

CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

This thesis can be concluded into two parts. The first part is synthesis of KL zeolite by microwave treatment at elevated temperature of 443 K. The main advantage of microwave heating is higher heat transfer as a result of faster crystallization than conventional method. Contrasting with conventional heating, the rapid heating in microwave synthesis required ageing step to form sufficient nuclei before fast crystallization. In addition, the crystal size of synthesized KL zeolite depended on both ageing time. Increasing ageing time resulted in increasing in amount of nuclei and reducing in crystal size. However, a greater ageing time than 24 hr was not found to reduce the crystal size of KL zeolite in this study.

The second part is n-octane and n-hexane aromatization reaction. Even on catalysts with different crystal sizes that exhibited excellent performance under n-hexane, the deactivation is rapid and the selectivity to C8 aromatics is low under n-octane. This low selectivity was due to secondary hydrogenolysis of C8 aromatics to benzene and toluene. The hydrogenolysis of the C8 aromatics is particularly pronounced with ortho-xylene, which diffuses through the zeolite channels much less rapidly than benzene, toluene, and ethylbenzene.

This work has been demonstrated that the different crystal sizes effect performance of catalyst for n-octane aromatization. The larger crystal size led to higher residence time of OX inside the pore resulting in higher EB/OX ratio.

5.2 Recommendations

To improve catalytic activity of n-octane aromatization reaction, very small crystal size, high pore volume and surface area of KL zeolite (below the crystal size of commercial KL, 0.65 micron) should be used as catalyst. The interesting methods to reduce the crystal size is by adjusting formula synthesis, temperature, or by adding seed such as KL zeolite, and colloidal suspension of KL zeolite.

Conversely, if the channels are too short, Pt seepage to the external surfaces becomes significant and the rate of coke production increases (Treacy, 1999).