



Highly Commended

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How are the technical properties of glass changing the world?

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Introduction

Glass has been around for a very long time. Today, I am writing about what glass is, what are some of the technical properties of glass and how these technical properties of glass transformed the world we see today.

What is Glass?

Once glass was considered to be magically made because the ingredients used for making glass was a big secret. Only very few knew it.

The following diagram shows the contents of glass.

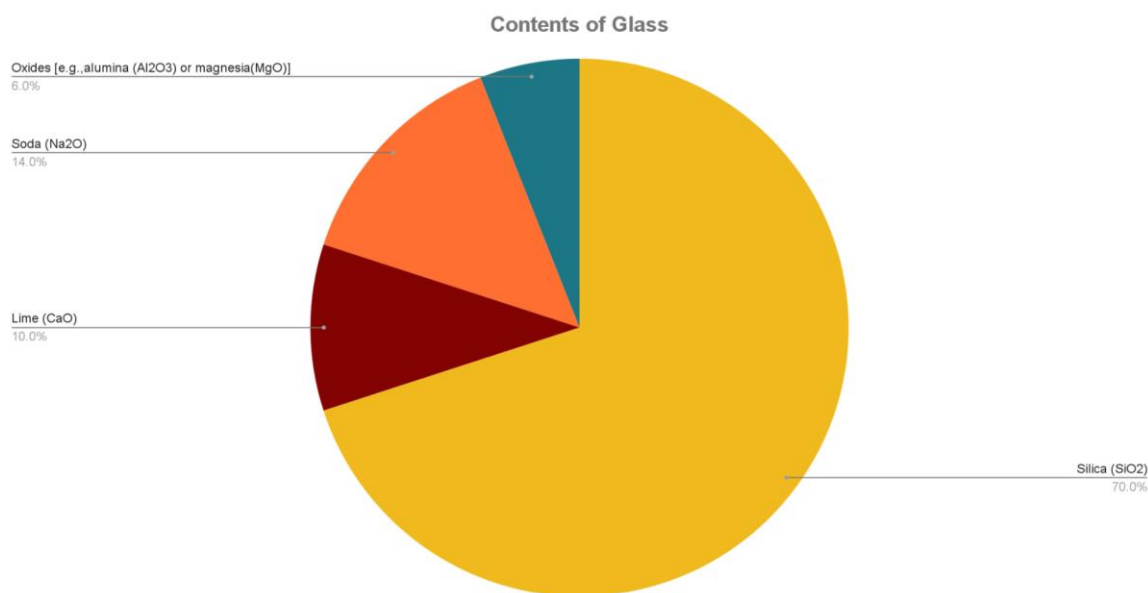


Diagram 1: Pie chart showing contents of glass

When these ingredients are heated at 1000 - 2000 degree celsius they melt together and become glass. So really, there is no magic in this process - just chemistry.

What are the technical properties of glass?

Transparency of glass allows light to pass and travel through it. This is also likely to be the first property of glass that comes to mind as it is very obvious. Glass also has the ability to enlarge images visually allowing us to read tiny text through a magnifying glass.

Glass is also heat resistant and it can reach up to a high temperature without melting. For example, if you put a glass object into a boiling kettle, it will not melt or soften. In fact, there are glass pans and kettles that can be used to bake and boil things. Also, electricity doesn't pass through glass at normal room temperature but it does if the glass is heated. That is why glass insulators were used in overhead power lines in electricity grids.

Again, glass is waterproof. That means you can pour water on it and it won't get absorbed and being chemical resistant means that glass does not react with most chemicals. That is why scientists can use glass beakers and syringes for conducting experiments. Glass can also be produced in different shapes. This is what makes it possible to manufacture items like dinnerware, window panes, car windshields, ornamentals and lots of other things out of glass. Being fire resistant means that glass doesn't burn and catch flames easily.

So how did the technical properties of glass impact the world?

The earliest known manufactured glass was made in Mesopotamia. The technique of melting silica, soda and lime together to make glass then spread to Egypt. They used glass to make colourful, glittery and differently shaped glass jewellery. In the 1400s, Venetian glass makers used the transparent property of glass to make crystal clear glass. This helped them to make better quality windows, chandeliers and utensils out of glass.

Magnifiability is another property of glass that was used to create microscopes and telescopes. In the 1670s, Antony van Leeuwenhoek developed lenses that could enlarge images up to 270 times! That's pretty impressive for the time! Robert Hook improved upon Leeuwenhoek's microscope by making the lens even better. This led to the discovery of cells, germs and other microscopic organisms and invention of better medicines and vaccines to treat and cure diseases.

In 1965, fibre optic glass was invented. In case you didn't know what fibre optic cables are, they're threads of hair thin glass. It is used instead of copper wires (and other metal wires) in phone lines. When someone speaks into their phone at one end of the line, the sound then travels to the other end of the line through electric signals. Copper wires (and other metal wires) were good for this but they were just a teeny tiny bit slow. Then, something better and more brilliant was invented. Fibre optic glass.

What travels faster than sound? Light. When someone speaks into their phone at one end of a fibre optic cable, the sound of the speaker turns into a series of light pulses which travel through the fibre optic glass threads and it is translated into words, voice, volume and speed to the person at the other end of the line. The invention of fibre optic glass led to the development of super-fast internet. This helped to upload and download information quicker. This is a major innovation of glass that continues to change and improve our world.

Most screens of portable devices like phones and tablets are made from Gorilla glass. Gorilla glass is a "chemically strengthened glass" made by Corning Incorporated that is damage resistant and more durable than normal glass. As a result, we can now make more portable and lightweight devices.

Conclusion

From glass beads, jewellery, telescopes, microscopes, fibre optic cables and Gorilla glass, glass continues to be used as a very significant and awesome material for building, science, engineering and medical inventions.

The future of glass is looking even brighter and more amazing.

There are new technologies and new uses of glass that are being developed. For example, photovoltaic glass is a new type of glass that is being developed to generate electricity from sunlight. This invention could help make climate friendly buildings and vehicles that will reduce our carbon footprint.

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