

Production of Renewable and Clean Bio-Fuel (DME) from Biomethanol over Copper Modified Alumina Catalyst

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Abstract : The effect of loading of copper on the catalytic performance of different alumina support during the dehydration of methanol to dimethyl ether (DME) was performed in a fixed bed reactor. There are two levels of loading; low loading (1, 2, 4 and 6% Cu wt/wt) and high loading (10 and 15% Cu wt/wt) on both AC350 (alumina catalyst calcined at 350) and AC550 (alumina catalyst calcined at 550), to study the effect of loading and the effect of the support during methanol dehydration to DME (MTD). The catalysts were characterized by TGA, XRD, BET, TPD-NH₃, TEM and DRIFT-Pyridine. Under reaction conditions where the temperature ranged from 180-300°C with a WHSV= 12.1 h⁻¹ it was found that all the catalysts calcined at 550°C showed higher activity than those calcined at 350°C. In this study, the optimum catalyst was 6% Cu/AC550. This catalyst showed a high degree of stability, had one half activity of the pure catalyst (AC550) and double the activity of the optimum catalyst calcined at 350°C (6% Cu/AC350). So, we recommended 6% Cu/AC550 for the production of DME from methanol.

Keywords : bio-fuel, nano composite catalyst, DME, Cu-Al₂O₃

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