What is carbon dioxide?

Summary

Groups of children to explore some simple demonstrations of carbon dioxide gas

Activities

1. Carbon dioxide from a fizzy drink.
2. Carbon dioxide with an Alka-Seltzer.
3. Baking soda volcano.

Teacher info

Carbon dioxide is a colourless and odourless gas. It makes up about 0.4% of the atmosphere. It is produced as a waste product when fuel is used to make energy and it is used as a raw material by plants to make their own food.

Perform an appropriate risk assessment before undertaking any of the suggested activities.

Do not confuse carbon dioxide (CO_2) with carbon monoxide (CO). Carbon monoxide is a toxic gas that is given off in car exhaust gases.

Timing

60 minutes in class

Resources

Carbonated drink in bottle.

Alka-seltzer or other 'fizzy' antacid tablet and a beaker or glass.

Baking soda, washing up bowl, empty plastic drinks bottle (or similar), washing up liquid, beaker and vinegar. Can be done with fizzy antacid tablet instead of baking soda.

Curriculum links

Science – Observing and explaining

Changing materials

Differentiation

In the baking soda volcano, link the production of carbon dioxide with changing materials.

Carbon dioxide from a fizzy drink

Demonstrate the carbon dioxide gas that is dissolved in a fizzy drink by simply shaking and opening a new bottle of fizzy drink. As the carbon dioxide 'escapes' out of the liquid it causes the bubbles and froth and makes a hissing sound. It can be demonstrated that the bubbles contain a light gas by adding a handful of raisins to a bottle of fizzy drink. The bubbles attach to the rough surface of the fruits and carry them up to the surface. When the bubbles burst, the gas is released and the raisins fall back to the bottom to collect more

bubbles and rise again.

Children can observe that carbon dioxide is colourless and odourless.

Carbon dioxide with an Alka-Seltzer

Add a fizzy ant-acid tablet to a glass or beaker of water. The tablets contain bicarbonate and this releases carbon dioxide as it dissolves. Children can see the fizzing and the bubbles produced which are full of carbon dioxide.

Antacid tablets are generally low-risk but, as with any medication, care should be taken to ensure that children do not take any tablets or drink the solution.

Baking soda volcano

Baking soda, or a fizzy antacid tablet, is sodium bicarbonate. It will react with vinegar (an acid) to produce carbon dioxide. If a small amount of washing up liquid is added to the mixture it forms a long lasting foaming froth.

1. Place a small amount of baking soda (two teaspoons) into a clear, plastic drinks bottle.
2. Place the bottle into a bowl to collect the foam that spills out.
3. Mix a small amount (about ¼ of a cup) of vinegar with a few drops of washing up liquid. Food colouring can also be added for greater effect.
4. Add the vinegar mixture to the bottle and watch the foaming 'lava' that erupts.

The sodium bicarbonate is reacting with the acidic vinegar to produce carbon dioxide gas. The washing up liquid then froths up. The bubbles containing the carbon dioxide.

The materials used are generally low risk but care should be taken so that none of them, or the foam produced get onto clothes or into children's eyes.
If a food dye is used, make sure it is non-toxic and take care that it does not stain clothing.
A bowl will help to prevent any foam getting onto surfaces.

To dispose of the materials, place the bowl and contents into a sink. Wait for the reaction to complete. Wear plastic kitchen gloves. Rinse the bottle thoroughly and flush the foam down the sink with copious amounts of water.