

Hydrogeochemical characterization of a shallow groundwater system in the weathered basement aquifer of Ilesha area, southwestern Nigeria

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Abstract Hydrogeochemical characterization of a weathered basement aquifer in Ilesha area, southwest Nigeria, was carried out with respect to geogenic and anthropogenic influences on the shallow groundwater system. Physico-chemical parameters revealed a pH of 6.4–8.4 and EC of 22–825 $\mu\text{s}/\text{cm}$ in the urban areas compared to a pH of 7.3–10.5 and relatively higher EC of 126–1027 $\mu\text{s}/\text{cm}$ in the peri-urban area. The concentrations of major cations (Ca, Na, K, Mg) in the urban areas revealed relatively lower average concentrations of 28.4, 16.7, 8.4 and 5.0 mg/L, respectively, compared to 82.5, 33.4, 19.3 and 12.4 mg/L, respectively, for the peri-urban areas. The low concentrations of major cations in the urban areas can be attributed to low mineral dissolution of quartzite and muscovite quartz-schist bedrocks compared to the weathered granitic, amphibolite and biotite schist in the peri-urban areas. Hydrochemical characterization revealed two main water types; namely Ca-Mg-(Na)-HCO₃ mostly in the urban areas suggesting CO₂-charged infiltrating recharge rainwater, and Ca-Na-(K)-SO₄-Cl type in the peri-urban areas as products of water–rock interactions.

Key words groundwater; crystalline basement; weathered aquifer; hydrochemical characterization; water quality