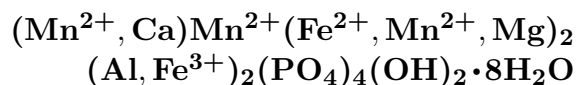


Rittmannite



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Crystal Data: Monoclinic. *Point Group:* $2/m$. As crystals, flattened on {001}, pseudo-hexagonal, to 1 mm, in subparallel aggregates.

Physical Properties: *Cleavage:* On {001}, indistinct. Hardness = 3.5 D(meas.) = 2.81(1) D(calc.) = 2.83

Optical Properties: Transparent. *Color:* Very pale yellow to lemon-yellow, brownish yellow. *Streak:* White. *Luster:* Vitreous.

Optical Class: Biaxial (+). *Orientation:* $X = b$; $Z \wedge c = 7^\circ$. $\alpha = 1.622$ $\beta = [1.626]$
 $\gamma = [1.654]$ $2V(\text{meas.}) = 43(2)^\circ$

Cell Data: *Space Group:* $[P2/a]$ (by analogy to the whiteite group). $a = 15.01(4)$
 $b = 6.89(3)$ $c = 10.16(3)$ $\beta = 112.82(25)^\circ$ $Z = 2$

X-ray Powder Pattern: Mangualde pegmatite, Portugal.
9.38 (s), 2.802 (s), 4.69 (ms), 5.66 (m), 4.93 (m), 4.85 (m), 3.530 (m)

Chemistry:	(1)
P_2O_5	35.9
Al_2O_3	11.3
Fe_2O_3	2.6
FeO	10.4
MnO	18.9
MgO	1.5
CaO	3.3
H_2O	[19.7]
Total	[103.6]

(1) Mangualde pegmatite, Portugal; by electron microprobe, average of two analyses, $\text{Fe}^{2+}:\text{Fe}^{3+}$ from stoichiometry, total Mn as MnO, H_2O calculated; corresponds to $(\text{Mn}_{0.54}\text{Ca}_{0.47})_{\Sigma=1.01}\text{Mn}_{1.01}(\text{Fe}_{1.15}^{2+}\text{Mn}_{0.56}\text{Mg}_{0.29})_{\Sigma=2.00}(\text{Al}_{1.75}\text{Fe}_{0.25}^{3+})_{\Sigma=2.00}(\text{PO}_4)_4(\text{OH})_{2.02} \cdot 8\text{H}_2\text{O}$.

Mineral Group: Whiteite group.

Occurrence: A very rare mineral in phosphatic nodules in zoned granite pegmatite veins (Mangualde pegmatite, Portugal).

Association: Kryzhanovskite, frondelite, huréaulite, orthoclase (Mangualde pegmatite, Portugal).

Distribution: From the Mangualde pegmatite, near Mesquitela, and the Bendada pegmatite, near Guarda, Portugal.

Name: To honor Professor Alfred Rittmann (1893–1980), German petrologist and volcanologist, University of Catania, Catania, Italy.

Type Material: Natural History Museum, Pisa, 4760/89; Civic Museum of Natural History, Milan, Italy.

References: (1) Marzoni Fecia di Cossato, Y., P. Orlandi, and G. Vezzalini (1989) Rittmannite, a new mineral species of the whiteite group from the Mangualde granitic pegmatite, Portugal. *Can. Mineral.*, 27, 447–449. (2) (1990) *Amer. Mineral.*, 75, 932–933 (abs. ref. 1).