WILANCOOKITE, A NEW BERYLLOPHOSPHATE FROM MINAS GERAIS, BRAZIL

Hatert F.*[1], Philippo S.[2], Ottolini L.[3], Dal Bo F.[1], Scholz R.[4], Chaves M.L.S.C.[5], Yang H.[6], Downs R.T.[6], & Menezes Filho L.A.D.[7]

[1] Laboratory of Mineralogy, University of Liège, Belgium
[2] Natural History Museum, Luxembourg
[3] CNR – Instituto di Geoscienze e Georisorse, Pavia, Italy
[4] Universidade Federal de Ouro Preto, Brazil
[5] Universidade Federal de Minas Gerais, Brazil
[6] Department of Geosciences, University of Arizona, USA
[7] (†) Rua Esmeralda 534, Prado 30410-080, Belo Horizonte, MG, Brazil

Wilancookite, beryllophosphate, Brazil

Wilancookite, $(Ba,K,Na)_8(Ba,Li,[])_6Be_{24}P_{24}O_{96}.32H_2O$, is a new beryllophosphate discovered in the Lavra Ponte do Piauí granitic pegmatite, Itinga, Jequitinhonha, Minas Gerais, Brazil. The mineral forms tiny colourless dodecahedral {110} crystals reaching 100 µm in diameter, deposited on moraesite fibres. The lustre is vitreous, the streak is white, and the mineral is non-fluorescent either under long or short-wavelength ultraviolet light. No cleavage has been observed, but the mineral is brittle with an irregular fracture. Mohs hardness is 4-5, calculated density is 3.05 g/cm^3. Wilancookite is isotropic, colourless, non-pleochroic, with n = 1.560(2) (measured under λ = 590 nm). Quantitative chemical analyses were performed with a Cameca SX-50 electron microprobe (Ruhr-Universität Bochum, Germany); Be and Li contents were determined with a Cameca IMS 4f ion microprobe (CNR-IGG, Pavia, Italy). The empirical formula of wilancookite, based on 96 anhydrous oxygen atoms per formula unit (*apfu*), is: $(Ba_{7.54}K_{0.32}Na_{0.14})_{\Sigma 8.00}(Ba_{3.04}Li_{1.57}[]_{1.39})_{\Sigma 6.00}Be_{24.08}(P_{23.88}Al_{0.38}Si_{0.03})_{\Sigma 24.29}O_{96}\cdot 32H_2O$. The simplified formula is $Ba_8(Ba_3Li_2[])Be_{24}P_{24}O_{96}\cdot 32H_2O$. The Raman spectrum is characterized by peaks at 430 (Be-O), 580 (ν_4 PO_4), 1000 (ν_1 PO_4), 1050 (ν_3 PO_4), 1600 (ν_2 H_2O), 3430 and 3680 (ν_3 H_2O) cm^{-1}. An X-ray structural study was carried out on a crystal measuring 0.089 x 0.070 x 0.065 mm. A total of 1292 reflections were extracted, corresponding to 805 unique reflections. The unit-cell parameter refined from these reflections, a = 13.5398(2) Å, is in good agreement with that refined from the X-ray powder diffraction data. The crystal structure was refined in space group $I2_13$, to an R_1 value 0.0458; it is characterized by a framework similar to that of pahasapaite, $(Ca,Li,K,[])_{24}Li_8Be_{24}P_{24}O_{96}.38H_2O$. This framework is based on corner-sharing BeO_4 and PO_4 tetrahedra forming a large cavity that contains Ba atoms and water molecules. Three different type of rings are building the cavity: eight-membered rings are parallel to {100} planes, six-membered rings are parallel to {111} planes, and four-membered rings are parallel to {110} planes. The positions of Ba atoms and water molecules are significantly different to those of Ca and Li in pahasapaite; however, the general topology of the framework is preserved. The mineral is named to honour William R. Cook Jr. (1927-2006) and his wife Anne, very active mineral collectors. This name was originally given by Luiz A.D. Menezes Filho (1950-2014), when he discovered this species. The mineral species and its name were approved by the IMA-CNMNC under number 2015-034.