CHAPTER V
CONCLUSIONS AND RECOMMENDATIONS

The pyrolysis of scrap tire was operated in a bench-scaled autoclave reactor. the monometallic catalysts (1%wt Rh and 1, 5, 10, 15, 20%wt of Ni and Co) supported on KL zeolite were investigated by incipient wetness impregnation technique, and the bimetallic catalysts supported on KL zeolite (RhNi/KL and RhCo/KL) were prepared by co-impregnation technique with a total metal content of 1 %wt with the varied amount of Rh from 0.05 to 0.75 %. N_2 flow rate, heating rate, the amount of sample and the amount of catalysts were fixed at, 30 ml/min, 10°C min, 30 g and 7.5 g, respectively.

The introduction of 1%Rh/KL significantly affected the increases in gaseous fraction at the expense of liquid fraction. This catalysts show the activity in hydrogenation of multi-ring aromatics compounds with a subsequent ring opening reaction involving C-C bond breaking, which lead to a high concentration of mono-aromatics and also a high yield of cooking gas. The presence of Ni cluster with varying metal loading on KL as an alternative low cost catalyst exhibited the increase in the gas yield as well as mono-aromatic concentration at a higher loading. Moreover, the use of Ni cluster also had potential in the reduction of sulfur-containing compounds in oil due to the ability in C-S bond rupture. On the other hand, the use of Co as low as 1% loading on KL seemed to be a good catalyst for the production of light olefins and methane ascribed to the activity of multiple C-C bond breaking. A higher yield of liquid product was observed when using a higher Co loading, which is ascribed to the reduction in cracking ability. However, using Co resulted in an apparently-high amount of mono-aromatics, which can be comparable with the noble metal. Among the monometallic catalysts, 5%Co/KL can be the best choice for single-ring aromatics production due to the high activity on multi-ring aromatics reduction via hydrogenation reaction combined with the activity in C-C bond rupture leading to ring opening reaction, which resulted in the shift of peak to a lower carbon number in the carbon number distribution of mono-aromatic species.

The incorporation of bimetallic catalysts with varying metal composition had the impact on saturated hydrocarbons formation. Especially, 0.05% of Rh

combined with 0.95% Co gave the highest content of saturated hydrocarbons which is attributed to the ability in converting mono-aromatics to saturates by hydrogenation and ring-opening reactions. Furthermore, increasing Rh up to 0.75% in the bimetallic catalyst gave the good performance in the gas production, which exhibited the highest yield of light olefins as compared to the monometallic catalysts. However, the co-loaded catalysts had the insignificant impact on polar-aromatics reduction and sulfur content in the derived oil.

It is recommended that the further study about the improvement of catalyst may be investigated for the use as an industrial catalyst. According to the results, the investigation of the metals with various types of supports such as acid zeolites or mesoporous material seems interesting as well as the further study about the utilization of valued products.