

Transesterification of non-edible *Jatropha curcas* oil to biodiesel using binary Ca-Mg mixed oxide catalyst: Effect of stoichiometric composition.

Abstract

Heterogeneous base catalysts were studied to develop an effective biodiesel manufacturing process with high activity and durability. Investigations were conducted on solid base CaO–MgO mixed metal oxides with different Ca/Mg atomic ratios. These catalysts were characterized by X-ray diffraction (XRD), nitrogen sorption with Brunauer–Emmer–Teller method (BET surface area), scanning electron microscopy (SEM) with energy dispersive X-ray (EDS) spectroscopy and temperature-programmed desorption of CO₂ (TPD-CO₂). The catalytic activity was evaluated by transesterification of non-edible oil (*Jatropha curcas* oil) to its corresponding fatty acid methyl ester. Under optimum condition: 3 h reaction time, 25:1 methanol/oil molar ratio, 3 wt.% catalyst loading and 120 °C reaction temperature, a series of calcium-based mixed oxide catalysts with different Ca/Mg atomic ratio produced a FAME yield in the range of 75–90%.

Keyword: Biodiese; FAME; Methanolysis; Heterogeneous catalysts; Base catalysts.