

Occurrence and sources of aliphatic hydrocarbons in anthropogenic impacted soils from petroleum tank-farms in the Niger Delta, Nigeria

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Abstract. The occurrence and compositional pattern of priority pollutants are vital in understanding the anthropogenic contributions, origin, and risks of these pollutants to the surrounding environment. Thus, the focus of this study was to determine the concentrations, compositional profiles, and sources of aliphatic hydrocarbons (AHCs) in anthropogenic impacted soils from petroleum tank-farms environment in the Niger Delta, Nigeria. Forty-five soil samples were collected from the vicinity of petroleum tank-farms at the top (0-15 cm), sub (15-30 cm), and bottom (30-45 cm) soil depths. The concentration of AHCs was determined using gas chromatography-mass spectrometer (GC-MS) after extraction by ultrasonication with hexane/dichloromethane and clean-up in silica gel/alumina packed column. The mean concentrations of AHCs in the samples ranged from 0.52 ± 0.90 to 35.26 ± 35.69 mg/kg. The AHCs results show that the equivalent carbon number index (ECn-) ECn-13-35 had the highest concentration when compared to ECn-8-12 and ECn-36-40. The linear regression and ANOVA indicate that there is no significant positive correlation between TOC and the total concentration of AHCs in the soil profiles, and a significant variation in AHCs levels between soil profiles respectively. Results also showed that soils from the tank-farms are moderately contaminated with AHCs when compared to the UNEP recommended limit. However, when compared to other regulatory thresholds, the observed concentrations of AHCs, human and environmental health risks are likely. Source apportionments depict that the principal sources of AHCs were petrogenic and plant diagenesis. Appropriate clean-up and mitigation measures and further study to determine the occurrence, composition, and exposure risks of other priority pollutants in water and sediment samples from the surrounding creeks should be determined.

Keywords: aliphatic hydrocarbons; occurrence profiles; source identification; soil pollution; exposure risk.

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