Chapter 5

Conclusions

In the present study, chitosan membranes crosslinked by sulfuric acid were prepared and used for separation of ethanol-water mixture by pervaporation process. The conditions for membrane preparation and the operating conditions for pervaporation were investigated using RSM for experimental design to optimize membrane properties and pervaporation performance. As a result of the present experimental study the following conclusions can be reached:

1. Swelling ratio and flux increased, while tensile strength, sorption selectivity and separation factor decreased with increasing concentration of sulfuric acid at constant crosslinking time and membrane formation temperature.

2. Swelling ratio and flux decreased, but tensile strength, sorption selectivity and separation factor increased with increasing crosslinking time at constant concentration of sulfuric acid and membrane formation temperature.

3. Swelling ratio and flux decreased, but tensile strength, sorption selectivity and separation factor increased with increasing membrane formation temperature at constant concentration of sulfuric acid and crosslinking time.

4. The preparation conditions of membranes which gave optimum pervaporation performance were found to be 66 °C of membrane formation temperature, 0.28 M of crosslinking agent (H_2SO_4) and 102 min crosslinking time.

5. Total flux decreased and separation factor increased with increasing in feed concentration.

6. Total flux increased, while separation factor decreases with increasing feed temperature.

7. The optimum conditions of pervaporation performance which were found to be 70 °C of feed temperature and 95 %w/w ethanol of feed concentration.

8. From the comparison shown in Table 4.1, there were few reports in literatures which gave the better separation factor, but less total flux than this work.

Future work recommendation

1. The effect of membrane thickness on pervaporation process should be investigated in order to explain flux increases with decreasing membrance thickness. These due to decreasing resistance faced by molecules for diffusing through the barrier.

2. The effect of feed flow rate on pervaporation process should be investigated since flux increases with increasing feed flow rate, which attributed to the decreasing of concentration polarization.

3. Results from using RSM investigated the membrane preparation condition gave low value of R^2 of each response model. Thus, the model of each response should be changed for increasing R^2 value.