

# QUARTZ (SiO<sub>2</sub>)

**Mass of earth's crust is 59% silica and 95% of known rocks**



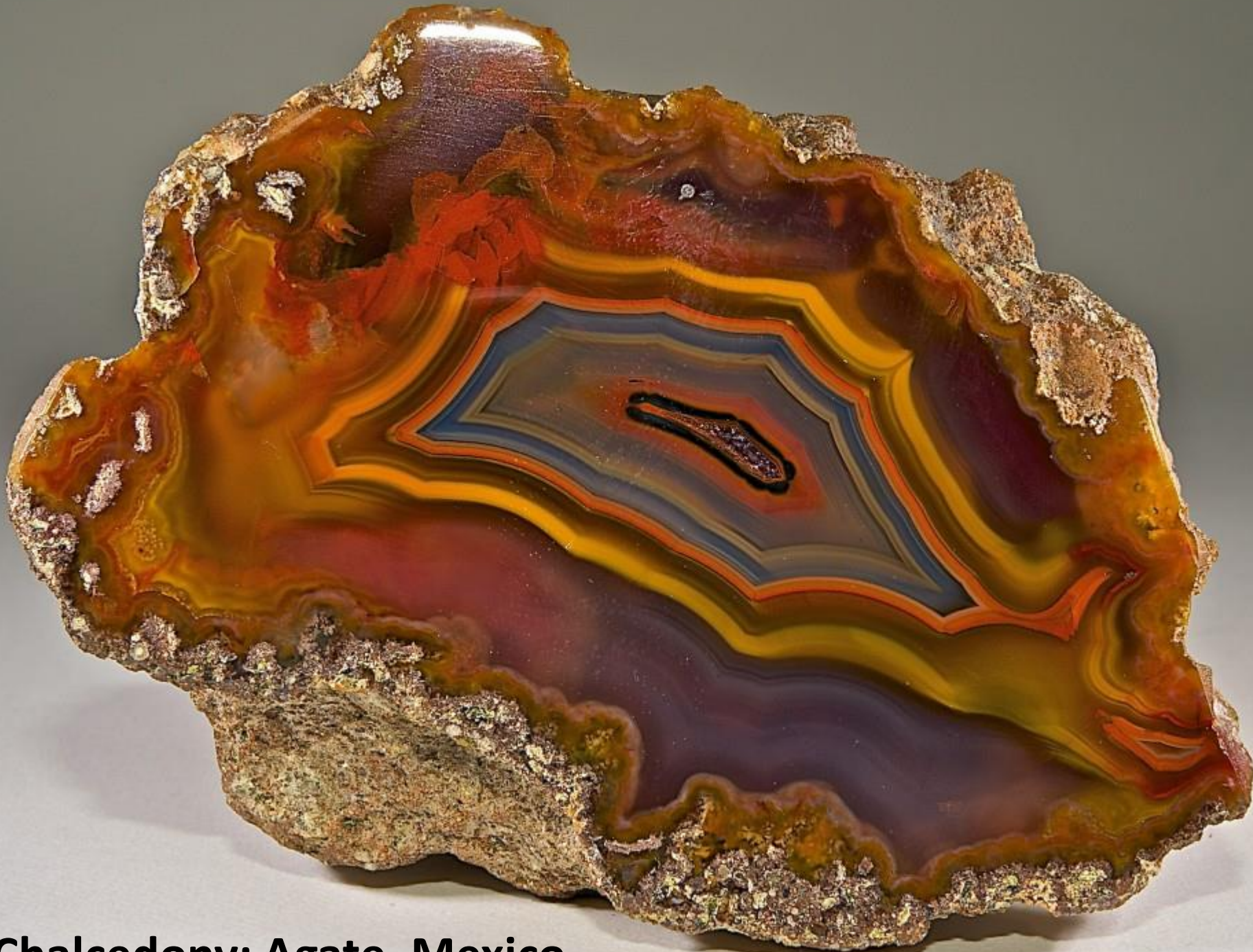
***amethyst crystals inside a geode***

# Chalcedony

A variety of [Quartz](#)

Depending on the context, the term "chalcedony" has different meanings.

A more general term for all varieties of quartz that are made of microscopic or submicroscopic crystals, the so-called microcrystalline varieties of quartz. Examples are the different types of agate, jasper, chert, chrysoprase, onyx, pietersite, etc.

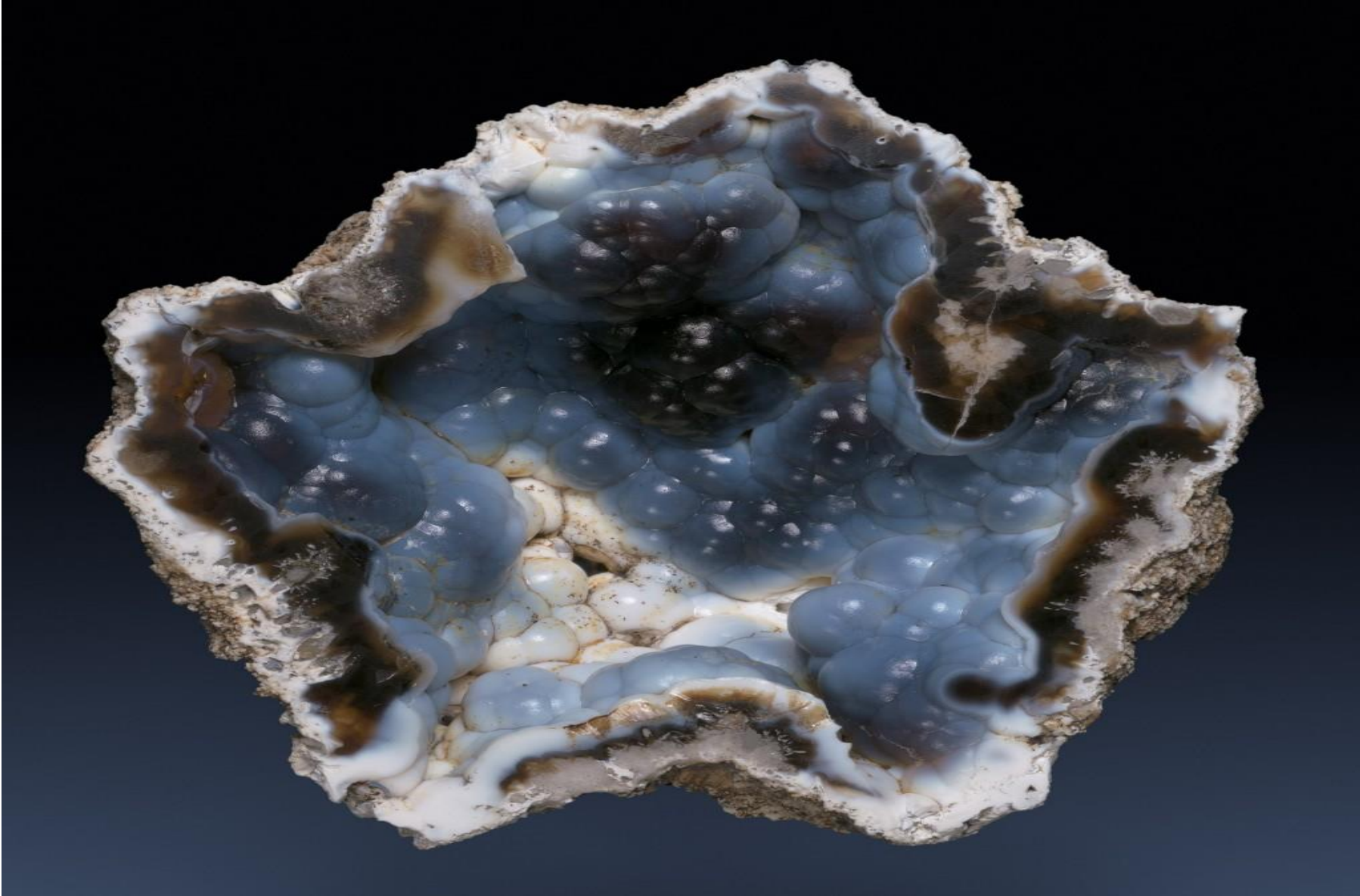




**Chalcedony: Red Jasper, Arizona**



Quartz - Agate plate, redbrown-white



**Chalcedony: Chrysoprase, Poland**





# Single Crystal vs Aggregate Gems

Both amethyst and chalcedony are the same species: namely quartz, so their crystals (whatever their size) are of the trigonal system, and their chemical formula is  $\text{SiO}_2$ , but the difference in the crystal sizes and arrangement creates some notably different physical and optical properties in the two varieties. For example, amethyst, and other single crystal quartzes, are commonly transparent and one color, while chalcedonies, agates, and other aggregate quartzes are translucent to opaque and often have complex color patterns. Although single crystal and aggregate types of quartz are equally hard, the aggregates are notably tougher



***Single crystal (amethyst)***



***aggregate (agate) forms of quartz***



***Twinned quartz crystals in "rabbit ear" form***

# Gemstone Mining

The total process of gemstone mining is so intricate that in spite of putting in so much efforts, there is no surety of the results. Failures and disappointments always have higher percentage than success.

The first and foremost requirement of this exclusive process is to identify the gemstone deposits. This necessitates the vast knowledge of gemstone properties, with the help of this key the deposits are identified where there could be the probability of the finding the gems.

# Gemstone Mining Methods

## Surface Mining

**Hydraulic Mining** – use powerful jets of water to loosen the gem material from the overburden. Miners make channels on the rock/gravel hillsides in form of sluices where water under pressure is sprayed. The water pressure splits down the rock and washes large rock piece of it down hill. And finally the gems as raw stones are recovered.

**River Panning** – Also known as placer mining. Here gems are collected while washing the gravels from river/stream in the mining area. Process initiated with the identification of the gravel which may contain gems.

**Quarrying** – Rock attained from this mining method is used for making buildings, interiors of houses like flooring, kitchen slabs. Gems can also be searched.

**Open Pit Mining** – Can only be done under the guidance experienced mining engineers and gemologists. Once the location is finalized, layers of overburden is removed one after the other till rocks are visible and removed and sent for further processing to allow the search for gems. Sometimes explosives are used to reach gem bearing rock.

**Strip Mining** – Similar to open pit mining. With help of a bulldozer, trees and bushes are removed. Remains are dumped in nearby area. The area is drilled and blasted to get to gem bearing rock. Raw stones are sent for further processing. This mining is done in long strips so it is called strip mining.

**Mountaintop Removal Mining** – Here the mountain top at the ground level is cleaned by cutting the trees and shrubs. Using explosives, the top of the mountain is blasted for making the vein. This gives huge blocks of rocks from which the gemstone in unprocessed form are retrieved.

**Underground Mining:** Used when surface mining is not possible or does not yield rewarding results.