

Kampfite**Ba₁₂(Si₁₁Al₅)O₃₁(CO₃)₈Cl₅**

Crystal Data: Monoclinic. *Point Group:* *m*. As irregular masses, to 1 cm.

Physical Properties: *Cleavage:* Perfect, {001}. *Fracture:* Uneven. *Tenacity:* Brittle. Hardness = 3 D(meas.) = n.d. D(calc.) = 3.809

Optical Properties: Translucent. *Color:* Light blue-gray. *Streak:* White. *Luster:* Vitreous.

Optical Class: Biaxial (-) [Probable]. $\alpha = 1.641(1)$ $\beta = 1.642(1)$ γ (calc) = 1.642
2V = 20(5)° *Dispersion:* $r < v$, slight.

Cell Data: *Space Group:* *Cc*. $a = 31.2329(7)$ $b = 5.2398(1)$ $c = 9.0966(3)$
 $\beta = 106.933(2)^\circ$ $Z = 1$

X-ray Powder Pattern: Rush Creek, California, USA.

14.67 (100), 3.883 (100), 2.616 (70), 2.988 (60), 3.357 (50), 2.887 (50), 1.969 (50)

Chemistry:	(1)	(2)
Na ₂ O	0.08	0.06
CaO	0.06	-
SrO	-	0.10
BaO	57.72	56.74
SiO ₂	20.14	19.75
Al ₂ O ₃	7.76	8.06
CO ₂	[5.69]	10.74
H ₂ O	[1.16]	-
Cl	5.60	5.33
<u>-O = Cl₂</u>	<u>1.26</u>	<u>1.20</u>
Total	96.95	99.69

(1) Rush Creek, California, USA; average of 3 electron microprobe analyses, H₂O and CO₃ confirmed by IR spectroscopy and calculated, corresponding to (Ba_{5.83}Na_{0.04}Ca_{0.02}) $\Sigma=5.89$ (Si_{5.18}Al_{2.36}) $\Sigma=7.54$ O_{15.08}(CO₃)₂Cl₂[(H₂O)Cl_{0.45}] $\Sigma=1.45$. (2) Rush Creek, California, USA; average of 10 electron microprobe analyses of crystal used for structure determination, micro-IR spectroscopy did not detect H₂O; corresponding to (Ba_{12.12}Na_{0.06}Sr_{0.03}) $\Sigma=12.21$ (Si_{10.77}Al_{5.18}Ti_{0.05}) $\Sigma=16.00$ C_{8.00}O_{55.14}Cl_{4.93}.

Occurrence: In quartz-sanbornite bodies in contact metamorphic gneiss near a granodiorite pluton.

Association: Celsian, fresnoite, macdonaldite, titantaramellite, traskite, witherite, pyrrhotite.

Distribution: Esquire no. 1 claim, Rush Creek, eastern Fresno County, California, USA.

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Type Material: M.Y. Williams Museum, University of British Columbia, Vancouver, and Mineral Collection, Geological Survey of Canada, Ottawa, Canada.

References: (1) Basciano, L.C., L.A. Groat, A.C. Roberts, J.D. Grice, G.E. Dunning, E.E. Foord, I.M. Kjarsgaard, and R.E. Walstrom (2001) Kampfite, a new barium silicate carbonate mineral species from Fresno County, California. *Can. Mineral.* 39, 1053–1058. (2) Basciano, L.C., and L.A. Groat (2007) The crystal structure of kampfite. *Can. Mineral.*, 45, 935–943. (3) (2002) *Amer. Mineral.*, 87, 766 (abs. ref. 1). (4) (2008) *Amer. Mineral.*, 93, 705-706 (abs. ref. 2).