SUPERGENE ARSENATES OF COPPER FROM THE PIESKY DEPOSIT, ŠPANIA DOLINA, CENTRAL SLOVAKIA

ŠTEVKO, M.[1]* & SEJKORA, J.[2]
[1] Department of Mineralogy and Petrology, Comenius University, Mlynská dolina G, 842 15 Bratislava, Slovakia
[2] Department of Mineralogy and Petrology, National Museum, Cirkusová 1740, 193 00, Prague 9, Czech Republic
* E-mail: stevko@fns.uniba.sk

The abandoned Piesky deposit is part of Špania Dolina ore district and is situated approximately 1.2 km to the north from Špania Dolina village in the Starohorské Mts., Central Slovakia. In the past, Špania Dolina ore district was one of the most prominent producers of copper in Europe and there is evidence at the Piesky deposit that copper was mined there already during the Bronze Age (TOČÍK & BUBLOVÁ, 1985). Hydrothermal quartz-carbonate-sulphide mineralization is hosted mostly in sandstones and conglomerates of Permian age. The main primary minerals are quartz, siderite, dolomite, chalcopyrite and tetrahedrite (ILAVSKÝ, 1976; MICHŇOVÁ & OZDÍN, 2010a, b). There is an extensive supergene zone, especially at the near-surface part of the Piesky deposit. Most common supergene minerals are azurite, antlerite, brochantite, cuprite, chalcophyllite, devilline, gypsum, langite, malachite, native copper and posnjakite (e.g., FIGUSCHOVÁ, 1977, 1978; ŘÍDKOŠIL, 1978, 1981; ŘÍDKOŠIL & POVONDRA, 1982).

Studied samples with supergene copper arsenate minerals were recently collected from the dumps and mineralized outcrops at the Piesky deposit. All mentioned minerals were identified using a Bruker D8 Advance X-ray powder diffractometer and quantitative chemical data were collected using Cameca SX100 electron microprobe operating in the wavelength-dispersive mode from polished samples mounted in epoxy resin.

Together with other supergene minerals, clinoclase, cornwallite, chalcophyllite and sulfate rich tyrolite were identified. Clinoclase forms dark blue well developed columnar crystals up to 1 mm, sometimes grouped to the radial aggregates. It is associated with azurite, malachite, cornwallite and tyrolite. Refined unit-cell parameters of clinoclase are: a = 7.237(1) Å, b = 6.444(1) Å, c = 12.356(2) Å and V = 568.247(7) Å^3. Chemical composition of clinoclase is rather simple, only minor contents of Fe (up to 0.01 *apfu*), Al (up to 0.01 *apfu*), P (up to 0.03 *apfu*) and F (up to 0.02 *apfu*) were detected. Cornwallite occurs as pale to emerald-green botryoidal aggregates which usually replace aggregates of azurite. The refined unit-cell parameters of cornwallite are: a = 4.523(1) Å, b = 5.732(1) Å, c = 17.106(4) Å and V = 443.461(3) Å^3. An extensive As ↔ P substitution as well as minor contents of Al (up to 0.04 *apfu*), Sb (up to 0.07 *apfu*), Si (up to 0.02 *apfu*), S (0.02 *apfu*) and F (0.05 *apfu*) are characteristic for cornwallite. Chalcophyllite is most common supergene arsenate and it forms emerald to pale green tabular crystals up to 5 mm, which are mostly associated with azurite and baryte. Its refined unit-cell parameters are: a = 10.748(1) Å, c = 28.586(2) Å and V = 2697.335(12) Å^3. Contents of Fe (up to 0.11 *apfu*), Sb (up to 0.22 *apfu*), Si (up to 0.12 *apfu*), P (1.18 *apfu*) and Cl (up to 0.06 *apfu*) were observed in chalcophyllite. Sulphate-rich tyrolite occurs as blue-green to emerald-green radial aggregates up to 3 mm associated with azurite, malachite and clinoclase. The refined unit-cell parameters are: a = 27.425(5) Å, b = 5.564(2) Å, c = 10.496(4) Å and V = 1587.086(24) Å^3. Content of sulphate groups in tyrolite reaches up to 0.40 *apfu*. Minor amounts of Zn (up to 0.02 *apfu*), Sb and Si (both up to 0.04 *apfu*) and P (up to 0.09 *apfu*) were detected. Interesting are also contents of Cl (up to 0.03 *apfu*) and F (up to 0.13 *apfu*). All described copper arsenate minerals from the Piesky deposit represent decomposition products of tetrahedrite, which is locally arsenic-enriched.

References

FIGUSCHOVÁ, M. (1977): Hornická Příbram ve vědě a technice, 55–70.
FIGUSCHOVÁ, M. (1978): Mineralia Slovaca, 10: 383–384.
ILAVSKÝ, J. (1976): Economic Geology, 71: 423–432.
MICHŇOVÁ, J. & OZDÍN, D. (2010a): Mineralia Slovaca, 42: 69–78.
MICHŇOVÁ, J. & OZDÍN, D. (2010b): Acta Mineralogica-Petrographica, Abstract Series, 6: 237.
ŘÍDKOŠIL, T. (1978): Časopis pro Mineralogii a Geologii, 23: 436–437.
ŘÍDKOŠIL, T. (1981): Časopis pro Mineralogii a Geologii, 26: 263–271.
ŘÍDKOŠIL, T. & POVONDRA, P. (1982): Časopis pro Mineralogii a Geologii, 27: 79–84.
TOČÍK, A & BUBLOVÁ, M. (1985): Štúdijné Zvesti Acheologického ústavu, 21: 47–135.