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

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.) = 2.91 D(calc.) = 2.927

Optical Properties: Translucent. *Color*: Dark blue. *Streak*: Light greenish blue. *Luster*: Vitreous. *Optical Class*: Uniaxial (-). $\omega = 1.83(1)$ $\varepsilon = 1.80(2)$ *Orientation*: $X \approx c$. *Pleochroism*: Shades of greenish blue. *Absorption*: $O > E$.

Cell Data: *Space Group*: $P2$. $a = 6.119(8)$ $b = 6.105(8)$ $c = 21.460(9)$ $\beta = 90.06(14)°$ $Z = 2$

X-ray Powder Pattern: Pandora mine, La Sal district, San Juan County, Colorado, USA. 11.07 (100), 1.9401 (25), 2.564 (23), 2.745 (22), 3.084 (16), 2.831 (14), 4.055 (12)

Chemistry:

	(1)
Na_2O	0.06
K_2O	0.08
CaO	4.88
SrO	0.23
BaO	1.54
Al_2O_3	0.05
Fe_2O_3	4.13
VO_2	43.33
V_2O_5	37.62
H_2O	[7.65]
Total	99.57

(1) Pandora mine, La Sal district, San Juan County, Colorado, USA; average electron microprobe analysis, H_2O calculated from structure, total VO_2 (77.64) allocated as VO_2 and V_2O_5 for charge balance; corresponds to $(Ca_{0.62}Ba_{0.07}Sr_{0.02}Na_{0.01}K_{0.01})_{\Sigma=0.73}(V^{4+}_{3.70}V^{5+}_{2.93}Fe^{3+}_{0.37}Al_{0.01})_{\Sigma=7.01}O_{16}\cdot 3H_2O$.

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: Finchite.

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 (67287).

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).