CHAPTER V
CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

The catalytic pyrolysis of tire was studied for the effect of Pd/H-BETA catalyst and operation conditions on upgrading pyrolysis oil. The saturated and aromatic hydrocarbon contents were determined by using liquid chromatograph techniques in order to examine the pyrolysis oil quality. Not only quality but also the quantities of petroleum fractions were investigated by using a SIMDIST-GC. The pyrolysis oils were separated into gasoline, kerosene, gas oil, light vacuum gas oil, and heavy vacuum gas oil according to their boiling points.

The Pd/H-BETA catalyst can reduce aromatic hydrocarbons in the pyrolysis oil, and was selective to produce a large amount of kerosene fraction with higher saturated hydrocarbons. The amount of palladium loading affected to the chemical composition of pyrolysis oil. The saturated hydrocarbons were decreased, and the efficiency of aromatic reduction was also reduced with the increasing palladium loading amount. The optimum of palladium loading was 0.25 wt% on H-BETA zeolite.

The influence of catalyst preparation was examined using the impregnation and ion-exchange methods. The impregnated catalysts had a higher activity in reduce-ing aromatic hydrocarbons than the ion-exchange catalysts. The location of metal particles played the important role in the aromatic reduction of Pd/H-BETA zeolite.

0.25 wt% Pd impregnated catalyst was selected to study on the effect of operating conditions. The catalytic temperature had more influence on the chemical compositions, especially the aromatic hydrocarbons in pyrolysis oil. These hydrocarbons were increased with catalytic temperature. At higher catalytic temperature, the activity of aromatic reduction was suppressed by coke formation on the catalyst. The residence time was the one parameter which affected to the chemical composition of pyrolysis oil. The aromatic hydrocarbons were declined simultaneously, the saturated hydrocarbons were increased when the hydrocarbon vapor spent longer contact time with the catalyst.

5.2 Recommendations

For the future work, the other operating condition such as catalyst to tire ratios, the amount of tire, and the different type of tire rubber should be further investigated. In addition, the chemical composition of oil should be determined by using other techniques (GC-MS) and gas products should be analyzed the H_2, CO, CO_2, and H_2S in order to investigate the effect of catalyst on non-hydrocarbon gas and the sulfur distribution. Moreover, the catalytic temperature in lower range (< 350°C) should be determined in the future work.