Kleberite $Fe^{3+}Ti_6O_{11}(OH)_5$

Crystal Data: Monoclinic. *Point Group*: 2/*m.* As rounded grains to 0.3 mm, as pseudomorphs after ilmenite. *Twinning*: Observed in X-ray analysis.

Physical Properties: *Cleavage*: n.d. *Fracture*: Irregular. *Tenacity*: Brittle. Hardness = n.d. D(meas.) = 3.28 [Low due to intragrain porosity.] D(calc.) = 3.91

Optical Properties: Translucent. *Color*: Red-brown, orange; yellow, red-brown to deep red in transmitted light; dark blue-gray in reflected light. *Streak*: Beige. *Luster*: Waxy to vitreous. *Optical Class*: Uniaxial (-). [Also biaxial (-) with 2V(meas.) = ~ 0° in localized regions.] *n*(calc.) = 2.16(3)

Cell Data: *Space Group*: $P2_1/c$. a = 7.537(1) b = 4.5795(4) c = 9.885(1) β = 131.02(1)° Z = n.d.

X-ray Powder Pattern: Königshain, Saxony, Germany.
1.676 (100), 2.170 (82), 2.466 (27), 1.423 (22), 2.764 (9), 3.933 (8), 1.297 (6)

Chemistry:	(1)
TiO_2	65.9
Fe_2O_3	11.2
Al_2O_3	4.20
SiO_2	2.57
P_2O_5	0.51
V_2O_5	0.50
MnO	0.07
MgO	0.31
H_2O	10.6
Total	95.9

(1) Königshain, Saxony, Germany; average of 15 electron microprobe analyses, H_2O by TGA; corresponding to $Fe^{3+}_{1.01}Mg_{0.06}Ti_6O_{11.2}(OH)_{4.8}[Al_{0.59}Si_{0.31}P_{0.04}O_{1.60}\cdot 1.8H_2O]$ - the components in square brackets contributed by inclusions.

Occurrence: In the heavy mineral fractions of marine sand deposits.

Association: MgO-rich ferrian ilmenite, pseudorutile, "leucoxene," tourmaline, spinel, kaolinite, quartz, diaspore.

Distribution: From Königshain, Saxony, northeast Germany; the Murray Basin, southeast Australia; and at Kalimantan, Indonesia.

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Type Material: At the Natural History Museum, Humboldt University, Berlin, Germany (1980-0283) and the Museum Victoria, Melbourne, Victoria, Australia (M52010-M52011).

References: (1) Grey, I.E., K. Steinike, and C.M. MacRae (2013) Kleberite, $Fe^{3+}Ti_6O_{11}(OH)_5$, a new ilmenite alteration product, from Königshain, northeast Germany. Mineral. Mag., 77(1), 45-55.
(2) (2015) Amer. Mineral., 100, 2354-2355 (abs. ref. 1).