

Crystal Data: Isometric. *Point Group:* $\bar{4} 3m$. As isolated cubes to 0.5 mm and intergrown aggregates of cubes. *Twinning:* On {100} observed through X-ray diffraction analysis.

Physical Properties: *Cleavage:* Imperfect on {100}. *Fracture:* Irregular. *Tenacity:* Brittle. D(meas.) = n.d. D(calc.) = 2.564 *Hardness* = 2.5 VHN = 214-329 (98.3 mN load).

Optical Properties: Transparent. *Color:* Colorless. *Streak:* White.

Luster: Vitreous to adamantine.

Optical Class: Anomalously biaxial. $n = 1.556$ Anomalous birefringence. [By analogy with members of the pharmacosiderite group.]

Cell Data: *Space Group:* $P\bar{4} 3m$. $a = 7.7280(3)$ $Z = 1$

X-ray Powder Pattern: Maria Josefa mine, Andalusia, Spain.

7.759 (100), 3.870 (50), 4.473 (40), 2.331 (12), 2.446 (9), 3.459 (6), 3.158 (6)

Chemistry:	(1)	(2)
Na ₂ O	2.52	4.51
K ₂ O	1.49	
Al ₂ O ₃	29.50	29.65
As ₂ O ₅	48.84	50.13
H ₂ O	[16.28]	15.72
Total	98.63	100.00

(1) Maria Josefa mine, Andalusia, Spain; electron microprobe analyses, H₂O calculated and confirmed by structure analysis; corresponding to [Na_{0.57}K_{0.22}(H₃O)_{0.21}]_{Σ=1.00}Al_{4.05}(As_{2.97}O₁₂)(OH)₄•4H₂O. (2) NaAl₄(AsO₄)₃(OH)₄•4H₂O.

Mineral Group: Pharmacosiderite supergroup, pharmocoalumite group.

Occurrence: A secondary mineral in cavities and fractures in quartz in an epithermal gold-bearing alunite deposit.

Association: Quartz, chenevixite, kaolinite, jarosite, indeterminate Fe and Sb oxyhydroxides.

Distribution: From the Maria Josefa mine, in the Rodalquilar caldera, near Rodalquilar, Andalusia, Spain.

Name: As the Na (*natro*) and Al (*alum*) end-member in the pharmacosiderite supergroup.

Type Material: Natural History Museum, London, England (BM2009,161 and probe mount P16713).

References: (1) Rumsey, M.S., S.J. Mills, and J. Spratt (2010) Natropharmacoalumite, NaAl₄[(OH)₄(AsO₄)₃]•4H₂O, a new mineral of the pharmacosiderite supergroup and the renaming of aluminopharmacosiderite to pharmacoalumite. *Mineral. Mag.*, 74, 929-936. (2) (2011) *Amer. Mineral.*, 96, 1656-1657 (abs. ref. 1).