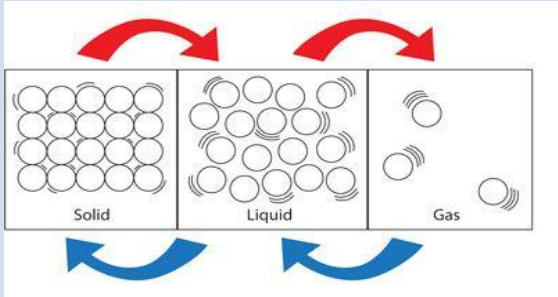
Properties and Changes of Materials | Science | Years 5 & 6 | Autumn Term 2026-27

National Curriculum Science - Knowledge

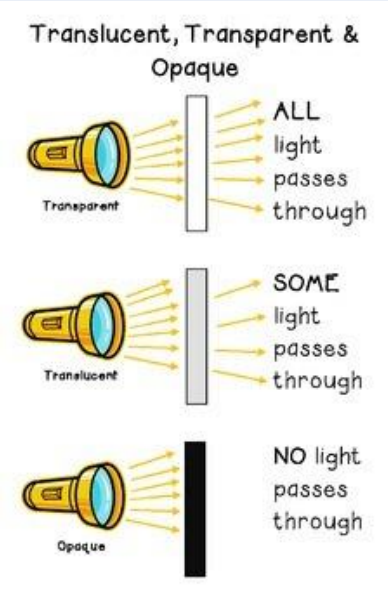
- Compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets.
- Know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance 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.

Key Learning

Materials have different uses depending on their properties and state (liquid, solid, gas).



Properties include hardness, transparency, electrical and thermal conductivity and attraction to magnets.



Some materials will dissolve in a liquid and form a solution.

Others are insoluble and form sediment. This is known as a mixture..

Vocabulary

Change of state: a physical change in a matter including melting, boiling, freezing and condensation.
Mixture: a substance made by mixing other substances together.
Dissolve: to become incorporated into a liquid so as to form a solution.
Solution: a mixture whereby one substance has been dissolved in the liquid substance.
Soluble: able to be dissolve, especially in water.
Insoluble: not able to be dissolved.
Reversible: capable of being reversed so that the previous state is restored.
Irreversible: not capable of being reversed.
Separate: the process of dividing into individual parts / materials.
Material / substance: the matter from which a thing is or can be made.
Property: an attribute, quality, or characteristic of something.
Filtration: to pass a liquid through a device (e.g. filter paper) to remove unwanted material.
Evaporation: the process of turning from liquid into vapour
Sieving: the process of passing a mixture through a sieve to separate larger particles from smaller ones.
Transparent: allowing light to pass through so that objects behind can be seen (see-through)
Opaque: blocking light from passing through; not transparent.
Conductor: allowing heat or electricity to pass through.

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National Curriculum Science – working scientifically

- Plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary.
- Take measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate.
- Record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs.
- Use test results to make predictions to set up further comparative and fair tests.
- Report and present findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations.
- Identify scientific evidence that has been used to support or refute ideas or arguments.

Key Learning continued…

Mixtures can be separated by filtering, sieving and evaporation.

<u>Filtering</u>

<u>Sieving</u>

<u>Evaporation</u>

Some changes to materials such as dissolving, mixing and changes of state are reversible, but some changes such as burning wood, rusting and mixing vinegar with bicarbonate of soda result in the formation of new materials and these are not reversible.

Charcoal

Rust

Vinegar and bicarbonate of soda

Bread dough

Scientific investigations

1) Which materials dissolve to form a solution?
2) How can mixtures be separated?
3) Why are some changes not reversible?
4) Why are changes caused by burning irreversible?

- Make scientific observations.
- Record and present findings using diagrams, tables and graphs.
- Interpret results to answer the scientific question being investigated, linking to knowledge of changes, and materials and their properties to explain them.

5) Which changes caused by heating / cooling are reversible?

- Make scientific predictions on basis of knowledge about reversible and irreversible changes, and states of matter.

Group materials on the basis of their properties and present this data using Venn diagrams and Carroll Diagrams.

Interpret enquiry results (provided) to determine the best material for a given purpose (buoyancy of a boat).

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Key Learning: Work scientifically to identify the properties of materials, the changes they incur and the usefulness of different materials .

1	**Which materials dissolve to form a solution?** In a mixture, substances are generally just mixed and are not completely dissolved. In a solution, substances are dissolved completely and they cannot be filtered out. A substance can be recovered from a solution using evaporation; this separation is possible because dissolving is a revisable change. Test different materials to see what happens when they are mixed with water and record observations.
2	**Reversible changes: How can mixtures be separated?** Some changes of state (gas, liquid, and solid), dissolving and mixing processes can be reversed because they are reversible changes. Evaporation can be used to separate soluble materials from water. Filtering and sieving can be used to separate insoluble materials from water. Conduct practical experiments to explore how best to separate different mixtures using sieves and filters.
3	**Why are some changes not reversible?** Some changes when materials are mixed together form new materials, and these changes are not usually reversible – they are irreversible changes. Conduct practical experiments to mix together different substances, make observations and explain what new material has been produced to make an irreversible change.
4	**Which changes caused by heating or cooling are reversible?** Some changes caused by heating or cooling form new materials and these changes are often not reversible. However, some materials change state when they are heated or cooled (e.g. water through evaporation and condensation) and these changes of state are reversible. Predict what will happen to a variety of materials / substances when they are heated or cooled, saying whether each change is reversible or irreversible and why.
5	**Why are changes caused by burning irreversible?** Changes caused by burning form new materials and therefore these changes are not reversible. Give examples of new materials that are formed through burning. Conduct practical experiments and make observations to support understanding. Identify and assess hazards associated with burning materials.
6	**How can we group materials according to their properties?** Describe everyday materials on the basis of their properties (e.g. flexibility, solubility, conductivity, magnetism, transparency). Compare and group together everyday materials on the basis of their properties. Explain why some everyday materials are useful (and suited to their jobs) due to their properties.
7	**Which material is best-suited?** Analyse experiment results to choose materials for certain purposes. Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials.