Chemistry Unit: Materials

What does progression of knowledge look like at St Leonard's?

Year	Progression of knowledge:
EYFS	• Use all their senses in hands on exploration of natural materials • Explore collections of materials with similar and/or different properties • Discuss the differences between materials and changes they notice • Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter
1	• Correctly identify and name an object and the material from which it is made • Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock • Describe the simple physical properties (see vocabulary appendix for examples) of a variety of everyday materials • Compare a variety of everyday materials based on their simple physical properties • Group together a variety of everyday materials based on their simple physical properties
2	• Identify what properties a material needs for a particular purpose • Name the materials from which different objects are made • Recognise suitable and unsuitable choices of materials for purposes based on physical properties • Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses • Know that materials can be either man-made or naturally occurring • Group objects into man-made or natural categories • Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching
4	• Know that all things are made up of particles • Know that particles are arranged differently in solids, liquids and gases • Name properties of solids, liquids and gases • Compare and group materials together according to if they are solids, liquids and gases, giving reasons to justify their choice • Observe that some materials change state when heated or cooled and can give everyday examples of melting and freezing • Understand that melting and freezing are a state change between solids and liquids • Measure or research the temperature at which melting and freezing occurs for some materials • Know that water freezes at $0^{\circ}C$ and boils at $100^{\circ}C$ • Understand that condensation is a state change from a gas to a liquid • Understand that evaporation is a state change from liquid to gas • Understand that boiling and evaporation are the same state change from liquid to gas but at different temperatures • Know that the speed of evaporation depends on several variables including the temperature • Describe the water cycle • Identify the parts played by evaporation and condensation in the water cycle

5	• Compare and group together everyday materials based on their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets • Discuss the suitability of everyday materials for different purposes based on their properties, giving reasons, based on evidence from comparative and fair tests • Know the difference between reversible and irreversible changes • Demonstrate that dissolving, mixing and changes of state are reversible changes • Explain that some changes results 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 • Understand some materials will dissolve in liquid to form a solution • Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving, and evaporating • Describe how to recover a substance from a solution
KS3 (NC)	• The concept of a pure substance • Mixtures, including dissolving • Diffusion in terms of the particle model • Simple techniques for separating mixtures: filtration, evaporation, distillation and chromatography • The identification of pure substances. • The properties of the different states of matter (solid, liquid and gas) in terms of the particle model, including gas pressure • Changes of state in terms of the particle model • a simple (Dalton) atomic model • differences between atoms, elements and compounds • Chemical symbols and formulae for elements and compounds • Conservation of mass changes of state and chemical reactions • The varying physical and chemical properties of different elements • The principles underpinning the Mendeleev Periodic Table • The Periodic Table: periods and groups; metals and non-metals • How patterns in reactions can be predicted with reference to the Periodic Table • The properties of metals and non-metals • The chemical properties of metal and non-metal oxides with respect to acidity • Chemical reactions as the rearrangement of atoms • Representing chemical reactions using formulae and using equations • Combustion, thermal decomposition, oxidation and displacement reactions • Defining acids and alkalis in terms of neutralisation reactions • The pH scale for measuring acidity/alkalinity; and indicators • Reactions of acids with metals to produce a salt plus hydrogen • Reactions of acids with alkalis to produce a salt plus water • What catalysts do. • The order of metals and carbon in the reactivity series • The use of carbon in obtaining metals from metal oxides • Properties of ceramics, polymers and composites (qualitative)