

Quantification of Polychlorinated Biphenyls (PCBs) in Soil Samples of Electrical Power Substations from Different Cities in Nigeria

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Abstract : Polychlorinated Biphenyls (PCBs) are Persistent organic pollutants (POPs) that are very toxic; they possess ability to accumulate in soil and in human tissues hence resulting in health issues like birth defect, reproductive disorder and cancer. The air is polluted by PCBs through volatilization and dispersion; they also contaminate soil and sediments and are not easily degraded. Soil samples were collected from a depth of 0-15 cm from three substations (Warri, Ughelli and Ibadan) of Power Holding Company of Nigeria (PHCN) where old transformers were dumped in Nigeria. Extraction and cleanup of soil samples were conducted using Accelerated Solvent Extraction (ASE) with Pressurized Liquid extraction (PLE). The concentration of PCBs was determined using gas chromatography/mass spectrometry (GC/MS). Mean total PCB concentrations in the soil samples increased in the order Ughelli < Ibadan < Warri, 2.457757ppm Ughelli substation 4.198926ppm, for Ibadan substation and 14.05065ppm at Warri substation. In the Warri samples, PCB-167 was the most abundant at about 30% (4.28086ppm) followed by PCB-157 at about 20% (2.77871), of the total PCB concentrations (14.05065ppm). Of the total PCBs in the Ughelli and Ibadan samples, PCB-156 was the most abundant at about 44% and 40%, respectively. This study provides a baseline report on the presence of PCBs in the vicinity of abandoned electrical power facilities in different cities in Nigeria.

Keywords : polychlorinated biphenyls, persistent organic pollutants, soil, transformer

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