

## CHAPTER V

### CONCLUSIONS AND RECOMMENDATIONS

#### 5.1 Conclusions

In this 3-steps process, the protection reaction or acetonation of glycerol in this work was carried out and provided the high conversion of glycerol (82.4%). The protected glycerol was then transesterified with refined palm oil. The influence of protected glycerol to refined palm oil molar ratio (5:1, 7:1, 10:1, 13:1 and 17:1) and reaction temperature (ranging from 120 to 180 °C) was examined. The protected monoglycerides (1,2-O-isopropylidene monoglycerides) content increased with the increasing molar ratio of protected glycerol to refined palm oil while other undesired esters content decrease. Moreover, the protected monoglycerides selectivity increased with transesterification temperature (at 180 °C provided the highest selectivity of 88.8%). The protected monoglycerides was then deprotected in order to remove isopropylidene group (protecting group) by ethanolysis using Dowax®M-31 (wet) ion-exchange resin as acid heterogeneous catalyst. The result showed that the yield of glycerol monoglyceride was 65.8%.

#### 5.2 Recommendation

To increase the yield of protected glycerol, it is suggested that water should be removed during the reaction. This could be done by adding molecular sieve (or zeolite) to adsorbed water in the reaction. Moreover, the catalyst for glycerolysis of refined palm oil with protected glycerol can be a base heterogeneous (solid) catalyst which can be easily removed from product mixture. The solvent selection for selective deprotection should also be further investigated.