Galgenbergite-(Ce) $CaCe_2(CO_3)_4 \bullet H_2O$

Crystal Data: Triclinic. *Point Group*: $\bar{1}$. As bladed to tabular crystals flattened on {001} and elongated on [010], showing {001}, {101}, and {010} to 0.6 mm; as rosettes to 1mm.

Physical Properties: *Cleavage*: Perfect on {001}. *Fracture*: Splintery. *Tenacity*: Brittle. Hardness = n.d. D(meas.) = n.d. D(calc.) = 3.99

Optical Properties: Translucent to transparent. *Color*: Colorless to white. *Streak*: White. *Luster*: Vitreous.
Optical Class: Biaxial (-). α = 1.635 β= 1.725 γ = 1.750 2V(calc.) = 53°

Cell Data: *Space Group*: $P\bar{1}$. a = 6.3916(5) b = 6.4005(4) c = 12.3898(9)
α = 100.884(4)° β = 96.525(4)° γ = 100.492(4)° Z = 2

X-ray Powder Pattern: Galgenberg railroad tunnel, Styria, Austria.
5.052 (100), 3.011 (70), 3.006 (66), 5.899 (59), 3.900 (51), 3.125 (46), 2.526 (42)

Chemistry:

	(1)	(2)
CaO	9.49	9.70
Ce_2O_3	28.95	56.74
La_2O_3	11.70	
Nd_2O_3	11.86	
Pr_2O_3	3.48	
CO_2	[30.00]	30.44
H_2O	[3.07]	3.12
Total	98.55	100.00

(1) Galgenberg railroad tunnel, Styria, Austria; average of 6electron microprobe analyses supplemented by IR spectroscopy, CO_2 and H_2O calculated from stoichiometry; corresponding to $Ca_{0.99}(Ce_{1.04}La_{0.42}Nd_{0.41}Pr_{0.12})_{\Sigma=1.99}(CO_3)_4 \bullet H_2O$. (2) $CaCe_2(CO_3)_4 \bullet H_2O$.

Occurrence: In small fissures cutting an albite–chlorite schist.

Association: Calcite, siderite, ancylite-(Ce), pyrite, kaolinite, albite, chlorite.

Distribution: From the Galgenberg railroad tunnel between Leoben and St. Michael, Styria, Austria.

Name: For the locality, the *Galgenberg* railroad tunnel, that produced the first specimens and suffix for the dominant rare earth element, *Ce*sium.

Type Material: The Institute of Earth Sciences, University of Graz, Austria.

References: (1) Hollerer, C.E. (1998) $Ca(REE)_2(CO_2)_4 \bullet H_2O$, a new mineral from Steiermark, Austria. Mitteil. Österr. Mineral. Ges., 143, 200-201 (in German). (2) (2004) Amer. Mineral., 89, 1826-1827 (abs. ref. 1). (3) Walter, F., H.-P. Bojar, C. E. Hollerer, and K. Mereiter (2013) The crystal structure of galgenbergite-(Ce), $CaCe_2(CO_3)_4 \bullet H_2O$. Mineralogy and Petrology, 107(2), 189-199.