

Characteristics of Ore-forming Fluid in Herenping Albite-quartz Lode Gold Deposit, Western Hunan Province, China

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Abstract: Herenping gold deposit, a typical albite-quartz lode gold deposit, is located in the Liulincha gold ore belt, western Hunan Province, China. The ore-forming fluid geochemistry was systematically studied in this paper. It is shown that the fluid inclusions in quartz and calcite related to gold mineralization are predominated by two-phase (liquid-rich) inclusion. The homogenization temperatures and salinities of fluid inclusion in quartz range from 111 °C to 375 °C and from 0.18 wt% NaCl to 7.86 wt% NaCl, respectively. The homogenization temperatures and salinities of fluid inclusion in calcite vary from 196 °C to 271 °C and from 4.18 wt% NaCl to 6.74 wt% NaCl, respectively. The densities of the ore-forming fluid are estimated at 0.633 ~ 0.997 g/cm³. Therefore the ore-forming fluid responsible for gold mineralization in Herenping deposit is characterized by low-to-moderate temperature, low salinity and low density. The pressures of ore-forming fluid are calculated as 4 ~ 209 MPa, indicating that the gold deposit formed at the depth of 1.2 ~ 6.8 km. Based on the laser Raman analysis of fluid inclusion, it is concluded that the gas composition mainly consists of H₂O, CO₂, CO, CH₄ and N₂, and liquid phase composition is mainly H₂O and CO₃²⁻, which reveals that the ore-forming fluid is caused by the metamorphic dehydration of organic matter-bearing sediments. Hydrogen and oxygen isotope compositions also reveal, that the δD_{H_2O} is 7.1‰ ~ 10.8‰ and the $\delta^{18}O_{H_2O}$ is -69‰ ~ -55‰, indicating that the ore-forming fluid in this gold deposit is mainly derived from metamorphic water.

Keywords: ore-forming fluid; laser Raman; hydrogen isotope; oxygen isotope; albite-quartz lode deposit; herenping gold deposit