

**Tazheranite****(Zr, Ti, Ca)(O, □)<sub>2</sub>**

**Crystal Data:** Cubic. *Point Group:*  $4/m\bar{3}2/m$ . Anhedronal crystals, thick tabular, may be rounded, to 1.5 mm, and as irregular grains.

**Physical Properties:** *Fracture:* Conchoidal. *Tenacity:* Brittle. Hardness = 7.5 D(meas.) = 5.01(2) D(calc.) = 4.9

**Optical Properties:** Semitransparent. *Color:* Yellowish orange to reddish orange, rarely cherry-red, then zoned, brownish green; in thin section, pale yellow, zoned with a reddish tint.

*Luster:* Adamantine to greasy on fractures.

*Optical Class:* Isotropic; may exhibit weak to strong anisotropism, centrally zoned.  $n = 2.25(2)$

**Cell Data:** *Space Group:*  $Fm\bar{3}m$ .  $a = 5.111(1)$   $Z = 4$

**X-ray Powder Pattern:** Tazheran massif, Russia.

2.94 (10), 1.804 (10), 1.539 (10), 2.55 (6), 1.171 (5), 1.044 (5), 0.9828 (5)

<b>Chemistry:</b>	(1)	(2)	(1)	(2)
SiO <sub>2</sub>	0.63		Cr <sub>2</sub> O <sub>3</sub>	0.02
TiO <sub>2</sub>	2.42	4.84	Sc <sub>2</sub> O <sub>3</sub>	15.23
ZrO <sub>2</sub>	67.67	68.42	Y <sub>2</sub> O <sub>3</sub>	2.12
Ti <sub>2</sub> O <sub>3</sub>	11.65		HfO <sub>2</sub>	1.34
Al <sub>2</sub> O <sub>3</sub>	4.61	0.45	MgO	2.38
Fe <sub>2</sub> O <sub>3</sub>	0.92		<u>CaO</u>	<u>9.97</u> <u>6.52</u>
FeO		0.87	Total	100.25 100.04
V <sub>2</sub> O <sub>3</sub>		0.23		

(1) Tazheran massif, Russia; after deduction of spinel 5.41% and forsterite 1.48%, corresponds to  $(Zr_{0.59}Ca_{0.19}Ti^{3+}_{0.18}Ti^{4+}_{0.03}Al_{0.02}Fe_{0.02})_{\Sigma=1.03}O_{1.74}$ . (2) Allende meteorite; by electron microprobe; corresponds to  $(Zr_{0.55}Sc_{0.22}Ca_{0.12}Ti_{0.06}Y_{0.02}Hf_{0.01}Fe_{0.01}Al_{0.01})_{\Sigma=1.00}O_{1.75}$ .

**Occurrence:** In calciphyres banding periclase-brucite marble xenoliths in an alkalic massif (Tazheran massif, Russia). In a CV3 carbonaceous chondrite meteorite.

**Association:** Spinel, forsterite, åkermanite-gehlenite, clinohumite, ludwigite, azoproite, magnesioferrite, calzirtite, baddeleyite, geikielite, perovskite, rutile, zircon, dolomite, calcite (Tazheran massif, Russia). Allendeite, perovskite (Allende meteorite).

**Distribution:** In the Tazheran alkalic massif, west of Lake Baikal, eastern Siberia, Russia. On Alnö Island, Sweden. From the Jacupiranga carbonatite, São Paulo, Brazil. In the Allende meteorite.

**Name:** For the *Tazheran* massif, Russia, where it was first noted.

**Type Material:** Mining Institute, St. Petersburg, 1094/1; A.E. Fersman Mineralogical Museum, Academy of Sciences, Moscow, Russia, 72602, vis5748; National Museum of Natural History, Washington, D.C., USA, 145796.

**References:** (1) Konev, A.A., Z.F. Ushchapovskaya, A.A. Kashaev, and V.S. Lebedeva (1969) Tazheranite, a new calcium-titanium-zirconium mineral. *Doklady Acad. Nauk SSSR*, 186, 917-920 (in Russian). (2) (1970) *Amer. Mineral.*, 55, 318 (abs. ref. 1). (3) Kashaev, A.A. and Z.F. Ushchapovskaya (1969) Tazheranite - a mineral with CaF<sub>2</sub>-type structure. *Kristallografiya (Sov. Phys. Crystal.)*, 14, 1064-1065 (in Russian). (4) Rastsvetaeva, R.K., D.Yu. Pushcharovskii, E.M. Spiridonov, and V.M. Gekimyants (1998) Tazheranite and calzirtite: structural-mineralogical similarity and distinction. *Doklady Akad. Nauk*, 359(4), 529-531 (in Russian). (5) (1999) *Amer. Mineral.*, 84, 1688 (abs. ref. 4). (6) Ma, C., J.R. Beckett, and G.R. Rossman (2014) Allendeite (Sc<sub>4</sub>Zr<sub>3</sub>O<sub>12</sub>) and hexamolybdenum (Mo,Ru,Fe), two new minerals from an ultrarefractory inclusion from the Allende meteorite. *Amer. Mineral.*, 99, 654-666 [occurrence reference].