



**What have we learnt in this topic before, what we will learn this year and what will we learn next?**

- In Year 1, we learnt in our topic: Everyday Materials (Objects and materials)**
- To distinguish between an object and the material from which it is made
  - To identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock
  - describe the simple physical properties of a variety of everyday materials
  - compare and group together a variety of everyday materials on the basis of their simple physical properties
  - Our Focus Scientist was **Charles Macintosh** – Waterproof fabrics
- In Year 2, we learnt in our topic: Uses of everyday materials (Materials for different uses)**
- To identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses
  - To find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching
  - Our Focus Scientist was **John McAdam** – building roads
- In Year 5, we will develop this further and learn about**
- 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
  - To know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution
  - To use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating
  - To give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic
  - To 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.
  - Our Focus Scientist is **Ruth Benerito** – wash and wear cotton fabrics

## CLASSIFYING MATERIALS

Different materials are used for **particular jobs** based on the **properties** they have.

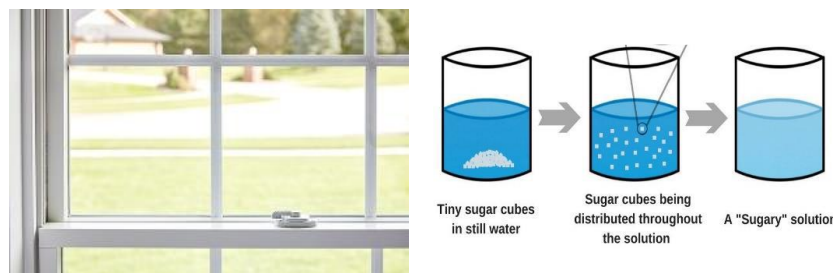
**Conductor** – A conductor is a material that **allows heat or electricity** to easily **pass through** it. Most metals are **thermal conductors** (conduct heat) and electrical conductors.

**Insulator** – An insulator is a material that **does not allow heat or electricity** to easily **travel through** it. Woods and plastics are both thermal and electrical insulators.

**Soluble** – Materials that **dissolve** when introduced to **water**.

**Insoluble** – Materials that **do not dissolve** when introduced to **water**.

**Transparent** – A material that **allows light** to **pass through** it.



## FOCUS SCIENTIST – RUTH BENERITO – WASH AND WEAR COTTON FABRICS



**Ruth Benerito** was an American chemist. She is best known for developing **wrinkle-free cotton fabric**. Benerito also invented a **fat mixture** that could **provide nutrients through the veins of patients who could not eat**. In **1986**, Benerito retired from the USDA. She received **55 patents** while working there. A patent is an official document that gives an inventor control over who may use their invention. In **2008**, Benerito was inducted into the **National Inventors Hall of Fame**. She died on October 5, 2013, in Metairie, Louisiana.

### Key Vocabulary

melt freeze evaporate transparent insulator cooling condensation evaporation solids liquids gases conductor reversible process

## CHANGES OF STATE

### Dissolving

Some substances **dissolve** when you mix them with **water**. 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**. When you mix sugar with water, the sugar dissolves to make a transparent solution. Salt is soluble in water too.

### Mixtures

A **mixture** is the result of combining **two or more substances**, in which they **do not change their physical state** and **no chemical reaction takes place**. These mixtures are **reversible** as the substances included in the mixture **can be separated** without great levels difficulty.

Creating a mixture of two or more objects may involve sand and water (**suspension**) or pasta and paperclips (**mixture**).

### Changes of State

A **reversible** change of state refers to any form of process that can be **undone**.

For example, when **ice melts to water** it goes from being a **solid to a liquid**. If you were to continue **heating** the liquid, it would once again **change state to a gas**.

The original ice cube could be restored once the water was collected by the process of **evaporation and frozen again**.

Therefore the state of a substance is **interchangeable** between a solid, liquid or gas.

## FORMATION OF NEW MATERIALS

When **substances** create a **new material** through **chemical change**, it is **irreversible**. A change is called irreversible if it cannot be changed back to its original state.

### Heating

Heating can cause an irreversible change. For example, you heat a raw egg to cook it. **The cooked egg cannot be changed back to a raw egg again**.

### Mixing

Mixing substances can cause an irreversible change. For example, when vinegar (an acid) and bicarbonate of soda are mixed, the mixture changes and lots of bubbles of carbon dioxide are made. **These bubbles and the liquid mixture left behind, cannot be turned back into vinegar and bicarbonate of soda again**.

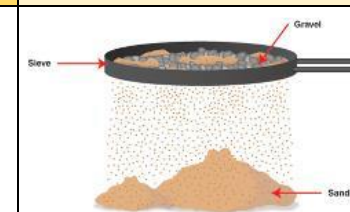
### Burning

**Burning is an example of an irreversible change.**

When you burn wood, you get ash and smoke. You cannot change the ash and smoke back to wood again.



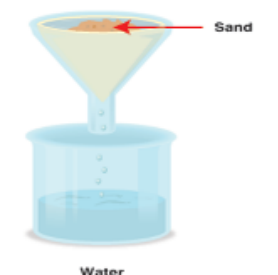
## SEPARATING MIXTURES



**SIEVING** – a mixture of different sized solid particles can be separated with a sieve. The particles small enough fall through the

holes of the sieve, whilst the largest particles remain within it.

**FILTERING** – an insoluble solid can be separated from a liquid when passed through a filter. The liquid passes through and the solid particles are trapped on the filter.



**EVAPORATING** – if a solution is boiled (heated) the water will evaporate into gas and the solid will be left behind.

