

RADICAL REACTIONS

Phase Transitions

Watch the video here:

[youtu.be/
RaYosPIOFuY](https://youtu.be/RaYosPIOFuY)

Name:



Swansea University
Science for
Schools Scheme



PHASE TRANSITIONS

Physics lesson

WHAT ARE WE LEARNING?

We will be learning about solids, liquids and gases or 'states of matter'.

Most substances are either a **solid**, a **liquid**, or a **gas**.

These are the three main **states of matter**.

- **Solids have a definite shape which they retain.**
- **Liquids do not have a definite shape.** Liquids take the shape of whatever container they are in and flow (move) under gravity
- **Gases do not have a definite shape.** If a gas is heavier than air it will take the shape of the container it is in. If it is lighter than air it will move out of the container it is in.

When materials change from one **state of matter** to another (**liquid** water changing to **solid** ice) it is called a **PHASE TRANSITION**.

Changing a material's temperature is the easiest way to change its state of matter. For example, if we heat water it turns into steam, which is a gas. Sometimes there are other things that we can do to **create a phase transition**.

WHAT ARE WE EXPLORING?

We are going to explore three ways in which we can change a substance's state of matter.

1. **'Clouds in a Bottle'**. Changing the air pressure inside a bottle causes a liquid to change into a gas, releasing the pressure changes it back to a liquid.
2. **'Making Oobleck'**. Oobleck is not a solid, liquid or gas. It is a special type of matter called a **Non-Newtonian fluid**. Non-Newtonian fluids sometimes behave like liquids and sometimes like solids.
3. **'Slime'**. We are going to watch a chemical reaction between two liquids. When these liquids are mixed, there is a reaction between their particles which turns the mixture from a liquid into 'slime' - another example of a non-Newtonian fluid.

SAFETY

- Get an adult to help you with the matches.
- Be careful with matches near the plastic bottle. Do not bring the lit match into contact with the plastic.
- Do not use any liquid other than water.

EXPERIMENTS

MAKING OOBLECK

MATERIALS:

- Cornflour/Corn starch
- Water
- Food colouring (optional)
- Bowl
- Spoon

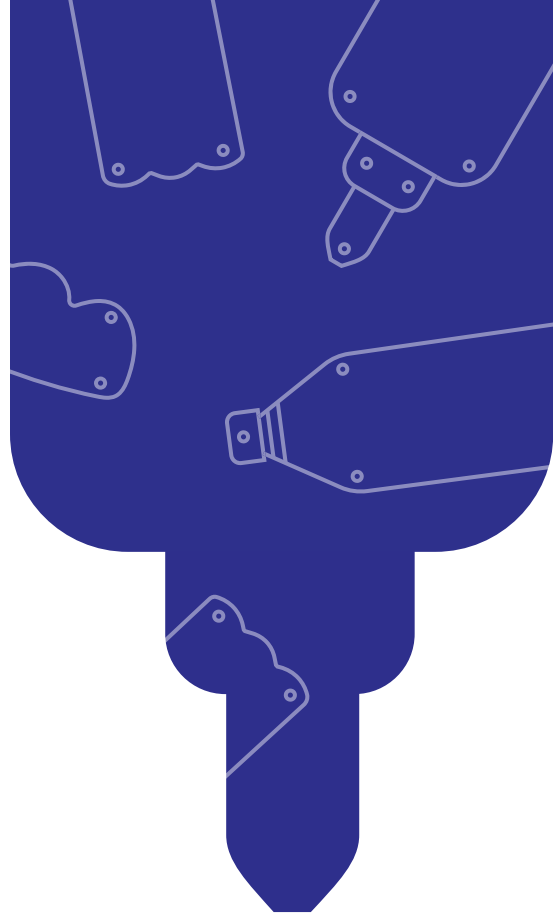
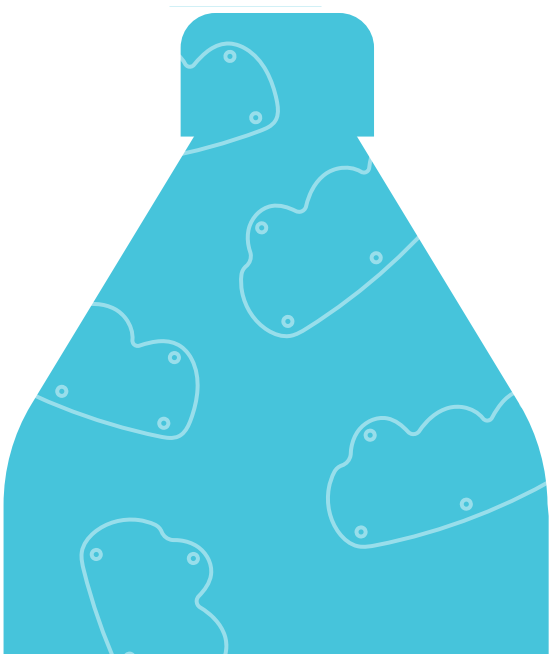
MAKING A CLOUD IN A BOTTLE

MATERIALS:

- Matches
- Water
- Empty plastic bottle

CLOUD IN A BOTTLE

1. Fill your bottle between 1/2 and 3/4 of the way up, with cold tap water.
2. Put the lid on the bottle and squeeze it to increase the pressure inside the bottle. Release the bottle to decrease the pressure inside the bottle. Repeat this a few times to see if anything happens.
3. Take the lid off the bottle.
4. Ask an adult to light a match for you. Drop the lit match into the bottle so that it falls into the water. Quickly put the lid back onto the bottle.
5. Squeeze the bottle to increase the pressure again and release to decrease the pressure.
6. You should now be able to see a 'cloud' inside the bottle.
7. Experiment with putting more, or less, water in the bottle, does it change how the cloud appears? What happens if you use colder or warmer water?



MAKING OOBLECK

1. Choose how much oobleck you want to make. The recipe is the same for any amount of oobleck, you just need to make sure you use 2 parts cornflour to 1 part water. So, if you use 2 cups of cornflour, you should use 1 cup of water.
2. Measure out your cornflour and water.
3. Put the cornflour in to the bowl.
4. Add a couple of drops of food colouring to the water and stir (if you are using colouring).
5. Add the water slowly to the cornflour, stirring the mixture as you go.
6. The end mixture should be a viscous (thick) liquid, like honey. If it is too stiff, add more water, if it is too runny, add more cornflour.
7. Now you can get messy! Try picking up the oobleck in your hands. How does it behave?

ACTIVITY SHEET

Is it a solid, liquid, or gas? (tick the correct box)

Milk	SOLID	LIQUID	GAS	Honey	SOLID	LIQUID	GAS
Water	SOLID	LIQUID	GAS	Steam	SOLID	LIQUID	GAS
Air	SOLID	LIQUID	GAS	Carbon dioxide	SOLID	LIQUID	GAS
Fish	SOLID	LIQUID	GAS	Ice cube	SOLID	LIQUID	GAS
Pencil	SOLID	LIQUID	GAS	Sand	SOLID	LIQUID	GAS

liquid

gas

solid

Complete each sentence with the words:

A has a definite shape. It does not take the shape of its container. If you put it in a bowl, it will stay the same shape and not move.

A does not have a definite shape. It takes the shape of its container. If you put it in a bowl, it will move and become the same shape as the bowl.

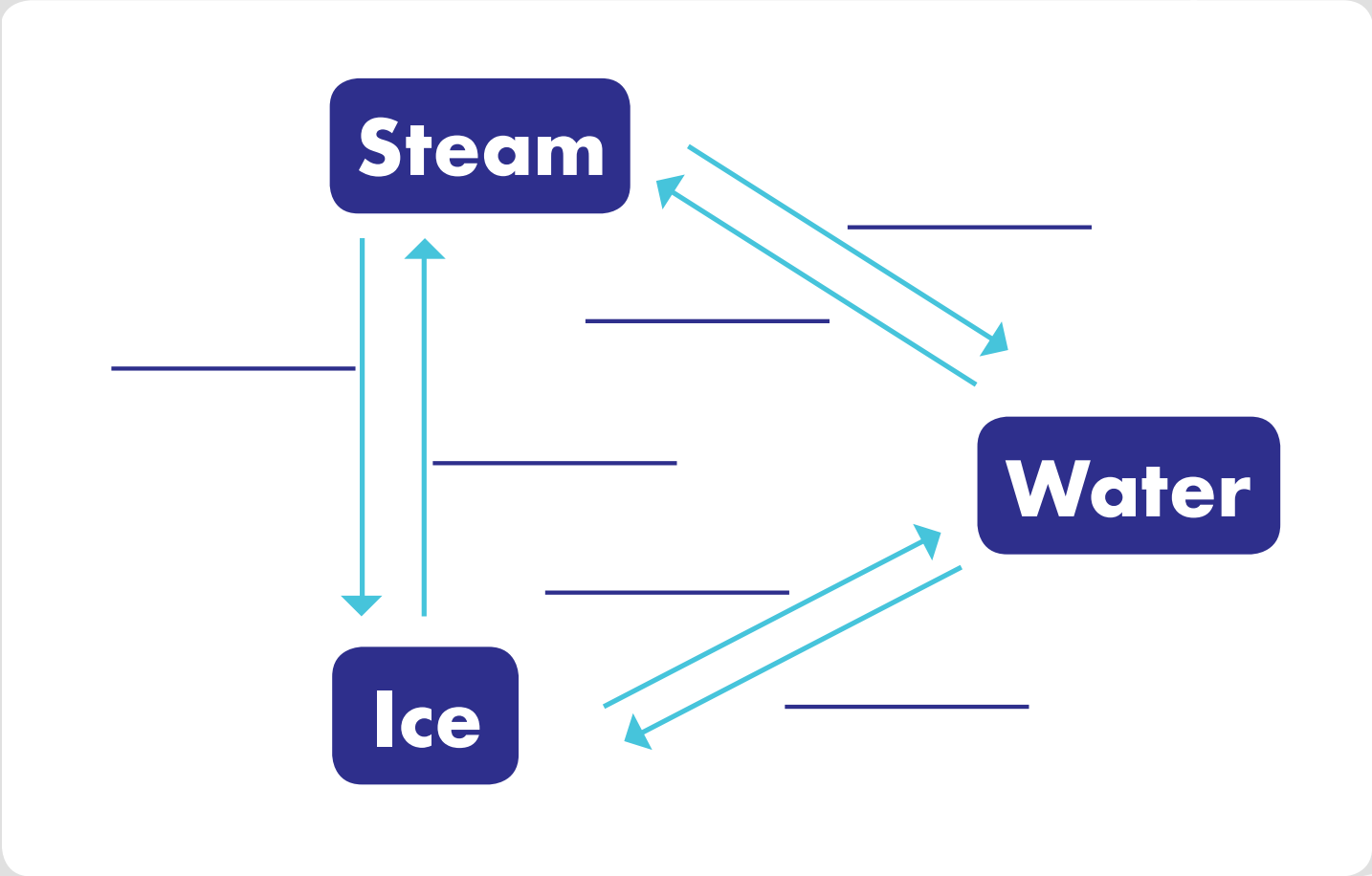
A does not have a definite shape. It sometimes takes the shape of its container and sometimes flies out of the top of the container. It moves around to fill the space it is in.



Watch how to make your own non-Newtonian slime! Watch it on YouTube by clicking here.

Fill in the missing words in the diagram

Words to use: melting, freezing, evaporating, condensing, sublimation, decomposition





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