Arcanite

\[ \text{K}_2\text{SO}_4 \]

\(\text{Crystal Data:}\) Orthorhombic. \textit{Point Group: } 2/m 2/m 2/m. As thin cyclically twinned pseudohexagonal tablets, to 1 cm; typically in crusts and coatings. \textit{Twinning: } On \{110\}, cyclic.

\(\text{Physical Properties:}\) \textit{Cleavage: } On \{010\} and \{001\}, good. \textit{Hardness: } n.d. \textit{D(meas.)} = 2.66 \textit{D(calc.)} = [2.667] Soluble in \(\text{H}_2\text{O}\).

\(\text{Optical Properties:}\) Transparent to translucent. \textit{Color: } White to colorless, yellow. \textit{Optical Class: } Biaxial (+). \textit{Orientation: } \(X = b; Y = c; Z = a\). \textit{Dispersion: } \(r > v\), moderate. \(\alpha = 1.494\) \(\beta = 1.495\) \(\gamma = 1.497\) \(2V(\text{meas.}) = 67^\circ20'\)

\(\text{Cell Data:}\) \textit{Space Group: } Pnam (synthetic). \(a = 7.746(3)\) \(b = 10.071(4)\) \(c = 5.763(2)\) \(Z = 4\)

\(\text{X-ray Powder Pattern:}\) Synthetic. 2.903 (100), 3.001 (77), 2.886 (53), 4.176 (28), 2.422 (25), 2.089 (25), 2.082 (25)

\(\text{Chemistry:}\)

\[
\begin{array}{ll}
\text{SO}_3 & 45.37 \\
\text{Na}_2\text{O} & < 0.01 \\
\text{K}_2\text{O} & 47.50 \\
(\text{NH}_4)_2\text{O} & 5.14 \\
\hline
\text{Total} & 98.01
\end{array}
\]

\(1\) Chincha Islands, Peru; original total given as 97.87%; corresponds to \( [\text{K}_{1.78}(\text{NH}_4)_{0.35}]_{\Sigma=2.13}\text{SO}_4.00 \). \(2\) \(\text{K}_2\text{SO}_4\).

\(\text{Polymorphism & Series:}\) Forms a series with mascagnite.

\(\text{Occurrence:}\) In a pine railroad tie (Santa Ana mine, California, USA); in hydrothermally altered rock in a geothermal field (Cesano geothermal field, Italy); derived from bird guano on islands and bat guano in caves.

\(\text{Association:}\) Syngenite (Cesano geothermal field, Italy); swaknoite, mundrabillaite, dittmarite (Arnhem Cave, Namibia).

\(\text{Distribution:}\) From the Santa Ana tin mine, Trabuco Canyon, Orange Co., California, USA. On the Chincha Islands, off the coast of Peru. At the Cesano geothermal field, Latium, Italy. From the Arnhem, Arun Aas, Baobab, Gâuan Aas, Né-rab-aas, Temple of Doom, and Uisib Caves, Namibia. In the Lobatse Cave, Botswana. From Timbavati Cave, South Africa. In the Murra-el-elevyn Cave, Cocklebiddy, Western Australia.

\(\text{Name:}\) From the Latin \textit{arcanum duplicitatum}, for double secret, a medieval alchemical name.

\(\text{Type Material:}\) University of California, Berkeley, California; Harvard University, Cambridge, Massachusetts, USA, 100763.


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