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Hydrothermal fluids in the Kekesayi gold deposit, Altay, China

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The Kekesayi gold deposit, located in Qinghe County, Xinjiang, is controlled by the Buergen ductile shear zone in the southern margin of Altai. Two main mineralization types can be identified as altered mylonite type and gold-bearing quartzveintype. Themain ore-bearingrocks are gray metamorphic tuff of the Tuoranggekuduke Formation. The orebodies aremostly lenticular and veins that are strictly controlled by shear bands. Gold mineralization in the deposit is closely related toductile shearing. The various types of alteration in the surrounding rocks is both superimposedand spatially zoned. Much of the alteration is characterized by sericitization, pyritization, and silicification that is dominant in shallower parts of the deposit. The vein quartz occurs mainly as smoky gray and milky white grainsin the altered mylonite zone.There are at least three quartz vein stages based upon crosscuttingrelations. The Q1 quartz veins growing along the direction of schistosity and striking in a NW direction correspondto the early ductileshearing process. The Q2 quartz veins that are oblique schistosity are white and near vertical. Theen-echelonQ3 veins representthe late opening of fractures.

The fluid inclusions in vein quartz from the mineralized rocks were observedand classified microscopically. The primary fluid inclusions are randomly distributed and the secondary fluid inclusions occur linearly along the fissuresowing to the strong tectonic deformation. Fluid inclusions are generally 8~16 μm in maximum dimension. The types of inclusions can be classified into three types: LH_2O-VH_2O, LH_2O-$VCO_2$and LH_2O.They can be all foundin the early quartz veins, but only LH_2O-VH_2Otypes are in the late quartz veins. The homogenization temperaturesof fluid inclusions in Q1 quartz veins is 219~414℃, in Q2 quartz veins is 356~446 ℃, andin Q3 quartz veins is 121~292℃. The wide range of homogenization temperatures ireflectsthe tectonic evolution processes of the ductile shear zone. Laser Raman microprobeanalysis of the fluid inclusions showed clear H_2O peaks and CO_2peaks. Ore-forming fluids are characterized byCO_2-rich, medium-high temperatures in the early stage, and CO_2-poor, low-medium temperatures during the later hydrothermal stage.Movement along the shear zone wasthe main controlling factor of mineralization and hydrothermal alteration by a magmatic fluid simultaneouslyplayedan important role in mineralization.