Fizzics Education

Science shows & workshops

Kitchen Chemistry

Experiments!

Kids Edition

Contents

Before you start!

We know that you'd LOVE to go ahead and get into all the science experiments in this booklet but before you do, it's worth reviewing how to setup a scienfic experiment so that you cover 3 crical things:

- Forming a testable hypothesis (what do you guess will happen?)
- Fair testing that hypothesis (is your experiment fair?)
- Idenfying variables that are in your experiment (what can you control and what can you change?)

As you look over each experiment, please keep these things in mind…

Forming a testable hypothesis (what do you guess will happen?)

Get your kids in the habit of making a guess of what they think will happen prior to the experiment. This is great to focus their minds on the challenge ahead as well as to teach them to form quesons about their world and then test those quesons! This is part of the scienfic method.

Fair testing that hypothesis (is your experiment fair?)

Once your kids have a queson to test, they need to learn to run an experiment that fairly tests that que-son. often in school kids will setup an experiment which is created in such a way that it doesn't actually test what their predicon was… this means that they haven't really designed the experiment correctly. Learning to do this means that they'll be more successful in their invesgaons!

Idenfying variables that are in your experiment (what can you control and what can you change?)

Kids need to be able to work out what factors affect their experiment. They need to learn to run at least two experiments at the same me where they only change one thing (eg. heat) and then measure their experiment to see if that thing they changed had an effect. If your kids can do this, they'll be way ahead when it comes to idenfying variables!

In this experiment book

- You'll find a sample experiment page that your kids can use in class on the next page. The em phasis is on geng students to idenfy variables correctly and to reflect on their results, rather than merely copying in the method of each experiment.

- Each experiment is self-contained for ease of prinng and sharing. Addionally, in each experiment there are links back to the Fizzics Educaon website so you can see addional videos too!

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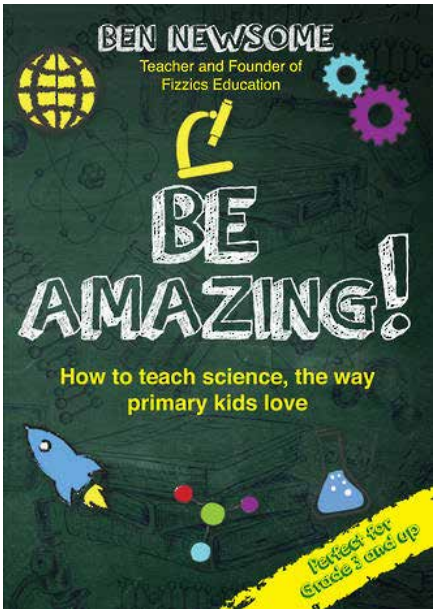

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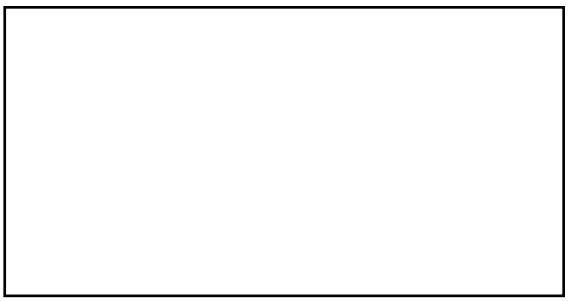
Experiment Title: _____

Picture of your experiment



Aim:

_____

_____

Materials

_____

_____

_____

Variables

- Independent variable (the one we varied) _____
- Dependent variable (what we measured to see an affect)_____
- Controlled variables (everything that stayed the same)_____

_____

Prediction

What did you think would happen if you changed the independent variable?

_____

Results summary (attach your raw data to this sheet)

_____

_____

Experiment Reflections

a) Which happened?_____

b) Did this match your prediction?_____

c) Explain why you observed this. _____

CREATE A MILK RAINBOW

You will need:

- Full-cream cow's milk
- Food Colouring
- Dishwashing detergent
- A saucer
- Eye droppers

Instruction

Pour some milk into a saucer (ignoring your cat: this is for the cause of science).

Drop four different colour drops of food colouring near the edge of the saucer.

In the centre, add one drop of dishwashing detergent.

4

And watch.

Why Does This Happen?

The drop of detergent reduces the surface tension at the point where it dissolves the fat molecules in the milk. The higher surface tension of the surrounding milk pulls the surface away from that spot, dragging the food dye with it.

The rest is due to the detergent breaking down the fats within the milk. As the fats break down, water carries the food colouring to where the fat was to fill the space.

Variables to consider

- Different types of milk (soy, almond, light and full cream milk)
- Temperature of the materials

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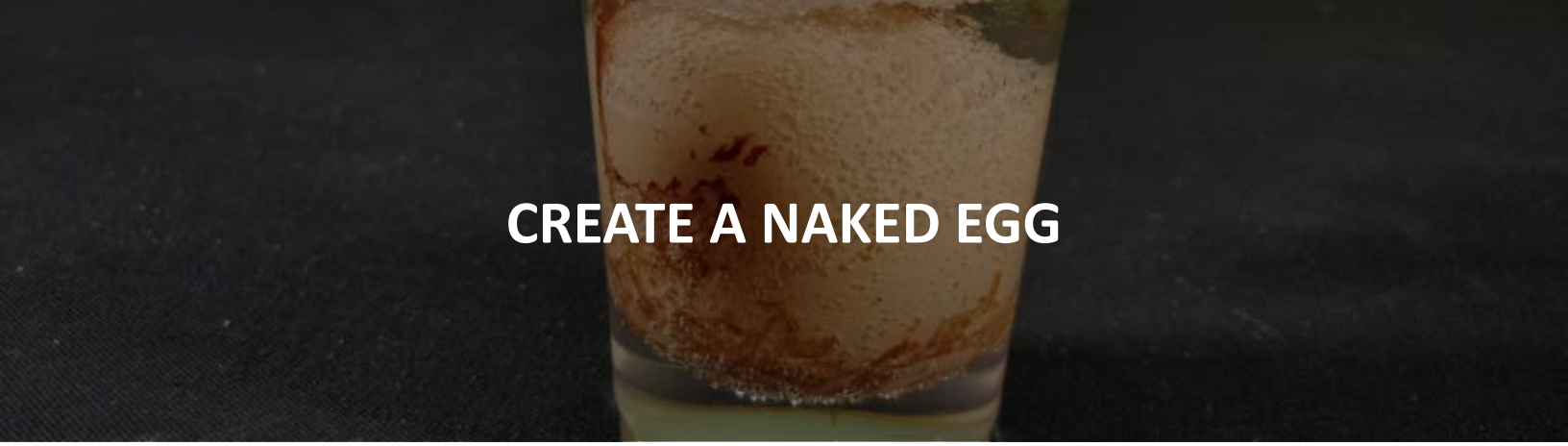

CREATE A NAKED EGG

You will need:

One Egg

A 500mL bottle of clear white vinegar

One drinking glass

Instruction

Put the egg into the glass.

Pour vinegar into the glass until it completely covers the egg.

Have a look closely at the surface of the eggshell. You should see it start to be covered in tiny bubbles.

4

Leave the glass, vinegar and egg overnight where it won't be touched.

5

After about 24 hours has passed, check the egg again. The shell has disappeared, leaving the egg completely naked.

6

Carefully take the egg out of the glass and feel it. What does it feel like?

VERY carefully drop the egg into a table from about 5cm up. What does the egg do?

Why Does This Happen?

Eggshells are made of a compound called Calcium Carbonate ($CaCO_3$).
This is the compound that keeps the egg strong and protects it from damage while the chick grows inside.
Vinegar is an acid, more specifically acetic acid. Acids are chemicals which taste sour, and have a lot of Hydrogen in them. Acids have a pH of less than 7.

When the vinegar comes into contact with the eggshell, a chemical reaction occurs.
The acid splits up the $CaCO_3$ into its two main parts: Calcium (Ca) and Carbonate (CO_3).
The Calcium dissolves into the vinegar solution, much like sugar dissolving in a cup of tea.
It's invisible in this state. The Carbonate gets released as Carbon Dioxide gas, which is what all those bubbles you saw were full of.

As the eggshell is broken up, dissolved and released, we get to see what's underneath.
We can see the egg white, still in a gooey liquid state, and the liquid yolk too. Perhaps the coolest thing though is the egg membrane that's now holding the whole lot together. This membrane is always there, but we usually break it when we crack the eggshell. It's strong enough to hold the egg together and even let it bounce from short heights, but will break if put under too much stress. This membrane forms on egg inside the hen, before the shell is made. It's permeable (which means some chemicals can soaks through it) and all the nutrients that are in the egg pass through it.

You can experiment with this membrane do see some really cool effects:

- Putting the naked egg in a cup of water allows the water to soak into the egg, making it swell and grow!
- Conversely, putting the naked egg in a cup of highly salty water makes some of the water in the egg flow out into the cup, leaving the egg shrivelled.

- Put the egg in a cup of water with food colouring.
  The colouring soaks into the egg. If you break the membrane you'll see that it's not just the membrane that's gone coloured, but the egg white and yolk too!

Further information

Acid rain occurs when acidic chemicals in the atmosphere mix with water and turn the rain acidic, like our vinegar. In some parts of the world this is so severe that birds are having trouble making eggshells. They drink the acidic rainwater, and the acid in their bodies dissolves the eggshells as they make them. Environmental issues like this can have far-reaching and unexpected consequences.

Variables to consider

- Different dilutions of vinegar
- Temperature of the materials

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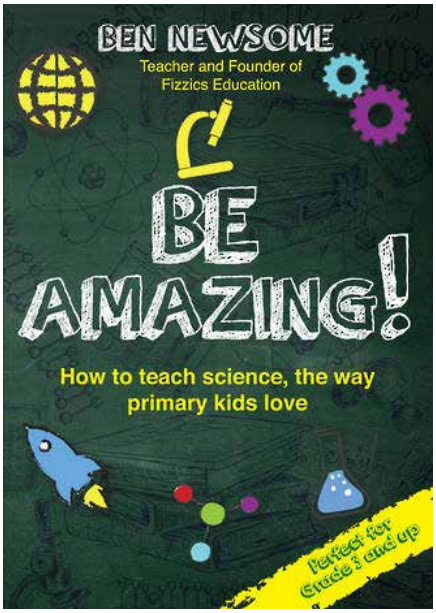

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