



- Describe how we make soda lime glass and borosilicate glass
- Describe how clay ceramics are formed
- Describe what's meant by a composite and give examples of composites

**Key Facts:**

**Ceramics**

Due to their high melting points and resistance to stains, ceramics are used in kitchen and dinnerware.

**Glass Ceramics**

Transparent and strong, glass ceramics **insulate** against heat and allow **light** to pass through, making glass the ideal material for making windows.

Glass ceramics are also more **durable** than other materials hence they are better suited for use in windows than plastic.

Most of the glass produced is soda-lime glass which is made by heating a mixture of limestone, sand and sodium carbonate (soda) until it melts.

On cooling it crystallises to form glass.

A variation is **borosilicate glass** which is made using sand and boron trioxide and has a higher melting point than soda-lime glass.

**Clay Ceramics**

These are hardened materials that resist **compressive forces**.

Clay is a soft material dug up from the earth which hardens at high temperatures.

Allows bricks to be used to build walls which withstand the **weight** and **pressure** of the material bearing downwards on itself.

**Composites**

These are made from two components: **reinforcement** and **matrix**.

The reinforcement material is embedded in the matrix material which acts as a binder..

Common examples include **fibreglass** and steel reinforced concrete.

Wood is an example of a **natural composite** as it consists of cellulose fibres held together by an organic polymer mix.

Composite	Reinforcement	Matrix
Concrete	Steel	Concrete
Fibreglass	Glass fibres	Polymer resin
Carbon fibre / tubes	Carbon fibres / nanotubes	Polymer resin

The properties of composites depend on the reinforcement and matrix used so composites can be **tailor engineered** to meet specific needs.

Carbon fibres for example are extremely **strong** and **low weight**, hence they are used in aviation, aeronautics and for making professional racing bicycles.

The picture to the right shows steel reinforced concrete has immense **tensile** and **compressive strength** allowing it to be used as columns and supporting structures in construction.





## KS4-17-08: Using Resources - Explore glass, ceramics and composites

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Describe how the following are produced and give uses for each:

- soda-lime glass
- borosilicate glass
- clay ceramics
- composites

soda-lime glass

borosilicate glass



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Research the physical properties of:

- soda-lime glass
- borosilicate glass
- clay ceramics
- composites

soda-lime glass

borosilicate glass

clay ceramics

composites