

Measuring the Effect of Co-Composting Oil Sludge with Pig, Cow, Horse And Poultry Manures on the Degradation in Selected Polycyclic Aromatic Hydrocarbons Concentrations

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Abstract : Components of oil sludge (PAHs) are known cytotoxic, mutagenic and potentially carcinogenic compounds also bacteria and fungi have been found to degrade PAHs to innocuous compounds. This study is aimed at measuring the effect of pig, cow, horse and poultry manures on the degradation in selected PAHs present in oil sludge. Soil spiked with oil sludge was co-composted differently with each manure in a ratio of 2:1 (w/w) spiked soil: manure and wood-chips in a ratio of 2:1 (w/v) spiked soil: wood-chips. Control was set up similar as the one above but without manure. The mixtures were incubated for 10 months at room temperature. Compost piles were turned weekly and moisture level was maintained at between 50% and 70%. Moisture level, pH, temperature, CO₂ evolution and oxygen consumption were measured monthly and the ash content at the end of experimentation. Highest temperature reached was 27.5 °C in all compost heaps, pH ranged from 5.5 to 7.8 and CO₂ evolution was highest in poultry manure at 18.78µg/dwt/day. Microbial growth and activities were enhanced; bacteria identified were Bacillus, Arthrobacter and Staphylococcus species. Percentage reduction in PAHs was measured using automated soxhlet extractor with Dichloromethane coupled with gas chromatography/mass spectrometry (GC/MS). Results from PAH measurements showed reduction between 77% and 99%. Co-composting of spiked soils with animal manures enhanced the reduction in PAHs.

Keywords : animal manures, bioremediation, co-composting, oil refinery sludge, PAHs

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