Woodlands Academy - Science

Topic: States of Matter	Year: 4	Strand: Chemistry

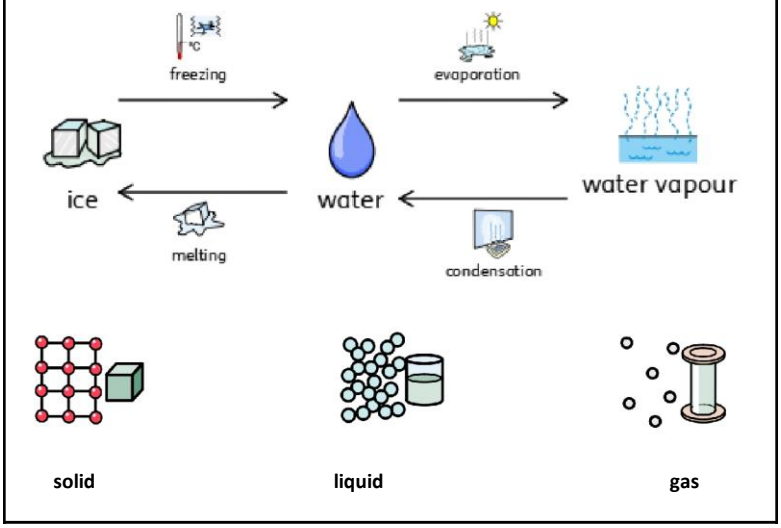
What should I already know?

- 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^{o}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

Diagram

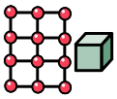


What will I know by the end of the unit?

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?

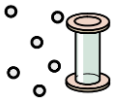


- In the **solid** state, the material holds its shape.
- **Solids** have **vibrating particles** which are closely packed in and form a regular pattern.
- This explains the fixed shape of a solid and why it can't poured.
- **Solids** always take up the same amount of space.

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?



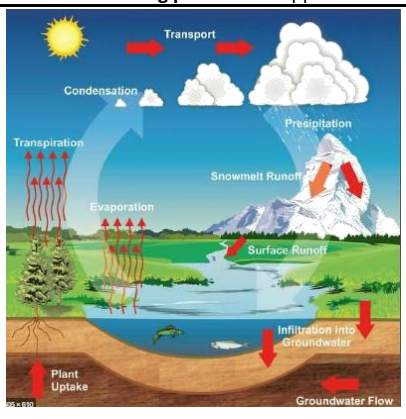
- In the **gas** state, **particles** can escape from open containers.
- **Gases** have **particles** which are spread out and move in all directions.

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^{o}C.

What is the water cycle?

(see separate knowledge organiser Geography - The Water Cycle)



Investigate!

- 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).

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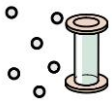
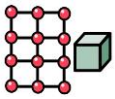
Question 1: The particles in a solid:	Start of unit:	End of unit:
are closely packed together and vibrate		
move freely over each other within a container in which they are held		
can be poured		
are very spread out and can escape an open container		

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:
solid 		
liquid 		
gas 		

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:
ice turns to water — condensation water turns to water vapour — evaporation water vapour turns to water — melting		

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: