

CHAPTER V

CONCLUSION AND RECOMMENDATION

5.1 Conclusion

The conclusions of the present research are the following:

1. This study shows that all of the investigated solid catalysts have a potential to be used for the transesterification. Based on the methyl esters content. The order of activity of the solid catalysts for soybean oil transesterification is $K_2CO_3/ZnO > KOH/ZnO > Na_2CO_3/ZnO > KNO_3/ZnO > Li_2CO_3/ZnO > KCl/ZnO$.
2. The optimum condition was achieved using methanol-to-oil molar ratio of 9:1, catalyst amount of 3 wt.% at reflux of methanol for 48 h. In addition, it is noteworthy that THF can speed up the transesterification reaction as a phase-merging agent.
3. The results also showed that the catalytic activity of the catalysts depended upon both basic properties and the surface area but basicity was more dominant effect.
4. Basicity of the catalyst depends directly on the amount of alkali metal salt coated on the surface of catalyst. FTIR was shown that alkali metal salt is only coated on the surface of catalyst without forming bond with ZnO. Alkali metal salt can be easily desorbed.

5. Reusability of the catalyst was performed and found that activity of the reused catalyst is decreased due to the leaching of alkali metal from the surface into solution. It may be expected that the catalyst prepared in this work behaves like homogenous catalyst.

5.2 Recommendation

From the previous conclusions, the following recommendations for future studies can be proposed.

1. The preliminary study showed surprisingly that the preparation of rod ZnO gave rise to the increase of biodiesel productivity when loaded with K_2CO_3 . The next step of using this type of material could be of great important to understand the nature of ZnO towards the transesterification process.
2. Since the K_2CO_3/ZnO showed a promising result, it is suggested to try and look for another catalyst supported in preparing the K_2CO_3 loaded catalyst for this reaction. It is also interesting to develop a good understanding of the systems kinetics by studying a wide range of temperature to determine the best condition.