

Polygenetic Iron Mineralization in the Baba-Ali and Galali Deposits, Further Evidences from Stable (S, O, H) Isotope Data, NW Hamedan, Iran

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Abstract : The Baba-Ali and Galali iron deposits are located in northwest Hamedan and the Iranian Sanandaj-Sirjan geological structural zone. The host rocks of these deposits are metavolcanosedimentary successions of Songhor stratigraphic series with permo-trriassic age. Field investigation, ore geometry, textures and structures and paragenetic sequence of minerals, all indicate that the ore minerals are crystallized in four stages: primary volcanosedimentary stage, secondary regional metamorphism with formation of ductile shear zones, contact metamorphism and metasomatism stage and the finally late hydrothermal mineralization within uplift and exposure. Totally 29 samples of sulfide, oxide-silicate and carbonate minerals of iron ores and gangue has been purified for stable isotope analysis. The isotope ratio data assure that occurrence of dynamothermal metamorphism in these areas typically involves a lengthy period of time, which results in a tendency toward isotopic homogenization specifically in O and H stable isotopes and showing the role of metamorphic waters in mineralization process. Measurement of $\delta^{34}\text{S}$ (CDT) in first generation of pyrite is higher than another ones, so it confirms the volcanogenic origin of primary iron mineralization. $\delta^{13}\text{C}$ data measurements in Galali carbonate country rocks show a marine origin. $\delta^{18}\text{O}$ in magnetite and skarn forming silicates, $\delta^{18}\text{O}$ and $\delta^{13}\text{C}$ in limestone and skarn calcite and $\delta^{34}\text{S}$ in sulphides are all consistent with the interaction of a magmatic-equilibrated fluid with Galali limestone, and a dominantly magmatic source for S. All these data imply skarn formation and mineralisation in a magmatic-hydrothermal system that maintained high salinity to relatively late stages resulting in the formation of the regional Na metasomatic alteration halo. Late stage hydrothermal quartz-calcite veinlets are important for gold mineralization, but the economic evaluation is required to detailed geochemical studies.

Keywords : iron, polygenetic, stable isotope, BabaAli, Galali

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