CHAPTER V
CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

Partial Hydrogenation reaction was the effective way which used to improve the biodiesel properties especially oxidative stability. For this work, all of three metal types; Pd, Pt, and Ni, exhibited good partial hydrogenation of soybean oil based-biodiesel. They could decrease the contents of C18:3 and C18:2 and also increase monounsaturated FAME and saturated FAME particularly C18:1 (both *cis*- and *trans*-isomers) and C18:0 contents, respectively. As compared between these catalysts, Pd catalyst presented the highest catalytic activity as presented by TOF of C18:2 conversion. In addition, this result was consistent with several authors such as McArdel *et al.*, 2011 and Numwong *et al.*, 2012. After adding additional sulfur, Pd catalyst gave the highest catalytic activity; however, Pt catalyst could resist the effect of sulfur compound more than the others. In the same way, the highest sulfur tolerance was Pt catalyst. The significant factor for sulfur tolerance was metal particle size. The larger particle size gave the faster metal sulfidation. Although, Ni metal had the smallest size, there were large cluster formation. This caused the lowest sulfur tolerance. Pd metal was the relatively large particle size; however, it was loaded on support with the lowest percentage and also well dispersed. There were little cluster formation as compared to Ni metal. For Pt metal, the particle size was 3 times smaller than Pd metal and exhibited the highest metal dispersion which caused the lowest metal cluster formation than the others and showed the highest sulfur tolerance in this study.

5.2 Recommendations

Apart from the polyunsaturated FAMEs conversion, the *cis*- and *trans*-isomers of C18:1 also should be more considered. Since these isomers also relate to the cold flow properties which are the important properties in cold contries.