

11<sup>th</sup> Annual Congress on  
**CHEMISTRY**  
September 12-13, 2018 Singapore

**Source and toxicological assessment of Polycyclic Aromatic Hydrocarbons in sediments from Imo River, Southeastern Nigeria**

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Rivers are an important interface between the continents and oceans since they are involved in the delivery of a key flux of toxic and persistent organic pollutants such as Polycyclic Aromatic Hydrocarbons (PAHs) to the ocean. Continued gas flaring associated with petroleum related activity as well as bunkering/oil pipeline vandalization introduce large amounts of PAHs into the Niger delta river network with attendant adverse health effect on the resident fauna and flora. As part of the river system, understanding the sources of PAHs in sediments allows mitigation process to be carried out much easier. PAHs in sediments from the Imo River were analyzed to characterize their sources and assess their toxicity potential with the view of mitigating them. Localized contamination prevailed, reflected in a wide range of total PAH concentrations (TPAH) of 409.43-41,198.36 ng/g dry weight (dw) with a large standard deviation of  $4,796.67 \pm 1941.56$ . A more robust Principal Component Analysis (PCA) coupled with n-alkanes distribution profiles approach differentiated stations that were heavily from those that were mildly impacted by oil and discriminated among stations that were influenced by pyrogenic sources. Effect Range Low (ERL) and Effect Range Median (ERM) as well as Risk Quotients (RQwcs) revealed that only naphthalene, flourene, dibenzo(a,h)anthracene and low molecular weight PAHs were implicated as compounds of concern. The Maximum Toxicity Equivalency value measured for the illegal petroleum refinery site, 179.81 ng/g TEQ<sub>scarce</sub>, indicated that this site requires some control measure and remedial action. Currently, the mechanism and kinetic of a natural based biochar augmented biodegradation process with higher remediation efficiency potential is being investigated by us for application in the Niger delta environment.

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