# SECONDARY MINERALS FOUND IN OLD MINE GALLERIES FROM ROŞIA MONTANĂ, ROMANIA

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Recent investigations carried out on some secondary minerals formed along old mining galleries in the Cârnic district (Roşia Montană) enabled us to characterize eight minerals, out of which, according to a recently published inventory (SZAKÁLL, 2002), one (jokokuite) is for the first time mentioned in the Carpathians. Another mineral (apjohnite) seems to represent a new occurrence in Romania as it was neither mentioned on UDUBAŞA's (1999) checklist nor in SZAKÁLL (2002). The precipitation of the minerals described below is largely controlled by changes in temperature and water vapor partial pressure of the galleries microenvironment, and also by the cation substitutions. All the minerals described were identified by routine X-ray powder diffraction analyses, being subsequently investigated by means of energy-dispersive spectrometry, electron-microprobe analyses, optical and scanning electron microscope observations. The specimens are deposited in the Mineralogical Museum of the "Babeş-Bolyai" University in Cluj-Napoca, Romania.

*Jokokuite* - $Mn^{2+}SO_4 \cdot 5H_2O$ forms pale pink, rosette-like aggregates up to 2-3 cm in length on the walls of an old mining gallery at horizon +958 m, intimately associated with rozenite. The jokokuite crystals have vitreous luster, no cleavage and are easily soluble in water. The average cell parameters obtained on the basis of 29 powder reflections are $a$ = 6.38(2) Å, $b$ = 10.70(1) Å, $c$ = 6.22(2) Å, $\alpha$ = 97.619(5)°, $\beta$ = 110.493(8)°, $\gamma$ = 75.88(9)°. The $c$ cell parameter is smaller than the reported value in the ICDD file 31-836, which may reflect the substitution of $Mn^{2+}$ with $Fe^{2+}$.

*Apjohnite* - $Mn^{2+}Al_2(SO_4)_4 \cdot 22H_2O$. Found in several samples collected from either floor or walls of old adits. It forms white to yellowish brown or greenish crusts or fibrous and needle-like crystals (up to few centimeters). The unit cell of a representative sample (#1538) as refined by least squares of 48 reflections were found to be $a$ = 6.266(5) Å, $b$ = 24.502(2) Å, $c$ = 21.281(3) Å, and $\beta$ = 98.692(8)°. In sample #1541 it appears associated with pickeringite.

*Alunogen* - $Al_2(SO_4)_3 \cdot 17H_2O$ appears in association with pickeringite as efflorescences on dietrichite botryoidal aggregates. The prismatic crystals of alunogen are up to 2 mm in length and are extremely thin (<0.5 mm). Up to now, this mineral was mentioned to occur only as efflorescences on metamorphic or igneous rocks (RĂDULESCU & DIMITRESCU, 1966).

*Dietrichite* - $(Zn,Fe^{2+},Mn^{2+})Al_2(SO_4)_4 \cdot 22H_2O$ forms tufted aggregates of acicular crystals and efflorescences along galleries' ceiling. The color is dirty yellow or sometimes greenish. The type locality for this mineral is Baia Sprie (Maramureş, Romania) whereas Roşia Montană represents its second occurrence in Romania.

*Halotrichite* - $Fe^{2+}Al_2(SO_4)_4 \cdot 22H_2O$ was observed as yellowish-brown mammillary aggregates with vitreous luster. It was also found as hair-like efflorescences.

*Kalinite* - $KAl(SO_4)_2 \cdot 11H_2O$ is rather abundant in the gallery we investigated and appears as delicate, tiny fibers overlying halotrichite aggregates. Crystals are translucent and if removed from the gallery environment will decompose within minutes into a white milky powder.

*Melanterite* - $Fe^{2+}SO_4 \cdot 7H_2O$ forms colorless to translucent, sometimes slightly green fibrous aggregates (up to 4 cm) having vitreous luster. Upon exposure to dry air crystals become white-yellowish and opaque.

*Pickeringite* - $MgAl_2(SO_4)_4 \cdot 22H_2O$ was first identified in Romania in Diana Cave, Băile Herculane (DIACONU & MEDEŞAN, 1973). In our investigated occurrence at Roşia Montană the mineral forms shining white to silky thin crystals (3-5 mm in length) covering apjohnite crusts.

*Rozenite* - $Fe^{2+}SO_4 \cdot 5H_2O$ is the main component of the rosette-like aggregates found on the ceiling of abandoned adits of the gold deposit at Roşia Montană. The white or colorless fibrous aggregates of rozenite form directly on highly weathered dacites and can reach 3 to 5 cm in length.

**References**

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