

**Calkinsite-(Ce)****(Ce, La)<sub>2</sub>(CO<sub>3</sub>)<sub>3</sub>•4H<sub>2</sub>O**

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**Crystal Data:** Orthorhombic. *Point Group:* 222. As platy {010} crystals, to 1 mm.  
*Twinning:* Commonly twinned on {101}, compound and elongated along [100].

**Physical Properties:** *Cleavage:* {010}, perfect; {101}, distinct; {001}, a parting (?).  
Hardness = ~2.5 D(meas.) = 3.28(1) D(calc.) = [3.27]

**Optical Properties:** Translucent. *Color:* Pale yellow.  
*Optical Class:* Biaxial (-). *Pleochroism:* X = yellow; Y = Z = colorless. *Orientation:* X = b; Y = c; Z = a. *Dispersion:*  $r < v$ , weak.  $\alpha = 1.569$   $\beta = 1.657$   $\gamma = 1.686$  2V(meas.) = 54°  
2V(calc.) = 57.2°

**Cell Data:** *Space Group:*  $P2_122_1$ .  $a = 9.57(2)$   $b = 12.65(8)$   $c = 8.94(2)$   $Z = 4$

**X-ray Powder Pattern:** Big Sandy Creek, Montana, USA.  
6.54 (10b), 3.27 (5), 4.78 (4), 4.49 (4), 2.931 (3b), 2.128 (3), 2.115 (3)

**Chemistry:**

	(1)
CO <sub>2</sub>	23.93
La <sub>2</sub> O <sub>3</sub>	19.82
Ce <sub>2</sub> O <sub>3</sub>	32.05
Pr <sub>2</sub> O <sub>3</sub>	2.89
Nd <sub>2</sub> O <sub>3</sub>	7.97
H <sub>2</sub> O	13.34
Total	[100.00]

(1) Big Sandy Creek, Montana, USA; recalculated to 100% after deduction of impurities 11.65%, from an original total of 100.47%; corresponds to (Ce<sub>1.03</sub>La<sub>0.67</sub>Nd<sub>0.26</sub>Pr<sub>0.10</sub>)<sub>Σ=2.06</sub>(CO<sub>3</sub>)<sub>3.00</sub>•4.09H<sub>2</sub>O.

**Occurrence:** A weathering product closely associated with burbankite, in calcite veins cutting shonkinite in a composite stock (Big Sandy Creek, Montana, USA).

**Association:** Burbankite, ancylite, lanthanite, barite, goethite, calcite, “biotite” (Big Sandy Creek, Montana, USA); barite, strontianite, pyrite (Vuoriyarvi massif, Kola Peninsula, Russia); dolomite, khanneshite, carbocernaite, mckelveyite, barite, “chlorite” (Khanneshin complex, Afghanistan).

**Distribution:** In the USA, from vermiculite prospects at the head of Big Sandy Creek, Rocky Boy’s Indian Reservation, about 40 km east of Box Elder, Hill Co., Montana. At the Vuoriyarvi carbonatite massif, Kola Peninsula, Russia. From the Khanneshin carbonatite complex, Afghanistan.

**Name:** Honors Frank Cathcart Calkins (1878–1974), geologist with the U.S. Geological Survey.

**Type Material:** n.d.

**References:** (1) Pecora, W.T. and J.H. Kerr (1953) Burbankite and calkinsite, two new carbonate minerals from Montana. *Amer. Mineral.*, 38, 1169–1183.