Mineralization processes modeling of Shangmanggang gold deposit, Yunnan, China

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The deposit is located in the southwestern of China and occurs along the southwest-trending Shangmanggang Fault. The hanging wall of the fault consists mainly of sandy mudstone of Mongga Formation (J_{2m}). The footwall is composed by dolomitite of Permian Sazipo Formation (P_{1s}). The minable ores are mainly earth-red clay ore with illite reaching to ~70%. Gold is disseminated in the ore with the association of Ag, Sb, As. Five stages of mineralization are identified. Alteration of kaolinite-pyrite and kaolinite-illite-pyritealteration is favorable for ore.

With CHILLER and SOLTHERM the mineralization processes are modeled: ① the starting ore-fluid(I) (200°C) ascended along the Shangmanggang Fault to the shallower place (~1000m deep), and mixed with the descening cold water (40°C)with the ratio of 16:1, quartz (>97%)+ carbon (graphite) + pyrite precipitating, which occurred as jasperoid because of quenching. This is Stage I, silicification-jasperoid(I). ② The derived ore-fluid(II)(190°C) interacted with dolomitite of Sazipo Formation (P_{1s}). With calcite dissolving, dolomite + Beidellite + pyrite + quartz + carbon (+ stibnite) deposited. This is stage II, dolomitization .③ The altered ore-fluid(III) got cooling from 190 to 165°C as it made its way to contact with rocks of Mongga Formation (J_{2m}). The products occurs as comb-quartz stockwork with quartz + carbon+ pyrite + stibnite and trance of As-Sb-Cu-bearing sulfosalt, This is stage III, quartz vein . ④ Now come to the main ore-forming stage, Stage IV, the derived ore-fluid(IV) interacted with the sandy mudstone of Mongga Formation (J_{2m}). When water/ rock >250/1, the mineral assemblage consists of quartz + kaolinite + pyrite + gold (± carbon ± stibnite ± As-Sb-Cu-bearing sulfosalt), which represents the early Stage IV, and as water/rock reached to 250/25, the assemblage is quartz + kaolinite + illite + pyrite + siderite + dolomite + gold + barite, which is the later Stage IV. ⑤ with the residual fluid(V) cooling (165-145°C) stockwork of crystalline quartz depositing, and mineralization is waning as CO_2 effervescene. This is stage V.

The effect of Ni-S speciation on nickel partitioning in olivine

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Nickel partition coefficients between olivine and silicate melt (D^{Ni}) of mid-ocean ridge basalts (MORB-measured on glass samples) are 30 to 60% lower than those of experiments performed on S-free basaltic systems. In addition, the D^{Ni} values of the MORB samples exhibit positive correlations with silicate liquid MgO content and temperature instead of negative correlations that are found in the experiments. The reduced D^{Ni} values of the MORB samples appear to be related to variations in Ni speciation in the silicate liquid. In S-bearing systems such as the MORB some amount of Ni is present as NiS in the silicate liquid, which contributes to the liquid concentration but is not available for partitioning into olivine. The overall effect is a reduction in the D^{Ni} value calculated based on the total Ni content of the silicate liquid. Apparent variations in D^{Ni} values as a function of sulfur concentration indicate that the available experimentally determined D^{Ni} values of S-free basaltic systems are not applicable to natural basaltic systems containing sulfur. Knowledge of the S-speciation which governs the partition coefficients of Ni and other chalcophile elements is vitally important in modeling early planetary history, mantle partial melting and fractional crystallization.