Cuatrocapaite-(K) $K_3NaMg\square(As_{12}O_{18})Cl_6 \cdot 16H_2O$

Crystal Data: Hexagonal. *Point Group*: $\bar{3}\,2/m$. As hexagonal tablets, flattened on {00*1} and bounded by {10*0} to ~0.3 mm or as massive aggregates.

Physical Properties: *Cleavage*: Perfect on {00*1}. *Tenacity*: Somewhat flexible, but not elastic. *Fracture*: Irregular. Hardness = ~2.5 D(meas.) = 2.76(2) D(calc.) = 2.771

Optical Properties: Transparent. *Color*: Colorless. *Streak*: White. *Luster*: Vitreous to pearly. *Optical Class*: Uniaxial (-). ω = 1.777(3) ε = 1.539(3) Non-pleochroic.

Cell Data: *Space Group: R*$\bar{3}$ *m*. *a* = 5.2637(15) *c* = 46.228(8) Z = 1

X-Ray Diffraction Pattern: Torrecillas mine, Iquique Province, Tarapacá Region, Chile.
15.50 (100), 2.621 (69), 2.339 (36), 3.228 (33), 3.098 (33), 5.13 (32), 2.489 (25)

Chemistry:

	(1)	(2)
$(NH_4)_2$	0.44	
Na_2O	2.26	1.67
K_2O	6.94	7.63
MgO	2.06	2.18
As_2O_3	65.39	64.07
Cl	12.04	11.48
H_2O	[15.56]	15.56
-O = Cl	2.72	2.59
Total	101.97	100.00

(1) Torrecillas mine, Iquique Province, Chile; average electron microprobe and IR spectroscopic analyses, H_2O calculated; corresponds to $K_{2.68}Na_{1.33}Mg_{0.93}(NH_4)_{0.31}(As_{12}O_{18.01})Cl_{6.16} \cdot 16.04H_2O$.
(2) $K_3NaMg\square(As_{12}O_{18})Cl_6 \cdot 16H_2O$.

Polymorphism & Series: Series with cuatrocapaite-(NH_4).

Occurrence: A secondary alteration phase formed under hyperarid conditions from the oxidation of native arsenic, and possibly other As-bearing primary phases, coupled with reaction with underground brines rich in mobile cations such as K^+ , Na^+ , NH^{4+}, Ca^{2+} and Mg^{2+}.

Association: Anhydrite, gypsum, lavendulan, torrecillasite, native arsenic, arsenolite, pyrite.

Distribution: From the Torrecillas mine, Iquique Province, Tarapacá Region, Chile.

Name: An allusion to the structure, which consists of four (*cuatro* in Spanish) different types of layers (*capa* in Spanish): (1) $[As_2O_3]$, (2) $[(NH_4),K]$, (3) $[Cl_6]$, and (4) $[(Na, Mg,)_3(H_2O)_{16}]$. The suffix indicates the dominant cation in the large-cation layer, (2).

Type Material: Natural History Museum of Los Angeles County, Los Angeles, California, USA (66987).

References: (1) Kampf, A.R., N.V. Chukanov, G. Möhn, M. Dini, A.A. Molina Donoso, and H. Friis (2019) Cuatrocapaite-(NH_4) and cuatrocapaite-(K), two new minerals from the Torrecillas mine, Iquique Province, Chile, related to lucabindiite and gajardoite. Mineral. Mag., 83, 741-748.