CHAPTER V
CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

In this study, the adsorption isotherm of surfactant on plastics which have high polarity were investigated and correlated to the contact angle of surfactant solution on those plastics. Three surfactant used were sodium octylbenzene sulfonate (anionic surfactant), cetylpyridinium chloride (cationic surfactant), and polyoxyethylene octyl phenyl ether (nonionic surfactant). The plastics used for both adsorption and contact angle study were polymethyl methacrylate (PMMA), acrylonitrile butadiene styrene (ABS) and polyhexamethylene adipamide (Nylon6,6)

From the results, the conclusion can be drawn as following:

Adsorption and wetting of CPC

1. According to the opposite charge between CPC and the surfaces, in the non-NaCl condition, CPC adsorbed in horizontal line which obstructed others CPC molecules to adsorb.

2. The effect of electrolyte on adsorption was more pronounced for CPC solution below CMC due to both the reduction of electrostatic repulsion between the head group and the reduction of charge attraction between head group and the surfaces.

3. For all cases, the presence of CPC in solution decreased the contact angle of water on plastics. In non-NaCl condition, CPC lowered only the γ_{LV}. Moreover, the presence of NaCl could also reduce the γ_{SL} resulting in a lower contact angle.

4. For a pure CPC solution, the γ_{SL} was not a function of CPC concentration and adsorption on polar plastics.

5. The addition of NaCl leaded the γ_{SL} to be related to CPC concentration as the γ_{SL} decreased with increasing CPC concentration. Together with the adsorption isotherm, γ_{SL} was also found to be decrease with CPC adsorption on plastics since NaCl allowed more CPC to adsorb on the surface.

6. The wettability of CPC could be effected by the polarity of plastics. The presence of NaCl hindered the ability to reduce the contact angle for CPC solution that has the same γ_{LV}. This phenomenon due to the difference in the nature of solid/liquid (polar/polar) interface and liquid/vapor (polar/non-polar) interface. This difference caused CPC preferred to adsorb on liquid/vapor interface. Therefore, the addition of NaCl did not effectively reduce γ_{SL} as effectively as γ_{LV}.

Adsorption and wetting of NaOBS

1. As well as CPC, the effect of adding electrolyte on NaOBS adsorption was increased with added NaCl and this effect was more pronounced below CMC.

2. Similar to CPC case, the contact angles decrease significantly with increasing NaOBS concentration until becoming constant at above the CMC. Moreover, the presence of NaCl resulted in better wetting for solutions that have the same NaOBS concentration.

3. For all cases, the γ_{SL} decreased with increasing NaOBS concentration.

4. At the same NaOBS concentration, the solution that had a higher ionic strength had a lower γ_{SL} because the addition of NaCl allowed more NaOBS to adsorb at the solid/liquid interface.

5. Contrary to CPC case, polarity of plastics had no effect on wettability of NaOBS solution. For the same γ_{LV} of NaOBS produced almost the same contact angle on the same type of plastic. This phenomenon possibly due to due to both the structure and the charge of NaOBS.

Adsorption and wetting of $OPEO_{10}$

1. As obtained from CPC and NaOBS, the adsorption increased with $OPEO_{10}$ concentration until reach plateau at about CMC.

2. The contact angle decreased with increasing $OPEO_{10}$ concentration and become nearly constant at the CMC region.

3. As well as CPC and NaOBS, the γ_{SL} decreased with increasing $OPEO_{10}$ concentration and adsorption.

5.2 Recommendations

1. The effect of pH is recommended for further study. The range of pH should cover a point of zero charge (PZC) of the polar plastics.

2. The effect of mixed surfactant on wettability should be studied by using the mixture of cationic/nonionic, anionic/nonionic and cationic/anionic in the ratio of 1:1.