

Clintonite

Ca(Mg, Al)₃(Al₃Si)O₁₀(OH)₂

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Crystal Data: Monoclinic. *Point Group:* 2/*m*. In tabular pseudo-hexagonal crystals, complexly twinned, to 2.5 cm; foliated or lamellar radiated; massive. *Twinning:* On {001}, twin axis [310] or [3 $\bar{1}$ 0]; spiral polysynthetic twinning.

Physical Properties: *Cleavage:* {001}, perfect. *Tenacity:* Brittle. Hardness = 3.5 on {001}; 6 $\perp$ {001}. D(meas.) = 3.0–3.1 D(calc.) = 3.096

Optical Properties: Transparent to translucent. *Color:* Colorless, yellow, orange, red-brown, brown, green. *Streak:* White, slightly yellow-gray. *Luster:* Vitreous, pearly, submetallic. *Optical Class:* Biaxial (–). *Pleochroism:* *X* = colorless, pale orange, red-brown; *Y* = *Z* = pale brownish yellow, pale green. *Orientation:* *Y* $\simeq$ *a* or *Y* = *b*; *Z* = *b* or $\simeq$ *a*; *X* $\wedge$ *c* = 5°–10°. *Dispersion:* *r* < *v*, weak. *Absorption:* *Y* $\simeq$ *Z* > *X*. α = 1.643–1.648 β = 1.655–1.662 γ = 1.655–1.663 2*V*(meas.) = 2°–40°

Cell Data: *Space Group:* C2/*m*. *a* = 5.204 *b* = 9.026 *c* = 9.812 β = 100°20' *Z* = 2

X-ray Powder Pattern: Zlatoust, Russia.

2.56 (100), 3.21 (70), 2.11 (70), 1.505 (60), 9.68 (50), 2.45 (50), 1.485 (50)

Chemistry:	(1)	(2)		(1)	(2)
SiO ₂	18.78	16.74	MgO	20.56	20.03
TiO ₂	0.54		CaO	12.90	13.09
Al ₂ O ₃	40.00	42.70	F	2.01	
Fe ₂ O ₃		2.85	H ₂ O ⁺	[4.20]	4.49
FeO	1.86	0.41	–O = F ₂	[0.85]	
MnO	0.00		Total	[100.00]	100.31

(1) Amity, New York, USA; by electron microprobe, H₂O by difference; corresponds to Ca_{0.97}(Mg_{2.15}Al_{0.70}Fe_{0.11}²⁺Ti_{0.03}) Σ =2.99(Al_{2.68}Si_{1.32}) Σ =4.00O_{9.45}[(OH)_{1.55}F_{0.45}] Σ =2.00.

(2) Crestmore, California, USA; corresponds to Ca_{0.98}(Mg_{2.09}Al_{0.70}Fe_{0.15}³⁺Fe_{0.02}²⁺) Σ =2.96(Al_{2.83}Si_{1.17}) Σ =4.00O_{9.92}(OH)_{2.10}.

Polymorphism & Series: 1M polytype; 2M₁ and 3A polytypes rare.

Mineral Group: Mica group.

Occurrence: In chlorite schists; in metasomatically altered limestones; in siliceous skarns near contact metamorphic zones.

Association: Talc, spinel, grossular, vesuvianite, clinopyroxene, monticellite, chondrodite, phlogopite, chlorite, quartz, calcite, dolomite.

Distribution: In the USA, around Amity, Edenville, and Warwick, Orange Co., New York; from Crestmore, Riverside Co., California; near Ludwig, Lyon Co., Nevada; at Sulzer, Prince of Wales Island, Alaska. On Mt. Monzoni and at Mts. Castone and Adamello, Trentino-Alto Adige, Italy. In the Pargas district, Finland. From the Akhmatovsk mine, near Zlatoust, Ural Mountains, Russia. In the Chichibu mine, Saitama Prefecture, Japan. On the Ertzberg, Irian Jaya.

Name: For De Witt Clinton (1769–1828), American statesman.

References: (1) Dana, E.S. (1892) Dana's system of mineralogy, (6th edition), 638–640 [seybertite, xanthophyllite]. (2) Deer, W.A., R.A. Howie, and J. Zussman (1963) Rock-forming minerals, v. 3, sheet silicates, 99–102. (3) Forman, S.A., H. Kodama, and S. Abbey (1967) A re-examination of xanthophyllite [clintonite] from the type locality. Can. Mineral., 9, 25–30. (4) MacKinney, J.A., C.I. Mora, and S.W. Bailey (1988) Structure and crystal chemistry of clintonite. Amer. Mineral., 73, 365–375.

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