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# Ethanolysis and methanolysis of soybean and macauba oils catalyzed by mixed oxide Ca-Al from hydrocalumite for biodiesel production

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Homogeneous catalysis is a common industrial process for biodiesel production and alkali-metal methoxides are often used as catalysts. These catalysts allow for obtaining high conversion rates using reactions with low temperatures and times shorter than 1 hour. However, the drawbacks of their use are that these catalysts are unrecoverable, favor saponification reactions and generate large volumes of aqueous effluents with environmental impacts. The objective of this study was to synthesis and characterization of the Ca-Al mixed oxide produced from the thermal decomposition of a synthetic hydrocalumite. The produced mixed oxide was tested as a catalyst in the transesterification reaction for biodiesel production using the following reagents: Refined soybean oil, crude macauba kernel oil, methanol and ethanol. The synthetic hydrocalumite and mixed oxide were characterized by powder X-ray diffraction, thermogravimetry-differential scanning calorimetry coupled with mass spectrometry, specific surface area, scanning electron microscopy, energy-dispersive X-ray spectroscopy and temperature programmed desorption of $CO_2$. The catalytic tests indicated that the methanol reactions exhibited more favorable kinetics than the ethanol reactions regardless of the oil type used (soybean or macauba). Ethanolysis produced better results for the higher molar mass oil (soybean) due to the effect of the ethanol co solvent. The catalyst was efficient for transesterification, with conversions of 97% and 95% for soybean and macauba oil respectively, in 1.5 hour of reaction, at atmospheric pressure and reflux temperature. The mixed oxide presented more favorable kinetics than the CaO, using soybean oil and methanol.

## Biography

Camila Carriço received her degree in Chemistry at the University of Santa Cruz (2009), a Master's degree in Inorganic Chemistry at Federal University of Bahia (2012) and currently a doctoral student in Physical Chemistry at Federal University of Minas Gerais. Her experience is focused in renewable energy area, mainly with biodiesel production, glycerol utilization, biomass and industrial waste utilization for production of biomaterials (polyurethanes) and biopoliols. She also has expertise in synthesis and characterization of catalysts (HDL and zeolites).

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