

Studies on the performance of tubular flow reactor for esterification of free fatty acid from used cooking oil using highly porous cation exchange resin as catalyst

Nursofia Mohd Yunusa^b; Sumaiya Zainal Abidin^{ab} and Chin Sim Yee^{ab}

^a Centre of Excellent for Advanced Research in Fluid Flow (CARIFF), Universiti Malaysia Pahang, Kuantan, Pahang, Malaysia;

^b Faculty of Chemical and Natural Resources Engineering, Universiti Malaysia Pahang, Kuantan, Pahang, Malaysia

ABSTRACT

Semi-batch esterification of free fatty acid (FFA) from used cooking oil with methanol was carried out using RCP160M cation exchange resin in a tubular flow reactor (TFR). The results revealed that the conversion of FFA increased with the increase of catalyst bed height, methanol to oil mass ratio and decreases with increase of feedstock flow rates. However, the FFA conversion was decreased upon further increases of methanol to oil mass ratio from 6:1 to 12:1. This might possibly happen due to several factors such as mass transfer limitation between reactants and catalyst and inhomogeneity of the reactants during the reaction.

KEYWORDS:

Esterification, free fatty acid, ion exchange resin, Semi-batch, tubular flow reactor, used cooking oil