[Template:Infobox mineral](/wiki/Template:Infobox_mineral" \o "Template:Infobox mineral)

**Moissanite** ([Template:IPAc-en](/wiki/Template:IPAc-en)),[[1]](#cite_note-1) is the name given to naturally occurring [silicon carbide](/wiki/Silicon_carbide) and to its various crystalline [polymorphs](/wiki/Polymorphism_(materials_science)). It has the chemical formula SiC and is a rare mineral, discovered by the French chemist [Henri Moissan](/wiki/Henri_Moissan) in 1893. Nowadays it is usually synthesized in laboratories.

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## Background[[edit](/index.php?title=(none)&action=edit&section=1)]

Mineral moissanite was discovered by Henri Moissan while examining rock samples from a meteor crater located in [Canyon Diablo](/wiki/Canyon_Diablo_(canyon)), [Arizona](/wiki/Arizona), in 1893. At first, he mistakenly identified the crystals as diamonds, but in 1904 he identified the crystals as silicon carbide.<ref name = xu>[Template:Cite journal](/wiki/Template:Cite_journal)</ref>[[2]](#cite_note-2) Artificial silicon carbide had been synthesized in the lab just two years prior to Moissan's discovery by Edward G. Acheson.[[3]](#cite_note-3) The mineral form of silicon carbide was named moissanite in honor of Moissan later on in his life. The discovery in the [Canyon Diablo meteorite](/wiki/Canyon_Diablo_(meteorite)) and other places was challenged for a long time as [carborundum](/wiki/Silicon_carbide) contamination from human abrasive tools.<ref name = pierro>[Template:Cite journal](/wiki/Template:Cite_journal)</ref>

## Geological occurrence[[edit](/index.php?title=(none)&action=edit&section=2)]

Until the 1950s no other source, apart from meteorites, had been encountered. Later moissanite was found as inclusions in [kimberlite](/wiki/Kimberlite) from a diamond mine in [Yakutia](/wiki/Sakha_Republic) in 1959, and in the [Green River Formation](/wiki/Green_River_Formation) in [Wyoming](/wiki/Wyoming) in 1958.[[4]](#cite_note-4) The existence of moissanite in nature was questioned even in 1986 by Charles Milton, an American geologist.[[5]](#cite_note-5) Moissanite, in its natural form, is very rare. It has only been discovered in a small variety of places from upper [mantle](/wiki/Mantle_(geology)) rock to [meteorites](/wiki/Meteorite). Discoveries have shown that moissanite occurs naturally as inclusions in diamonds, [xenoliths](/wiki/Xenolith), and [ultramafic rocks](/wiki/Ultramafic_rock) such as [kimberlite](/wiki/Kimberlite) and [lamproite](/wiki/Lamproite).<ref name = pierro/> They have also been identified in [carbonaceous chondrite](/wiki/Carbonaceous_chondrite) meteorites as [presolar grains](/wiki/Presolar_grains).<ref name = sch>[Template:Cite journal](/wiki/Template:Cite_journal)</ref>

## Meteorites[[edit](/index.php?title=(none)&action=edit&section=3)]

Analysis of SiC grains found in the [Murchison meteorite](/wiki/Murchison_meteorite) has revealed anomalous isotopic ratios of carbon and silicon, indicating an origin from outside the solar system.[[6]](#cite_note-6) 99% of these SiC grains originate around carbon-rich [asymptotic giant branch](/wiki/Asymptotic_giant_branch) stars. SiC is commonly found around these stars, as deduced from their infrared spectra.[Template:Citation needed](/wiki/Template:Citation_needed)

## Sources[[edit](/index.php?title=(none)&action=edit&section=4)]

All applications of silicon carbide today use [synthetic material](/wiki/Synthetic_material), as the natural material is very scarce.

Silicon carbide was first synthesized by [Jöns Jacob Berzelius](/wiki/Jöns_Jacob_Berzelius), who is best known for his discovery of [silicon](/wiki/Silicon).<ref name = saddow>[Template:Cite book](/wiki/Template:Cite_book)</ref> Years later, [Edward Goodrich Acheson](/wiki/Edward_Goodrich_Acheson) produced viable minerals that could substitute for diamond as an abrasive and cutting material. This was possible, as moissanite is one of the hardest substances known, with a hardness below that of [diamond](/wiki/Diamond) and comparable with those of cubic [boron nitride](/wiki/Boron_nitride) and [boron](/wiki/Boron).

Pure synthetic moissanite can be made from thermal decomposition of the preceramic polymer [poly(methylsilyne)](/wiki/Poly(methylsilyne)), requiring no binding matrix, *e.g.*, cobalt metal powder.

## Physical properties[[edit](/index.php?title=(none)&action=edit&section=5)]

[Template:Main](/wiki/Template:Main) The crystalline structure is held together with strong [covalent bonding](/wiki/Covalent_bonding) similar to diamonds,<ref name = xu/> that allows moissanite to withstand high pressures up to 52.1 [gigapascals](/wiki/Gigapascal).<ref name = xu/><ref name = zhang>[Template:Cite journal](/wiki/Template:Cite_journal)</ref> Colors vary widely and are graded from D to K range on the [diamond color grading scale](/wiki/Diamond_color).<ref name = Read>[Template:Cite book](/wiki/Template:Cite_book)</ref>

## Applications[[edit](/index.php?title=(none)&action=edit&section=6)]

[Template:Main](/wiki/Template:Main) [thumb|right|A moissanite engagement ring](/wiki/File:Moissanite_ring_natural_light.jpg) Moissanite was introduced to the jewelry market in 1998.[[7]](#cite_note-7) It is regarded as a diamond alternative, with some optical properties exceeding those of diamond. Its lower price and less exploitative mining practices necessary to obtain it make it a popular alternative to diamonds. Due in part to the similar thermal conductivity of moissanite and diamond, it is a popular target for scams; however, higher electrical conductivity and [birefringence](/wiki/Birefringence) of moissanite may alert a buyer to fraud. In addition, [thermoluminescence](/wiki/Thermoluminescence) is exhibited in moissanite, such that heating it gradually will cause it to change color starting at around 150 degrees Fahrenheit. This color change can be diagnostic for distinguishing diamond and moissanite, although birefringence and electrical conductivity differential are more practical diagnostic differentiators.[[8]](#cite_note-8) On the [Mohs scale of mineral hardness](/wiki/Mohs_scale_of_mineral_hardness) it is a 9.5, with a diamond being a 10.<ref name=Handbook/> In many developed countries, the use of moissanite in jewelry has been patented; these patents expired in August 2015 for the United States, and will expire in 2016 in most other countries except Mexico, where it will remain under patent until 2018.[[9]](#cite_note-9)[[10]](#cite_note-10)[[11]](#cite_note-11) Moissanite gemstones are sometimes marketed as *amora gems*, as well as under the trademark *Berzelian* (a reference to the work of Berzelius on SiC).

Because of its hardness, it can be used in high-pressure experiments, as a replacement for diamond (see [diamond anvil cell](/wiki/Diamond_anvil_cell)).<ref name = xu/> Since large diamonds are usually too expensive to be used as anvils, synthetic moissanite is more often used in large-volume experiments. Synthetic moissanite is also interesting for [electronic](/wiki/Electronics) and thermal applications because its [thermal conductivity](/wiki/Thermal_conductivity) is similar to that of diamonds.<ref name = zhang/> High power SiC electronic devices are expected to find use in the design of protection circuits used for motors, [actuators](/wiki/Actuator), and energy storage or pulse power systems.<ref name=baliga>[Template:Cite journal](/wiki/Template:Cite_journal)</ref>

## See also[[edit](/index.php?title=(none)&action=edit&section=7)]

* [Glossary of meteoritics](/wiki/Glossary_of_meteoritics)
* [Engagement ring](/wiki/Engagement_ring)
* [Fair trade](/wiki/Fair_trade)
* [Charles & Colvard](/wiki/Charles_&_Colvard)
* [Diamond](/wiki/Diamond)
* [Cubic zirconia](/wiki/Cubic_zirconia)

## References[[edit](/index.php?title=(none)&action=edit&section=8)]

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## Further reading[[edit](/index.php?title=(none)&action=edit&section=9)]

[Template:Commons category](/wiki/Template:Commons_category)

* [Template:Cite journal](/wiki/Template:Cite_journal)

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