

SCIENCE · Y4

States of Matter

Knowledge Organiser — Year 4 Science

Key vocabulary

1

Matter

Anything that takes up space and has mass. Everything around us is matter.

2

State

The form matter takes — solid, liquid, or gas.

3

Solid

A state with a fixed shape and a fixed volume. Particles packed tightly together. Examples: rock, ice, wood.

4

Liquid

Has a fixed volume but takes the shape of its container. Particles can move around but stay close. Examples: water, milk.

5

Gas

Has no fixed shape or volume — fills any container. Particles move quickly and spread out. Examples: air, steam.

6

Particles

Tiny pieces that all matter is made of. Too small to see, but they explain how matter behaves.

7

Melting

When a solid changes to a liquid by heating. Example: ice → water at 0°C.



8

Freezing

When a liquid changes to a solid by cooling. Example: water → ice at 0°C.

9

Evaporation

When a liquid slowly changes to a gas, even without boiling. Example: a puddle drying up.

10

Condensation

When a gas changes back to a liquid by cooling. Example: water droplets on a cold window.

11

Boiling point

Temperature at which a liquid turns to gas. Water boils at 100°C.

Three states compared

Same particles, different behaviour

- SOLID: particles vibrate but stay in fixed positions. Closely packed. Cannot flow. Keeps its shape.
- LIQUID: particles slide past each other. Closely packed but free to move. Flows. Takes shape of container.
- GAS: particles move very quickly in all directions. Far apart. Spreads out to fill any space. Can be squashed (compressed).
- Heating gives particles MORE ENERGY — they move faster. This causes melting and evaporation.
- Cooling REMOVES ENERGY — particles slow down. This causes freezing and condensation.

The water cycle

States of matter in the real world

- EVAPORATION: sun heats water in oceans/lakes — water turns to vapour (gas).
- CONDENSATION: vapour rises and cools, forming clouds (tiny water droplets).
- PRECIPITATION: water falls as rain, snow, hail, or sleet.
- COLLECTION: water collects in rivers, lakes, the sea.



- The cycle never stops — same water has cycled the Earth for billions of years.
- All three states (solid ice, liquid water, gaseous vapour) appear in the water cycle.

Common misconceptions

Things to watch out for

- Steam is NOT a gas you can see. Real water vapour is invisible. The 'steam' you see above a kettle is tiny droplets of liquid water that have already condensed.
- Ice and water are the SAME substance — just different states. The chemistry doesn't change.
- Gases ARE matter — they have mass. Even air weighs something.
- Boiling and evaporation are different. Evaporation happens at any temperature. Boiling happens only at the boiling point.
- Melting needs energy (heat). Freezing releases energy.

Investigations to try

1. Watch ice melt at room temperature and time how long it takes.
2. Boil water in a kettle and watch the 'steam' (droplets of condensed liquid water).
3. Put water in a sealed plastic bag, leave in sunshine, observe condensation forming.
4. Heat chocolate buttons gently — observe melting.
5. Make ice lollies — observe freezing.
6. Dry wet clothes on a line — observe evaporation.

