CHAPTER V
CONCLUSIONS AND RECOMMENDATIONS

This work was conducted to study the combined effects of Fe-based catalysts and Pt/KL or HZSM5 aromatization catalysts on converting syngas to aromatics. One of the main challenges of this work was that Fischer-Tropsch synthesis and aromatization has opposite relation with temperature and hence a catalyst which has better performance at high temperature played a big role.

Among FT catalysts studied, co-precipitated FeCoK catalyst showed better performance at high temperature than Fe impregnated on KL zeolite producing higher C_{4+} with better stability. The C_{4+} product selectivity was higher with FeCoK compared to 9.5Fe/KL at a given temperature.

The physical mixture of Pt/KL with Fe/KL or FeCoK showed a better performance in converting syngas to aromatics than co-impregnated FePt/KL catalysts but showed a lower selectivity around 3%. This higher selectivity in physical mixture is due to the availability of accessible Pt sites in KL pores than in co-impregnated FePt/KL catalyst. This lower selectivity of aromatics with Pt/KL catalyst is due to the deactivation of Pt sites with CO as proved in n-hexane aromatization.

Further, The composition of hybrid catalyst of FeCoK and HZSM5 (Si/Al=23) showed a significant influence on syngas aromatization leading to the highest aromatic yield at 66 percent of HZSM5 in the catalyst among 0, 44, 75, and 80 percent studied resulting to 4.7% after 430 min on stream. The lower HZSM5 gives lower aromatic selectivity is due to the quick deactivation of HZSM5 and higher HZSM5 content gives lower aromatic selectivity due to reduction in C_{5+} products due to cracking properties of HZSM5.

Finally, Investigation on syngas aromatization with Ru which is highly active metal for FT synthesis, co-impregnated with Pt on KL zeolite can be recommended for future studies. Further, study on bimetallic aromatization catalysts with metals such as Cu which withdraws electrons from Pt could be proposed to increase in CO tolerance.