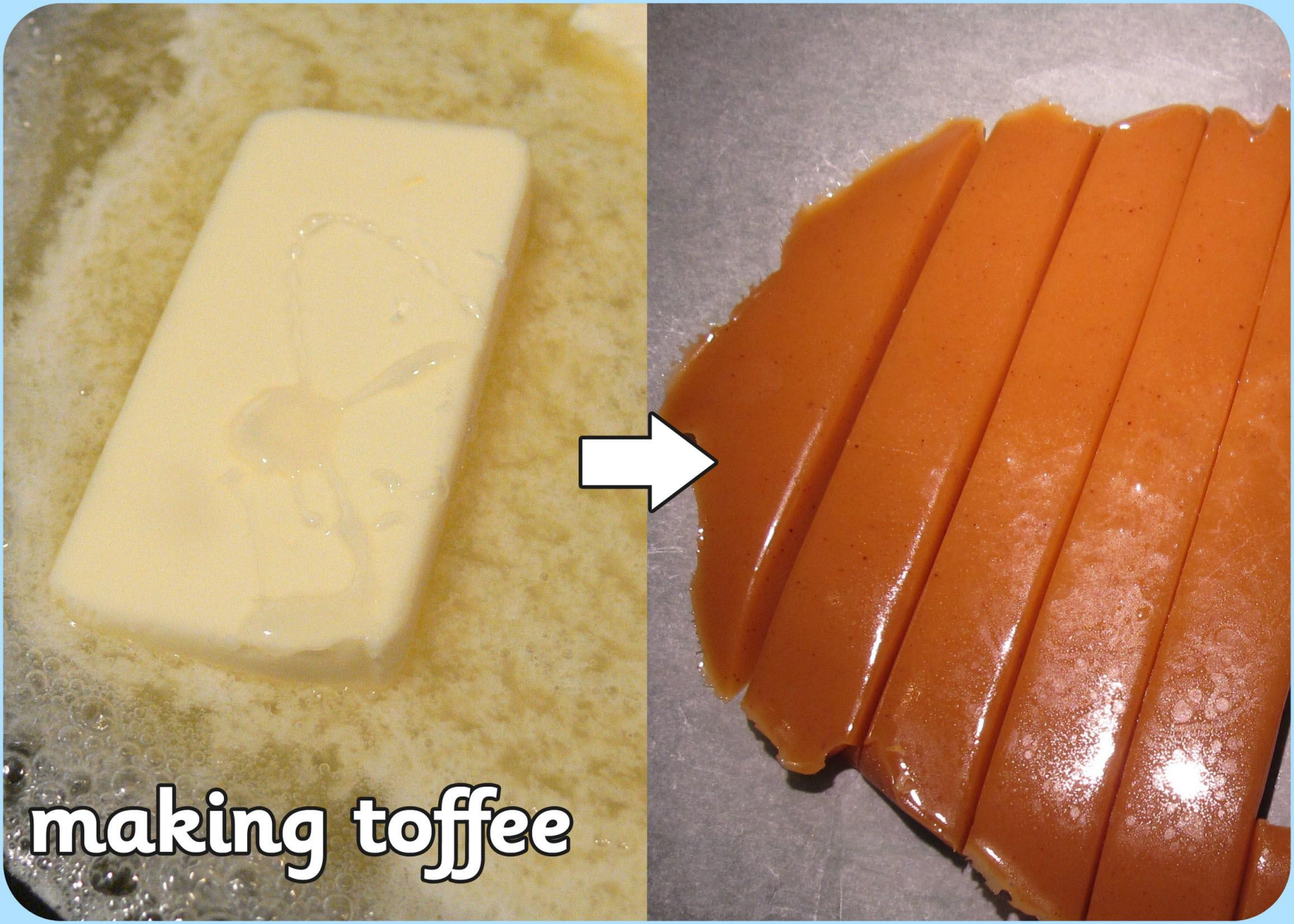

fireworks exploding


demolition of flats
EAST BAY


magma flowing from a volcano


baking a cake


a melting candle


making toffee


metal being melted to recast


rusting metal chain


match burning


burning wood


burning coal

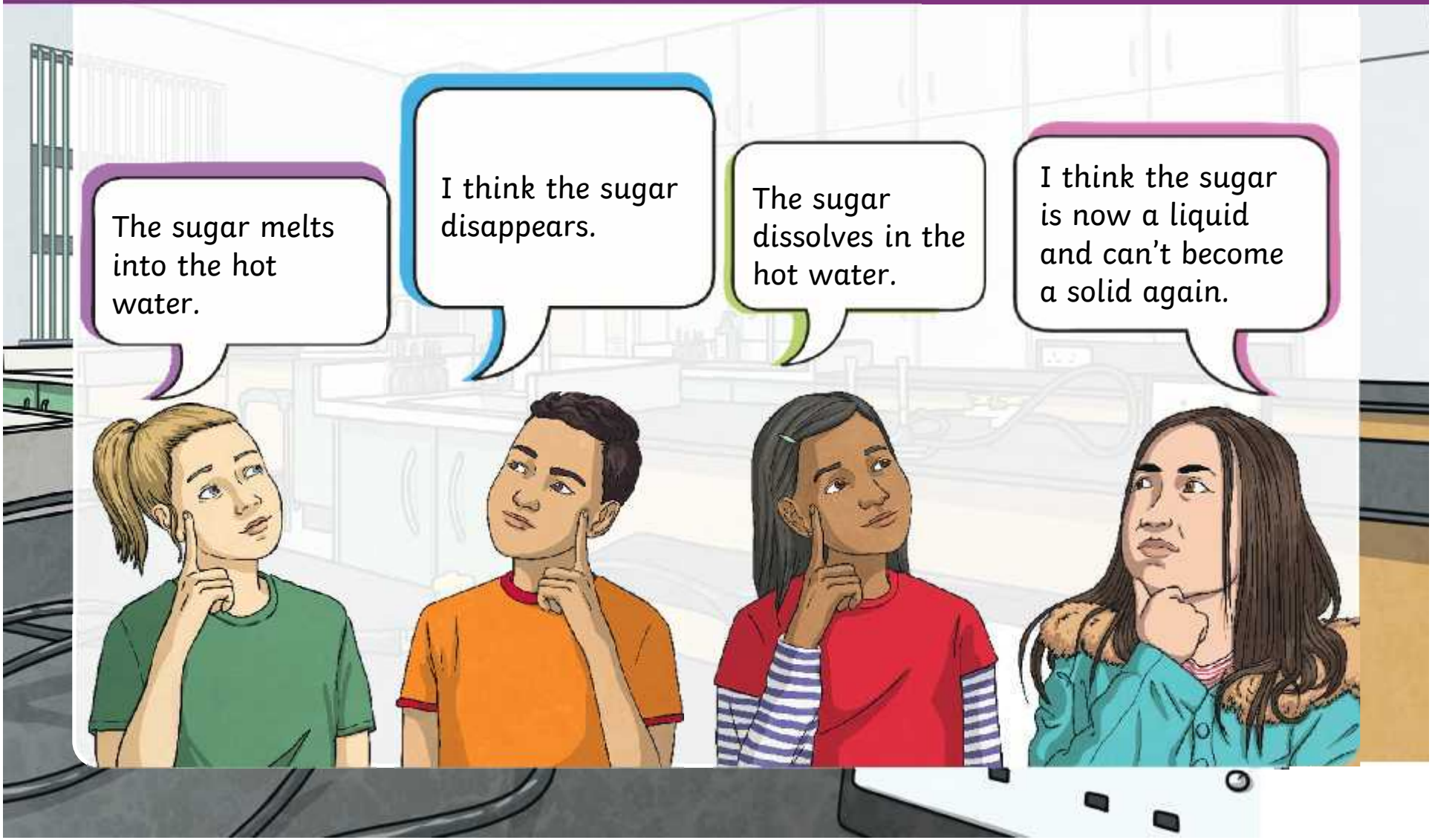

forest fire


house fire

Properties and Changes of Materials Discussion Starter

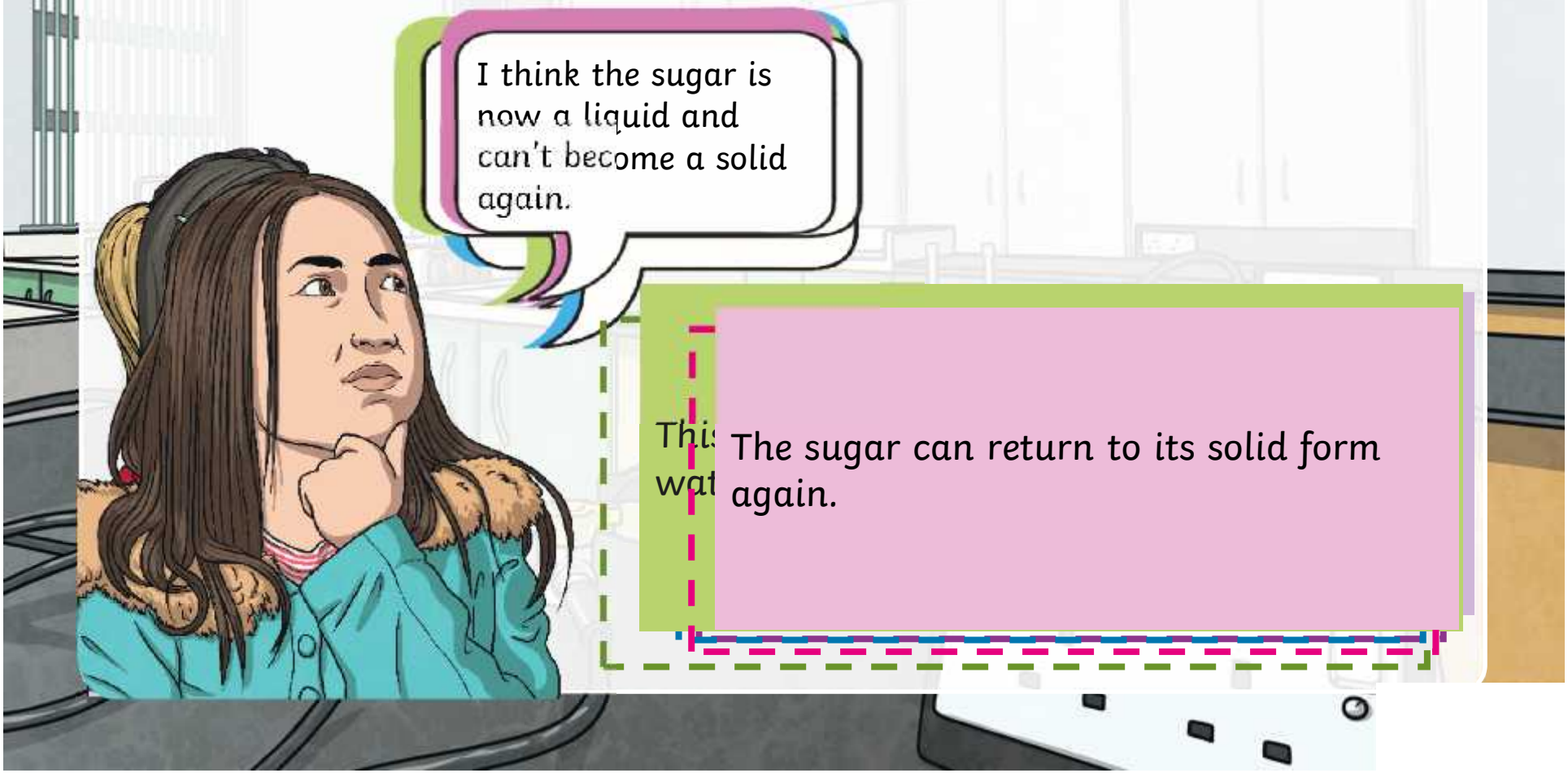
KS2 Year 5 Science

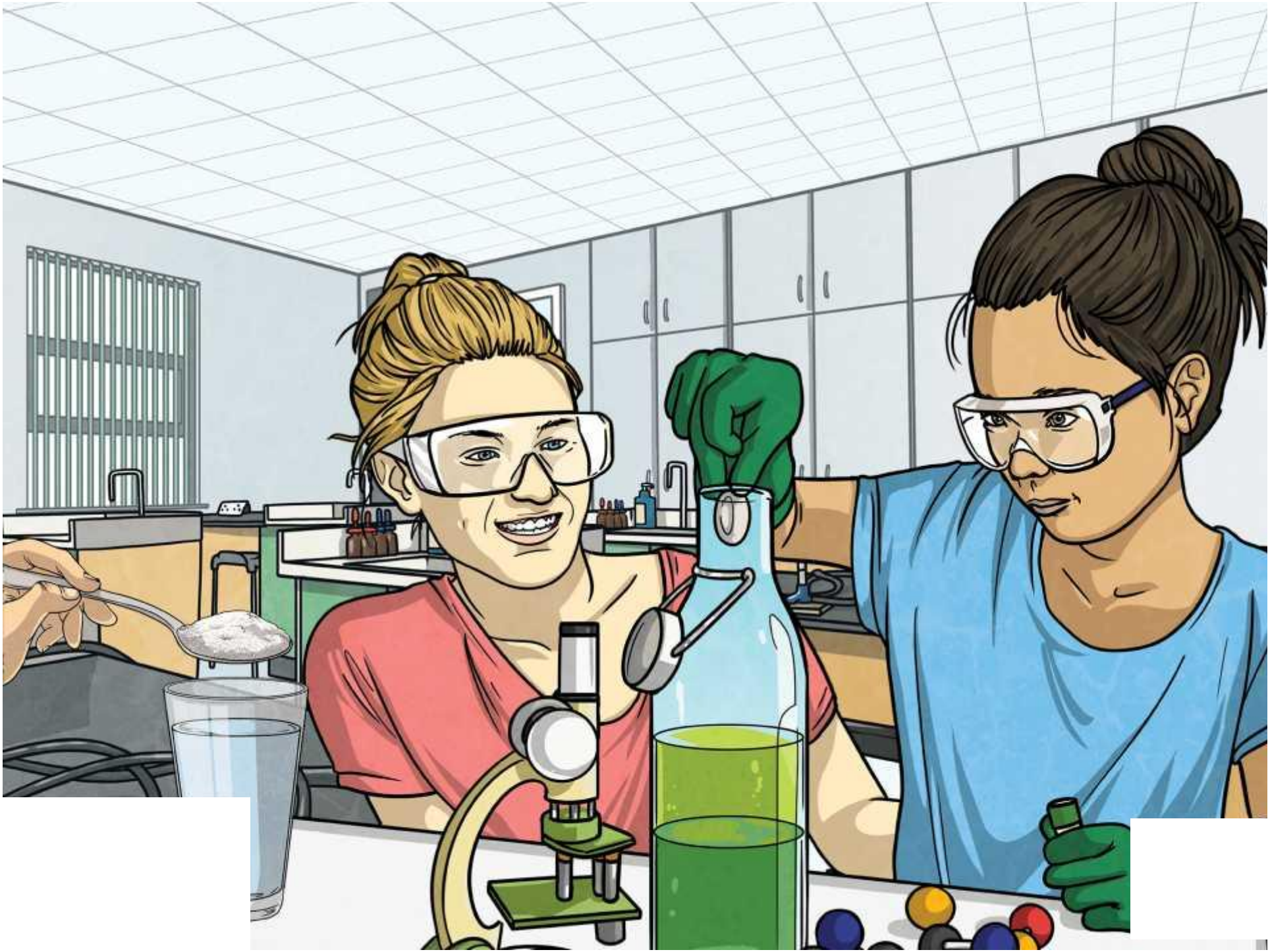
What Happens to Sugar When It Is Added to Hot Water?



Answers – What Happens to Sugar When It Is Added to Hot Water?

Asking scientific questions is a great way for you to explore a new topic.
Although not all of your questions will be answered at this point, these facts may help you to understand more about **properties and changes of materials.**





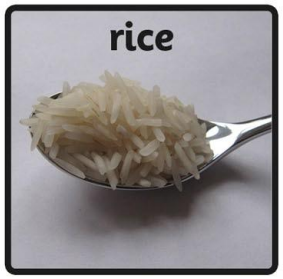

coffee


curry


salt

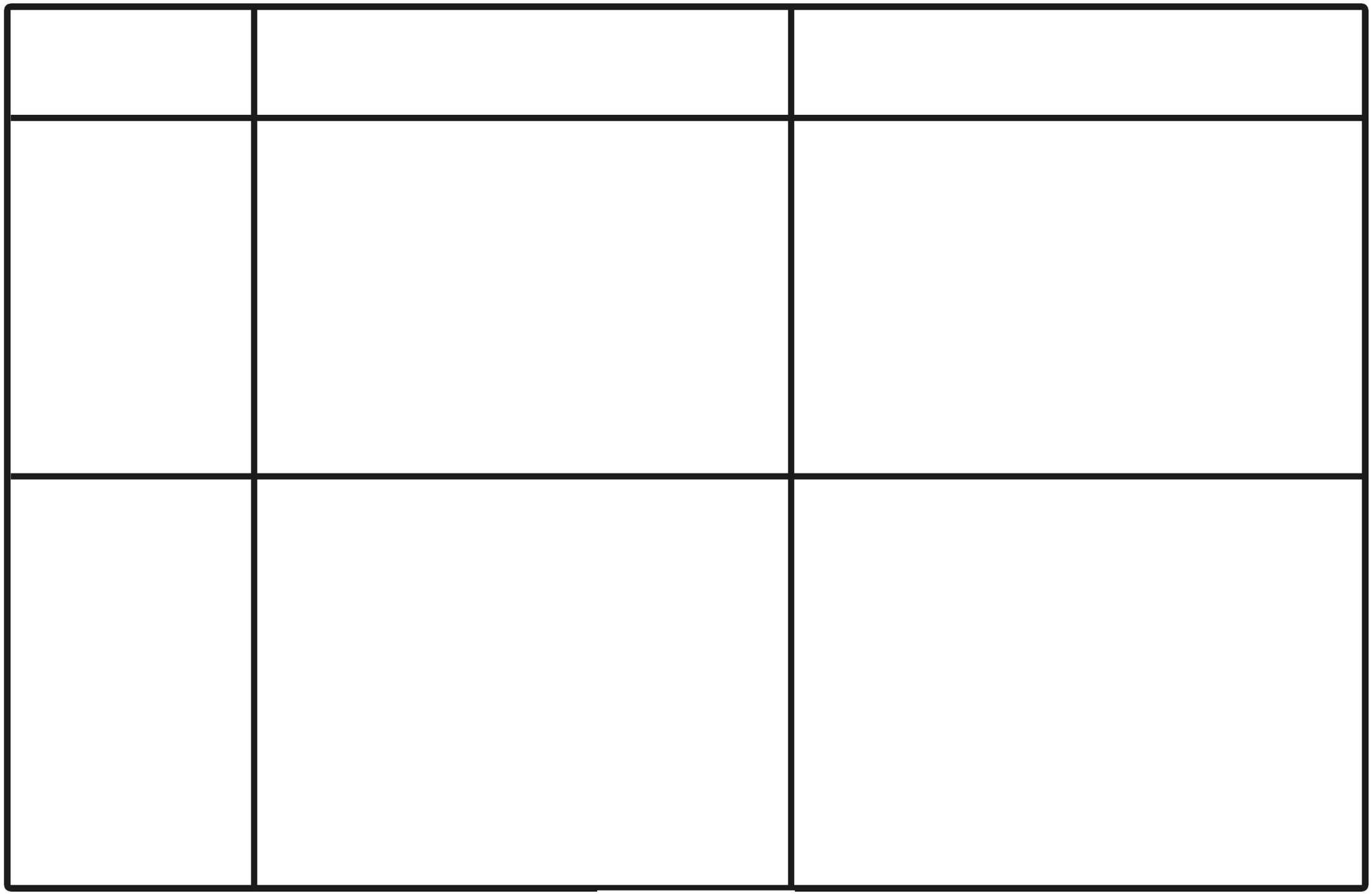

sand

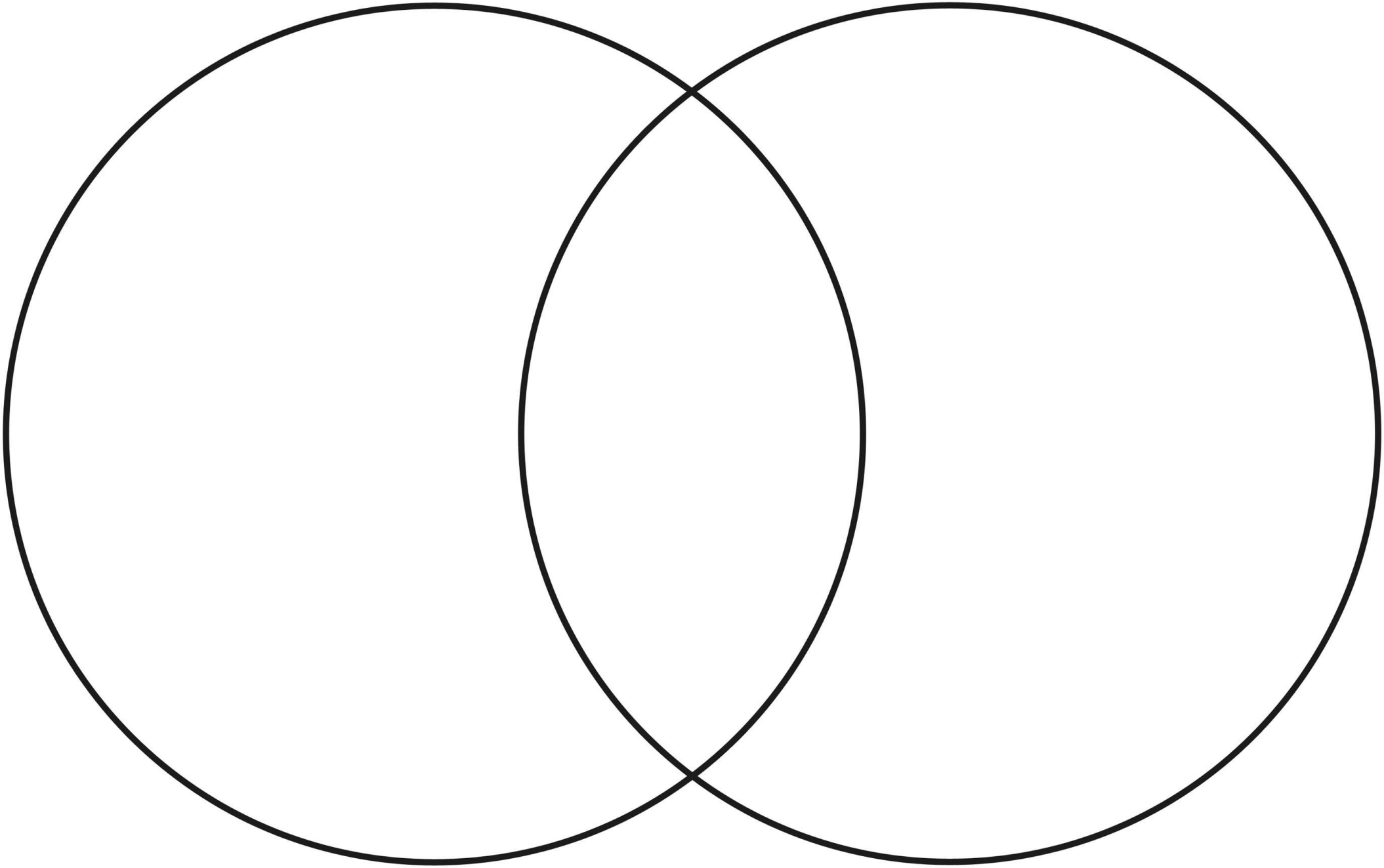

flour

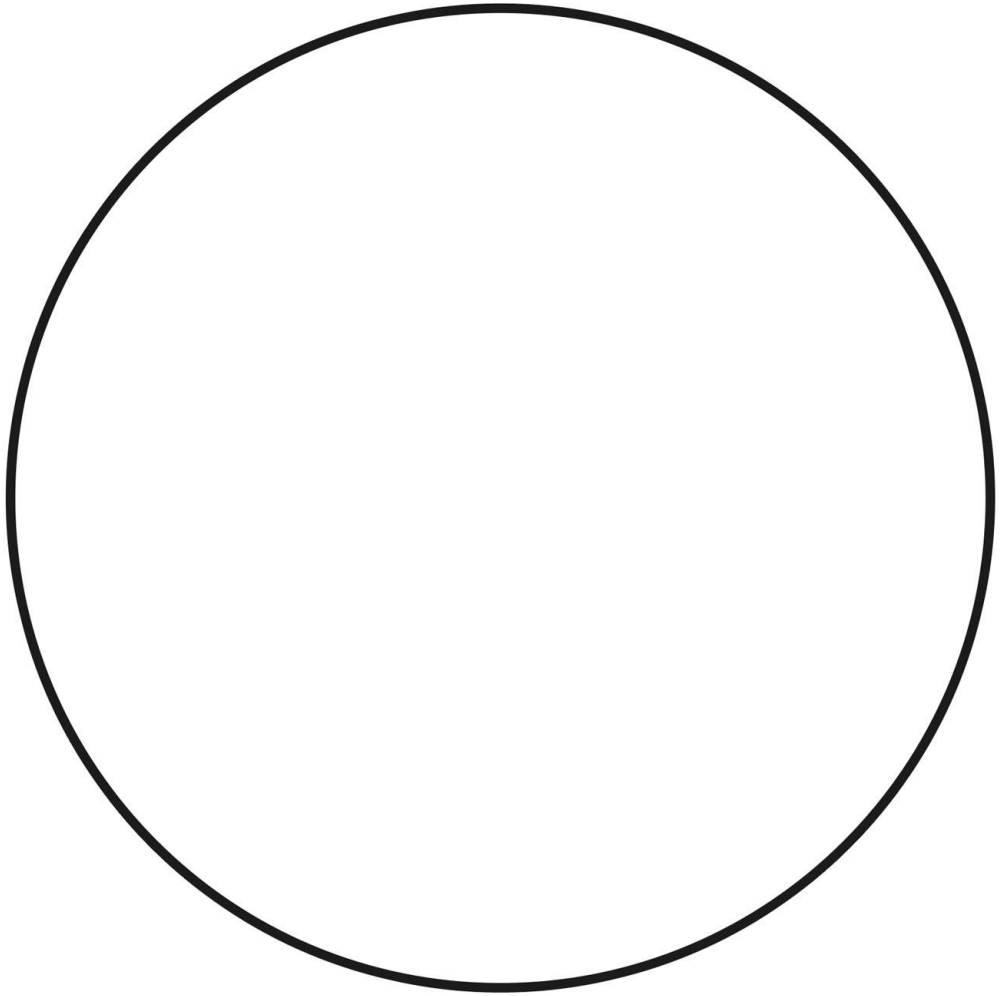

rice

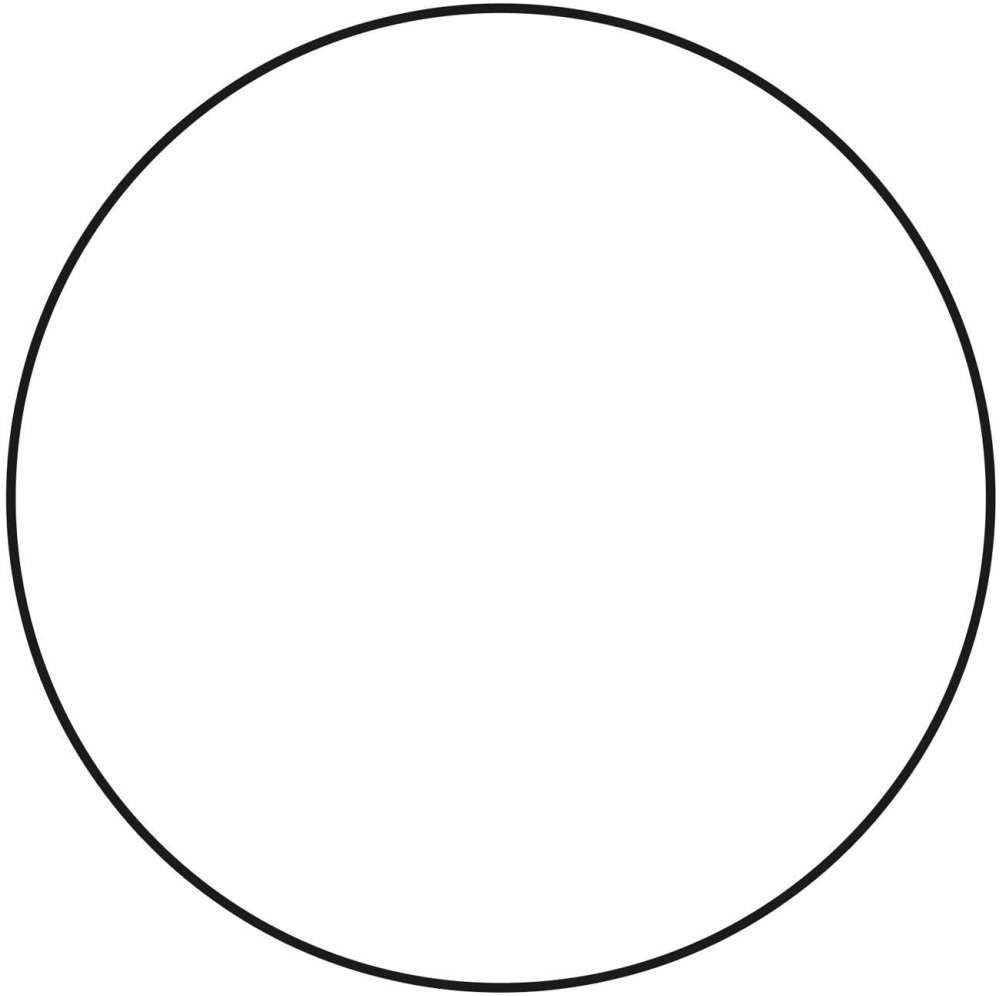

shavings

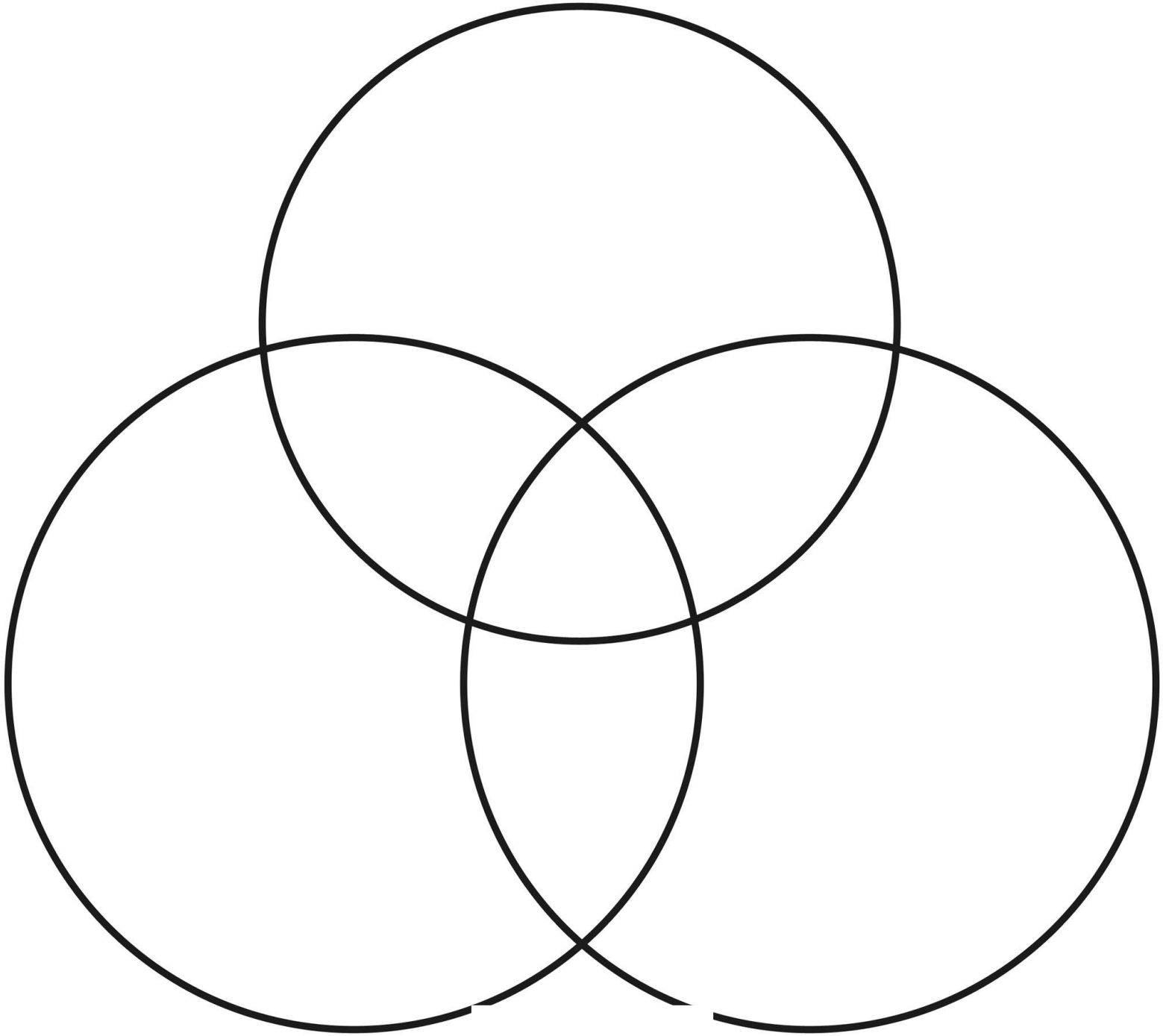

sugar











Science KS2: Y5 Dissolving, Reversible Changes and Separation

This document is gives guidance to the main areas of study in the Year 5 Materials requirements.

Curriculum 2014

Year 5

Statutory Requirements

Pupils should be taught to:

- compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets
- know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution
- use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating
- give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic
- demonstrate that dissolving, mixing and changes of state are reversible changes
- explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda.

Progression

Content	Vocabulary
Dissolving What is dissolving? Which materials dissolve? What are the conditions for better dissolving? (Investigation) A simplified explanation of dissolving.	dissolve (dissolved / undissolved) solid and liquid solution solute solvent pure mixture fair reliable accuracy
Reversible changes Introductory discussion	melt freeze

melting / freezing evaporation / condensation recovering a solute from a solution	solidify evaporate evaporation condense condensation distilled
Separation (recovering a solute from a solution) filtration to separate a liquid and solid sieving to separate 2 different size solids	separate sieve filter

Materials in the curriculum

Some of this work provides opportunities to present data using a spreadsheet.

Year 5 Science lessons about Materials

Lesson 1	Dissolving – materials that dissolve and materials that do not dissolve
Lesson 2	Dissolving – the conditions in which dissolving happens
Lesson 3	Dissolving - Saturation
Lesson 4	Reversible changes – melting / freezing
Lesson 5	Reversible changes – evaporation / condensation
Lesson 6	Reversible changes – recovering dissolved substances by evaporation
Lesson 7	Separation – filtering
Lesson 8	Separation - sieving

Powerpoint Slide Notes

	Dissolving, Reversible Changes and Separation
1	Title - A task setting PowerPoint Pack about Dissolving, Reversible changes and Separation
2	Contents – click on the links for the different lessons.
3	Lesson 1: Begin by asking the children to predict what will happen when these materials are added to water. Discuss with the children how their own experience is used to predict what will happen.
4	Lesson 1: Decide with the children how much powder to add to the water and whether they will stir the water.
5	Lesson 1: Vocabulary for this learning.
6	Lesson 1: Sorting activity. Discuss with the children whether this Venn Diagram should intersect and move the circles if necessary.
7	Lesson 1: Sorting activity. Her is an editable Carroll Diagram which can be used for showing the results of the activity.

8	Lesson 1: The process of dissolving is complicated, not least because there are 2 types of materials that dissolve, as characterised by salt and sugar. A useful video for teachers can be found at http://www.youtube.com/watch?v=0cPFx0wFuVs, but this is not for KS2 children. Salt – the 2 parts that make sugar, sodium and chlorine (ions) are split up in the water and are "hidden" in the water. Sugar – the crystals are broken up into molecules of Carbon, Hydrogen and Oxygen, but are not split up any further. These are then "hidden" in the water.
9	Lesson 2: Following on from the initial discovery about some solids dissolving ask the children to consider the different conditions that affect how well and how quickly substances dissolve. The children would benefit from investigating by observation first. The main changes would be temperature of the water and movement (stirring). The second level of the slide suggests what the children might investagate.
10	Lesson 2: Here are some suggested questions. The third question gives a practical reason for the investigation, and teachers may want to use this initially or as a supplementary question.
11	Lesson 2: These are the important questions to ask to ensure that a fair test is being carried out. Click to add the suggestions.
12	Lesson 2: These are the important questions to ask to ensure that a fair test is being carried out. Click to add the suggestions.
13	Lesson 2: Here is an example of a table for recording the results.
14	Lesson 2: Here is an example of a table for recording the results.
15	Lesson 2: This is an editable spreadsheet. Right click on the spreadsheet to edit the fields or data or graph type. As the measurements are not exact it would be worth discussing with the children whether a graph is appropriate, and in what form it should take.
16	Lesson 2: This slide looks at how to ensure reliability and considers the option of repeating the test with a different amount of salt or sugar.
17	Lesson 3: An introduction to saturation with a real life question.
18	Lesson 3: A simple activity for the children to see the point of saturation with sugar.
19	Lesson 3: a suggested investigation to compare the point at which water becomes saturated and compare salt and sugar. Click to add suggestions.

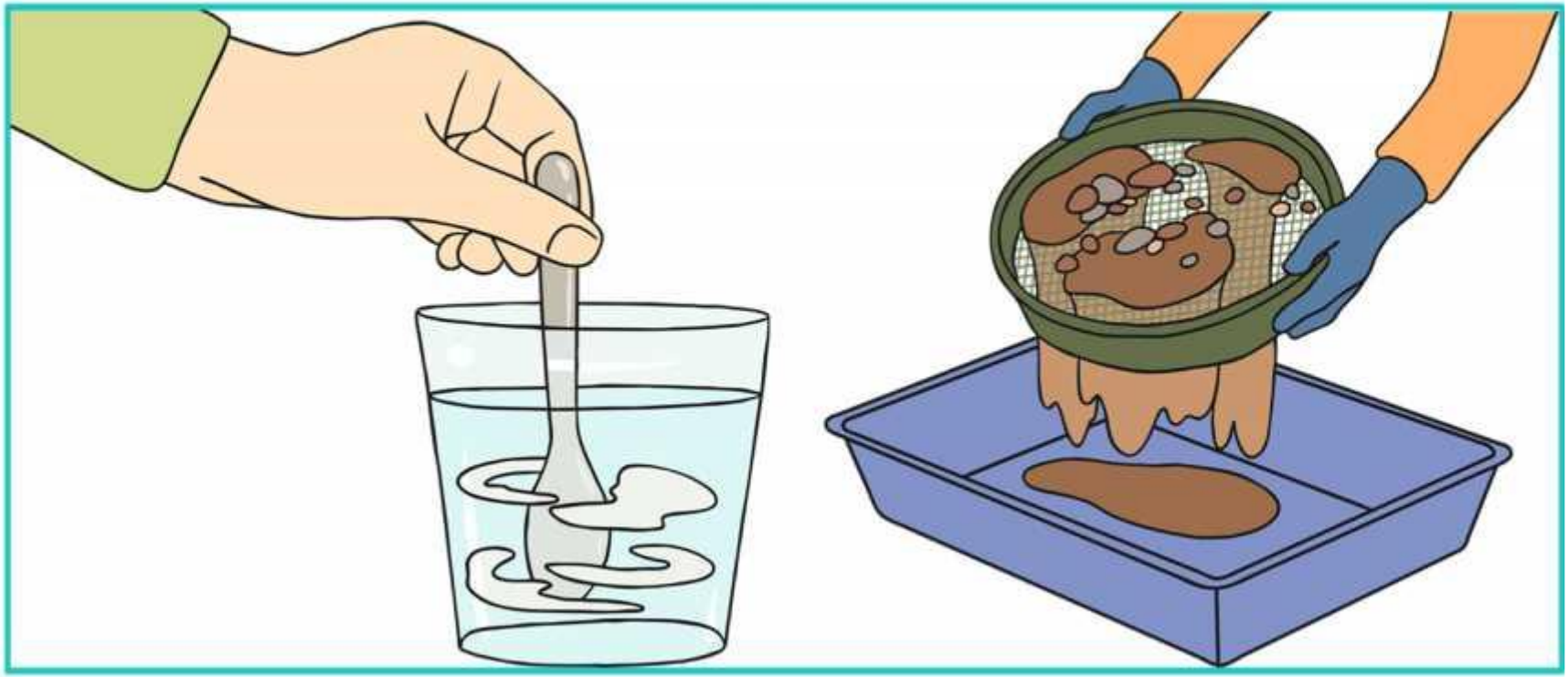
20	Lesson 3: an editable graph.
21	Lesson 4: Teachers may wish you use this BBC clip to start the work on reversible and non-reversible changes. Details of the clip This is a compilation of clips set to a background of music and based on the theme of changing materials. It includes images of fireworks exploding, demolition of tower blocks, a volcano and magma flowing, a time lapse sequence of a cake being baked, a candle melting, toffee in both liquid and solid form, melted metal being cast, a rusted metal sculpture, a match burning, wood, coal, a burning building and a forest fire. Reversible and irreversible changes are demonstrated. One way to share ideas across the class is for one member of a group to go to other groups to gather their ideas and bring them back to their group. Impress upon the children that we learn from each other, and that sharing ideas is a good way to do this. There are some drawings of ideas from the video to help the children in their discussions if the teacher wishes to use them.
22	Lesson 4: Slide with images from the video which can be used for a sorting activity
23	Lesson 4: Introduces the reversible change of melting and freezing/ solidifying
24	Lesson 4: Opportunity to discuss other materials that can melt and return to its original state by freezing or solidifying.
25	Lesson 4-8: Vocabulary for this learning.
26	Lesson 5: Another example of a reversible change – evaporation and condensation.
27	Lesson 5: Demonstrating reversible changes Children could try this in a classroom with hot water in a cup or bowl and holding a cold surface above the cup where the water will condense.
28	Lesson 6: Another example of a reversible change – returning a solution to its original state.
29	Lesson 7: Separating materials by filtration Children could try this in a classroom.
30	Lesson 8: Separating materials by sieving Children could try this in a classroom.
31	The end

Useful websites

URL	Information
	explanation of dissolving for teachers
	introductory video about reversible and irreversible changes

Some other websites are linked from within the PowerPoint.

Dissolving, Reversible Changes and Separation



A task setting PowerPoint Pack about Dissolving, Reversible changes and Separation.

Contents

LO: to understand dissolving

Here are some solids that are in the form of a powder.

What do you think will happen when you add them to water?

What helps you to make your prediction?








LO: to understand dissolving

What happens when you add the powders to water?

Record what happens:

- How much powder will you add to how much water?
- Will you stir the powder in the water?

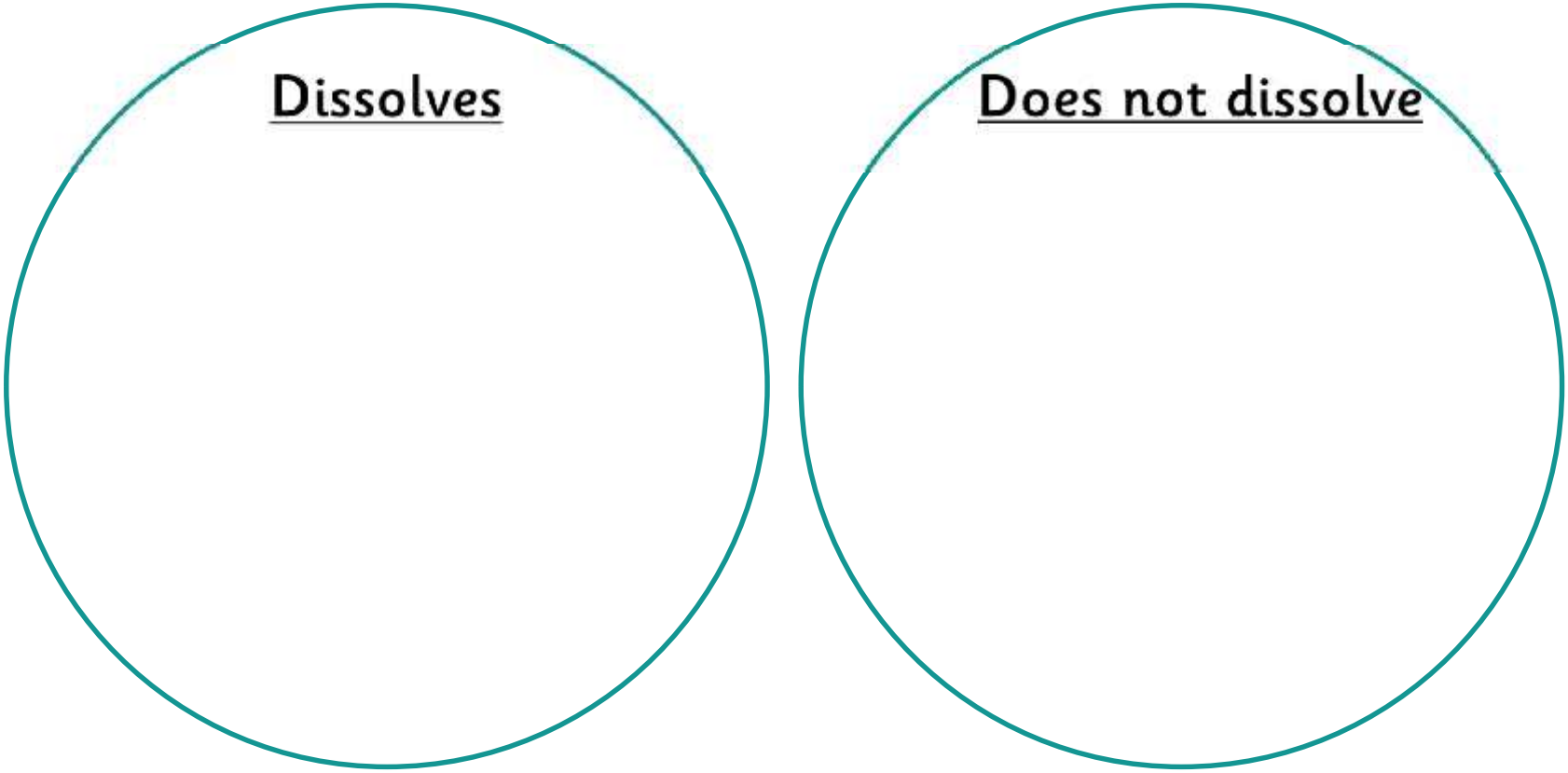
LO: to understand dissolving

Here is some important vocabulary for this learning.

dissolve – a solid mixes with a liquid to become a **solution**
solid – a material in **solid** form has a rigid structure
liquid – a material in **liquid** form fills the container it's in
solution – the **mixture** of a **dissolved** solid in a liquid
solute – the **solid** that has **dissolved** in a **solution**
solvent – the **liquid** into which a **solute** has **dissolved**
pure – a material that can't be separated using physical means
mixture – where different materials are combined
fair – free from bias
reliable – can be trusted
accuracy – measuring the true value

LO: to understand dissolving

How could you sort these materials based on your findings?



LO: to understand dissolving

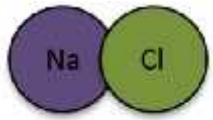
How could you sort these materials based on your findings?

	Dissolves	Does not dissolve
Clear water		
Colours the water		

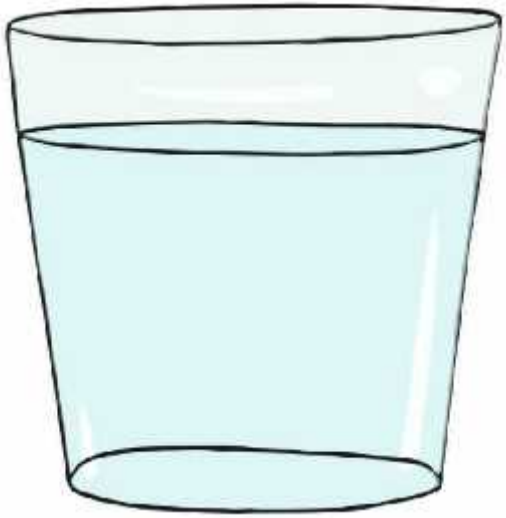
LO: to understanding dissolving

What happens when a substance dissolves?

- Salt is made of sodium (Na) (a metal) and chlorine (Cl).



- In water the sodium and chlorine are split up.

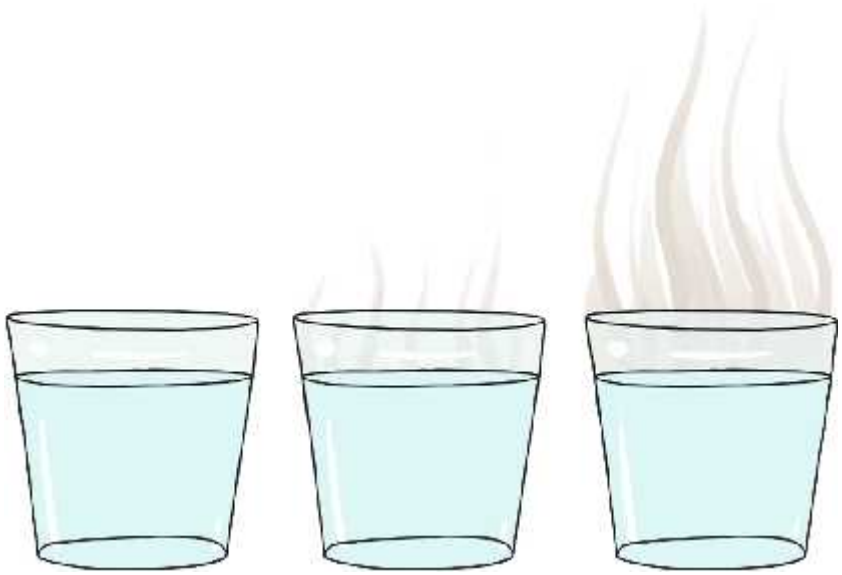


- They are "hidden" by the water.

Contents

LO: to carry out a fair and reliable test

What conditions cause more solid to dissolve?



The temperature of the water

Stirring the water

LO: to carry out a fair and reliable test

What conditions cause more solid to dissolve?

Questions to investigate:

- How does the temperature of the water affect the amount of a solid that dissolves in water?
- How does stirring the water affect the amount of solid that dissolves in water?
- If I put 2 teaspoons of sugar in a milky cup of tea, what should I do to ensure all the sugar dissolves?

LO: to carry out a fair and reliable test

What conditions cause more solid to dissolve?

What you will change?

- the temperature of the water

What you will measure/ observe?

- how much salt or sugar had dissolved

What you will keep the same?

- the amount of water
- the amount of salt or sugar
- the number of stirs (if any)

LO: to carry out a fair and reliable test

What conditions cause more solid to dissolve?

How will you record your results?

	cold water	room temperature	warm water	hot water
Amount of salt dissolved				

How will you measure/ observe the amount of salt that has or hasn't dissolved?

LO: to carry out a fair and reliable test

What conditions cause more solid to dissolve?

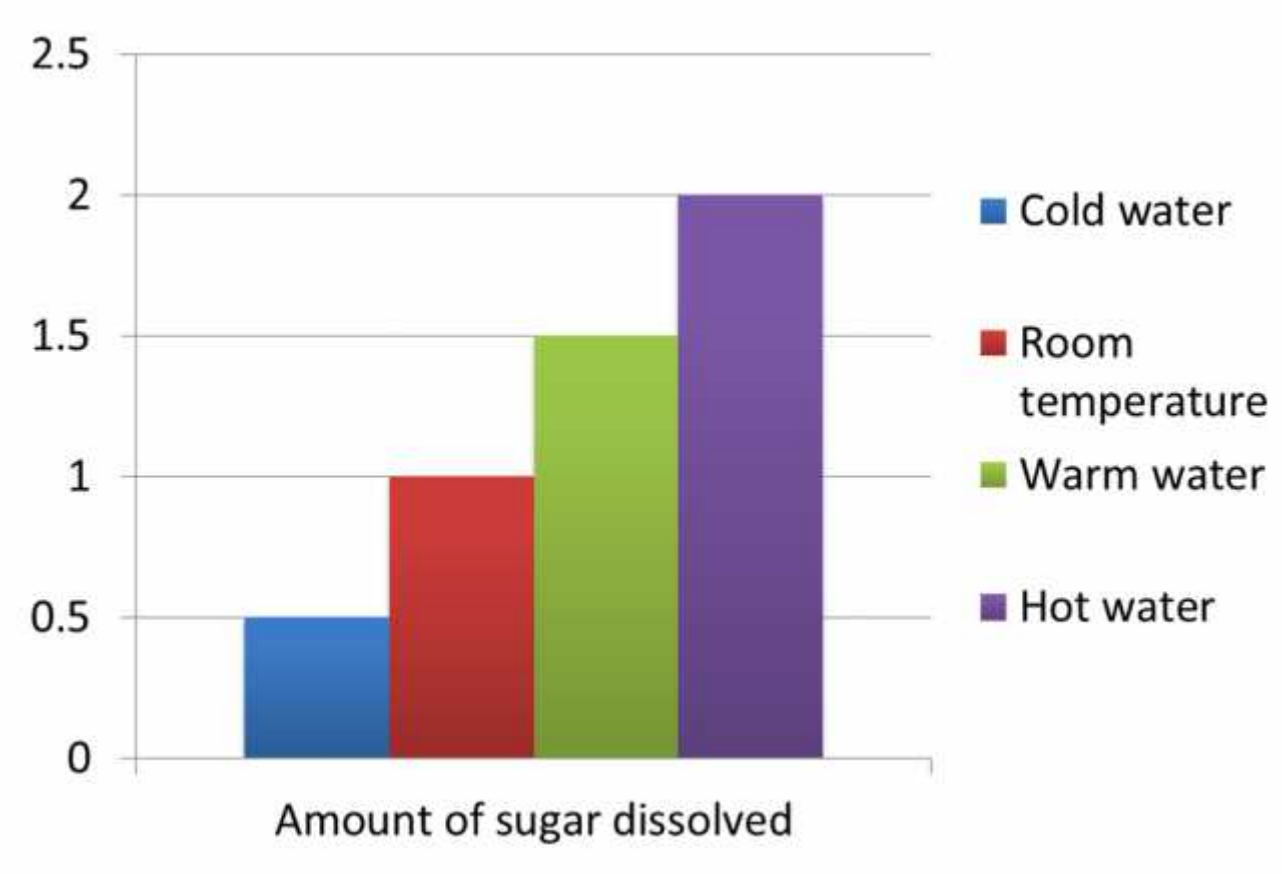
How will you record your results?

	no stirs	2 stirs	4 stirs	6 stirs
Amount of sugar dissolved				

How will you measure/ observe the amount of sugar that has or hasn't dissolved?

LO: to carry out a fair and reliable test

What conditions cause more solid to dissolve?



LO: to carry out a fair and reliable test

What conditions cause more solid to dissolve?

How do you ensure your test is reliable?

Repeat the test with all factors the same.

It is also possible to repeat the test but change the amount of sugar or salt you are trying to dissolve.

Discuss how this would impact on the fairness and reliability of the test.

Contents

LO: to understand saturation

If you keep adding sugar to a cup of tea, will it continue to dissolve?

When a solute will no longer dissolve, the solution is **saturated**.

LO: to understand saturation

- Measure some warm water into a clear cup
- Add a teaspoon of sugar to a cup of warm water and stir until it all dissolves.
- Keep adding a teaspoon of sugar and stir until the sugar dissolves.
- How many teaspoons of sugar can you add until the sugar does not dissolve.

LO: to carry out a fair and reliable test

Do sugar and salt create a saturated solution after the same amount of solute is added?

What you will change?

- the solute – sugar and salt

What you will measure/ observe?

- how much salt or sugar is added before the solution is saturated

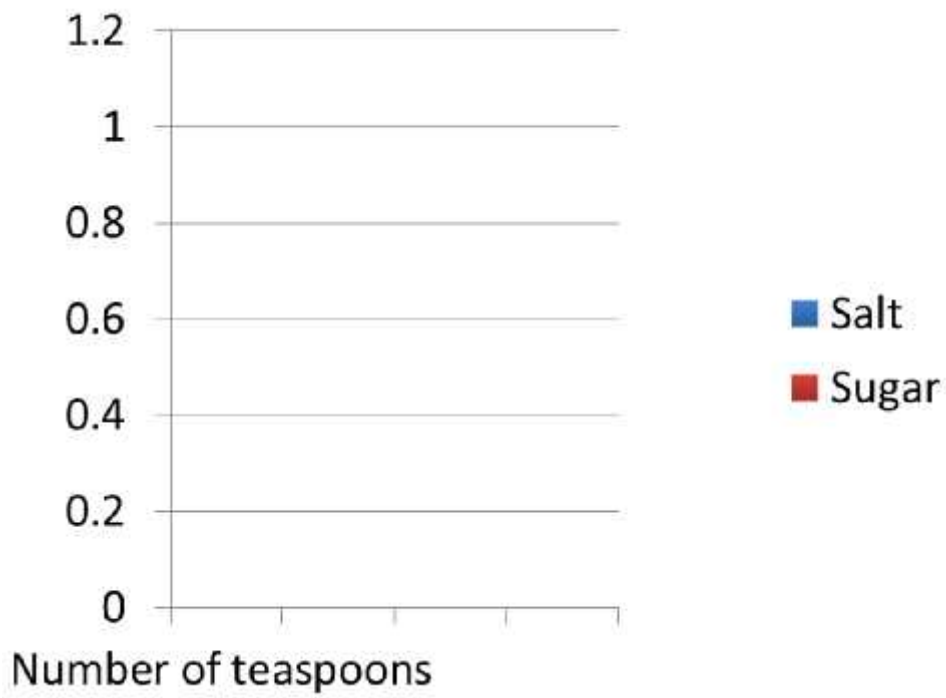
What you will keep the same?

- the amount and temperature of the water
- each teaspoon of salt or sugar

LO: to carry out a fair and reliable test

Do sugar and salt create a saturated solution after the same amount of solute is added?

This graph is editable. Right click and edit data.



Contents

LO: to understand different ways materials change

Watch the video from the link below:

- What changes do you notice in this video?
- Can you think of how any of the changes might be different?

- Discuss your ideas as a group.
- Send one of your group to gather ideas from other groups.

LO: to understand different ways materials change







LO: to understand different ways materials change

Contents

LO: to understand a reversible change

- A reversible change is when a material can be changed back to its original state
- An example of a reversible change is when a material melts and then solidifies again.

heat

cool

LO: to understand a reversible change

What other materials can you think of that melt and can be returned to their original state?

Contents

LO: to understand reversible changes and separation

Here is some other important vocabulary for this learning.

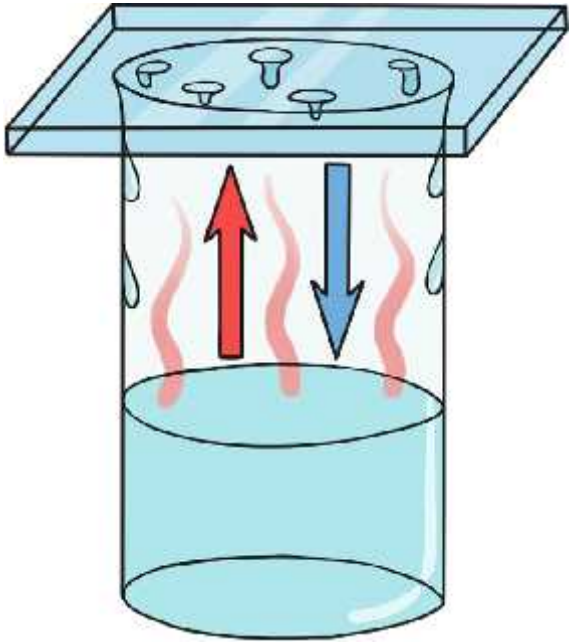
melt – when a solid turns into a liquid
freeze – when a liquid turns into a solid
solidify – when a liquid turns into a solid
evaporate/evaporation – when a liquid turns into a gas
condense/condensation – when a gas turns into a liquid
distilled – the result of a liquid being evaporated and condensed
separate – to return a mixture into its different materials
sieve – an implement with small holes to allow a fine powder through
filter – an implement with microscopic holes to allow a liquid through

LO: to understand a reversible change

- A reversible change is when a material can be changed back to it's original state.
- Another example of a reversible change is when a material evaporates and then condenses.

LO: to understand a reversible change

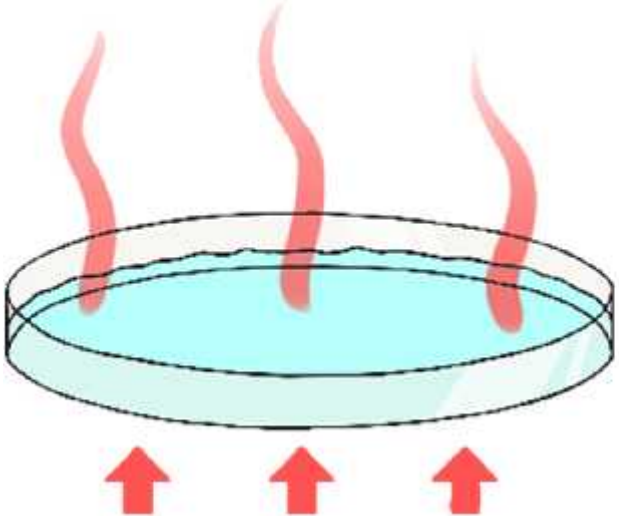
Try condensing water by holding a cold surface over a cup of hot water.

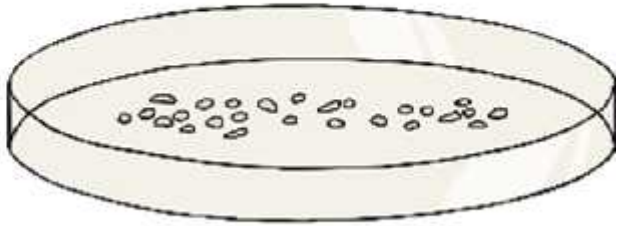


Contents

LO: to understand a reversible change

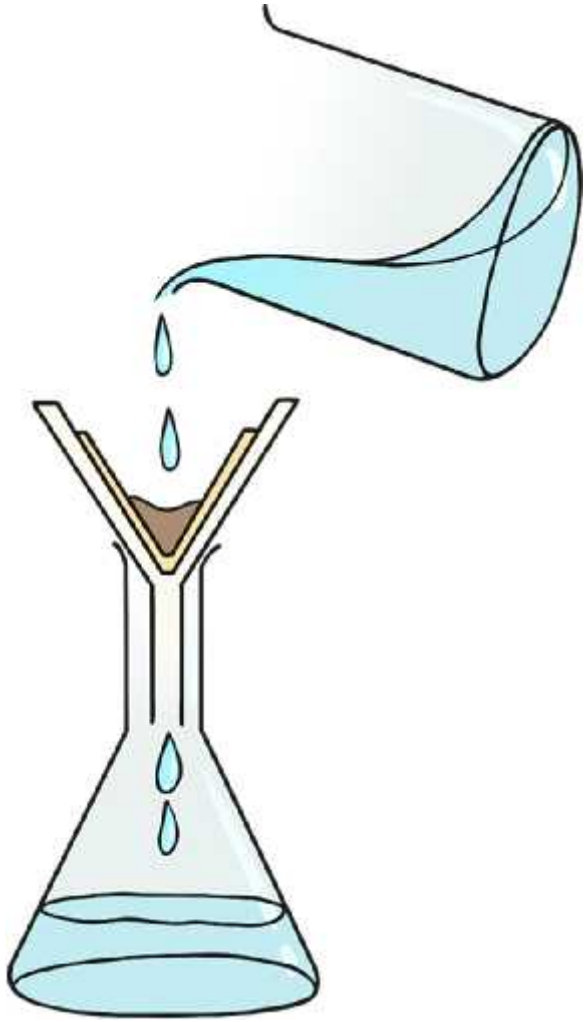
- A reversible change is when a material can be changed back to it's original state.
- Another example of a reversible change is when a material that has been dissolved can be separated from the solution.
- Can you use your knowledge about evaporation and condensation to think how this might be done?





Contents

LO: to separate by filtration



Mixtures of solids in a liquid can be separated by filtration.

Filtration is when a liquid and solid mixture is poured through a filter which allows the liquid through and catches the solid.

Make a mixture of sand/ soil/ flour and water and filter.

Contents

LO: to separate by sieving

Mixtures of solids can be separated by sieving.

Sieving will separate 2 solids of different sizes by passing one through a sieve, which collects the other solid.

Take a mixture of soil and stones and pass through a sieve to separate the stones from the soil.

Contents