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Distribution and Historical Trends of PAHs Deposition in Recent Sediment Cores of the Imo River, SE Nigeria

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Abstract : Polycyclic aromatic hydrocarbons (PAHs) are a class of priority listed organic pollutants due to their carcinogenicity, mutagenity, acute toxicity and persistency in the environment. The distribution and historical changes of PAHs contamination in recent sediment cores from the Imo River were investigated using gas chromatography coupled with mass spectrometer. The concentrations of total PAHs (TPAHs) ranging from 402.37 ng/g dry weight (dw) at the surface layer of the Estuary zone (ESC6; 0-5 cm) to 92,388.59 ng/g dw at the near surface layer of the Afam zone (ASC5; 5-10 cm) indicate that PAHs contamination was localized not only between sample sites but also within the same cores. Sediment-depth profiles for the four (Afam, Mangrove, Estuary and illegal Petroleum refinery) cores revealed irregular distribution patterns in the TPAH concentrations except the fact that these levels became maximized at the near surface layers (5-10 cm) corresponding to a geological time-frame of about 1996-2004. This time scale coincided with the period of intensive bunkering and oil pipeline vandalization by the Niger Delta militant groups. Also a general slight decline was found in the TPAHs levels from near the surface layers (5-10 cm) to the most recent top layers (0-5 cm) of the cores, attributable to the recent effort by the Nigerian government in clamping down the illegal activity of the economic saboteurs. Therefore, the recent amnesty period granted to the militant groups should be extended. Although mechanism of perylene formation still remains enigmatic, examination of its distributions down cores indicates natural biogenic, pyrogenic and petrogenic origins for the compound at different zones. Thus, the characteristic features of the Imo River environment provide a means of tracing diverse origins for perylene.

Keywords : perylene, historical trend, distribution, origin, Imo River
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