

Topic:	Year group	Term
Reversible and irreversible changes	5	Summer

Background knowledge

In this unit the children will cover the following scientific knowledge.

Some materials will dissolve in a liquid and form a solution while others are insoluble and form sediment.

Mixtures can be separated by filtering, sieving and evaporation.

Some changes to materials such as dissolving, mixing and changes of state are reversible, but some changes such burning wood, rusting and mixing vinegar with bicarbonate of soda result in the formation of new materials and these are irreversible.

Lots of misconceptions exist around reversible and irreversible changes, including around the permanence and impermanence of change. There is confusion between physical/chemical and reversible and irreversible changes. They do not correlate simply. Chemical changes result in a new material being formed. These are mostly irreversible. Physical changes are often reversible but may be permanent. These do not result in new materials e.g. cutting a loaf of bread. The shape, but not the material, has been changed.

Common misconceptions

- Solids dissolved in liquids have vanished and so you cannot get them back.
- Lit candles only melt, which is a reversible change

What should I already know?

Year 1

I can distinguish between an object and the material it is made from.

I can explain the materials an object is made from.

I can name wood, plastic, glass, metal, water and rock.

I can describe the properties of everyday materials (hard, soft, stretchy, stiff, shiny, dull, rough, smooth etc.)

I can group objects based on the materials they are made from.

Year 2

I can identify and name a range of materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard.

I can suggest why a material might or might not be used for a specific job.

I can explore how shapes can be changed by squashing, bending, twisting and stretching.

Year 3

I can predict and test whether objects will be magnetic and carry out an enquiry to test this out.

I can sort materials into magnetic and non-magnetic.

I can compare and group rocks based on their appearance and physical properties giving a reason.

I can sort material into opaque, translucent and transparent.

Year 4

I can group materials based on their state of matter (solid, liquid, gas).

I can describe in simple terms the properties of different states of matter.

I can describe how some materials change state e.g. water.

I can use the terms evaporation, condensation, freezing, solidify, melt to explain what happens when materials change state.

I can measure temperature accurately.

I can explain the part played by evaporation and condensation in the water cycle.

I can sort materials into electrical conductors and insulators.

National Curriculum Objectives / Key Skills	The Journey
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. 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. <u>Working scientifically</u>	1. Dissolving 2. Separate materials - filtering and sieving 3. Solutions and evaporating 4. Reversible changes 5. Irreversible changes - burning 6. Irreversible changes - acid

Using test results to make predictions to set up further comparative and fair tests

Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs.

Taking measurements, using a range of scientific equipment, with increasing accuracy and precision, and taking repeat readings when appropriate.

Use relevant scientific language and illustrations to discuss, communicate and justify their scientific ideas (non-statutory).

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Identifying scientific evidence that has been used to support or refute ideas or arguments.

Scientific enquiry



Outcomes

Working towards: I can name a range of solids, liquids and gases and describe their properties with support. I can investigate which materials dissolve in water to form a solution and recognise the material is still present. I can think of a question to investigate about dissolving with support and start to plan a fair test changing only one variable I can present my results with support in either a line graph or bar chart explaining what it shows. I can measure with a thermometer. I can investigate how to recover a substance from a solution. I can use a variety of techniques to separate materials. I can give some examples of reversible and irreversible changes.

Expected: I can name a range of solids, liquids and gases and describe their properties. I know which materials dissolve in water to form a solution and recognise the material is still present. I can explain what happen when a material dissolves. I can think of a question to investigate about dissolving, plan a fair test changing only one variable and select appropriate equipment to carry it out. I can present my results clearly in either a line graph or bar chart explaining what it shows. I can measure accurately with a thermometer. I know how to recover a substance from a solution. I can use a variety of techniques to separate materials explaining how they work. I can give examples of reversible and irreversible changes.

Exceeding: I know which materials dissolve in water to form a solution and recognise the material is still present. I can confidently explain what happen when a material dissolves. I can think of a question to investigate about dissolving, plan a fair test changing only one variable independently and select appropriate equipment to carry it out. I can present my results clearly in either a line graph or bar chart explaining the relationship evident e.g. the colder the water, the longer it takes to dissolve. I can measure precisely with a thermometer. I know how to recover a substance from a solution explaining my method. I can use a variety of techniques to separate materials confidently explaining how they work. I can give examples of reversible and irreversible changes and define the meaning of these terms.

Key Vocabulary	Timeline / Diagrams
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Conductor- a material which let heat or electricity through.

Dissolve- when a solid mixes with a liquid and becomes part of a liquid.

Filtering - where a solid is removed from a liquid.

Insoluble- a solid that doesn't dissolve in a liquid.

Irreversible- can't be changed back to its original state.

Magnetic- is attracted by a magnet.

Mixture - a mixture is created when two or more materials are combined.

Saturated- when a substance can't be dissolved any more.

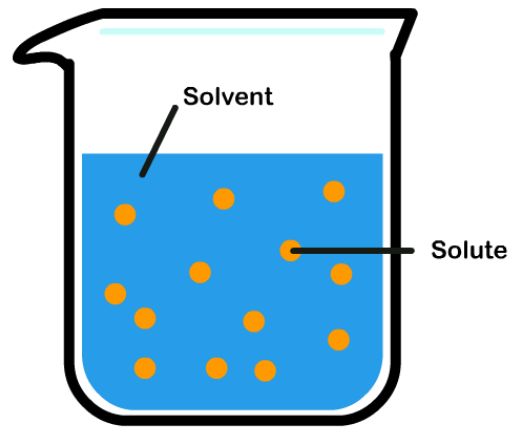
Soluble- a solid which will dissolve in a liquid.

Solute- the solid which is dissolved in the solution.

Solution - the mixture formed when a solid dissolves in a liquid.

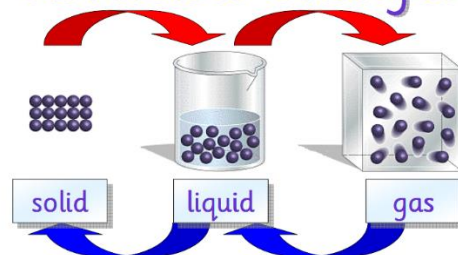
Solvent- the liquid part of a solution

Thermal - heat



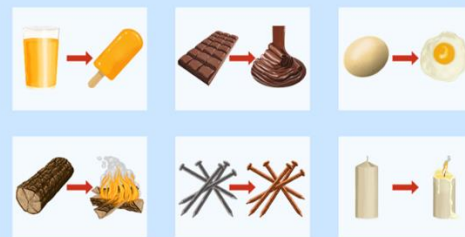
Solution

Reversible Changes



Physical change, from solid to liquid to gas and back again, is a reversible change.

Reversible and Irreversible Changes



Key people / places

NUSTEM- Materials engineer.

Famous scientist- Spencer Silver or Ruth Benerito.

Assessment questions / outcomes

Sort the substances into solids, liquids, and gases. What are their properties?

Sort the materials into soluble and insoluble. What happens when a solution is made?

Which variable did you change? Which ones did you keep the same?

How can we get the solid back from a solution?

Explain how to separate these materials.

What happens when these material are heated? (include reversible and irreversible)

Sort these pictures into reversible and irreversible changes. What is a reversible/ irreversible change?