CHAPTER V
CONCLUSIONS AND RECOMENDATIONS

5.1 Conclusions

This study showed that the heterogeneous catalysts KOH/Al_2O_3 and KOH/NaY can be used as solid base catalysts for biodiesel production via transesterification. The optimum conditions for KOH/Al_2O_3 was 2 hours reaction time, 25 wt% KOH/Al_2O_3, 15:1 methanol/oil molar ratio, 3 g of catalyst, 300 rpm stirrer speed, and 60°C. At the optimum conditions of the KOH/Al_2O_3, a biodiesel yield of 91.07% was obtained.

The optimum conditions for KOH/NaY was 3 hours reaction time, 10 wt% KOH/NaY, 15:1 methanol/oil molar ratio, 6 g of catalyst, 300 rpm of stirrer speed, and 60°C. At the optimum conditions of the KOH/NaY, a biodiesel yield of 91.07% was obtained.

The conversion to methyl ester catalyzed by KOH/Al_2O_3 (86.93%) is higher than that of KOH/NaY (84.55%).

The KOH/Al_2O_3 catalyst showed better activity than the KOH/NaY catalyst for biodiesel production via transesterification because the KOH/Al_2O_3 can produce biodiesel at optimum conditions very close to the standard EN 14214 methods, which limit the amounts of mono-, di- and tri-glycerides at $\leq 0.80\%$, $\leq 0.20\%$, and $\leq 0.20\%$ respectively. The amount of mono-, di- and tri-glycerides of biodiesel produced from KOH/Al_2O_3 are 0.86%, 0.06% and 0.28%, respectively. Whereas the amounts of mono-, di- and tri-glycerides of biodiesel produced from KOH/NaY are 1.09%, 0.41% and 0.46%, respectively.

5.2 Recommendations

The quantity of potassium element on the surface of catalyst that was determined by Atomic Adsorption Spectroscopy (AAS) gave higher accuracy value than Scanning Electron Microscopy with Energy Dispersive Spectrometry.