Winai Posuwanwattana 2008: A Kinetics Study: Transesterification of *Jatropha curcas* Oil Using Base Catalyst. Master of Engineering (Chemical Engineering), Major Field: Chemical Engineering, Department of Chemical Engineering. Thesis Advisor: Assistant Professor Jarun Chutmanop, D.Eng. 140 pages.

This research aims to study kinetics study of transesterification process of *Jatropha curcas* oil using potassium hydroxide(1 wt % of oil) as a catalyst. Effect of temperature and molar ratio of oil to methanol on both the reaction rate and the reaction rate constants were investigated. Experiments were performed in a batch system stirred at 600 rpm over 90 minutes at 40, 50 and 60 $^{o}$C and the molar ratio of oil to methanol at 1:7, 1:9 and 1:12. Three main unconverted reactant; monoglyceride, diglyceride and triglyceride; were detected by Gas Chromatography. Proposing mechanism was three-elementaly-step irreversible reactions.

According to the results, the reaction increases with increasing temperature and molar ratio of oil to methanol. The high conversion was observed at 60 $^{o}$C and at the molar ratio of oil to methanol of 1:12, in which 1.77 wt% of unconverted triglyceride and 96.01 wt% methyl ester were obtained. A kinetic model follows a pseudofirst-order mechanism for irreversible reaction. When the temperature is rising, at the molar ratio of oil to methanol 1:12 the rate constants for hydrolysis of triglyceride ($k_1$) diglyceride ($k_2$) and monoglyceride ($k_3$) is increased. The highest value of $k_1$ $k_2$ and $k_3$ obtained at 60 $^{o}$C were 0.18383 0.59575 and 0.73143 min$^{-1}$ respectively. The results showed the trend of $k_3 > k_2 > k_1$. Moreover, it was found that hydrolysis of triglyceride is the slowest step and can be considered as a rate determining step. In addition, activation energy of the hydrolysis of triglyceride diglyceride and monoglyceride were 60.32 66.26 and 41.23. kJ/mole respectively.

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