Topic Summary: LKS2 State of Matter

National Curriculum Objectives

- Compare and group materials together, according to whether they are solids, liquids or gases.
- 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.

Working Scientifically Skills

- asking relevant questions and using different types of scientific enquiries to answer them
- setting up simple practical enquiries, comparative and fair tests
- recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables
- reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions
- using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions
- identifying differences, similarities or changes related to simple scientific ideas and processes

Possible misconceptions

- Children sometimes use the word solid to mean heavy, not flexible, or in one big piece.
- Children often confuse melting and dissolving.
- Children also sometimes believe that gases are not matter because most are invisible, and that gases do not have mass.

Substantive knowledge

- Know that materials can be classified as belonging to one of three states of matter: solid, liquid or gas.
- Know that each state of matter has specific properties.
- Know that many materials can change state between solid, liquid and gas.
- Know that solids consisting of very small pieces (e.g. sand) behave like liquids in some ways.
- Know that there are gases all around us but they are invisible.
- Know that the same material can exist as both solid and liquid.

Disciplinary knowledge

- Know how to use a thermometer.
- Set up simple comparative and fair tests to establish the factors that affect evaporation.
- Describe the water cycle in terms of changes of state.
- Classify a range of solids and liquids.
- Explore making gases.
- Classify materials according to whether they are solids, liquids and gases.
- Investigate the melting and freezing points of different materials.
- Use secondary sources to find out about the water cycle.

Vocabulary

Solid, liquid, gas, state change, melting, freezing, melting point, boiling point, water cycle, particle, matter

Phonics / polysyllabic words

evaporation
temperature
hydrologic

Reading support

- Word mats
- Scaffolded recording / choice of recording
- Pre teaching of vocab

Extension deeper thinking

Name metals and research their melting points
Research different gases and their boiling point
How do smells travel?
Does fizzy water weigh more or less than still water?

Key People

- Dr Pearl Agyakwa (Materials Scientist)
- Dr Alison Parker (Water Scientist)
- The first published thinker to assert that rainfall alone was sufficient for the maintenance of rivers was Bernard Palissy (1580 CE), who is often credited as the "discoverer" of the modern theory of the water cycle.

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Prior learning

- Distinguish between an object and the material from which it is made. (Y1 - Everyday materials)
- Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock. (Y1 - Everyday materials)
- Describe the simple physical properties of a variety of everyday materials. (Y1 - Everyday materials)
- Compare and group together a variety of everyday materials on the basis of their simple physical properties. (Y1 - Everyday materials)
- 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)

Future learning

- Compare and group together everyday materials on the basis of their properties (Y5 - Properties and changes of materials)
- Know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution (Y5 - Properties and changes of materials)
- Use knowledge of solids, liquids and gases to decide how mixtures might be separated (Y5 - Properties and changes of materials)

British Values

- Democracy Take the views and opinions of others into account. Take turns and instructions from others.
- The rule of law Understand the importance of safety rules when working scientifically make choices when planning an investigation as others may have different points of view as to where to start.
- Tolerance Scientific discoveries have come from other cultures and religious beliefs often compete with scientific understanding.
- Mutual respect Work as a team, discuss findings and Offer support and advice to others.

Christian Values

- Courage: Asking our own questions and investigating new ideas.
- Trust: Celebrating everyone's unique ideas and working together collaboratively.
- Respect: Supporting each other's ideas, even if they differ from our own.