

Year 5: Properties and changes of materials

Topic overview for teachers

Age 9-10

This topic overview is based on the PLAN knowledge matrix (for England). Please use link:

<https://www.planassessment.com/properties-changes-of-materials-y5>

The matrix includes:

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

Year 5 – Properties and changes of materials

Topic	Key Learning	page
<i>Exploring properties and uses of materials</i>	<ul style="list-style-type: none">• Materials have different uses depending on their properties.• Properties include hardness, flexibility, absorbency, strength, transparency, electrical and thermal conductivity and attraction to magnets.	4
<i>Investigating thermal insulators</i>	<ul style="list-style-type: none">• Thermal insulators do not allow heat to pass through them easily.• Materials which trap air inside them are good thermal insulators.	5
<i>Comparing soluble and insoluble materials</i>	<ul style="list-style-type: none">• Some materials will dissolve in a liquid and form a solution. They are soluble materials.• Other materials do not dissolve in a liquid. They form a sediment. These materials are insoluble.	6

Year 5 – Properties and changes of materials

Topic	Key Learning	page
<i>Investigating reversible changes by separating materials</i>	<ul style="list-style-type: none"> Some changes to materials such as dissolving and mixing are reversible. The materials can be separated, as no new materials have been formed. Insoluble materials can be separated from a liquid by sieving or filtering. Soluble materials can be separated from a liquid by the process of evaporation. 	7
<i>Understanding that changes of state are reversible</i> <i>(see Year 4 topic for a more detailed set of lessons)</i>	<ul style="list-style-type: none"> Melting is a change of state from solid to liquid. Freezing is a change of state from liquid to solid. Boiling and evaporating are both a change of state from liquid to gas. Condensing is a change of state from gas to liquid. All changes of state are reversible. 	8
<i>Exploring irreversible changes</i>	<ul style="list-style-type: none"> Some changes to materials are not reversible. New materials are formed. These are called irreversible changes. Burning wood, rusting, cooking food and mixing vinegar with bicarbonate of soda are examples of irreversible changes. 	9



Properties and changes of materials

Exploring properties and uses of materials

Key Learning

- Materials have different uses depending on their properties.
- Properties include hardness, flexibility, absorbency, strength, transparency, electrical and thermal conductivity and attraction to magnets.

I can...

- use Carroll diagrams to classify materials by their properties.

Activities and websites

- **Exploring prior knowledge about properties of materials.**

<https://www.bbc.co.uk/bitesize/topics/z4339j6/articles/zx8hhv4>

- **Using Carroll diagrams to classify household items/materials by their properties.**
- *Optional activity to investigate an object made of two or more materials, such as a bike or skateboard.*

<https://www.dkfindout.com/uk/science/materials/>



Properties and changes of materials

Investigating thermal insulators

Key Learning

- Thermal insulators do not allow heat to pass through them easily.
- Materials which trap air inside them are good thermal insulators.

I can...

- investigate how to stop a snowman melting using a comparative test.
- plot a bar chart or a line graph with my results.

Activities and websites

- **Exploring ideas about how you might stop a snowman from melting.**
- **Investigating how quickly an ice cube melts with or without a 'jacket' on. This is a comparative test.**
- **Plotting a bar chart or a line graph.**
- *Optional activity to try a further investigation: How else could you investigate the time it takes for a 'snowman' to melt?*



Properties and changes of materials

Comparing soluble and insoluble materials

Key Learning

- Some materials will **dissolve** in a liquid and form a **solution**. They are **soluble** materials.
- Other materials do not dissolve in a liquid. They form a **sediment**. These materials are **insoluble**.

I can...

- identify and compare soluble and insoluble materials.

Activities and websites

- Exploring what happens when you add sugar to a warm drink.

<https://www.bbc.co.uk/bitesize/topics/zcvv4wx/articles/zpbdpbk>

- Comparing soluble and insoluble materials we use in the kitchen.
- *Optional activities to find out more about the properties of salty water.*

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

<https://www.dkfindout.com/uk/earth/oceans-and-seas/>

<https://www.wildlifetrusts.org/why-sea-salty-and-why-sea-blue>

<https://www.nhm.ac.uk/discover/quick-questions/why-is-the-sea-salty.html>



Properties and changes of materials

Investigating reversible changes by separating materials

Key Learning

- Some changes to materials such as dissolving and mixing are **reversible**. The materials can be separated, as no new materials have been formed.
- **Insoluble materials** can be separated from a liquid by **sieving** or **filtering**.
- **Soluble materials** can be separated from a liquid by the process of **evaporation**.

I can...

- select equipment to separate two or more materials using sieving, filtering and/or evaporating.

Activities and websites

- **Exploring how sieves and colanders are used in the kitchen.**
- **Considering how you can separate materials that are mixed together.**

<https://www.bbc.co.uk/bitesize/clips/z9jd7ty>

<https://www.bbc.co.uk/bitesize/topics/zcvv4wx/articles/zw7tv9q>

- **Separating materials using sieving, filtering and evaporating.**
- *Optional further activities to explore separating mixtures.*

<https://www.youtube.com/watch?v=sgRnDK4CFX4>

<https://pstt.org.uk/resources/curriculum-materials/Science-Fun-at-Home>



Properties and changes of materials

Understanding that changes of state are reversible

Key Learning

- **Melting** is a **change of state** from solid to liquid. **Freezing** is a change of state from liquid to solid.
- **Boiling** and **evaporating** are both a change of state from liquid to gas. **Condensing** is a change of state from gas to liquid.
- All **changes of state** are **reversible**.

I can...

- observe and describe changes of state, including melting, freezing, evaporating and condensing.

Activities and websites

- Exploring prior knowledge about melting, freezing, boiling, evaporating and condensing.

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

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

- **Observing and describing changes of state including melting, freezing, evaporating and condensing.**
- *Optional activities to find out more about how chocolate is made or to try making chocolate ice cream.*

https://www.youtube.com/watch?v=OnE_84GtPdU&list=PLg7f-TkW11iV563gfcXjRlafm2jklQOc&index=12&t=0s

<https://www.youtube.com/watch?v=-JcNMN0uvvE>



Properties and changes of materials

Exploring irreversible changes

Key Learning

- Some changes to materials are not reversible. New materials are formed. These are called **irreversible changes**.
- Burning wood, rusting, cooking food and mixing vinegar with bicarbonate of soda are examples of irreversible changes.

I can...

- compare reversible and irreversible changes.
- recognise that new materials are formed during an irreversible change.

Activities and websites

- **Exploring different types of change which can be made to materials.**

<https://www.bbc.co.uk/bitesize/clips/zc84d2p>

- **Identifying and comparing reversible and irreversible changes.**

<https://www.bbc.co.uk/bitesize/topics/zcvv4wx/articles/z9brcwx>

<https://www.bbc.co.uk/bitesize/clips/zc89wmn>

<https://www.bbc.co.uk/bitesize/clips/z9wkjxs>

- *Optional further activities to explore irreversible changes.*
(See website links on page 7 of this lesson.)