

GEOCHEMISTRY, WEATHERING INTENSITY AND PALEO-CLIMATIC CONDITIONS OF SOILS AROUND DUMPSITES FROM IBADAN, OYO STATE, NIGERIA

Romanus A. Obasi
Department of Geology
Ekiti State University
Ado Ekiti, NIGERIA

Henry Y. Madukwe
Department of Geology
Ekiti State University
Ado Ekiti, NIGERIA

Paulinus N. Nnabo
Department of Geology
Ebonyi State University
Abakaliki, NIGERIA

Corresponding author: R.A. Obasi (romanus.obasi@eksu.edu.ng):henrymadukwe@yahoo.co.uk

ABSTRACT

In this study, the chemical compositions, intensity of weathering, and paleo climatic conditions of the soils around dumpsites at Ibadan, Oyo State, Nigeria were studied. Ten soil samples were analyzed using the Laser ablation microprobe inductively coupled plasma- mass spectrometry (La ICP-MS) for the trace and rare earth elements and X-ray fluorescence (XRF) methods for the major oxides at the Central laboratory of the Stellenbosch University, South Africa. The results showed that the chemical compositions indicated a relatively enriched SiO_2 (44.56-67.48) Wt. %, Al_2O_3 (13.54-27.70) and Fe_2O_3 (4.90-11.62) and strongly depleted K_2O (0.57-2.45). Low concentrations (values less than one) of MgO , MnO and Na_2O reflected chemical destruction under oxidizing condition during weathering. Al_2O_3 with Fe_2O_3 and TiO_2 correlated positively suggesting their occurrence in clay minerals formed from the weathering of granite. High ranges of chemical index of alteration (CIA: 81.47-96.91) and chemical index of weathering (CIW: 91.67-99.36) in the study area indicated an intensive weathering of the parent materials. Supporting high intensity of weathering are plots of CIA against Al_2O_3 , high range of PIA (90.61- 99.32%) and the low contents of CaO , K_2O and Na_2O . Low concentrations of K_2O (K-feldspar), Na_2O (Na-feldspars) and an enriched aluminous clay mineral implied serious exposure of the parent rocks to an increased chemical weathering. In the area of provenance, the plot of Na_2O versus K_2O indicated a quartz-rich zone that suggested a mixed source origin whereas a plot of TiO_2 versus Zr showed samples that plotted in both the felsic and intermediate zones, suggesting provenance from more than one source. Reconstructed paleo-climate findings based on the climofunctions indicated that during the formation of Ibadan soils, the climate was humid and warm. The low ranges of Ca (0.08-1.67) and Mn (0.05-0.2) values indicated a warm and humid climate while the average Sr/Cu ratios (1.02) showed a warm humid weather during its deposition.

Keywords: Geochemistry, K-Na feldspar, weathering intensity, provenance, paleo-climate.