Science Y5 Properties & Changes of Materials Summer Term 1 and 2

In this unit of work the children will investigate how different materials can be compared and grouped together on the basis of their properties. They will draw states of matter particle arrangements for solids, liquids and gases and will investigate reversible and irreversible changes. They will conduct experiments to find out which materials will dissolve in liquids to form a solution making it soluble or insoluble and look at different ways of separating mixtures.

In this unit children will:

- 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 form 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 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 and can explain this
- Give reasons, based on evidence from comparative and fair tests for the particular uses of everyday materials including metals, wood and plastic.
- Write definitions for solids, liquids and gas particles and draw diagrams to demonstrate their states of matter.
- Draw diagrams to explain the changes of state in solids to liquids and liquids to gases
- Know that dissolving, mixing and changes in the state of matter are reversible and building on their knowledge of solutions they will look at ways to recover dissolved materials - melting chocolate.
- Explore changes that cannot be reversed making a cake, how can we get the flour and sugar back?
- Explain what makes a good thermal insulator and conductor and discuss what electrical insulators and conductors actually are.
- Investigate dissolving of sugar/salt. Patterns in time taken to dissolve with different temperatures/sizes of sugar/stirring and not stirring etc use thermometers and stop watches

Prior Learning

FS - Use talk to work out problems, organise thinking and explain how things workY1 - Name objects made from basic materials and their simple properties.

Y2 - Compare suitability of everyday materials.Y4 - Compare and group materials; change of materials when heated or cooled

Cross Curricular Links D&T - Making Masks

Key Vocabulary

Absorb - To take in or soak up a liquid Conductor - A substance that heat or electricity can pass through or along Dissolves - When a substance is mixed with a liquid and the substance disappears Evaporation - To turn from liquid into gas; pass away in the form of a vapour Filtering - A device used to remove dirt or other solids from liquids or gases. It can be made of paper, charcoal, or other materials with tiny holes in it.

Gas - A substance in a matter of state in which it will expand freely to fill the whole of a container, having no fixed shape unlike a solid and no fixed volume unlike a liquid

Insoluble - Impossible to dissolve **Insulator** - A non-conductor of electricity or heat

Impermeable - Something that will not allow fluid to pass through it

Irreversible - Impossible to reverse, turn back or change

Liquid - A substance that flows freely but is of a constant volume like water

Particles - A tiny amount of a substance or matter

Resistance - Opposing power of 1 force against another

Rigid - Unable to bend or be forced out of shape

Permeable - A substance that allows liquids or gases to go through it **Soluble** - A mixture that contains 2 or more substances combined evenly

Solution - A mixture of two or more substances that stays evenly mixed

States of matter - On Earth all matter exists in 1 of 3 different states - solid, liquid or gas

Thermal - Using, resulting from, or producing heat

Solid - The shape of a solid does not change on its own, it is rigid.

Key Knowledge

- Materials can be grouped based on their properties - if they are magnetic, transparent, flexible, permeable, soluble or insoluble.
- Materials which are good thermal conductors allow heat to move through them easily.
- Thermal conductors are used to make items that require heat to travel through them easily, such as a saucepan which requires heat to travel through it to cook the food.
- Thermal insulators do not let heat travel through them easily.
- Examples of thermal insulators include woolen clothes and flasks for hot drinks.
- Electrical conductors allow electricity to pass through them easily.
- Electrical insulators have a high resistance which means that it is hard for electricity to pass through these objects.
- Some materials can be separated after they have been mixed based on their properties this is a reversible change.
- Some methods of separation include the use of a magnet, a filter (for insoluble materials), a sieve (based on the size of the solids) and evaporation.
- When a mixture can't be separated back into the original components, this is called irreversible change. Examples of this include when materials burn or mixing bicarbonate of soda with vinegar.
- Sometimes when a solid (solate) is mixed with a liquid (solvent) it will dissolve to form a solution e.g. dissolving sugar in hot tea
- A soluble material can dissolve, however an insoluble material can't dissolve

- A mixture of different sized solid particles can be separated with a sieve.
- 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.
- If a solution is boiled the water will evaporate into gas and the solid will be left behind.
- Solid particles are packed closely together.
- Liquid particles have some space to move.
- Gas particles are free to move around.



Key Questions

Name something which a thermal insulator does.

What do they call a material which dissolves?

What is an example of an electrical conductor?

You are going to do an investigation to find out if some solids dissolve quicker than others, what can you do to make the test fair?