Mineralization and fluid inclusion studies in the northern part of the Kuh Zar Au-Cu deposit, Damghan (Firuzeh-Gheychi area)

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Abstract: The Kuh Zar Au-Cu deposit is located about 100 km southeast of Damaghan city. Structurally, this area is part of the Alborz Magmatic Assemblage (AMA). The oldest rock units in the Firuzeh-Gheychi area consists of syenogranite and tourmaline biotite granodiorite units. These units were intruded by quartz monzonite porphyry stocks. Pyroxene diorite porphyry and hornblende diorite porphyry are younger than all of the rock units mentioned. They were intruded by syenogranitic and monzogranitic dikes. All units have been affected by QSP, propylitic, argillic and silicification-tourmalinization alteration zones. Mineralogy studies show that the seven main groups of veinlets in the area included: I: quartz-pyrite-chalcopyrite-tourmaline, II: quartz-chlorite-pyrite-tourmaline, III: quartz-pyrite, IV: quartz-pyrite-chalcopyrite, V: quartz-tourmaline-pyrite, VI: tourmaline-pyrite and VII: pyrite-chalcopyrite-chlorite-tourmaline. Fluid inclusion petrography also shows that dominant primary fluid inclusions of the two-phase LV and single-phase L are the rich liquid. Microthermometric studies show that the homogenization temperature and salinity range for type-I veinlet fluid inclusions are 428 to 486 °C and 14.4 to 16.7 Wt.%NaCl, type-II veinlet fluid inclusions are 436 to 500°C and 22.5 to 23 Wt.%NaCl, type-III veinlet fluid inclusions are 367 to 479°C and 15.3 to 23.5 Wt.%NaCl, type-IV veinlet fluid inclusions are 363 to 407°C and 16.1 to 17.4 Wt.%NaCl and type-V veinlet fluid inclusions are 421 to 516°C and 20.2 to 21.4 Wt.%NaCl, respectively. Fluid inclusion studies show that two types of magmatic fluid with similar temperature, but different salinity have a role in the formation of the deposit. The boiling also led to deposition of metals, instability complexes and formed mineralization in the Kuh Zar deposit. The high temperature and intermediate salinity of fluid inclusions, diversity, and extension of alterations, and types of mineralization are similar to copper porphyry deposits.

Keywords: Mineralization; fluid inclusions; magmatic fluid; Kuh Zar; Alborz Magmatic Assemblage; Damghan.