

Production of high calorific synthetic natural gas using cobalt supported-catalysts

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Synthetic natural gas (SNG) from coal gasification is an environmentally friendly energy source. However, its heating value is lower than the standard heating value for power generation (especially in South Korea and Japan). This problem could be solved by adding C₂-C₄ hydrocarbons through Fischer-Tropsch reaction. In this study, Catalytic performance and characterization were investigated to elucidate effect of metal support interaction between cobalt and support (Al₂O₃ and SiO₂). The TPR profile of the Co/SiO₂ showed the lower reduction temperature than that of the Co/Al₂O₃. The XRD peaks of Co/SiO₂ showed Co metal peak from Co₃O₄ after reduction at 400 °C, while Co/Al₂O₃ did not indicate Co metal peak but CoO peak. The Co/SiO₂ exhibited higher CO conversion compared to Co/Al₂O₃ under H₂/CO = 3.1, 10 bar and 300 °C, because of better reducibility of cobalt in Co/SiO₂. In addition, its heating value is similar to that of noble metal catalyst in previous literature. Therefore, Co/SiO₂ could be the promising catalyst for the production of high calorific SNG.