CHAPTER V
CONCLUSIONS

Biosurfactant producing *Pseudomonas aeruginosa* SP4 was isolated from petroleum or oil environments. Preliminary results indicated that the isolate SP4 is a member of genus *Pseudomonas aeruginosa* with high similarity to *Pseudomonas aeruginosa* which was reported to produce rhamnolipid-type biosurfactant (Jarvis and Johnson, 1949).

Although, some research work reported that biosurfactant production was produced by used carbohydrate as a carbon source but most of biosurfactant-producing *Pseudomonas aeruginosa* was cultivated by hydrocarbon as a carbon source such as glycerol, safflower oil, soybean oil, olive oil, coconut oil, canola oil, n-hexane and alcohol (Lang *et al.,* 1999, Rahman *et al.,* 2002, Patel *et al.,* 1997, and Sim *et al.,* 1997). Thus, in this research we used palm oil as a supplemented carbon source because it was easy to obtain as well as being low in price in Thailand. *Pseudomonas aeruginosa* SP4 has the capacity to use carbon source such as nutrient broth, basal medium, and defined medium. This strain can produce four compounds of biosurfactants from palm oil as a substrate carbon source. However, the use of a nutrient broth supplemented with palm oil as a carbon source showed the best results as described by Chongchin *et al.,* 1999.

The variation in the percentage of palm oil as a substrate from 2 to 10 %v/v with nutrient broth showed that, at 2% palm oil, the highest percentage reduction of surface tension (43.2%) and the greatest oil displacement (132.8 cm^2) were obtained, and that when the percentage of palm oil rose above 2 %v/v there was an inhibitory effect on microbial activity. This inhibitory effect was hypothesized to be problems linked to the solubility of palm oil and the difficulty of the bacterium to gain access to the high concentration (%v/v) of palm oil in the culture medium (Santa Anna *et al.,* 2002).

The critical micelle concentration of free-cell broth of *Pseudomonas aeruginosa* SP4 was 61 mg/L that was good in agreement with the tension-active properties of these molecules, indicating good prospects for application in industry,

when compared to the values of the CMC of synthetic surfactants (Santa Anna *et al.*, 2002) as shown in, Table 5.1.

The preliminary test for oil recovery applications was shown that 76.37% of diesel motor oil complex can recovered by using a free-cell broth (containing biosurfactants) solution after analyzing by total organic carbon analyzer (TOC).

Table 5.1 Comparison of the critical micelle concentration (CMC) of biosurfactant (*Pseudomonas aeruginosa* SP4) with other surfactants

Surfactants	CMC (mg/L)
Biosurfactant (*P. aeruginosa* SP4)	5
Biosurfactant (*Pseudomonas* sp.A41) (Chongchin *et al.*, 1999)	810
Lipopeptide Biosurfactant BS1 (Babu *et al.*, 1994)	67
Tween 80 (Roongsawang *et al.*, 1999)	200
Triton X-100 (Roongsawang *et al.*, 1999)	150
Cetylpyridium chloride (Roongsawang *et al.*, 1999)	500