CHEMICAL COMPOSITION OF THE SULPHOSALTS FROM THE BISMUTHINITE–AIKINITE SERIES FROM THE WESTERN CARPATHIANS

PRŠEK, J. & OZDÍN, D.
Deparment of Mineralogy and Petrology, Comenius University, Mlynská dolina G, 842 15 Bratislava, Slovakia
E-mail: prsek@yahoo.com

Sulphosalts of the bismuthinite–aikinite series are mostly accessory minerals in several types of mineralizations. We studied samples of these group of sulphosalts from stibnite mineralizations (Dúbrava deposit, Klačianka occurrence) and siderite mineralizations (Vyšná Boca, Bystrá-Hviezda, Bacúch, Ľubietová-Kolba, Slovinky deposits) in the Western Carpathians, using an electron microprobe. The position of the studied phases in the bismuthinite–aikinite series was classified at the base of n_a using the formula: $n_a = 25(x + y)/2$, proposed by MAKOVICKY & MAKOVICKY (1978), where x is the number of Pb *apfu* and y is the number of Cu *apfu*. For the determination of the exact position of these phases in the system Cu_2S–PbS–$Bi(Sb)_2S_3$ the classification proposed by TOPA *et al.* (2002) was used.

These sulphosalts formed a part of complex sulphide associations usually together with tetrahedrite and many other Bi sulphosalts as lillianite homologues, pavonite homologues, nuffieldite, cosalite, galenobismutite, cuprobismutite homologues and kobellite homologues. They form small homogeneous grains, needles up to 2 cm in size, complicated intergrowths with other sulphosalts and galena, decomposition products or exsolution lamellae (especially gladite and bismuthinite). Furthermore, they often form thin veinlets up to few cm in size or aggregates in the hydrothermal veins.

We identified all the known members except the three new ones (paarite, salzburgite and emilite). Bismuthinite, gladite, krupkaite and aikinite are the most common members; the others (lindströmite, hammarite and friedrichite) are rare. Cu-rich members occur together with tetrahedrite in the older parageneses; Bi-rich members with other Bi sulphosalts are part of the younger parageneses. We followed chemical compositions of these phases, especially the degree of substitutions and the contents of microelements as Ag, Fe and Sb. The content of Ag in all the studied samples is usually very low – it reach maximally 0.1 wt%, the same as the content of Fe (up to 0.1 wt%). Sometimes, in the localities richer in Fe minerals as siderite and pyrite in the paragenesis, they could contain more Fe (up to 0.5 wt%; Slovinky, Ľubietová-Kolba or Vyšná Boca). The content of Sb in the analyses is variable and strongly depends from the type of mineralization or mineral paragenesis. The phases coming from localities without any Sb mineral (Bacúch, Čierna Lehota) have small contents of Sb (up to 0.3 wt% only in few analyses). The phases coming from localities with tetrahedrite as the only Sb mineral (Vyšná Boca) usually contain around 1 wt% Sb. Samples from localities with Sb overprint or close to the Sb mineralizations (Hviezda) are richer in Sb (up to 5 wt%). The samples richest in Sb come from the stibnite type mineralizations, where various intermediate members of the bismuthinite–stibnite solid solution series occur together with other Sb-rich sulphosalts (tintinaite, bournonite, jamesonite and chalcostibite). The most interesting phase from that paragenesis is "krupkaite with n_a around 51" from Dúbrava, where the content of Sb could reach up to 28 wt%, which corresponds to 2.11 *apfu*. The nature of the individual sulphosalt phase does not exert big influence on the content of Sb. The same content was found in coexisting gladite and bismuthinite or in other phases, but generally the highest values of Sb are shown by the members of the bismuthinite–stibnite solid solution series. The degree of Cu + Pb = Bi + vac. substitution (n_a) in the individual members is various. The n_a values in bismuthinite started approximately about 0 and gradually increased through the value 10.6 up to n_a = 14.5 (Kolba and Hviezda), exceeding the field of bismuthinite. In the field of pekoite the value started at the n_a = 16.5 and gradually increased to n_a = 32. The analyses of gladite fall into the field of n_a values from 33 up to 39.2. The analyses of krupkaite fall into the n_a interval 45.42 up to 59.23. Lindströmite, hammarite and friedrichite are very rare and their analyses fall into the known fields for these minerals. The n_a values of aikinite vary from 80.7 up to 96.8, but in the special case of the locality Slovinky, n_a of aikinite vary from 90.5 up to 108.9. These "oversubstitued" analyses with very high values of n_a are caused by increased content of Cu without adequate amount of Pb and could probably correspond to another mineral, thought all used calculations suggest that the mineral should be aikinite.

References

MAKOVICKY, E. & MAKOVICKY, M. (1978): Canadian. Mineralogist, 16: 405–409.
TOPA, D., MAKOVICKY, E. & PAAR, W. H. (2002): Canadian Mineralogist, 40: 849–869.