

Chemical composition and deposition conditions of gold from the Seolhwa mine

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Mesothermal gold mineralization of the Seolhwa mine was deposited in a single stage of massive quartz veins which filled the mainly NE-trending fault shear zones exclusively in the granitoid within the Gyeonggi Massif. The Seolhwa mesothermal gold mineralization are spatially associated with the Seolhwa granitoid (161Ma). The mesothermal-type deposits documented up to date in South Korea are exclusively gold-rich and are characterized by being situated solely within Precambrian paragneiss, and by a single stage of massive quartz veins, the simple mineralogy consisting of poor sulfides and gold with an absence of any silver-sulfosalts, and the weak wall-rock alteration. The mineralogy of the Seolhwa mesothermal-type veins is simple and consists mainly of rare sulfides and gold. Gold grains (electrum and native gold) associated with sulfides typically occur within the veinlets cutting earlier-deposited quartz. The electrums from the Seolhwa deposit are gold-rich, ranging from 69.7 to 90.9 atomic % Au. Native gold(9.1~20.0 atom. % Ag) occurs as free gold within the fracture of quartz and is intergrown with chalcopryrite. Electrum(20.2~30.3 atom. % Ag) is frequently associated with bismuthinite, chalcopryrite, galena, sphalerite, tellurobismuthite infilling fractures of quartz and sulfides. The dominant iron-bearing sulfides are pyrrhotite, chalcopryrite and sphalerite, and characteristically contain Bi(-Te-S) minerals. The fugacity of sulfur of the auriferous mesothermal fluids was evolved and progressively decreased close to the pyrite-pyrrhotite sulfidation curve. The estimated temperature and log f_{S_2} for the main gold deposition are about 450° to 520°C and about -3 to -5 atm. Because most golds were precipitated paragenetically later than sphalerites, main gold deposition at Seolhwa probably occurred near the lower temperature(450°C) within this range. During the late telluride-gold mineralization, Bi-telluride and electrum were deposited with galena. The occurrence of tellurides in veins may indicate an increase in f_{Te_2} during the late mineralization.

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