Mineralogical and Geochemical Study on the Diamante Gold Deposit (Colombia) and Some Genetic Aspects

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The Diamante mine is located in the southwestern part of Colombia on the west flank of the Occidental Andes Cordillera approximately 150 km east of Pacific Ocean, and 2600 m above sea level. The gold-bearing quartz veins of the Diamante mine occur in volcanic rocks, andesitic agglomerate and tuff breccias. The general trends of Diamante ore veins are N50-60°W, with dips of 60°NE.

The quartz veins are composed of quartz, pyrite, arsenopyrite, chalcopyrite, sphalerite, and electrum, in very minor amount: tetrahedrite, arsenic-bearing pyrite, pyrargyrite, hessite, galena, proustite, argentite and polybasite.

The fluid associated with gold mineralization has a range of salinity between 1.7 to 5.8 wt % NaCl equivalent. Densities vary from 0.58 to 0.92 g/cc. Homogenization temperature averages range between 228-340°C. The pressure of mineralization estimated with sphalerite geobarometry corresponds with an average of 830 bars. The pressure correction for homogenization temperatures is about 60°C.

$\delta^{34}S_{pyrite}$ values of –7.1 to –5.3‰ and $\delta^{34}S_{\Sigma S=}$ -5.7‰ suggest a mixing of sulfur with sedimentary and magmatic origin. The $\delta^{18}O$ and δD values for the fluids are 7.6 to 9.6‰ and -74 to -83‰, respectively. The isotopic and fluid inclusion data of ore fluids suggest that the gold mineralization at the Diamante mine may have evolved from mixing of magmatic and meteoric fluids possibly related to intrusion of the nearby Piedrancha Granodiorite of late Miocene age. The gold deposition is attributed to destabilization of the bisulfide complex as a result of decrease of the sulfur activity, through sulfide deposition and/or H_2S los