

Magnetic Susceptibility Index for Gemstones

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Magnetic responses are standardized to 1/2" X 1/2" N-52 magnet cylinders.

Colorless and extremely pale stones of any species tend to be Inert (diamagnetic).

Black opaque stones of many species are strongly magnetic and may Pick Up or Drag.

Pick Up and Drag responses are weight-dependent. Direct responses on the Index apply to gems 1-4cts.

Larger gems may be too heavy to Pick Up or Drag. Smaller non-Garnet gems with strong magnetism may Pick Up.

Gemstone	Response Range	SI X 10 (-6) Range	Cause of Color
Actinolite			
Black Nephrite Jade	Strong	321 SI	Iron
Green Nephrite Jade	Moderate to Strong	91-312	Iron
White/Yellow Nephrite Jade	Inert	< 0 (diamagnetic)	none, some Iron
Green Pargasite	Inert	< 0 (diamagnetic)	Iron, Vanadium?
Orangey brown Pargasite	Weak	35 SI	Iron
Afghanite (blue)	Inert	< 0 (diamagnetic)	Chromium, Vanadium
Amber (any color)	Inert	< 0 (diamagnetic)	Organic
Amblygonite (blue)	Inert	< 0 (diamagnetic)	Unknown
Andalusite	Inert to Weak	< 0 -26	Manganese
Apatite (any color)	Inert (Weak in rare cases)	< 0 (diamagnetic)	Manganese, Rare-earth
Astrophyllite	Strong	1146-1328	Iron, Manganese
Axinite	Drags	603 SI	Iron, Manganese
Azurite (opaque)	Strong	382 SI	Copper
Barite (pale brown)	Inert	< 0 (diamagnetic)	Unknown
Bastnasite	Drags (Picks Up under 1ct)	773-803 SI	Cerium (rare-earth)
Benitoite	Inert	< 0 (diamagnetic)	Iron-Titanium intervalence charge transfer
Beryl			
Aquamarine (pale to medium blue)	Weak to Moderate	20-100	Iron
Golden / Yellow Beryl	Inert to Weak	< 0-48	Iron
Heliodor (yellowish green)	Inert	< 0 (diamagnetic)	Chromium, Iron
Morganite	Inert	< 0 (diamagnetic)	Manganese
Blue Beryl (Maxixe)	Inert	< 0 (diamagnetic)	Color centers
Red Beryl (transparent Bixbite)	Strong	117 SI	Manganese
Green Beryl	Inert	< 0 (diamagnetic)	Chromium, Vanadium, Iron
Emerald	Weak	20-56	Chromium, Vanadium
Synthetic Emerald	Weak to Moderate	26-143	Chromium, Vanadium
Synthetic Red Beryl	Moderate	126 SI	Cobalt
Synthetic Blue Beryl	Strong (Drags under 0.5ct)	218 SI	Iron
Bismuth (native metal)	Diamagnetic	< 0 (diamagnetic)	Bismuth
Calcite			

Most Calcite Color Variations	Inert	< 0 (diamagnetic)	Various Metals
Pink Calcite	Weak	22-26	Cobalt
Cassiterite (pale yellow)	Inert	< 0 (diamagnetic)	Iron
Cavansite (stabilized cab)	Moderate	> 82	Vanadium
Celestite (blue)	Inert	< 0 (diamagnetic)	Color Centers
Chalcedony			
Most Agates & Jaspers	Inert	< 0 (diamagnetic)	Iron
Red Jasper	Weak to Picks Up	69-8836	Iron
Mahogany Jasper	Strong	217 SI	Iron
Bloodstone	Weak to Strong	26-521	Iron
Carnelian	Inert	< 0 (diamagnetic)	Iron
Chrysoprase	Weak to Strong	42-224	Nickel
Blue Chalcedony	Inert	< 0 (diamagnetic)	Unknown
Fire Agate	Picks Up	3975 SI	Iron, Interference colors
Green Agate (Mtorolite)	Inert	< 0 (diamagnetic)	Chromium
Onyx	Inert	< 0 (diamagnetic)	Iron
Charoite	Weak	56-69	Manganese
Chondrodite	Inert	< 0 (diamagnetic)	low Iron, Manganese
Chrysoberyl			
Chrysoberyl	Weak to Moderate	20-127	Iron
Alexandrite	Weak	43 SI	Chromium
Synthetic Alexandrite Chrysoberyl	Inert	< 0 (diamagnetic)	Chromium
Chrysocolla	Moderate-Strong	104-239	Copper
Clinohumite			
Red Clinohumite	Weak	65 SI	Iron, Manganese
Orange Clinohumite	Strong	334 SI	Manganese, Iron
Clinozoisite	Drags	373 SI	Iron
Cobaltite (purity unknown)	Strong	No Data	Cobalt, Arsenic
Copper			
Pure Copper	Inert	< 0 (diamagnetic)	Copper
Native Copper (impurities)	Strong	No Data	Copper (and impurities)
Coral	Inert	< 0 (diamagnetic)	Organic
Corundum			
Black Star Sapphire	Weak to Moderate	20-143	Titanium, Iron
Emery (brown)	Moderate	130 SI	Iron
Blue Sapphire (of most origins)	Weak to Moderate	22-82	Iron-Titanium intervalence charge transfer
Blue Sapphire (from Sri Lanka and Canada)	Inert	< 0 (diamagnetic)	Iron-Titanium intervalence charge transfer
Fancy Color Sapphires	Weak to Moderate	< 20-191	Chrom., Titanium, Iron
Ruby	Weak to Moderate	26-109	Chrom., Titanium, Iron
Synthetic Ruby (red corundum)	Inert to Strong	< 0-195	Chromium, Titanium
Synthetic Sapphire (any color except red)	Inert	< 0 (diamagnetic)	Titanium
Cubic Zirconium			
Most CZ colors	Inert to Weak	< 0-39	Various

Pink CZ	Drags	430-807	Rare-earth Elements
Color Change CZ (red to green)	Drags to Picks Up	1237 SI	Rare-earth Elements
Cuprite (opaque)	Weak	74 SI	Copper
Danburite (yellow)	Inert	< 0 (diamagnetic)	Rare Earth Elements
Diamond (colorless, fancy colors, black)	Inert	< 0 (diamagnetic)	Carbon,Nitrogen, Boron, Irradiation
HTHP Synthetic Diamond (yellow,blue,colorless)	Inert to Picks Up (metal incluions)	< 0 to Ferromagnetc	Nitrogen, Boron
CVD Synthetic Diamond (colorless)	Inert	< 0 (diamagnetic)	N/A
Diaspore	Weak	39-48	Manganese, Iron, Chromium
Diopside			
Black Star Diopside	Picks Up	8,925- 9,960 Ferrimagnetic	Iron (magnetite)
Chrome Diopside (chrome green)	Weak to Strong	56-296	Chromium
Vanadium Diopside (mint green)	Weak	< 20-39	Vanadium
Green Diopside (grayish green)	Strong	122 SI	Iron, Chromium
Yellow Diopside	Weak	< 20	Iron
Violane (blue opaque Diopside)	Inert	< 0 (diamagnetic)	Manganese
Dumortierite	Weak	< 20	Various
Enstatite			
Hypersthene (opaque black)	Drags to Picks Up	> 1298	Iron
Bronzite (opaque brown)	Drags to Picks Up	No Data	Iron
Enstatite (transparent brown, green)	Drags	308-681	Iron
Eosphorite	Picks Up	2365 SI	Manganese, Iron
Epidote	Drags	491 SI	Iron
Euclase (pale blue)	Inert	< 0 (diamagnetic)	Iron
Eudialite (transparent to opaque)	Strong to Drags	345-469	Manganese, Iron
Feldspar Group			
Andesine Feldspar			
Untreated (yellow, reddish brown) Andesine	Weak	< 20	Iron, Copper
Diffused (red & green) Andesine	Weak	< 20	Copper
Bytownite Feldspar	Weak	35 SI	Iron
Labradorite Feldspar			
Oregon Sunstone (with copper schiller)	Weak	< 29	Copper
Oregon Sunstone (red, green)	Weak	< 29	Copper
Spectral Labradorite	Inert	< 0 (diamagnetic)	Interference Colors
Spectral Labradorite with magnetite inclusions	Weak to Picks Up	< 20-1779	Interference Colors
Yellow Labradorite	Weak	< 26	Iron
Microcline Feldspar			
Amazonite	Inert	< 0 (diamagnetic)	Lead, Color Centers
Oligoclase Feldspar			
Sunstone (with Hematite, African & Indian)	Inert	< 0 (diamagnetic)	Iron (Hematite)
Orthoclase Feldspar			
Moonstone Orthoclase	Inert	< 0 (diamagnetic)	Scattering of Light
Yellow (Noble) Orthoclase	Weak to Moderate	65-104	Iron
Fluorite (any color)	Inert	< 0 (diamagnetic)	Color Centers

Gadolinite (opaque)	Picks Up	8,780 SI	Iron, Beryllium, Rare-earth Elements
Garnet Group			Primary Garnet Chromophore(s)
Almandine Garnet	Picks Up	1926-3094	Iron
Andradite Garnet			
Demantoid Garnet	Picks Up	2253-2752	Iron, Chromium
Brown Andradite & Topazolite	Picks Up	2559-2907	Iron
Melanite (black) Garnet	Picks Up	1866 SI	Iron, Titanium
Irridescent Andradite	Picks Up	2930 SI	Interference Colors
Grossular Garnet			
Hessonite (pale to dark yellow/orange)	Moderate to Strong	91-308	Iron, Manganese
Hydrogrossular (green)	Strong to Drags	243-321	Iron, Chromium
Mali Garnet	Drags	234-720	Iron
Green Grossular (including Tsavorite & Merelani)	Weak to Strong	20-336	Vanadium, Chromium
Rosolite (pink)	Strong	147 SI	Manganese
Pyrope Garnet			
Standard Pyrope Garnet	Picks Up	1163-1971	Iron, Chromium, Vanadium
Rhodolite Garnet	Picks Up	1007-1840	Iron, Chromium, Vanadium, Titanium
Malaya Garnet	Picks Up	1127-2689	Manganese, Chromium, Vanadium, Iron, Titanium
Chrome Pyrope	Drags to Picks Up	454-999	Chromium, Iron
Pastel Pyrope	Drags to Picks Up	618-1181	Manganese, Chromium, Vanadium, Iron, Titanium
Color-Change Pyrope	Picks Up	1445-2326	Manganese, Iron, Chromium, Vanadium, Titanium
Spessartine Garnet			
Spessartine Garnet	Picks Up	4301-4728	Manganese, some Iron
Color-Change Spessartine	Picks Up	2435-4179	Manganese, Iron, Chromium, Vanadium, Titanium
Malaya Garnet	Picks Up	2734-3089	Manganese, Iron, Chromium, Vanadium, Titanium
Uvarovite Garnet	Picks Up	> 780	Iron, Chromium
Synthetic Garnet			
GGG (Gadolinium Gallium Garnet) Any Color	Picks Up	6219-7404	Gadolinium (colorless) and Various dopants
SGG (Samarium Gadolinium Garnet) Yellow	Strong	291 SI	Samarium (rare-earth)
YAG (Yttrium Aluminum Garnet) Yellow	Inert to Weak	< 0-35	Various
YAG (Yttrium Aluminum Garnet) Green	Inert to Strong	< 0-278	Chromium
YAG (Yttrium Aluminum Garnet) Pink	Strong to Drags	563-716	Manganese
Gaspeite	Strong	859 SI	Nickel, Iron
Glass (man-made)			
Most Glass Colors	Inert	< 0 (diamagnetic)	Various
Blue Glass	Inert to Weak	< 0-61	Cobalt
Goldstone Glass (various colors)	Moderate to Strong	135-221	Copper particles, Cobalt, Manganese, Chromium
Glass/Garnet Doublet	Inert Glass side/ Strong Garnet side	794-942	Iron
Gold (pure 24k)	Inert	< 0 (diamagnetic)	Gold
Hauyne	Weak	Unknown	Color Centers
Hematite (natural)	Picks Up only by rare-earth magnet	2604-6853	Iron
Hematine (imitation Hematite)	Picks Up	> 86,000 Ferromagnetic	Iron
Hemimorphite (blue)	Inert	< 0 (diamagnetic)	Copper

Howlite (white or dyed)	Inert	< 0 (diamagnetic)	None or Man-made Dyes
Idocrase (green)	Strong	217-233	Iron
Iolite	Moderate-Strong	105-200	Iron
Iron (native element)	Picks Up	Ferromagnetic	Iron
Ivory	Inert	< 0 (diamagnetic)	Organic
Jadeite Jade			
Green Jadeite	Weak to Moderate	65-104	Chromium, Iron
Orange Jadeite	Weak	< 20	Iron
Red Jadeite	Weak to Moderate	40-122	Iron
Purple Jadeite	Weak to Moderate	22-130	Manganese, Iron
White/Yellow Jadeite	Inert to Weak	< 0-48	None
Black Jadeite	Picks Up	2070 SI	Iron
Jeremejevite	Inert	< 0 (diamagnetic)	Iron (intervalence charge transfer)
Jet	Inert	< 0 (diamagnetic)	Organic Carbon
Kornerupine	Moderate to Strong	135-282	Iron
Kyanite			
Blue Kyanite	Inert	< 0 (diamagnetic)	Iron- Titanium intervalence charge transfer
Green Kyanite	Weak	61 SI	Vanadium
Orange Kyanite	Moderate	95 SI	Iron and/or Manganese
Lapis Lazuli	Inert	< 0 (diamagnetic)	Sulfur, Color Centers
Lazulite (transparent)	Strong	No Data	Iron
Libyan Desert Glass (natural glass)	Inert	< 0 (diamagnetic)	Iron
Magnetite	Picks Up	Ferrimagnetic	Iron
Malachite	Drags	477 SI	Copper
Maw Sit Sit	Moderate to Strong	139-230	Chromium
Moldavite (natural glass)	Weak	69 SI	Iron
Muscovite/Mica			
Lepidolite (lavender)	Inert	< 0 (diamagnetic)	Lithium
Fuchsite	Weak	< 20-69	Chromium
Niccolite	Moderate	No Data	Nickel, Arsenic
Nummrite (Anthophyllite & Gedrite)	Drags	1094 SI	Interference colors in black substrate (iron)
Obsidian			
Mahogany Obsidian	Picks Up	1953 SI	Iron
Opaque Obsidian	Drags	304 -750	Iron
Translucent Obsidian	Strong	247 SI	Iron
Transparent Obsidian (black)	Weak to Moderate	74-95	Iron
Transparent Obsidian (near-colorless)	Weak	22 SI	Iron
Opal			
Fire Opal	Inert	< 0 (diamagnetic)	Light Diffraction
Play of Color Opal (all types)	Inert	< 0 (diamagnetic)	Light Diffraction
Pearl	Inert	< 0 (diamagnetic)	Organic
Pectolite (blue Larimar)	Inert	< 0 (diamagnetic)	Copper
Peridot			

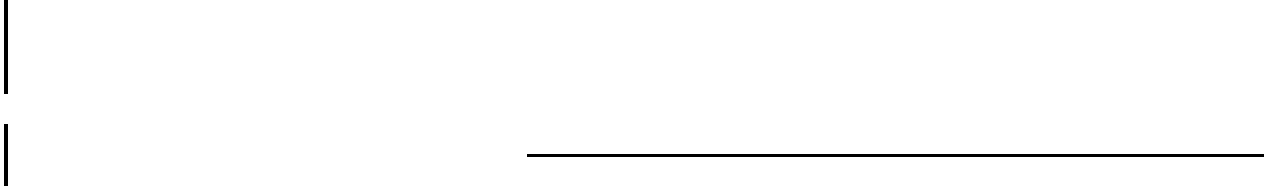
Green Peridot with saturated color	Drags	417-590	Iron
Near-colorless Peridot (Forsterite)	Weak	52 SI	Iron
Pezzottaite (Beryl Group)	Weak	< 20	Manganese
Plastic	Inert	< 0 (diamagnetic)	Various
Platinum	Strong	No data	Platinum
Prehnite (green)	Weak to Moderate	26-122	Iron
Psilomelane	Strong to Drags	343-1007	Manganese
Pyrite	Weak	43 SI	Iron-Sulphur properties
Pyromorphite (opaque)	Inert	< 0 (diamagnetic)	Unknown
Pyrrhotite	Picks Up	Ferromagnetic	Iron
Quartz (macro-crystalline)			
Amethyst	Inert	< 0 (diamagnetic)	Color Centers
Citrine	Inert (Weak in rare cases)	< 0 (diamagnetic)	Irradiation, some Iron
Rock Crystal (colorless Quartz)	Inert	< 0 (diamagnetic)	None
Rose Quartz	Inert	< 0 (diamagnetic)	Manganese, Iron
Smoky Quartz	Inert	< 0 (diamagnetic)	Irradiation
Quartz with Inclusions			
Rutile, Hematite & Most Other Inclusions	Inert	< 0 (diamagnetic)	Varies with type of Inclusions
Tourmalinated Quartz	Weak	43-56	Iron, Copper
Chrysocolla Inclusions (Gem Silica)	Weak to Moderate	69-82	Copper
Green Hedenbergite Inclusions	Weak	56 SI	Iron
Blue Paraiba Tourmaline Inclusions	Weak	56 SI	Copper
Tiger's Eye	Inert to Picks Up	< 0-3889 (varies with iron)	Iron oxide, Crocidolite
Hawk's Eye	Weak	< 20	Iron oxide, Crocidolite
Pietersite	Inert to Strong	< 0-305 (varies with iron)	Iron Oxide, Crocidolite
Quartzite			
Aventurine Quartz	Inert to Weak	< 0-27	Chromium
Rhodochrosite	Picks Up	3515-4761 SI	Manganese
Rhodonite	Picks Up	3610-3936	Manganese
Richterite (blue opaque)	Moderate	113 SI	Iron, Titanium
Rutile			
Opaque Metallic Gray	Strong	122 SI	Iron, Titanium
Transparent Red	Strong	327 SI	Iron, Titanium
Synthetic Rutile (transparent colorless)	Inert to Very Weak	< 0 (diamagnetic)	Rare-earth Elements
Scapolite (yellow, purple)	Inert	< 0 (diamagnetic)	Color Centers
Selenite	Inert	< 0 (diamagnetic)	no color
Scheelite (transparent yellow)	Inert	< 0 (diamagnetic)	Rare-earth Elements
Serpentine (opaque)	Drags to Picks Up	363-1519	Iron, Chromium, Nickel
Shell	Inert	< 0 (diamagnetic)	Organic
Siderite (transparent)	Picks Up	4,924 SI	Iron
Sillimanite			
Green/ Yellow Sillimanite	Weak	35-52 SI	Iron, Chromium
Fibrolite (gray Sillimanite)	Weak	< 20	Iron

Silver (native element)	Inert	< 0 (diamagnetic)	Silver
Sinhalite			
Yellow/Brown	Weak to Strong	78 SI	Iron
Brown	Strong	148-152 SI	Iron
Smithsonite			
Pink Smithsonite	Inert	< 0 (diamagnetic)	Manganese, Cobalt
Blue Smithsonite	No Data	No Data	Copper
Green Smithsonite	Moderate to Strong	No Data	Copper
Yellow Smithsonite	Weak	43 SI	Cadmium
Sodalite			
Sodalite (translucent to opaque)	Inert to Weak	< 0-48	Color Centers
Hackmanite (transparent)	Inert	< 0 (diamagnetic)	Color Centers
Sphalerite (orange, yellow)	Inert	< 0 (diamagnetic)	Iron
Sphene (Titanite)			
Yellow/Brown Sphene	Weak to Strong	30-78	Rare-earth Elements, Iron
Green Sphene	Weak	35-52	Chromium
Spinel			
Cobalt Blue (ghanospinel)	Weak to Strong	48-182 SI	Cobalt, Iron
Pale Spinel colors	Inert to Weak	< 0-48	Iron, Cobalt, Chromium
Pink, Purple, Red, Blue, Black Spinel (transparent)	Weak to Moderate	48-104	Iron, Cobalt, Chromium
Hercynite Black Spinel (opaque)	Drags to Picks Up	1263-1328	Iron
Synthetic Spinel			
Synthetic Mint Green Spinel	Inert to Moderate	< 0-122	Manganese, Chromium
Synthetic Spinel (most colors)	Inert (blue is weak in rare cases)	< 0 (diamagnetic)	Various
Spodumene			
Kunzite (pink, purple, some fading)	Inert	< 0 (diamagnetic)	Irradiation, Chromium
Pale Yellow/Green Spodumene (fades in light)	Inert to Weak	< 0 -56	Irradiation, Chromium
Hiddenite (pale green, permanent color)	Weak	65 SI	Chromium
Staurolite			
Transparent Staurolite	Picks Up	927-1054	Iron, Titanium
Opaque Staurolite	Drags	890 SI	Iron
Strontium Titanite	Inert	< 0 (diamagnetic)	None
Sugilite	Drags to Picks Up	556-950	Manganese, Iron
Tantalite	Picks Up	No Data	Manganese
Titanium (native element)	Weak	No Data	Titanium
Topaz			
Blue, Pink, Sherry, Brown, Green Topaz	Inert	< 0 (diamagnetic)	Color Centers, Chromium
Imperial Topaz	Inert	< 0 (diamagnetic)	Color Centers, Chromium
Tortoise Shell	Inert	< 0 (diamagnetic)	Organic
Tourmaline Group			
Black (Schorl)	Drags	924 SI	Iron
Brown (Dravite)	Inert	< 0 (diamagnetic)	Iron-Titanium intervalence charge transfer
Chrome Tourmaline (Dravite)	Inert	< 0 (diamagnetic)	Chromium

Colorless Achroite (Elbaite)	Inert	< 0 (diamagnetic)	N/A
Cuprian Paraiba any color (Elbaite)	Strong	221-399	Copper, Manganese, Titanium
Medium to Dark Green (Elbaite)	Strong to Drags	148-418	Iron, Chromium, Vanadium
Browish Olive Green (Species?)	Moderate to Strong	74-252	Iron, Chromium, Vanadium
Mint Green (Vanadian Elbaite)	Moderate	122 SI	Vanadium, Chromium, Iron
Medium to Dark Blue Indicolite (Elbaite)	Drags	313-369	Iron
Pink & Mauve (Elbaite)	Inert to Strong	< 0-291	Manganese
Red Rubellite (Elbaite)	Inert to Strong	< 0-326 SI (wide range)	Manganese
Watermelon (Elbaite)	Weak	43 (red) / 65 (green)	Various
Yellow (Dravite)	Inert	< 0 (diamagnetic)	Unknown
Yellow (manganese, species?)	Drags	443 SI	Manganese
Triphylite (transparent)	Picks Up	3289 SI	Iron, some Manganese
Triplite (transparent)	Picks Up	4,706 SI	Manganese, Iron
Tugtupite	Inert	< 0 (diamagnetic)	Color Centers
Turquoise			
Blue	Weak to Moderate	26-135	Copper
Green	Weak to Strong	35-278	Copper, Iron
Variscite	Inert to Moderate	< 0-117	Chromium, Iron
Vivianite	Picks Up	1766 SI	Iron
Wulfenite (orange)	Inert	< 0 (diamagnetic)	Charge Transfer involving Chromium
Xenotime	Picks Up	No Data	Unknown
Zincite (red, yellow)	Inert	< 0 (diamagnetic)	Zinc, Manganese
Zircon (any color)	Inert	< 0 (diamagnetic)	Color Centers
Zoisite			
Tanzanite (blue, green, brown)	Inert	< 0 (diamagnetic)	Vanadium
Tanzanite (pink)	No Data	No Data	Manganese
Thulite (opaque pink)	Picks Up	3454 SI	Manganese

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