**Pandoraite-Ca**

\( \text{CaV}^{4+}\text{V}^{5+}\text{O}_{16}\cdot3\text{H}_2\text{O} \)

**Crystal Data:** Monoclinic, pseudotetragonal. *Point Group:* 2. As subparallel to random intergrowths of thin, square plates to ~100 \(\mu\text{m}\).

**Physical Properties:** *Cleavage:* Perfect on \{001\}. *Tenacity:* Brittle. *Fracture:* Curved. *Hardness:* \(\approx 2.5\) \(D(\text{meas.}) = 2.91\) \(D(\text{calc.}) = 2.927\)

**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:* \(\text{O} > \text{E}\).

**Cell Data:** *Space Group:* \(P2_1\). \(a = 6.119(8)\) \(b = 6.105(8)\) \(c = 21.460(9)\) \(\beta = 90.06(14)^\circ\) \(Z = 2\)

**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:**

\[
\begin{align*}
\text{Na}_2\text{O} & : 0.66 \\
\text{K}_2\text{O} & : 0.08 \\
\text{CaO} & : 4.88 \\
\text{SrO} & : 0.23 \\
\text{BaO} & : 1.54 \\
\text{Al}_2\text{O}_3 & : 0.05 \\
\text{Fe}_2\text{O}_3 & : 4.13 \\
\text{VO}_2 & : 43.33 \\
\text{V}_2\text{O}_5 & : 37.62 \\
\text{H}_2\text{O} & : [7.65] \\
\text{Total} & : 99.57 \\
\end{align*}
\]

(1) Pandora mine, La Sal district, San Juan County, Colorado, USA; average electron microprobe analysis, \(\text{H}_2\text{O}\) calculated from structure, total \(\text{VO}_2\) (77.64) allocated as \(\text{VO}_2\) and \(\text{V}_2\text{O}_5\) for charge balance; corresponds to (\(\text{Ca}_{0.62}\text{Ba}_{0.07}\text{Sr}_{0.02}\text{Na}_{0.01}\text{K}_{0.01})\text{V}^{4+}_{2.93}\text{V}^{5+}_{3.70}\text{Fe}^{3+}_{0.37}\text{Al}_{0.01})\Sigma_{7.01}\text{O}_{16}\cdot3\text{H}_2\text{O}.

**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, \(\text{Ba}(\text{V}^{4+}\text{V}^{5+})\text{O}_{16}\cdot3\text{H}_2\text{O}\) and \(\text{Ca}(\text{V}^{4+}\text{V}^{5+})\text{O}_{16}\cdot3\text{H}_2\text{O}\), 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).