

Science Knowledge Organiser

States of Matter

Yr 4

Main Foci: Chemistry

What should I already know?

- Why some materials are used for certain purposes because of their **properties**.
- The **water cycle**, and the **processes** of **evaporation**, **condensation** and **precipitation**.

Vocabulary

condensation	small drops of water which form when water vapour or steam touches a cold surface , such as a window
cooling	lowering the temperature of something
evaporation	to turn from liquid into gas ; pass away in the form of vapour .
freezing	If a liquid or a substance containing a liquid freezes , it becomes solid because of low temperatures
freezing point	The freezing point of a particular substance is the temperature at which it freezes . The freezing point of water is 0°C.
gas	a form of matter that is neither liquid nor solid . A gas rapidly spreads out when it is warmed and contracts when it is cooled .
heating	raising the temperature of something
liquid	in a form that flows easily and is neither a solid nor a gas .
melting	to change from a solid to a liquid state through heat or pressure
melting point	The melting point of a particular substance is the temperature at which it melts .
particles	a tiny amount or small piece
precipitation	rain, snow, sleet, dew, etc, formed by condensation of water vapour in the atmosphere
process	a series of actions used to produce something or reach a goal.
properties	the ways in which an object behaves
solid	having a firm shape or form that can be measured in length, width, and height; not like a liquid or a gas
temperature	a measure of how hot or cold something is
vibrations	when something vibrates , it shakes with repeated small, quick movements
water cycle	the process by which water on the earth evaporates , then condenses in the atmosphere, and then returns to earth in the form of precipitation .
water vapour	water in the gaseous state, esp when due to evaporation at a temperature below the boiling point

What will I know by the end of the unit?

What is a **particle**?

- **Particles** are what materials are made from.
- They are so small that we cannot see them with our eyes.
- The **properties** of a substance depend on what its particles are like, how they move and how they are arranged
- **Particles** behave differently in **solids**, **liquids** and **gases**.

What is a **solid**?



- In the **solid** state, the material holds its shape.
- **Solids** have **vibrating particles** which are closely packed in and form a regular pattern.
- This explains the fixed shape of a solid and why it can't be poured.
- **Solids** always take up the same amount of space.

What is a **liquid**?



- In the **liquid** state, the material holds the shape of the container it is in.
- This means that **liquids** can change shape, depending on the container.
- **Liquids** have **particles** which are close together but random.
- **Liquid particles** can move over each other.
- **Liquids** can be poured.

What is a **gas**?



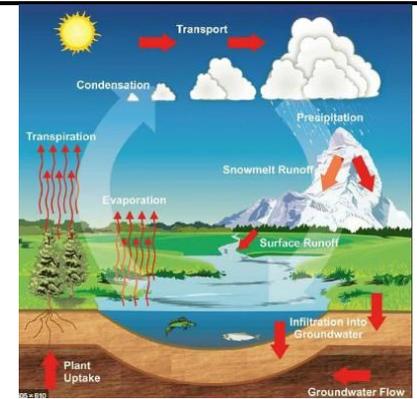
- In the **gas** state, **particles** can escape from open containers.
- **Gases** have **particles** which are spread out and move in all directions.

What happens to the **particles** in water when it is **heated** or **cooled**?

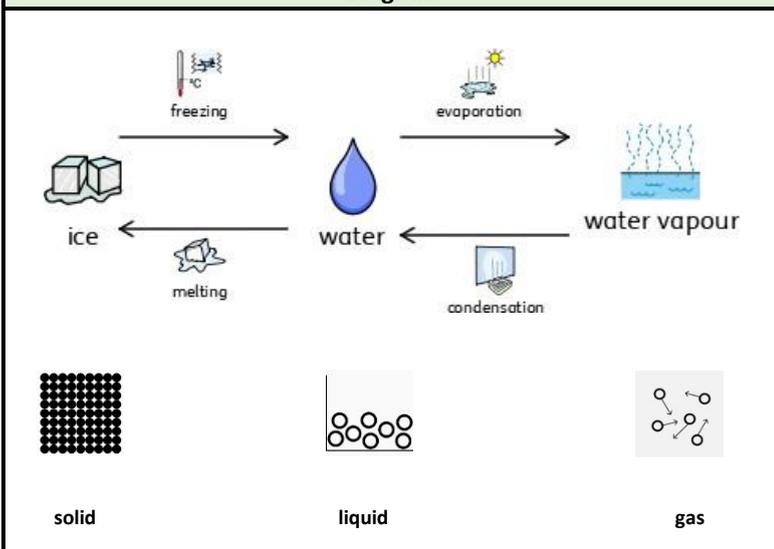
- When water (in its **liquid** form) is **heated**, the particles start to move faster and faster until they have enough energy to move about more freely. The water has **evaporated** into a **water vapour**.
- When water is **cooled**, the particles start to slow down until a solid structure (ice) is formed. The water has **frozen**.
- The **temperature** at which water turns to ice is called the **freezing point**. This happens at 0°C.

What is the **water cycle**?

(see separate knowledge organiser Geography - The Water Cycle)



Diagram



Procedural Knowledge

- Group materials according to their states.
- Explain the **particle** structure of **solids**, **liquids** and **gases**.
- Explore the effect of **temperature** on substances such as chocolate, butter, cream. Compare their **melting points** and place them in a table.
- Research the **temperature** at which materials change state, for example, when iron **melts** or when oxygen **condenses** into a **liquid**.
- Observe and record **evaporation** over a period of time, for example, a puddle in the playground or washing on a line, and investigate the effect of **temperature** on washing drying or snowmen melting.
- Analyse and interpret different forms of data (tables, graphs) to show the effects of **temperature** on states of matter.
- Present what you know about the water cycle using a variety of skills using appropriate vocabulary (The Water Cycle Knowledge Organiser).
- Observe **evaporation** and **condensation** in action by using bowls of water and mirrors /glass (The Water Cycle Knowledge Organiser).

Science Knowledge Organiser

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Main Foci: Chemistry

Question 1: The particles in a solid:	Start of unit:	End of unit:
are closely packed together and vibrate		
move freely over each other within a container in which they are held		
can be poured		
are very spread out and can escape an open container		

Question 2: The particles in a liquid (tick two):	Start of unit:	End of unit:
are closely packed together and vibrate		
move freely over each other within a container in which they are held		
can be poured		
are very spread out and can escape an open container		

Question 3: The particles in a gas:	Start of unit:	End of unit:
are closely packed together and vibrate		
move freely over each other within a container in which they are held		
can be poured		
are very spread out and can escape an open container		

Question 4: Match the states to their particle structure:	Start of unit:	End of unit:
<div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="border: 1px solid black; padding: 5px; width: 80px; text-align: center;">solid</div> <div style="text-align: center;">  </div> </div> <div style="display: flex; justify-content: space-around; align-items: flex-start; margin-top: 10px;"> <div style="border: 1px solid black; padding: 5px; width: 80px; text-align: center;">liquid</div> <div style="text-align: center;">  </div> </div> <div style="display: flex; justify-content: space-around; align-items: flex-start; margin-top: 10px;"> <div style="border: 1px solid black; padding: 5px; width: 80px; text-align: center;">gas</div> <div style="text-align: center;">  </div> </div>		

Question 5: What is the freezing point of water?	Start of unit:	End of unit:

Question 6: Name the process that describes the change from water to ice.	Start of unit:	End of unit:

Question 7: Write solid, liquid or gas to label each part of the diagram.	Start of unit:	End of unit:
		

Question 8: Match these changes to the scientific name for the process.	Start of unit:	End of unit:
<div style="display: flex; justify-content: space-around;"> <div style="border: 1px solid black; padding: 5px; width: 100px; text-align: center;">ice turns to water</div> <div style="border: 1px solid black; padding: 5px; width: 100px; text-align: center;">condensation</div> </div> <div style="display: flex; justify-content: space-around; margin-top: 10px;"> <div style="border: 1px solid black; padding: 5px; width: 100px; text-align: center;">water turns to water vapour</div> <div style="border: 1px solid black; padding: 5px; width: 100px; text-align: center;">evaporation</div> </div> <div style="display: flex; justify-content: space-around; margin-top: 10px;"> <div style="border: 1px solid black; padding: 5px; width: 100px; text-align: center;">water vapour turns to water</div> <div style="border: 1px solid black; padding: 5px; width: 100px; text-align: center;">melting</div> </div>		

Question 9: Solids, liquids and gases have different properties. Indicate using an S, L or G, which state these properties apply to.	Start of unit:	End of unit:
keeps its own shape		
can be poured		
flows easily through a pipe		
takes the shape of the container it is in		
can escape from an open container		

Question 10: Explain why puddles get smaller after it has rained.	Start of unit:	End of unit: