

Crystal Data: Tetragonal. *Point Group:* 4/m 2/m 2/m. Platy crystals, to 5 mm, may be in radiating, blocky or foliated masses.

Physical Properties: *Cleavage:* {001}, perfect; {100}, less perfect. *Tenacity:* Brittle. Hardness = 2-2.5 D(meas.) = n.d. D(calc.) = [3.62] Yellow-green fluorescence under UV. Radioactive.

Optical Properties: Semitransparent. *Color:* Lemon-yellow, lettuce-yellow, greenish yellow. *Luster:* Vitreous, pearly on {001}. *Optical Class:* Uniaxial (-). $\omega = 1.578$ $\varepsilon = 1.559$ *Pleochroism:* Weak; *O* = light yellow; *E* = pale yellow.

Cell Data: *Space Group:* P4/ncc. $a = 6.9935(7)$ $c = 17.5101(12)$ $Z = 4$

X-ray Powder Pattern: Kuruk deposit, Tajikistan. 3.67 (10), 2.675 (8), 1.566 (8b), 1.540 (8b), 3.23 (7), 1.639 (7), 1.364 (7)

Chemistry:	(1)	(2)	(3)		(1)	(2)	(3)
UO ₃	61.9	62.53	64.70	CaO	1.2	0.14	
P ₂ O ₅	15.56	14.69	16.06	Na ₂ O	5.62	6.88	7.01
CO ₂	0.24			H ₂ O ⁺	4.05		
SiO ₂	1.6			H ₂ O ⁻	9.02		
Al ₂ O ₃	0.32			<u>H₂O</u>		14.84	12.23
Fe ₂ O ₃	0.97			Total	100.91	99.08	100.00
MgO	0.43						

(1) Kuruk deposit, Tajikistan; after deduction of impurities, stated to correspond to (Na,Ca)_{Σ=1.02}(UO₂)_{0.95}(PO₄)_{1.00} • 3.33H₂O. (2) Do.; corresponds to (Na,Ca)_{Σ=1.06}(UO₂)_{1.05}(PO₄)_{1.00} • 3.95H₂O. (3) Na(UO₂)(PO₄) • 3H₂O.

Mineral Group: Autunite group.

Occurrence: In the oxidized zone of a uranium deposit in a granodiorite massif (Tajikistan). In a miarolitic cavity in granite (Lake Boga).

Association: Schoepite, gypsum, kaolinite, “limonite” (Tajikistan); saleeite, torbernite (Lake Boga).

Distribution: Found in the Kuruk uranium deposit, 15 km northeast of Khodzhen, Samgar Steppe, northern Tajikistan. In the Lake Boga Granite, Victoria, Australia.

Name: The prefix *meta* indicates the dehydration product of “*sodium autunite*”, the transitory sodium analog of *meta-autunite*.

Type Material: A.E. Fersman Mineralogical Museum, Academy of Sciences, Moscow, Russia (67809-67812).

References: (1) Chernikov, A.A., O.V. Krutetskaya, and N.I. Organova (1957) Sodium-autunite [metanatroautunite]. *Atomnaya Energiya*, 3, 133-140 (in Russian). (2) (1958) *Amer. Mineral.*, 43, 383 (abs. ref. 1). (3) Chernikov, A.A. and N.I. Organova (1994) Sodium autunite and sodium meta-autunite. *Doklady Acad. Nauk SSSR*, 338, 368-371 (in Russian). (4) (1995) *Amer. Mineral.*, 80, 1329-1330 (abs. ref. 3). (5) Pekov, I.V. (1998) Minerals first discovered on the territory of the former Soviet Union, 190-191. (6) Mills, S.J. (2004) Metanatroautunite (‘sodium autunite’) from the Lake Boga Granite, Victoria. *Australian J. Mineral.*, 10, 29-31. (7) Mills, S.J., A.R. Kampf, and W.D. Birch (2012) The crystal structure of metanatroautunite, Na[(UO₂)(PO₄)](H₂O)₃, from the Lake Boga Granite, Victoria, Australia. *Amer. Mineral.*, 97, 735-738.