World Academy of Science, Engineering and Technology
International Journal of Environmental and Ecological Engineering
Vol:18, No:02, 2024

Determination of Elements and Minerals Present in Harmattan Dust Using Particle Induced X-Ray Emission (PIXE) and X-Ray Fluorescence (XRF) Across Selected Nigerian Stations

Authors : Aweda Francis Olatunbosun, Falaiye Oluwasesan Adeniran

Abstract : The suspended harmattan dust was collected at seven different stations in Nigeria: Iwo (7º 63'N, 4º 19'E), Oyo (8º 12'N, 3º 42'E), Ilorin (8º36'N, 4º 35'E), Minna (9º36'N, 06º35'E), Abuja (09º 09'N, 07º 11'E), Lafia (08º 49'N, 07º50'E), and Jos (9º55'N, 8º55'E), which were analyzed to determine elements and minerals present in the sample using X-Ray Fluorescence (XRF), and Particle Induced X-Ray Emission (PIXE). The collected sample results show the elemental concentration of the sample in various forms across each station. Cr, Ce, Mo, Zr, Sr, V, Ti, K, As, Ni, Mn, Ca, Pb, Fe, Zn, and Cu were found in the sample using an XRF machine. The minerals discovered in the sample include, but are not limited to, Corundum [Al_2O_3], Periclase [MgO], Rutile [TiO_2], and Quartz [SiO_2] in various proportions. Furthermore, the results revealed the enrichment factor for Iwo (1.3998 µg/m³), Oyo (1.3998 µg/m³), Ilorin (1.79765 µg/m³), Minna (1.737325 µg/m³), Abuja (1.635425 µg/m³), Lafia (1.409695 µg/m³), and Jos (1.787075 µg/m³). The study concluded that the sample contains sixteen (16) elements and minerals in varying percentages and concentrations. It is therefore recommended that appropriate safety procedures be put in place to raise community awareness of the presence of elements in harmattan dust.

Keywords : elements, minerals, harmattan dust, XRF, PIXE
Conference Title : ICMCAP 2024 : International Conference on Meteorology, Climatology and Atmospheric Physics
Conference Location : New York, United States
Conference Dates : February 19-20, 2024