

Meitnerite**(NH₄)(UO₂)(SO₄)(OH)·2H₂O**

Crystal Data: Triclinic. *Point Group:* $\bar{1}$. As intergrown tabular crystals to ~80 μm , flattened on $\{01\bar{1}\}$ and displaying $\{01\bar{1}\}$, $\{001\}$, $\{100\}$, $\{101\}$ and $\{10\bar{1}\}$.

Physical Properties: *Cleavage:* Perfect on $\{01\bar{1}\}$. *Fracture:* Irregular. *Tenacity:* Brittle. Hardness = ~2 D(meas.) = n.d. D(calc.) = 3.320 Fluoresces greenish white in 405 nm light.

Optical Properties: Transparent. *Color:* Slightly greenish yellow. *Streak:* Very pale yellow. *Luster:* Vitreous.

Optical Class: Biaxial (-). $\alpha = 1.568(2)$ $\beta = 1.589(2)$ $\gamma = 1.607(2)$ $2V(\text{meas.}) = 84(1)^\circ$ $2V(\text{calc.}) = 84.5^\circ$ *Dispersion:* Moderate, $r > v$. *Orientation:* $X \wedge b = 26^\circ$, $Y \wedge a = 15^\circ$, $Z \wedge c = 53^\circ$. *Pleochroism:* $X =$ nearly colorless, $Z =$ pale green-yellow, $Y =$ light green-yellow. *Absorption:* $X < Z < Y$.

Cell Data: Space Group: $P\bar{1}$. $a = 6.7964(2)$ $b = 8.0738(3)$ $c = 9.2997(7)$ $\alpha = 113.284(8)^\circ$ $\beta = 99.065(7)^\circ$ $\gamma = 105.289(7)^\circ$ $Z = 2$

X-ray Powder Pattern: Green Lizard Mine, San Juan County, Utah, USA. 7.15 (100), 5.85 (36), 6.36 (30), 5.038 (21), 3.075 (21), 3.340 (20), 3.569 (19)

Chemistry:	(1)	(2)
(NH ₄) ₂ O	5.53	5.96
Na ₂ O	0.41	
SO ₃	17.44	18.31
UO ₃	58.40	65.43
<u>H₂O</u>	<u>[10.29]</u>	<u>10.30</u>
Total	92.07	100.00

(1) Green Lizard Mine, San Juan County, Utah, USA; electron microprobe analysis supplemented by Raman spectroscopy, H₂O calculated from structure; corresponds to (NH₄)_{1.01}Na_{0.07}(U_{0.97}O₂)(S_{1.03}O₄)[(OH)_{0.93}O_{0.07}]·2H₂O. (2) (NH₄)(UO₂)(SO₄)(OH)·2H₂O.

Occurrence: As efflorescent crusts on the surfaces of mine walls by oxidation in the humid underground environment of a Colorado Plateau type, roll-front uranium deposit in organic-rich former stream channel sediment.

Association: Beshtauite, gypsum, quartz.

Distribution: From the Green Lizard Mine, White Canyon mining district, San Juan County, Utah, USA.

Name: Honors Austrian-Swedish physicist Lise Meitner (1878-1968) who, with Otto Hahn and his assistant Fritz Straßmann, discovered nuclear fission (of uranium) in 1938 and explained the physical process. Chemical element 109 was named meitnerium in her honor.

Type Material: Natural History Museum of Los Angeles County, Los Angeles, California, USA (66623).

References: (1) Kampf, A.R., J. Plášil, B.P. Nash, and J. Marty (2018) Meitnerite, (NH₄)(UO₂)(SO₄)(OH)·2H₂O, a new uranyl-sulfate mineral with a sheet structure. *Eur. J. Mineral.*, 30(5), 999-1006. (2) (2019) *Amer. Mineral.*, 104(9), 1363-1364 (abs. ref 1).