Palygorskite \((\text{Mg, Al})_2\text{Si}_4\text{O}_{10}(\text{OH})\cdot 4\text{H}_2\text{O}\)

Crystal Data: Monoclinic. Point Group: \(2/m\). Crystals are tiny laths, flattened on \{100\}, elongated along [001], to 1 cm. Commonly fibrous, forming tangled mats termed “mountain leather,” also compact.

Physical Properties: Cleavage: Good on \{110\}. Tenacity: Tough. Hardness = 2–2.5 D(meas.) = > 1.0–2.6 D(calc.) = 2.35

Optical Properties: Semitransparent. Color: White, grayish, yellowish, gray-green; colorless in thin section. Luster: Earthy to waxy. Optical Class: Biaxial (-). Pleochroism: For colored varieties; \(X = \) pale yellow; \(Y = Z = \) pale yellow-green. Orientation: \(Z \wedge c = \) small. Absorption: \(Z = Y > X\). \(\alpha = 1.522–1.528\) \(\beta = 1.530–1.546\) \(\gamma = 1.533–1.548\) \(2V(\text{meas.}) = 30°–61°\)

Cell Data: Space Group: \(C2/m\). \(a = 12.78\) \(b = 17.86\) \(c = 5.24\) \(\beta = 95.78°\) \(Z = 4\)

X-ray Powder Pattern: Sapillo Creek, New Mexico, USA. 10.44 (100), 4.262 (22), 4.466 (20), 2.539 (20), 3.096 (16), 3.679 (15), 6.36 (13)

Chemistry:

\[
\begin{align*}
\text{SiO}_2 & \quad 55.03 \\
\text{Al}_2\text{O}_3 & \quad 10.24 \\
\text{Fe}_2\text{O}_3 & \quad 3.53 \\
\text{MgO} & \quad 10.49 \\
\text{K}_2\text{O} & \quad 0.47 \\
\text{H}_2\text{O}^+ & \quad 10.13 \\
\text{H}_2\text{O}^- & \quad 9.73 \\
\text{Total} & \quad 99.62
\end{align*}
\]

(1) Attapulgus, Georgia, USA; corresponds to \((\text{Mg}_{0.99}\text{Al}_{0.68}\text{Fe}^{3+}_{0.16}\text{Ca}_{0.16}\text{Ti}_{0.04})\Sigma=2.05\) \((\text{Si}_{3.92}\text{Al}_{0.08})\Sigma=4.00\text{O}_{10}(\text{OH})\cdot 4\text{H}_2\text{O}\).

Occurrence: An alteration product of magnesium silicates in soils and sediments; in lacustrine marls, carbonate rocks, and mafic igneous rocks; in clay gouge associated with fault movement.

Association: Calcite, dolomite, talc, chlorite, quartz, “chalcedony,” “opal,” montmorillonite.

Distribution: Widespread; some localities for studied material include: at Palygorskaya, near the Popovka River, Perm, Russia. In the USA, at Attapulgus, Decatur Co., Georgia; near Sapillo Creek, Grant Co., New Mexico; in the Pend Oreille mine, Metaline Falls, Stevens Co., Washington; at the New Melones Dam, Calaveras Co., California; and at Gustavus, Alexander Archipelago, Alaska. In the Warren quarry, Enderby, Leicestershire, England. At Tafraout, Morocco. In the Hyderabad deposit, Andhra Pradesh, India.

Name: For the type locality, Palygorskaya, Russia.

Type Material: Mining Institute, St. Petersburg, Russia, N824/7; Harvard University, Cambridge, Massachusetts, USA, 105018.


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