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ENHANCED IN-SITU MOBILIZATION AND BIODEGRADATION OF PHENANTHRENE FROM THE SOIL BY PARAFFIN OIL/SURFACTANT

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Mobilization and biodegradation of phenanthrene in the soil was enhanced by using paraffin oil which was stabilized by the addition of surfactant(Brij 30). The ratio of paraffin oil/Brij 30 was determined by measuring the changes in the critical micelle concentration. Stabilized paraffin oil emulsion could solubilize more phenanthrene than control experiments. Column experiment showed increased phenanthrene mobilization from the contaminated soil. Phenanthrene mobilized in the paraffin oil/Brij 30 emulsion could be biodegraded more faster than in water phase or surfactant solution. This result indicates that paraffin oil/surfactant system can be effective and non-toxic for the removal of PAH from the contaminated soil.

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Reductive Dechlorination of PCBs: Dechlorinating Microorganisms and Their Interactions with Methanogens and Sulfate Reducers

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Population dynamics of dechlorinating microorganisms and their interactions with methanogens and sulfate reducers were determined using the most-probable-number technique and specific inhibitors. PCB-free sediments spiked with Aroclor 1248 were inoculated with microorganisms from PCB-contaminated sediments and incubated under anaerobic conditions. The time course of dechlorination mirrored the growth of dechlorinators, which increased more than 2 orders of magnitude. The growth yield was 4×10^{13} cells/mol of Cl dechlorinated. On the other hand, when dechlorinators were inoculated into PCB-free sediments, they declined from the initial level with time. These results indicate that PCBs are required for their growth. Methanogens and sulfate reducers also grew about 2 orders of magnitude from their initial levels, but there was no difference between PCB-spiked and free sediments. Inhibition of sulfate reducers using molybdate did not have any effect on PCB dechlorination or the number of dechlorinators. However, when methanogens were inhibited by 2-bromoethanesulfonate (BES), the rate and extent of dechlorination decreased. This decrease was primarily due to the resistance of dechlorination in congeners rich in *meta*-Cl such as 2,5,2,5-, 2,3,2,5- and 2,5,2-chlorobiphenyls. BES had little effect on the number of dechlorinators. Therefore, it appears that either some methanogens are also dechlorinators or some dechlorinators require methanogens for the dechlorination of some of the *meta*-substituted congeners.