Actinolite  \( \text{Ca}_2(\text{Mg, Fe}^{2+})_5\text{Si}_8\text{O}_{22}(\text{OH})_2 \)

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Crystal Data: Monoclinic. Point Group: 2/m. As bladed crystals, to 15 cm; columnar, may be kinked or bent; radiating fibrous to asbestiform; granular to massive. Twinning: Simple or lamellar, common || {100}; lamellar, less common || {001}.

Physical Properties: Cleavage: Good on {110}, with intersections of 56° and 124°; parting on {100}. Tenacity: Brittle, tough in fibrous aggregates ("nephrite jade"). Hardness = 5–6 D(meas.) = 3.03–3.24  D(calc.) = [3.07]

Optical Properties: Transparent to translucent. Color: Bright green to grayish green; in thin section, colorless, pale green to deep green. Streak: White. Luster: Vitreous, silky. Optical Class: Biaxial (-). Pleochroism: Weak; X = pale yellow, yellowish green; Y = pale yellow-green, green; Z = pale green, deep greenish blue. Orientation: Y = b; Z \& c = 14°–18.5°. Dispersion: \( r < v \), weak. \( \alpha = 1.613–1.646 \)  \( \beta = 1.624–1.656 \)  \( \gamma = 1.636–1.666 \)

2V(meas.) = 79°–86°

Cell Data: Space Group: C2/m.  \( a = 9.891(1) \)  \( b = 18.200(1) \)  \( c = 5.305(1) \)

\( \beta = 104.64(1)^\circ \)  \( Z = 2 \)


Chemistry:

\begin{align*}
\text{SiO}_2 & \quad 55.17 & \text{MnO} & \quad 0.18 \\
\text{TiO}_2 & \quad 0.17 & \text{MgO} & \quad 16.21 \\
\text{Al}_2\text{O}_3 & \quad 2.69 & \text{CaO} & \quad 12.08 \\
\text{FeO} & \quad 11.07 & \text{Na}_2\text{O} & \quad 0.82 \\
\hline
\text{Total} & \quad 98.39
\end{align*}

(1) Southeast Anglesey, Wales; by electron microprobe, corresponding to (Ca\(_{1.83}\)Na\(_{0.22}\))\(_\Sigma=2.05\) (Mg\(_{5.41}\)Fe\(_{1.26}\)Al\(_{0.23}\)Fe\(_{3.05}\)Mn\(_{0.05}\)Ti\(_{0.02}\))\(_\Sigma=4.99\) (Si\(_{7.79}\)Al\(_{0.21}\))\(_\Sigma=8.00\)O\(_{22}\)(OH)\(_2\).

Polymorphism & Series: Forms a series with tremolite and ferro-actinolite.

Mineral Group: Amphibole (calcic) group: 0.5 Mg/(Mg + Fe\(^{2+}\)) 0.89; (Na + K)\(_A < 0.5\); Na\(_B < 0.67\); (Ca + Na)\(_B \geq 1.34\); Si \> 7.5.

Occurrence: Produced by low-grade regional or contact metamorphism of magnesium carbonate, mafic, or ultramafic rocks; also in glaucophane-bearing blueschists.

Association: Talc, epidote, chlorite, glaucophane, pumpellyite, lawsonite, albite.

Distribution: Many localities. In Austria, on Mt. Greiner, Zillertal, and at Untersulzbachtal. From Zermatt, Valais, Switzerland. At Snarum and Arendal, Norway. From the Ural Mountains, Russia. In the USA, from Gouverneur, St. Lawrence Co., New York; Franklin and Newton, Sussex Co., New Jersey; Chester, Windsor Co., Vermont; in the Fairfax quarry, Centreville, Fairfax Co., Virginia; Crestmore, Riverside Co., California; at Salida, Chaffee Co., Colorado. "Nephrite jade" occurs, in the USA, south and east of Lander, Fremont Co., Wyoming; north from Cape San Martin, Monterey Co., California; and around Jade Mountain, near the Kobuk River, Alaska. Along the Fraser River, British Columbia, Canada. Around Mt. Cook, South Island, New Zealand. Fine material from the Kunlun Mountains, Sinkiang Uighur Autonomous Region, China.

Name: From the Greek for ray, in allusion to the mineral’s common radiating fibrous habit.


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