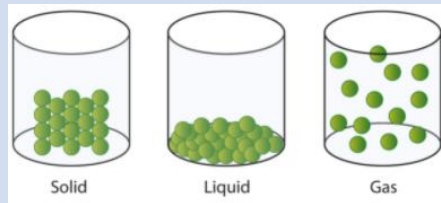


## National Curriculum Science - Knowledge

- 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.

## Key Learning

That all materials are made up of particles and how these particles are arranged determines if they are a solid, liquid or gas.



Particles in a solid are close together, they cannot move, only vibrate.

Particles in a liquid are close together but they can move around each other easily.

Particles in a gas can spread out and move around each other very easily and quickly.

Some materials can change state when heated or cooled  
Solids to liquids- melting and freezing



Liquids to gases – evaporation and condensation



## Vocabulary

**Particles** - A particle is an extremely tiny piece of matter, and scientists believe that everything in the universe is made up of particles

**Solid** – A solid is a material that has a fixed shape unless a force is applied. They take up the same amount of space no matter what has happened to them (volume)

**Liquid** – liquids take the shape of their container. They can change shape but do not change the amount of space they take up (volume). They can flow or be poured.

**Gas** – Gases can spread out completely, fill the container or room they are in. They do not have any fixed shape.

**Water Vapour** – This is water that takes the form of a gas. When water is heated it evaporates into a water vapour.

**Evaporation** – When a liquid changes into a gas

**Condensation** – When a gas changes into a liquid

**Precipitation** – Liquid or solid particles that fall from a cloud as rain, sleet, hail or snow

**Melting point** – The temperature a solid becomes a liquid

**Freezing point** – The temperature when a liquid becomes a solid.

## National Curriculum Science – working scientifically

- Asking relevant questions and using different types of scientific enquiries to answer them
- **Setting up simple practical enquiries, comparative and fair tests**
- **Making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers**
- **Gathering, recording, classifying and presenting data in a variety of ways to help in answering questions**
- **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
- **using straightforward scientific evidence to answer questions or to support their findings.**

## Key Learning continued...

Condensation and evaporation occur naturally in the water cycle.



1. Water (liquid) from lakes, puddles, rivers, seas and Oceans is evaporated by the sun's heat, turning it from a liquid into a water vapour (gas)
2. This water vapour (gas) rises into the atmosphere, then cools down to form water droplets (liquid) in clouds (condensation)
3. When the droplets become too heavy, they fall back to earth as rain, sleet, hail or snow (precipitation)

## Scientific investigations

### How quickly can an ice cube melt?

- Set up a fair test
- Make systematic observations
- Record findings and present data in variety of ways (table and graph)
- Use scientific evidence to answer question

### Does the temperature affect how fast liquid evaporates?

- Plan the investigation to see the effects of temperature on evaporation of water
- Set up simple investigation
- Record results
- Present findings
- Use findings to answer the question and draw a conclusion.

## Sequence of learning – States of Matter

- 1** **Solid, Liquid or Gas?** - What is a particle (retrieve knowledge from sound unit) – role play how the particles behave in solids, liquids and gases. Children sort objects into solids, liquids and gases based on their particles – include sand to challenge misconceptions that it is a liquid.
- 2** **Can solids change state?** Investigate what happens to a ‘pet’ ice cube when removed from the freezer. Discuss what is changing with the arrangement of particles – now becomes a liquid. Investigate the speed of melting. What is the opposite of melting? Watch video of freezing and how the particle structure changes.
- 3** **Can liquids change state?** Observe what happens to a liquid (water) when it is heated and reaches boiling point – evaporates to a gas (water vapour). Discuss the structure of the particles in the gas and how they are different.
- 4** **Can a gas change state?** What is the opposite of evaporation? Introduce condensation using breath on a cold mirror. The water vapour is condensing back to water. Explore rates of evaporation – water drying on a finger experiment.
- 5** **Where can we see these changes in state in our world?**– Stages of the water cycle and explain how water changes it’s state at the different stages. Create a mini water world to observe each part of the water cycle.
- 6** **How could climate change affect the water cycle?** – Research and report on the effects of climate change on the water cycle.