

Synthesis gas production by partial oxidation of methane over La promoted Ni/CeO₂ catalysts

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The process to produce synthesis gas from natural gas is the largest hydrogen production source. Furthermore, synthesis gas is widely used in various important processes to produce various important chemical products. Nowadays, synthesis gas is commercially produced by the steam reforming of natural gas. However, the process is endothermic so that the process is very energy intensive one. This study was conducted to produce synthesis gas by the partial oxidation of methane, which is slightly exothermic process and can save energy cost. Catalysts were prepared using Ni as an active component and using CeO₂ as a support. In this reaction system, carbon deposition is known as a drawback, so we introduced La as a promoter to reduce the carbon deposition. The catalysts were prepared by the impregnation method and the urea method. The catalysts prepared by the urea method showed higher surface areas and finer particle sizes than those prepared by the impregnation method. Conversion and selectivity were examined with changing Ni contents. It was found that with the introduction of La as a promoter the amount of carbon deposition was decreased. The role of the promoter was elucidated with XRD, TPD, BET, and XPS analyses.