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Textural properties, Fluid inclusion study and mineral chemistry of Istala and Kostere Mines, Gumushane (NE-Turkey)

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Istala and Köstere Mines located in *"Lower Acidic Sequence"* of *Late Cretaceous* dacite, dacitic tuff, sandstone, aglomeras and limestone lenses. Mineral paragenesis of Istala Mine consists of sphalerite, galena, fahlore, chalcopyrite, pyrite, bornite, covellite and chalcocite. Barite and less amount of quartz occur as gangue minerals. Sphalerite, chalcopyrite, galena, pyrite and fahlore are the major sulphides in Köstere Mine with only quartz as a gangue mineral. Mineral size in Istala is less than 150 μm whereas up to 3 mm in Köstere Mine.

While Ag content of all fahlores in Istala is less than 1.69 wt%, it riches up to 7.32 wt% in Köstere where high mineralization temperature was measured. Ag content of galena that replaced the fahlore is lower than 0.1 wt% but in Köstere it riches up to 0.49 wt%. Sphalerite in Istala has 63.04–66.13 wt% Zn, 0–0.89 wt% Fe and in Köstere 64.18–66.45 wt% Zn, 0.05–0.82 wt% Fe. Low FeS content of sphalerite for both mines infers low mineralization temperature [1].

Gangue minerals of white, grey and red barite were observed in Istala Mines. Fluid inclusions in these gangue are quite less and smaller in size (5-10 μm). Homogenization temperature of Istala Mine is found to be between 100-230 ^{o}C. Fluid inclusions in quartz of Köstere Mine are much more abundant and bigger in size (15-20 μm) and homogenization temperature is measured between 170-300 ^{o}C.

Brecciated, massive and disseminated ore textures are seen macroscoply, whereas exolution lamellae, replacement, porphyroblastic, cataclastic, skeletal and myrmecitic

types are present as micro textures in Istala Mine. Vein, disseminated, stocworks, banded, massive, open space filling type textures in macroscopic scale and replacement, spotted parting, granular, porphyroblastic, cataclastic ore textures are seen in microscopic scale.

In Istala Mine, geological and structural features of ore, smaller size of minerals, complexity of mineral grains due to dense replacement processes, smaller size of trapped inclusions, less amount of fluid inclusions and low homogenization temperatures infers existence of a typical “Kuroko Type Massive Sulphide Deposit”. On the other hand, geometry of ore, bigger mineral grains comparing to first one, rarity of replacement textures, presence of more frequent and bigger size fluid inclusions, higher homogenization temperatures point out a “Hydrothermal Vein Type Ore Deposits” for Köstere.

Literature:

[1] Browne et al., 1973, Economic Geology, 68: 381-387.