CHAPTER V
CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

The biosurfactant production by *Pseudomonas aeruginosa* SP4 which was isolated from petroleum-contaminated soil in Thailand. This experiment was performed in the two identical units of SBRs under aseptic conditions. The reactor temperature was maintained at 37°C throughout the experiments by circulating water through bioreactor jacket. The SBR was operated on the fill-and-draw basis, and the reactors were designed to have working volume of 1,500 ml, feeding volume of 500 ml, and decanting volume of 500 ml. The biosurfactant production was done by using mineral medium as nutrient source, palm oil as the main carbon source, and glucose as the supplement or another carbon source. The effect of oil-to-glucose ratio on the biosurfactant production was investigated. The results indicated that glucose added in the reactor significantly affected the biosurfactant production in the SBR system. It was found that an optimum oil-to-glucose ratio was 40/1 oil-to-glucose ratio.

Two kg/m^3 day of oil loading rate (OLR) and 16/1 of carbon-to-nitrogen ratio were selected to use in this studied because Pornsunthorntawee *et al.* (2009) reported that it was an optimum condition for biosurfactant production by *Pseudomonas aeruginosa* SP4. In this work the effect of oil-to-glucose ratio on the biosurfactant production in the SBR system was studied at six oil-to-glucose ratios: oil-to-glucose ratio without glucose added, 60/1, 40/1, 30/1, 20/1, and 10/1 oil-to-glucose ratio. An optimum oil-to-glucose ratio for biosurfactant production was obtained at 40/1 oil-to-glucose ratio. Any change to both lower and higher glucose added caused an appreciable drop in COD and oil removal. The results suggest that 40/1 oil-to-glucose ratio was the most suitable ratio for the biosurfactant production since it gave a surface tension of 29.9 mN/m and a surface tension reduction of 58.45%, corresponding to a highest COD and oil removal of 85.14% and 77.69%, respectively.

MLSS, represented microorganisms, in the reactor at 40/1 oil-to-glucose ratio increased 2297.5 mg/l (78.8%) from 2915 mg/l to 5212.5 mg/l when compared to using palm oil as a sole carbon source. The findings exhibited that when glucose

was added to the reactor, it was effectively enhanced the microbial growth in the system. pHs of biosurfactant-producing by using palm oil as a sole carbon source and the combination of 2 carbon sources (palm oil, and glucose) were in the range 7.6-8.1 whereas the pH at optimum oil-to-glucose ratio (40/1 oil-to-glucose ratio) was 7.9. The maximum biosurfactant concentration of 1.11 times CMC was observed at an operation time of 42^{nd}-48^{th} h.

5.2 Recommendations

The purification and chemical characterization of biosurfactant should be further investigated because the results can determine chemical components of biosurfactant produced by *Pseudomonas aeruginosa* using SBR. There are many advantages for utilizing this biosurfactant in the future.