

Geochemical studies of the weathering profile developed on the Pegmatitic terrain in Awo mining district, Southwestern Nigeria.

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This study on geochemistry of the weathering profile developed on pegmatite in Awo mining district describes mobility of elements from the bedrock to the top soil. The report is targeted at obtaining the concentration of the major, trace and rare earth elements in the weathered profile revealing the degree of weathering. The pegmatite which intrudes the syenite and migmatite gneiss belongs to the NE/SW trending type.

The samples collected from the B-horizon were air dried, sieved with size of 75 mesh and analysed using X-ray Fluorescence Spectrometry (XRF) analytical technique of the digested samples at ACME Laboratory, Ontario, Canada.

The result of the major, trace and rare earth elements of the weathered soil revealed that Mg, Ca, Na and K have been extremely weathered and massively depleted. The mass percentage of these elements are Mg (-84.3%), Ca (-99.2%), Na (99.9%) and K (-96.0%). The Chemical Index of Alteration (CIA) for the soil samples 1 to 9 are 97%, 97%, 97%, 96%, 96%, 95%, 97%, 97% and 98% respectively; this shows high degree of weathering which indicate that Kaolinite is the clay mineral found in the mining site.

The analysis also shows that there is high abundance of rare metals typified by Ta (3 ppm), Nb (25.6ppm), Cs (26.3ppm), and Sn (36.7ppm), this reveals that the precambrian pegmatite of the study area rare metal bearing.

Integrated C and Cl isotope modeling of chlorinated ethenes degradation

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We propose an integrated method to predict the evolution of carbon and chlorine isotope ratios and we apply the new approach to chlorinated aliphatic hydrocarbons dechlorination. The carbon and chlorine isotopic changes are explicitly simulated by tracking the cleavage of isotopically different C-Cl bonds of the combined carbon-chlorine isotopologues. To illustrate the proposed modeling approach we compare our method with the currently available method, in which carbon and chlorine isotopologues are treated separately. Our approach is self-consistent and provides an accurate description of dual-isotope effects regardless of the extent of the isotope fractionation and physical characteristics of the experimental system. We further applied the new approach to reproduce published experimental results on dehalogenation of chlorinated ethenes both in well-mixed systems and in situations where mass-transfer limitations control the overall rate of biodegradation. Our integrated dual isotope modeling approach is proved to be most advantageous when isotope fractionation factors of carbon and chlorine differed significantly and for systems with mass-transfer limitations, where both physical and (bio)chemical transformation processes affect the observed isotopic values.