Sodium boltwoodite $(H_3O)(Na,K)(UO_2)SiO_4 \cdot H_2O$

Crystal Data: Orthorhombic. *Point Group:* $2/m\ 2/m\ 2/m$. As flaky, radiating-fibrous aggregates and fine-grained coatings.

Physical Properties: *Cleavage:* Perfect on {010}, imperfect on {001}. Hardness = n.d. D(meas.) = 4.1 D(calc.) = 4.4 Radioactive.

Optical Properties: Translucent. *Color:* Pale yellow to white; in transmitted light, pale yellow to colorless.
Optical Class: Biaxial (–). *Pleochroism:* X = colorless; Z = pale yellow. α = 1.613–1.645 β = [1.63–1.66] γ = 1.645–1.672 2V(meas.) = Large.

Cell Data: *Space Group:* $P2_12_12_1$. $a = 27.40(5)$ $b = 7.02(2)$ $c = 6.65(2)$ Z = 8

X-ray Powder Pattern: Kyzylsai district, Kazakhstan.
6.71 (10), 2.92 (10), 4.70 (8), 3.49 (8), 3.37 (8), 3.10 (8), 6.92 (7)

Chemistry:

	(1)
SiO_2	14.70
UO_3	59.57
Al_2O_3	0.1
Fe_2O_3	0.45
PbO	0.00
MgO	0.00
CaO	4.35
Na_2O	4.21
K_2O	3.10
H_2O	8.70
LOI	14.23
Total	[109.41]

(1) Kyzylsai district, Kazakhstan; contained quartz and calcite, original total given as 100.71%; after subtracting impurities, corresponds to $(H_3O)(Na_{0.7}K_{0.3})_{\Sigma=1.0}(UO_2)(SiO_4) \cdot H_2O$.

Occurrence: A minor secondary mineral formed from subalkaline groundwater in the near-surface parts of uranium deposits in arid regions.

Association: Kaolinite, calcite, feldspar, quartz, gypsum, Fe-Mn oxides and hydroxides.

Distribution: Found at an unnamed uranium deposit, Kyzylsai district, Chu-Ili Mountains, Balkhash Lake region, Kazakhstan.

Name: For *sodium* in its composition and its relation to *boltwoodite*.

Type Material: n.d.

References: (1) Chernikov, A.A., D.P. Shashkin, and I.N. Gavrilova (1975) Sodium boltwoodite. Doklady Acad. Nauk SSSR, 221, 195–197 (in Russian). (2) (1976) Amer. Mineral., 61, 1054–1055 (abs. ref. 1). (3) Stohl, F.V. and D.K. Smith (1981) The crystal chemistry of the uranyl silicate minerals. Amer. Mineral., 66, 610–625.