## Gerdtremmelite $(Zn, Fe^{2+})(Al, Fe^{3+})_2(AsO_4)(OH)_5$



**Crystal Data:** Triclinic. *Point Group:* $\overline{1}$ or 1. Crystals are tabular, to 0.5 mm, in spherulitic aggregates.

**Physical Properties:** Hardness = n.d. D(meas.) = > 3.3 D(calc.) = 3.66

**Optical Properties:** Transparent. *Color:* Brown, yellowish brown, dark brown.
*Streak:* White. *Luster:* Adamantine.
*Optical Class:* Biaxial; high birefringence. $n = 1.735(5)$ 2V(meas.) = n.d.

**Cell Data:** *Space Group:* $P\overline{1}$ or $P1$. $a = 5.169(5)$ $b = 13.038(9)$ $c = 4.931(4)$
$\alpha = 98.78(7)°$ $\beta = 100.80(6)°$ $\gamma = 78.73(6)°$ Z = 2

**X-ray Powder Pattern:** Tsumeb, Namibia.
12.77 (100), 3.878 (50), 3.631 (50), 3.140 (50), 4.801 (40), 4.695 (40), 4.220 (40)

**Chemistry:**

| | (1) | (2) | (3) |
|---|---|---|---|
| $MoO_3$ | 1.08 | 1.08 | |
| $As_2O_5$ | 32.53 | 31.54 | 32.79 |
| $Al_2O_3$ | 23.76 | 26.74 | 24.73 |
| $Fe_2O_3$ | 11.38 | 10.01 | 6.83 |
| FeO | | | 3.07 |
| CuO | 0.01 | 0.04 | |
| ZnO | 19.51 | 19.58 | 19.73 |
| $H_2O$ | 11.25 | 11.25 | 12.85 |
| Total | 99.52 | 100.24 | 100.00 |

(1) Tsumeb, Namibia; by electron microprobe, total Fe as $Fe_2O_3$, $H_2O$ by TGA on a separate sample; corresponds to $(Zn_{0.83}Fe_{0.49}Al_{1.60})_{\Sigma=2.92}[(As_{0.97}Mo_{0.03})_{\Sigma=1.00}O_4](OH)_{4.30}$. (2) Do.; corresponds to $(Zn_{0.85}Fe_{0.44}Al_{1.86})_{\Sigma=3.15}[(As_{0.97}Mo_{0.03})_{\Sigma=1.00}O_4](OH)_{4.43}$. (3) $(Zn_{0.85}Fe^{2+}_{0.15})_{\Sigma=1.00}(Al_{1.70}Fe^{3+}_{0.30})_{\Sigma=2.00}(AsO_4)(OH)_5$.

**Occurrence:** A very rare secondary mineral from the deep oxidized zone of a dolostone-hosted hydrothermal polymetallic ore deposit.

**Association:** Powellite, betpakdalite, scorodite, wilhelmkleinite, adamite, hematite, kaolinite, quartz.

**Distribution:** From Tsumeb, Namibia.

**Name:** To honor Dr. Gerd Tremmel (1940– ), of Overath-Steinbrück, Germany, who submitted the mineral for identification.

**Type Material:** Mineralogical-Petrographical Institute, University of Heidelberg, Heidelberg, Germany; National Museum of Natural History, Washington, D.C., USA, 162488.

**References:** (1) Schmetzer, K. and O. Medenbach (1985) Gerdtremmelite, $(Zn, Fe)(Al, Fe)_2[(AsO_4)|(OH)_5]$, a new mineral from Tsumeb, Namibia. Neues Jahrb. Mineral., Monatsh., 1–6. (2) (1986) Amer. Mineral., 71, 845 (abs. ref. 1).