CHAPTER V
CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

The multistage foam fractionation for surfactant recovery from water was investigated in a continuous flow operation. The effects of several important parameters such as feed position, reflux position and reflux ratio were investigated for two single-surfactant system and mixed system of cetylpyridinium chloride (CPC) and Polyethylene glycol tert-octylphenyl ether ($OPEO_{10}$) were used as a model of cationic and nonionic surfactant, respectively. The separation efficiencies are presented in terms of the %surfactant recovery and the enrichment ratio. From the results of this study, it can be concluded that:

1. In both single-surfactant systems and the mixed-surfactant system were strongly effect by the feed position.

2. Effect of feed position in single-surfactant systems, the %surfactant recovery of CPC and $OPEO_{10}$ obtained in this column were in the rang of 87-97 and 89-97, respectively. Also, the enrichment ratio of CPC was in the rang of 1-6 while the enrichment ratio of $OPEO_{10}$ was in the rang of 130-160.

3. The effect of the reflux position and the reflux ratio were not significant on the %surfactant recovery and the enrichment ratio of $OPEO_{10}$ systems.

4. In all of the mixed-surfactant systems, the effectiveness of the multi-stage foam fractionation process in recovering $OPEO_{10}$ is better than CPC and the $\%OPEO_{10}$ recovery was almost 100% in the studied condition due to the synergism effect of CPC and $OPEO_{10}$.

5. In the mixed system, an increase in the feed position resulted in an increase both the %surfactant recovery and the enrichment ratio.

6. The reflux ratio had strongly effect on %CPC recovery.

5.2 Recommendations

The other parameters such the other type of nonionic surfactants and cationic surfactants are recommended for further study in order to explain the effect of the feed position in surfactant recovery by a multistage foam fractionation column.