

Fransoletite**Ca₃Be₂(PO₄)₂(PO₃OH)₂•4H₂O**

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Crystal Data: Monoclinic. *Point Group:* 2/*m*. Crystals are arrow-head-shaped, curved, composed of mosaiced aggregates of minute crystallites, to 3 mm. Elongated along [101], tabular on {010}, forms are {100}, {011}, {010}.

Physical Properties: *Cleavage:* {010}, imperfect. *Fracture:* Irregular. Hardness = ~3
D(meas.) = 2.56(3) D(calc.) = 2.53

Optical Properties: Transparent to translucent. *Color:* Colorless to slightly whitish.
Streak: White. *Luster:* Subvitreous.

Optical Class: Biaxial (+). *Orientation:* $Y = b$; $Z \wedge c = 14^\circ$. $\alpha = 1.560(2)$ $\beta = 1.566(2)$
 $\gamma = 1.586(2)$ $2V(\text{meas.}) = 25^\circ$ $2V(\text{calc.}) = 25^\circ$

Cell Data: *Space Group:* $P2_1/a$. $a = 7.3482(13)$ $b = 15.0522(28)$ $c = 7.0685(13)$
 $\beta = 96.519(6)^\circ$ $Z = 2$

X-ray Powder Pattern: Tip Top mine, South Dakota, USA.
3.044 (100), 3.47 (90), 3.32 (70), 2.317 (50), 7.52 (40), 2.597 (40), 6.55 (30)

Chemistry:

	(1)	(2)
P ₂ O ₅	47.3	47.93
MnO	0.3	
BeO	9.3	8.45
CaO	28.8	28.41
H ₂ O	[14.3]	15.21
Total	[100.0]	100.00

(1) Tip Top mine, South Dakota, USA; by electron microprobe, Be by AA, H₂O by difference; corresponds to (Ca_{3.08}Mn_{0.02})_{Σ=3.10}Be_{2.23}(PO₄)₂(PO₃OH)₂•3.76H₂O.

(2) Ca₃Be₂(PO₄)₂(PO₃OH)₂•4H₂O.

Polymorphism & Series: Dimorphous with parafransoletite.

Occurrence: Formed by late-stage hydrothermal alteration of beryl and other phosphates in a zoned granite pegmatite.

Association: Beryl, tiptopite, whitlockite, carbonate-apatite, montgomeryite, hurlbutite, englishite, roscherite, quartz.

Distribution: From the Tip Top mine, 8.5 km southwest of Custer, Custer Co., South Dakota, USA.

Name: To honor Dr. André-Mathieu Fransolet (1947-), Professor of Mineralogy, University of Liège, Liège, Belgium, for his work with primary phosphate minerals.

Type Material: National Museum of Natural History, Washington, D.C., USA, 149607.

References: (1) Peacor, D.R., P.J. Dunn, W.L. Roberts, T.J. Campbell, and D. Newbury (1983) Fransoletite, a new calcium beryllium phosphate from the Tip Top pegmatite, Custer, South Dakota. *Bull. Minéral.*, 106, 499–503. (2) (1985) *Amer. Mineral.*, 70, 215 (abs. ref. 1). (3) Kampf, A.R. (1992) Beryllophosphate chains in the structures of fransoletite, parafransoletite, and ehrleite and some general comments on beryllophosphate linkages. *Amer. Mineral.*, 77, 848–856.