Kaitianite $Ti^{3+}_2Ti^{4+}O_5$

Crystal Data: Monoclinic. *Point Group*: 2/*m*. As elongated crystals to 3.6 μm.

Physical Properties: *Fracture*: n.d. *Tenacity*: n.d. Hardness = n.d. D(meas.) = n.d. D(calc.) = 4.29

Optical Properties: n.d. *Color*: n.d. *Streak*: n.d. *Luster*: n.d.
Optical Class: n.d.

Cell Data: *Space Group*: *C*2/*c*. a = 10.115 b = 5.074 c = 7.182 β = 112° Z = 4

X-ray Powder Pattern: Calculated pattern.
2.662 (100), 3.377 (75), 2.931 (73), 1.671 (67), 1.737 (66), 2.466 (59), 4.689 (53)

Chemistry:

	(1)	(2)
Ti_2O_3	[56.55]	64.28
TiO_2	[39.29]	35.72
Al_2O_3	1.18	
MgO	1.39	
FeO	0.59	
V_2O_3	0.08	
Total	99.07	100.00

(1) Allende CV3 carbonaceous chondrite meteorite, average of 4 electron microprobe analyses, Ti^{3+}/Ti^{4+} apportioned by stoichiometry; corresponds to $(Ti^{3+}_{1.75}Al_{0.05}Ti^{4+}_{0.10}Mg_{0.08}Fe_{0.02})(Ti^{4+}_{1.00})O_5$.
(2) $Ti^{3+}_2Ti^{4+}O_5$.

Mineral Group: Berdesinskiite group.

Occurrence: In a CV3 carbonaceous chondrite meteorite.

Association: Tistarite, rutile, Ti^{3+}-bearing corundum oxide $(Ti^{3+},Al,Zr,Si,Mg)_{1.95}O_3$, Ti-xifengite.

Distribution: In the Allende CV3 carbonaceous chondrite meteorite (fallen near Pueblito de Allende, Chihuahua, Mexico on February 8th, 1969).

Name: After the Chinese words "*kai tian*," meaning creating the heaven (sky). Chinese mythology says Pan Gu, the giant, created the world by separating heaven and earth from an egg-shaped chaos.

Type Material: National Museum of Natural History, Smithsonian Institution, Washington, D.C., USA (USNM 3510-5).

References: (1) Ma, C. and J.R. Beckett (2021) Kaitianite, $Ti^{3+}_2Ti^{4+}O_5$, a new titanium oxide mineral from Allende. Meteoritics & Planetary Science 56, Nr 1, 96-107. (2)Ma, C. (2019) Discovery of kaitianite, $Ti^{3+}_2Ti^{4+}O_5$, in Allende: a new refractory mineral from the solar nebula. 82*nd* Annual Meeting of The Meteoritical Society (LPI Contrib. No. 2157), 6098.pdf. (3) (2020) Amer. Mineral., 105, 1922 (abs. ref. 2).