

## Calcium-based mixed oxide catalysts for methanolysis of *Jatropha curcas* oil to biodiesel

### ABSTRACT

Calcium-based mixed oxides catalysts (CaMgO and CaZnO) have been investigated for the transesterification of *Jatropha curcas* oil (JCO) with methanol, in order to evaluate their potential as heterogeneous catalysts for biodiesel production. Both CaMgO and CaZnO catalysts were prepared by coprecipitation method of the corresponding mixed metal nitrate solution in the presence of a soluble carbonate salt at  $\sim$  pH 8.69. The catalysts were characterized by X-ray diffraction (XRD), temperature programmed desorption of CO<sub>2</sub> (CO<sub>2</sub>-TPD), scanning electron microscopy (SEM) and N<sub>2</sub> adsorption (BET). The conversion of JCO by CaMgO and CaZnO were studied and compared with calcium oxide (CaO), magnesium oxide (MgO) and zinc oxide (ZnO) catalysts. Both CaMgO and CaZnO catalysts showed high activity as CaO and were easily separated from the product. CaMgO was found more active than CaZnO in the transesterification of JCO with methanol. Under the suitable transesterification conditions at 338 K (catalyst amount = 4 wt. %, methanol/oil molar ratio = 15, reaction time = 6 h), the JCO conversion of more than 80% can be achieved over CaMgO and CaZnO catalysts. Even though CaO gave the highest activity, the conversion of JCO decreased significantly after reused for fourth run whereas the conversion was only slightly lowered for CaMgO and CaZnO after sixth run.

**Keyword:** Biodiesel; Transesterification; *Jatropha curcas* oil; Heterogeneous catalysts; Calcium-based mixed oxide