Hydrothermal fluid evolution based on mineralogic and fluid inclusion studies on iron ores from Qatruyeh area, Fars province

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Abstract: The Qatruyeh iron occurrences are located in the eastern edge of the Sanandaj-Sirjan metamorphic zone, southwestern Iran (at 50 Km northeastern of Neyriz), and are hosted by a Late Proterozoic to Early Paleozoic sequence which is dominated by metamorphosed carbonate rocks. The Iron ores occur as layered, massive and disseminated magnetite and in lesser amount as hematite-bearing veins and veinlets. Mineralogical studies on host rock and iron ores indicate that magnetite mineralization was occurred in relation to pervasive Na-Ca alteration. The stage is shown by spread metasomatic replacement textures, gradational contact between magnetite ore and host rock and mineral assemblages of magnetite + actinolite + quartz + titanite + dravite + paragonite + siderite ± tremolite ± pyrite ± chalcopyrite. Fluid inclusion data on quartz minerals accompanied by ores indicate that metamorphic-hydrothermal fluids caused magnetite mineralization at temperatures between 285 and 345 °C with salinities between 3.5 and 15 weight percent NaCl equivalent at pressures below 280 bars, at greenschist to amphibolite metamorphic conditions. The brittle and ductile deformation regimes result in remobilization of metamorphic fluids and iron ore precipitation along the wide ductile shear zones, lithological boundaries and superficial fractures. Physicochemical changes by interaction of fluids with carbonates can be effective mechanisms of iron ore precipitation due to cooling and condensation, effervescence, increasing of pH and pCO2, break the ligands and decreasing of H2O dielectric constant.

Keywords: Iron; mineralization; hydrothermal fluid; alteration; fluid inclusion; Qatruyeh.

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