

Student Sheet

In this practical I will be:

- Experimenting to see what happens when I mix ethanoic acid with sodium hydrogen carbonate.
- Describing what is observed.
- Explaining my results using my scientific knowledge and understanding, making sure to use key words like **reaction**, **fizzing** and **gas**.

Introduction:

You are an Ancient roman science-artist and you have just heard how Mount Vesuvius has erupted- covering the large areas, including the towns of Pompeii and Herculaneum in lava and ash.

By all accounts, the eruption was both horrifying and very exciting. You wonder if there's a way you could simulate your own mini-eruption. Like all good science-artists, you decide to investigate further...

Equipment:

For a group of 2 pupils:

- 1 teaspoon
- 1 cake tin for making cup cakes
- 1 table
- 1 newspaper
- Sodium hydrogen carbonate (bicarbonate of soda or baking powder) (50 g) **Low hazard**
- Ethanoic acid (white vinegar) (250 cm³) **Low hazard**
- 4 different food colourings (e.g. blue, red, green and yellow) these need to be artificial since 'natural' ones are not concentrated enough

For Going Further:

- Additional carbonates (e.g. potassium carbonate (**Harmful if swallowed, irritant**), calcium carbonate (**Low Hazard**))
- Narrow necked bottle or 100cm³ conical flask, or 25cm³ measuring cylinder
- Balloon
- Spatula
- Balance
- Weighing boat

Method:

1. Cover the table with newspaper in case of spillage (this is very likely).
2. Half -fill four muffin cups with ethanoic acid.



3. In one of these muffin cups put 3-4 drops of the first food colouring. Repeat with each of the other muffin cups, each time using a different colour.
4. Use a teaspoon to add one heaped spoonful of sodium hydrogen carbonate into each coloured solution.
5. Record what happens.

Going further:

Try comparing the change in mass when you use different carbonates

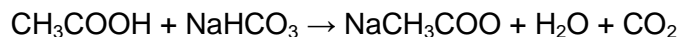
1. Put the ethanoic acid inside a bottle with a narrow mouth.
2. Put the carbonate inside a balloon and fix this on the top of a jar without pouring the carbonate into the bottle.
3. Find the mass before you mix the two chemicals.
4. Now turn the balloon up so the carbonate falls into the bottle and swirl to mix the chemicals.
5. Watch what happens and describe what happens to the mass.
6. Repeat with different carbonates and compare the changes in mass.
7. Explain your result

What does this tell you about the chemical reaction?

Theory:

The ethanoic acid reacts with the sodium hydrogen carbonate to form carbon dioxide gas and water.

ethanoic acid + sodium hydrogen carbonate → sodium acetate + water + carbon dioxide



The carbon dioxide gas produced rushes away from the solution. This is seen as bubbles. Because carbon dioxide is heavier than air, it cannot easily escape away from the reaction so it appears to flow down over the edges of your cupcake tin looking a little like lava flowing out of a volcano.

The fact there is no loss in mass when any carbonate reacts with the acid is to demonstrate the conservation of mass. It is a gaseous reaction so without the balloon attached to the reaction vessel the gas escapes and the mass will seem to decrease. The balloon stops captures the gas, so it is a sealed vessel reaction, and there is no loss in mass.

