

Groatite

Crystal Data: Monoclinic. *Point Group:* 2/m. As divergent to stellate sprays of acicular crystals, to 1 mm.

Physical Properties: *Cleavage:* None observed. *Fracture:* Uneven. *Tenacity:* Brittle. Hardness = 3 D(meas.) = n.d. D(calc.) = 3.213

Optical Properties: Translucent. *Color:* Colorless to pale yellow, pale orange. *Streak:* White. *Luster:* Vitreous.

Optical Class: Biaxial (+). $\alpha = 1.622(1)$ $\beta = 1.634(1)$ $\gamma = 1.663(1)$ $2V$ (meas.) = 67(1)° $2V$ (calc.) = 66.5° *Orientation:* $X \wedge a = 35.4$ (in β obtuse); $Y \wedge c = 10.1$ ° (in β acute); $Z \parallel b$.

Cell Data: *Space Group:* C2/c. $a = 12.5435(9)$ $b = 12.4324(9)$ $c = 6.7121(4)$
 $\beta = 115.332(2)^\circ$ $Z = 4$

X-ray Powder Pattern: Tanco Mine, Lake Bernic, Manitoba, Canada. 3.187 (100), 2.726 (90), 6.204 (80), 2.788 (80), 5.653 (70), 2.580 (70), 3.608 (30)

Chemistry:	(1)
	P ₂ O ₅ 46.66
	FeO 0.49
	MnO 29.31
	CaO 12.51
	Na ₂ O 6.87
	<u>H₂O</u> 3.93
	Total 99.77

(1) Tanco Mine, Lake Bernic, Manitoba, Canada; average of 4 electron microprobe analyses, H₂O from stoichiometry, corresponding to Na_{1.02}Ca_{1.02}(Mn_{1.90}Fe²⁺_{0.03}) $\Sigma=1.93$ P_{3.02}O₁₀(OH)₂.

Group: Alluaudite group.

Occurrence: A late-stage mineral, most likely derived from the dissolution of lithiophosphate and lithiophilite, in a spodumene-rich portion of a zoned petalite-subgroup pegmatite.

Association: Whitlockite, crandallite, an unidentified Na–Al phosphate, quartz.

Distribution: Tanco Mine, Lake Bernic, Manitoba, Canada.

Name: Honors Lee A. Groat (b. 1959), professor of Mineralogy at the University of British Columbia, Vancouver, British Columbia, Canada, for his extensive contributions to pegmatite mineralogy.

Type Material: Royal Ontario Museum, Toronto, Canada (M40501).

References: (1) Cooper, M.A., F.C. Hawthorne, N.A. Ball, R.A. Ramik, and A.C. Roberts (2009) Groatite, NaCaMn²⁺₂(PO₄)[PO₃(OH)]₂, a new mineral species of the alluaudite group from the Tanco pegmatite, Bernic Lake, Manitoba, Canada: description and crystal structure. *Can Mineral*, 47, 1225–1235. (2) (2010) *Amer. Mineral.*, 95, 1123–1124 (abs. ref. 1).