

Juansilvaite**Na₅Al₃[AsO₃(OH)]₄[AsO₂(OH)₂]₂(SO₄)₂·4H₂O**

Crystal Data: Monoclinic. *Point Group:* 2/m. Crystals exhibit {001}, {111}, and {20 $\bar{1}$ } as blades, to ~ 0.5 mm, flattened on {001} and elongated on [100]; also grouped in tightly intergrown radial or rounded aggregates.

Physical Properties: *Cleavage:* Very good on {001}. *Tenacity:* Brittle. *Fracture:* Irregular. Hardness = ~ 2.5 D(meas.) = 3.01(2) D(calc.) = 3.005 Slight solubility in dilute HCl.

Optical Properties: Transparent. *Color:* Bright pink. *Streak:* White. *Luster:* Vitreous. *Optical Class:* Biaxial (+). $\alpha = 1.575(1)$ $\beta = 1.597(1)$ $\gamma = 1.623(1)$ $2V(\text{meas.}) = 86(1)^\circ$ $2V(\text{calc.}) = 86.5^\circ$ *Orientation:* $X = b$; $Z \wedge c = 27^\circ$ in the obtuse angle β . *Dispersion:* Weak, $r < v$. *Pleochroism:* Shades of pale pink. *Absorption:* $X > Y \approx Z$.

Cell Data: *Space Group:* C2/c. $a = 18.1775(13)$ $b = 8.6285(5)$ $c = 18.5138(13)$ $\beta = 90.389(6)^\circ$ $Z = 4$

X-ray Powder Pattern: Torrecillas mine, Iquique Province, Chile. 9.25 (100), 2.960 (68), 3.145 (66), 3.363 (42), 3.988 (43), 7.20 (34), 4.545 (34)

Chemistry:	(1)	(2)
Na ₂ O	11.35	11.90
CuO	0.24	
Al ₂ O ₃	8.61	11.75
Mn ₂ O ₃	1.24	
Fe ₂ O ₃	2.97	
As ₂ O ₅	50.34	52.97
SO ₃	10.82	12.30
H ₂ O	[11.57]	11.07
Total	97.14	100.00

(1) Torrecillas mine, Iquique Province, Chile; average of 10 electron microprobe analyses, H₂O calculated on the basis of Al+Fe+Mn = 3 apfu, charge balance and O = 36 apfu); corresponds to Na_{4.95}Al_{2.28}Fe³⁺_{0.50}Mn³⁺_{0.21}Cu_{0.04}As_{5.92}S_{1.83}O₃₆H_{17.37}.

(2) Na₅Al₃[AsO₃(OH)]₄[AsO₂(OH)₂]₂(SO₄)₂·4H₂O.

Occurrence: From the oxidation of native arsenic and other As-bearing primary phases, followed by later alteration by saline fluids derived from evaporating meteoric water under hyperarid conditions.

Association: Anhydrite, canutite, halite, sulfur, a mahnertite-like phase.

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

Name: Honors Juan Silva Aguirre (1939-2012), a prominent Chilean mining engineer and successful mining entrepreneur.

Type Material: Natural History Museum of Los Angeles County, Los Angeles, California, USA (65605, 65606, 65607 and 65608).

References: (1) Kampf, A.R., B.P. Nash, M. Dini, and A.A. Molina Donoso (2017) Juansilvaite, Na₅Al₃[AsO₃(OH)]₄[AsO₂(OH)₂]₂(SO₄)₂·4H₂O, a new arsenate-sulfate from the Torrecillas mine, Iquique Province, Chile. *Mineral. Mag.*, 81(3), 619-628. (2) (2018) *Amer. Mineral.*, 103, 833 (abs. ref. 1).