Heisenbergite $UO_2(OH)_2 \cdot H_2O$

Crystal Data: Orthorhombic. *Point Group*: n.d. As crusts of prismatic crystals to 0.15 μm.

Physical Properties: *Cleavage*: None. *Fracture*: Irregular. *Tenacity*: n.d. Hardness = ~ 2
D(meas.) = n.d. D(calc.) = 5.14

Optical Properties: Opaque to translucent. *Color*: Yellow, yellow-brown or orange-brown.
Streak: Yellow. *Luster*: Vitreous.
Optical Class: Biaxial (-). α =1.733(3) β is close to γ γ = 1.800(5) 2V(meas.) = n.d.
Crystals have positive elongation and straight extinction.

Cell Data: *Space Group*: $P2_12_12_1$, $Pna2_1$ or *Pnma*. a = 13.10(1) b = 13.76(1) c = 14.50(1)
Z = 24

X-ray Powder Pattern: Menzenschwand, Germany.
7.92 (10), 7.25 (9), 3.27 (9), 3.57(7), 5.96 (4), 1.992 (4), 4.02 (3)

Chemistry:	(1)
UO_3	88.58
PbO	1.31
BaO	0.17
CaO	0.13
H_2O	[9.81]
Total	100.00

(1) Menzenschwand, Germany; average of 15 electron microprobe analyses, H_2O by difference, OH and H_2O confirmed by Raman spectroscopy; corresponding to $U_{1.04}Pb_{0.02}Ca_{0.01}Ba_{<0.01}H_{3.67}O_5$.

Occurrence: A secondary mineral formed by weathering.

Association: Quartz, uraninite, billietite, studtite, rutherfordine, joliotite, goethite, hematite, barite (Menzenschwand); uraninite, anglesite, dumontite (Sherana mine); uraninite, richetite, antlerite, zeunerite, metazeunerite, nováčekite, langite (Joachimsthal).

Distribution: Krunkelbach Valley near Menzenschwand, Southern Black Forest, Baden Württemberg, Germany, from the El Sherana Mine, South-Alligator-River-District, Northern Territory, Australia, also at Joachimsthal, Czech Republic.

Name: Honors German physicist Werner Heisenberg (1901-1976).

Type Material: Staatliches Museum für Naturkunde, Stuttgart, Germany.

References: (1) Walenta, K. and T. Theye (2012) Heisenbergite, a new uranium mineral from the uranium deposit of Menzenschwand in the Southern Black Forest, Germany. Neues Jahrbuch für Mineralogie-Abhandlungen, 189/2, 117-123. (2) (2015) Amer. Mineral., 100, 2007-2008 (abs. ref. 1).