NEW DATA ON CHEMICAL COMPOSITION OF LUZONITE-FAMATINITE SERIES MINERALS IN PRECIOUS AND BASE METAL DEPOSIT ZLATÁ BAŇA (SLOVAKIA)

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Geology and mineralogy of the precious and base metal mineralization

The epithermal precious and base metal mineralization of low-sulphidation type at the Zlatá Baňa deposit is located in the Central Zone of the Zlatá Baňa Stratovolcano (Slanské Vrchy Mts., Eastern Slovakia). It occurs in various altered effusive, extrusive and intrusive bodies mainly of pyroxene andesite and diorite porphyries. The central part of the volcanic structure hosts to miscellaneous mineralization types with dominant presence of Pb-Zn(-Au-Ag) type of ores, however, the marginal parts are characterised by Sb(-Au) and Hg type of ores only.

Main ore minerals of the vein mineralization are pyrite, sphalerite and galena, accompanied by chalcopyrite, marcasite, arsenopyrite, Pb-Sb sulphosalts, stibnite, berthierite and cinnabar. The gangue consists of variety of carbonates, minor amount of quartz and barite is very rare. The precious metal mineralization in the deposit is superimposed on the base metal ores and is concentrated in the near-surface parts of veins. The average Au and Ag content in the deposit (in the area of calculated reserves) is 1.42 g/t and 39.74 g/t, respectively. The precious metal mineral association is represented by gold, electrum, silver, Au and Ag tellurides (petzite, hessite), acanthite, polybasite, miargyrite and numerous rare and less rare Ag-Pb-Sb sulphosalts. Reserve of the deposit are 1,623 kt of ore with 1.17% Pb, 2.78% Zn, and 0.1% Cu (KOVALENKER *et al*., 1988, 2000; BAKOŠ *et al*., 2017).

Chemical composition of the luzonite-famatinite series minerals

During a detailed investigation of vein filling ores in Gemerka adit were found a continuous series of solid solutions of Cu_3SbS_4 – Cu_3AsS_4 (luzonite-famatinite) series minerals, unusual for their optical properties and chemical composition. They form separate isometric and irregular grains intergrowing with Ag- and Hg-tetrahedrite, thin veins in chalcopyrite, also thin reaction rims (thickness up to 10 μm) on the border of the pyrite grains. Colour in reflected light is pale brownish pink. The variable chemical composition also documents of the investigated phases (13 WDS analyses; representative analyses are presented in Table 1). Antimony content ranges from 0.26 to 26.63 wt.%, As from 0.46 to 18.4 wt.% and Fe from 0.74 to 2.05 wt.%. Content of other elements is low (Ag up to 0.28; Pb up to 0.19 wt.%). SUGAKI *et al*. (1978) concluded, that the complete solid solution between luzonite and famatinite exists at low temperature. Relationships of above mentioned minerals in aggregates indicate that the minerals of the famatinite-luzonite series were formed at the end of the ore-forming process after the polymetallic mineralization.

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Table 1. Chemical composition of the famatinite-luzonite series minerals from Zlatá Baňa in wt.%.

Sample	Sb	Ag	Cu	As	Fe	S	Total	Sb/(Sb+As)
1. ZB-6A 3	26.56	0.05	44.20	0.84	0.74	29.22	101.58	0.97
2. ZB-6A 2	20.26	0.13	45.10	5.07	0.83	29.41	100.83	0.80
3. ZB-6A 6	9.56	0.15	47.10	11.56	1.27	32.76	102.40	0.45
4. ZB-6A 29	0.73	0.10	48.70	17.79	1.40	33.30	102.01	0.04

Empirical formulae: **1.** $(Cu_{3.01}Fe_{0.06})_{\Sigma 3.07}(Sb_{0.94}As_{0.05})_{\Sigma 0.99}S_{3.94}$; **2.** $(Cu_{3.03}Fe_{0.06}Ag_{0.01})_{\Sigma 3.10}(Sb_{0.71}As_{0.29})_{\Sigma 1.00}S_{3.91}$,
3. $(Cu_{2.94}Fe_{0.09}Ag_{0.01})_{\Sigma 3.04}(Sb_{0.31}As_{0.61})_{\Sigma 0.92}S_{4.05}$; **4.** $(Cu_{2.95}Fe_{0.10}Ag_{0.01})_{\Sigma 3.06}(Sb_{0.02}As_{0.92})_{\Sigma 0.94}S_{4.00}$