

OPTIMIZATION BY RESPONSE SURFACE METHODOLOGY THE EXPERIMENTAL CONDITIONS IN THE PRODUCTION OF BIODIESEL WITH CALCIUM OXIDE AS HETEROGENEOUS CATALYST.

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In this work, has been optimized the experimental conditions on the transesterification reaction of sunflower oil. To optimize the conditions has been employed a multi-factorial design based on the response surface methodology (RSM) evaluating the effects of several conditions (temperature, molar ratio of methanol to oil and catalyst amount) on the partial transesterification of sunflower oil. The catalyst used in this reaction has been the calcium oxide (CaO) to produce one mole of monoglycride (MG) and two moles of fatty acids methyl esters (FAME). This blend constitutes a new type of biofuel called Ecodiesel which can be applicable to diesel engines. This Ecodiesel integrates the glycerol as MG removing by-products and increasing the lubricity of the biofuel.

In order to obtain an improvement in selectivity and viscosity, the influence on catalytic performance of several kinetic parameters was separately evaluated. It was obtained that a 6:1 molar ratio of methanol to oil, 7 wt% CaO catalyst, 65 °C reaction temperature, 60 min reaction time and 0.3% water content respect to oil, gave the best results (conversions around 70%; selectivity around 35%; kinematic viscosities about 15.3mm²/s). Besides, CaO catalyst maintained sustained activity after being repeatedly used for 20 cycles.

Key words: biodiesel, methanolysis, partial transesterification, sunflower oil, Calcium Oxide, ANOVA method, response surface methodology.

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