



CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

In this research, the experiments were divided into 2 parts: the effect of cycle time and the effect of C/N ratio on the biosurfactant production using sequencing batch reactors (SBR). Both of these two effects were investigated at oil loading rate of 2 kg/m³d. The results showed that the optimum cycle time of 2 d/cycle provided the highest surface tension reduction of 59% corresponding to the lowest surface tension of 28.82 mN/m. The maximum biosurfactant concentration of 1.05 times the CMC was observed at an operation time of 40 h, providing the highest COD and oil removals of about 89.9% and 96.7%, respectively. Moreover, this cycle time also gave a stable and suitable pH for the microbial growth, which was found to be around 6.04.

The results demonstrated that the MLSS and SS were changed as the C/N ratio was varied. The MLSS at the C/N ratio of 16/3 was higher than that at the C/N ratio of 16/0.57, indicating that nitrogen concentration played an important role in the microbial growth and manipulation (Haba *et al.*, 2000). However, the remaining palm oil in the culture medium at the C/N ratio of 16/3 was much lower than that at the C/N ratio of 16/0.57. The results of surface tension and surface tension reduction at different C/N ratios showed that the lowest surface tension and the highest surface tension reduction were found at the C/N ratio of 16/1. This C/N ratio also gave the suitable pH for the biosurfactant production. Thus, the optimum C/N ratio for the biosurfactant production by *Pseudomonas aeruginosa* SP4 was 16/1, corresponding to the optimum ratio for the biosurfactant production by *Pseudomonas aeruginosa* DSM2659 (Guerra-Santos *et al.*, 1984).

5.2 Recommendations

In this present study, the optimum conditions for the maximum surfactant production were obtained in terms of oil loading rate, cycle time and the C/N ratio. However, the maximum surfactant of 1.05 times the CMC is considerably too low for commercial production. Hence, the future work will try to increase the microbial concentration in the bioreactor by supplementing with soluble organic compounds such as glucose.