

Birefringence Table			
Zircon (L) 0.000 - 0.008 Emerald (flux) 0.003 - 0.005 Idocrase 0.003 - 0.018 Chalcedony 0.004 Beryl 0.004 - 0.009 Zoisite 0.004 - 0.009 Orthoclase (Feldspar) 0.005 - 0.008 Iolite 0.005 - 0.018 Oligoclase (Feldspar) 0.007 Andalusite 0.007 - 0.013 Corundum 0.008 - 0.009 Microcline (Feldspar) 0.008 - 0.010 Topaz 0.008 - 0.011 Chrysoberyl 0.008 - 0.012 Zircon (M) 0.008 - 0.043 Quartz (all colors) 0.009 Rhodonite 0.010 - 0.014 Albite (Feldspar) 0.011 Labradorite (Feldspar) 0.012	Jadeite 0.012 - 0.020 Serpentine 0.014 Spodumene 0.014 - 0.027 Diopside 0.024 - 0.031 Nephrite (Jade) 0.027 Peridot (Olivine) 0.033 - 0.038 Zircon (H) 0.036 - 0.059 Turquoise 0.04 Turquoise 0.04 Benitoite 0.047 Diopside 0.053 Pearl 0.155 Coral 0.16 Calcite 0.172 - 0.190 Tourmaline 0.180 - 0.020 Rhodochrosite 0.201 - 0.220 Smithsonite 0.227 Malachite 0.25 Hematite 0.28		



DISPERSION TABLE

Orthoclase Feldspar	0.012	Spinel	0.02
Quartz	0.013	Almandite Garnet	0.024
Beryl	0.014	Rhodolite Garnet	0.026
Topaz	0.014	Pyrope Garnet	0.027
Chrysoberyl	0.015	Spessartite Garnet	0.027
Tourmaline	0.017	Grossularite Garnet	0.028
Spodumene	0.017	Zircon	0.038
Corundum	0.018	Diamond	0.044
Kornerupine	0.019	Andradite Garnet	0.057
Idocrase	0.019	Strontium Titanate	0.109
Peridot	0.02	Synthetic Rutile	0.33

DESCRIPTION OF FRACTURE TYPES

Conchoidal - Fracture resembling a semicircular shell, with a smooth, curved surface. An example of conchoidal fracture can be seen in broken glass.

Subconchoidal - Fracture that falls somewhere between *conchoidal* and *even*; smooth with irregular rounded corners.

Even or smooth - Fracture that forms a smooth surface.

Uneven - Fracture that leaves a rough or irregular surface.

Hackly - Fracture that resembles broken metal, with rough, jagged, points. True metals exhibit this fracture. (This fracture is also known as "jagged")

Splintery - Fracture that forms elongated splinters. All fibrous minerals fall into this category.

Earthy or crumbly - Fracture of minerals that crumble when broken.



Gem Material Hardness (Ref. Moh's Scale)

Hardness\Range		Gemstone Material
1		Talc
	1 - 1.5	Soapstone
2		Gypsum
	2 - 2.5	Amber
2.5		Turtle Shell, Ivory
	2.5 - 4	Jet
	2.5 - 4.5	Pearl
3		Calcite
	3 - 3.5	Amber
3.5		Coral, Shell
	3.5 - 4	Coral, Malachite, Rhodochrosite
4		Fluorite
5		Apatite
	5 - 6.0	Lapis Lazuli, Turquoise, Sodalite, Strontium Titanate, Diopside
	5 - 6.5	Opal
5.5		Enstatite
	5.5 - 6.5	Hematite, Rhodonite
6		Labradorite (Feldspar)
	6 - 6.5	Nephrite (Jade), Microcline - Orthoclase - Oligoclase (Feldspars), Pyrite, Benitoite, Rutile, Marcasite
6.5		Scapolite
	6 - 7.0	Spodumene
	6.5 - 7	Peridot, Chalcedony (Quartz), Jadeite (Jade), Andradite(Garnet), Synthetic Rutile
7		Quartz, Danburite, Grossularite - Spessartine - Uvavorite (Garnet), Dumortierite
	7 - 7.5	Tourmaline, Zircon, Rhodolite - Pyrope (Garnet), Iolite, Staurolite, Andalusite
7.5		Almandine (Garnet)
	7.5 - 8	Aquamarine - Emerald (Beryl), Synthetic Emerald
8		Topaz, Spinel, Synthetic Spinel
8.5		Cat's Eye - Alexandrite (Chrysoberyl)
9		Ruby - Sapphire (Corundum), Synthetic Corundum
10		Diamond



Refractive Index of Common Gemstones

Stone	R.I.	Stone	R.I.
Hematite	2.940 - 3.220	Andalusite	1.627 - 1.650
Diamond	2.417	Turquoise	1.610 - 1.650
Zircon (High)	1.925 - 2.025	Topaz	1.607 - 1.643
Andradite (Garnet)	1.875 - 1.940	Nephrite	1.600 - 1.638
Zircon (Medium)	1.875 - 1.905	Tourmaline	1.603 - 1.655
Spessartite (Garnet)	1.790 - 1.810	Rhodochrosite	1.578 - 1.840
Zircon (Low)	1.777 - 1.850	Beryl	1.560 - 1.620
Corundum	1.762 - 1.779	Labradorite (Feldspar)	1.559 - 1.572
Almandine (Garnet)	1.750 - 1.830	Quartz	1.532 - 1.553
Hessonite (Garnet)	1.742 - 1.748	Oligoclase (Feldspar)	1.539 - 1.547
Chrysobery	1.740 - 1.777	Chalcedony	1.535 - 1.553
Rhodolite (Garnet)	1.740 - 1.770	Ivory	1.535 - 1.555
Uvarovite (Garnet)	1.740 - 1.870	Iolite	1.533 - 1.596
Pyrope (Garnet)	1.730 - 1.766	Pearl	1.520 - 1.685
Grossular (Garnet)	1.720 - 1.940	Shell	1.530 - 1.686
Spinel	1.712 - 1.735	Albite (Feldspar)	1.525 - 1.538
Rhodonite	1.711 - 1.752	Orthoclase (Feldspar)	1.518 - 1.526
Zoisite (Tanzanite)	1.685 - 1.725	Microcline (Feldspar)	1.514 - 1.539
Diopside	1.664 - 1.730	Lapis-Lazuli	1.500
Idocrase	1.655 - 1.761	Serpentine	1.490 - 1.575
Malachite	1.655 - 1.910	Coral	1.486 - 1.658
Spodumene	1.653 - 1.682	Opal	1.450 - 1.450
Jadeite	1.640 - 1.680	Amber	1.390 - 1.545
Peridot	1.635 - 1.700		

These values are the extremes at which one can find readings. There may be a range given even for singularly refractive stones.

The low and the high values are not indicative of the birefringence value.



SPECIFIC GRAVITY OF GEMSTONE SPECIES

Stone	S.G.		Stone	S.G.
Amber	1.04 - 1.10	:	Zoisite	3.20 - 3.40
Opal	1.98 - 2.25	:	Peridot	3.22 - 3.48
Turquoise	2.30 - 2.90	:	Malachite	3.25 - 4.10
Lapis Lazuli	2.45 - 3.00	:	Diopside	3.26 - 3.02
Chalcedony	2.55 - 2.70	:	Idocrase	3.30 - 3.50
Feldspar	2.55 - 2.76	:	Garnet	3.30 - 4.30
Iolite	2.56 - 2.66	:	Topaz	3.50 - 3.60
Beryl	2.63 - 2.91	:	Diamond	3.51 - 3.52
Quartz	2.65 - 2.66	:	Spinel	3.58 - 4.06
Coral	2.65 - 2.70	:	Chrysoberyl	3.68 - 3.78
Pearl	2.68 - 2.85	:	Rhodochrosite	3.70
Nephrite	2.90 - 3.10	:	Corundum	3.94 - 4.05
Jadeite	2.90 - 3.50	:	Zircon - (L)	3.95 - 4.07
Tourmaline	3.01 - 3.25	:	Zircon - (M)	4.08 - 4.55
Andalusite	3.10 - 3.21	:	Zircon - (H)	4.65 - 4.73
Spodumene	3.15 - 3.21	:	Hematite	5.12 - 5.28

These values describe the lower and upper limits. For **varieties** within the **species** please refer to a more comprehensive list.



Transparent Violet Gemstones

<i>Species</i>	<i>Variety</i>	<i>Species</i>	<i>Variety</i>
Almandite (Gar)		Quartz	Amethyst
Andalusite		Rhodolite (Gar)	
Apatite		Spinel	
Beryl	Morganite	Spodumene	Kunzite
Corundum	Sapphire	Topaz	
Diamond		Tourmaline	
Iolite		Zircon	
Pyrope (Gar)		Zoisite	

Transparent Blue Gemstones

<i>Species</i>	<i>Variety</i>	<i>Species</i>	<i>Variety</i>
Apatite		Opal	
Beryl	Aquamarine	Sodalite	
Chalcedony		Spinel	
Corundum	Sapphire	Topaz	
Diamond		Tourmaline	
Iolite		Zircon	
Kyanite		Zoisite	

Transparent Green Gemstones

<i>Species</i>	<i>Variety</i>	<i>Species</i>	<i>Variety</i>
Andalusite		Grossularite (Gar)	
Andradite (Gar)	Demantoid	Peridot	
Apatite		Quartz	
Beryl	Emerald	Spinel	
Chalcedony	Chrysoprase	Spodumene	
Chrysoberyl		Topaz	
Corundum	Sapphire	Tourmaline	
Diamond		Zircon	

Transparent Yellow Gemstones

<i>Species</i>	<i>Variety</i>	<i>Species</i>	<i>Variety</i>
Amber		Peridot	
Apatite		Quartz	Citrine
Beryl		Spessartite (Gar)	
Chrysoberyl		Spinel	
Corundum	Sapphire	Spodumene	
Diamond		Topaz	
Grossularite (Gar)	Hessonite	Tourmaline	
Opal		Zircon	



Transparent Orange to Brown Gemstones

<i>Species</i>	<i>Variety</i>	<i>Species</i>	<i>Variety</i>
Amber		Opal	
Andalusite		Peridot	
Beryl		Quartz	Smoky
Chalcedony		Spessartite (Gar)	
Chrysoberyl		Spinel	
Corundum	Sapphire	Topaz	Smoky
Diamond		Tourmaline	
Grossularite (Gar)	Hessonite	Zircon	
Obsidian			

Transparent Pink to Red Gemstones

<i>Species</i>	<i>Variety</i>	<i>Species</i>	<i>Variety</i>
Almandite (Gar)		Opal	
Amber		Pyrope (Gar)	
Andalusite		Quartz	Rose
Apatite		Rhodolite (Gar)	
Beryl	Morganite	Spessartite (Gar)	
Chalcedony	Carnelian	Spinel	
Chalcedony	Sard	Spodumene	Kunzite
Chrysoberyl	Alexandrite	Topaz	
Corundum	Sapphire	Tourmaline	
Corundum	Ruby (Red)	Zircon	
Diamond			

Transparent Colorless Gemstones

<i>Species</i>	<i>Variety</i>	<i>Species</i>	<i>Variety</i>
Albite (Feld)	Moonstone	Spodumene	
Apatite		Strontium Titanate	
Beryl		Synthetic Corundum	
Corundum	Sapphire	Synthetic Rutile	
Diamond		Synthetic Spinel	
Grossularite (Gar)		Topaz	
Opal		Tourmaline	
Quartz		Y.A.G.	
Spinel		Zircon	



Non- Transparent Violet Gemstones

<i>Species</i>	<i>Variety</i>	<i>Species</i>	<i>Variety</i>
Almandite (Gar)		Chalcedony	
Corundum	Sapphire	Jadeite	

Non- Transparent Blue Gemstones

<i>Species</i>	<i>Variety</i>	<i>Species</i>	<i>Variety</i>
Azurite		Lazurite	Lapis Lazuli
Chalcedony	Chrysocolla	Opal	
Corundum	Sapphire	Sodalite	
Jadeite		Turquoise	
Labradorite (Feld)			

Non - Transparent Green Gemstones

<i>Species</i>	<i>Variety</i>	<i>Species</i>	<i>Variety</i>
Beryl		Labradorite (Feld)	
Chalcedony	Chrysoprase	Malachite	
Chalcedony	Bloodstone	Microline (Feld)	Amazonite
Chrysoberyl	Cat's Eye	Nephrite	
Corundum		Opal	
Grossularite (Gar)		Quartz	Aventurine
Idocrase		Tourmaline	
Jadeite		Turquoise	

Non - Transparent Yellow Gemstones

<i>Species</i>	<i>Variety</i>	<i>Species</i>	<i>Variety</i>
Amber		Coral	
Chalcedony		Jadeite	
Chrysoberyl		Smithsonite	

Non - Transparent Orange to Brown Gemstones

<i>Species</i>	<i>Variety</i>	<i>Species</i>	<i>Variety</i>
Albite (Feld)	Sunstone	Jadeite	
Amber		Opal	
Chalcedony		Quartz	Tiger's Eye
Chrysoberyl	Cat's Eye	Smithsonite	
Coral			



Non - Transparent Brown to Orange Gemstones

<i>Species</i>	<i>Variety</i>	<i>Species</i>	<i>Variety</i>
Almandite (Gar)		Jadeite	
Chalcedony	Sard	Quartz	
Chalcedony	Sardonyx	Rhodochrosite	
Chalcedony	Carnelian	Rhodonite	
Coral		Scapolite	
Corundum		Thomsonite	
Grossularite (Gar)		Zoisite	Thulite

Non - Transparent White Gemstones

<i>Species</i>	<i>Variety</i>	<i>Species</i>	<i>Variety</i>
Alabaster		Grossularite (Gar)	
Albite (Feld)	Moonstone	Jadeite	
Chalcedony		Nephrite	
Coral		Onyx	
Corundum	Sapphire	Opal	

Non - Transparent Black Gemstones

<i>Species</i>	<i>Variety</i>	<i>Species</i>	<i>Variety</i>
Andradite (Gar)	Melanite	Hemetine	
Chalcedony	Onyx	Jadeite	
Coral		Jet	
Corundum	Sapphire	Nephrite	
Diamond		Obsidian	
Diopside		Opal	
Hematite		Tourmaline	

Non - Transparent Grey Gemstones

<i>Species</i>	<i>Variety</i>	<i>Species</i>	<i>Variety</i>
Chalcedony	Agate	Jadeite	
Corundum	Sapphire	Labradorite (Feld)	
Hematite		Nephrite	
Hemetine			



Transparency \ Diaphaneity :

Refers to the ability of a gemstone to absorb or reflect light.

Transparent (TP): Light passes through the material.

Semi-Transparent (ST): Light passes deep into the material but little passes out.

Translucent (TL): Light penetrates to a shallow depth.

Opaque (O): No light passes the surface. It is all reflected.

Luster : Common Fracture and Surface Luster Descriptions.**Appears:**

Adamantine | highly reflective (diamond like)

Vitreous | like glass (most common for gemstones)

Metallic | like reflective metal

Submetallic | dull or non reflective metal

Pearly | lustrous (like a pearl)

Resinous | like dried resin

Fibrous \ Silky | fibrous \ coarse or fine

Dull | non- reflective at all

Earthy | like caked dirt or dried mud

Waxy | like wax

Greasy | like it is coated with a thin layer of oil

Cleavage : Breaking of a material along a crystal axis.

Perfect \ Excellent: Cleaving occurs along a perfectly smooth plane.

Calcite

Kyanite

Diamond

Rhodochrosite

Diopside

Spodumene

Feldspar

Topaz

Fluorite

Zoisite

Good \ Distinct: Occurs along a clear or distinct plane.

Chrysoberyl

Iolite

Phrenite

Existing but usually obscured:

Jadeite

Rhodonite

Nephrite

Sodalite

