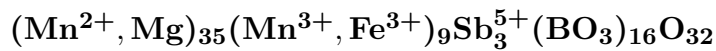


Blatterite

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Crystal Data: Orthorhombic. *Point Group:* $2/m\ 2/m\ 2/m$. Lathlike crystals, to 5 mm, elongated and striated parallel [001], showing {110}, poorly terminated, may be slightly curved.

Physical Properties: *Cleavage:* On {001}, perfect; on {100}, imperfect, a parting. *Tenacity:* Brittle. Hardness = ~6 VHN = 814–940, 877 average (100 g load). D(meas.) = 4.7(4) D(calc.) = 4.25

Optical Properties: Opaque. *Color:* Black; exhibits red-orange internal reflections. *Streak:* Brown. *Luster:* Metallic to submetallic. *Optical Class:* Biaxial (-). *Orientation:* $X = a; Y = c; Z = b$. *Anisotropism:* Weak to distinct; shades of grayish brown. *Bireflectance:* Buff, creamy buff, pale buff. R_1 – R_2 : (400) 11.1–12.4, (420) 10.9–12.2, (440) 10.7–12.0, (460) 10.5–11.9, (480) 10.4–11.8, (500) 10.3–11.7, (520) 10.2–11.6, (540) 10.1–11.5, (560) 10.0–11.4, (580) 9.98–11.4, (600) 9.97–11.3, (620) 9.95–11.3, (640) 9.93–11.2, (660) 9.91–11.2, (680) 9.88–11.1, (700) 9.86–11.1

Cell Data: *Space Group:* $Pn\bar{m}$. $a = 37.654(8)$ $b = 12.615(3)$ $c = 6.2472(8)$ $Z = 2$

X-ray Powder Pattern: Nordmark, Sweden. 2.605 (100), 5.243 (45), 2.721 (40), 2.621 (35), 1.564 (35), 2.520 (30), 5.621 (20)

Chemistry:

	(1)	(2)
B ₂ O ₃	14.4	[14.63]
Sb ₂ O ₅	12.65	12.80
TiO ₂		0.19
Al ₂ O ₃		0.33
Fe ₂ O ₃	3.48	1.96
Mn ₂ O ₃	[9.9]	[16.03]
MnO	[46.2]	[38.89]
MgO	13.0	14.89
Total	[99.63]	[99.72]

(1) Nordmark, Sweden; by ICP, total Sb as Sb₂O₅, total Fe as Fe₂O₃, Mn²⁺:Mn³⁺ calculated for charge balance; then corresponds to (Mn_{22.38}²⁺Mg_{12.62})_{Σ=35.00}(Mn_{4.91}³⁺Fe_{1.71}³⁺Mn_{3.12}²⁺)_{Σ=9.74}Sb_{3.06}⁵⁺(B_{1.01}O₃)_{16.00}O₃₂. (2) Långban, Sweden; by electron microprobe, total Sb as Sb₂O₅, total Fe as Fe₂O₃, Mn²⁺:Mn³⁺ calculated for charge balance; then corresponds to (Mn_{20.87}²⁺Mg_{14.06})_{Σ=34.93}(Mn_{7.73}³⁺Fe_{0.93}³⁺Al_{0.25}Ti_{0.09})_{Σ=9.00}Sb_{3.01}⁵⁺(BO₃)_{16.00}O₃₂.

Occurrence: From metamorphosed Fe–Mn orebodies.

Association: Manganosite, pyrochroite, hausmannite, katoptrite, calcite.

Distribution: From [the Brattfors mine,] Nordmark, and at Långban, Värmland, Sweden.

Name: Honoring Fritz Blatter (1943–), German mineral collector, who provided the original material.

Type Material: Swedish Museum of Natural History, Stockholm, Sweden; Mineralogical-Geological Museum, University of Oslo, Oslo, Norway; The Natural History Museum, London, England 1986, 112, E.1168.

References: (1) Raade, G., M.H. Mladeck, V.K. Din, A.J. Criddle, and C.J. Stanley (1988) Blatterite, a new Sb-bearing Mn²⁺–Mn³⁺ member of the pinakolite group, from Nordmark, Sweden. Neues Jahrb. Mineral., Monatsh., 121–136. (2) (1989) Amer. Mineral., 74, 1399 (abs. ref. 1). (3) Cooper, M.A. and F.C. Hawthorne (1998) The crystal structure of blatterite, Sb₃⁵⁺(Mn³⁺, Fe³⁺)₉(Mn²⁺, Mg)₃₅(BO₃)₁₆O₃₂, and structural hierarchy in Mn³⁺–bearing zigzag borates. Can. Mineral., 36, 1171–1193.

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