

Barioferrite, $\text{BaFe}^{3+}_{12}\text{O}_{19}$ – a new magnetoplumbite-group mineral from the Most Basin, Czech Republic

V. Žáček¹, R. Skála², J. Haloda³

1 Czech Geological Survey, Klárov 3, CZ-118 21 Praha 1, vladimir.zacek@geology.cz

2 Institute of Geology AVČR, v.v.i., Rozvojová 269, CZ-165 00 Praha 6, skala@gli.cas.cz

3 Czech Geological Survey, Klárov 3, CZ-118 21 Praha 1, jakub.haloda@geology.cz

Barioferrite, hexagonal $\text{BaFe}^{3+}_{12}\text{O}_{19}$, occurred in subsilicic Ca- and Fe^{3+} -rich paralava enclosed in the porcellanite (clinkered clay) sequence in Želénky, Most Basin, Czech Republic. The host rock of barioferrite is fine- to medium-grained holocrystalline melilitite composed of gehlenite-dominant melilite with minor magnesioferrite, hematite, Ca_2SiO_4 , bredigite ($\text{Ca}_7\text{MgSi}_4\text{O}_{16}$), srebrodolskite ($\text{Ca}_2\text{Fe}_2\text{O}_5$), unnamed phase CaFe_4O_7 , barite and perovskite, plus secondary aragonite, calcite, thaumasite and several poorly identified phases.

The mineral is grey, opaque and forms platy euhedral crystals of hexagonal outline which in thin section often appear as needles. They reach up to 100 μm in the length and only several μm in the thickness but larger aggregates (consisting of several crystals) attain the size up to $120 \times 40 \mu\text{m}$. The phase obviously corresponds to synthetic magnetoplumbite-type compound $\text{BaFe}_{12}\text{O}_{19}$ (barium hexaferrite, *S.G* *P63/mmc*, $a = 5.88$, $c = 23.17$ (Å), $Z = 2$) which

was studied by Townes et al. (1967). The identity of natural mineral with synthetic barium hexaferrite was demonstrated by EBSD study, because small size of objects prevented obtaining of a reasonable X-ray diffraction data. Barioferrite from Želénky contains dominant Fe_2O_3 (75–78 wt. %) and major BaO (11–13 wt. %), with minor TiO_2 (0.8–4.9 wt. %), Al_2O_3 (1.5–4.6 wt. %), ZrO_2 (0.8–1.6 wt. %); 0.5–1.7 wt. % of Ca-Mg- a Mn-oxides, and up to 0.25 wt. % of SrO. The natural occurrence of barium hexaferrite first reported Žáček et al. (2001) with more details given by Žáček et al. (2005, 2010) but the name was introduced into the literature recently by Murashko et al. (2010) from Israel. The mineral from Israel occurs in the “Mottled Zone” complex (Gross et al. 1967, Grapes 2006) resulting from pyrometamorphism of bituminous Ca-rich sediments of the Hatrurim Basin in the assemblage with barite, calcite, magnetite and maghemite.

References:

- Grapes R. (2006): Pyrometamorphism. – Springer, 275 pp.
- Gross S., Mazor E., Saas E., Zak I. (1967): The Mottled Zone of Nahal Ayalon (central Israel). – *Isr. J. Earth Sci.*, 16, 84–96.
- Murashko M. N., Chukanov N. V., Mukhanova A. A., Vapnik, E., Britvin S. N., Krivovichev S. V., Polekhovskii Y. S., Ivakin Y. D. (2010): Barioferrite $\text{BaFe}^{3+}_{12}\text{O}_{19}$ – a new magnetoplumbite-group mineral from Hatrurim Formation, Israel. – *Zapiski RMO*, 139, 3, 22–31.
- Townes W. D., Famg J. H., Perrota A. J. (1967): (2010): The crystal structure and refinement of ferrimagnetic barium ferrite, $\text{BaFe}_{12}\text{O}_{19}$ – *Z. Kristallogr.*, 125, 437–439.
- Žáček V., Dvořák Z., Skála R. (2001): Unusual Mineral Assemblage Associated with the Fossil Fire of the Coal Seam at Želénky, North Bohemian Brown Coal Basin, Czech Republic. – *Geolines* 13, 126–127. Praha.
- Žáček V., Skála R., Chlupáčová M., Dvořák Z. (2005): Ca- Fe^{3+} - rich, Si-undersaturated buchite from Želénky, North-Bohemian Brown Coal Basin, Czech Republic. – *Eur. J. Miner.* 17, 623–633.
- Žáček V., Skála R., Dvořák Z. (2010): Rocks and minerals formed by fossil combustion pyrometamorphism in the Neogene brown coal Most basin, Czech Republic. – *Bull. mineral.-petrol. Odd. Nár. Muz. (Praha)*, 18/1, 1-32 (in Czech with English abstract).