Pandoraite-Ba $BaV^{4+}_5V^{5+}_2O_{16}\cdot 3H_2O$

Crystal Data: Monoclinic, pseudotetragonal. *Point Group*: 2. As subparallel to random intergrowths of thin, square plates to ~100 μm.

Physical Properties: *Cleavage*: Perfect on {001}. *Tenacity*: Brittle. *Fracture*: Curved. Hardness = ~2.5 D(meas.) = 3.24 D(calc.) = 3.256

Optical Properties: Translucent. *Color*: Dark blue. *Streak*: Light greenish blue. *Luster*: Vitreous. *Optical Class*: Uniaxial (-). ω = 1.84(1) ε = 1.81(2) *Orientation*: $X \approx c$. *Pleochroism*: Shades of greenish blue. *Absorption*: $O > E$.

Cell Data: *Space Group*: $P2$. a = 6.1537(16) b = 6.1534(18) c = 21.356(7) β = 90.058(9)° Z = 2

X-ray Powder Pattern: Pandora mine, La Sal district, San Juan County, Colorado, USA. 10.9 (100), 2.559 (26), 2.739 (20), 1.9345 (20), 2.812 (19), 3.631 (18), 2.176 (13)

Chemistry:

	(1)
Na_2O	0.11
K_2O	0.09
CaO	0.36
SrO	1.10
BaO	15.54
Al_2O_3	0.13
Fe_2O_3	3.41
VO_2	42.99
V_2O_5	26.40
H_2O	[6.60]
Total	96.73

(1) Pandora mine, La Sal district, San Juan County, Colorado, USA; average electron microprobe analysis, H_2O calculated from structure, total VO_2 (67.07) allocated as VO_2 and V_2O_5 for charge balance; corresponds to $(Ba_{0.83}Sr_{0.09}Ca_{0.05}Na_{0.03}K_{0.02})_{\Sigma=1.02}(V^{4+}_{4.25}V^{5+}_{2.38}Fe^{3+}_{0.35}Al_{0.02})_{\Sigma=7.00}O_{16}\cdot 3H_2O$.

Polymorphism & Series: Complete solid solution between pandoraite-Ba and pandoraite-Ca.

Occurrence: Deposited from solutions rich in U and V where they encountered pockets of strongly reducing solutions developed around accumulations of carbonaceous plant material.

Association: Carnotite, a Ba-Fe-V-bearing member of the alunite supergroup.

Distribution: From the Pandora mine, La Sal district (Paradox Valley district), San Juan County, Colorado, USA.

Name: For the mine where it was discovered, and a suffix indicates the dominant interlayer cation.

Type Material: Natural History Museum of Los Angeles County, Los Angeles, California, USA (67293 and 67294).

References: (1) Kampf, A.R., J.M. Hughes, B.P. Nash, and J. Marty (2019) Pandoraite-Ba and Pandoraite-Ca, $Ba(V^{4+}_5V^{5+}_2)O_{16}\cdot 3H_2O$ and $Ca(V^{4+}_5V^{5+}_2)O_{16}\cdot 3H_2O$, two new vanadium oxide bronze minerals in solid solution from the Pandora mine, La Sal mining district, San Juan County, Colorado, USA. Can. Mineral., 57(2), 255-265. (2) (2021) Amer. Mineral., 106, 1187 (abs. ref. 1).