Year 4: States of Matter

Topic overview for teachers

This topic overview is based on the PLAN knowledge matrix (for England). Please use link: https://www.planassessment.com/states-of-matter-y4

The matrix includes:

- National Curriculum learning objectives
- Key learning
- Key vocabulary
- Common misconceptions
- Possible activities & evidence

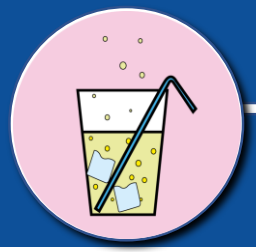
Age 8-9

Year 4 – States of Matter

Topic	Key Learning	page
Introduction to solids, liquids and gases	• There are three **states of matter**: **solid**, **liquid** and **gas**. • A **solid keeps its shape** and has a **fixed volume**. Some solids are made up of small grains which can be poured into a heap. • A **liquid** has a **fixed volume** but **changes in shape** to fit the container. A liquid can be poured and keeps a level, horizontal surface. • A **gas** fills all available space; it has **no fixed shape** or **volume**.	4
Exploring the properties of liquids	• A **liquid** has a **fixed volume** but **changes in shape** to fit the container. A liquid can be poured and keeps a level, horizontal surface. • Some liquids flow less easily and are slow to pour.	5
Changes of state: investigating freezing and melting	• **Melting** is a **change of state** from solid to liquid. **Freezing** is a **change of state** from liquid to solid. • The temperature a liquid freezes at is called its **freezing point**. • The **freezing point** of water is 0°C. • Different substances have different freezing points.	6

Year 4 – States of Matter

Topic	Key Learning	page
Changes of state: comparing boiling and evaporation	• **Boiling** and **evaporation** are both a **change of state** from liquid to gas. • **Boiling** happens **at a specific temperature** and bubbles of the gas can be seen inside the liquid. Water boils when it is heated to 100°C. • **Evaporation** happens **at any temperature** and only at the surface of the liquid. It happens more quickly if the temperature is higher, the liquid has a larger surface area or it is windy.	7
Understanding evaporation, condensation and the water cycle	• The **water cycle** is an example of **evaporation** and **condensation**. • Water at the surface of seas, lakes and rivers **evaporates** into water vapour, a gas. • Water vapour rises and cools. It **condenses** back into liquid water droplets which form clouds. • When the water droplets in a cloud get too heavy, they fall as rain, sleet or snow. This is known as **precipitation**.	8
Exploring the properties of gases	• A **gas** fills all available space; it has no fixed shape or volume. • Many gases are **invisible**. • A gas has a mass, so its weight can be measured. • A gas can be squashed or **compressed** into a smaller space.	9



States of matter

Introduction to solids, liquids and gases

Key Learning

- There are three **states of matter**: **solid**, **liquid** and **gas**.
- A **solid keeps its shape** and has a **fixed volume**. Some solids are made up of small grains which can be poured into a heap.
- A **gas** fills all available space; it has **no fixed shape** or **volume**.
- A **liquid** has a **fixed volume** but **changes in shape** to fit the container. A liquid can be poured and keeps a level, horizontal surface.

I can…

- classify a range of objects and materials as solids, liquids or gases.

Activities and websites

- **Exploring prior knowledge about solids and liquids.**

https://www.bbc.co.uk/bitesize/clips/zv4rkqt

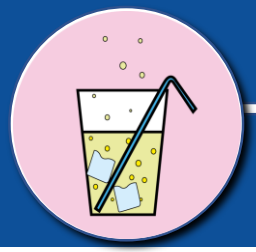
- **Comparing the properties of solids, liquids and gases.**

https://www.bbc.co.uk/bitesize/clips/zrdkjxs

https://www.bbc.co.uk/bitesize/topics/zkgg87h/articles/zsgwwxs

- **Classifying a range of objects as solids, liquids or gases using a Venn diagram.**

Additional activity to explore solids, liquids and gases in fruits and vegetables.
https://pstt.org.uk/application/files/1115/8694/0466/4._SINK_OR_SWIM.pdf



States of matter

Exploring the properties of liquids

Key Learning

- A **liquid** has a **fixed volume** but **changes in shape** to fit the container. A liquid can be poured and keeps a level, horizontal surface.
- Some liquids flow less easily and are slow to pour.

I can…

- describe the properties of liquids.
- compare the thickness of different liquids.

Activities and websites

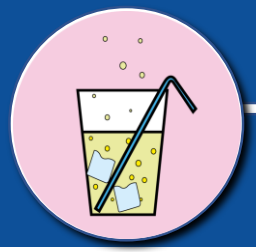
- **Exploring the properties of liquids.**
- **Investigating the thickness of different liquids.**

https://www.youtube.com/watch?time_continue=1&v=m3dzLaZKmDE&feature=emb_logo

- *Additional optional activities to find out more about floating and sinking in different liquids.*

https://pstt.org.uk/application/files/6115/8633/7142/3._EGG-CITING_SCIENCE.pdf

https://www.youtube.com/watch?time_continue=30&v=QwCgPkPrA-A&feature=emb_logo



States of matter

Changes of state: investigating freezing and melting

Key Learning

- **Melting** is a **change of state** from solid to liquid. **Freezing** is a **change of state** from liquid to solid.
- The temperature a liquid freezes at is called its **freezing point**. The **freezing point** of water is 0°C.
- Different substances have different freezing points.

I can…

- compare ice and other frozen liquids.
- observe how different solids melt.

Activities and websites

- **Exploring prior knowledge about melting and freezing.**

https://www.bbc.co.uk/bitesize/topics/zkgg87h/articles/z9ck9qt

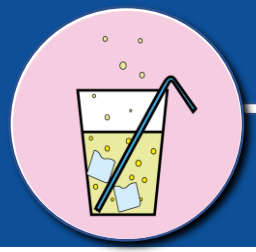
- **Observing how different liquids freeze and melt.**

https://pstt.org.uk/application/files/9315/8513/5527/1._Science_with_Ice.pdf

- *Optional further activity investigating melting.*
- *Optional activity to find out more about melting different types of chocolate.*

https://www.youtube.com/watch?v=OnE_84GtPdU&list=PLg7f-TkW11iV563gfcXjRlafm2jlklQOc&index=12&t=0s

https://www.youtube.com/watch?v=CA2d_b8E6Ds



States of matter

Changes of state: comparing boiling and evaporation

Key Learning

- **Boiling** and **evaporation** are both a **change of state** from liquid to gas.
- **Boiling** happens **at a specific temperature** and bubbles of the gas can be seen inside the liquid. Water boils when it is heated to 100°C.
- **Evaporation** happens **at any temperature** and only at the surface of the liquid. It happens more quickly if the temperature is higher, the liquid has a larger surface area or it is windy.

I can…

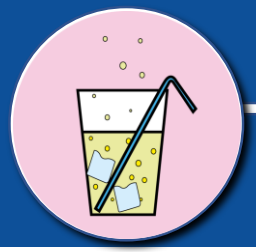
- compare boiling and evaporation.
- investigate how quickly water evaporates from different sized containers.

Activities and websites:

- **Exploring prior knowledge about boiling and evaporation.**
- **Understanding the difference between boiling and evaporation.**

https://www.bbc.co.uk/bitesize/clips/z9d9wmn

- **Investigating how quickly water evaporates with a comparative test.**
- *Optional activity to design another investigation to explore how quickly water evaporates.*



States of matter

Understanding evaporation, condensation and the water cycle

Key Learning

- The **water cycle** is an example of **evaporation** and **condensation**.
- Water at the surface of seas, lakes and rivers **evaporates** into water vapour, a gas.
- Water vapour rises and cools. It **condenses** back into liquid water droplets which form clouds.
- When the water droplets in a cloud get too heavy, they fall as rain, sleet or snow. This is known as **precipitation**.

I can…

- make a model of the water cycle.
- evaluate how well the model shows evaporation, condensation and precipitation.

Activities and websites:

- **Exploring prior knowledge on condensation.**
- **Understanding how water evaporates and condenses.**

https://www.bbc.co.uk/bitesize/topics/zkgg87h/articles/zydxmnb

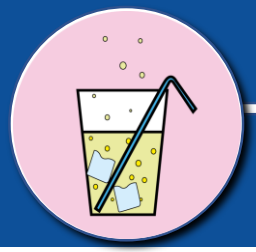
- **Investigating and modelling the water cycle.**

https://www.bbc.co.uk/bitesize/topics/zkgg87h/articles/z3wpp39

https://www.bbc.co.uk/bitesize/clips/zh4rkqt

- *Optional activity to describe the journey of a water droplet in the water cycle.*

https://www.dkfindout.com/uk/earth/water-cycle/



States of matter

Exploring the properties of gases

Key Learning

- A **gas** fills all available space; it has no fixed shape or volume.
- Many gases are **invisible**.
- A gas has a mass, so its weight can be measured.
- A gas can be squashed or **compressed** into a smaller space.

I can…

- understand the properties of gases.
- describe some everyday uses of gases.

Activities and websites

- **Does air weigh anything?**
- **Comparing air, helium and carbon dioxide.**

https://www.bbc.co.uk/bitesize/clips/zhbygk7

- **Understanding that gases can be compressed.**

https://www.bbc.co.uk/programmes/articles/41CtKNScD66yfvn37tPzmNP/studying-tool-using-tusk-fish

- **Describing some everyday uses of gases.**
- *Optional activities making carbon dioxide gas.*

https://pstt.org.uk/application/files/8615/8814/8781/Science_Fun_at_Home_6_Gases.pdf

https://bit.ly/3avocm1