

Geothermometry and physiochemical condition of Qaleh- Zari Cu-Au ore bearing solution based on chlorite composition and fluid inclusion study

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Abstract: Qaleh-Zari mine is the largest Cu-Au vein type deposit in Iran and is located about 182 km south of Birjand (Khorasan province). The ore grade ranges from Cu= 0.5-8%, Au= 0.5-15 ppm, and Ag= 20-150 ppm. Mineralization concentrated in three major veins. Host rocks are mainly andesite to basaltic andesite (Paleocene-Eocene). The main paragenesis is: quartz, hematite (specularite), chlorite, chalcopyrite, \pm pyrite, \pm Ag-sulfosalts, and \pm gold.

Samples were collected from three veins at depth of -70, -100, -135, and -170 meters. At each level, samples are taken every 10m. Chlorites are mainly Fe-rich ripidolite, however a few sampels are brunsvigite and pycnochlorite. Temperature of chlorites formation were calculated based on the Cathelineau and Nieva (1985) equation. The chlorites were formed between 260-300°C. The temperature of chlorite formation is 10-30°C less than temperature measured from fluid inclusion. Using chlorite composition and fluid inclusion data from Qaleh- Zari, new equation is presented for calculation of temperature for chlorite formation . The ore fluid contained

$\log m\text{H}_2\text{S} = -3$ to -3.5 , $\log m\text{H}_2 < -5.5$, $\log f\text{O}_2 = -30$ to -29 .