

Evaluation of the Operating Parameters for Biodiesel Production Using a Membrane Reactor

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Abstract : Biodiesel production using membrane reactor has become increasingly studied, because this process minimizes some of the main problems encountered in the biodiesel purification. The membrane reactor tries to minimize post-treatment steps, resulting in cost savings and enabling the competitiveness of biodiesel produced by homogeneous alkaline catalysis. This is due to the reaction and product separation may occur simultaneously. In order to evaluate the production of biodiesel from soybean oils using a tubular membrane reactor, a factorial experimental design was conducted (2^3) to evaluate the influence of following variables: temperature (45 to 60 °C), catalyst concentration (0.5 to 1% by weight) and molar ratio of oil/methanol (1/6 to 1/9). In addition, the parametric sensitivity was evaluated by the analysis of variance and model through the response surface. The results showed a tendency of influence of the variables in the reaction conversion. The significance effect was higher for the catalyst concentration followed by the molar ratio of oil/methanol and finally the temperature. The best result was obtained under the conditions of 1% catalyst (KOH), molar ratio oil/methanol of 1/9 and temperature of 60 °C, resulting in an ester content of 99.07%.

Keywords : biodiesel production, factorial design, membrane reactor, soybean oil

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