

Hydrogeochemical Investigation of Lead-Zinc Deposits in Oshiri and Ishiagu Areas, South Eastern Nigeria

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Abstract : This study assessed the concentration of heavy metals (HMs) in soil, rock, mine dump pile, and water from Oshiri and Ishiagu areas of Ebonyi State. Investigations on mobile fraction equally evaluated the geochemical condition of different HM using UV spectrophotometer for Mineralized and unmineralized rocks, dumps, and soil, while AAS was used in determining the geochemical nature of the water system. Analysis revealed very high pollution of Cd mostly in Ishiagu (Ihetutu and Amaonye) active mine zones and with subordinates enrichments of Pb, Cu, As, and Zn in Amagu and Umungbala. Oshiri recorded sparingly moderate to high contamination of Cd and Mn but out rightly high anthropogenic input. Observation showed that most of the contamination conditions were unbearable while at the control but decrease with increasing distance from the mine vicinity. The potential heavy metal risk of the environments was evaluated using the risk factors such as enrichment factor, index of Geoaccumulation, Contamination Factor, and Effect Range Median. Cadmium and Zn showed moderate to extreme contamination using Geoaccumulation Index (Igeo) while Pb, Cd, and As indicated moderate to strong pollution using the Effect Range Median. Results, when compared with the allowable limits and standards, showed the concentration of the metals in the following order Cd>Zn>Pb>As>Cu>Ni (rocks), Cd>As>Pb>Zn>Cu>Ni (soil) while Cd>Zn>As>Pb> Cu (for mine dump pile. High concentrations of Zn and As were recorded more in mine pond and salt line/drain channels along active mine zones, it heightened its threat during the rainy period as it settles into river course, living behind full-scale contaminations to inhabitants depending on it for domestic uses. Pb and Cu with moderate pollution were recorded in surface/stream water source as its mobility were relatively low. Results from Ishiagu Crush rock sites and Fedeco metallurgical and auto workshop where groundwater contamination was seen infiltrating some of the wells points gave rise to values that were 4 times high than the allowable limits. Some of these metal concentrations according to WHO (2015) if left unmitigated pose adverse effects to the soil and human community.

Keywords : water, geo-accumulation, heavy metals, mine and Nigeria.

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