CHAPTER V
CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

In the present study, the effect of catalyst preparation methods over the Pd/TiO_2 catalyst on the deoxygenation of beef fat for the production of hydrogenated biodiesel was investigated. The different preparation methods gave the different conversions and product selectivities. There were two main groups of liquid products which were hydrocarbons and oxygenates (fatty acids, fatty alcohols, and fatty esters). The hydrocarbon products obtained from all catalysts were in the specification range of diesel fuel and the main products were n-heptadecane (n-C17) and n-pentadecane (n-C15) resulting from decarboxylation/decarbonylation pathway. Therefore, catalyst preparation methods did not significantly change the deoxygenation reaction pathway. Among Pd supported titania catalysts, Pd/TiO_2 catalyst synthesized via a combined single-step sol-gel process (SSSG) with surfactant-assisted templating method gave the highest conversion of triglycerides of beef fat and diesel-like hydrocarbon yield that cause by the high surface area and the high dispersion of Pd on TiO_2 support of SSSG catalyst among other Pd/TiO_2 catalysts. Beside, the high catalytic activity and the high desired product selectivity also corresponded to the low amount of coke deposition on the catalyst.

5.2 Recommendations

Among Pd-supported catalysts, SSSG catalyst showed the highest conversion and selectivity to hydrocarbons in the range of biodiesel. The stability should be study in the further work for purpose of optimization and improvement of hydrogenation biodiesel production from beef fat.

Furthermore, the large alkanes produced from the free fatty acids can be converted into branch isomers that are highly valuable. It should be focused on how to selectively produce branch isomers without cracking to lighter products.