ABSTRACT

Energy needs are increasing along with population growth and industrial activities, so a solution is needed in the form of a renewable energy mix, one of which is biodiesel. The need for alternative energy encourages the use of used cooking oil as a raw material for biodiesel. This study aims to optimize the process of reducing FFA levels through the esterification process of used cooking oil using a heterogeneous natural zeolite catalyst activated by 1M HCl acid to reduce free fatty acid (FFA) levels. The process is carried out with variations in catalyst concentration (2%, 3%, 4%) and reaction time (60, 80, 100 minutes) using the Completely Randomized Design (CRD) method. The results of this study obtained the highest percentage of FFA reduction after the esterification process in the A2B3 variation (3% m/v), 100 minutes) of 83.8%, with oil quality of 0.38% FFA, density of 0.902 gr/cm3, and kinematic viscosity of 3.826 cSt.

Keywords: Biodiesel, Esterification, Heterogenous Catalyst, Natural Zeolite, Used Cooking Oil.