

PHYSICO-CHEMICAL EVOLUTION OF THE FLUIDS ASSOCIATED TO THE COSTA SENA GOLD QUARTZ VEINS (MG - BRAZIL).

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The Costa Sena free-gold mineralization occurs in specularite-bearing quartz veins located in shear zones affecting the volcanosedimentary serie of the Rio Paraúna Supergroup. The quartz lodes are enclosed in archaean quartz-sericitic/chloritic schists. They characterize the mine of Periquito and the occurrences of Córrego da Agua Fria and Morro do Ouro.

Five samples of mineralized and gold free quartz veins have been selected for fluid inclusion (FI) analysis. This study was performed on doubly polished plates with a Chalk Meca heating and cooling stage microscope and with a laser Raman microprobe spectrometer.

Six main inclusion types were recognized:

- 1-Type C₁: Early stage, triphased FI, of composition H₂O (~94 mole%) - CO₂ (~3,8 mole%) - NaCl (~2,2 mole%) with rare trapped accidental crystals of calcite.
Th = 150-180°C, Salinity 6-7 weight % eq. NaCl.
- 2-Type C₂: Early stage, triphased FI, of composition H₂O (~82,2 mole%) - CO₂ (~16 mole%) - NaCl (~1,8 mole %) eventually with trapped calcite.
Th = 150-350°C, Salinity 13-15 weight % eq. NaCl.
- 3-Type L_c: Early stage, biphased FI, H₂O - CO₂ (traces) - NaCl.
Decrepitation T = 150 -190°C, Salinity 8-15 weight % eq. NaCl.
- 4-Type L₁: later, biphased, aqueous FI, H₂O - NaCl.
Th = 80 - 180°C, Salinity = 7,5 - 9,5 weight % eq. NaCl.
- 5-Type L₂: later, biphased, aqueous FI, H₂O - NaCl.

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Th = 80 - 250, Salinity = 10 - 18 weight % eq. NaCl.

6-Type M: Secondary, monophased, aqueous inclusions (two generations: M₁ and M₂).

The C and L types were found in the same inclusion alignments or clusters and the L₁ type is always associated to the L₂ type. The trapped calcite of C₁ and C₂ types occurs commonly as solid inclusion in the quartz. Some inclusions exhibit laboratory induced leakage and natural necking down, that are responsible for much of the scatter of the microthermometric data. The interpretation of these data shows that the earlier C₂ aquo-carbonic fluid was progressively diluted by the L aqueous fluid.

This dilution led to the formation of C₁ and Lc inclusion types. The P and T mixing conditions must be those which permit C₂ and L₂ mixing (i. e. T=350°C, P=2,0 to 2,5kb). The C₂ → C₁ evolution took place during a decrease of the P,T and salinity conditions that led to the final trapping of C₁. The evolution C₂ → C₁ → Lc types is characterized by a progressive increase of H₂O always with a pure CO₂ composition. The absence of CH₄, H₂S or N₂, the presence of specularite and the absence of pyrite in the veins, indicate that the fO₂ conditions of the fluid were closed to the Fe₃O₄/Fe₂O₃ buffer. Under these oxidizing conditions, the transport of gold would take place within the stability field of the pair HSO₄⁻/SO₄²⁻, gold being soluble as AuCl₂⁻ (Touray, 1987). The gold precipitation is probably related to a pH increase which is favored by the fluid dilution.

References:

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