Fluid inclusion and stable isotopes studies on hydrothermal breccia, the main stage of mineralization in Khunik prospecting area

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The Khunik prospecting area, in east part of Lut Block of Iran, is a breccia hosted low to intermediate-sulfidation epithermal mineralization. Khunik gold mineralization is associated with Eocene calc-alkaline subvolcanic intrusions (38±1 Ma). Precious metal occurred with sulfid minerals especially pyrite and less calcopyrite. Mineralization occurs as veinlet sets + conjugate and stockwork veinlets and hydrothermal breccia. The maximum gold concentration (300-4200ppb) accours along hydrothermal breccia zone. The hydrothermal breccia in this area are mostly mosaic to rubble monomictic breccia with hydrothermal cement. Detailed systematic mapping lead us to the recognition of two distinct breccia base on cement: carbonate-quartz cement breccia and carbonate cement breccia. The carbonate cement is more anomalous than carbonate-quartz one. Microthermometric measurement on quartz and calcite-hosted, two phase, liquid-rich fluid inclusions in cement of hydrothermal breccia indicate that mineralization may have taken place between 300 to 430˚C from a moderately saline hydrothermal fluid (2 to 12 wt% NaCl equiv.). First ice melting temperatures between -51˚C and -55˚C indicate that aqueous fluids contain NaCl, $CaCl_2$ ± Mg ± $FeCl_2$. The presence of hydrothermal breccia is consistent with boiling to some extent. The average calculated $\delta^{34}S$ H_2S values for clast and cement of hydrothermal breccia are respectively -2.4‰ and 0.9‰ for pyrite that are consistent with a magmatic source for sulfur in prebrecciation and synbrecciation stages. Gold deposition at hydrothermal breccia is infered to have been largely by boiling, although mixing with meteoric waters may have been also occured.