CHAPTER V
CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

From this study, it is demonstrated that the commercial HZSM-5 catalysts with SiO_2/Al_2O_3 ratios of 23 to 195 could be preliminarily employed for the vapor phase alkylation of benzene with ethanol to ethylbenzene. Based on several parameters including acidity of catalyst, temperature, weight hourly space velocity (WHSV), and benzene to ethanol (B/E) feed ratio, significant findings obtained from this study can be concluded in the following. The HZSM-5 catalyst with higher acidity (lower Si/Al ratio) yields a higher benzene conversion, but yields a lower EB selectivity. Due mainly to the exothermic nature of the reaction, a higher benzene conversion is obtained when using a lower temperature. Decreasing the contact time by increasing WHSV results in decreasing the benzene conversion, but increasing the selectivity to EB. Additionally, a change in B/E feed ratio exhibits similar results to that of WHSV. In summary, it is suggested that for alkylation of benzene with ethanol when using the commercial HZSM-5 catalyst with SiO_2/Al_2O_3 of 23, the optimal parameters be a temperature of 300 °C, a WHSV of 20 h^{-1}, and a B/E feed ratio of 4. In addition, the HZSM-5 catalyst with SiO_2/Al_2O_3 of 23 was found to be active up to 30 h and after that the conversion was dropped because of the coke formation.

5.2 Recommendations

Now that the stability of the catalyst is low, the improving of the catalyst should be further studied. Moreover, other parameters such as pressure should be considered.