

Materials: Fire Extinguisher

What to do in advance: This demo is fairly reliable but it is worth trying it a couple of times in advance. Arrange a row of 5-6 candles in a metal tray or nightlights in a sand tray. Have a jug (e.g. of about 1-2l size) with 3-4 teaspoons of bicarbonate of soda in it. Have a bottle of vinegar on one side.

What to do with pupils: Light the row of candles. Pour about 200ml of vinegar into the jug and gently swirl for a few seconds. Pour the jug over the first candle, taking care not to tip the liquid contents out! Move the jug along the line of candles and they should extinguish one by one.

Questions to stimulate pupils' thinking:

- What is happening in the jug? Why does the liquid foam up and rise up the jug?
- Am I pouring anything out of the jug? What is coming out of the jug?
- Why doesn't the carbon dioxide gas go up and escape from the jug?
- Why do the candles go out?
- Do you know any other experiments that make carbon dioxide gas? Do you think they would work in the same way?

The science behind it

Vinegar and bicarbonate of soda is an example of a reaction between an acid and an alkali. One of the products of the reaction is carbon dioxide gas. Molecules of carbon dioxide have more mass than the molecules which make up most of the air (nitrogen and oxygen) and so they do not automatically rise up and escape from the jug. When you tip the jug you can pour the carbon dioxide out and because it is denser than air it falls towards the candles, pushing the air out of the way. Without the oxygen from the air to react with the wax vapour from the candles, the candles go out.

Real world connection

Red carbon dioxide fire extinguishers work in the same way, displacing the oxygen that the fire needs in order to keep burning.

