

## Student's Card

# Glass Raw Materials

**Objective: Understanding the role of each raw material on a glass composition**

## Introduction

Glass materials are very attractive for the development of eco-friendly, engineer safe and fully recyclable smart-materials. Glasses can be a solution for a more sustainable future as a fully recyclable material that can partially substitute plastics in different applications. Industrially the most common glass composition is the soda-lime silicate used in packaging, containers and windows float glass. Nevertheless, borosilicate glasses are frequently used in kitchen utensils and laboratory glassware since they have better thermal shock properties and can withstand higher temperatures without deforming.

To produce glass different raw materials can be used, which can be divided in:

- a) *Glass former or network former* – That can form single component glasses. Silica is the principal glass former, but it melts at very high temperatures.
- b) *Flux or modifier network* - To decrease the melting temperature, fluxes are added to the glass composition, ex.  $\text{Na}_2\text{O}$ ,  $\text{K}_2\text{O}$ ,  $\text{Li}_2\text{O}$ . However, they also cause partial net ruptures that decrease the glass stability.
- c) *Stabilizer* – Stabilizes certain glass properties and acts with an intermediate character between the network former and the modifier, ex.:  $\text{CaO}$ ,  $\text{Al}_2\text{O}_3$ ,  $\text{ZnO}$ .
- d) *Secondary components* – have specific functions, such as colourants



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## Necessities



### List of materials/tools

- UV-light
- Periodic Table

Besides this, it is not required any additional equipment or material other than what is available in the toolkit to carry out the activities.

## Lab Procedure

Activity#1. Discover natural raw materials to produce glass.

- Observe the different compounds present in the glass bottles.
- Try to figure out the elements existent in the raw materials and their role in the glass formation

Activity#2 What is the element that gives this colour?

- From the different glass samples, choose five glasses
- On the periodic table, place the glass on the element you think is giving the observed colour.
- Place the glasses under UV light to observe if they have luminescence. If they have it, identify the element that is giving luminescence.

## Questions/Quiz



*PowerPoint Quiz*