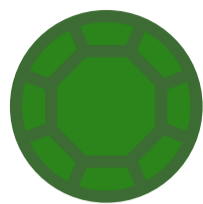


CHEMICAL COMPOSITION OF GEMSTONES

THE COLOURS OF GEMSTONES ARE AFFECTED BY DIFFERENCES IN CHEMICAL AND ATOMIC STRUCTURE, LEADING TO THE ABSORPTION OF DIFFERENT WAVELENGTHS OF LIGHT. THEIR HARDNESS IS MEASURED ON THE MOHS SCALE, WHICH RUNS FROM 1-10.

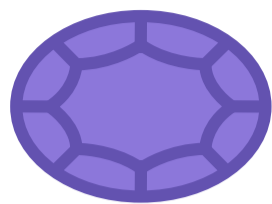


ALEXANDRITE



Hardness: 8.5

Colour caused by chromium ions replacing aluminium in some sites. Colour varies in different light.

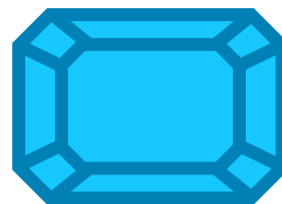


AMETHYST

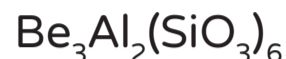


Hardness: 7.0

Colour caused by irradiation of iron 3+ ions in place of silicon in some locations in the structure.

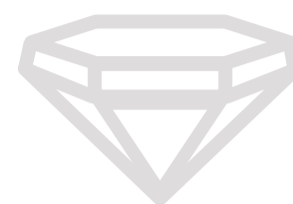


AQUAMARINE



Hardness: 7.5-8.0

Colour caused by iron 2+/3+ ions replacing aluminium ions in some locations in the structure.

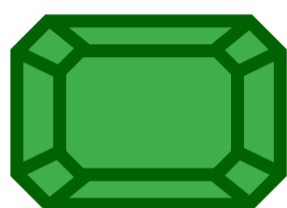


DIAMOND

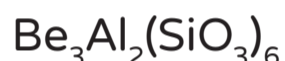


Hardness: 10

Colourless; can be faintly coloured by the trapping of nitrogen atoms in the crystal.



EMERALD

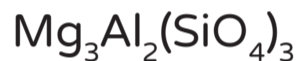


Hardness: 7.5-8.0

Colour caused by chromium ions replacing aluminium in some locations in the structure.

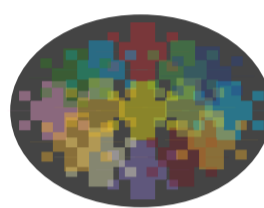


GARNET



Hardness: 6.5-7.5

Colour caused by iron 2+ ions replacing magnesium ions in some locations in the structure.

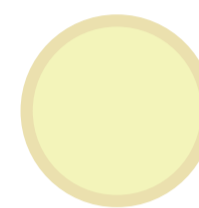


OPAL



Hardness: 5.5-6.0

A 'play of colours' caused by interference & diffraction of light passing through the structure.

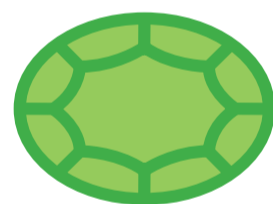


PEARL



Hardness: 2.5-4.5

Produced in the soft tissue of shelled molluscs. Most modern pearls are artificially cultured.



PERIDOT



Hardness: 6.5-7.0

Colour caused by iron 2+ ions replacing magnesium ions in some locations in the structure.

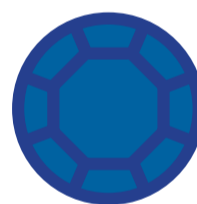


RUBY



Hardness: 9.0

Colour caused by chromium ions replacing aluminium ions in some locations in the structure.



SAPPHIRE



Hardness: 9.0

Colour caused by titanium and iron ions replacing aluminium ions in some locations in the structure.



SPINEL



Hardness: 7.5-8.0

A variety of colours are possible, caused by impurities such as iron, chromium and nickel.

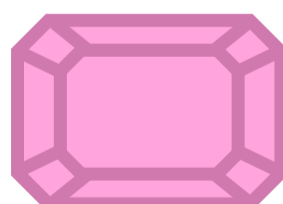


TOPAZ



Hardness: 8.0

Pure topaz is colourless; blue & brown varieties are caused by imperfections in atomic structure.

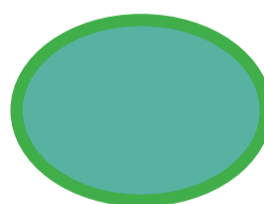


TOURMALINE



Hardness: 7.0-7.5

Colour caused by manganese ions replacing lithium and aluminium ions in some sites.

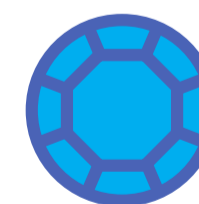


TURQUOISE



Hardness: 5.0-6.0

Colour caused by the presence of copper ions coordinated to the hydroxide ions and water.



ZIRCON



Hardness: 7.5

A range of possible colours that depend on the impurities present. Colourless specimens are popular diamond substitutes.