CHAPTER V

CONCLUSION AND SUGGESTION

5.1 Conclusion

The pervaporation separation of methanol-water mixture was carried out using PTFE/PP membrane. The influence of the following operating parameters on the pervaporation flux and selectivity was studied: the feed concentration in the range of 10 to 60 wt % methanol, the downstream pressure of 12 to 34 cmHg, the feed temperature of 30 to 50 °C, and the feed flow rate of 3.5 to 17 ml min^{-1}.

In all cases, the methanol content in permeate higher than that in feed indicated that the PTFE/PP membrane exhibited preferential permeation to methanol. When the concentration of methanol in feed increased, the total flux and methanol flux increase, while water flux, selection factor, and PSI were found to decrease. The concentration of methanol in feed did not affect the water flux. In the other hand, The fluxes decreased, but selection factor increased with an increase in the downstream pressure. At downstream pressure of 12 cmHg, low values of PSI were obtained at feed concentrations of 10 to 60 wt % methanol. An increase in the feed temperature resulted in increasing the water flux, but decreasing the selection factor and PSI. The feed temperature did not affect the total flux and the methanol flux. The similar trend was obtained for the effect of the feed flow rate, except the behavior on PSI. At feed concentration of 10 wt % methanol, slight different PSI was obtained. The PSI was found to decrease with an increase in feed flow rate at feed concentration above 20 wt % methanol.

The best conditions giving the high performance of the pervaporation system were the concentration of methanol in feed of 10 wt %, downstream pressure of 34 cmHg, feed temperature of 30 °C, and feed flow rate of 3.5 ml min^{-1}. The following maximum values were obtained: selection factor of 4.08, PSI of 6.07 kg m^{-2} h^{-1}, total flux of 1.97 kg m^{-2} h^{-1}, methanol flux of 0.56 kg m^{-2} h^{-1}, and water flux of 1.41 kg m^{-2} h^{-1}.

5.2 Suggestion for further Work

For the further, a series of separation units (modules) should be used to provide a high degree of separation and to show energy-saving in perveporation system. Therefore, types of modules should be developed inorder to increase the vapor-liquid contact area per unit equipment volume. In addition, the model of pervaporation of other groups of organic compounds could be studied.