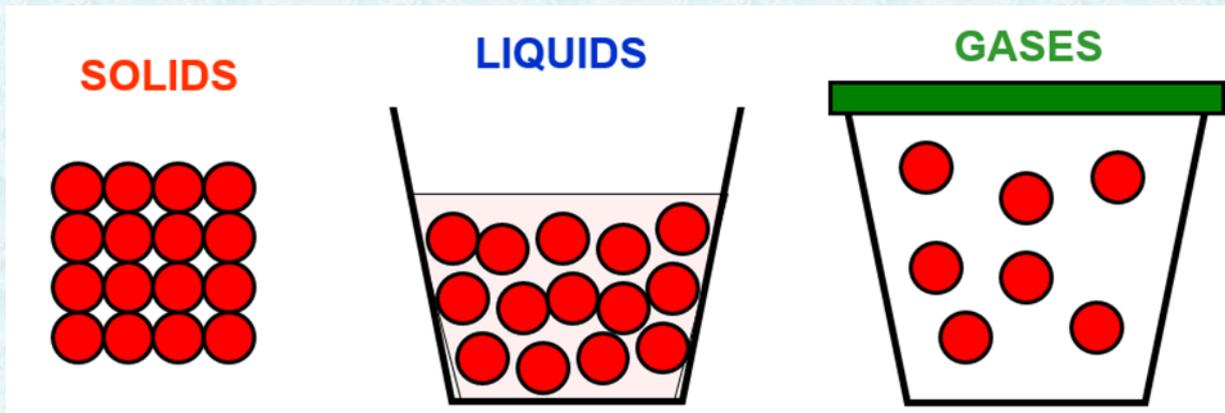


States of Matter



Is water always wet?



STATES OF MATTER: Is water always wet?



States of Matter: What are they?

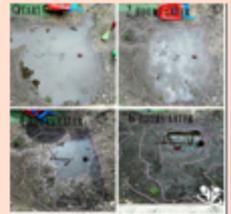
matter	Matter is the building blocks of all things including you, the air and objects around you, the planets, the sun and all the stars. There are three main states of matter: solids, liquids and gases.
molecules 	Matter is made up of tiny particles called molecules and it is the arrangement of these molecules that determine whether something is a solid, liquid or gas.
solid 	Solid objects hold their shape and are rigid because their molecules are held tightly together. They have a fixed volume (the space they take up). Like a table or the moon.
liquid 	Liquids are difficult to hold but they can be poured and they take the shape at the bottom of their container, because their molecules are loosely connected. They have a fixed volume. Like lemonade, milk or water.
gases 	Gas molecules are full of energy and are not joined in any way, meaning they are constantly free to move around and are very difficult to control. Like the bubbles in lemonade or oxygen.

Processes involved in Changing States of Matter

Several processes describe how matter can change state.



Evaporation: Occurs at the surface of a liquid. The liquid molecules gain enough energy to break free and form a gas.



Freezing: When the temperature of a liquid is reduced to its

freezing point, the molecules slow down. They only move very slowly and gently on the spot so the liquid becomes a solid.



Melting: When a solid is heated to its melting point the molecules move faster and are able to move around each other.

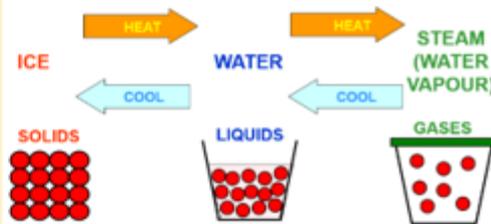
Condensation: When a gas cools down the molecules move together and form a liquid. It happens to the windows and mirrors in your bathroom.



Changing States of Matter

When water and other liquids reach a certain **temperature**, they change state into a solid or a gas. The temperatures that these changes happen at are called the **boiling**, **melting** or **freezing points**.

Matter can change state depending on its temperature.



Changing state and its role in the Water Cycle

Energy from the sun heats up the surface water in rivers, lakes and oceans. This causes the water molecules to rise and to **evaporate** into the air as water vapour (gas).

As the water vapour rises, it cools in the higher air and **condenses** creating clouds of water droplets (liquid). If it is very cold the droplets can form snow or hail stones (solid). When too much water has condensed, the clouds become too heavy and **precipitation** (rain, hail or snow) occurs.



wood ice cube sand glass

Solids

coffee steam water shower gel

Liquids

water vapour carbon dioxide air

Gases

SOLIDS

LIQUIDS

GASES

**are different states of
matter.**

SOLIDS

LIQUIDS

GASES

Today, we'll recap some of the work we've already covered at school and look at exploring the gases around us.

Recap

SOLIDS

Matter is the building blocks of all things including you, the air and objects around you, the planets, the sun and all the stars.

LIQUIDS

Matter is made up of tiny particles called molecules and it is the arrangement of these molecules that determine whether something is a solid, liquid or gas.

GASES

SOLIDS

Recap

LIQUIDS

GASES

**What were their
properties?**

**Why do they behave
differently?**

Recap



Do you remember what happened to the raisins when we put them into water or lemonade?

Try to explain it to your grown up.

Recap

That's right, the gas in the lemonade made the raisins (solid) appear to jump up and down in the lemonade (liquid).

Can you remember why this happened?

Think about the properties of gases.



Recap

We said that the gas was rising to the surface of the lemonade and it was carrying the raisins with it.

When it got to the top the bubble popped – the gas went into the air around us and then the raisin sank to the bottom again.

This is because the gas is trying to fill the container it is in.



Recap

Can you remember the other things we found out about solids, liquids and gases?

What do you already know?

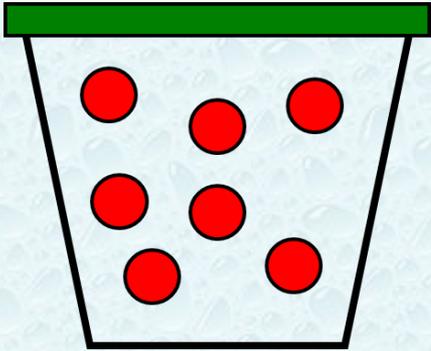
Solids	Liquids	Gases

Recap

Stay in one place and can be held.	Difficult to hold.	Often invisible
Keep their shape.	Can be poured or flow easily.	Change their shape depending on their container. Takes the shape at the bottom of the container.
They change their volume.	Can be difficult to squash.	Can be shaped or cut.
They always take up the same amount of space.		Do not flow.
	Do not have a fixed shape. They change their shape to fill the container.	Can be easily squashed.

Which state of matter do these different properties belong to?

GASES

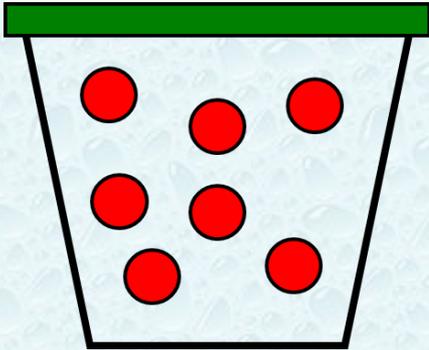


Gases surround us!!

It's easy to prove you can hold solids or that liquids pour. It is harder for us to understand gases because we can't see them.

Today we're going to find out more about gases and how they behave.

GASES



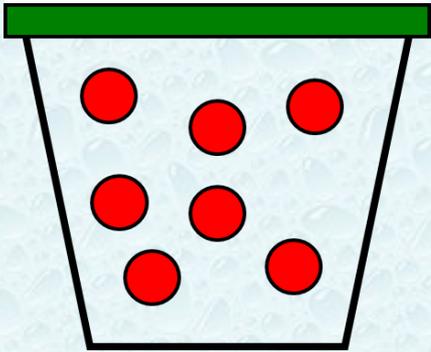
Gases surround us!!

How do we use gases in our everyday lives?

<https://www.bbc.co.uk/bitesize/clips/zxgvr82>

How many can you spot? Jot your notes down whilst watching the video.

GASES



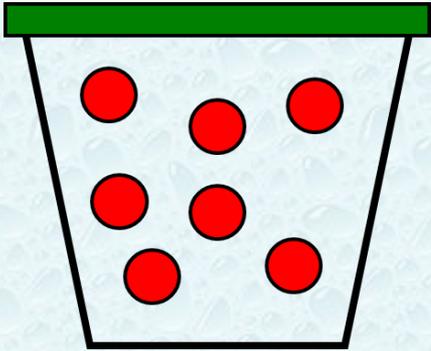
Gases surround us!!

How many can you name?

Do you know which gases make up the air around us?

Which gases are important for human or plant life?

GASES



Gases surround us!!

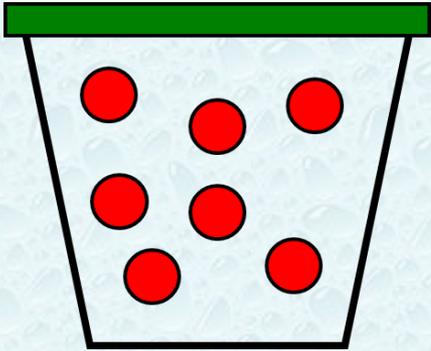
How many can you name?

Do you know which gases make up the air around us?

nitrogen, oxygen, carbon dioxide, hydrogen and neon

Which gases are important for human or plant life? **carbon dioxide (CO₂) and oxygen (O₂)**

GASES



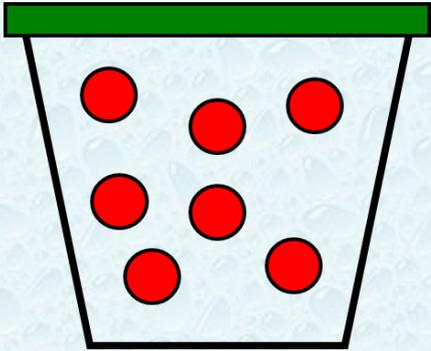
Gases surround us!!

How can you tell you are surrounded by air?

Let's find out.

Today we're going to carry out some investigations/demonstrations that show us that we are surrounded by a gas – air.

GASES



Gases surround us!!

Try out some or all of the following activities at home to prove that there is something in the air around us.



Get 2 plastic drinks bottles. They should both be empty.

Keep the lid on one of the bottles.

Can you flatten both of them?

Why?

What does this tell you about air?

Draw a labelled diagram of the bottles on a page and try to explain why you cannot flatten both of them.



Put some objects in a transparent container – stones, plastic blocks, marbles will do.

Quickly pour some water from a jug into the container. Look closely at the objects – what do you notice around them? Where did it come from?

Draw a labelled diagram of the container of objects.

Write down your observations and try to explain what is happening.

Get a dry sponge and plunge it into some water.

Squeeze the sponge as hard as you can.

What do you notice?

Where did they come from?

Draw a labelled diagram.

Write down your observations and try to explain what is happening.





This could be a game for all the family.

One person hides a scented card in a room.

Use your sense of smell to find the scented card.

How did you find the card?

What does that tell you about gases?

A prediction:

Imagine you have 2 identical balloons.

One is full of air the other is flat.

Put one balloon on each side of the balance.

**What do you think will happen?
Why?**



Remember the property cards from earlier?

Stay in one place and can be held.	Difficult to hold.	Often invisible
Keep their shape.	Can be poured or flow easily.	Change their shape depending on their container. Takes the shape at the bottom of the container.
They change their volume.	Can be difficult to squash.	Can be shaped or cut.
They always take up the same amount of space.		Do not flow.
	Do not have a fixed shape. They change their shape to fill the container.	Can be easily squashed.

Can you name the ones for gases more easily now?

Look at the prompts on the next sheet to see what your investigations have helped you prove.



Gas is not easily squashed. When you squash the bottle without the lid the air is pushed out into the room. You could try squashing a bottle full of water – with a lid, and compare it to squashing a bottle full of air – with a lid. Is there a difference? What does that tell you?



Gas is all around us and moves to fill a space.

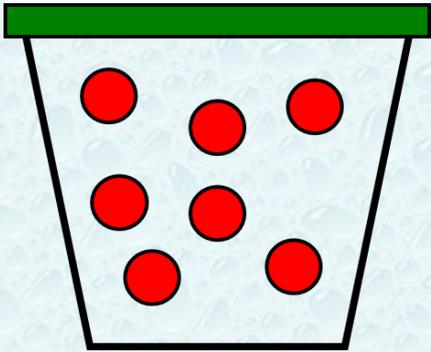


Gas expands to fill its container – you cannot smell it when it is inside the perfume bottle.

Air has a mass. The inflated balloon would be heavier than the flat balloon because it is full of air.



GASES



Gases surround us!!

To finish off.

How many ways do we use moving air?

Is moving air always useful?

When does it cause damage?