What is Moissanite?

- What is Moissanite?

Possessing fire, brilliance, and luster that far surpasses even that of a diamond, Moissanite twinkles and sparkles unlike any gemstone on earth. Composed of carbon and silicon, the Moissanite crystal is one of the hardest andtoughest known elements on earth, making it extremely resistant to scratching, chipping and breaking.

Moissanite, also known as silicon carbide, was first discovered in minute quantities from particles carried to earth by a meteorite 50,000 years ago. It is now available as faceted gemstones in a large array of shapes and sizes.

Unlike other brilliant stones that cloud and dull with time, Moissanite is guaranteed to never lose its optical properties. Therefore, it will be every bit as beautiful, fiery and brilliant generations from now as the day you purchase it.

- Moissanite History

Fifty thousand years ago a meteorite crashed into the Arizona desert creating what is now known as "Meteor Crater." Fragments of this meteorite were scattered across the desert. Hidden in these fragments was a brilliant secret waiting to be discovered. In 1893, Nobel-Prize winning scientist Henri Moissan began studying fragments of this meteorite in nearby Diablo Canyon. In these fragments Dr. Moissan discovered minute quantities of a shimmering new mineral, with fire and brilliance never before seen on earth. After extensive research, Dr. Moissan concluded that this mineral was made of silicon carbide.


Canyon Diablo, Arizona, USA

In 1905, well-known Tiffany & Co. gem expert and mineralogist, George Kunz, suggested the new jewel be named moissanite in Dr. Moissan's honor. Despite this amazing discovery, since naturally occurring quantities of moissanite are so small, it would be another century before this stunning mineral would emerge as the brilliant jewel it is today.

In the late 1980's, inspired by Dr. Moissan's discovery, a North Carolina company named CREE developed a proprietary process for producing large single crystals of Moissanite.

In the summer of 1995, a master diamond cutter observed samples of Moissanite and suggested that properly cut crystals would make a brilliant new jewel. From there scientists from CREE and eventually Charles & Colvard began a three-year research project to bring the fire and brilliance of Moissanite jewels to consumers.

The Superior Fire, Brilliance and Luster of Moissanite

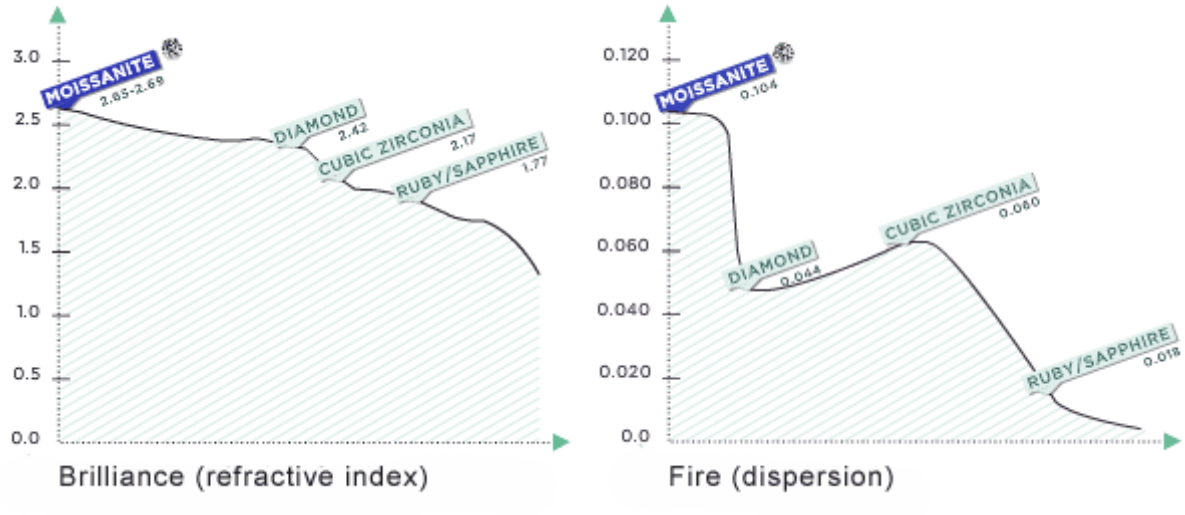
- ## Optical Properties

Moissanite's characteristic sparkle is more than just a show of beauty - it's a testament to the superior science behind the jewel, boasting more fire, brilliance and luster than any gemstone on earth. This is not merely a sales line, but a scientific and quantifiable fact.

Moissanite is known for its high refractive index of 2.65, which is notably higher than diamond, sapphire, CZ and other gemstones known to be very brilliant. Brilliance is the flashes of white light exiting the top and sides of a gemstone. The higher the refractive index of a gemstone, the more brilliance the jewel emits. Moissanite's superior refractive index makes Moissanite the most brilliant fine gemstone on earth.

Moissanite's fire, the flashes of colored light, is even more impressive, being more than twice that of a diamond.

Luster is the amount of light that is reflected back to the observer from the surface of the gemstone. In addition to superior fire and brilliance, Moissanite has 18% greater luster than a diamond and 50% greater luster than CZ.



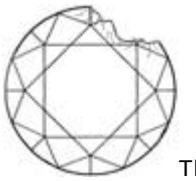
Hardness, Toughness and Durability of Moissanite

- Physical Properties

Moissanite's brilliance outshines every gemstone, but its exceptional durability is truly remarkable to say the least. Moissanite is a gemstone that will endure for generations and beyond.

Durability consists of hardness, toughness and stability.

Moissanite is Tougher than Diamond



The ability of a gemstone to remain intact, withstand force (pressure) and resist breaking or chipping is known as toughness. Determined by a substance's atomic and chemical structure, toughness can vary directly within a gemstone. While both Moissanite and diamond are rated excellent in toughness, Moissanite has a different atomic structure than diamond which does not have a direction of cleavage (which sometimes is considered as a direction of structural weakness) like diamond. Simply said, Moissanite outranks diamond in overall toughness.

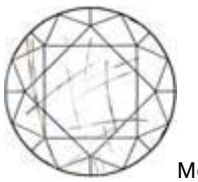
Durability: Impervious to Heat & Chemicals

Durability is a material's ability to remain intact or withstand exposure to temperature and chemicals. Moissanite can easily withstand temperature variations during the jewelry manufacturing process and repairs at a jeweler's bench (unlike other gemstones such as cubic zirconia or emerald). In fact, Moissanite has a higher vaporization temperature than diamond and can withstand temperatures reaching 2,000 degrees Fahrenheit.

Moissanite is also very stable when exposed to various chemicals, solutions and acids typically used during both manufacturing and jewelry repair that commonly damage other less stable gemstones.

Moissanite is one of the hardest gemstones on earth

Hardness refers to a gemstone's resistance to being scratched or abraded and is commonly expressed as a number ranking (1 being the softest and 10 being the hardest) on Mohs relative hardness scale.



Moissanite ranks 9.25 on the Mohs scale making Moissanite one of the hardest gemstones on earth. It's unusually high hardness makes scratching and abrasions very rare, even after many years of daily wear and tear.

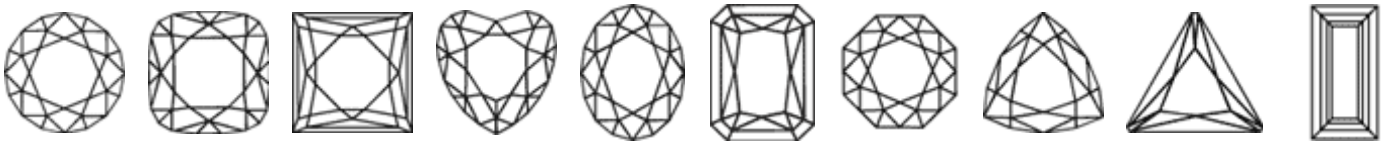
Moissanite's ability to resist abrasion and scratching easily outranks and is more than double (120%) the hardness of any popular diamond simulants such as Diamond Nexus (CZ), Russian Brilliants (CZ), or Sona Diamond (CZ).

Moissanite Shapes & Cut

- Cut & Shape

Moissanite's Cut Is Designed to Maximize Fire & Brilliance

Unlike diamonds which are most commonly cut to maximize carat weight, Moissanite gemstones are cut and faceted to maximize the superior fire and brilliance of the gemstone. The Moissanite ideal cut pattern was established after years of studying the angles of light refraction through Moissanite. Although the facets on a standard round-brilliant cut Moissanite are the same in number and are very close to the measurement to the customary 57-facet round brilliant cut diamond, subtle differences exist. These subtle differences are exactly what contribute to Moissanite's ideal cut standards different than "ideal cut" proportions that might be associated with other gemstones or diamonds.



Round Brilliant | Cushion | Square Brilliant | Heart | Oval | Radiant | Octagon | Trillion | Triangle | Baguette

The Process

Moissanite begins as a raw crystal form. Each crystal is first evaluated for quality, color and clarity. Only the crystals that meet the highest quality standards are allowed to be cut and faceted. After the initial quality evaluation, a team of C&C experts determine what shapes and sizes of Moissanite gemstones will be cut from the crystals.

The crystals are then routed to a team of 18 cutters, technical experts and faceters; each of whom play a role in bringing the gemstone to its ideal display of brilliance. Along each stage of this involved 18-step process, from crystal evaluation to faceting the finished gemstone, experts evaluate Moissanite against strict quality standards and specifications. The last step, is final grading for color, cut and clarity. Only the most desirable gemstones that meet C&C's standards are chosen to be sold.

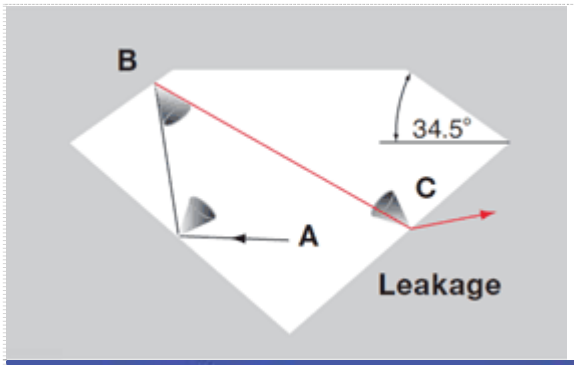
The Importance of the Right Cut

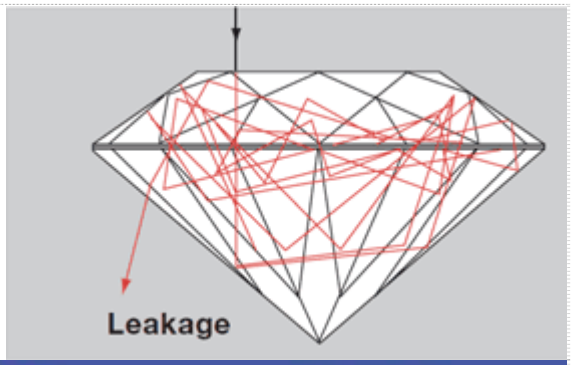
Every type of gemstone must have different facet and proportion designs to achieve the best optical performance (fire and brilliance). Below are computer models which demonstrate why the ideal cut proportions for diamond are not the ideal cut for Moissanite.

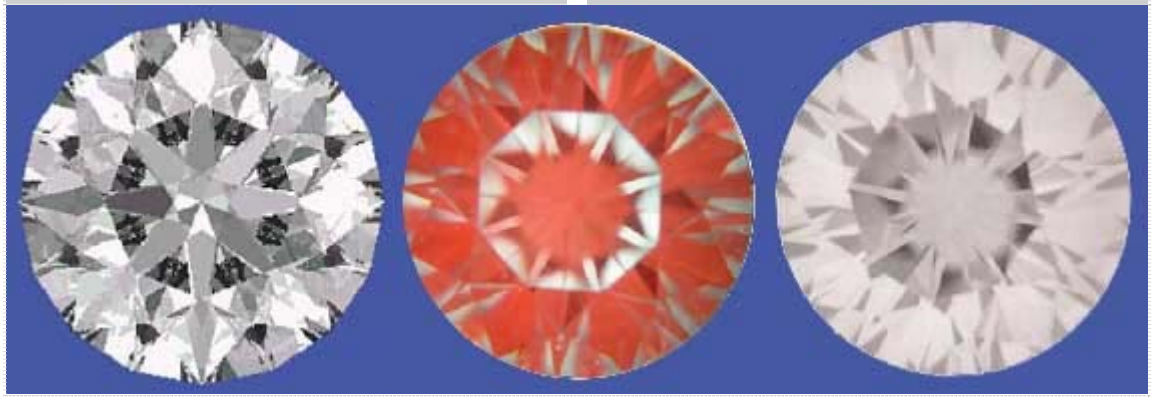
Moissanite faceted like an ideal cut diamond

Due to a greater crown angle, the light ray is reflected back internally to then leak from the right side of the pavilion (C).

When the "ideal cut" for diamond is used for Moissanite. The light ray reflects internally until it escapes from the pavilion where potential brilliance is lost (leakage).



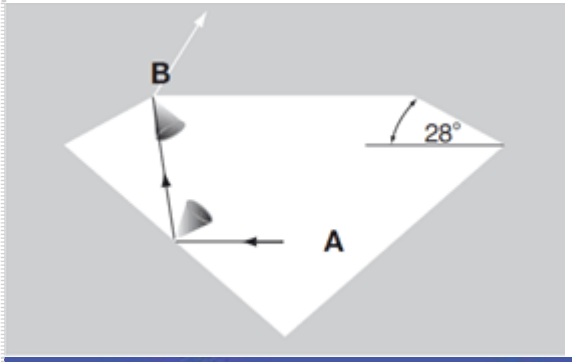


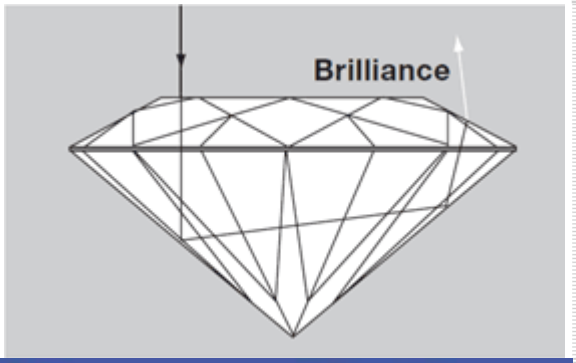


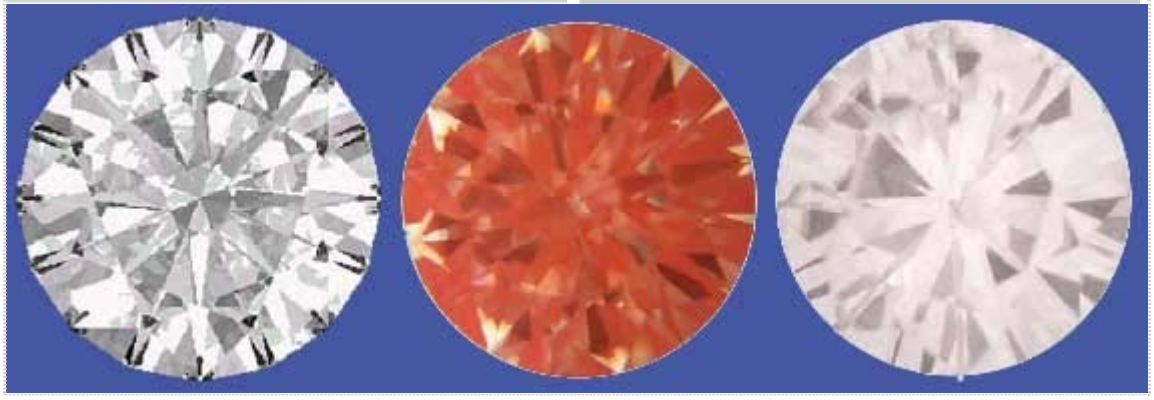
Moissanite faceted to the ideal proportions for Moissanite

The Moissanite crown angle is lowered to allow more light to exit from the crown (B).

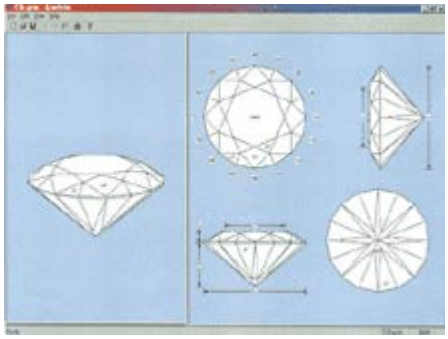
When the Charles & Colvard cut is used for Moissanite, it properly reflects the light ray and directs it out through the crown as brilliance.



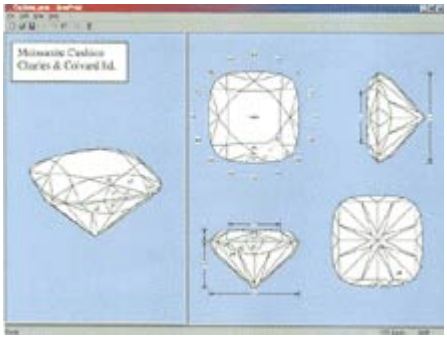




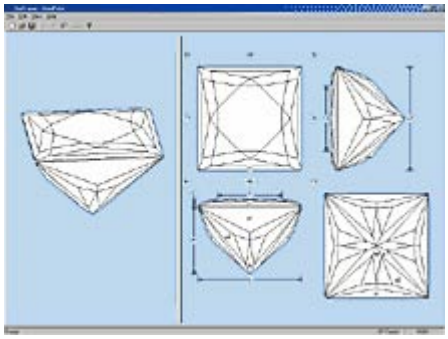
Computer Aided Design Moissanite Cuts



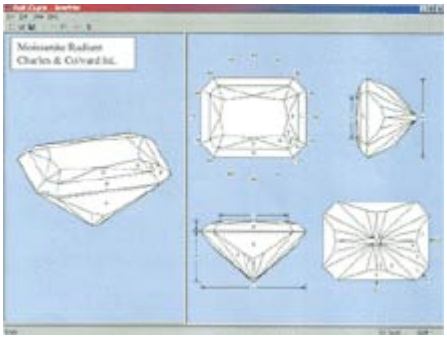
Round Brilliant



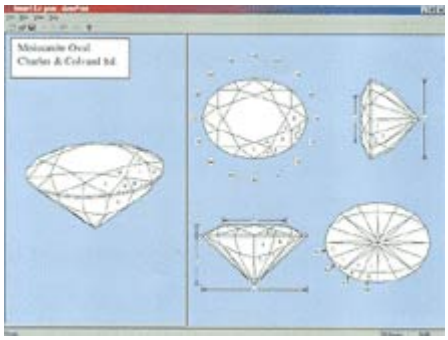
Cushion



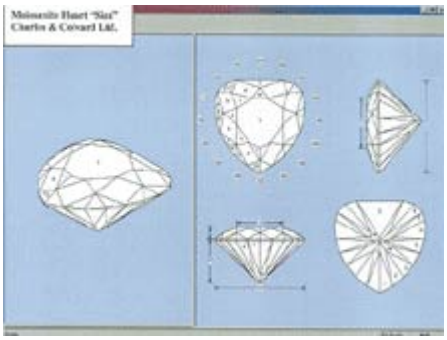
Square Brilliant



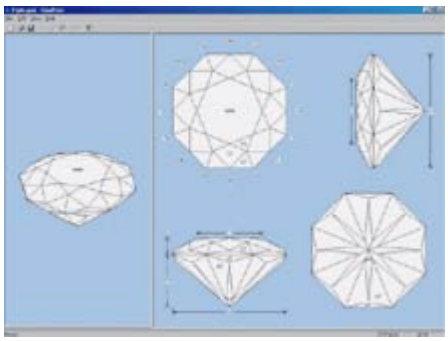
Radiant



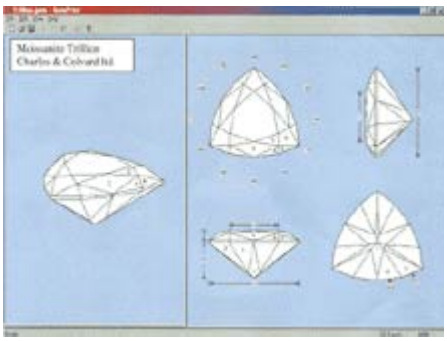
Oval



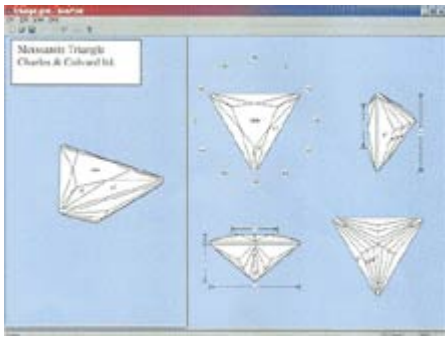
Heart



Octagon



Trillion



Triangle

Moissanite Clarity

- ## Clarity

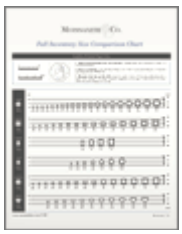
Clarity is a measure of the surface blemishes and internal inclusions of a gemstone. For the purpose of comparison to natural diamonds, experts agree the clarity of Moissanite is equivalent to VS clarity on the GIA scale. VS stands for very slightly included. What this means in reality is inclusions can only be seen under magnification, and under a jewelers loupe (10x magnification) are difficult to see. Less than 10% of faceted diamonds have this level of clarity.

- ## Carat

Carat is the traditional measuring unit of a diamond's weight (1 carat = 200 milligrams). A carat is divided into 100 "points," so the same diamond can be represented as weighing a carat and a half, 150 points or 1.50 carats. Moissanite stones are slightly lighter (less heavy) than diamonds. Therefore, while a 6.5mm round diamond weighs 1.0 carat, a 6.5mm moissanite weighs 0.88 carat. However, the two stones would be the same size, 6.5mm in diameter.

In order to minimize the confusion this can create, all stones are listed on Nathaan-gem-jewelry. with their actual size in mm and/or the diamond equivalent in carats.

Please reference our loose stone page for the full size to diamond equivalent carat weight conversion table.



To help our customers visualize the actual size of the Moissanite gemstones, we provide the following Actual Stone Size Comparison Chart.

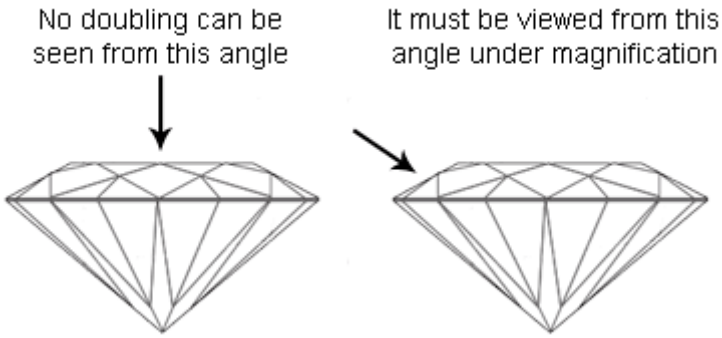
Moissanite Double Refraction

- ## Double Refraction

Moissanite has a property known as double refraction. When a ray of light passes through the gemstone it is slowed, bent and split in two. Sapphire is a doubly refractive material as well, as are peridot, tourmaline and zircon. To some degree it is this property that gives Moissanite its amazing fire. However it is often cited by critics of Moissanite, typically by companies who sell CZ, as a disadvantage, claiming that the double refraction will make the stone appear blurry. What they don't say is that every double refractive gem has at least one direction in which the material behaves like a singly

refractive gem. This is referred to as the optic axis, and does not break light into two rays.

Moissanite is cut so that this direction of single refraction is though the table. This means that the doubling is not apparent when the stone is viewed though the table (top of the stone). Moissanite must be viewed at 10x magnification (jewelers loupe) through any other crown facet (e.g. star, or bezel) to see the doubling. Most of our customers do not know or realize that Moissanite is double refractive, and we provide this explanation and images to explain that, although it is a unique property of Moissanite, it does not negatively effect its beauty.



Below is a picture of an emerald cut Charles & Colvard created Moissanite. It is a rare stone as the emerald cut is not normally offered. However we feel it is very illustrative when explaining Moissanite's double refractive properties. If the doubling were easily seen in a brilliant cut stone (and it is not, as explained above), it would be even more readily apparent in a step cut such as an emerald cut given its long straight lines. However, based on the picture below you can see that it is not.

Moissanite vs. Diamond

- Moissanite vs Diamond

For centuries couples around the world have worn wedding rings as a symbol of their love and the commitment to each other. Although diamonds were at times used for engagement rings, it wasn't until the discovery of the Kimberley diamond mine in South Africa in 1870's that diamonds became widely available, and not until the 1940's that the DeBeers company cemented society's fixation on one particular stone: diamond.

CZ is just a simulated diamond

In the 1970's with the invention of the cubic zirconia (CZ) it was widely speculated that this new diamond look-a-like would alter the diamond and engagement ring market. However this prediction did not come true. Many jewelers believe the principle reason is because CZ is considered a "fake" gemstone due to it being lab grown, and therefore not "natural". Many have called it an "imposter".

Moissanite doesn't simulate, it surpasses diamond

We agree that CZ is nothing more than a gemstone that simulates a diamond. However we believe the reason it didn't significantly change the diamond market is not because it wasn't natural, but because it failed to live up to the hype. If the optical and physical properties of a CZ more closely matched or even exceeded that of a diamond, the diamond market would look much different than it does today.

Moissanite doesn't try and simulate a diamond, it surpasses it in many important ways including brilliance, fire, luster, toughness, resistance to heat, without even mentioning the obvious: price. Below is a chart which compares the properties of Moissanite to diamond.

Moissanite vs Diamond

	Diamond	Moissanite	Amora Moissanite
R.I. (Brilliance)	2.42	2.69	2.69
Fire (dispersion)	0.044	0.104	0.104
Luster	17.20%	20.40%	20.40%
Hardness	10	9.25	9.25
Toughness	Good	Excellent	Excellent
Clarity	I3 - Flawless	VS	VS
Color (Faceup)	Varies: F-Z	I-K	G-H
Quality of Cut	Varies: Poor to Excellent	Excellent	Excellent
Attraction to Dirt/Oil	Moderate	Low	Low
Heat Resistance	High	Very High	Very High
Price	$3000-8000/ct	~ $325 / ct	~ $500 / ct

Summary:

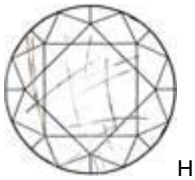
- *Optical Properties:* Moissanite has superior fire, brilliance and luster than diamond
- *Physical Properties:* Moissanite is tougher. The hardness of Moissanite, although less, is comparable in the sense that it is easily sufficient for daily wear and to last for generations. Moissanite is the 2nd hardest gemstone on earth.
- *Durability:* Moissanite has higher heat tolerance than diamonds making damage from heat during jewelry manufacturing and repair very unlikely
- *Clarity and Quality of Cut:* diamonds vary widely whereas Moissanite has consistently high clarity and cut
- *Color:* diamonds vary widely although the most popular colors for diamond jewelry are G - J in the United States. The face up color of Moissanite and our new Amora Moissanite is in this same color range.
- *Attraction to Dirt/Oil:* the pure carbon composition of diamond make it so attractive to oil and grease that it is used to seperate rock and diamonds at diamond mines. Due to the mixed carbon and silicon composition of Moissanite it has a much lower propensity to attract dirt and oil.

Moissanite vs. CZ (Cubic Zirconia)

- Moissanite vs CZ

At first glance Moissanite resembles diamond and might be mistaken for a diamond, a synthetic (lab grown) diamond or diamond simulant (CZ). When compared with cubic zirconia or CZ (perhaps the world's most popular diamond simulant), the differences are obvious. CZ is an inexpensive simulated diamond look-alike, inferior in almost every gemological property to Moissanite. CZ is mass produced under a myriad of trade names and promoted with various brand names. Please refer to the next section: Commonly Marketed Gemstones & Diamond Alternatives.

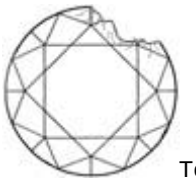
CZ is too soft



Hardness is the resistance of a gemstone to being scratched or the facets being worn down. Compared to Moissanite, CZ has less than one half (45%) the hardness of Moissanite as measured using the Knoop indention test: 1370 kg/mm2 vs. 3000 kg/mm2. Therefore, Moissanite is 219% harder. Because CZ scratches easily, it can lose its surface luster after just a few months or years with regular wear.

Although CZ sellers boast that CZ can scratch glass, many gemstones and jewels are ranked above glass in hardness and can easily scratch it as well. Therefore this is no amazing feat.

CZ is not tough enough



Toughness is the resistance to chipping and breaking. Compared to Moissanite, CZ has only 1/3 the toughness: 2.4 PSI compared to 7.6 PSI. Therefore Moissanite is over 300% more resistant to chipping.

Therefore given the substantially inferior hardness and toughness of CZ, it will have a finite life. Given Moissanite's very high hardness and toughness, it will not scratch, chip and wear like a CZ, and with a little care, it will last a lifetime and beyond.

CZ has inferior optical properties

The beauty and sparkle of engagement gemstones is found in their brilliance, fire and luster.

Moissanite is known for its high refractive index of 2.69, which is 25% greater than the refractive index of a CZ. The higher the refractive index of a gemstone, the more brilliance the jewel emits. Therefore, Moissanite's brilliance easily out performs CZ.

Moissanite's dispersion of 0.104 is 58% greater than a CZ (0.044). Therefore Moissanite emits more fire, or flashes of rainbow colored light, than CZ.

The luster of Moissanite is 50% higher than that of CZ. The higher the luster, the greater the amount of light reflected from the surface of the gemstone.

In summary, Moissanite has significantly higher brilliance, fire and luster than CZ.

Optical Anamolies: Windowing

The lower refractive index of CZ causes the stone to exhibit substantially more "windowing" than a Moissanite or diamond and gives CZ what many women refer to as a "glassy" appearance.

Windowing is an optical phenomenon that occurs when light passes through a gemstone without being refracted. If windowing is present in a gemstone the observer can look through the stone at certain angles as if it were a window or can observe large dark areas in the stone (caused by light leaking out the window).

A well cut stone should reflect so much light that nothing is seen behind it. However this statement presumes that you are looking straight down through the top of the stone, and the stone is not tilted at all. Tilting the stone even slightly will change the angles of light hitting the pavilion facets. Each type of gem has its own range of "tilt brilliance". The lower the refractive index the less tilting it takes to window the stone. Since the refractive index of CZ is substantially lower than Moissanite (1.8 - 2.17 compared to Moissanites 2.69), the result is that although a CZ may look pretty when viewed from the top, but when viewed at various angles many dark or black spots can appear, making it easy to spot as a "fake".

CZ strong affinity to dirt

CZ has a very strong affinity to dirt. Another reason many consumers feel that CZ quickly loses its luster and "looks cloudy" is because hand oils, cosmetics, etc. will quickly cling to the gemstone. Given the inferior refractive index of a CZ compared to a diamond or Moissanite, even a little bit of dirt can make the CZ appear dull or lifeless. This in turn requires the wearer to have to clean it often, we have had customers tell us even multiple times a day, to keep it sparkling. Although Moissanite can get dirty with time, it is much more resistant to dirt than CZ and even a diamond, which means it will stay cleaner longer.

CZ lacks stability and durability

CZ is sensitive to heat. When exposed to too much heat, CZ stones will shatter and turn a very opaque, milky color. This can be a problem if you would like to make modifications to your CZ jewelry such as ring sizing. Many jewelers will refuse to perform repairs on CZ jewelry.

Cubic zirconia also naturally tries to bond with CO2 and water which can lead with time to clouding on the surface of the stone.

Conclusion

In the end, CZ is great for cheap fashion jewelry, but is simply too soft for jewelry if you intend to wear it frequently (i.e. bridal jewelry), it has too strong an affinity to dirt, and its optical properties (luster, fire and brilliance) all fall short when compared to a Moissanite. Unlike Moissanite and diamond, CZ will not stand the test of time.

Hardness:	Moissanite is 219% harder (less likely to scratch)
Toughness	Moissanite is 317% more tough (less likely to chip)
R.I. (Brilliance):	Moissanite is 25% more brilliant
Fire (dispersion):	Moissanite has 58% more fire
Luster:	Moissanite has 50% more luster
Windowing:	CZ demonstrates obvious windowing, giving it a glass-like appearance. Moissanite displays less windowing than even diamond.
Affinity to Dirt:	Moissanite requires substantially less cleaning
Durability:	Unlike CZ, will not shatter when jeweler applies heat
Stability:	Unlike CZ, will not react with CO2 and water

MOISSANITE

Created By

CHARLES & COLVARD

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