Year 5 Chemical Science: Everyday Materials (Reversible and Irreversible Changes) Unit 1

Scientific Model (KS2):

Particle Model

- Use particle diagrams to demonstrate how particles are combined and separated in mixtures and solutions.
- In irreversible changes the chemical reaction bonds the particles together so that they cannot be separated.

Scientific Investigations:

- Observing Changes over Time
- Identifying and Classifying Things
- Comparative and Fair Testing

Scientists:

- Alexander Parkes (Plastic)

Scientific Skills Taught:

ASK
- To ask different kinds of questions
- To make predictions based on evidence

BREAKDOWN
- To recognise and control variables in tests
- To plan different enquiries to answer questions
- To recognise when to use comparative and fair tests
- To plan when to take repeat readings

CAPTURE
- To choose and use a range of equipment precisely
- To decide how to record data
- To decide what observations and measurements to make

DESCRIBE
- To use evidence from enquiry to support or refute ideas being tested
- To use varied ways to present data
- To identify and comment, using appropriate language, on patterns they notice
- To use relevant scientific language and illustrations in reports and when drawing conclusions

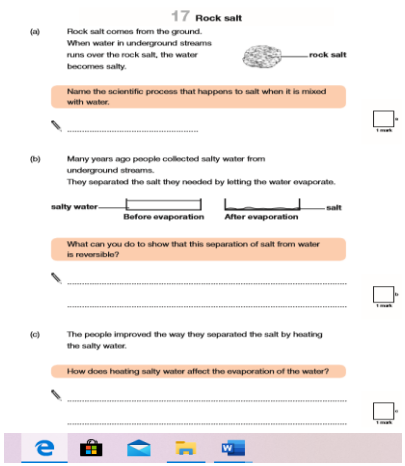
Prior Learning:

- Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper, and cardboard for particular uses. (Y2 Uses of everyday materials)
- Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting, and stretching. (Y2 - Uses of everyday materials)
- Compare and group materials together, according to whether they are solids, liquids, or gases. (Y4 - States of matter)
- Observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C). (Y4 - States of matter)
- Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature. (Y4 - States of matter)

Curriculum	Learning Intention	Knowledge and Key Vocabulary
Making links to learning and discuss the model (if needed) Use particle diagrams to demonstrate the difference between solids, liquids, and gasses as well as the processes involved in changing states. Explain that particles move because they have energy. The more energy they have the quicker they move.	How can we compare and group together everyday materials on the basis of their properties? Describe a material's properties. Explain the uses of different materials based on their properties. Sort and compare materials according to their properties.	**Knowledge:** - Know particles in a solid are packed closely together. - Know particles in a liquid have some space to move. - Know particles in a gas are free to move **Vocabulary:** - Solid, liquid, gas, permeable, non-permeable, state,

	Recall and draw a particle model	
Knowledge and skills through investigations Pupils should be taught 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 - 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. Notes and guidance (non-statutory): - Pupils should build a more systematic understanding of materials by exploring and comparing the properties of a broad range of materials, including relating these to what they learnt about magnetism in year 3 and about electricity in year 4. - They should explore reversible changes, including, evaporating, filtering, sieving, melting, and dissolving, recognising that melting and dissolving are different processes. - Pupils should explore changes that are difficult to reverse, for example, burning, rusting and other reactions, for example, vinegar with bicarbonate of soda. - They should find out about how chemists create new materials, for example, Spencer Silver, who	Which material makes the best insulator? Identify materials which are thermal conductors and insulators. Explain what thermal Plan and carry out an investigation into thermal insulators and conductors. Give reasons for uses of thermal conductors and insulators. How can material change the brightness of a bulb? Identify electrical conductors and insulators. Identify effective electrical conductors. Carry out an investigation to find the best electrical conductor. What happens to a material when it is dissolved? Describe dissolving Identify materials which will dissolve in water. Investigate factors which affect the speed of dissolving. Can we reverse mixtures, solutions, and suspensions? Identify different ways materials can be mixed together. Know when to use which processes to separate mixtures. Are all changes reversible? Explore reversible changes Compare two reversible changes Explore irreversible/chemical changes:	**Knowledge:** - Name 3 soluble - Explain what a solution is and know it can be reversed - Know insoluble material will not dissolve. - Know a thermal conductor will carry heat - Name at least two electrical conductors - Explain an electrical conductor will allow electricity to travel through it - Define a reversible change - Define an irreversible change - Define a suspension - Define a mixture **Vocabulary:** - freezing; melting; boiling; burning; solid; liquid; gas; properties; solution; solute; solvent; mixture; filter; sieve; evaporation; decanting; sieving; condensation; saturated; temperature; Celsius; state; reaction; chemical; reversible; irreversible; conductivity; brittle; thermal; flexible; waterproof; synthetic; absorbent; rigid; natural; hard; permeable; impermeable; hardness; conductor ; insulator; transparent; magnetic; non-magnetic

invented the glue for sticky notes or Ruth Benerito, who invented wrinkle-free cotton. - Note: Pupils are not required to make quantitative measurements about conductivity and insulation at this stage. It is sufficient for them to observe that some conductors will produce a brighter bulb in a circuit than others and that some materials will feel hotter than others when a heat source is placed against them. Safety guidelines should be followed when burning materials. Pupils might work scientifically by: - carrying out tests to answer questions, for example, 'Which materials would be the most effective for making a warm jacket, for wrapping ice cream to stop it melting, or for making blackout curtains?' - They might compare materials in order to make a switch in a circuit. They could observe and compare the changes that take place, for example, when burning different materials or baking bread or cakes. - They might research and discuss how chemical changes have an impact on our lives, for example, cooking, and discuss the creative use of new materials such as polymers, super-sticky and super-thin materials.		

Application and Assessment Activity	 17 Rock salt (a) Rock salt comes from the ground. When water in underground streams runs over the rock salt, the water becomes salty. rock salt Name the scientific process that happens to salt when it is mixed with water. 1 mark (b) Many years ago people collected salty water from underground streams. They separated the salt they needed by letting the water evaporate. salty water — Before evaporation — After evaporation — salt What can you do to show that this separation of salt from water is reversible? 1 mark (c) The people improved the way they separated the salt by heating the salty water. How does heating salty water affect the evaporation of the water? 1 mark

Thinking Deeper:
How have materials had an impact on our environment? With this in mind, what type of materials can you envisage being invented in the future? What do we need to meet our daily needs and prevent the pollution we currently see?

Links to other subjects:
Subject Specific links – Maths
Personal Development – teamwork- working in groups to perform investigations
SMSC – (thinking deeper) considering about how the materials we use can have an impact on animals and the future of our planet
Cultural Capital – developing an understanding of how different objects in our world work through investigations
Careers – chemists/inventors,
British Values – mutual respect – respecting the planet, respecting others' ideas, democracy – linked to opinions about plastic pollution,
Equality – equality within class/groupwork, everyone having opportunities to participate