

CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

In this experiment, cloud point of each condition was taken to investigate the effect of molecular structures of surfactant which are number of ethylene oxide and number of carbon in alkyl chain. CPE efficiency showed in terms of coacervate fractional volume, surfactant partition ratio, organic solute partition ratio, surfactant extraction percentage, and organic solute partition ratio.

5.1 Conclusions

There are many factors studied in this study to show the effect on CPE efficiency.

Effect of Number of Ethylene Oxide Group on CPE Efficiency

At the low number of ethylene oxide, the low cloud point and the low extraction efficiency were obtained. Organic solute of the low number of ethylene oxide was very concentrated in the small coacervate phase volume, so this condition would be suitable for the pre-concentration and recycling process of the organic solution. At the high number of ethylene oxide, the high cloud point and the high extraction efficiency were obtained. This condition consumed quite high energy even it gave the less amount of wastewater from the dilute phase.

Effect of Number of Carbon Atoms in Alkyl Chain on CPE Efficiency

As the number of carbon atoms in alkyl chain increased, both percentage of organic solute extraction and organic solute partition ratio increased in the less volume of coacervate phase. These behaviors can be implied that CPE efficiency increased as the number of carbon atoms in alkyl chain increased.

Effect of Electrolyte on CPE Efficiency

The extraction efficiency increased as the concentration of NaCl increases. Moreover, to increase CPE efficiency, addition of NaCl could also enable the

coacervate phase shift from the bottom to the top of the solution after the extraction occurred.

Effect of Operating Temperature on CPE Efficiency

Increasing of organic solute partition ratio as the operating temperature increases can conclude that the CPE efficiency increase. The unchanged percentage of organic solute extraction with the changed operating temperature was due to the decreasing coacervate volume.

Effect of Molecular Structure of Organic Solute on CPE Efficiency

The extraction efficiency of *p*-cresol was higher than that of phenol because *p*-cresol has higher hydrophobicity than phenol.

5.2 Recommendations

In order to enhance CPE efficiency, the further study should be done. For instances, the effect of adding the other types of surfactant to form a mixed surfactants system should be investigated. In addition, CPE is usually carried out as batch experiment in the laboratory scale; therefore, this technique scale up to the continuous system should be carried out for practical uses. The investigation of surfactant recovery should be examined as well. For example, the removal of nonionic surfactant in the coacervate phase which is contaminated with organic compound possible to be accomplished by using of vacuum stripping.