

Screening of promoted ceo2/al2o3 catalysts in aqueous Phase glycerol reforming and hydrogenolysis into 1,2- Propanediol

ABSTRACT

A series of promoted CeO₂/Al₂O₃ catalysts (10Cu-90CeO₂/Al₂O₃, 10Ni-90CeO₂/Al₂O₃, 10Co-90CeO₂/Al₂O₃) were synthesized via method of impregnation and later calcined at 600 °C. Those catalysts were formerly tested for their physicochemical properties by X-ray diffraction (XRD), H₂-temperature programmed reduction (H₂-TPR), and NH₃-temperature programmed desorption (NH₃-TPD). After characterized, it was then evaluated in the performance of catalytic glycerol conversion into 1,2-propanediol; propylene glycol (1,2-PDO; PG) via aqueous phase glycerol reforming and hydrogenolysis route under inert N₂ flow. Among the examined catalysts, CeO₂/Al₂O₃ with 10wt% Cu loading (10Cu-90CeO₂/Al₂O₃) showed optimum catalytic activity with 88.5% glycerol conversion (GC) and 35.5% PG selectivity at 300 °C reaction temperature, 2 h duration test, 30 cc/min of N₂ initial pressure, 0.1 g catalyst dosage and 10wt% glycerol concentration. The high catalytic performance of 10Cu90CeO₂/Al₂O₃ was owing to the good copper-cerium-alumina interaction via its good metal reducibility at low temperature along with good acid capacity for the reaction.