

Studies on Modified Perovskite Catalysts over Steam CO₂ Reforming of Methane

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Steam CO₂ reforming of methane (SCR) is a remarkable way to produce synthesis gas which can be a feedstock for GTL-FPSO process. Modified LaNiO₃ based perovskite type catalysts (La_{1-x}M_xNi_{1-y}Fe_yO₃, M = Pr, Ce, Sr, Ca) were prepared by modified EDTA-cellulose method. The prepared perovskite type catalysts were characterized by various techniques such as N₂ physisorption, CO chemisorption, TPR, XRD, SEM, TEM-EDS and TG analysis. Commercial simulation package was used to estimate optimum experimental conditions for SCR of methane. The simulation results were compared with the experimental results under the tested conditions.

It was found that La_{0.95}Ca_{0.05}Ni_{0.5}Fe_{0.5}O₃ catalyst shows higher catalytic performance and stability than the other catalysts in the SCR of CH₄ at the reaction conditions of 900°C, 21 bar and molar ratio of CH₄:CO₂:H₂O = 1 : 0.7 : 1.63. It was identified that the coke formation was restricted by the addition of alkali metal in reforming catalyst enhance the basicity of the catalysts and it leads strong adsorption of CO₂ during SCR reaction.