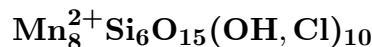


Friedelite

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Crystal Data: Monoclinic, pseudohexagonal. *Point Group:* $2/m$. As pseudohexagonal tablets, may be hemimorphic, to 1 cm; more rarely as slender needles or as fibrous or lamellar aggregates; stalactitic, massive, cryptocrystalline. *Twinning:* Universal, repeated about $[110]$ and $[\bar{1}10]$, composition plane $\{001\}$, giving pseudorhombohedral symmetry.

Physical Properties: *Cleavage:* Perfect on $\{0001\}$. Hardness = 4–5 $D(\text{meas.}) = 3.04\text{--}3.06$ $D(\text{calc.}) = 3.066$

Optical Properties: Translucent to transparent. *Color:* Pale pink, brownish red, dark red, brown. *Streak:* Pale rose. *Luster:* Vitreous, pearly on basal plane.

Optical Class: Biaxial; sensibly uniaxial (–). $\omega = 1.654\text{--}1.656$ $\epsilon = 1.620\text{--}1.625$ $2V(\text{meas.}) = \text{n.d.}$

Cell Data: *Space Group:* $C2/m$. $a = 23.33(5)$ $b = 13.396(8)$ $c = 7.447(4)$ $\beta = 105.08(8)^\circ$ $Z = [4]$

X-ray Powder Pattern: Franklin, New Jersey, USA; nearly identical with mcgillite. 2.56 (100), 7.17 (90), 3.60 (70), 2.88 (60), 1.676 (60), 2.115 (40), 2.408 (30)

Chemistry:

	(1)	(2)	(3)
SiO ₂	36.35	34.45	34.6
Al ₂ O ₃	0.03		
FeO	5.27	0.68	3.4
MnO	46.67	51.48	48.4
ZnO	0.32	1.43	1.0
MgO	0.05	1.54	1.4
CaO	trace		0.1
Cl	3.08	0.29	2.9
H ₂ O	8.86	9.74	[8.9]
–O = Cl ₂	0.69	0.06	0.7
Total	99.94	99.55	[100.0]

(1–2) Franklin, New Jersey, USA. (3) Sterling Hill, New Jersey, USA; by electron microprobe, H₂O by difference; corresponding to $(\text{Mn}_{7.01}^{2+}\text{Fe}_{0.49}\text{Mg}_{0.36}\text{Zn}_{0.13}\text{Ca}_{0.02})_{\Sigma=8.01}\text{Si}_{5.92}\text{O}_{15}[(\text{OH})_{10.15}\text{Cl}_{0.84}]_{\Sigma=10.99}$.

Occurrence: In metamorphosed Mn-Fe deposits.

Association: Rhodochrosite, alabandite (Adervielle, France); franklinite, willemite, calcite, rhodochrosite, barite, chlorite, sphalerite (Franklin, New Jersey, USA); calcite, kutnohorite, andradite, hausmannite (Kuruman, South Africa).

Distribution: In France, at Adervielle, Louron Valley, Hautes-Pyrénées, and Costabonne, Pyrénées-Orientales. From the Harstigen mine, near Persberg, Värmland, and in the Sjö mine, near Grythyttan, Örebro, Sweden. In the Ködnitz Valley, Tirol, Austria. At Dshumart and Kamya, Atasui region, Kazakhstan. In the USA, at Franklin and Sterling Hill, Ogdensburg, Sussex Co., New Jersey, and the Sunnyside mine, Silverton district, San Juan Co., Colorado. From the Wessels and N'Chwaning mines, near Kuruman, Cape Province, South Africa. At Broken Hill, New South Wales, Australia.

Name: For the noted French chemist and mineralogist, Charles Friedel (1832–1899).

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