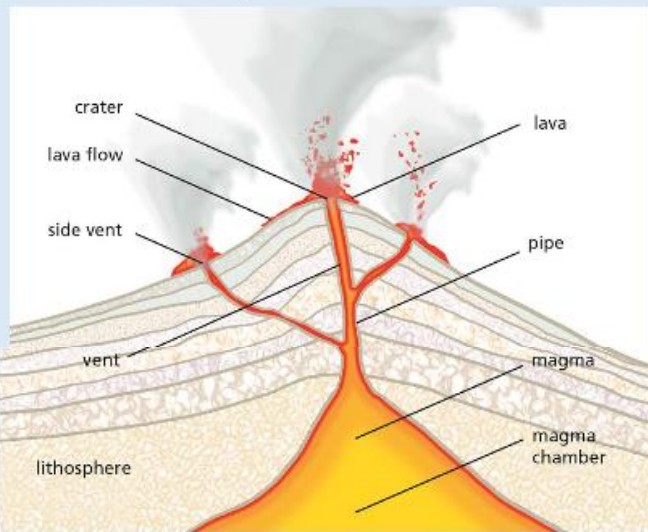


# How sapphires are formed

Sapphires are highly-prized gemstones of rare beauty that are found naturally, and can be produced in a laboratory. They are a variety of the aluminium oxide-based mineral corundum. The hardness of sapphires is second only to the hardness of diamonds, and this is what makes them so highly valued.

Tiny quantities of elements like iron, titanium, chromium, copper or magnesium make them appear different colours – from blue, purple and pink to orange, yellow and green. Red sapphire has always been known as ruby.

Sapphires occur in igneous or metamorphic rock and are mostly retrieved from alluvial deposits.



Cross-section of a volcano

## Formation in nature

### Heat and pressure deep in the lithosphere

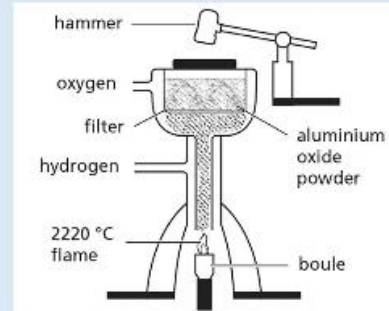
Deep in the lithosphere, heat and pressure form hexagonally-shaped corundum crystals or sapphires.

### Brought to the surface

Most sapphires are carried by magma flow towards the surface.

### Alluvial deposits

Because of their hardness, when rock is eroded by water flow, sapphires remain intact in alluvial sediments.



The Verneuil process (simplified version)

## Formation in the laboratory

### The Verneuil furnace

Aluminium oxide powder, or alumina, is added to an oxyhydrogen flame.

### Boule formation

Alumina in the flame slowly forms a teardrop shape of corundum, which is called a boule.

### Growing the crystal

Heat increases as more powder enters the flame, hitting the boule, melting then crystallising into a solid. When the sapphire is a suitable size, it is removed.



Multicoloured sapphire crystals



Blue sapphires