

Characterization of Ni catalyst supported on α -Al₂O₃ and SiO₂ for syngas production via dry reforming of glycerol

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ABSTRACT

Ni-based catalysts supported on α -Al₂O₃ and SiO₂ were prepared through wet impregnation method for glycerol dry reforming to produce hydrogen, carbon monoxide and methane. Glycerol dry reforming was carried out in tubular reactor at 973 K under atmospheric pressure. The catalysts were characterized using X-Ray Diffraction, Brunauer-Emmet Teller surface area, Thermogravimetric Analysis, temperature-programmed reduction and Scanning Electron Microscopy. Ni/Al₂O₃ gives the higher glycerol conversion and hydrogen yield (14.46% and 9.82% respectively) compared to Ni/SiO₂. This result was due to smaller crystallite size and higher specific surface area of Ni/Al₂O₃ compared to Ni/SiO₂. Additionally, the nature of Al₂O₃ could increase metal dispersion as well as avoid the carbon deposition, helps the activity and the stability of this catalyst. The deposition of encapsulated carbon and filamentous carbon could be observed on Ni/Al₂O₃ and Ni/SiO₂, respectively, and can be easily removed through oxidation.

KEYWORDS:

Glycerol; Dry reforming; Syngas; Nickel-based catalysts; Silicon Oxide; Aluminium Oxide