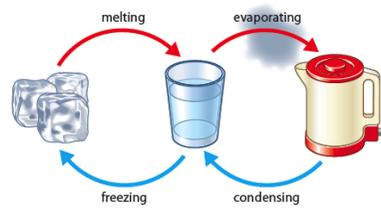


Solid	firm or stable in shape; not liquid or fluid.
Liquid	a substance that flows freely but is of constant volume, having a consistency like that of water or oil.
Gas	a substance or matter in a state in which it will expand freely to fill the whole of a container, having no fixed shape and no fixed volume.
Plasma	a substance with no fixed volume or shape, which can fill the whole of a container and is able to conduct electricity easily and both produces and responds to a magnetic field.
Matter	a physical substance which occupies space and possesses mass.
Temperature	the degree or intensity of heat present in a substance or object, as expressed according to a comparative scale shown by a thermometer or perceived by touch.
Melting	becoming liquefied by heat.
Freezing	turning into ice or another solid as a result of extreme cold.
Melting point	the temperature at which a given solid will melt.
Freezing point	the temperature at which a liquid turns into a solid when cooled.
Boiling point	the temperature at which a liquid turns to vapour.
Evaporation	the process of turning from liquid to vapour (a gas).
Condensation	the process of turning from vapour (a gas) into liquid.
Water cycle	the cycle of processes by which water circulates between the Earth's oceans, atmosphere and land.
Boiling	the action of bringing a liquid to a temperature at which it bubbles and turns into vapour.
State of matter	one of the four main conditions in which matter exists (solid, liquid, gas and plasma)

Heating and cooling water



Warming solid ice makes it **melt** into liquid water.

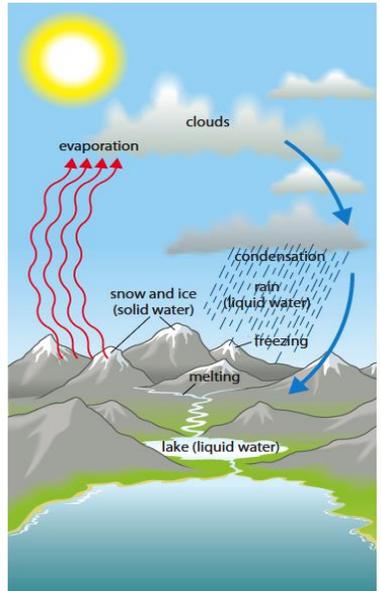
Adding more heat makes it **evaporate** into water vapour.

At 100 °C you see this as steam.

When water vapour is cooled, it **condenses** into liquid water.

If it is cooled to 0°C it **freezes** and forms solid ice.

The water cycle



Water continually moves around the Earth in the water cycle.

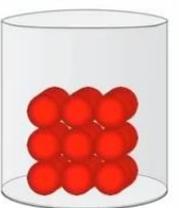
The Sun evaporates water into water vapour.

When the water vapour cools down it turns into liquid water and it rains.

In very cold places the water freezes into snow or ice.

Snow and ice, when warmed up, change into liquid water.

Solids



solid

Solids are:

- Hard
- Difficult to compress
- Keep their shape independently

You can hold solids in your hands.

The molecules making up a solid substance are connected (bonded) together so strongly, all the molecules hold each other closely. These strong bonds are very strong when the substance is cooler and helps hold the shape firmly.

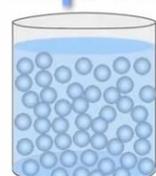
These molecules vibrate when they have energy from heat.

When a substance cools it reduces the amount of energy each molecule has, and so reduces the movements they make. Fewer movements or vibrations means stronger bonds between molecules.

Water in a solid state is known as ice, formed from **0°C**.
Oxygen is a solid at a temperature of **-218.79 °C**.
Iron is a solid at room temperature.



Liquids



liquid

Liquids:

- Pour easily
- Take the shape of their container

You cannot hold liquids in your hands – it all drains away!

When the molecules of a solid are heated, each molecule is provided with more energy.

This energy makes the molecules vibrate quicker.

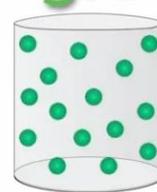
This vibrating breaks the bonds held between the molecules changing the state of the substance from a solid to a liquid. These molecules are separated from each other but are now bouncing off each other rapidly.

In a liquid, the molecules are held together closely, but are not as compacted as in a solid. This enables the liquid to alter its shape to fit the shape of the container in which it is held, filling the space from the bottom as identified by gravity.

The remaining connections (bonds) between molecules also means that when the container holding a liquid is tipped, they fall out of the container, pulling the connecting molecules along with them – this is what we see as a flow of liquid.

Water becomes a liquid when the temperature increases above 0°C.

Gases



gas

Gases:

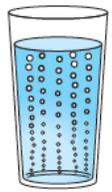
- They usually cannot be seen (but are sometimes visible as bubbles moving inside a liquid or trapped inside a solid)
- They fill their containers.
- They escape from unsealed containers.
- They spread out to fill all the space available.

You cannot hold gas in your hands – it floats away!

When molecules of a liquid are heated further, they are each provided with even more energy and vibrate even quicker. This makes them bounce from the walls of the container and each other even more frequently, adding to their energy.

- As the energy increases the molecules bounce further and further away from each other. Now the molecules cannot pull each other, move together or hold their shape and become a gas.
- If the container holding a gas is open, the gas will escape from the container and move into the air.
- Sometimes, liquids are heated inside a closed container. As the liquid heats up and the gas particles bounce around quicker, they begin to put pressure on the container trapping it. If this continues, the container will burst open to allow the gas to release.

Water becomes a gas (water vapour) at 100°C.



Quiz

Question 1

Which of the following is not true about gases?

- A. The molecules inside a gas have lots of energy so bounce around quickly.
- B. Gases are formed when a liquid is heated and the molecules move into the air.
- C. Gases will escape from an unsealed container.
- D. The molecules in a gas are held together with strong bonds.

Question 2

Which of the following occurs after evaporation in the water cycle?

- A. Rain fall
- B. Freezing
- C. Melting
- D. Condensation

Question 3

From what temperature does water become a solid?

- A. 100°C
- B. 10°C
- C. 0°C
- D. -10°C

Question 4

In the water cycle, what evaporates the water from the lakes, rivers and seas?

- A. The mountains
- B. The ice
- C. The clouds
- D. The sun

Question 5

At what temperature does water become a gas?

- A. 100°C
- B. 10°C
- C. 0°C
- D. -10°C

Question 6

At what temperature does water change state from solid to liquid?

- A. 100°C
- B. 10°C
- C. 0°C
- D. -10°C