



Year 5 - Materials Reading Booklet

Lesson Series:

1. Properties of materials.
2. Which material is best?
3. Solubility.
4. Separating mixtures.
5. Reversible and Irreversible changes.

Name: _____

Class: _____

Lesson 1 - Properties of materials

A property is anything that describes a material or substance. It is a characteristic of that material. For example, how hard the material is, its colour, or its shape.



When we refer to the properties of a material, we are talking about features we can sense, measure or test. For example, if we have a sample of metal in front of us, we can identify that this material is grey, hard and shiny. Testing shows that this material is able to conduct heat and electricity and that it will react with an acid. These are some of the metal's properties.

It is important to decide if you are investigating the properties of a material or of an object. For example, are you identifying the properties of a spoon (an object), or are you looking at properties of the material: is it made of, for example, stainless steel? Properties like shape and mass may be different for different objects, even when they are made of the same material.

Materials can be grouped by their properties in many ways: shiny/dull, electrical conductor/electrical insulator, transparent/opaque.

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

Some Properties of Materials
hard
soluble
shiny
dense
thermal conductor
transparent
flexible
strong

Lesson 2 - Which material is best?

Children will plan and carry out an investigation into which materials are the best thermal insulators in the context of how to keep a cup of tea hot for longer.

Read this

Thermal conductivity refers to measuring the ability of heat energy to pass through a material. If heat can move through a material, we say it conducts the heat. Thermal insulators are materials that do not conduct heat. Thermal insulators are useful for keeping things warm, or keeping things cool.

Metals are often able to conduct heat well. When two objects of different temperatures are in contact, their molecules will transfer heat energy in an effort to reach a point where they both have the same temperature. This is a point of equilibrium which means balanced. We see this when we place an ice cube in the sun, it gradually melts as the heat flows from the warmer air and melts the cold ice. Thermal insulators reduce the rate at which molecules transfer their heat energy. Thermal insulators are used in everyday objects such as winter coats, thermos flasks, oven gloves.

Lesson 3 - Solubility

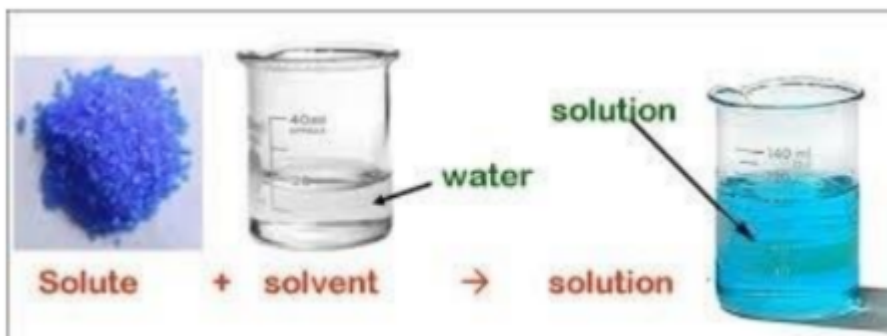
When substances are mixed without chemical bonds being formed, we call them mixtures. A special kind of mixture is formed when a substance dissolves in a liquid. The solid has not melted or disappeared. This mixture is called a solution, and occurs because the two substances are evenly mixed together.

Read this

The solid breaks into individual molecules which disperse between the molecules of the liquid so the solid can no longer be seen (but they can often be tasted-salt/sugar, or if coloured can be seen- instant coffee).

If the solid doesn't break into small enough particles to dissolve it is just called a mixture, rather than a solution. Some solids dissolve better than others- the more mg that dissolve per litre at a certain temperature, the greater the solubility. Higher temperatures increase solubility.

Useful links: <https://www.bbc.co.uk/bitesize/clips/zx7w2hv>



Lesson 4 - Separating Mixtures

Mixtures can be separated using a range of techniques. Large solids can be removed by sieves, smaller solids by filters. Iron can be removed by magnetism.

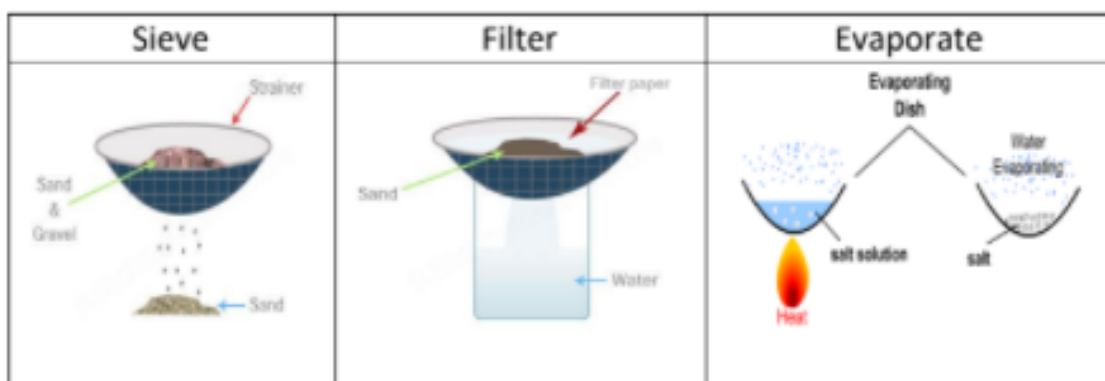
Read this

Dissolved solids can be regained by evaporating the solution. Heat will greatly speed this up. If you had a solution of salt and water, the salt can be separated from the solution through evaporation, and then if the water vapour is collected and cooled, it turns back into a liquid. This process is called distillation.

Distillation is a process developed many years ago by the invention of a piece of equipment called the alembic by an Arab-Yemini alchemist called Jabir ibn Hayyan in 800 AD.

The alembic allowed scientists to collect water vapour and condense it back into a liquid. Jabir ibn Hayyan contributed huge amounts of thought, invention and understanding to the field of chemistry turning it into a scientific discipline, for that he is known as the 'Father of Chemistry'. There is some dispute over the authorship of all the writings attributed to Jabir ibn Hayyan, and some historians think his name may have been used by a number of different people.

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



Alembic

UNTO THE PURE ALL THINGS ARE PURE!

Alembic(noun) in literal terms is an obsolete apparatus used for distillation. It consists of two retorts connected by a tube. Technically alembic is the top lid on the container but is used to refer to the whole apparatus. Metaphorically, the word can be used for anything that refines or purifies.



www.wordpandit.com

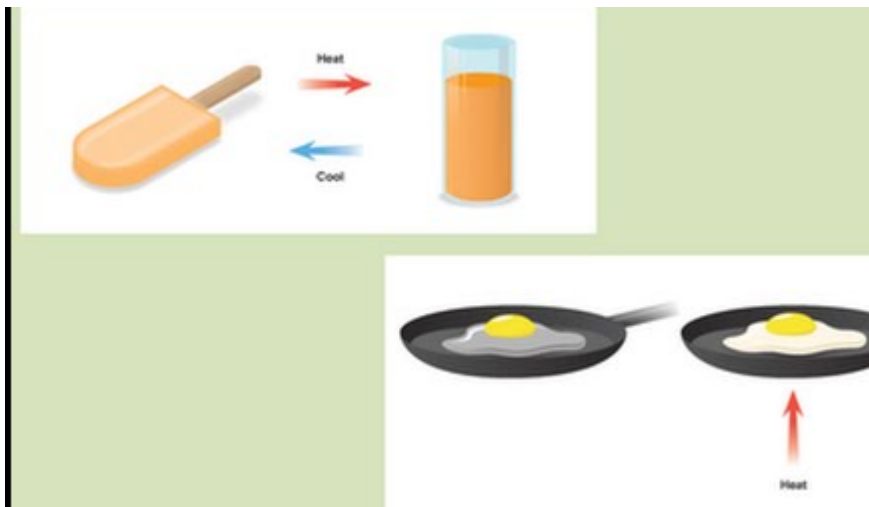
Lesson 5 - Reversible and Irreversible Changes

All changes that happen are one of two types – reversible changes and irreversible changes.



A change which can happen backward is called a reversible change. If you keep water in the freezer for some time, it transforms into ice. But as soon as you take it out of the freezer, it turns into water again. This is a reversible change.

A change which cannot happen backward, that is, it cannot be reversed is called an irreversible change. When you burn a piece of paper, it turns to ash. It cannot become paper again. Your height cannot decrease. These are irreversible changes. They cannot be reversed.

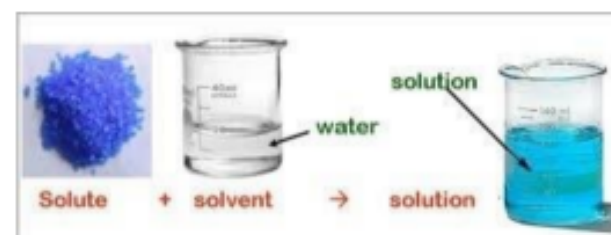


Top picture - Reversible change Solid melting to liquid and liquid freezing to solid.

Bottom picture - Irreversible change.

Knowledge Organiser- Science Year 5- Materials

Key Vocabulary	Definition
Physical property	Something that can be observed and measured for a material- such as hardness, shininess, conductivity
Mixture	Two or more materials that can be separated
Dissolved	When something mixes and blends well with a liquid
Solvent	The liquid that something dissolves in
Solute	The material that dissolves in the solvent
Saturated	When no more of a solute can dissolve in a solvent
Reversible change	A change that can be reversed so the material goes back to how it was
Evaporation	When a liquid changes state to a gas
Filtering	Removing solids from a mixture by passing through paper that only allows liquid through



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