

CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

The adsorption isotherm of SDS on paper fiber was found to be S-Shaped. The curve could be explained that SDS was adsorbed mainly by hydrophobic interaction as tail down orientation with negatively charged sites of paper fiber. However, the adsorption of SDS remained constant when the concentration reached CMC. At this concentration the plateau adsorption of SDS was approximately at $0.5 \mu\text{mol}/\text{m}^2$. On the other hand, calcium ions were adsorbed mainly by electrostatic interaction on negatively charged site of paper fiber. The surface loading of calcium on paper fiber was higher than $15 \mu\text{mol}/\text{m}^2$. The adsorption capacity of paper fiber for calcium was greater than that for SDS. However, paper fiber had more affinity for SDS than calcium. For the system with the presence of calcium concentration of $100 \mu\text{M}$, the surface loading of calcium ions was $0.02 \mu\text{mol}/\text{m}^2$. Adsorbed SDS remained unchanged and was not affected by calcium adsorption. When calcium concentration was increased to $1,000 \mu\text{M}$, it could cover surface up to $0.15 \mu\text{mol}/\text{m}^2$. In this condition, initial SDS concentration used was less than $1,000 \mu\text{M}$ to prevent precipitation and SDS could adsorb only one-tenth of total capacity. Therefore, there was enough negatively charged sites for calcium adsorption and were not adsorbed as cooperative adsorption. The pH of solution had direct effect on SDS adsorption because H^+ and OH^- ions were the potential determining ions. At pH 9, there were more OH^- ions on paper fiber than one at pH 7. From pH 7 to 9, the SDS adsorption was decreased by half in the concentration range lower than CMC. But the difference of SDS adsorption in these two conditions were almost the same at concentration

greater than CMC. While changing pH made not much effect to the calcium adsorption.

The magnitude of negative zeta potential which is the measurement to inform the dispersion of particles resulted from the quantity of adsorption of SDS and calcium ions. SDS adsorption resulted in decreasing the absolute magnitude of zeta potential by approximately 7 mV. The presence of 100 μM of calcium concentration further decreased the absolute magnitude zeta potential by approximately 1 mV and 2.5 to 5 mV when 1,000 μM of calcium was added. Decreasing pH from 9 to 7 increased SDS adsorption 2 times and decreased the absolute magnitude zeta potential by approximately 3 mV. The decrease of absolute magnitude of zeta potential was only 1 mV when the concentration was close to CMC.

5.2 Recommendations

- To investigate the influence of SDS chain length because the adsorption of SDS on paper fiber is the hydrophobic interaction. Therefore, the effects of hydrocarbon chain length of SDS are recommended to further study.
- To investigate the adsorption at other pH ranges beside pH 7 and 9 that this work had already studied. Other pH levels are suggested to go under study because the change in pH obviously affects the SDS adsorption on paper fiber.