## Nordgauite $MnAl_2(PO_4)_2(F, OH)_2 \cdot 5H_2O$

**Crystal Data:** Triclinic. *Point Group:* $\bar{1}$. As tabular, on {100}, to prismatic crystals, to 200 μm; in compact nodules and fibrous hemispherical aggregates.

**Physical Properties:** *Cleavage:* n.d. *Fracture:* n.d. *Tenacity:* n.d. Hardness = n.d. D(meas.) = 2.35 D(calc.) = 2.46

**Optical Properties:** Transparent to translucent. *Color:* Off-white, snow white. *Streak:* White. *Luster:* Earthy, slightly waxy to silky (aggregates).
*Optical Class:* Biaxial. $n = 1.57$

**Cell Data:** *Space Group:* $P\bar{1}$. $a = 9.920(4)$ $b = 9.933(3)$ $c = 6.087(2)$ $\alpha = 92.19(3)°$ $\beta = 100.04(3)°$ $\gamma = 97.61(3)°$ $Z = 2$

**X-ray Powder Pattern:** Hagendorf-Süd pegmatite, Bavaria, Germany.
9.806 (100), 7.432 (40), 4.119 (20), 2.951 (16), 4.596 (12), 3.225 (12), 3.215 (12)

**Chemistry:**

| | (1) |
|---|---|
| CaO | 0.96 |
| MgO | 0.12 |
| MnO | 14.29 |
| FeO | 0.60 |
| ZnO | 0.24 |
| $Al_2O_3$ | 22.84 |
| $P_2O_5$ | 31.62 |
| F | 5.13 |
| $H_2O$ | 2.86 |
| -O=F | 2.16 |
| Total | 96.50 |

(1) Hagendorf-Süd pegmatite, Bavaria, Germany; average of 8 electron microprobe analyses, $H_2O$ by CHN, corresponding to $(Mn_{0.90}Ca_{0.08}Fe_{0.04}Zn_{0.01}Mg_{0.01})_{\sum=1.04}Al_{2.01}(PO_4)_2[F_{1.21}(OH)_{0.90}]_{\sum=2.11} \cdot 5.25H_2O$.

**Occurrence:** A late stage secondary hydrothermal mineral in altered zwieselite-triplite masses in a zoned granite pegmatite.

**Association:** Apatite-(CaF), sphalerite, uraninite, a columbite-tantalite phase, metastrengite, whiteite-jahnsite (inclusions).

**Distribution:** From the Hagendorf-Süd pegmatite, Bavaria, Germany.

**Name:** For *Nordgau*, the oldest name for that part of northeastern Bavaria in which Hagendorf is situated, and where mining has taken place since the 13th century.

**Type Material:** Museum Victoria, Melbourne, Australia (M48795; M51231).

**References:** (1) Birch, W.D., I.E. Grey, S.J. Mills, A. Pring, C. Bougerol, A. Ribaldi-Tunnicliffe, N.C. Wilson, and E. Keck (2011) Nordgauite, $MnAl_2(PO_4)_2(F,OH)_2 \cdot 5H_2O$, a new mineral from the Hagendorf-Süd pegmatite, Bavaria, Germany: description and crystal structure. Mineral. Mag., 75(2), 269–278. (2) (2013) Amer. Mineral., 98, 280-281 (abs. ref. 1).