## Calciodelrioite $Ca(VO_3)_2(H_2O)_4$

**Crystal Data**: Monoclinic. *Point Group*: 2/*m*. As terminated, prismatic crystals with {001} and {011} dominant. Typically as needles elongated and striated parallel to [100], forming parallel to sub-parallel intergrowths or divergent sprays to 2 mm or as very tightly intergrown broad blade-like aggregates in flat-lying "star bursts" to 2 mm.

**Physical Properties**: *Cleavage*: Perfect on {001}, others possible parallel [100]. *Tenacity*: Brittle. *Fracture*: Irregular to splintery. Hardness = 2.5 D(meas.) = n.d. D(calc.) = 2.451-2.503 Soluble in water.

**Optical Properties**: Transparent. *Color*: Colorless, tan to reddish brown, brown. *Streak*: White. *Luster*: Subadamantine (crystals), silky (aggregates).
*Optical Class*: Biaxial (+). $\alpha = 1.733(3)$ $\beta = 1.775(3)$ $\gamma = 1.825(3)$ 2V(meas.) = 87.3(9)° 2V(calc.) = 87° *Orientation*: $X = b$, $Z \approx a$. *Pleochorism*: None.

**Cell Data**: *Space Group*: *I*2/*a*. $a = 14.6389(10)$ $b = 6.9591(4)$ $c = 17.052(2)$ $\beta = 102.568(9)°$ Z = 8

**X-ray Powder Pattern**: West Sunday mine, Colorado, USA.
6.450 (100), 3.027 (50), 2.560 (28), 3.489 (18), 1.786 (18), 3.215 (17), 4.350 (16)

**Chemistry**:

| | (1) | (2) | (3) |
|---|---|---|---|
| $Na_2O$ | 0.34 | 0.08 | |
| $K_2O$ | 0.22 | 0.02 | |
| CaO | 15.83 | 13.39 | 18.09 |
| SrO | 2.31 | 6.87 | |
| $V_2O_5$ | 58.13 | 56.96 | 58.67 |
| $H_2O$ | [23.16] | [22.66] | 23.24 |
| Total | 99.99 | 99.98 | 100.00 |

(1) West Sunday mine, Colorado, USA; average of 11 electron microprobe analyses, $H_2O$ calculated from structure refinement, results normalized to account for dehydration during analysis; corresponding to $(Ca_{0.88}Sr_{0.07}Na_{0.04}K_{0.01})_{\Sigma=1.00}(V_{1.00}O_3)_2(H_{2.01}O)_4$. (2) West Sunday mine, Colorado, USA; average of 10 electron microprobe analyses, $H_2O$ calculated from structure refinement, results normalized to account for dehydration during analysis; corresponding to $(Ca_{0.76}Sr_{0.21}Na_{0.01})_{\Sigma=0.98}(V_{1.00}O_3)_2(H_{2.01}O)_4$. (3) $Ca(VO_3)_2(H_2O)_4$.

**Polymorphism & Series**: Forms a series with delrioite; dimorphous with rossite.

**Occurrence**: A secondary mineral as crystalline crusts on fracture surfaces in the oxidized portions of corvusite- and montroseite-impregnated sandstone.

**Association**: Gypsum, rossite, metarossite, celestine, huemulite, pascoite (West Sunday mine); delrioite, hendersonite, pascoite, powellite, schindlerite (St. Jude mine); delrioite, huemulite, hummerite, magnesiopascoite, powellite, K- and Mg-bearing decavanadate (Blue Streak mine); huemulite (Little Eva mine).

**Distribution**: From the West Sunday and St. Jude mines, Slick Rock district, San Miguel County; and at the Blue Streak mine, Bull Canyon, Montrose County, Colorado; and also at the Little Eva mine, Yellow Cat district, Grand County, Utah, USA.

**Name**: As the calcium (*Ca*) analog of *delrioite.*

**Type Material**: Natural History Museum of Los Angeles County, California, USA (# 63837, 63838, and 63839).

**References**: (1) Kampf, A.R., J. Marty, B.P. Nash, J. Plášil, A.V. Kasatkin, and R. Škoda (2012) Calciodelrioite, $Ca(VO_3)_2(H_2O)_4$, the Ca analog of delrioite, $Sr(VO_3)_2(H_2O)_4$. Mineral. Mag., 76(7), 2803-2817. (2) (2014) Amer. Mineral., 99, 2437-2438 (abs. ref. 1).