

Abstract

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Project Title : Effect of $\text{La}_2\text{O}_3\text{-ZrO}_2$ Mixed Oxide Supports on Characteristics and Catalytic Activity of Cobalt Catalyst for CO Hydrogenation

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The effect of lanthana-modified zirconia support (10 mol% La), prepared by three different methods i.e. co-precipitation, impregnation and mechanically mixing, on cobalt catalyst characteristics and catalytic activity for CO hydrogenation (CO:H₂ at 1:9) was investigated at atmospheric pressure. Although the lanthana-modified zirconia supported cobalt catalysts possessed surface areas on the narrow range of 40-50 m²/g, the CO adsorption results revealed the highest active metal dispersion over lanthana-modified zirconia supported cobalt catalyst derived from mechanically mixing method (26.47 × 10¹⁸ molecules/ g catalyst) compared to the cobalt particles/clusters on La-modified supports derived from other ways. This could be ascribed by the lowest reduction temperature (maximum at 330°C) and highest reducibility (45%) arising from significant interaction of the support and cobalt lanthanum compound particles/clusters. The catalytic activities of all catalysts were correspondence to the CO chemisorption results. However, the most active catalyst was deactivated within 6-h CO hydrogenation testing.

Keywords: ZrO_2 , La_2O_3 , mixed oxide support, cobalt catalyst, CO hydrogenation