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New data on sulphosalts from the hydrothermal siderite-type veins in the Spišsko-gemerské rudohorie Mts. (eastern Slovakia): 3. Tintinaite and bournonite from the Gašpar (Grexa) vein near Rožňava

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Abstract

A new occurrence of tintinaite was recently discovered at the Gašpar (Grexa) siderite-type hydrothermal vein with sulphides located in the Rožňavská dolina valley near Rožňava, Spišsko-gemerské rudohorie Mts., Rožňava Co., Košice Region, Slovakia. Tintinaite occurs as lead-gray, acicular to prismatic crystals up to 4 cm long or rich fibrous aggregates and nests reaching up to 7 × 5 cm, which are enclosed in quartz-siderite gangue. Crystals and aggregates of tintinaite are often directly associated with massive accumulations of older sulphides, especially arsenopyrite, chalcopyrite, pyrrhotite and pyrite. Grains and aggregates of younger native bismuth or bournonite are occasionally replacing aggregates of tintinaite. The refined unit-cell parameters of tintinaite (for the orthorhombic space group *Pnnm*) are: *a* 22.523(7) Å, *b* 34.137(11) Å, *c* 4.0389(14) Å and *V* 3105.4(1) Å^3. The calculated value of *N* for tintinaite from the Gašpar vein is ranging from 1.93 to 2.00 and the Sb/(Sb+Bi) atomic ratio in three studied samples varies between 0.49 and 0.60, corresponding to Bi-rich tintinaite, with only one spot representing Sb-rich kobellite. The average Cu+Fe content in tintinaite is 1.96 *apfu* and minor concentrations of Ag (up to 0.14 *apfu*) and Se (up to 0.22 *apfu*) were also detected. The average (n = 55) empirical formula of tintinaite based on sum of all atoms = 63 *apfu* is $(Pb_{10.56}Ag_{0.07})_{10.63}(Cu_{1.12}Fe_{0.85})_{1.97}(Sb_{8.50}Bi_{6.75})_{15.25}(S_{35.01}Se_{0.15})_{35.16}$. Bournonite is rare and it forms anhedral grains or aggregates up to 220 μm, which are replacing aggregates of tintinaite. Its average (n = 8) empirical formula of bournonite based on sum of all atoms = 6 *apfu* is $Pb_{0.99}Cu_{1.00}(Sb_{0.98}Bi_{0.03})_{1.01}(S_{2.99}Se_{0.01})_{3.00}$.

Key words: *tintinaite, kobellite homologous series, bournonite, sulphosalts, X-ray powder data, chemical composition, siderite veins, Gašpar vein, Grexa, Rožňava, Spišsko-gemerské rudohorie Mts., Slovak Republic*

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