

## CHAPTER V

### CONCLUSIONS AND RECOMMENDATIONS

#### 5.1 Conclusions

A heterogeneous catalyst KOH/bentonite can be used as a solid based catalyst for biodiesel production via transesterification of palm oil. The 25 wt% K/bentonite catalysts gave biodiesel yield of 94.13% at temperatures of 60°C within 3 h at a 1:15 molar ratio of palm oil to methanol, a catalyst amount of 3 wt%, and 20–40 mesh of catalyst size. The basicity of the catalyst increased when the KOH increased; however, the opposite trend was observed with regard to the calcination temperature. The leaching of the active species on the catalyst was observed.

#### 5.2 Recommendations

The regeneration of heterogeneous catalyst is required for further study. It is recommended to study the appropriate method that could activate the spent catalyst in order to give higher methyl ester content. Finding the new type of heterogeneous catalyst with high stability and low-cost is another attractive study.

For the process of biodiesel production, it is very interesting to up-scale the size to the fixed-bed reactor or operating at the industrial condition. Moreover, the new method that could extend the contact time between the reactant and the catalyst is also interesting, for example, the reduction of feed flow rate, the higher amount of catalyst, and the longer of catalyst bed.