

Gems classification by types

Mineral (most gems) : Quartz, Diamond, corundum, beryl, ...

Synthetic : Synthetic corundum, synthetic diamond, synthetic quartz, ...

Artificial : GGG, YAG

Rock : Lapis Lazuli, ...

Organic : amber, pearl, shell, coral, ...

Man-made mineraloid : Man-made glass, plastic, ...

Gems classification by origin

Natural : Quartz, Diamond, corundum, beryl, ...

Treated gem : corundum, diamond, emerald, ...

Synthetic : Synthetic corundum, synthetic diamond, synthetic quartz, ...

Artificial : GGG, YAG

Rock : Lapis Lazuli, ...

Assembled : opal, garnet, glass...

Imitation : CZ for Diamond, Red Spinel for Ruby, ...

Gemstone Families

Many gemstones belong to groups or families which share a common crystal structure, if not a common chemical composition. It is due to small amounts of impurities that we have such a kaleidoscopic range of fine gemstones. Corundum with no impurities is just that; add a tiny amount of iron and chromium and it becomes a ruby, add a tiny amount of iron and titanium and it becomes a sapphire.

Corundum group	Tourmaline group	Opal group
Ruby	Indicolite	White
Sapphire	Rubellite	Black
	...	Boulder
		Fire opal or Mexican opal
Beryl group	Quartz group	Jade group
Emerald	Agate	Jadeite
Aquamarine	Fossilized wood	Nephrite
Morganite	Chalcedony	
Heliodor	Chrysoprase	
Goshenite	Heliotrope or Bloodstone	
	Jasper (many varieties)	
	Carnelian	
	Onyx	
	Sard	
	Sardonyx	
	Amethyst	
	Aventurine	
	Rock crystal	
	Rutilated quartz	
	Citrine	
	Cat's Eye quartz	
	Smoky quartz	
	Rose quartz	
	Milky quartz	
	Tiger's Eye	
Garnet group		Zoisite group
Pyrope		Tanzanite
Rhodolite		Analyte
Almandine		
Spessartine		
Grossular		
Hessonite		
Tsavorite or Tsavorite		
Andradite		
Demantoid		
Uvarovite		
		Feldspar group
		Moonstone
		Orthoclase
		Amazonite
		Labradorite
		Aventurine
		Organic Gemstones
		Coral
		Jet
		Ivory
		Amber
		Pearl
		Mother of pearl

Gemstones Optical Phenomena

Adularescence

Adularescence is the phenomenon of blue sheen reflecting on the domed cabochon surface of Moonstone. The phenomenon of shimmer is created by the interaction of light with layer of little “albite” crystals in the moonstones. The quality of blue shimmer is determined by the thickness of layer of these tiny crystals, thinner the layer, better the blue flash. This usually appears as a billowy light effect. Moonstone is orthoclase feldspars and are also known as Selenite. The Romans called them Astrion.

Asterism

The gem material that is low on clarity is often cut as cabochon. In such gems and stones when the light falls on the domed surface and makes star-like rays, the phenomenon is called asterism. There are 4 ray and 6 ray stars observed normally. This happens when the orientation of the needle like inclusions or silk within the crystal is on more than one axis.

Chatoyancy

Chat in French means Cat and chatoyancy refers to a phenomenon akin to opening and shutting of cat's eye. This phenomenon can be seen in Chrysoberyl cat's eye gem with great clarity. Cat eye gems have a single sharp band (sometimes two or three bands) running across the domed cabochon surface. The Chrysoberyl Cat's eye gem is very specifically cut en cabochon to highlight chatoyancy. The rutile silk in this case is aligned perpendicular to the crystal. So when light falls on it, the sharp band can be seen. In the best cases, the chatoyant Chrysoberyl cat's eye visually separates the surface into two halves creating the milk and honey effect as the stone is moved under light.

Iridescence

Iridescence is also known as goniochromism, a phenomenon where the surface of a material displays several colors as the angle of viewing changes. It can be easily seen in neck of a pigeon, soap bubbles, wings of a butterfly, mother of pearl etc.

The irregularity of surface and large interstitial spaces allow light to pass and reflect back from multiple surfaces (diffraction) causing the multi color visual effect. Combined with interference, the result is dramatic. Natural pearls display iridescence that is very different from its body colour. Tahitian pearls display great iridescence.

Play of colour

The wonderful gem called opal displays a beautiful color. The fire opals from Lightning Ridge, Australia (showing shifting patches of luminous spectral colors against black) are famous for this phenomenon. While this phenomenon- play of color is a type of iridescence, it is wrongly called fire. Fire is actually a term used for the brilliant flashes of color in a diamond which is caused by dispersion of light. In case of opals it isn't dispersion and hence cannot be called fire.

Color change

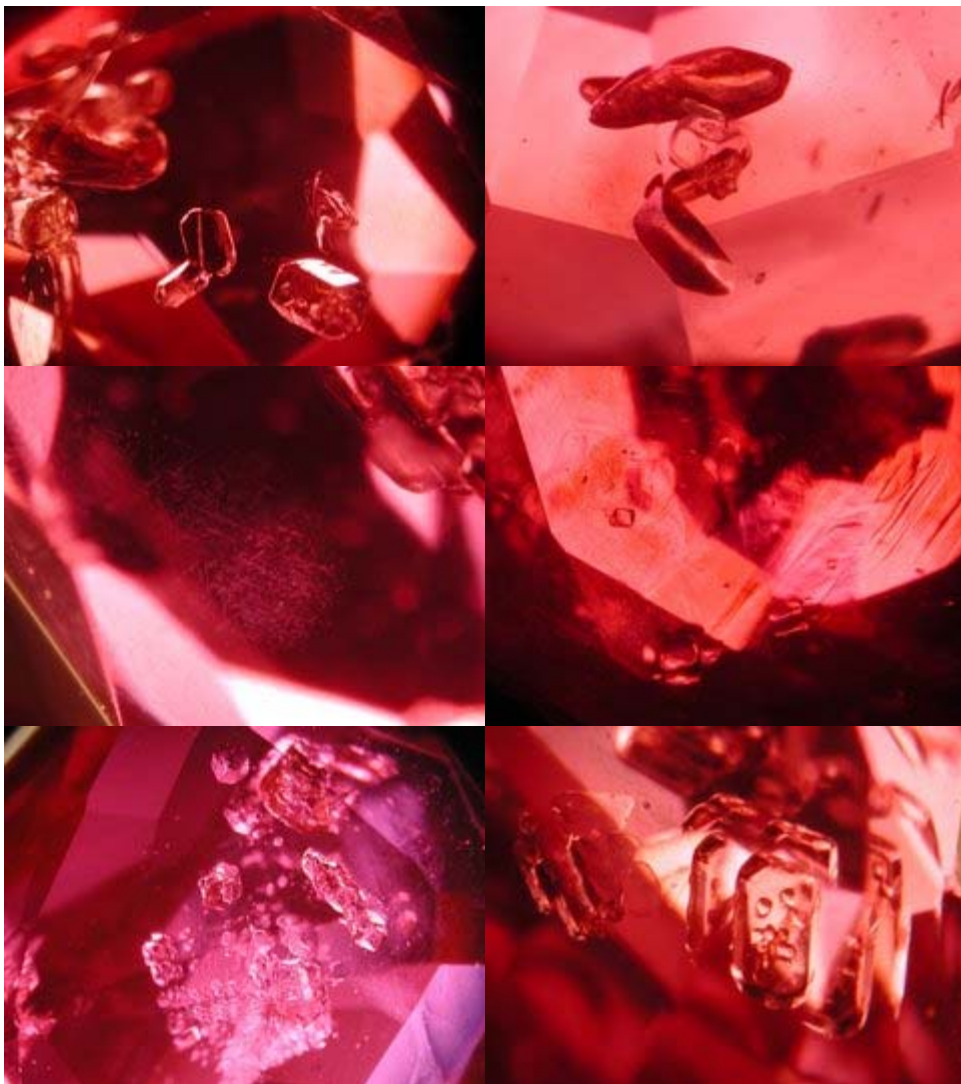
The most famous example that can be taken in reference to colour change is the alexandrite. These gems and stones appear very different in incandescent light compared to natural day light. This is largely due to the gems chemical composition as well as strong selective absorption. The alexandrite appears green in daylight and appears red in incandescent light. The phenomenon of color change can be found in some sapphires and tourmaline also.

Labradorescence

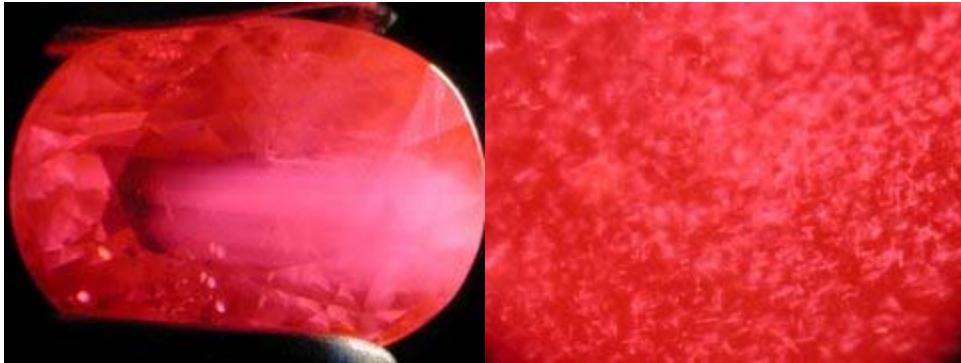
Labradorescence is iridescence but is highly directional because of twinning of crystals. It is found in the gemstone called labradorite.

Ruby

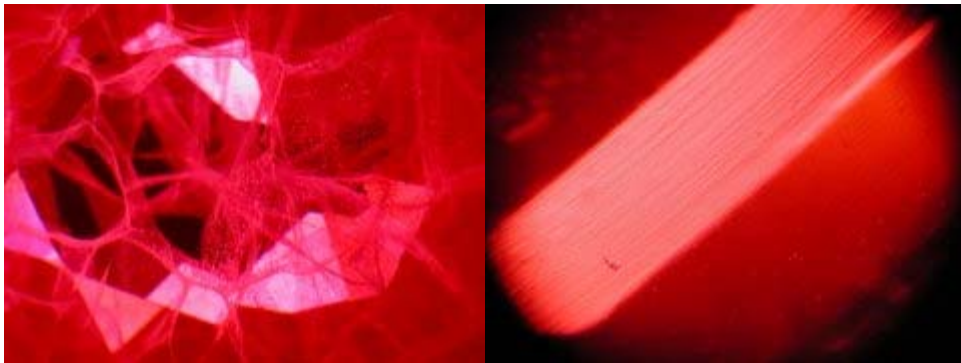
Untreated



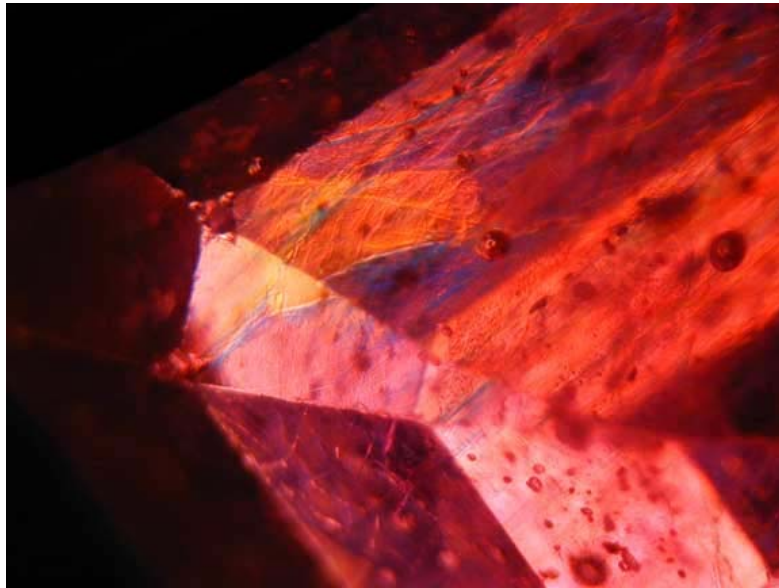
Heat treated



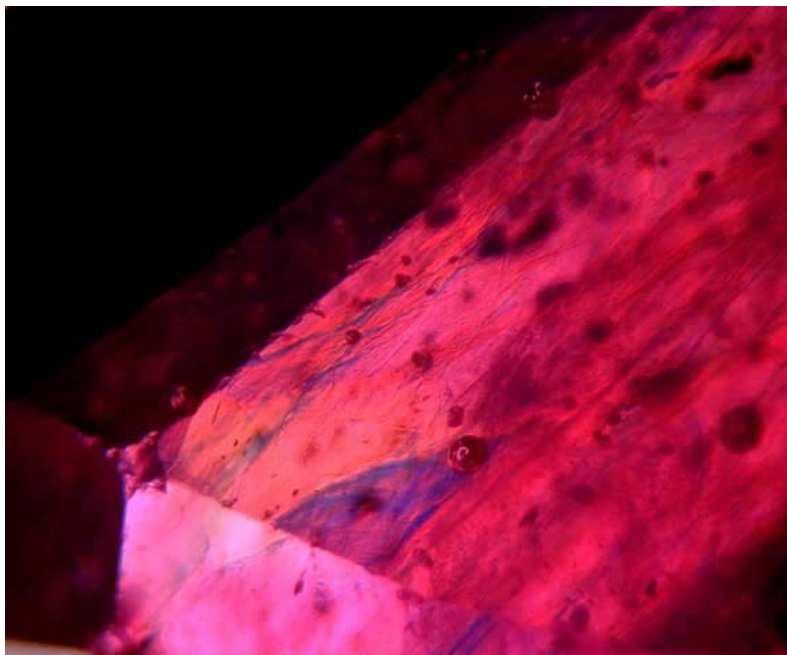
Synthetic

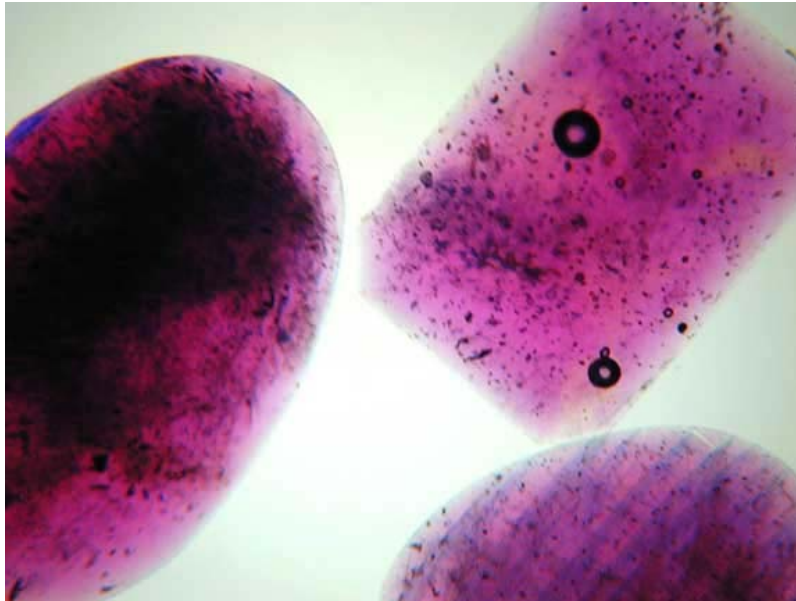


Glass-filled rubies

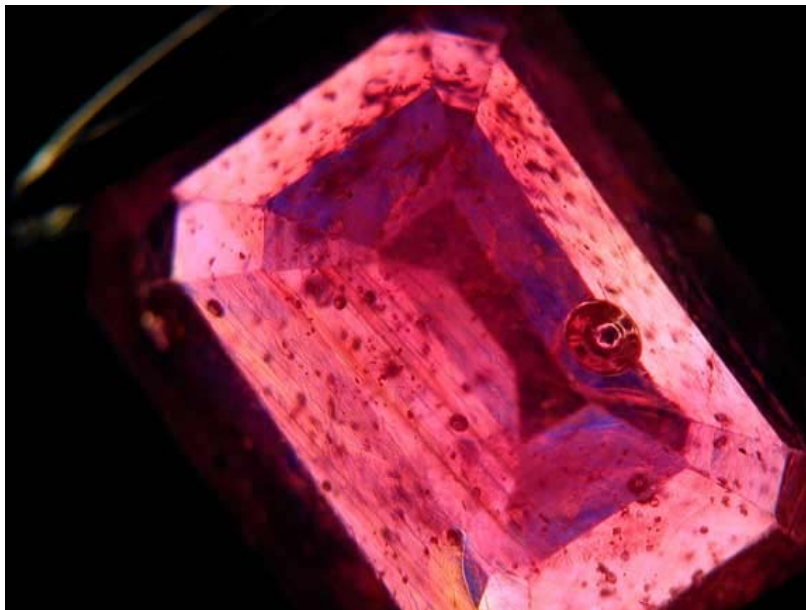


Flashy: Blue and orange flash effect seen along structural fractures, a key identifying feature of glass-filled rubies



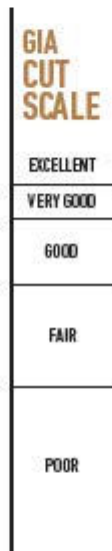
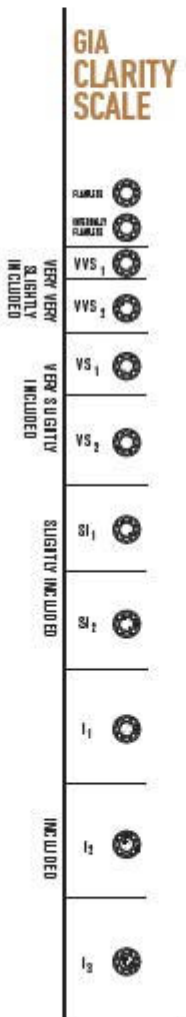
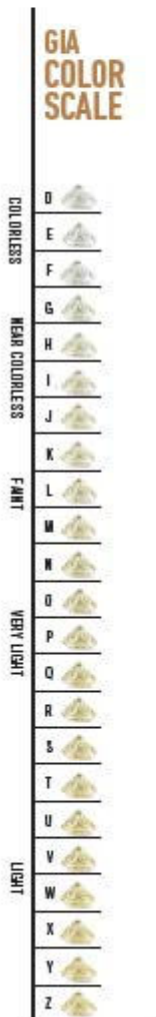


All wet: Lead glass filled rubies immersed, showing bubbles and color concentrations along fractures



Bubble trouble: Gas bubbles like that shown above, are indicative of lead-glass filling, and are easily seen with a microscope

UNDERSTANDING THE 4Cs



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