

Carletonite **$\text{KNa}_4\text{Ca}_4\text{Si}_8\text{O}_{18}(\text{CO}_3)_4(\text{OH},\text{F})\cdot\text{H}_2\text{O}$**

Crystal Data: Tetragonal. *Point Group:* $4/m\ 2/m\ 2/m$. Crystals, prismatic along [001], to 6 cm; massive.

Physical Properties: *Cleavage:* Perfect on {001}, good on {110}. *Fracture:* Conchoidal. *Tenacity:* Brittle. Hardness = 4-4.5 D(meas.) = 2.45 D(calc.) = 2.426

Optical Properties: Transparent to translucent. *Color:* Pink or pale to dark blue, commonly zoned; colorless in thin flakes. *Streak:* White. *Luster:* Vitreous to pearly, may become slightly waxy after long exposure to air.

Optical Class: Uniaxial (-). *Pleochroism:* Weak; *O* = very pale blue; *E* = very pale pinkish brown. $\omega = 1.521(1)$ $\varepsilon = 1.517(1)$

Cell Data: *Space Group:* $P4/mbm$. $a = 13.178(3)$ $c = 16.695(4)$ $Z = 4$

X-ray Powder Pattern: Mont Saint-Hilaire, Canada.

8.353 (100), 4.171 (100), 2.903 (90), 2.384 (60), 4.053 (50), 16.705 (40), 4.816(40)

Chemistry:

	(1)	(2)
SiO ₂	44.9	44.7
TiO ₂	trace	trace
Al ₂ O ₃	0.5	0.6
MgO	0.09	0.13
CaO	19.92	19.97
Na ₂ O	10.23	10.64
K ₂ O	3.28	3.31
F	0.70	0.73
H ₂ O ⁺	3.51	
H ₂ O ⁻	0.70	0.63
CO ₂		15.2
LOI	19.92	
-O = F ₂	0.29	0.30
Total	99.95	99.12

(1-2) Mont Saint-Hilaire, Canada; CO₂ by acid evolution-gravimetry, H₂O by direct determination of H; the average corresponds to $\text{K}_{0.74}\text{Na}_{3.56}(\text{Ca}_{3.74}\text{Mg}_{0.03})_{\Sigma=3.77}(\text{Si}_{7.89}\text{Al}_{0.11})_{\Sigma=8.00}\text{O}_{18}(\text{CO}_3)_{3.65}\text{F}_{0.41}\cdot 2.05\text{H}_2\text{O}$.

Occurrence: In cores of thermally metamorphosed wall-rock xenoliths of shale and interbedded limestone, now hornfels and siliceous marble, in nepheline syenite in an intrusive alkalic gabbro-syenite complex.

Association: Quartz, narsarsukite, calcite, fluorite, ancylite, molybdenite, leucosphenite, lorenzenite, galena, albite, pectolite, arfvedsonite, apophyllite, leifite (hornfels); pectolite, microcline, arfvedsonite, apophyllite (marble).

Distribution: From Mont Saint-Hilaire, Quebec, Canada.

Name: For Carleton University, Ottawa, Canada, where it was first studied.

Type Material: Canadian Museum of Nature, Ottawa, Canada, T711.

References: (1) Chao, G.Y. (1971) Carletonite, $\text{KNa}_4\text{Ca}_4\text{Si}_8\text{O}_{18}(\text{CO}_3)_4(\text{F},\text{OH})\cdot\text{H}_2\text{O}$; a new mineral from Mount St. Hilaire, Quebec. *Amer. Mineral.*, 56, 1855-1866. (2) Chao, G.Y. (1972) The crystal structure of carletonite, $\text{KNa}_4\text{Ca}_4\text{Si}_8\text{O}_{18}(\text{CO}_3)_4(\text{F},\text{OH})\cdot\text{H}_2\text{O}$; a double-sheet silicate. *Amer. Mineral.*, 57, 765-778.