Juansilvaite $Na_5Al_3[AsO_3(OH)]_4[AsO_2(OH)_2]_2(SO_4)_2 \cdot 4H_2O$

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 (+). α = 1.575(1) β = 1.597(1) γ = 1.623(1) 2V(meas.) = 86(1)° 2V(calc.) = 86.5° *Orientation*: $X = b$; $Z \wedge c$ = 27° 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) β = 90.389(6)° 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_2O	11.35	11.90
CuO	0.24	
Al_2O_3	8.61	11.75
Mn_2O_3	1.24	
Fe_2O_3	2.97	
As_2O_5	50.34	52.97
SO_3	10.82	12.30
H_2O	[11.57]	11.07
Total	97.14	100.00

(1) Torrecillas mine, Iquique Province, Chile; average of 10 electron microprobe analyses, H_2O calculated on the basis of Al+Fe+Mn = 3 apfu, charge balance and O = 36 apfu); corresponds to $Na_{4.95}Al_{2.28}Fe^{3+}_{0.50}Mn^{3+}_{0.21}Cu_{0.04}As_{5.92}S_{1.83}O_{36}H_{17.37}$.
(2) $Na_5Al_3[AsO_3(OH)]_4[AsO_2(OH)_2]_2(SO_4)_2 \cdot 4H_2O$.

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, $Na_5Al_3[AsO_3(OH)]_4[AsO_2(OH)_2]_2(SO_4)_2 \cdot 4H_2O$, 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).