Torrecillasite $Na(As,Sb)_4^{3+}O_6Cl$

Crystal Data: Orthorhombic. *Point Group*: 2/*m* 2/*m* 2/*m*. As thin prisms elongated on [100] with diamond-shaped cross section and irregular terminations to 0.4 mm; in jack-straw aggregates, "puff balls", and massive intergrowths.

Physical Properties: *Cleavage*: None observed, however likely on {001}. *Fracture*: Irregular. *Tenacity*: Brittle. Hardness = 2.5 D(meas.) = n.d. D(calc.) = 4.056

Optical Properties: Transparent. *Color*: Colorless. *Streak*: White. *Luster*: Adamantine. *Optical Class*: Biaxial (-). α = 1.800(5) β = 1.96(1) γ = 2.03(calc) 2V(meas.) = 62.1(5)° 2V(calc.) = n.d. *Dispersion*: None. *Orientation: X = c, Y = b, Z = a*.

Cell Data: *Space Group*: *Pmcn*. *a* = 5.2580(9) *b* = 8.0620(13) *c* = 18.654(3) Z = 4

X-ray Powder Pattern: Torrecillas mine, Iquique Province, Chile.
3.035 (100), 2.642 (84), 4.031 (78), 2.853 (39), 2.426 (34), 4.298 (33), 1.8963 (32)

Chemistry:

	(1)	(2)
Na_2O	6.56	6.82
MgO	0.15	
As_2O_3	68.64	87.13
Sb_2O_3	18.43	
Cl	6.75	7.81
–O=Cl	1.52	1.76
Total	99.01	100.00

(1) Torrecillas mine, Iquique Province, Chile; average of 6 electron microprobe analyses; corresponding to $(Na_{1.03}Mg_{0.02})_{\Sigma=1.05}(As_{3.39}Sb_{0.62})_{\Sigma=4.01}O_{6.07}Cl_{0.93}$. (2) $NaAs^{3+}{}_4O_6Cl$.

Occurrence: A secondary mineral formed by the oxidation of native As and As-bearing minerals in hydrothermal veins followed by later alteration by saline fluids derived from evaporating meteoric water under hyperarid conditions.

Association: Anhydrite, cinnabar, gypsum, halite, lavendulan, magnesiokoritnigite, marcasite, quartz, pyrite, scorodite, wendwilsonite, leverettite, canutite.

Distribution: From the Torrecillas mine, Torrecillas Hill, northern Atacama Desert, Iquique Province, Tarapacá Region, Chile.

Name: For the locality that produced the first specimens.

Type Material: Natural History Museum of Los Angeles County, Los Angeles, California, USA (#64079, 64080, 64081, 64082).

References: (1) Kampf, A.R., B.P. Nash, M. Dini, and A.A. Molina Donoso (2014) Torrecillasite, $Na(As,Sb)^{3+}{}_4O_6Cl$, a new mineral from the Torrecillas mine, Iquique Province, Chile: description and crystal structure. Mineral. Mag., 78(3), 747-755. (2) (2015) Amer. Mineral., 100, 338 (abs. ref. 1).