BOURNONITE FROM HYDROTHERMAL ORE DEPOSITS IN THE BAIA MARE AREA, ROMANIA

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The most frequent occurrences of bournonite in Romania are related with the Neogene hydrothermal mineralizations. In the hydrothermal mineralizations associated with the Neogene subduction type magmatism at the Baia Mare area, bournonite was identified at Ilba-Alunis, Dealul Crucii, Herja, Baia Sprie, Cavnic, Băiuț and Toroiaga-Borşa. In the base metal mineralizations bournonite appears as intergrowths with galena and less frequently with chalcopyrite, sphalerite and pyrite. Among the sulphosalts the mineral frequently associated with bournonite is tetrahedrite. Bournonite is present as prismatic crystals of 2–3 mm size with vertical striations. These crystals are disposed on galena and sphalerite. Bournonite forms crystal aggregates with different spatial arrangements, of several centimetres in diameter. In reflected light they show fine characteristic lamellar twins (0.05-0.10 mm) in one or two directions. The value of Vickers microhardness determined for a standard print of 20 μ is 150–190 kg/mm^2. The bournonites from the Baia Mare area were studied by electron microprobe analyses. The formulae of the studied bournonites have been recalculated on the basis of 3 sulphur (Table 1).

Besides the major elements Cu, Pb, Sb, S small quantities of As, Fe, Bi, Ag, Sn and Te also appear. Arsenic appears as substitute for Sb. This shows the existence of a solid solution between $CuPbSbS_3$ (bournonite) and $CuPbAsS_3$ (seligmannite). Fe, Ag and Sn appear as substitutes for metallic cations Cu and Pb. The presence of Sn can indicate a high formation temperature of the paragenesis. Bi and Te appear as substitutes for Sb.

Table 1: Atomic proportions based on 3 atoms of sulphur for the Baia Mare bournonites.

No	Atomic proportions	Sample
1	$Pb_{1.03}Cu_{1.1}Ag_{0.003}Sb_{0.98}S_3$	Țiganul vein, Toroiaga
2	$Pb_{1.02}Cu_{0.95}Bi_{0.004}Sb_{1.11}S_3$	Caterina vein, Toroiaga
3	$Pb_{0.98}Cu_{0.99}Sb_{1.05}S_3$	Caterina vein, Toroiaga
4	$Pb_{1.02}Cu_{0.98}Sb_{1.03}S_3$	Caterina vein, Toroiaga
5	$Pb_{092}Cu_{1.17}Ag_{0.0005}Fe_{0.004}Sb_{1.09}S_3$	Baia Sprie
6	$Pb_{0.86}Cu_{1.12}Fe_{0.002}Sb_{1.02}S_3$	Baia Sprie
7	$Pb_{1.004}Cu_{1.02}Bi_{0.002}Sb_{1.02}As_{0.01}Te_{0.001}S_3$	Ignațiu vein, Herja
8	$Pb_{0.96}Cu_{0.95}Sb_{0.95}S_3$	Dealul Crucii
9	$Pb_{0.933\text{-}0.96}Cu_{0.95\text{-}0.98}Fe_{0.02\text{-}0.034}Sb_{0.92\text{-}0.99}As_{0.013\text{-}0.085}Sn_{0.004\text{-}0.01}S_3$	Băiuț 101
10	$Pb_{0.97\text{-}0.99}Cu_{0.96\text{-}0.98}Fe_{0.011\text{-}0.05}Sb_{0.723\text{-}0.98}As_{0.08\text{-}0.3}Sn_{0.003\text{-}0.005}S_3$	Băiuț 602
11	$Pb_{099}Cu_{0.98}Fe_{0.018}Sb_{0.95}S_3$	Baia Sprie
12	$Pb_{0.98}Cu_{1.15}Fe_{0.072}Sb_{0.91}As_{0.027}S_3$	Cavnic

1–4 after GÖTZ & DAMIAN (1990); 9–10 after DAMIAN & COSTIN (1999); 11 after SIPŐCZ (1886); 12 after HIDEGH (1881).

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