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ANAEROBIC BIOREMEDIATION OF PAH–CONTAMINATED SOIL: ASSESSMENT OF THE DEGRADATION OF CONTAMINANTS AND BIOGAS PRODUCTION UNDER THERMOPHILIC AND MESOPHILIC CONDITIONS

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Abstract

The degradation of polycyclic aromatic hydrocarbons (PAHs) including fluorene, phenanthrene, anthracene, fluoranthene and pyrene were investigated under thermophilic and mesophilic anaerobic-methanogenic conditions. By using central composite design, the impact of PAH concentration and soil to inocula ratio were systematically studied for their influence on PAH removal and biogas production. During the first 30 days, PAH concentration decreased in all samples indicating that the inocula used were able to biodegrade the contaminants; although an inhibition effect was initially observed in biogas production. Phospholipids fatty acids analysis was used to monitor the microbial communities present during the process. These communities were more complex in samples containing moderate to high PAH contamination concentrations. After 50 days, the concentration of PAHs increased in the majority of samples indicating possible reversed biotransformation of these compounds.

Key words: anaerobic digestion, central composite design, PAH-contaminated soil, phospholipids fatty acids, thermophilic/mesophilic conditions

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