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STANDARD HYDROCARBONS

ACHARAPORN SUNGPETCH: BIOREMEDIATION OF CRUDE OIL  
AND STANDARD HYDROCARBONS IN SOIL. THESIS ADVISORS: SUCHART  
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Seven different types of bacteria were obtained from oil contaminated soil in the Bangkok area. The enrichment culture was inoculated in Mineral Salt Medium (MSM) with 0.5% Tapis crude oil as the sole carbon source. Seven types of crude oil degraders were isolated: four of them (*Acinetobacter* sp., *Pseudomonas aeruginosa* strain MU 01, MU 02, and MU 03) could degrade crude oil well, whereas the rest (*Pseudomonas cepacia*, *Sphigobacterium multivorum*, and *Acinetobacter lwoffii*) could not degrade crude oil at all, though they could grow in MSM with 0.5% Tapis crude oil. The four dominant types were selected for studying the effects of temperature, nutrients (nitrogen and phosphorus), and surfactant (Tween 80) on crude oil degradation in batch reactor system by using both mixed and pure culture. The results showed that the percentage of total hydrocarbons (THC) degradation was highest at 30°C (30.22%), and was lower at 20°C (22.70%) and 40°C (14.29%). On the other hand, the highest percentage of crude oil degradation by pure culture was obtained at 20°C (24.67%), whereas at temperatures 30°C and 40°C, the percentages of THC degradation were 5.58 and 12.62%, respectively. Furthermore, the results showed that the degradation of crude oil in MSM with nutrients (N and P) was better than in MSM without nutrients for both mixed and pure culture. In mixed and pure culture, the percentages of degradation of THC in MSM at 30°C were 20.32% with nutrients and 16.71% without nutrients, and 14.11% with nutrients and 12.62% without nutrients, respectively. Similarly, a surfactant (Tween 80) also had a positive effect on crude oil degradation. The percentages of THC degradation in MSM of mixed and pure culture at 30°C were 31.76% with surfactant and 30.22% without surfactant, and 26.76% with surfactant and 5.60% without surfactant, respectively. The results indicated that the addition of surfactant exhibited more positive effect on the ability of pure culture to degrade crude oil than on mixed culture. The average rate of standard hydrocarbon (C9-C30) degradation by mixed culture was similar to each other, i.e., 0.1 mg/day. The results also showed that bacteria could degrade the shorter chain n-alkanes C9-C20 more than the longer chain C21-C30. Abiotic loss process also had an effect on crude oil degradation. The results showed that the percentages of abiotic loss of THC were 56.09, 59.60, and 56.24% at 20°C, 30°C, and 40°C, respectively.