Wilhelmkleinite $ZnFe_2^{3+}(AsO_4)_2(OH)_2$

Crystal Data: Monoclinic. *Point Group:* $2/m$. Spearhead-shaped crystals, to 5 mm, exhibiting {100}, {430}, {$31\overline{1}$}, in aggregates. *Twinning:* Interpenetration twins on {101}.

Physical Properties: *Cleavage:* On {$23\overline{2}$}. Hardness = 4.5 D(meas.) = n.d. D(calc.) = 4.364

Optical Properties: Translucent. *Color:* Blackish green. *Streak:* Green. *Luster:* Dull, adamantine on fractures.
Optical Class: Biaxial. *Pleochroism:* Strong; olive-green to emerald-green to reddish brown. $n = \sim 1.94$ α = n.d. β = n.d. γ = n.d. 2V(meas.) = n.d.

Cell Data: *Space Group:* $P2_1/n$. $a = 6.631(1)$ $b = 7.611(1)$ $c = 7.377(1)$ $\beta = 91.80(1)^\circ$ Z = 2

X-ray Powder Pattern: Tsumeb, Namibia.
3.385 (100), 3.315 (78), 2.939 (47), 1.621 (34), 1.652 (32), 2.381 (29), 2.839 (28)

Chemistry:

	(1)	(2)
As_2O_5	46.69	47.01
Fe_2O_3	33.60	32.66
ZnO	13.81	16.65
H_2O	[5.90]	3.68
Total	[100.00]	100.00

(1) Tsumeb, Namibia; by electron microprobe, average of five analyses, total Fe as Fe_2O_3, H_2O by difference; corresponding to $Zn_{0.84}Fe_{2.07}(AsO_4)_2(OH_{1.6})_2$. (2) $ZnFe_2(AsO_4)_2(OH)_2$.

Occurrence: Very rare from a deep oxidation zone in a dolostone-hosted hydrothermal polymetallic ore deposit.

Association: Scorodite, gerdtremmelite, adamite.

Distribution: From Tsumeb, Namibia.

Name: To honor Wilhelm Klein (1889–1939), Manager of the Otavi Mining and Railroad Company mines in Namibia (1916–1939), an early collector of Tsumeb minerals.

Type Material: Mineralogical Museum, University of Hamburg, Hamburg, Germany.

References: (1) Schlüter, J., K.-H. Klaska, K. Friese, G. Adiwidjaja, and G. Gebhard (1998) Wilhelmkleinite, $ZnFe_2^{3+}(AsO_4)_2(OH)_2$, a new mineral from Tsumeb, Namibia. Neues Jahrb. Mineral., Monatsh., 558–564. (2) (1999) Amer. Mineral., 84, 1197 (abs. ref. 1).