

Mineralogy, geochemistry and genesis of the Halalan Mn deposit, south of Damghan

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Abstract: Halalan Manganese ore deposit is located in Torud-Chah Shirin volcano-sedimentary band and the northern part of Central Iran structural-sedimentary zone. The outcropped rocks in the area include metamorphic complex with lithology composition of slate, phyllite, schist, marble, limestone, dolomite and slightly metamorphed sandstone with Early Jurassic age. Manganese mineralization has occurred in the form of stratiform (Layered and lens-shaped) and parallel to stratification. The main minerals forming the ore deposit are mainly pyrolusite, psilomelane, heulandite, braunite and hematite. The massive, layered, lentiform and bandy structures and the disseminated, the empty space filling and replacement textures are the most important structure and texture of the ore deposit. The existent alterations in the region include chloritic, epidote, argillic, silication and carbonatization alterations. Based on the geochemical studies, The high ratios of Mn / Fe and low concentrations of trace metals, especially Co, Ni, Cu, and high amounts of Mn, SiO₂ and Fe are as evidences of Mn enrichment and depletion from submarine hydrothermal fluids (exhalative) in this deposit. Therefore, all the evidences indicate that the Halalan manganese ore deposit has formed under two mechanisms: the enrichment in seawater by exhalative-hydrothermal fluids and this deposition in sedimentary conditions influenced by changes in Eh and pH in marine environment and it is a volcano-sedimentary ore deposit. Based on the studies, the Halalan manganese ore deposit is most similar to the manganese ore deposits of Cuba type, with the exception that the Halalan manganese ore deposit has been affected by a metamorphic phase in the green schist facies.

Keywords: *manganese; volcano-sedimentary; Early Jurassic; the Cuba Type; Halalan.*

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