

Betpakdalite-NaCa**Crystal Data:** Monoclinic. *Point Group:* 2/m.**Physical Properties:** *Cleavage:* n.d. *Tenacity:* n.d. *Fracture:* n.d. *Hardness:* = n.d.
D(meas.) = 2.02 D(calc.) = 2.892**Optical Properties:** Translucent. *Color:* Lemon yellow. *Streak:* n.d. *Luster:* Dull.
Optical Class: Biaxial. $\alpha = 1.792$ $\beta = \text{n.d.}$ $\gamma = 1.81$ $2V(\text{meas.}) = \text{n.d.}$ $2V(\text{calc.}) = \text{n.d.}$
Pleochroism: $X = \text{pale yellow}$, $Z = \text{yellow}$. *Absorption:* $Z > X$. *Orientation:* $Z \wedge \text{elongation} = 38^\circ$.**Cell Data:** *Space Group:* C2/m. $a = 19.41(3)$ $b = 11.12(4)$ $c = 15.26(3)$ $\beta = 131.13(7)^\circ$ $Z = 2$ **X-ray Powder Pattern:** Kyzylsai Mo-U deposit, Chu-Ili mountains, Kazakhstan.
8.80 (100), 3.615 (90), 9.64 (80), 2.034 (80), 1.723 (80), 2.952 (70), 2.096 (70)

Chemistry:	(1)	(2)
Na ₂ O	3.14	1.58
K ₂ O	0.20	0.30
CaO	4.23	3.64
CuO	n.d.	0.06
MgO	0.22	n.d.
Fe ₂ O ₃	11.25	10.28
Al ₂ O ₃	0.40	0.64
SiO ₂	0.20	0.11
As ₂ O ₅	13.93	9.38
MoO ₃	50.22	53.29
H ₂ O	16.65	[20.83]
Total	100.44	100.00

(1) Kyzylsai Mo-U deposit, Chu-Ili mountains, Kazakhstan; wet chemical and DTA analyses.

(2) Do., normalized electron microprobe analysis, H₂O calculated for stoichiometry; corresponding to [Na_{1.10}Ca_{0.47}K_{0.14}(H₂O)_{17.29}Ca_{0.93}Al_{0.05}Cu²⁺_{0.02}(H₂O)₆][Mo⁶⁺₈As⁵⁺_{1.88}Fe³⁺_{2.78}Al_{0.22}O_{33.63}(OH)_{3.37}].**Mineral Group:** Betpakdalite supergroup, betpakdalite group.**Occurrence:** n.d.**Association:** n.d.**Distribution:** Kyzylsai Mo-U deposit, Chu-Ili mountains, Kazakhstan.**Name:** For the Bet-Pak-Dal Desert, Kazakhstan. Two suffixes correspond to the dominant cations in the two different types of non-framework cation sites.**Type Material:** A.E. Fersman Mineralogical Museum, Moscow, Russia (47275).**References:** (1) Skvortsova, K.V., Sidorenko, G.A., Nesterova, Y.S., Arapova, G.A., Dara, A.D. and Rybakova, L.I. (1971) Sodium betpakdalite and conditions of its formation. *Zapiski Vsesoyuzhogo Mineralogicheskogo Obshchestva*, 100, 603-611 [in Russian] [betpakdalite-NaCa]. (2) Kampf, A.R., S.J. Mills, M.S. Rumsey, M. Dini, W.D. Birch, J. Spratt, J.J. Pluth, I.M. Steele, R.A. Jenkins, and W.W. Pinch (2012) The heteropolymolybdate family: structural relations, nomenclature scheme and new species. *Mineral. Mag.*, 76(5), 1175-1207.