

Crystal Data: Monoclinic. *Point Group:* 2/m. As columnar crystals elongated along [010], to 2 cm, and as tangled-fibrous aggregates. *Twinning:* Polysynthetic, by rotation about [100].

Physical Properties: *Cleavage:* Perfect on {001}, good on {100}. *Tenacity:* Very brittle. Hardness = 4.6 VHN = 310-330 D(meas.) = 2.562-2.593 D(calc.) = 2.71

Optical Properties: Semitransparent. *Color:* Dark to pale brown, colorless. *Luster:* Vitreous. *Optical Class:* Biaxial (-). $\alpha = 1.563$ $\beta = 1.569$ $\gamma = 1.573$ 2V(meas.) = n.d. *Orientation:* $Z = b$; $Y \wedge c = 5^\circ$ - 7° . *Dispersion:* $r < v$.

Cell Data: Space Group: C2/m. $a = 14.0178(7)$ $b = 14.1289(6)$ $c = 7.8366(3)$ $\beta = 109.436(3)^\circ$ $Z = 4$

X-ray Powder Pattern: Khan-Bogdo massif, Mongolia.

4.26 (100), 3.05 (100), 6.60 (90), 3.80 (90), 7.05 (50), 2.995 (50), 1.947 (50)

Chemistry:	(1)	(2)	(3)
SiO ₂	60.12	62.5	61.64
TiO ₂	0.12	0.03	
ZrO ₂	19.80	20.9	21.07
Al ₂ O ₃	0.60	0.02	
(Y,RE) ₂ O ₃	0.55	0.45	
Fe ₂ O ₃	1.31		
MgO	0.19		
MnO		0.04	
CaO	9.15	9.2	9.59
Na ₂ O	0.18	0.03	
K ₂ O	0.14	0.01	
H ₂ O	7.90	6.2	7.70
P ₂ O ₅	0.20		
Total	100.26	99.38	100.00

(1) Khan-Bogdo massif, Mongolia. (2) Khan-Bogdo massif, Mongolia; electron microprobe analyses supplemented by FTIR spectroscopy, H₂O from structure; corresponds to (Ca_{0.96}Ce_{0.01}Yb_{0.01})_{Σ=0.98}Zr_{0.99}Si₆O_{14.97}•2.02H₂O. (3) CaZrSi₆O₁₅•2.5H₂O.

Occurrence: In schlieren of alkalic granite pegmatite, at the contact of arfvedsonite-bearing granite with xenoliths of felsic volcanic rock.

Association: Elpidite, quartz, microcline, albite, aegirine, arfvedsonite, monazite, synchesite, titanite, other titanosilicates (Khan-Bogdo); elpidite, gittinsite (Strange Lake).

Distribution: In the Khan-Bogdo granitic massif, southern Gobi desert, Mongolia. In the Strange Lake alkaline complex, southeast of Lac Brisson, Quebec and Labrador, Newfoundland, Canada.

Name: Honors Neil Alden Armstrong (1930-2012), American astronaut, first man to walk on the Moon.

Type Material: A.E. Fersman Mineralogical Museum, Russian Academy of Sciences, Moscow, Russia.

References: (1) Vladykin, N.V., V.I. Kovalenko, A.A. Kashaev, A.N. Sapozhnikov, and V.A. Pisarskaya (1973) A new mineral of calcium and zirconium, armstrongite. Doklady Acad. Nauk SSSR, 209, 1185-1188 (in Russian). (2) (1974) Amer. Mineral., 59, 208 (abs. ref. 1). (3) Mesto, E., E. Kaneva, E. Schingaro, N. Vladykin, M. Lacalamita, and F. Scordari (2014) Armstrongite from Khan Bogdo (Mongolia): Crystal structure determination and implications for zeolite-like cation exchange properties. Amer. Mineral., 99, 2424-2432.