Plumboferrite $\mathbf{Pb_2Fe^{3+}_{11-x}Mn^{2+}_xO_{19-2x}}$ (x = 1/3)

Crystal Data: Hexagonal. *Point Group:* $6/m\ 2/m\ 2/m$. Thick tabular crystals, to 1 cm, with dominant $\{10\bar{1}1\}$ and {0001}, may have very complex form development; commonly cleavable massive.

Physical Properties: *Cleavage:* {0001}, perfect. Hardness = 6.5 VHN = 824–946, 882 average (100 g load). D(meas.) = 6.07 D(calc.) = 6.09–6.12

Optical Properties: Opaque. *Color:* Black; light gray in reflected light. *Streak:* Nearly black. *Luster:* Submetallic.
Optical Class: Uniaxial (–). *Bireflectance:* Weak.
R_1–R_2: (400) 27.3–29.4, (420) 26.9–28.7, (440) 26.5–28.0, (460) 26.1–27.5, (480) 25.8–26.9, (500) 25.5–26.4, (520) 25.2–25.9, (540) 24.9–25.5, (560) 24.6–25.0, (580) 24.1–24.6, (600) 23.6–24.0, (620) 23.1–23.5, (640) 22.6–23.0, (660) 22.2–22.6, (680) 21.8–22.1, (700) 21.4–21.7

Cell Data: *Space Group:* $P6_3/mmc$. $a = 5.931(1)$ $c = 23.551(2)$ Z = 2

X-ray Powder Pattern: Jakobsberg, Sweden.
2.9438 (100), 3.922 (85), 11.78 (40), 2.8132 (30), 2.6473 (30), 5.888 (25), 1.6919 (16)

Chemistry:

	(1)	(2)		(1)	(2)
SiO_2		0.10	PbO	33.03	34.18
TiO_2	0.08	0.21	MgO	0.34	0.29
Al_2O_3		0.01	CaO	0.40	
Fe_2O_3	63.01	63.91	Na_2O	0.17	
Sb_2O_3	0.25	0.00	K_2O	0.13	
FeO	0.78		H_2O		
MnO	1.41	1.24	insol.	0.15	
			Total	99.75	99.94

(1) Jakobsberg, Sweden. (2) Do.; by electron microprobe, average of several determinations, total Fe as Fe_2O_3, O from charge balance; corresponding to $(Pb_{2.03}Mn_{0.23}Mg_{0.10}Fe_{10.59}Ti_{0.03}Si_{0.02})_{\Sigma=13.00}O_{18.35}$.

Occurrence: In metamorphosed lead-bearing Fe–Mn orebodies.

Association: Hematite, jacobsite, magnesioferrite, lindqvistite, hedyphane, svabite, barite, hematophanite, copper, cuprite, calcite, andradite, phlogopite (Jakobsberg, Sweden).

Distribution: From Jakobsberg, Värmland, and at the Sjö mine, near Grythyttan, Örebro, Sweden.

Name: From the Latin for lead, PLUMBum, and FERROus iron in its composition.

Type Material: Swedish Museum of Natural History, Stockholm, Sweden, 81:224.

References: (1) Palache, C., H. Berman, and C. Frondel (1944) Dana's system of mineralogy, (7th edition), v. I, 726–727. (2) Holtstam, D., R. Norrestam, and A. Sjödin (1995) Plumboferrite: new mineralogical data and atomic arrangement. Amer. Mineral., 80, 1065–1072.