(227)

Study the Change in Laterite Geochemistry with Atmospheric Conditions (Chemical Properties)

Ranaweera, A.B.*, Jayawardena, S.

Institute of Chemistry Ceylon, Rajagiriya, Sri Lanka
**abranaweera@gmail.com*

Abstract

Laterite is a porous, reddish-brown sedimentary rock formed in tropical climates by decomposition of parent rocks and leaching soluble elements. In this process, soluble elements like lime, magnesia, and potash are washed away by water during the wet season, while less soluble oxides of iron, aluminium, and manganese accumulate and cement within the residual soil. Known for its durability, laterite is widely used in construction, necessitating chemical studies under environmental conditions. This study investigates the geochemical behavior of dry and wet laterite under different atmospheric conditions. The methodology involved collecting hardened and fresh laterite samples and analyzing them through EDX analysis for Confirmation, measuring moisture content, Water absorbance, and iron leaching in weathering conditions using atomic absorption spectrometry and conductivity and pH variations to assess chemical changes of laterite in atmospheric settings. Laterite samples taken from the Gampaha district were analyzed throughout the study. In moisture content analysis with dry and wet samples, it was found to exhibit moisture content values of 20.68% and 8.88%, respectively. Conductance measurements revealed that wet laterite releases more ions into water compared to dry laterite, indicating that water interacting with laterite can increase the conductance over time. In acidic medium, higher conductance was observed for both laterite types than water with wet laterite giving higher conductance than dry samples. The study also confirmed that acidic water exacerbates Iron leaching from laterite, resulting in significantly higher Iron concentrations compared to neutral water. Consequently, both the laterite soil and groundwater in such acidic environments are likely to exhibit elevated concentrations of Iron. This emphasizes the enhanced impact of acid rain on soil chemistry. The pH variation of water with laterite indicated initial acidification, followed by stabilization, which is likely due to the dynamic exchange of hydrogen ions between negatively charged clay particles and the solution. This finding highlights the vulnerability of groundwater contaminations in regions with acidic precipitation. Additionally, water absorption tests demonstrated a rapid initial water uptake by dry laterite samples within the first two hours, moving to a moisture saturation with time. The study concludes that laterite undergoes substantial chemical transformations under atmospheric exposure, affecting both water chemistry and soil properties. These results provide valuable insights into laterite's interaction with environmental factors, contributing to its effective management in construction, and environmental engineering.

Keywords: *Conductance, Iron leaching, Laterite, pH variation, Weathering*