Kasamar Petchtabtim 2009: Study of Kinetic Rate of Heterogeneous Catalysts for Biodiesel Production. Master of Engineering (Chemical Engineering), Major Field: Chemical Engineering, Department of Chemical Engineering. Thesis Advisor: Associate Professor Thongchai Srinophakun, Ph.D. 149 pages.

Kinetic rate equation of the transesterification of palm olein with methanol (biodiesel production) is reported. Firstly, the effect of mass transfer resistance on the kinetic rate was investigated using a different speed of agitator that is 500, 700 and 1000 rpm. For the kinetic study, both Pseudo-homogeneous (PH) and Langmiur-Hinshelwood (LH) kinetic models were used and evaluated to find the suitable model that could be described the kinetic rate data. The experiments were carried out at 328, 333 and 338 K by a strontium oxide as solid catalysts. In order to estimate related parameters, the genetic algorithm (GA) was used to find the chemical reaction rate constant. The values of operator in GA were tune to address the best performance.

Overall, the mass transfer resistance was not shown the effect on the reaction rate while the reaction temperature played the more effect on the reaction rate. The reaction rate was increased with increasing the temperature. Both kinetic models showed the suitable results to explain and predict the kinetic results. In case of PH model, the activation energy of hydrolysis triglyceride, diglycerides, monoglycerides and reversible of monoglycerides were 70.28, 33.34, 250 and – 85.24 kJ/mol; respectively. The best value of population size, generation number, crossover fraction, mutation rate, migration fraction and hybrid function for GA operators were 100, 100, 0.8, 0.01, 0.2 and none, respectively.

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