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PŮVODNÍ PRÁCE/ORIGINAL PAPER

Chenowethite, rare Mg-uranyl -sulphate, from the Jáchymov ore district, Krušné hory Mountains (Czech Republic) - description and Raman spectroscopy

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Abstract

We studied a rare magnesium uranyl sulphate mineral, chenowethite, from the Jáchymov ore district, Krušné hory Mountains (Czech Republic). It was confirmed from the two samples originating from the Svornost mine in Jáchymov. Chenowethite forms rich crystalline aggregates on supergene-altered rocks in association with dark yellow to orange mineral of the zippeite group and white acicular crystals of gypsum. Its randomly arranged aggregates are composed of elongated thin tabular crystals up to 100 μm in length. Chenowethite is pale or bright yellow with a pale yellow streak and fluoresces greenish yellow, weak or dull under 254 nm and 366 nm UV-radiation, respectively. Chenowethite crystals are transparent to translucent and have an intensive vitreous luster. It is very brittle, and at least one system of perfect cleavage (along {010}) was observed. The quantitative chemical analyses of chenowethite agree well with the proposed ideal composition and correspond to the following empirical formulae (on the basis of 2 U atoms *pfu*) $(\text{Mg}_{1.02}\text{Fe}_{0.03}\text{Mn}_{0.03})_{\Sigma 1.08}[(\text{UO}_2)_2(\text{SO}_4)_{2.06}(\text{OH})_{2.04}] \cdot 11\text{H}_2\text{O}$ (sample A) and $(\text{Mg}_{0.92}\text{Fe}_{0.11}\text{Mn}_{0.04}\text{Zn}_{0.01})_{\Sigma 1.08}[(\text{UO}_2)_2(\text{SO}_4)_{1.96}(\text{SiO}_4)_{0.01}(\text{OH})_{2.23}] \cdot 11\text{H}_2\text{O}$ (sample B). Chenowethite is orthorhombic, the space group *Cmcm*, with the unit-cell parameters refined from X-ray powder diffraction data: *a* 6.9329(8), *b* 19.0019(15), *c* 16.3298(15) Å and *V* 2151.2(3) Å³ (sample A) and *a* 6.937(3), *b* 19.019(5), *c* 16.348(6) Å and *V* 2156.8(1.1) Å³ (sample B). Vibrational (Raman and infrared) spectroscopy documents the presence of molecular water, uranyl and sulphate units in the crystal structure of chenowethite.

Key words: chenowethite, uranyl sulphate, unit-cell parameters, chemical composition, Raman spectroscopy, infrared spectroscopy, Jáchymov, Czech Republic

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