## Phyllotungstite $HCaFe_3^{3+}(WO_4)_6 \cdot 10H_2O$

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**Crystal Data:** Orthorhombic. *Point Group:* $2/m\ 2/m\ 2/m$, $mm2$, or 222. Crystals are flattened on {001}, to 0.25 mm, showing {100}, {010}, {110}, {001}, in radial aggregates and scaly crusts. *Twinning:* On {110}.

**Physical Properties:** *Cleavage:* On {001}, perfect. *Fracture:* Irregular. Hardness = ∼2
D(meas.) = > 4.03 D(calc.) = 5.26

**Optical Properties:** Translucent. *Color:* Yellow to yellow-brown. *Streak:* Pale yellow. *Luster:* Pearly.
*Optical Class:* Biaxial (–), may be uniaxial (–). *Orientation:* $Z = c$. *Dispersion:* $r \gg v$.
$\alpha = 2.10(1)$ $\beta$ = n.d. $\gamma = 2.185(1)$ 2V(meas.) = 18°

**Cell Data:** *Space Group:* $Pmmm$, $Pmm2$, or $P222$. $a = 7.29$ $b = 12.59$ $c = 19.55$
Z = 3

**X-ray Powder Pattern:** Clara mine, Germany.
3.13 (10), 3.25 (8), 1.822 (8), 6.33 (7), 2.92 (7), 2.45 (7), 6.01 (6)

**Chemistry:**

| | (1) | (2) |
|---|---|---|
| $WO_3$ | 72.7 | 74.16 |
| $Fe_2O_3$ | 13.3 | 12.77 |
| PbO | 2.1 | |
| CaO | 1.8 | 2.99 |
| $H_2O$ | [10.1] | 10.08 |
| Total | [100.0] | 100.00 |

(1) Clara mine, Germany; $H_2O$ by difference, corresponds to $H(Ca_{0.61}Pb_{0.18})_{\Sigma=0.79}Fe_{3.15}(WO_4)_{5.93} \cdot 10.2H_2O$. (2) $HCaFe_3(WO_4)_6 \cdot 10H_2O$.

**Occurrence:** A rare secondary mineral in the oxidized zone of a hydrothermal polymetallic barite–fluorite deposit.

**Association:** Ferritungstite, scheelite, pyrite, fluorite, hematite, quartz.

**Distribution:** From the Clara mine, near Oberwolfach, Black Forest, Germany.

**Name:** From the Greek for *leaf*, reflecting its crystal habit, and *tungsten* in its composition.

**Type Material:** University of Stuttgart, Stuttgart, Germany; National Museum of Natural History, Washington, D.C., USA, 161199.

**References:** (1) Walenta, K. (1984) Phyllotungstit, ein neues sekundäres Wolframmineral aus der Grube Clara im mittleren Schwarzwald. Neues Jahrb. Mineral., Monatsh., 529–535 (in German with English abs.). (2) (1986) Amer. Mineral., 71, 846 (abs. ref. 1).

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