

Crystal Data: Triclinic. *Point Group:* $\bar{1}$. Crystals flattened on {010} and elongated along [001]; typically, as lamellae to $\sim 50 \mu\text{m}$ and a few μm thick within altered phosphophyllite crystals.

Physical Properties: *Cleavage:* Good on {010}. *Fracture:* Uneven. *Tenacity:* Brittle. Hardness = n.d. D(meas.) = n.d. D(calc.) = 2.96

Optical Properties: Milky opaque. *Color:* n.d. *Streak:* White. *Luster:* n.d. *Optical Class:* Biaxial (-). $\alpha = 1.642(2)$ $\beta(\text{calc.}) = 1.659$ $\gamma = 1.660(2)$ $2V(\text{meas.}) = 27(1)^\circ$ $2V(\text{calc.}) = \text{n.d.}$ *Orientation:* $Y \approx b$, $X \wedge c = 27^\circ$. *Pleochroism:* Shades of pale brown. *Absorption:* $Y > X \approx Z$.

Cell Data: *Space Group:* $P\bar{1}$. $a = 10.438(2)$ $b = 5.102(1)$ $c = 10.546(2)$ $\alpha = 91.37(2)^\circ$ $\beta = 115.93(2)^\circ$ $\gamma = 94.20(2)^\circ$ $Z = 2$

X-ray Powder Pattern: Hagendorf Süd pegmatite, Cornelia mine, Oberpfalz, Bavaria, Germany. 4.657 (100), 9.313 (65), 3.365 (55), 3.071 (54), 5.077 (38), 2.735 (48), 4.726 (47)

| Chemistry: | (1) | (2) |
|--------------------------------|--------|--------|
| ZnO | 31.1 | 36.42 |
| MnO | 1.74 | |
| CaO | 0.45 | |
| Fe ₂ O ₃ | 21.9 | 17.87 |
| Al ₂ O ₃ | 0.26 | |
| P ₂ O ₅ | 32.9 | 31.60 |
| H ₂ O | [14.1] | 14.11 |
| Total | 102.45 | 100.00 |

(1) Hagendorf Süd pegmatite, Cornelia mine, Oberpfalz, Bavaria, Germany; average of 7 electron microprobe analyses supplemented by FTIR and Raman spectroscopy, H₂O calculated from structure; corresponds to $\text{Zn}_{1.65}\text{Fe}^{3+}_{1.19}\text{Mn}^{2+}_{0.11}\text{Ca}_{0.03}\text{Al}^{3+}_{0.02}(\text{PO}_4)_2(\text{OH})_{1.21}\cdot 2.79\text{H}_2\text{O}$.

(2) $\text{Zn}_2\text{Fe}^{3+}(\text{PO}_4)_2(\text{OH})\cdot 3\text{H}_2\text{O}$.

Occurrence: From a highly oxidized zone of a granitic pegmatite, formed by alteration and replacement of phosphophyllite by oxidation of iron and some replacement of zinc by iron.

Association: Albite, apatite, chalcophanite, jahnsite, mitridatite, muscovite, quartz, wilhelmgümbelite, goethite, cryptomelane, amorphous Fe-rich phosphate.

Distribution: From the Hagendorf Süd pegmatite, Cornelia mine, Oberpfalz, Bavaria, Germany.

Name: Honors Hermann Steinmetz (1879-1964), curator of Mineralogy at the Munich museum Sammlung des Bayerischen Staates from 1923 to 1928, and Professor of Mineralogy and Geology at the Technische Hochschule, Munich, Germany from 1928 to 1950.

Type Material: Museum Victoria, Melbourne, Australia (M53510).

References: (1) Grey, I.E., E. Keck, A.R. Kampf, W.G. Mumme, C.M. Macrae, R.W. Gable, A.M. Glenn, and C.J. Davidson (2017) Steinmetzite, $\text{Zn}_2\text{Fe}^{3+}(\text{PO}_4)_2(\text{OH})\cdot 3\text{H}_2\text{O}$, a new mineral formed from alteration of phosphophyllite at the Hagendorf Süd pegmatite, Bavaria. *Mineral. Mag.*, 81(2), 329-338. (2) (2017) *Amer. Mineral.*, 102, 1967 (abs. ref. 1).