

Potassium alum

KAl(SO₄)₂•12H₂O

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Crystal Data: Cubic. *Point Group:* $2/m\bar{3}$. Rarely as tiny octahedra, which may be strung along fibers; stalactitic, columnar, mealy or granular, massive efflorescences. *Twinning:* Very rare on {111}.

Physical Properties: *Cleavage:* On {111}, interrupted. *Fracture:* Conchoidal. Hardness = 2–2.5 D(meas.) = 1.757 D(calc.) = 1.754 Soluble in H₂O, taste sweetish and astringent; deliquesces at 91° C.

Optical Properties: Transparent. *Color:* Colorless, white; colorless in transmitted light. *Luster:* Vitreous. *Optical Class:* Isotropic; may be weakly anomalously birefringent and sectored. $n = 1.456$

Cell Data: *Space Group:* $Pa\bar{3}$. $a = 12.157(3)$ $Z = 4$

X-ray Powder Pattern: Synthetic.

4.293 (100), 3.250 (55), 4.053 (45), 5.44 (40), 2.789 (35), 3.039(25), 4.96 (20)

Chemistry:	(1)	(2)
SO ₃	34.00	33.75
Al ₂ O ₃	10.40	10.75
Fe ₂ O ₃	0.80	
Na ₂ O	1.35	
K ₂ O	5.75	9.93
(NH ₄) ₂ O	2.42	
H ₂ O	45.37	45.57
rem.	0.77	
Total	100.86	100.00

(1) Vesuvius, Italy; remnant Cr₂O₃ 0.16%, Mn₂O₃ 0.01%, CaO 0.36%, Cl 0.24%.

(2) KAl(SO₄)₂•12H₂O.

Occurrence: Formed from argillaceous rocks or coal containing oxidizing pyrite or marcasite; may be a fumarolic or solfataric precipitate.

Association: Alunogen, pickeringite, epsomite, melanterite, gypsum, sulfur.

Distribution: In Italy, on Vesuvius, from the Grotta della Zolfo and at Cap Miseno, near Naples, Campania; in the Cetine mine, 20 km southwest of Siena, Tuscany; from the Grotte de Faraglione and along the Baia de Levante, Vulcano, Lipari Islands. In Germany, from Duttweiler, near Saarbrücken, Saarland, and at Arzberg, Fichtelgebirge, Bavaria. From Chuquicamata, Antofagasta, Chile. In the USA, in California, at the Sulfur Bank cinnabar mine, Lake Co., The Geysers, Sonoma Co., and the Nortonville coal mine, Contra Costa Co.; at Silver Peak, Esmeralda Co., Nevada; from Alum Cave Bluff, Sevier Co., Tennessee. Noted in a number of caves, as at the Mbobu Mkuhu Cave, near Ngodwana, Eastern Transvaal, South Africa. In the Feengrotten, near Saalfeld, Thuringia, and the Alaunhöhle, near Dresden, Saxony, Germany.

Name: For its content of *potassium* and as an *alum*, *alumen*, Pliny, part.

References: (1) Palache, C., H. Berman, and C. Frondel (1951) Dana's system of mineralogy, (7th edition), v. II, 471–473 [potash alum]. (2) Larsen, A.C. and D.T. Cromer (1967) Refinement of the alum structures. III. X-ray study of the α alums, K, Rb and NH₄Al(SO₄)₂•12H₂O. Acta Cryst., 22, 793–800. (3) (1966) NBS Circ. 539, 6.