CHAPTER V
CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

All mixed matrix membranes (MMMs); Silicalite-Ultem, NaX-Ultem and Silicalite-Ultem MMMs were prepared by solution-casting method and evaluated for the permeabilities and selectivities of C_3H_6/C_3H_8 at room temperature by single gas measurements.

Strong evidence of void formation in the membrane matrix was observed by SEM. It was believed to occur due to partial incompatibility between polymer chains and zeolite particles, resulting in a poor separation performance.

Aminofunctional silane agent was effective to improve the adhesion between the solid and polymer phases. However, all void-free zeolite-Ultem MMMs only resulted in increasing in the permeabilities without improving the C_3H_6/C_3H_8 selectivities in which still remain or below compared to that of Ultem membrane. Therefore, all types of zeolite studies are not suitable to develope MMMs with Ultem membrane. The function of zeolite in the membrane matrix that effect to the separation performance of such MMMs can be explain using facilitation ratio. The molecular sieve effect of zeolite and the interactions between molecules of gas and zeolite might give the explanation for increasing in the permeability in this study. Appropriate selection of the specific dispersed material and polymer membrane are important consideration.

5.2 Recommendations

From this work, polyimide, Ultem membrane was used as polymeric phase. It showed the moderate C_3H_6/C_3H_8 selectivity. Zeolite used in this study only resulted in increasing in the gas permeability without the selectivity enhancement. Therefore, to further development incorporation of liquid phase material, such as polyethylene glycol (PEG) so that fabricate PEG-polyimide and zeolite-PEG-polyimide MMMs is interesting. Due to PEG is expected to increase solubility of

higher polar gas, olefin, it would enhance the permeability and the olefin/paraffin selectivity as well.