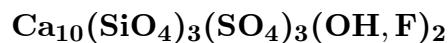


Hydroxyllestadite



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Crystal Data: Monoclinic, pseudo-hexagonal. *Point Group:* $2/m$. As cleavable aggregates, to 2 cm.

Physical Properties: Hardness = 4.5 $D(\text{meas.}) = 3.01(8)$ $D(\text{calc.}) = \sim 3.080$

Optical Properties: Translucent. *Color:* Pale purplish. *Luster:* Vitreous.
Optical Class: Uniaxial (-). $\omega = 1.654(1)$ $\epsilon = 1.650(1)$

Cell Data: *Space Group:* $P2_1/m$, pseudo- $P6_3/m$. $a = 9.476(2)$ $b = 9.508(2)$
 $c = 6.919(1)$ $\beta = 119.53(2)^\circ$ $Z = [2]$

X-ray Powder Pattern: Chichibu mine, Japan.
2.839 (100), 2.739 (60), 2.655 (45), 2.801 (44), 1.853 (43), 3.462 (40), 1.484 (20)

Chemistry:	(1)	(1)
SiO ₂	17.30	P ₂ O ₅ 0.66
Al ₂ O ₃	trace	F 0.28
Fe ₂ O ₃	0.21	Cl 0.91
MnO	0.04	H ₂ O ⁺ 2.04
MgO	trace	H ₂ O ⁻ 0.72
CaO	54.51	CO ₂ 1.65
SrO	0.28	SO ₃ 21.56
Na ₂ O	0.34	-O = (F, Cl) ₂ 0.32
K ₂ O	0.07	Total 100.25

(1) Chichibu mine, Japan; corresponds to $(\text{Ca}_{9.66}\text{Na}_{0.11}\text{Sr}_{0.03}\text{Fe}_{0.03}\text{K}_{0.02})_{\Sigma=9.85}$
 $[(\text{SiO}_4)_{2.86}(\text{SO}_4)_{2.68}(\text{CO}_3\text{OH})_{0.37}(\text{PO}_4)_{0.09}]_{\Sigma=6.00}[(\text{OH})_{1.88}\text{Cl}_{0.26}\text{F}_{0.15}]_{\Sigma=2.29}$.

Polymorphism & Series: Forms a series with fluorellestadite.

Mineral Group: Ellestadite group.

Occurrence: In pre-ore contact metamorphic skarns.

Association: Diopside, wollastonite, xanthophyllite, vesuvianite, calcite.

Distribution: In the Chichibu mine, Saitama Prefecture, Japan.

Name: For *hydroxyl* in the chemical composition and analogy to *ellestadite*.

Type Material: National Science Museum, Tokyo, Japan, M15761.

References: (1) Harada, K., K. Nagashima, K. Nakao, and A. Kato (1971) Hydroxyllestadite, a new apatite from Chichibu mine, Saitama Prefecture, Japan. *Amer. Mineral.*, 56, 1507–1518.
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(3) Rouse, R.C. and P.J. Dunn (1982) A contribution to the crystal chemistry of ellestadite and the silicate sulfate apatites. *Amer. Mineral.*, 67, 90–96.