B302 Biodegradation of pyrene in marine environment

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In this study, the biodegradation of recalcitrant polycyclic aromatic hydrocarbon, pyrene was investigated in microcosm simulating the beachsand and seawater. The natural biodegradation rates of pyrene were between 30-2200 ng/g(ml)/day in beach sand and seawater when the pyrene loading rates were 0.1, 0.05, 0.02, 0.01%(w/v) at 5, 10, 15, 20℃. The effects of the inoculum size, pyrene concentration, incubation temperature and surfactant addition were investigated in fertilized(Inipol EAP22) samples. Generally the biodegradation in beachsand was higher than seawater. A mixed inoculum(*Pseudomonas, Acinetobacter, Moraxella*) showed the 3120 ng/g/day of biodegradation rate in beachsand at the pyrene loading rate 0.02% and inoculum size 10^7cells/g, which was sixteen times higher than the natural biodegradation rate. The transformation rate in the beachsand of 0.1% pyrene loading rate, 4860 ng/g/day was the highest in this experiment. The glucose and surfactant addition to enhance the biodegradation have negatively influenced on the biodegradation of pyrene. In case of surfactants, CMC(critical micell concentration) might be the limiting factor for the biodegradation.

B303 Efficacy of PRP® for bioremediation of oil spill

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To examine whether PRP(Petrol-Rem, Inc., U.S.A.), which is a oil spill response bioremediation product, extensively enhances the biodegradation of crude oil, the bench-scale batch culture test was carried out. Although the initial rate of the crude oil degradation of PRP added sample was increased with a increase of incubation temperature, it was lower than that of non-stimulated condition(control). This result attributed to the volatilization of low molecular weight components in crude oil was confirmed using the headspace gas analysis. Because the PRP interacted with the crude oil to form a PRP/crude oil mixture that was semisolid and relatively stable, low molecular weight components were trapped and the crude oil degradation was hindered by limited oxygen in aggregate during the experiment. After 5 weeks of incubation at 5, 10, 15 and 20℃, the removal rates of the crude oil in sample were 35, 40, 55 and 80%, respectively. The CO_2 produced from the mineralization of crude oil was measured using the Biometer flask method during 2 months. The cumulative amount of the CO_2 produced in sample and control were 800 μM and 900 μM, respectively. As a result of this study, it can be concluded that this PRP is not capable of accelerating the natural rate of crude oil degradation significantly, but it has a high oil-adsorbing capacity.