

CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

As the cold water detergency of semi-solid fats is a complicated system compared to oily soil detergency. One of the most important mechanisms is solubilization of solubilize by surfactant solution. The aims of this study were to formulate middle microemulsion in solubilization study and to enhance solubilization of semi-solid fat using mixed surfactant systems.

The middle phase microemulsion formation is a key determination for obtaining optimum solubilization. Since the middle phase microemulsion ($IFT < 10^{-3}$ mN/m) was difficult to observe for single anionic extended surfactant [$C_{14-15}H_{29-31}-(PO)_8-SO_4Na$], nonionic surfactants [$C_{12-14}H_{25-29}-(EO)_n-OH$ ($n=3, 5, \text{ and } 9$)] and mixed anionic and nonionic surfactant systems [$C_{14-15}H_{29-31}-(PO)_8-SO_4Na/C_{12-14}H_{25-29}-(EO)_n-OH$ ($n=3, 5, \text{ and } 9$)]. Therefore, the optimum formulations were selected base on IFT measurement. The lowest IFT values were anionic extended surfactant [$C_{14-15}H_{29-31}-(PO)_8-SO_4Na$] at 4.6 %w/v NaCl and mixed surfactant systems [$C_{14-15}H_{29-31}-(PO)_8-SO_4Na/C_{12-14}H_{25-29}-(EO)_3-OH$] at 4.6 %w/v NaCl, while single nonionic surfactants cannot reach the low IFT as approximately as anionic surfactant and mixed surfactant systems.

From solubilization study with semi-solid, palm stearin, the nonionic surfactant [$C_{12-14}H_{25-29}-(EO)_3-OH$] proportion in mixed surfactant systems considerably increased β , MSR_s, X_{mic} and K_{mic} .

5.2 Recommendations

The further study should perform microemulsion with single fatty acid component to form middle phase microemulsion and the use of co-surfactants (hydrophilic linkers or alcohol) to enhance the solubilization capacity of triglyceride based vegetable oil or semi-solid fat need to be further investigated.