Ore-forming fluids and sulphur sources in Peña do Seo W-Sn vein deposit, NW Spain: fluid inclusion and $\delta^{34}S$ data

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Peña do Seo W-Sn vein-type deposit lies in the West Asturian-Leonese zone, part of the Variscan Massif. Total metal reserves were 1.35 Mt, with average grades of 0,25 % WO_3 and 0,05% SnO_2. Mineralization is found within Qz veins hosted by Precambrian schists from Villalba Formation. Mineralization is mainly constituted by wolframite, cassiterite, pyrite, chalcopirite and arsenopyrite. Ores might be related to small tardi-tectonic granitic stocks, whose intrusion produced thermal aureoles. Our aim is to characterize the main ore-forming fuids and sulphur sources, through fluid inclusion study and $\delta^{34}S$ isotope analysis.

Three different types of fluid inclusions have been found:

- I. (H_2O-NaCl): Th(ºC) 305/400 and 8.5/12 wt.% NaCl eq.
- II. (H_2O-CO_2-NaCl): Th(ºC) 280/325 and 2/5 wt.% NaCl eq.
- III. (H_2O-CO_2): Th(ºC) 180/305 and 1.6/5 wt.% NaCl eq.

The cooling of fluid is accompanied by a decrease in the salinity, suggesting a mixing between a brine-derived fluid and a more diluted fluid. Upcoming δD-$\delta^{18}O$ isotope analyses would contribute to the interpretation of the evolution and origin of the fluids. The S isotopic composition has been determined in euhedral Py crystals (Py-I) and in Py forming porphyric aggregates (Py-II), previously identified by optical microscopy, SEM and electron microprobe analysis. Their values range between 10-16‰ $\delta^{34}S$ in Py-I and 25-35‰ $\delta^{34}S$ in Py-II. Such a wide range implies the S source is neither magmatic nor metamorphic. As Py-II is strongly enriched in heavy S isotopes, and no sulphate minerals are found in the deposit, it was probably formed by reduction of marine sulfate, whereas $\delta^{34}S$ range from Py-I implies a different S source, probably the S-rich schist host rocks.

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