoter on the physiochemical properties of Ni/SBA-15 catalysts for methane dry reforming were examined in a fixed-bed reactor at 800 °C. Analytical characterizations including XRD, BET, FTIR, N₂ adsorption desorption, TEM and TGA were conducted to study the physiochemical properties of Zr/Ni/SBA-15 catalysts for the sake of identification of the amount of coke deposition formed on the spent catalyst. Increasing the amount of Zr loading from 1 to 7 wt% supported on Ni/SBA-15 reduced the catalyst's surface area as was proven from the physiochemical properties of Zr/Ni/SBA-15 catalyst. The catalytic activity test revealed that the optimum Zr loading was 1 wt% at which CH₄ and CO₂ conversions were 87.07% and 4.01%, meanwhile H₂:CO ratios was 0.42. This result was owing to the existence of the Zr species in promoting a good dispersion of Nickel (Ni) active sites on the catalyst surface as affirmed from XRD and FTIR results. The latest discovery indicates that promotion of 1 wt% Zr onto Ni/SBA-15 can prompt excellent catalytic performance in CRM.

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KEYWORDS: One pot synthesis, Zirconia, Promoter, Ni/SBA-15, DRM

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