Effect of Mg/Al Ratio in Ni/MgO-Al_2O_3 on Combined Reforming of Methane

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The control of adequate H_2/CO ratios in synthesis gas has been a key issue for application of oxo-synthesis and Fischer-Tropsch process by means of combined steam and carbon dioxide reforming of methane. In this study, H_2/ CO ratio of 2 was achieved in combined reforming of methane over Ni/ MgO-Al_2O_3. Ni catalysts supported on hydrotalcite-like MgO-Al_2O_3 have been used as promising catalysts because hydrotalcite-like MgO-Al_2O_3 have some advantages such as thermal stability, large surface area and well dispersion of metal catalyst (Ni). In this study, catalysts were prepared by an incipient wetness method and the Mg/Al ratio was varied from 0.5 to 3.5 in MgO-Al_2O_3 mixed oxide. The effect of Mg/Al ratio over Ni/MgO-Al_2O_3 catalysts pre-calcined at various temperatures from 800°C to 1200°C was investigated with respect to their characteristics and catalytic activity. The reaction was performed with the ratio of (H_2O+ CO_2)/CH_4 of 1.2 from 750°C to 650°C to observe the effect of reforming temperature. It was concluded that Ni/MgO-Al_2O_3 catalyst with the Mg/Al ratio of 0.5 exhibited good catalytic activity and stability due to low coke formation and sintering.