

Crystal Data: Triclinic. *Point Group:* $\bar{1}$. Crystals rare, as thin plates or prismatic [001] or {010} with a six-sided outline about [010], very complex, with about 60 forms noted. Commonly fibrous, to 5 mm, forming delicate masses, crusts, and efflorescences. *Twinning:* On {010}.

Physical Properties: *Cleavage:* {010}, perfect; probable on {100} and $\{\bar{3}13\}$. Hardness = 1.5–2 D(meas.) = 1.72–1.77 D(calc.) = 1.79 Soluble in H₂O; taste alumlike, acid and sharp.

Optical Properties: Transparent. *Color:* Colorless in crystals, aggregates white, or pale yellow or red from impurities; colorless in transmitted light. *Luster:* Vitreous to silky.

Optical Class: Biaxial (+). *Orientation:* $X \simeq b$; $Z \wedge c = 42^\circ$. $\alpha = 1.459$ – 1.475
 $\beta = 1.461$ – 1.478 $\gamma = 1.470$ – 1.485 $2V(\text{meas.}) = 31^\circ$

Cell Data: *Space Group:* $P\bar{1}$. $a = 7.420(6)$ $b = 26.97(2)$ $c = 6.062(5)$ $\alpha = 89^\circ 57'(5)'$
 $\beta = 97^\circ 34'(5)'$ $\gamma = 91^\circ 53'(5)'$ $Z = 2$

X-ray Powder Pattern: Nová Baňa, Slovakia.

4.489 (100), 4.390 (81), 3.969 (81), 4.329 (76), 13.46 (54), 3.897 (52), 3.675 (45)

Chemistry:

	(1)	(2)
SO ₃	37.74	37.04
Al ₂ O ₃	16.59	15.73
H ₂ O	44.64	47.23
insol.	0.94	
Total	99.91	100.00

(1) Pintado Canyon, Guadalupe Co., New Mexico, USA. (2) Al₂(SO₄)₃•17H₂O.

Occurrence: Forms by reaction of sulfates from decomposing sulfides with aluminous minerals in shales and slates; in gossan or altered wall rock of pyritic deposits in arid regions; in coal seams; in relatively low-temperature fumaroles.

Association: Pyrite, marcasite, halotrichite, pickeringite, epsomite, alum, melanterite, gypsum.

Distribution: Many localities, at some in large amounts. From near Nová Baňa (Königsberg), Slovakia. In Italy, on Vesuvius, and from Solfatara di Pozzuoli, Campi Flegrei, and at Miseno, near Naples, Campania; on Vulcano, Lipari Islands. In France, at Sain-Bel, Rhône; in coal at Ronchamp, Haute-Saône. At Libros, near Teruel, Teruel Province, Spain. From the Stamm Asser mine, near Schwartzenberg, and at Bräunsdorf, near Freiberg, Saxony, Germany. From the Avacha and other volcanoes, Kamchatka Peninsula, Russia. In Chile, at Francisco de Vergara, Antofagasta, and from Cerros Pintados, near Iquique, Tarapacá. On Mount Pelée, Martinique. In the USA, abundant at Smoky Mountain, Jackson Co., North Carolina; at Alum Cave Bluff, Sevier Co., Tennessee; extensive deposits in the Alum Mountain district, Grant Co., New Mexico; at The Geysers, Sonoma Co., California; good crystals from the Dexter No. 7 mine, Calf Mesa, San Rafael district, Emery Co., Utah; from the Mount St. Augustine volcano, Alaska. In Canada near Vernon, British Columbia; and Scotia mine, Cumberland Co., Nova Scotia. At geothermal areas of Tengchong, Yunnan Province, China. Found in the Heritage Range, Ellsworth Mountains, Antarctica. From near Joadja, New South Wales, Australia.

Name: From the Latin for *alum* and the Greek for *to make*.

References: (1) Palache, C., H. Berman, and C. Frondel (1951) Dana's system of mineralogy, (7th edition), v. II, 537–540. (2) Cesbron, F. and M. Sadzadeh (1972) Nouvelles données sur l'alunogène Al₂(SO₄)₃•18H₂O. Bull. Soc. fr. Minéral., 96, 385–387 (in French). (3) Fang, J. H. and P.D. Robinson (1976) Alunogen, Al₂(H₂O)₁₂(SO₄)₃•5H₂O: its atomic arrangement and water content. Amer. Mineral., 61, 311–317.

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