

# Uranophane



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**Crystal Data:** Monoclinic. *Point Group:* 2. Crystals are composite needles, elongated || [010], to over 1 cm, poorly developed, warped or bent. As stellate aggregates; in fibrous or felted crusts, and massive.

**Physical Properties:** *Cleavage:* Perfect on {100} (?); traces of another, parallel elongation. *Tenacity:* Brittle. Hardness = ~2.5 D(meas.) = 3.81–3.90 D(calc.) = 3.78 Crystals weakly fluorescent green under UV, typically not fluorescent when massive; radioactive.

**Optical Properties:** Transparent to translucent. *Color:* Lemon-yellow to pale straw-yellow or honey-brown; also greenish yellow to yellowish green, yellow-orange. *Luster:* Vitreous, pearly on the good cleavage; waxy or dull when massive.

*Optical Class:* Biaxial (-). *Pleochroism:* Weak; X = colorless; Y = pale canary-yellow; Z = canary-yellow. *Orientation:* Z = b; X ⊥ {100} cleavage or a flat face. *Dispersion:* r < v, strong, crossed. α = 1.642–1.648 β = 1.661–1.667 γ = 1.667–1.675 2V(meas.) = 32°–49°

**Cell Data:** *Space Group:* P2<sub>1</sub>. a = 15.858–15.909 b = 6.985–7.002 c = 6.641–6.665 β = 97°27'–97°33' Z = 2

**X-ray Powder Pattern:** Ruggles pegmatite, Grafton Co., New Hampshire, USA. 7.88 (100), 3.94 (90), 2.99 (80), 2.91 (80), 1.969 (70), 4.76 (50), 3.20 (50)

## Chemistry:

	(1)	(2)
SiO <sub>2</sub>	12.66	14.03
UO <sub>3</sub>	65.24	66.80
CaO	8.53	6.55
H <sub>2</sub> O	13.02	12.62
Total	99.45	100.00

(1) Lusk, Wyoming, USA. (2) Ca(UO<sub>2</sub>)<sub>2</sub>(SiO<sub>3</sub>OH)<sub>2</sub>•5H<sub>2</sub>O.

**Polymorphism & Series:** Dimorphous with uranophane-beta.

**Occurrence:** A common secondary mineral in uranium deposits and pegmatites, formed by alteration of uraninite; as coatings, presumably through deposition from meteoric waters.

**Association:** Uranophane-beta, kasolite, meta-autunite, phosphuranylite, uranium oxides.

**Distribution:** Only a few localities can be given for exceptional crystals or abundant material. At Miedzianka (Kupferberg), Silesia, Poland. From Wölsendorf, Bavaria, and at Neustädtl, near Schneeberg, Saxony, Germany. From Jáchymov (Joachimsthal), Czech Republic. At Lachaux, Puy de Dôme, France. In the USA, at the Monument No. 2 mine, Apache Co., Arizona; from the Happy Jack mine, White Canyon, San Juan Co., Utah; as large crystals in the Hanosh mine, Grants district, McKinley Co., New Mexico. In the Silver Cliff mine, Lusk, Niobrara Co., Wyoming, and from the Spruce Pine district, Mitchell Co., North Carolina. Large crystals from the Faraday mine, near Bancroft, Ontario, Canada. On Mt. Painter, in the Flinders Ranges, South Australia. In Congo (Zaire), at Shinkolobwe, and the Musonoi mine, Kolwezi, Katanga (Shaba) Province. From Rössing, Namibia.

**Name:** From URANIUM and the Greek for *to appear*.

**References:** (1) Dana, E.S. (1892) Dana's system of mineralogy, (6th edition), 699. (2) Frondel, C. (1958) Systematic mineralogy of uranium and thorium. U.S. Geol. Sur. Bull. 1064, 294–300. (3) Viswanathan, K. and O. Harneit (1986) Refined crystal structure of beta-uranophane, Ca(UO<sub>2</sub>)<sub>2</sub>(SiO<sub>3</sub>OH)<sub>2</sub>•5H<sub>2</sub>O. Amer. Mineral., 71, 1489–1493. (4) Ginderow, D. (1988) Structure de l'uranophane alpha, Ca(UO<sub>2</sub>)<sub>2</sub>(SiO<sub>3</sub>OH)<sub>2</sub>•5H<sub>2</sub>O. Acta Cryst., C44, 421–424 (in French).

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