CHAPTER V
CONCLUSIONS AND RECOMMENDATONS

5.1 Conclusions

In this work, the isotherms of surfactant adsorption on the hydrophobic plastic surfaces were investigated and related with the zeta potential of the plastic. Three surfactant representatives were sodium dodecyl sulfate (anionic surfactant), cetyl trimethylammoniumbromide (cationic surfactant) and t-cetylphenol polyethoxylate (nonionic surfactant). The plastics used for adsorption study were high-density polyethylene (HDPE) and polypropylene (PP)

From the experiment results, the conclusions can be drawn as following:

Adsorption of surfactants on HDPE

1. The adsorption isotherm of SDS and CTAB showed a inflection which can be described by changing the orientaion of surfactant, while Triton X-114 showed an unclear inflection on the isotherm.

2. From the adsorption and zeta potential results it can be concluded that, at pH 6, the SDS and CTAB adsorbed on HDPE plastic possibly had the head group toward the solution for all equilibrium concentration. However, at the maximum adsorption SDS formed partial bilayer while CTAB did not completely cover the plastic surface. For the maximum adsorption of nonionic surfactant Triton X-114, the orientation of surfactant on the surface was possibly in the horizontal formation.

3. Adding electrolyte caused a steeper adsorption isotherm at below CMC and also shifted the plateau to lower equilibrium. However, changing the ionic strength did not have much effect on the amount of adsorbed surfactants at plateau region.

4. The pH of solution had significant effect on an ionic surfactant adsorption by changing the charge of plastic surface. At lower pH, zeta potential is more positive, therefore the maximum adsorption of anionic surfactant (SDS) was increased, whereas for cationic surfactant (CTAB) the maximum adsorption was lower. The reversed is true when pH was increased.

Adsorption on PP

1. For adsorption on PP, the adsorption isotherm of all surfactants did not show a clear inflection .

2. The adsorption and zeta potential results can be concluded that at pH 6 the orientaion of SDS and CTAB possibly had the head group toward the solution for all equilibrium concentration and performed monolayer formation on the surface at the maximum adsorption. While, the orientation of Triton X-114 on the surface at the maximum adsorption was in the horizontal formation.

3. Adding electrolyte caused the same effect on the surfactant adsorption on PP surface also showed the similar results to the adsorption on HDPE.

4. Changing in pH had no effect on adsorption. This was consistent with the zeta potential of plastic surface.

5.2 Recommendations

1. The effect of hydrocarbon chain length are recommended to further study, because hydrophobic interaction is one of the main driving force to the adsorption of surfactant on hydrophobic surface.

2. The surfactant adsorption should be study on other plastics beside HDPE and PP to investigate the effect of hydrophobicity of plastic surface on the adsorption.