

## Vinegar and bicarbonate balloons

### Why do this?

The standard vinegar and sodium bicarbonate practical activity always generates enthusiasm and interest, but can get very messy when carried out in open containers! This practical offers a safe, controlled and clean method for children to enjoy this reaction, whilst clearly being able to observe/identify the reactants and products.

In addition to this practical being exciting it provides children with an opportunity to practise their manual handling/ manipulation skills and a chance to practice handling liquids safely i.e. so that they do not splash or spill.

Curriculum links: *solids, liquids and gases, changing materials, everyday materials, food, non-reversible change, carbon dioxide*

### Suitability

Years 3 to 6.

### Practical details

#### Safety

Ensure children do not taste or eat any of the food.

Children should stand to carry out this activity. This ensures that children can step away easily if there is a spill and limits the amount of vinegar on clothing.

There will be an increase in pressure inside the balloon at the end of the activity. Adults should help children remove the balloon when clearing away to minimise any vinegar/bicarbonate spray.

Search on the CLEAPSS website for further guidance or the chemicals section of ASE publication *Be Safe!* If in doubt, or for further information, contact CLEAPSS.



#### Equipment per child/per pair

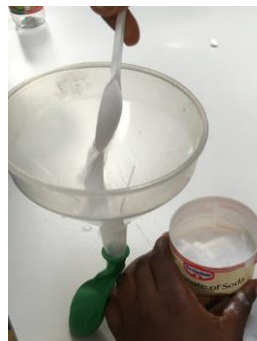
- 1 empty small plastic bottle (*Fruit shoot*/small water bottle size is ideal)
- 1 balloon
- 1 dry plastic funnel
- Vinegar
- Bicarbonate of soda (available from supermarkets)
- Small plastic spoon/spatula

#### Some common practical issues

1. Ensure the plastic funnel is dry before pouring sodium bicarbonate through it. If damp, the bicarbonate will stick to the sides. If you haven't got enough plastic funnels, you can make a substitute by cutting the top off another small plastic bottle.
2. Ensure the balloon is securely fixed to the top of the bottle. If not the pressure of the resulting carbon dioxide may force the balloon off, or you may find the carbon dioxide/foam mixture sprays through any gaps.
3. You can substitute normal malt vinegar with white vinegar and add a drop of food colouring for a more eye-catching result. Alternatively you can use lemon juice which smells better than vinegar.
4. You can use baking powder as an alternative to bicarbonate of soda (sodium bicarbonate) if necessary.
5. Ensure good ventilation in the room to help dissipate the vinegar smell.

## Procedure

1. Place 1-2 teaspoons of white bicarbonate of soda powder into a new balloon. The best way to do this is to insert the end of a dry plastic funnel into the balloon and carefully add the bicarbonate. Shake to ensure it goes into the balloon.
2. Remove the funnel and place the balloon on the table.
3. Place the funnel in the empty plastic bottle and fill the bottle with vinegar to a depth of 2-3 cm.
4. Remove the funnel and place to one side
5. Carefully fix the balloon to the top of the plastic bottle. Be careful not to position the balloon upright.
6. Place the bottle on a table and tip the bicarbonate into the vinegar by lifting the balloon upright.
7. Watch carefully what happens.



## Expected observations and results

As the reaction between the vinegar and sodium bicarbonate occurs, children will see a frothy product slowly rise up the bottle and the balloon will begin to inflate. It will continue to inflate until the reaction slows down and stops.

## Possible further activities

Once the children have seen and understood the reaction, there are a variety of enquiries they could undertake, including:

- Does the balloon blow up twice as big with double the amount of bicarbonate
- Does the balloon float or sink in air?
- What happens if you use lemon juice instead of vinegar?

There are also a number of variations on this theme, with the standard vinegar and bicarbonate reaction being used to make 'volcanos' etc.

## Background notes

This is an example of an irreversible chemical reaction as a new product is made and the original substances can't be re-made. The reactants are vinegar, which is a liquid, and sodium bicarbonate (also known as sodium hydrogencarbonate), which is a solid. The main product seen via the balloon inflating is carbon dioxide gas.

**This document supports teachers planning practical activities. It is not designed as a worksheet for classroom use**