Scien-tastic

Magnetism

You will need:

- two or more magnets
- a collection of iron based and non-iron based metals (ferrous vs non-ferrous)

1. Try pushing magnets toward each other. What do you notice? Try flipping one of the magnets, is there a change?

Why? Magnets, like the planet earth have two poles, a north pole and a south pole. When opposite poles are directed toward each other the magnets attract. When the same poles are directed toward each other the magnets repel.

2. Try moving different metals with a magnet. Which ones are affected?

Why? Metals affected by magnets are known as ferrous metals and include iron and steel. Non-ferrous metals aren't affected by magnets and include aluminium, copper and nickel.

3. Place your hand between your magnet and a ferrous metal. Does the magnet still work?

Why? Magnets produce a magnetic field. The size of the field is dependent on the strength of the magnet.

Soda Explosion

You will need:

- An unopened bottle of soda water

1. Shake the soda bottle, open it. What happens?

Why? The water is made fizzy by injecting a gas called carbon dioxide. When the bottle is shaken pressure builds. When the bottle is opened the pressure forces the soda water out the top of the bottle.

"Are you telling me that Science can explain the cruel magic of exploding water bottles?!"

Bleach experiment

You will need:

- Water of any kind
- Clear glass container
- Food colouring
- Laundry bleach

1. Fill a glass container with water. Add three drops of food dye. Stir. Add a capful of bleach and stir again. What has happened to the colour?

Why? On a molecular level bleach breaks the bonds of a chromophore. The chromophore is responsible for giving a molecule its colour. This means the colour is either radically changed or removed altogether.

CAUTION: Bleach is poisonous when consumed. Wear protective clothing and wash hands after experimenting with bleach.

Neutralisation experiment

You will need:

- Glass container with soda water
- ¼ cup vinegar
- 1 tablespoon bicarbonate soda
- Food dye (optional)

1. Add vinegar to the glass of soda water. Quickly stir and add bicarb soda. Stir again. What happens?
   Optional: add three drops of food dye before the vinegar.

Why? All chemicals solutions fit into two categories, acids and bases. When a strong acid such as vinegar is mixed with a strong base such a bicarb soda the two are involved in a fizzy neutralisation reaction.

Ruth seems to be having lots of fun with the neutralization experiment, but Tim is not so sure it's going to work…

Bam! The wonders of Science!

Water filtration experiment

You will need:

- Soda bottle
- Charcoal
- Sand
- Stones
- A small bottle of dirty water

1. Cut the bottom end of the soda bottle off and poke a hole in the cap. Layer the bottle with charcoal, sand and stones in that order. Charcoal should be at the cap end of the bottle. Pour half of the dirty water over the stones and collect the drops with the cut off piece of bottle. Is the water cleaner?

Why? This is a process known as carbon filtering. The water is dirty because it is full of impurities. By passing through layers of fine material (stones, sand, charcoal) the impurities are taken out.

CAUTION: To make dirty water use tap water before adding dirt, leaves etc. If attempting to filter water from a natural source boil it for 10 minutes before attempting to drink.

Stones

Sand

Charcoal

Ruth doesn't think Tim is brave enough to drink the filtered water…

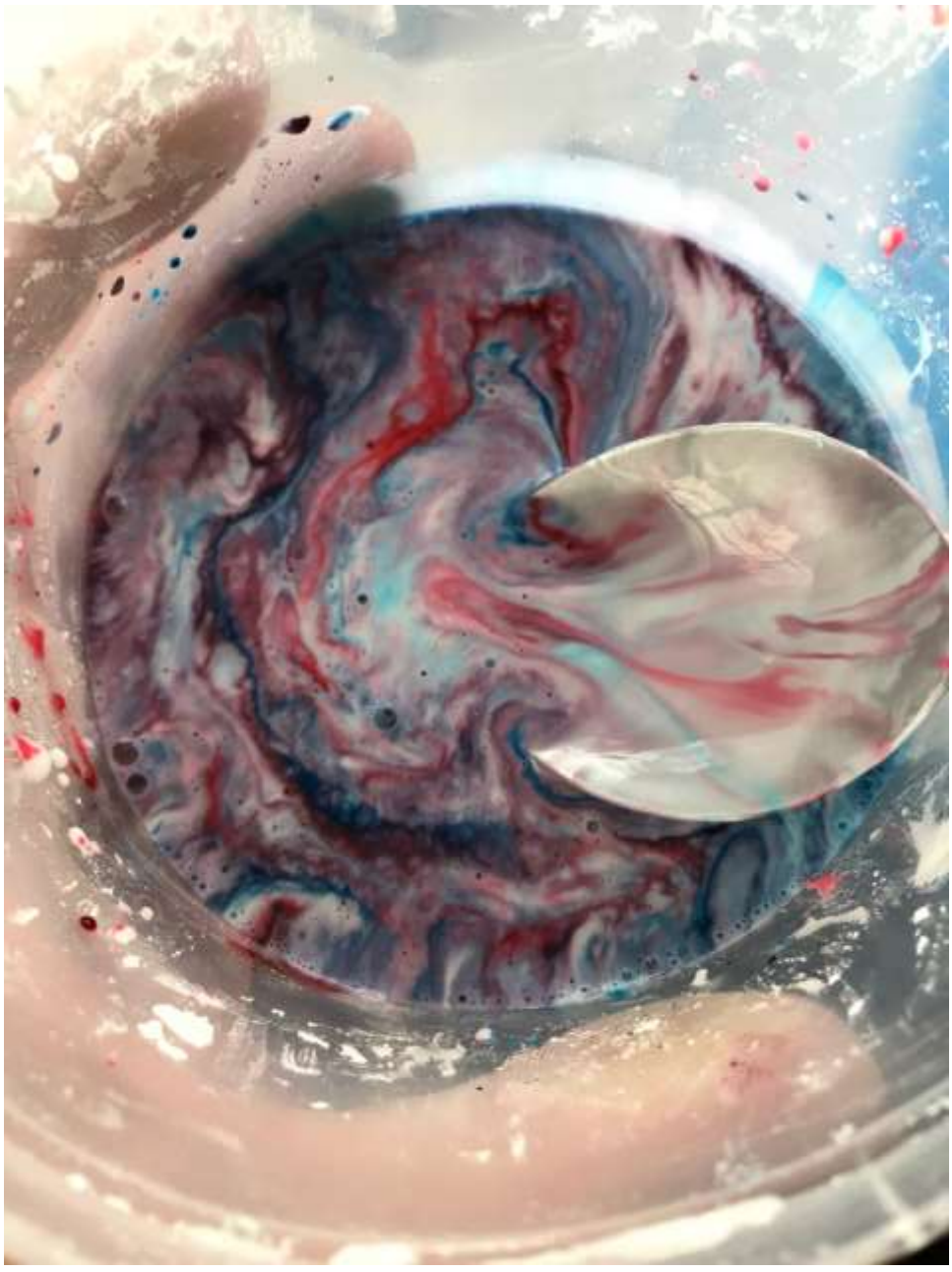
Making Oobleck (Non-Newtonian fluid)

You will need:

- Two parts cornflour
- One part water
- Food dye (optional)

1. Gradually add water to cornflour whilst stirring. Apply force to oobleck with a spoon. Release, what do you notice?

Why? Oobleck is an example of a non-newtonian fluid, which neither exists as a solid, liquid or gas. When the oobleck is at rest it behaves as a liquid but when any force is applied it behaves as a solid.



Bubble experiments

You will need:

- A bubble wand
- A smoke machine

1. Blow bubbles, what do you notice?
2. Aiming the jet of the smoke machine at the bubble wand. Blast smoke through the wand to form bubbles. What's different?

Why? Bubbles are formed by soap trapping pockets of air. The air can be substituted with any gas. As smoke is heavier than air you should notice the bubbles behave differently.

"Bubbles filled with smoke move slower than regular bubbles because smoke is heavier than air."

Vortex Cannon experiment

You will need:

- Round 80L bin
- Strong plastic shower curtain
- Jigsaw
- Strong tape such as gaffer or duct tape
- Plastic cups
- Smoke machine

1. To make the vortex cannon cut a small round hole in the base with the jigsaw. The hole shouldn't exceed 50% of the surface area of the base. Cut a piece of shower curtain and tape it to the top of the bin covering it completely. The shower curtain should be stretched tight.
2. Stack up plastic cups. Aim the vortex cannon at the cups and hit the plastic shower curtain. What happens?
3. Fill the vortex cannon with smoke. Fire the cannon by hitting the plastic shower curtain. What shape is the smoke when fired?

Why? A Vortex cannon fires compressed air. By hitting the plastic air is forced down the barrel and out the small hole with a great amount of force. By firing smoke rings we can actually see what compressed air looks like as smoke behaves a lot like air.