

Blow-Up Balloon

Blow up a balloon without using your own breath



Grab this stuff:

- A** Small plastic bottle
- B** Vinegar
- C** Water
- D** Baking soda/bicarbonate of soda

- E** Balloon
- F** Teaspoon
- G** Funnel

Blow-up Balloon



Put a small amount of water in the bottom of the bottle, and then add the same amount of vinegar.



1



Using a funnel, half fill the balloon with baking soda (between $\frac{1}{2}$ and 1 teaspoonful should be enough).

2



Carefully place the balloon over the neck of the bottle and allow it to droop over to the side, making sure none of the baking soda falls into the bottle.

3



Now lift the end of the balloon and pour all the baking soda into the bottle. Shake well and place the bottle on a table. Watch the balloon inflate all by itself.

4

Blow-Up Balloon notes

Aims

- Predictions – learn how to make predictions about mixing materials to create a particular result.
- Investigation – learn about carbon dioxide (CO₂), the expansion of gases and how gases differ from solids.
- Materials – learn the difference between an acid and a base, and explore the reaction that happens when an acid is mixed with a base.
- Fair testing – have the opportunity to repeat the experiment, to develop an understanding of fair testing.

Practicalities and preparation

- Attaching the balloon to the bottleneck can prove tricky. Here are some tips on how to accomplish this effectively... Place four fingers inside the neck of the balloon and open it gently without splitting it. Invert the neck of the balloon over the top of the bottle whilst keeping the body of the balloon vertical. Ensure the baking soda remains in the body of the balloon until it is completely attached.
- Ensure that all the materials you require are available and within their expiry date.
- This is not a messy experiment, but spillages can occur if bottles are knocked over. You may choose to use aprons.
- Ensure all bottles are clean to prevent contamination, which could alter the result of the experiment.

Safety information

Check latex allergies. If there are any ensure these children do not touch the balloon.

The science – an introduction

This is a reaction between a base (baking soda) and an acid (vinegar). It produces a gas called CO₂, one of the gases we breathe out. The gas produced by the reaction cannot escape and therefore fills the balloon.

Discussion

- What is making the balloon inflate?
- What happens if you dilute the vinegar even more?
- What happens if you make the water/vinegar solution strong?
- What can CO₂ be used for? See links to real life.
- Why do we do fair testing?

Extensions

- You can experiment with different-sized balloons. See if the amounts of materials used earlier will be sufficient to inflate a larger balloon.
- Instead of using a balloon, you can use other objects such as a disposable glove.
- Food colouring can be added to the water.

Links to real life

- CO₂ is used by the food, oil and chemical industries. It is used in many consumer products that require pressurised gas because it is inexpensive and non-flammable.
- Beverages – CO₂ is used to produce carbonated soft drinks and soda water. Traditionally, the carbonation in beer and sparkling wine came about through natural fermentation, but many manufacturers carbonate these drinks artificially.
- Foods – a type of sweet called Pop Rocks is pressurised with CO₂ gas. When it is placed in the mouth, it dissolves and releases the gas bubbles with an audible pop.

- Leavening agents produce CO₂ to cause dough to rise. Baker's yeast produces CO₂ by fermentation of sugars within the dough, while chemical leaveners such as baking soda release CO₂ when heated or if exposed to acids.
- Fire extinguisher – CO₂ extinguishes flames, and some fire extinguishers, especially those designed for electrical fires, contain liquid CO₂ under pressure. CO₂ extinguishers work well on small flammable liquid and electrical fires, but not on ordinary combustible fires because it is so dry.

Links to the Science Museum

Galleries:

- Challenge of Materials
- atmosphere ...exploring climate science

Further information

- Lava Lunacy
- Alka-Seltzer Rocket
- Fizzy Fountain