

Effect of Catalyst Preparation Method on Dry Reforming of Methane with Supported and Promoted Catalysts

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Abstract : Dry (CO₂) reforming of methane (DRM) is both scientific and industrial importance. In recent decades, CO₂ utilization has become increasingly important in view of the escalating global warming phenomenon. This reaction produces syngas that can be used to produce a wide range of products, such as higher alkanes and oxygenates by means of Fischer-Tropsch synthesis. DRM is inevitably accompanied by deactivation due to carbon deposition. DRM is also a highly endothermic reaction and requires operating temperatures of 800-1000 °C to attain high equilibrium conversion of CH₄ and CO₂ to H₂ and CO and to minimize the thermodynamic driving force for carbon deposition. The catalysts used are often composed of transition Methods like Nickel, supported on metallic and non-metallic oxides such as alumina and silica. However, many of these catalysts undergo severe deactivation due to carbon deposition. Noble metals have also been studied and are typically found to be much more resistant to carbon deposition than Ni catalysts, but are generally uneconomical. Noble metals can also be used to promote the Ni catalysts in order to increase their resistance to deactivation. In order to design catalysts that minimize deactivation, it is necessary to understand the elementary steps involved in the activation and conversion of CH₄ and CO₂. CO₂ reforming methane over promoted catalyst was studied. The influence of ZrO₂, CeO₂ and the behavior of Ni-Al₂O₃ Catalyst, prepare by wet-impregnation and Co-precipitated method was studied. XRD, BET Analysis for different promoted and unprompted Catalyst was studied.

Keywords : CO₂ reforming of methane, Ni catalyst, promoted and unprompted catalyst, effect of catalyst preparation

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