The Distribution and Environmental Behavior of Heavy Metals in Jajarm Bauxite Mine, Northeast Iran

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Abstract : Heavy metals are naturally occurring elements that have a high atomic weight and a density at least five times greater than that of water. Their multiple industrial, domestic, agricultural, medical, and technological applications have led to their wide distribution in the environment, raising concerns over their potential effects on human health and the environment. Environmental protection against various pollutants, such as heavy metals formed by industries, mines and modern technologies, is a concern for researchers and industry. In order to assess the contamination of soils the distribution and environmental behavior have been investigated. Jajarm bauxite mine, the most important deposits have been discovered in Iran, which is about 22 million tons of reserve, and is the main mineral of the Diaspora. With a view to estimate the heavy metals ratio of the Jajarm bauxite mine area and to evaluate the pollution level, 50 samples have been collected and have been analyzed for the heavy metals of As, Cd, Cu, Hg, Ni and Pb with the help of Inductively Coupled Plasma-Mass Spectrometer (ICP- MS). In this study, we have dealt with determining evaluation criteria including contamination factor (CF), average concentration (AV), enrichment factor (EF) and geoaccumulation index (GI) to assess the risk of pollution from heavy metals(As, Cd, Cu, Hg, Ni and Pb) in Jajarm bauxite mine. In the samples of the studied, the average of recorded concentration of elements for Arsenic, Cadmium, Copper, Mercury, Nickel and Lead are 18, 0.11, 12, 0.07, 58 and 51 (mg/kg) respectively. The comparison of the heavy metals concentration average and the toxic potential in the samples has shown that an average with respect to the world average of the uncontaminated soil amounts. The average of Pb and As elements shows a higher quantity with respect to the world average quantity. The pollution factor for the study elements has been calculated on the basis of the soil background concentration and has been categorized on the basis of the uncontaminated world soil average with respect to the Hakanson classification. The calculation of the corrected pollutant degree shows the degree of the bulk intermediate pollutant (1.55-2.0) for the average soil sampling of the study area which is on the basis of the background quantity and the world average quantity of the uncontaminated soils. The provided conclusion from calculation of the concentrated factor, for some of the samples show that the average of the lead and arsenic elements stations are more than the background values and the unnatural metal concentration are covered under the study area, That's because the process of mining and mineral extraction. Given conclusion from the calculation of Geoaccumulation index of the soil sampling can explain that the copper, nickel, cadmium, arsenic, lead and mercury elements are Uncontamination. In general, the results indicate that the Jajarm bauxite mine of heavy metal pollution is uncontaminated area and extract the mineral from the mine, not create environmental hazards in the region.

Keywords : enrichment factor, geoaccumulation index, heavy metals, Jajarm bauxite mine, pollution