

# Palygorskite



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**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:*  $Z \wedge c = \text{small}$ . *Absorption:*  $Z = Y > X$ .  $\alpha = 1.522$ –1.528  
 $\beta = 1.530$ –1.546  $\gamma = 1.533$ –1.548  $2V(\text{meas.}) = 30^\circ$ –61°

**Cell Data:** *Space Group:*  $C2/m$ .  $a = 12.78$   $b = 17.86$   $c = 5.24$   $\beta = 95.78^\circ$   $Z = 4$

**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:

	(1)
SiO <sub>2</sub>	55.03
Al <sub>2</sub> O <sub>3</sub>	10.24
Fe <sub>2</sub> O <sub>3</sub>	3.53
MgO	10.49
K <sub>2</sub> O	0.47
H <sub>2</sub> O <sup>+</sup>	10.13
H <sub>2</sub> O <sup>-</sup>	9.73
Total	99.62

(1) Attapulugus, Georgia, USA; corresponds to  $(\text{Mg}_{0.99}\text{Al}_{0.68}\text{Fe}_{0.18}^{3+}\text{Ca}_{0.16}\text{Ti}_{0.04})_{\Sigma=2.05}$   
 $(\text{Si}_{3.92}\text{Al}_{0.08})_{\Sigma=4.00}\text{O}_{10}(\text{OH}) \cdot 4\text{H}_2\text{O}$ .

**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 Attapulugus, 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.

**References:** (1) Dana, E.S. (1892) Dana’s system of mineralogy, (6th edition), 398 [palygorskite]. (2) Bradley, W.F. (1940) The structural scheme of attapulgitite. *Amer. Mineral.*, 25, 405–410. (3) Christ, C.L., J.C. Hathaway, P.B. Hostetler, and A.O. Shepard (1969) Palygorskite: new X-ray data. *Amer. Mineral.*, 54, 198–205. (4) Serna, C., G.E. VanScoyoc, and J.L. Ahlrichs (1977) Hydroxyl groups and water in palygorskite. *Amer. Mineral.*, 62, 784–792. (5) Chisholm, J.E. (1992) Powder-diffraction patterns and structural models for palygorskite. *Can. Mineral.*, 30, 61–73.

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