

Natroalunite

NaAl₃(SO₄)₂(OH)₆

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Crystal Data: Hexagonal. *Point Group:* $\bar{3}2/m$. Crystals are rhombohedral, pseudocubic, {01 $\bar{1}$ 2}, with small {0001}, several other forms, to 1 mm; fibrous, columnar, typically massive.

Physical Properties: *Cleavage:* Distinct on {0001}; traces on {01 $\bar{1}$ 2}. *Fracture:* Conchoidal. *Tenacity:* Brittle. Hardness = 3.5–4 D(meas.) = 2.75–2.83 D(calc.) = 2.819

Optical Properties: Transparent to translucent. *Color:* White; less commonly gray, yellow, green, brown; colorless in transmitted light. *Streak:* White. *Luster:* Vitreous to pearly on {0001}.

Optical Class: Uniaxial (+). $\omega = 1.574$ $\epsilon = 1.590$

Cell Data: *Space Group:* $R\bar{3}m$. $a = 6.982$ – 6.992 $c = 16.725$ – 16.905 $Z = 3$

X-ray Powder Pattern: Koenabib, South Africa.

2.96 (100), 4.90 (70), 2.98 (70), 2.22 (40), 1.895 (35), 3.49 (25), 1.745 (25)

Chemistry:	(1)	(2)	(3)		(1)	(2)	(3)
SO ₃	38.93	37.75	39.42	K ₂ O	4.26	0.39	5.80
Al ₂ O ₃	39.03	35.66	37.66	H ₂ O	13.35	n.d.	13.31
Fe ₂ O ₃		1.10		rem.		0.27	
Na ₂ O	4.41	6.12	3.81	insol.	0.50		
				Total	100.48		100.00

(1) National Belle mine, Colorado, USA. (2) Matanumad, India; remnant SiO₂ 0.09%, TiO₂ 0.10%, MnO 0.01%, CaO 0.06%, MgO 0.01%; stated to correspond to (Na_{0.96}K_{0.04}) $\Sigma=1.00$ (Al_{2.98}Fe_{0.02}³⁺) $\Sigma=3.00$ (SO₄)₂(OH)₆. (3) (Na, K)Al₃(SO₄)₂(OH)₆ with Na:K = 1:1.

Polymorphism & Series: Forms a series with alunite.

Mineral Group: Alunite group.

Occurrence: Less common than alunite, formed by solfataric or hydrothermal sulfate-bearing solutions reacting with clays, rarely with sillimanite; may be in laterites and as an authigenic sedimentary mineral.

Association: Alunite, kaolinite, halloysite, sillimanite, quartz.

Distribution: In the USA, from the National Belle mine, Red Mountain district, Ouray Co., and in the Rosita Hills, Custer Co., Colorado; at Sugarloaf Butte, near Quartzsite, La Paz Co., Arizona; in Carlsbad Cavern and Lechuguilla Cave, Eddy Co., New Mexico; on Desert Strip, Molokai, Hawaiian Islands. In the Ugusu mine and at Shirakawa, Shizuoka Prefecture, and from Sonomi, Makurazaki, Kagoshima Prefecture, Japan. In the Tatum copper deposit and Chinkuashi Cu–Au deposit, Taiwan. At Kalgoorlie and Kanowna, Western Australia; from Coober Pedy, South Australia. On Ruapahu volcano and Mount Taranaki, New Zealand. From Matanumad, 110 km northwest of Bhuj, Gujarath State, India. On the Gemsa Peninsula, Egypt. At Šaca, Košice district, Slovakia. In the Blyava deposit, Southern Ural Mountains, Russia. Found in the Hotson 6 quarry, Koenabib, west of Pofadder, Cape Province, South Africa.

Name: As the sodium, *natrium*, analog of *alunite*.

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