

# Citrine

Natural citrine

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## What is citrine?

Citrine is a yellow variety of the mineral quartz. The chemical formula of quartz is  $\text{SiO}_2$  and in pure form it is completely colourless, we call this rock crystal. In citrine, the crystal lattice contains trace elements that cause the yellow colour. It is thought that there are two elements that are responsible for the colour of citrine. Aluminum can turn quartz gray-brown or yellow under the influence of (natural) radiation. We call the gray-brown quartz smoky quartz and the yellow quartz citrine. Iron can also give quartz a yellow colour. That is why, as far as we know, there are two types of citrine, one with aluminum as a trace element and one with iron. Citrine should not be confused with quartz that is yellow because of inclusions of, for example, limonite.

## How do you distinguish natural from non-natural citrine?

Natural citrine is usually transparent and has the same colour throughout the crystal. The colour is generally soft yellow-brown or yellow-green. Citrine does not grow in geodes, but in clusters and as single crystals, sometimes in so-called candle quartz form. Real citrine is slightly dichroic, which means that the colour changes a bit when light enters the crystal at different angles. Processed smoky quartz is indistinguishable from natural citrine, but heat treated amethyst is fairly easy to recognize. Pay attention to the following characteristics:

- Heat treated amethyst is often white at the bottom of the crystal and only the tips of the crystals are coloured.
- Heat treated amethyst has a darker brown or more yellow-orange colour.
- Heat treated amethyst clusters often have same sized crystals and a sometimes a geode shape, this cannot be natural citrine.
- Real citrine is way more expensive, heat treated amethyst is often relatively cheap.

Note that there are also pieces of dyed tumbled quartz or glass on the market that are being sold as citrine. These often have a striking bright yellow colour.



Heat treated amethyst.



Heat treated amethyst

## How do people make fake citrine?

Citrine is a relatively rare mineral. Much of the citrine that you can buy in shops and online is therefore not real citrine but heat treated amethyst. By strongly heating amethyst (purple quartz) the purple colour disappears and it turns yellow-brown-orange. The purple colour of amethyst is caused by iron. The heating changes the colour so it becomes brown-orange. On the other hand, if you heated natural citrine strongly (the aluminum-containing citrine), the colour would disappear and the mineral would become colourless. The original yellow colour will return after irradiation. With heated amethyst this is not possible, once coloured orange-brown the purple colour will not return. Smoky quartz can also be heat treated, very carefully and not too much. This allows the brown colour to change to a yellow colour.