

**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)

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

(1-2) Mont Saint-Hilaire, Canada; CO<sub>2</sub> by acid evolution-gravimetry, H<sub>2</sub>O 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.