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Fluid Inclusion Characteristics of the Kalatage Meiling Cu-Au Deposit in Eastern Tianshan Mountains, NW China

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The Kalatage Meiling Cu-Au deposit was newly discovered in eastern Tianshan Mountains in recent years. The ore-bodies, are hosted by basic-neutral-acid volcanic, volcaniclastic and sub- volcanic rocks, consist of veinlet disseminated sulfide ore-bodies and a sulphide-silicate stock-work vein system (Mao et al., 2010; Miao et al., 2007). In this paper, the authors research the homogenization temperature and the hydrogen and oxygen isotopic compositions of the fluid inclusions based on the reseach of the previous, to intend to reveal the characteristics of the ore forming fluid and the ore-forming material source, to explore the genetic type of the Meiling deposit.

The fluid inclusions in samples taken from different positions of the ore-forming quartz veins associated with a large number of sulfides (mainly pyrite, followed by chalcopyrite and sphalerite again) and so it can be inferred that it was formed in the main metallogenic stage of the Meiling Cu-Au deposit.

The petrographic characteristics of the fluid inclusions are as follows. The type of the primary fluid inclusions of the Meiling deposit is relatively single and more of the inclusions are the gas-liquid two-phase fluid inclusions. The shapes of the fluid inclusions are irregular shape, ellipse, elongated or suborbicular and the size of the fluid inclusions is from 3μm to 10μm in diameter and most of them are from 5μm to 7μm. The vapor phase fraction is smaller and most of them are from 3% to 10%. Bubbles that are black specks are wandering beating in the liquid and the gas-liquid two-phase boundary is clear. Most of the fluid inclusions are colorless and transparent and the minority is light brown or light gray. A modest number of the fluid inclusions are sporadically random distribution.

Based on a study of the homogenization temperature of the fluid inclusion, the authors put forward the following conclusions. The homogenization temperature ranges from 133℃ to 214℃ while the salinity ranges from 2.4% to 6.2%, indicating a medium-low temperature and a medium-low salinity. The trapping pressure is 34.5 MPa to 56.8 MPa and the mineralization formed at the depths of 1.1km to 1.9km. With the inclusion temperature measurement results, the authors of the paper account that the Meiling deposit formed in medium-low temperature and shallow condition.

The hydrogen and oxygen isotopic compositions of fluid inclusions show that the $\delta^{18}O_{H2O}$ value ranges from -5.75‰ to -2.61‰ while the δD value ranges from -136‰ to -117‰, compared with the standard magmatic warter (the $\delta^{18}O_{H2O}$ value rangs from 5.5‰ to 9.5‰, the δD_{SMOW} value rangs from -80‰ to -40‰) that was defined by Ohmoto (1986) and Sheppard (1986), combined with the δD_{H2O}- $\delta^{18}O_{H2O}$ diagram on investment figure (picture omitted), it can be concluded that the ore-forming fluid was the mixture of magmatic water and atomspheric water. From the early to the late stage of the mineralization, the ore-forming fluid changed its characteristics, and these results show that the late ore-forming fluid may be subjected to extraneous hydrothermal fluid.

In conclusion, the Kalatage Meiling Cu-Au deposit in eastern Tianshan that formed in medium-low temperature and shallow condition belongs to the magmatic hydrothermal deposits, but it is also influenced by the superposed transformation of the volcanic action.

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