CHAPTER V
CONCLUSIONS

It was demonstrated that ZSM-5 zeolites synthesized via silatrane and alumatrane are better than commercial ZSM-5 in terms of physical properties. The results from toluene disproportionation reaction indicate that the crystal size and external surface acidity have strong effect on the product selectivity. The conversion extremely increases for high aluminium containing ZSM-5 without significantly change in para selectivity. However, coke formation is an important problem in the reduction of catalytic activity at high temperature. FAU zeolite gives low catalytic activity in this reaction. The para selectivity can be enhanced by using CVD and seeding techniques. The acidity of zeolite has influence on the amount of silica deposited using CVD modification. Only one CVD cycle is enough for high aluminium ZSM-5 to improve the selectivity. However, the product yields decreases due to partially blocked pore or some of silica obstructs on the internal surface. The silicalite shell seeding is a good technique to enhance para selectivity without the reduction of product yields.

The main problem encountered in this work is to control the crystal growth direction during secondary crystallization. In addition, the amount of modified catalyst used in the system has to be doubled because the silicalite shell reduces the mass fraction of ZSM-5 seed related to the number of acid sites in the catalyst. Therefore, one possible solution is to increase amount of seed to silicon precursor ratio during modification. The work under hydrogen pressure may give more advantage to prevent the coke formation.