CHAPTER V
CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

The Pd, Ni, Pd-Ni and Ni-Mn supported on alumina catalysts were investigated for the liquid phase hydrogenation of 1-hexyne under 1.5 bar and 40 °C. For the monometallic catalysts, $1\%Ni/Al_2O_3$ provides higher activity than other prepared catalysts. If the amount of Ni is higher than 1%, the activity tends to decrease significantly possibly due to agglomeration of metal. The activity is exhibited in the order: $1\%Ni/Al_2O_3 > 1.5\%Ni/Al_2O_3 > 2\%Ni/Al_2O_3 > 3\%Ni/Al_2O_3 > 0.3\%Pd/Al_2O_3 > 0.3\%Ni/Al_2O_3$. Interestingly, $0.3\%Ni/Al_2O_3$ shows lowest activity, while its 1-hexene selectivity is relatively high. The Ni-Mn bimetallic catalysts show the decrease of activity when Mn is loaded on Ni-based catalyst. It is suggested that Ni interacts with causing the reduction of chemisorbed hydrogen and activity. The Pd-Ni bimetallic catalysts show the activity in the order: PdNi1.5 > Pd > PdNi0.5 ≈ PdNi1.0 > PdNi2.0. $PdNi2.0/Al_2O_3$ and $NiMn1.0/Al_2O_3$ bimetallic catalysts provide 1-hexene selectivity 87% and 92% at completed conversion (2.5 h. and 3.0 h.) respectively. The $NiMn0.5/Al_2O_3$ exhibits the highest 1-hexene yield at 91%. As the results, the Ni-Mn bimetallic catalyst exhibits superior both 1-hexene selectivity and 1-hexene yield for the selective hydrogenation of 1-hexyne. Furthermore, the prepared Ni-Mn bimetallic catalysts present the advantages of low cost of nickel and manganese precursors, which leads to cheaper and highly selectivity catalysts.

5.2 Recommendations

For further studies, the Ni-Mn bimetallic catalysts should be studied for higher activity by increasing the metal loading. The other promoters such as Bi and Pb should also be tested and studied, as reported in the research done by Anderson *et al.* (2009).