Iron oxide-copper-gold (IOCG) mineralization at Jalal-Abad deposit, northwest of Zarand

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Abstract: Jalal-Abad iron deposit is located about 38 km northwest of Zarand town in Kerman Province. It contains 200 Mt iron ore with average chemical composition of Fe = 45%, S =1.18% and P = 0.08%. Iron mineralization occurs in an Early Cambrian volcano-sedimentary sequence of Rizu series which is composed of sandy siltstone, siltstone, volcanoclastic rocks and dolomite. Small intrusive bodies of gabbro and dioritic dykes are exposed in the area. Iron mineralization at Jalal-Abad is concealed with scarce outcrop. The main ore mineral is magnetite, which is located deeply, and has been oxidized to hematite in shallow depth and along fractures. Pyrite and chalcopyrite are the main sulfide minerals and bismuthinite, arsenopyrite and covellite are present in minor amounts. Cu mineralization occurred in sulphide and oxide stages as dissemination, veins, veinlet and open space filling. Malachite, azurite and atacamite are common minerals at oxide stage. Native gold was detected as inclusions smaller than 50 µm in pyrite, chalcopyrite and magnetite hosts. Alteration in Jalal-Abad is widespread and sodic-calcic, chloritic, sericitic and silicic alteration halos formed around orebody. Sodic-calcic alteration (actinolite, tremolite, magnesiohornblend and magnetite assemblage) is common in the deep levels. The main gangue mineral is quartz in association with talc, chlorite, ferroactinolite and calcite. Fluid inclusion investigation in quartz shows that inclusions are formed at three phase (L+V+S) with halite as a solid phase. Homogenization temperature varies from 260 to 440 °C and salinity varies from 30 up to 52 NaClwt% equivalents. The high salinity and homogenization temperature of fluid inclusions is similar to fluids with magmatic origin. Mineralogy, alteration, geochemistry and fluid inclusion studies indicate Jalal-Abad deposit is similar to IOCG deposits.

Keywords: Hydrothermal alteration, fluid inclusion, IOCG deposit, Jalal-Abad

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