XRF Spectroscopy Assessment of Trace Metal Pollution and Distribution in Surface Soils Caused by Anthropogenic Activities.

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Abstract

The study is aimed to analyze and assess the presence of trace metals (Pb, Hg, and Cd) in the surface soils near to the Subin River in the Kumasi metropolis, using X-Ray Fluorescence (XRF) spectroscopy. In all twenty (20) soil samples were collected close to the River at regular interval of 5m, which covers a 100 m transect long distance with the aid of stainless steel core samplers. The samples were suitably packaged and conveyed into the laboratory for sample preparation and the elemental analysis. The concentration of the trace metals were qualitatively and quantitatively measured using the X-Lab 2000 XRF spectrometer from the Ghana Geological Survey Department. After the elemental analysis the average concentrations of the trace metals (Pb, Hg, and Cd) were respectively (80.84 $mgkg^{-1}$, 2.52 $mgkg^{-1}$, and 4.05 $mgkg^{-1}$). According to these results, the concentration of the trace metals in the soil were highly recorded above their threshold limit values (TLVs) by an amount of 60.84 $mgkg^{-1}$ for Pb, 1.52 $mgkg^{-1}$ for Hg and 3.05 $mgkg^{-1}$. These metals are highly toxic even in very low concentrations, and their toxicity and poisoning in soft tissues of living organisms often become very detrimental to human health. These high excess concentration values alarmingly depict that, the study site is highly polluted with those metals, and the river-body and the inhabitants who reside closely to the polluted river, are at serious risk.

***Keywords*:** Trace metals, XRF spectroscopy, Pollution, concentration, Toxicity, Threshold Limit Values (TLVs), Soil.

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