

# Quartz

Silicon dioxide

$\text{SiO}_2$

Quartz is the most abundant and most common mineral on the Earth. It is found in almost every geological environment and also it is at least a component of almost every rock type. It has a hexagonal crystal structure and is made of trigonal crystallized silica. It is most varied in terms of varieties, colors and forms.

The most important distinction between the types of quartz is that one is of macrocrystalline, which is individual crystal visible to the unaided eye, and the other is microcrystalline or cryptocrystalline varieties, aggregates of crystals visible only under high magnification. Chalcedony is the generic term for cryptocrystalline quartz. The transparent variety tends to be macrocrystalline and the cryptocrystalline varieties are either translucent or mostly opaque.

The name "quartz" has been derived from the German "Quarz," a Slavic origin. It is the most common material identified as mystical substance maban in the Australian Aboriginal mythology. Pliny the Elder, a Roman naturalist believed quartz to be a permanently frozen ice. According to him, quartz is found near glaciers in the Alps and that the crystals of quartz were fashioned into spheres to cool the hands. It was also known to him the ability of quartz to split light into a spectrum.

Nicolas Steno's study of quartz made way for the modern crystallography. His discovery states that no matter how distorted a quartz crystal is, the long prism faces always made a perfect 60 degree angle.

## Physical Properties of Quartz

Color	Clear (in pure form)
Crystal habit	6-sided prism ending in 6-sided pyramid (typical)
Crystal system	Trigonal
Cleavage	None
Fracture	Conchoidal
Mohs scale hardness	7 - lower in impure varieties
Luster	Vitreous
Refractive index	1.544-1.553 - $D_r + 0.009$ (B-G interval)
Streak	White
Specific gravity	2.65 constant; variable in impure varieties
Melting point	1650 ( $\pm 75$ ) °C
Boiling point	2230 °C
Solubility	H <sub>2</sub> O insoluble

## Molecular Weight of Quartz

Silicon	46.74% (Si)	100.00% (SiO <sub>2</sub> )
Oxygen	53.26% (O)	
	100.00%	100.00% = Total Oxide

## Major Varieties of Quartz

Chalcedony - Any of the cryptocrystalline quartz, although usually only used for white or lightly colored material.

Agate - Banded Chalcedony, translucent.

Onyx - Agate, where bands are straight, parallel and also consistent in size.

Jasper - Opaque chalcedony, impure.

Aventurine - Translucent chalcedony with smaller inclusions (generally mica), which shimmer.

Tiger's Eye - Fibrous quartz, exhibiting chatoyancy.

Rock Crystal - Clear, colorless.

Ruby Quartz - Crimson glass-like crystal that absorbs vast amounts of solar energy.

Amethyst - Purple, transparent.

Citrine - Yellow to reddish orange, greenish yellow.

Rose Quartz - Pink, translucent, might display diasterism.

Milk Quartz or Snow Quartz - White, translucent to opaque, may display diasterism.

Smoky Quartz - Brown, transparent.

Morion - Dark-brown, opaque.

Carnelian - Reddish orange chalcedony, translucent.

## **Uses of Quartz**

- Silica for glass
- Electrical components
- Optical lenses
- Abrasives
- Gemstones
- Ornamental stone
- Building stone
- Piezoelectricity - It creates electricity through a process known as piezoelectricity with

mechanical stress given on it. Earlier, quartz crystal was used as phonograph pickup. Now, it is used as a crystal oscillator. These oscillators are simply known as "quartzes."

### **Occurrences of Quartz**

- Amethyst - Brazil, Uruguay, Mexico, Russia, Thunder Bay area of Canada, and some localities in the U.S.
- Smoky Quartz - Brazil, Colorado, Scotland, Swiss Alps and many other places.
- Rose Quartz - It is widespread but large quantities come from Brazil.
- Natural Citrine - It is found with many amethyst deposits but in very rare quantities.
- Rock Crystal - Brazil, Arkansas, many localities in Africa, etc.
- Fine Agates - Brazil, Lake Superior region, Montana, Mexico and Germany.