

Zoisite**Ca₂Al₃(SiO₄)(Si₂O₇)O(OH)**

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Crystal Data: Orthorhombic. *Point Group:* $2/m\ 2/m\ 2/m$. Crystals prismatic, to 10 cm, typically deeply striated || [010] and poorly terminated; columnar to compact, massive.

Physical Properties: *Cleavage:* {010}, perfect; {100}, imperfect. *Fracture:* Uneven, conchoidal. *Tenacity:* Brittle. *Hardness* = 6–7 $D(\text{meas.}) = 3.15\text{--}3.36$ $D(\text{calc.}) = 3.35$

Optical Properties: Transparent to translucent. *Color:* White, gray, greenish brown, greenish gray, pink, blue, purple; colorless to pink in thin section. *Luster:* Vitreous, pearly on cleavage. *Optical Class:* Biaxial (+). *Pleochroism:* $X =$ pale pink to red-violet; $Y =$ nearly colorless to bright pink or deep blue; $Z =$ pale yellow to yellow-green. *Orientation:* $X = b$; $Y = c$; $Z = a$. *Dispersion:* $r > v$ or $r < v$, strong. $\alpha = 1.685\text{--}1.707$ $\beta = 1.688\text{--}1.711$ $\gamma = 1.697\text{--}1.725$ $2V(\text{meas.}) = 0^\circ\text{--}69^\circ$

Cell Data: *Space Group:* $Pnma$. $a = 16.1909(15)$ $b = 5.5466(5)$ $c = 10.0323(6)$ $Z = 4$

X-ray Powder Pattern: Synthetic. 2.693 (100), 2.874 (65), 4.03 (50), 8.09 (40), 2.019 (35), 1.601 (35), 5.01 (30)

Chemistry:	(1)		(1)	
	SiO ₂	39.55	MgO	0.07
	Al ₂ O ₃	33.39	CaO	[24.44]
	Fe ₂ O ₃	0.04	SrO	0.05
	V ₂ O ₃	0.20	H ₂ O ⁺	2.00
			Total	[99.74]

(1) "Umba Valley," Tanzania; CaO originally given as 22.44%, and total given as 99.69%; corresponds to $(\text{Ca}_{1.99}\text{Mg}_{0.01})_{\Sigma=2.00}(\text{Al}_{2.98}\text{V}_{0.01})_{\Sigma=2.99}\text{Si}_3\text{O}_{12}(\text{OH})_{1.01}$.

Polymorphism & Series: Dimorphous with clinozoisite.

Mineral Group: Epidote group.

Occurrence: Typically in medium-grade regionally metamorphosed crystalline schists formed from igneous, sedimentary, or metamorphic rocks relatively high in calcium; in eclogites and blueschist facies metamorphic rocks.

Association: Garnet, albite, biotite, "hornblende," quartz, calcite.

Distribution: Widespread. Classic localities for fine crystals and decorative rocks follow. On the Saualpe, Carinthia, and in the Zillertal, Tirol, Austria. From near Trondheim, Norway. In the USA, at Goshen and Williamsburg, Hampshire Co., Massachusetts; in the Keystone quarry, near Cornog, Chester Co., Pennsylvania; at Milford Heights, Baltimore Co., Maryland. From around Spruce Pine, Mitchell Co., North Carolina; from Ducktown, Polk Co., Tennessee; in Washington, in the Tunk Creek area, east of Riverside, Okanogan Co. From Asbestos, Quebec, Canada. In the Juarez district, Baja California, Mexico. From Tanzania, exceptional gem material in the Merelani Hills, Lelatema Mountains, 40 km southeast of Arusha. Well crystallized from Alchuri village, Shigar Valley, Baltistan, Pakistan.

Name: For Siegmund Zois, Baron von Edelstein (1747–1819), Austrian supporter of mineralogy who supplied the first specimens.

References: (1) Dana, E.S. (1892) Dana's system of mineralogy, (6th edition), 513–515. (2) Deer, W.A., R.A. Howie, and J. Zussman (1986) Rock-forming minerals, (2nd edition), v. 1B, disilicates and ring silicates, 4–43. (3) Pistorius, C.W.F.T. (1961) Synthesis and lattice constants of pure zoisite and clinozoisite. *J. Geol.*, 69, 604–609. (4) Hurlbut, C.S., Jr. (1969) Gem zoisite from Tanzania. *Amer. Mineral.*, 54, 702–709. (5) Smith, J.V., J.J. Pluth, J.W. Richardson, Jr., and Å. Kvikvick (1987) Neutron diffraction study of zoisite at 15 K and X-ray study at room temperature. *Zeits. Krist.*, 179, 305–321.

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