

Alcaparrosaite

Crystal Data: Monoclinic. *Point Group:* 2/m. As blades and tapering prisms to 4 mm, flattened on {010} and elongated along [100]. Observed forms are {010}, {110}, {1.13.0} curved faces, and {021}.

Physical Properties: *Cleavage:* None. *Fracture:* Conchoidal. *Tenacity:* Brittle. *Hardness* = ~ 4
D(meas.) = 2.80(3) D(calc.) = 2.807 Hydrophobic.

Optical Properties: Translucent. *Color:* Pale yellow. *Streak:* White. *Luster:* Vitreous.
Optical Class: Biaxial (+). $\alpha = 1.643(1)$ $\beta = 1.655(1)$ $\gamma = 1.680(1)$ $2V(\text{meas.}) = 70(2)^\circ$
 $2V(\text{calc.}) = 70.3^\circ$ *Dispersion:* Strong parallel, $r < v$. *Orientation:* $X = b$, $Y \wedge c = 27^\circ$ in the obtuse angle β . *Pleochroism:* None.

Cell Data: *Space Group:* C2/c. $a = 7.55943(14)$ $b = 16.7923(3)$ $c = 12.1783(9)$
 $\beta = 94.076(7)^\circ$ $Z = 4$

X-ray Powder Pattern: Alcaparrosa mine, Cerritos Bayos, El Loa Province, Antofagasta, Chile.
3.096 (100), 6.907 (41), 3.000 (40), 2.704 (38), 3.628 (34), 3.320 (32), 1.8406 (31)

Chemistry:	(1)	(2)
Na ₂ O	0.32	
K ₂ O	20.44	21.50
Fe ₂ O ₃	11.58	12.15
TiO ₂	11.77	12.16
P ₂ O ₅	0.55	
SO ₃	47.52	48.72
H ₂ O	[5.79]	5.48
Total	97.97	100.00

(1) Alcaparrosa mine, Antofagasta, Chile; average of 4 electron microprobe analyses, H₂O calculated from structure refinement, OH⁻ for charge balance; corresponding to (K_{2.89}Na_{0.07})_{Σ=2.96}Ti⁴⁺_{0.98}Fe³⁺_{0.97}(S_{0.99}P_{0.01}O₄)₄O_{0.72}(OH)_{0.28}(H₂O)₂. (2) K₃Ti⁴⁺Fe³⁺(SO₄)₄O(H₂O)₂.

Occurrence: Formed by the oxidation of pyritic masses under increasingly arid conditions, likely at a relatively early stage.

Association: Intergrown with coquimbite, associated with ferrinatrite, krausite, pertlikite, pyrite, tamarugite, voltaite.

Distribution: From the Alcaparrosa mine, Cerritos Bayos, El Loa Province, Antofagasta, Chile.

Name: For the *Alcaparrosa* mine, Chile, from where the first specimens were collected.

Type Material: Natural History Museum of Los Angeles County, Los Angeles, California, USA (#63519, 63520 and 63521).

References: (1) Kampf, A.R., S.J. Mills, R.M. Housley, P.A. Williams, and M. Dini (2012) Alcaparrosaite, K₃Ti⁴⁺Fe³⁺(SO₄)₄O(H₂O)₂, a new hydrophobic Ti⁴⁺ sulfate from Alcaparrosa, Chile. *Mineral. Mag.*, 76(4), 851-861. (2) (2015) *Amer. Mineral.*, 100, 1319 (abs. ref. 1).