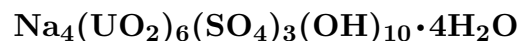


## Sodium-zippeite



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**Crystal Data:** Orthorhombic. *Point Group:* n.d. Rare in crystals, to 100  $\mu\text{m}$ , rhomboidal to slightly elongated plates, extremely thin, may be petallike, lathlike, spindle-shaped, in vermiform aggregates; as cross-fiber veinlets, warty crusts, very fine-grained powdery to massive; commonly in efflorescences. *Twinning:* Common on  $\{h0l\}$ , contact twins, with another law, polysynthetic.

**Physical Properties:** *Cleavage:* Perfect on  $\{010\}$ ; perhaps another perpendicular. Hardness =  $\sim 2$  D(meas.) =  $> 3.3$  D(calc.) = n.d. Radioactive; fluoresces bright yellow under SW and LW UV.

**Optical Properties:** Semitransparent. *Color:* Yellow, lemon-yellow, yellow-orange. *Optical Class:* Biaxial (-). *Pleochroism:* X = colorless to pale yellow; Z = dark yellow to golden yellow. *Orientation:* X  $\perp$  plane of flattening; Z = c.  $\alpha = 1.630\text{--}1.637$   $\beta = 1.685\text{--}1.689$   $\gamma = 1.732\text{--}1.739$  2V(meas.) = Moderate to large.

**Cell Data:** *Space Group:* n.d.  $a = 8.82$   $b = 17.12$   $c = 7.32$  Z = n.d.

**X-ray Powder Pattern:** Synthetic.

7.34 (100), 3.663 (54), 3.490 (44), 3.153 (35), 2.858 (15), 3.754 (14), 2.118 (11)

**Chemistry:**

	(1)	(2)
SO <sub>3</sub>	10.43	10.71
UO <sub>3</sub>	75.86	76.53
Na <sub>2</sub> O	5.25	5.53
K <sub>2</sub> O	0.47	
H <sub>2</sub> O	7.99	7.23
Total	[100.00]	100.00

(1) Delta mine, Utah, USA; recalculated to 100% after deduction of gypsum 0.1% and insoluble SiO<sub>2</sub> + Al<sub>2</sub>O<sub>3</sub> + Fe<sub>2</sub>O<sub>3</sub> 4.39%. (2) Na<sub>4</sub>(UO<sub>2</sub>)<sub>6</sub>(SO<sub>4</sub>)<sub>3</sub>(OH)<sub>10</sub> · 4H<sub>2</sub>O.

**Occurrence:** A secondary alteration product of uraninite and base-metal sulfides in the oxidized zone of uranium-rich deposits, typically in sandstone-type uranium deposits; of post-mine origin, where the sodium may be supplied by percolating saline water.

**Association:** Andersonite, uranopilite, johannite, schröckingerite, uranopilite, other “zippeite-group” minerals.

**Distribution:** In the USA, in Utah, from the Happy Jack mine, White Canyon, and the W.N. mine, Deer Flat, San Juan Co.; in the Delta and Lucky Strike No. 2 mines, San Rafael district, and at the Sodaroll mine, Green River district, Emery Co.; from the Parco No. 23 mine, Thompsons district, Grand Co.; at the Atomic King mine, Cane Springs, Moab Co.; in the Oyler mine, Henry Mountains district, Wayne Co.; in Arizona, from the Sue mine, Cherry Creek district, Gila Co., and in the Hillside mine, about 5.5 km north of Bagdad, Eureka district, Yavapai Co.; at the Jackpile mine, Grants district, Socorro Co., New Mexico. From Jáchymov (Joachimsthal), Czech Republic. In the Geevor mine, St. Just, Cornwall, England.

**Name:** For its content of *sodium* and relation to the other *zippeite* group species.

**Type Material:** n.d.

**References:** (1) Frondel, C., J. Ito, R.M. Honea, and A.M. Weeks (1976) Mineralogy of the zippeite group. Can. Mineral., 14, 429–436.