

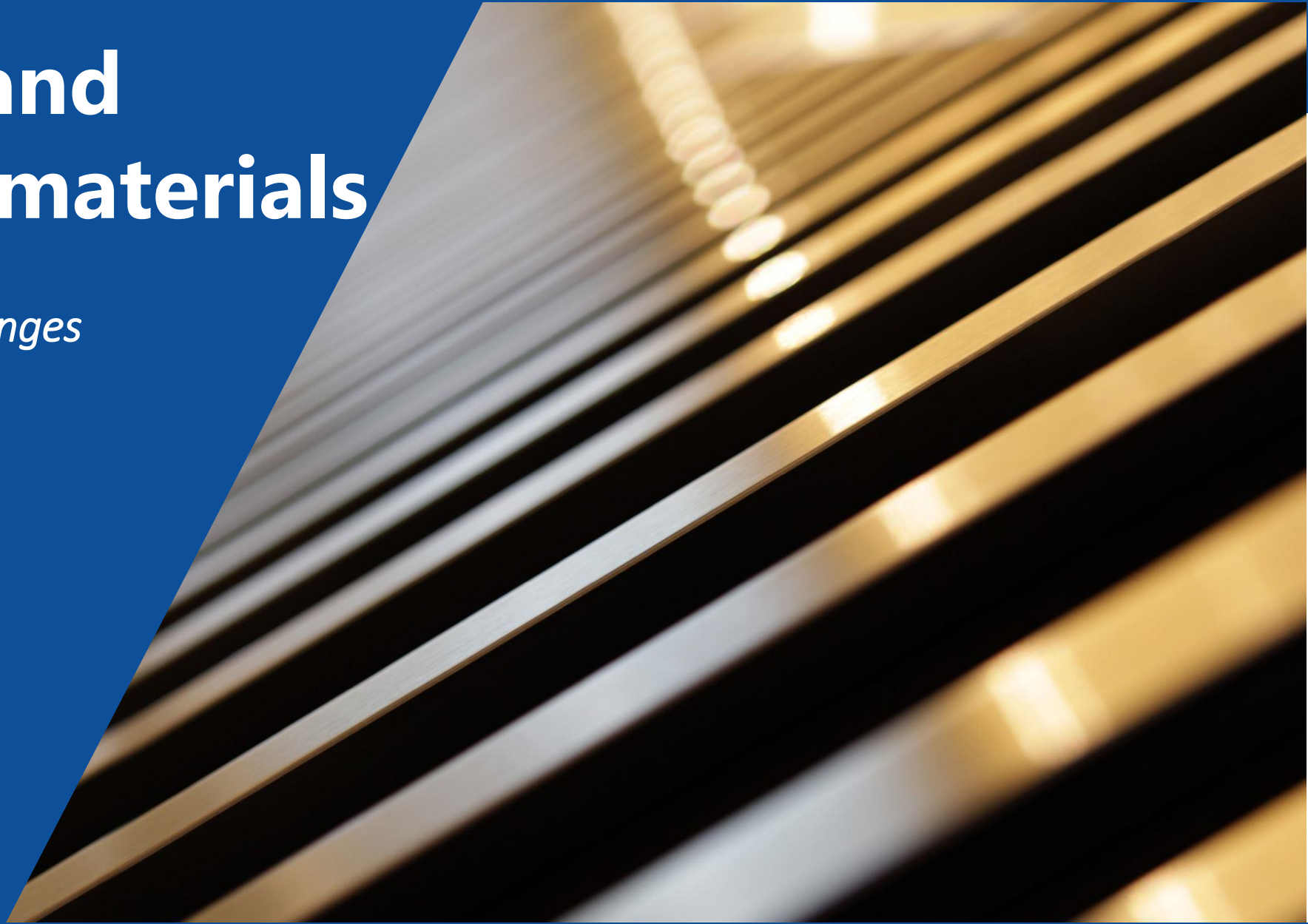
Properties and changes of materials

Exploring irreversible changes

Science

Tuesday 9th

February





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 (pages 4-8): 30 - 40 mins

Household items to support learning:

- Vinegar
- Bicarbonate of soda
- A cup and teaspoon

**THIS IS AN
OPTIONAL
ACTIVITY**

Use lined paper, a ruler and a pencil.
Alternatively, print page 6 as a worksheet.



Glossary of terms - DEFINITIONS

Reversible: A **reversible** change can be undone or reversed; no new materials are formed. Examples of reversible changes include dissolving, mixing, melting, freezing, evaporating and condensing.

Irreversible: An **irreversible** change cannot be undone or reversed; new materials are formed. Examples of irreversible changes include burning wood, rusting and cooking food.

Dissolve: Some materials will **dissolve** in a liquid. For example, salt dissolves in water to form a clear, transparent solution. Water can **evaporate** from a salt solution, leaving the salt behind. It is a reversible change.

Mix: Some materials can be **mixed** and then separated again. When no new material is formed, **mixing** is a reversible change.

Melting: **Melting** is a change of state when a solid is heated and changes to a liquid.

Freezing: **Freezing** is a change of state when a liquid is cooled and changes to a solid.

Evaporation: **Evaporation** is a change of state when a liquid is heated and changes to a gas.

Condensation: **Condensation** is a change of state when a gas is cooled and changes to a liquid.



Explore, review, think, talk...

*How do we change materials?
(5 – 10 minutes)*

- Look at these pictures.
- Which one do you think is the odd one out?
- Explain your reasons.



*frying
some eggs*



*burning a
bonfire*



*melting
chocolate*



Explore, review, think, talk...

*How do we change materials?
(5 – 10 minutes)*

- You may have selected ‘making food’ to choose the odd one out.



- Another way is to compare the type of change taking place. Can you get the original material back again?
- *Watch this clip and think about the changes you see happening.*
- <https://www.bbc.co.uk/bitesize/clips/zc84d2p>



Reversible and irreversible changes

Comparing reversible and irreversible changes
(10 minutes)

- Cooking an egg and burning a bonfire are **irreversible changes**.
- New materials are formed. You cannot reverse the change.



Watch this clip about irreversible changes:
<https://www.bbc.co.uk/bitesize/topics/zcvv4wx/articles/z9brcwx>

- Melting chocolate is a **reversible change**.
- No new material is formed. You can reverse the change by freezing.



- Think or talk about other reversible changes you have learnt about:
 - Mixing materials
 - Dissolving
 - Evaporation



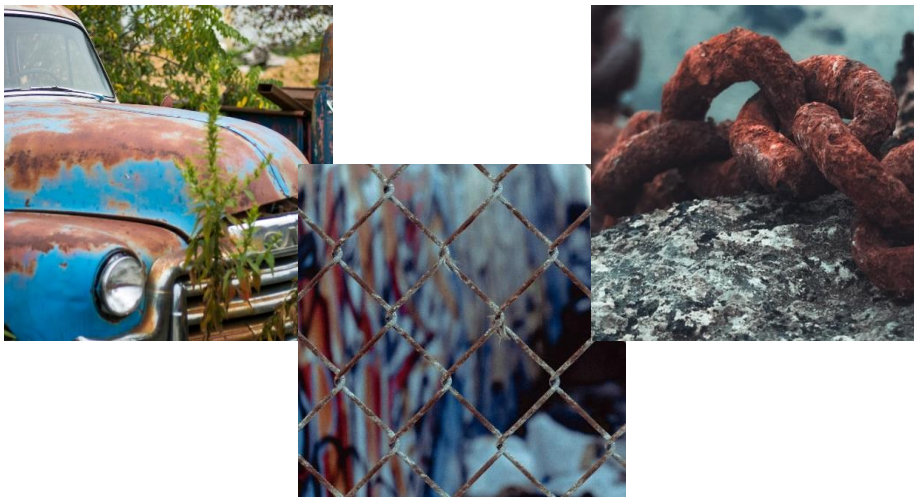
Irreversible changes

Exploring different types of irreversible change
(10 minutes)

Some irreversible changes happen slowly, like **rusting**. Watch this clip:

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

- We can sometimes see rust on the iron and steel parts of old cars, fences or chains.



Other irreversible changes happen more quickly! Watch this clip:

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

- Mixing vinegar with bicarbonate of soda produces new materials – including carbon dioxide gas.

You can try this with an adult:

- Put one teaspoon of bicarbonate of soda into a cup.
- Pour on a small amount of vinegar.
- *Watch what happens.*

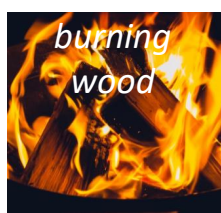
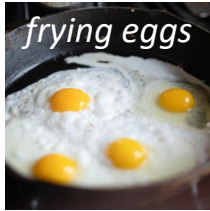


If you choose not to do this activity, you can watch the same reaction here:

https://youtu.be/Y_oppobHFzo

**THIS IS AN
OPTIONAL
ACTIVITY**

Sort these examples of changes into 'reversible' and 'irreversible'. Explain your reasons.



Add more of your own examples.

I can compare reversible and irreversible changes.

Reversible changes	Irreversible changes



Find out more...

You may like to explore more irreversible changes

**THESE ARE OPTIONAL
CHALLENGES**

Ask an adult if you can investigate more irreversible changes with them:

- Use this link to the PSTT Science Fun at Home 'What a gas!' activity.
- https://pstt.org.uk/application/files/8615/8814/8781/Science_Fun_at_Home_6_Gases.pdf
- Use this link to the RSC's 'Building a rocket' activity - this is only for trying outside!
- <https://bit.ly/3avocm1>

SCIENCE FUN AT HOME



Alternatively, you can try making bath bombs or a lava lamp.

- Use this link for bath bombs:
- https://www.youtube.com/watch?v=wieE0wSVXOQ&list=PLLnAFJxOjzZu0Qhykl_sCKp05sDa_a00kT&index=10&t=0s
- Use these links for a lava lamp:
- https://www.youtube.com/watch?v=v5a408V1BB4&feature=emb_logo
- <https://bit.ly/3aJLcOe>



THIS IS WHAT YOU MAY HAVE RECORDED. CHECK YOUR WORK WITH THIS EXAMPLE.

Changes of state are reversible.
For example:
- Solid chocolate can melt and then freeze again.
- Water can freeze and then melt again.
- Water can also evaporate or boil and then condense again.

Mixing and dissolving are reversible. The materials can be separated by sieving, filtering or evaporating.

I can compare reversible and irreversible changes.

<u>Reversible changes</u>	<u>Irreversible changes</u>
Mixing rice and salt - You can sieve them to separate.	Frying eggs - The outside turns from transparent to white.
Melting chocolate - It can freeze back to solid chocolate.	Toasting bread - The bread changes colour.
Freezing ice cubes - They can melt back to liquid water.	Burning wood - The wood turns into black ash.
Mixing sand and water - You can filter them to separate the sand from the water.	Making a cake - The flour, eggs, butter and sugar cook together. You cannot get them back!
Boiling water - The water vapour can condense back into liquid water.	Rusting iron - The iron changes colour to red-brown.
Dissolving sugar - You can leave the sugar solution to evaporate and the sugar will be left behind.	Making cement - The cement goes hard and cannot turn into a liquid again.
	Adding vinegar to bicarbonate of soda - It makes a gas.

Irreversible changes can often be recognised by a change of colour. For example, an 'egg white' changes from colourless to white when it is cooked.

New materials are formed in an irreversible change. For example, a cake is a new material made from eggs, flour, butter and sugar.

Irreversible changes sometimes produce a gas.