

CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

From this study, it is demonstrated that the synthesized HZSM-5 catalysts with $\text{SiO}_2/\text{Al}_2\text{O}_3$ ratios of 180 provide high selectivity to EB for the alkylation of benzene with ethanol. Based on several parameters including different synthesis of HZSM-5 catalyst, temperature, and benzene to ethanol (B/E) feed ratio, significant findings obtained from this study can be concluded in the following. The different synthesized HZSM-5 catalyst provides different crystallinity, surface characteristic, and Brönsted acid sites. It was observed that the catalyst hydrothermally synthesized at 150 °C for 48 h provide a relatively suitable crystallinity, surface characteristic, and Brönsted acid sites, resulting in a higher catalytic activity in terms of ethanol conversion and selectivity to EB. For reaction temperature 500 °C gave the highest selectivity to EB and benzene conversion because at suitable high temperature, bulkier molecules can diffuse more quickly, and other products cannot occur due to exothermic reaction. Moreover, increasing the B/E feed ratio results in decreasing the benzene conversion, but increasing the selectivity to EB. In summary, it is suggested that for alkylation of benzene with ethanol when using the synthesized HZSM-5 catalyst obtained from synthesized temperature 150 °C for 48h, the optimal parameters be a temperature of 500 °C, and a B/E feed ratio of 4.

5.2 Recommendations

The stability of the catalyst should be further studied. Moreover, other parameters such as pressure should be considered.