

Studies of Mineralogy and Geochemistry of Rare Earth Elements (REEs) in Permo-Triassic Bauxite Deposit, Northeast of Bukan, NW of Iran

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Abstract: Bauxite deposit of Permo-Triassic age in northeast of Bukan was developed stratiformly along the boundary between Ruteh and Elika formations, and includes four distinct rock units. This deposit was affected by tectonic and morphological processes. Mineralogical and geochemical investigations showed that during weathering processes, two mechanisms of ferruginization and deferruginization played crucial role in formation of minerals such as diaspore, boehmite, hematite, goethite, kaolinite, pyrophyllite, clinocllore, illite, montmorillonite, anatase, rutile, albite, sanidine, quartz, and calcite in this deposit. By taking notice of field evidence and of mineralogical and geochemical data, the basalts (whose remnants are still present along the contact of this deposit with carbonate bedrock) are the potential parent rock of this deposit. The distribution pattern of REEs (normalized to chondrite and basaltic parent rock) along with anomaly variations of Eu, Ce, and $(La/Yb)_N$ indicates differentiation of LREEs from HREEs during bauxitization processes. Further geochemical considerations indicate that the concentrations of LREEs were occurred by hematite, goethite, manganese oxides, cerianite, and secondary phosphates (rhabdophane, vitusite, gorceixite, monazite) and of HREEs by clay minerals, rutile, anatase, zircon, euxenite, and fergusonite. Incorporation of the results obtained from mineralogical and geochemical investigations suggests that in addition to factors such as pH of weathering solutions, ionic potential, composition of the parent rock, and fixation by residual minerals, adsorption processes also played crucial role in enrichment of REEs during moderate to intense lateritization in the study area.

Keywords: Bauxite, parent rock, REEs geochemistry, deferruginization, host minerals, NE Bukan.