CHAPTER V
CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusion

In this study, we prepared cardanol-modified polybenzoxazine membrane by mixing cardanol into benzoxazine prepolymer. The membranes were used to separate the ethanol-water mixtures. An increase of cardanol content in the membrane resulted in the decrease of degree of swelling of the membrane which might be useful for ethanol-water separation with higher ethanol concentration. However, adding cardanol contents higher than 5 wt%, cardanol could not mixed homogeneously with benzoxazine precursor and the cracked surface was observed. The total permeation and seperation factor of these membranes was found to be 0.33 kg/m^2h and 10,000, respectively. When compare between cardanol-modified polybenzoxazine membrane and other membranes, the seperation factor of these membranes was higher but the permeation flux was lower. Additionally, an increased in permeation flux was achieved by adding NaA into the system due to the porosity of the membranes increase as increasing NaA contents, more water could pass through the membrane while the separation factor was not affected because the pore size of NaA allowed only water to pass through. When NaA was incorporated up to 5wt%, the total permeation flux increase to 0.98 kg/m^2h, while the seperation factor higher than 10,000.

5.2 Recommendations

The interaction between zeolite and cardanol-modified polybenzoxazine matrix affected the service lifetime of the membrane in ethanol-water seperation via pervaporation; so, the future work should be focused on how to improve the interfacial interaction between NaA zeolite and cardanol-modified polybenzoxazine matrix by surface treatment of zeolite before incorporate to cardanol-modified polybenzoxazine precursor should be investigated.