

Combined reforming of methane over Ni-based catalyst to produce synthesis gas

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The present study was conducted to figure out the resistance of carbon deposit by adding Zr and Mg over Ni/ γ -Al₂O₃ catalyst in steam-CO₂ reforming of methane (CSCRM) to produce synthesis gas(H₂/CO = 2) for gas to liquid(GTL). The catalytic reaction was conducted at 900 °C, 20 bar with feed ratio of CH₄ : CO₂ : H₂O : Ar = 1 : 0.8 : 1.3 : 1 and GHSV = 2500 h⁻¹. The synthesized catalysts were characterized by N₂ Adsorption Desorption, X-Ray Diffraction (XRD), H₂-Temperature Programmed Reduction (TPR), CO₂-Temperature Programmed Desorption (TPD), Thermogravimetric Analysis (TGA) and Field Emission Scanning Electron Microscope (FE-SEM). Zr and Mg modified Ni/ γ -Al₂O₃ catalysts suppressed the carbon deposition also improved the catalytic activity. it was found that the addition of Zr and Mg could reduce Ni particle size and form strong metal support interaction with γ -Al₂O₃ support. Owing to the enhanced basicity on Mg modified catalyst, Ni(12)-Zr(5)-Mg(5)/ γ -Al₂O₃ exhibited improved coke resistance by coke gasification with CO₂.