St James' Church of England Primary School
Key Learning in Science – Material Changes

Key Learning: Material Changes		
Key Learning	**Notes and guidance (Non-statutory)**	**Working Scientifically (Featured skills)**
KS1: Not statutory within NC2014 Pupils should be taught to: **LKS2: Year 4 – States of matter** **- see also the 'Material Properties' unit in 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).** ▪ **Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.** ◦ Measuring temperature tells us how hot or cold something is. ◦ Heating causes solids to melt to liquids and liquids to evaporate into gases. Cooling causes gases to condense to liquids and liquids to freeze to solids. ◦ Evaporation happens when water is heated/warmed and changed into a gas. ◦ Condensation happens when water vapour in the air turns into a visible liquid. ◦ Evaporation and condensation are changes that can be reversed ◦ The water we use has been used before. ◦ Evaporation and condensation are an important part in the water cycle.	**KS1:** N/A **LKS2: Year 4 – States of Matter** *Pupils should explore a variety of everyday materials and develop simple descriptions of the states of matter (solids hold their shape; liquids form a pool not a pile; gases escape from an unsealed container). Pupils should observe water as a solid, a liquid and a gas and should note the changes to water when it is heated or cooled.* ***Note:** Teachers should avoid using materials where heating is associated with chemical change, for example, through baking or burning.*	**KS1:** N/A Pupils might work scientifically by: **LKS2: Year 4 – States of Matter** • *Grouping and classifying a variety of different materials.* • *Exploring the effect of temperature on substances such as chocolate, butter, cream (for example, to make food such as chocolate crispy cakes and ice-cream for a party).* • *Researching the temperature at which materials change state, for example, when iron melts or when oxygen condenses into a liquid.* • *Observing and recording evaporation over a period of time, such as a puddle in the playground or washing on a line, and investigating the effect of temperature on washing drying or snowmen melting.* *Additional suggestion from Lancashire for working scientifically opportunities which enhance learning and support using ICT across the curriculum.* ◦ This unit provides an ideal opportunity for using data logging equipment to detect/measure and compare temperatures.

◦ Changes to materials can happen at different rates (factors affecting evaporation – temperature only – see yr5).		

Key Learning (continued)	Notes and guidance (continued) (Non-statutory)	Working Scientifically (continued) (Featured skills)
UKS2: Year 5 – Properties and Changes of Materials **Reversible changes - Mixing and Separating Insoluble & Soluble Materials** ▪ **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** ▪ **Demonstrate that dissolving, mixing and changes of state are reversible changes.** ◦ Changes can occur when different materials are mixed ◦ Some material changes can be reversed and some cannot. ◦ Recognise that dissolving is a reversible change. ◦ Distinguish between melting and dissolving. ◦ Mixtures of solids (of different particle size) can be separated by sieving. ◦ Mixtures of solids and liquids can be separated by filtering if the solid is insoluble (un-dissolved). ◦ Evaporation helps us separate soluble materials from water. ◦ Changes to materials can happen at different rates (factors affecting dissolving, factors affecting evaporation – amount of liquid, temperature, wind speed).	**UKS2: Year 5 – Properties and Changes of Materials** **A: Mixing and Separating Insoluble & Soluble Materials - Reversible changes** Pupils should explore reversible changes including evaporating, filtering, sieving, melting and dissolving, recognising that melting and dissolving are different processes.	**UKS2: Year 5 – Properties and Changes of Materials** **Mixing and Separating Insoluble & Soluble Materials - Reversible changes** • *Observing and comparing the changes that take place, for example, when burning different materials or baking bread or cakes.* • *Researching and discussing how chemical changes have an impact on our lives, for example cooking, and discuss [research] the creative use of new materials such as polymers, super-sticky and super-thin materials.*

○ Freezing, melting and boiling changes can be reversed (revision from yr4).		
UKS2: Year 5 – Properties and Changes of Materials **Irreversible changes - Changes that form new materials** ▪ **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**.	**UKS2: Year 5 – Properties and Changes of Materials** **B: Irreversible changes - Changes that form new materials** *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 invented the glue for sticky notes or Ruth Benerito, who invented wrinkle-free cotton.* ***Note:*** *Safety guidelines should be followed when burning materials.*	**UKS2: Year 5 – Properties and Changes of Materials** **Irreversible changes - Changes that form new materials** • *Observing and comparing the changes that take place, for example, when burning different materials or baking bread or cakes.* • *Researching and discussing how chemical changes have an impact on our lives, for example cooking, and discuss [research] the creative use of new materials such as polymers, super-sticky and super-thin materials.*