Potassium alum \( \text{KAl(SO}_4\text{)}_2\cdot\text{12H}_2\text{O} \)

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Crystal Data:  Cubic.  Point Group: \( 2/m \overline{3} \).  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  \( D(\text{meas.}) = 1.757 \)  \( D(\text{calc.}) = 1.754 \)  Soluble in \( \text{H}_2\text{O} \), 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: \( \text{Pa3} \).  \( a = 12.157(3) \)  \( Z = 4 \)

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:

\[
\begin{array}{ccc}
\text{SO}_3 & 34.00 & 33.75 \\
\text{Al}_2\text{O}_3 & 10.40 & 10.75 \\
\text{Fe}_2\text{O}_3 & 0.80 & \\
\text{Na}_2\text{O} & 1.35 & \\
\text{K}_2\text{O} & 5.75 & 9.93 \\
(\text{NH}_4)_2\text{O} & 2.42 & \\
\text{H}_2\text{O} & 45.37 & 45.57 \\
\text{rem.} & 0.77 & \\
\text{Total} & 100.86 & 100.00
\end{array}
\]

(1) Vesuvius, Italy; remnant \( \text{Cr}_2\text{O}_3 \) 0.16%, \( \text{Mn}_2\text{O}_3 \) 0.01%, \( \text{CaO} \) 0.36%, \( \text{Cl} \) 0.24%.

(2) \( \text{KAl(SO}_4\text{)}_2\cdot\text{12H}_2\text{O} \).

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 Mbobo Mkulu 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.


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