HIGHLY FLAMMABLE
ethanol in food colouring

eye protection must be worn

VERY HOT
sugar

do not eat anything in the laboratory

2: Fake Stained Glass

● Basic level ● 30 minutes

Requirements

100 g granulated sugar
25 g powdered glucose
40 cm^3 tap water
solid food colouring (purchased at shops specialising in the decoration and icing of cakes)
small quantity (a few drops) ethanol (**highly flammable**)
100 cm^3 measuring cylinder
balance
test tube
baking sheet or shallow metal tray, or tray covered with kitchen foil
petroleum jelly (Vaseline) or vegetable oil (to grease baking sheet/foil covered tray)
small saucepan
metal spoon
glass stirring rod
Bunsen burner
tripod and gauze
thermometer (reading up to 200°C)
2 x heat proof mats
250 cm^3 beaker containing tap water

eye protection

Advance preparation

Use a spatula to place a small quantity (< 0.1 g) of solid food colouring in a test tube. Dissolve in a few drops (< 1 cm^3) ethanol.

Method

See pupils' sheet.

The sheets should be as transparent as glass, so do not overdo the colouring.

Sugar solids are very hygroscopic. The glass will keep well in a dessicator.

Thin strips of Plasticine can be used to make shapes to pour the hot mixture into. The Plasticine can then be removed when the 'glass' has set.

Safety advice

The saucepan and the sugar syrup are HOT. The saucepan should have a suitable handle and care should be taken to avoid burns.

Eye protection should be worn.

Do NOT allow the children to eat the sugar glass if it is prepared in the laboratory. The ethanol used in schools is industrial methylated spirits and should NEVER be eaten.

The activity could be done in a food technology room in which case vodka or gin could be used to dissolve the food colourings. The product would then be edible, but beware of allergies to food colourings.

Chemical background

Glucose, $C_6H_{12}O_6$, is the simplest of the sugars. Sucrose, of which granulated and caster sugar are crystalline forms, has molecules made up of two glucose-like units linked together. When it is sufficiently concentrated (as indicated by the boiling point) the syrup will solidify on cooling to form a transparent glass. The solid is a glass because the sucrose and glucose molecules are not stacked in the regular repeating pattern of a crystal. In effect rapid cooling has 'frozen' the random arrangement of the liquid.

Reference

This activity is based on instructions for making 'poured sugar' in *The Brothers Roux on Patisserie*, Michel and Albert Roux, Little Brown, 1986.