



**Driving Question:** How can we help find solutions to water problems around the world?

**Power Skill: Communication** - I can communicate through presentations and incorporate feedback from others

### National Curriculum Learning Objectives

- compare and group together everyday materials on the basis of their properties
- 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 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.

### Key Vocabulary

solid	liquid	gas	metal	plastic
glass	wood	fabric	reversible	irreversible
dissolve	soluble	insoluble	solution	

## Key Learning

### Changes of materials:

The properties or state of materials can be changed by going through different processes. Some of these processes are reversible (they can change back again) and some are irreversible (unable to change back).

### Irreversible changes:

In an irreversible change, new materials are formed.

Here are some examples of irreversible changes to materials:

- Heating or cooking eg. frying an egg or baking bread makes food into a different form.
- Mixing substances eg. when mixing vinegar and bicarbonate of soda which creates foam.
- Burning eg. when you burn wood, you get ash and smoke.

### Reversible changes:

These include evaporating, melting and freezing. For example, heating chocolate slowly will melt the chocolate to a liquid. By placing it back in a cold environment, the chocolate will return to a solid state. A reversible change might change how a material looks or feels, but it does not create new materials.

### Dissolving (to dissolve):

Dissolving is when a substance is mixed with water and it incorporates to create a solution.

When a substance dissolves, it might look like it has disappeared, but in fact it has just mixed with the water to make a transparent (see-through) liquid called a solution.

Substances that dissolve in water are called soluble substances. For example, when you mix salt with water, the salt dissolves to make a transparent solution.

Substances that do not dissolve in water are called insoluble substances. For example, when you mix sand or flour with water, they do not dissolve.

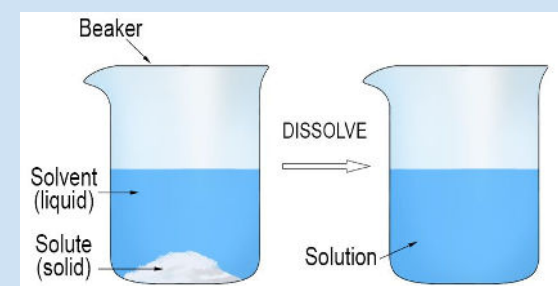
Dissolving is also an example of a reversible change. The dissolved substance (eg. salt in water) can be separated from the liquid and returned to their original state. This can be achieved through evaporation. By heating the water, it evaporates, leaving the salt behind.

### Thinking Point

Can you think of any other examples of reversible or irreversible changes?



Reversible	Irreversible
✓ States of matter	✗ Burning
✓ Solid + Liquid	✗ Rusted metals
✓ Solid + Solid	✗ Heating food
✓ Soluble solid + Liquid	✗ Mixed ingredients



### Explore and Investigate

**Soluble or insoluble?** - Investigate which solids do and do not dissolve. Use cocoa powder to demonstrate how heat aids dissolving.

**Explore reversible changes** - Use a mixture of rice, sand and dissolved salt to explore how filtering, sieving and evaporation processes work to reverse changes.

### Resources:

Beakers, sieves, filter paper, funnels, thermometer

## Key Learning

### Properties of materials:

Materials have different properties that make them useful for different jobs. This will depend on what they are made from.

Here are some examples of different materials and what they are useful for depending on their properties:

#### Metals:

- Most metals are strong, hard and shiny materials.
- They are good conductors of heat and electricity and some are magnetic.
- Their properties make them useful for objects such as cutlery, saucepans, cars and coins.

#### Plastics:

- Plastics are materials made from chemicals and are not found in nature.
- They are strong and waterproof.
- They can be made into any shape by applying heat.
- Plastics are not magnetic. They are good insulators and do not conduct heat or electricity.
- They're used to make things like bags, bottles and toys.

#### Glass:

- It is normally transparent and can be made into different shapes.
- Thick glass can be strong, but thin glass breaks easily.
- It is used for objects that need to be transparent, such as windows and glasses.

#### Wood:

- It is strong, flexible and long-lasting.
- Wood is an insulator of heat and electricity.
- It is used to make things such as furniture.

#### Fabric:

- Fabrics are made from thin fibres woven together.
- Different fabrics have different properties. They can be stretchy (a pair of tights), insulating (a woollen coat) or absorbent (a towel).
- Fabrics are used to make clothes as they are flexible, warm and do not wear out easily.

### Thinking Point

Which material do you think is the most useful? Why?



<p><b>hard</b></p> <p>not easily broken or pierced</p> <p>A hard diamond.</p>	<p><b>squashy</b></p> <p>easily crushed or squeezed</p> <p>The play dough is squashy.</p>	<p><b>smooth</b></p> <p>an even and regular surface</p> <p>Some smooth pebbles.</p>	<p><b>rigid</b></p> <p>unable to be bent or forced out of shape</p> <p>Stone is rigid.</p>	<p><b>transparent</b></p> <p>can be seen through</p> <p>This glass is transparent.</p>	<p><b>soft</b></p> <p>not firm to the touch</p> <p>The kitten has soft fur.</p>
<p><b>absorbent</b></p> <p>able to soak up liquid</p> <p>The sponge is absorbent.</p>	<p><b>bumpy</b></p> <p>uneven, raised patches</p> <p>This shell is bumpy.</p>	<p><b>opaque</b></p> <p>cannot be seen through</p> <p>She is hidden by the opaque screen.</p>	<p><b>flexible</b></p> <p>able to bend</p> <p>A flexible spring.</p>	<p><b>rough</b></p> <p>uneven, irregular surface</p> <p>The log has rough bark.</p>	<p><b>waterproof</b></p> <p>repels water and liquids</p> <p>A waterproof coat.</p>
<p><b>dull</b></p> <p>lacking shine or brightness</p> <p>The moth's wings are dull.</p>	<p><b>brittle</b></p> <p>hard, but may break easily</p> <p>The glass is brittle.</p>	<p><b>translucent</b></p> <p>allowing some light to pass through</p> <p>The screen is translucent.</p>	<p><b>elastic</b></p> <p>springs back once stretched</p> <p>An elastic band.</p>	<p><b>shiny</b></p> <p>reflects light, smooth surface</p> <p>A shiny silver spoon.</p>	<p><b>conductor</b></p> <p>lets heat, electricity or sound to pass through it</p> <p>Some metals are conductors of electricity.</p>