Acta Mineralogica–Petrographica, Szeged, XLI, Supplementum, 2000

ORE MINERALIZATION OF THE TATRIC UNIT, WESTERN CARPATHIANS, SLOVAKIA

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The Tatric basement is built of large Variscan granitoid plutons emplaced within medium to high grade metamorphic rocks like gneisses, anatectic migmatites and amphibolites. Low to medium grade shales and basic rocks of the Devonian to Early Carboniferous are less abundant. Crystalline sequences are exposed in the central, most elevated parts of core mountains. The Tatric cover comprises characteristic lithological members: Upper Carboniferous and Permian molasse sediments, bimodal volcanics and Lower Triassic–mid-Cretaceous sedimentary rocks. A few Mesozoic nappes were thrust from the S and overlie the Tatric basement and cover complexes.

Formation of the most important ore mineralizations is believed to be linked either to Variscan granitoids or metamorphism. Scheelite, molybdenite and pyrite-arsenopyrite mineralization were formed at highest temperatures. The arsenopyrite, less frequenty pyrite, are usually rich in gold (invisible gold). Au bearing quartz mineralization is often associated with stibnite mineralization, the most important and most abundant in the Tatry and Male Karpaty Mts. The stibnite mineralization is accompanied by Pb, Zn sulphides and Pb-Sb(-Bi) sulphosalts, Ag bearing tetrahedrite and barite mineralization. Barite mineralization with galena is thought to have formed during Variscan tectono-metamorphic event, although Alpine remobilization cannot be ruled out. Siderite-sulphide mineralization of the Tatric unit may be analogous to the vein type of siderite mineralization of the Gemeric unit. Most frequently its Alpine age is cited, although there exist indiations of Variscan age, and/or Alpine remobilization. Permian volcanic/sedimentary complexes of the nothern Tatric unit carry minor occurrences of primary U (Mo, Cu) mineralization. Negligible concentrations of barite and Cu minerals are connected with the Permian melaphyre volcanism. Small occurrences of base metal and hematite mineralizations in Mesozoic sequences probably formed during the Alpine epoch.

Fluid inclusion and sulphur and oxygen isotope studies indicate metamorphic and/or magmatic origin of the CO_2 rich fluids from the high temperature scheelite, molybdenite and arsenopyrite mineralizations. Wide range of salinities (3–24wt% NaCl), $CaCl_2$ rich composition of barite associated fluids, dilution trends and C, O isotope fluid signatures suggest an important role of interactions between formation and meteoric waters during crystallisation of low-T minerals, including the economically most important stibnite.

References

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