

Effect of different supports for copper as catalysts on glycerol hydrogenolysis to 1,2-propanediol

ABSTRACT

In this work, several copper supported catalysts, Cu/Dol, Cu/Al₂O₃, Cu/Bent, Cu/Mont, and Cu/Talc were prepared using wet impregnation route and characterized using BET, BJH, XRD, H₂-TPR, NH₃-TPD, and SEM analytical techniques and subsequently tested in hydrogenolysis of glycerol to 1,2-propanediol (1,2-PDO). The nature of support was found to determine the activation of the catalysts. Among the tested catalysts, dolomite supported copper catalyst (Cu/Dol) exhibited superior performance due to the copper and dolomite species mutual interaction. The findings from the various characterization tests showed that the presence of copper species were essentially enriched on the dolomite grain surfaces, the redox properties, and acidic property of the catalyst enhanced, as well as the formation of the small size of the catalyst (Cu/Dol) contributed to the high conversion of glycerol (78.5%) and high 1,2-PDO selectivity (79%) with low methanol production as the by-product at 200 °C, 4 MPa H₂ and 10 h reaction conditions.

Keyword: Copper; Comparison support; Acidity 1,2-PDO; Hydrogenolysis