

CHAPTER V

CONCLUSION 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 air flow rate, liquid feed flow rate, and foam heights were investigated in multi-stage operation for both single and mixed surfactant systems. Cetylpyridinium chloride (CPC) and Polyethylene glycol tert-octylphenyl (OPEO₁₀) were used as a model of cationic and nonionic surfactant, respectively. The performance of the foam fractionator was evaluated in two aspects: the surfactant recovery (%) and the enrichment ratio. From the results of this study, it can be concluded that:

1. In comparison in all single and mixed surfactant systems, the effectiveness of the multi-stage foam fractionation process in recovering OPEO₁₀ is better than CPC.

2. In single surfactant systems, the enrichment ratio of OPEO₁₀ and CPC obtained in this column were in the range of 12-380 and 2-81, respectively. Also, the surfactant recovery of OPEO₁₀ was in the range of 90-97% while the surfactant recovery of CPC was in the range of 80-95%.

3. In both single surfactant systems, both enrichment ratio and %surfactant recovery obtained in this study are higher than those of the previous work since the present foam fractionator has a higher mass transfer area than those of the previous units.

4. In mixed surfactant systems, Synergism of CPC and OPEO₁₀ is observed at the ratio of CPC:OPEO₁₀ equal to 1:3.

5. In all of the mixed surfactant systems, the surfactant recovery of OPEO₁₀ was much higher than that of CPC and it was almost 100% in the studied conditions.

6. Increasing liquid feed flow rate resulted in both decreases in the enrichment ratio and % surfactant recovery for both single and mixed surfactant systems.

7. An increase in air flow rate resulted in an increase in the surfactant recovery but the enrichment ratio was decreased.

8. The effect of foam height on the surfactant recovery was not as significant as it was on the enrichment ratio.

5.2 Recommendations

The other parameters such as number of stages, feed position, reflux ratio, and added salt are recommended for further study in order to maximize the effectiveness in surfactant recovery by a multistage foam fractionation column.