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Distribution and Risk Assessment of Phthalates in Water and Sediment of Omambala River, Anambra State, Nigeria in Wet Season

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Abstract : Phthalates or Phthalate esters (PAEs), categorized as an endocrine disruptor and persistent organic pollutants, are known for their environmental contamination and toxicological effects. In this study, the concentration of selected phthalates was determined across the sampling site to investigate their occurrence and the ecological and health risk assessment they pose to the environment. Water and sediment samples were collected following standard procedures. Solid phase and ultrasonic methods were used to extract seven different PAEs, which were analyzed by Gas Chromatography with Mass Detector (GCMS). The analytical average recovery was found to be within the range of s83.4% ± 2.3%. The results showed that PAEs were detected in six out of seven samples with a high percentage of detection rate in water. Di-n-butyl phthalate (DPB) and diisobutyl phthalates (DiBP) showed greater detection rate compared to other PAEs monomers. The concentration of PEs was found to be higher in the sediment samples compared to the water samples due to the fact that sediments serve as a sink for most persistent organic pollutants. The concentrations of PAEs in water samples and sediments ranged from 0.03 ± 0.01 to 0.29 ± 0.002 ppm and 3.99 ± 0.43 to 6.04 ± 1.25 ppm, respectively. Ecological risk assessment using the risk quotient method (RQ) reveals that the estimated environmental risk caused by phthalates lies within the moderate level as RQ ranges from 0.1 to 1.0, whereas the health risk assessment caused by phthalates on estimating the average daily dose reveals that the ingestion of phthalates was found to be high which can cause serious carcinogenic occurrence in the human system with time due to excess accumulation.

Keywords : phthaletes, assessment, marine pollution, endocrine
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