CHAPTER V
CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

Pyrolysis of waste tire was studied for expectation on upgrading pyrolysis products. KL zeolite was used as a catalyst support for the individually-loaded catalyst (%MoO_3/KL and %Re/KL) and the co-loaded catalysts (%Re-1%MoO_3/KL). All different catalysts were prepared by using incipient wetness impregnation technique.

The amount of MoO_3 loading was varied from 1 to 10 wt%, and the increasing MoO_3 loading of higher than 5 wt% showed the highest yield of pyrolytic gas. The MoO_3/KL catalysts can produce the high amount of mono-aromatics, especially at 2 wt% of MoO_3 loading. These results might be resulted from the cracking of poly-aromatics to mono-aromatics. The dehydrogenation and aromatization of light gas products obtained from MoO_3/KL also promoted the production of mono-aromatics. However, the MoO_3/KL catalysts produced the lower amount of naphtha fraction than KL zeolite. The increasing MoO_3 loading can enhance C-S bond breaking, leading to the high amount of sulfur deposited on catalysts.

The use of Re/KL catalysts (at 0.25-1 wt%) can produce the higher amount of mono-aromatics than the MoO_3/KL catalysts. The high amount of mono-aromatics was resulted from the hydrogenation and ring-opening activity of Re/KL catalysts, leading to the conversion of di- and poly-aromatics to mono-aromatics. 0.75 wt% was the optimum composition of the Re/KL catalysts to produce a high amount of mono-aromatics and a high naphtha fraction in maltene.

For co-loaded catalysts, the amount of Re loading was varied from 0.25 to 1 wt% with a fixed 1 wt% of MoO_3. Co-loading did not promote the production of mono-aromatics, but instead, it enhanced the amount of saturated hydrocarbons, which occurred from the cracking and hydrogenation of di- and poly-aromatics. The amount of saturated hydrocarbons obtained from co-loaded catalysts was higher than

using individually-loaded catalysts (MoO_3/KL and Re/KL). The co-loaded catalysts had the negative effect on petroleum fractions because they reduced the naphtha fraction, and increased the heavier fractions such as kerosene and light gas oil in maltenes.

5.2 Recommendations

The MoO_3/KL catalyst at higher than 10 wt% should be investigated for the sulfur adsorption and for whether it can reduce the amount of sulfur in pyrolytic oil. Moreover, the upgrading char product is interesting to produce the high quality activated carbon, which is usually used as an adsorbent in many industrial applications.