

## Chrysoberyl Classification and Properties

*"Crude classifications and false generalizations are the curse of organized life."*

*George Bernard Shaw*



**Chrysoberyl** is the third hardest naturally occurring **gemstone** and lies between **corundum** and topaz on the **hardness** scale. Only corundum and **diamond** are harder and chrysoberyl is well known for its toughness and **durability**. Rubbing chrysoberyl will produce a static charge that is retained for several hours. Chrysoberyl is a **mineral** consisting of ordinary colorless or yellow **transparent** chrysoberyl, **cymophane** (chrysoberyl cat's eye), and **alexandrite**.

Ordinary **chrysoberyl** is a yellowish-green, **transparent** to **translucent** and often has been referred to in the literature as chrysolite due to the common olive color of many of its gems, but that name is no longer used in the gemological nomenclature. When the **mineral** exhibits good pale green to yellow color and is transparent, then it is used as a **gemstone**. Chrysoberyl is often found as twins that produce wedge-shaped or heart-shaped crystals with v-striations. It is also found in pseudo-hexagonal crystals with repeated twinning resulting in sixlings and less commonly as contact twins that are extended along the c-axis (c[001]). Also found as granular to massive material.

See Alexandrite Tsarstone collectors guide, Chrysoberyl Classification and Properties, <http://www.alexandrite.net/viewpage.html?id=ALXS-002-00007> (A comprehensive guide to the chrysoberyl family and its varieties, including alexandrite and cymophane gemstones) (as of ).

## Chrysolite



Fig. 12.: Ordinary chrysoberyl is yellowish-green, transparent to translucent and often has been referred to in literature as chrysolite, but that name is no longer used in the gemological nomenclature.

[Alexandrite](#), a strongly pleochroic (dichroic) gem, will exhibit emerald green, red and orange-yellow colors and tend to change color in artificial light compared to daylight. The [color change](#) from red to green is due to strong absorption of light in the yellow and blue portions of the [spectrum](#). Typically, alexandrite has an emerald green color in daylight but exhibit a raspberry red color in incandescent light. Only [chrysoberyl](#) displaying a distinct change of color should be designated as alexandrite. This means that chrysoberyl and alexandrite can be difficult to differentiate. Since stones with a weak change may be called alexandrite or chrysoberyl, the determination can be subjective. As the color change in alexandrite is due to the presence of [chromium](#) and the color of yellow or brown in ordinary chrysoberyl is due to the presence of iron, spectroscopic examination will reveal these differences and help with identification. Chrysoberyl usually shows no [fluorescence](#).

[Cymophane](#) is popularly known as cat's eye. This variety exhibits pleasing [chatoyancy](#) or opalescence that reminds one of an eye of a cat. When cut to produce a [cabochon](#), the [mineral](#) forms a light-green specimen with a silky band of light extending across the surface of the stone. The finest quality cat's-eye has a sharp silvery white line across the stone that appears to open and close as the stone is rotated and exhibits a strong "milk and honey" effect (the stone on one side of the eye appears lighter than the other).

### Chrysoberyl properties datasheet

Synonyms	Alumoberyl, Chrysberil, Chrysoberil, Chrysopal, Delam��therie, Crisoberilo,
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	Krysoberil, Oriental Chrysolite Pacific Cat's Eye, Cat's eye, cat eye.
Varieties	Alexandrite, Cymophane
IMA status	Valid Species (Pre-IMA)
Identifying characteristics	Fingerprint inclusions, silk, color change
Absorption spectra	Two strong lines at 680.5 and 678.5 nm and weak lines at 665, 655, and 645 nm, partial absorption between 580 and 630, three weak lines at 476.5, 473, and 468 nm, and general absorption in the violet.
Birefringence	Weak (0.008-0.011)
Chemical composition	Cr <sup>3+</sup> : BeAl <sub>2</sub> O <sub>4</sub>
Class	Oxides
Cleavage	Distinct on {011} perfect, indistinct on {010}, and poor on {100}
Color	Green in daylight and red-violet in incandescent light.
Crystal habit	Prismatic crystals are elongated on c, and often tabular on {001}, with striations parallel to [100]
Crystal system	Orthorhombic. 2/m2/m2/m
Density	G/cm <sup>3</sup> 3,79
Dispersion	.015
Hardness	8.5
Heat sensitive	No
Lattice constants	A a=5.47, b=9.39, c=4.42
Lustre	Vitreous to greasy
Melting point	1870 C
Molecular weight	126.97 gm Beryllium 7.10 % Be 19.70 % BeO Aluminum 42.50 % Al

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	80.30 % Al <sub>2</sub> O <sub>3</sub> Oxygen 50.40 % O
Optic character	DR, biaxial positive
Optical effects	Metamerism, pleochroism
Pleochroism	Strong, X= red-purple, Y= orange, Z= green
Refractive index	1.745 - 1.759 (+ .004, - .006)
Specific gravity	3.70 to 3.78
Stability	Heat tolerance: Stable Light tolerance: Stable Chemical tolerance: None
Streak	White
Toughness	Excellent
Transparency	Transparent to translucent
Twinning	Commonly twinned on {130} resulting in a triangular or kite shaped form, repeated cyclic twinning produces pseudo hexagonal trillings.
Ultraviolet fluorescence	Inert to moderate red (LW and SW)

The [mineral chrysoberyl](#) is very rare but periodically found as an accessory mineral in granite pegmatites, aplites and mica schists. It is also described in altered zones around the margins of [ultramafic](#) rocks where they have been intruded by Be-rich granite pegmatites. Because of its favorable [hardness](#) and relatively high [specific gravity](#) it may also be found as a placer mineral downstream from these hosts. Chrysoberyl has high enough specific gravity that it will concentrate with black sands in active or paleoplacer stream deposits and concentrate with other relatively [heavy minerals](#) such as cassiterite, [diamond](#), [corundum](#), topaz and garnet. When found in placers, it will have rounded edges instead of sharp, wedge-shape forms. Much of the chrysoberyl mined in Brazil and Sri Lanka is recovered from placers as the host rocks have been intensely weathered and eroded.

[Chrysoberyl](#) deposits can be divided into three types, excluding rare dolomitic hosts. These include chrysoberyl in pegmatites intruded into [ultramafic](#) rocks, chrysoberyl hosted by pegmatites intruded into aluminous rocks, and chrysoberyl found as a primary [mineral](#) in REE-pegmatites.

There have been very few research projects on the genesis of [chrysoberyl](#) due to its rarity in primary host rocks since most chrysoberyl is recovered from placers. However, it may be

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hypothesized that in order to produce chrysoberyl, [metamorphic](#) overprint of some [beryllium-](#) and [aluminum](#)-rich pegmatites may be necessary.

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