Urusovite, Cu[AlAsO₅],
a new mineral from the Tolbachik volcano,
Kamchatka, Russia

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Abstract: Urusovite, ideally Cu[AlAsO₅], has been found in a fumarole in the North Breach of the great fissure Tolbachik eruption (1975-76, Kamchatka peninsula, Russia). It occurs as light-green plates up to 0.4 mm in maximal dimension, tabular on {100}, elongated along [001]; well-developed forms are {100}, {010}, {110}, {011}, {111}. Associated minerals are: ponomarevite, piypite, sylvite, dolerophanite, euchlorine, tenorite, hematite and two unknown As-bearing minerals. Urusovite is brittle and has a perfect cleavage on (100), a vitreous luster and a white streak. H = 378 kg/mm². Biaxial, optically negative. α = 1.672(2), β = 1.718(2), γ = 1.722(2), 2Vmeas ~ 30(2)°, 2Vcalc = 32.2°. Optical orientation is b = β, c ~ α. Pleochroism is in the light-green tones: α - colourless, β - light-green, γ - light-green. The mineral is monoclinic, space group P2₁/c, a = 7.314(2), b = 10.223(3), c = 5.576(2) Å, β = 99.79(3)°, V = 410.9(2) Å³. The diagnostic lines of the X-ray powder diffraction pattern are (I-d-hkl): 100-7.20-100; 9-4.844-011; 23-4.327-111; 10-3.604-200; 10-3.174-121; 20-3.125-211; 6-2.656-012; 8-2.458-221. Urusovite is isostructural with Fe²⁺[AlPO₅]. Microprobe analysis gave the following chemical composition (wt. %): CuO 32.23 (30.97-32.82), Al₂O₃ 20.89 (20.44-21.44), Fe₂O₃ 0.32 (0.10-0.72), ZnO 0.25 (0.10-0.43), As₂O₅ 46.02 (44.97-47.17), V₂O₅ 0.12 (0.00-0.40), Σ 99.83 (98.71-100.64). The empirical formula of urusovite, (Cu₀.₉₉Zn₀.₀₁)Σ₁.₀₀Al₁.₀₀As₀.₉₈O₅.₀₀, calculated on the basis of 5 O atoms, is close to the ideal one, Cu[AlAsO₅], confirmed by crystal-structure analysis. The mineral is named urusovite in honour of Vadim Sergeevich Urusov (1936-), crystal chemist, Corresponding Member of the Russian Academy of Sciences, chair of the Department of Crystallography and Crystal Chemistry of Moscow State University.

Key-words: urusovite, new mineral, arsenate, Tolbachik volcano, Kamchatka (Russia).

Introduction

A new copper aluminoarsenate, Cu[AlAsO₅], has been discovered in a fumarole of the North Breakthrough of the Great fissure Tolbachik eruption (GFTE) (1975-76, Kamchatka peninsula, Russia). The mineral is named urusovite in honour of Vadim Sergeevich Urusov, crystal chemist, Corresponding Member of the Russian Academy of Sciences, chair of the Department of Crystallography and Crystal Chemistry of Moscow State University. The type specimen is