Subject:	**Science:** Chemistry -State of matter & separating mixtures	
Class: T1 (Nurture)	**Teacher:** Sukhi Lall	**Term: 3**
Key Vocabulary: Basic States of Matter Solid – Liquid – Gas -Plasma - Mass – Volume –Density – Particle -Compression – Changes of State. Melting – Freezing – Liquid → Solid Evaporation – Liquid → Gas Boiling – Condensation – Gas - Sublimation - Deposition – Gas → Solid without becoming a liquid. Temperature – Heat - Kinetic Energy – Viscosity – Diffusion – Pressure –	**Alternative Learning Environments** A range of materials	**Resources:** **Khan Academy – States of Matter** https://www.khanacademy.org/science/physics/fluids **BBC Bitesize – Solids, Liquids, and Gases** **Chem4Kids – Matter** **States of Matter | FuseSchool** (YouTube) **CrashCourse Kids: States of Matter** **TED-Ed: The States of Matter Explained** Access to a gas tap. safety goggles Bunsen burner heatproof mat Small magnet covered in cling film to stop iron filings from adhering. Weighing boat or a watch glass. Small amount of sulfur powder (approximately 4g). Small amount of iron filings (approximately 7g). Note: only heat 2g of the combination of iron filings and sulfur from the 7:4 ratio above. One heatproof glass test tube. Mineral wool plug for end of test tube. One pair of test tube tongs or boss and clamp and clamp stand. Small circular 'sticky dots' in five different colours (approximately one small sheet per pupil) or five different coloured felt tips.

Unit Aim: aims to give pupils an understanding of the particulate nature of matter, the difference in arrangements of particles in solids, liquids and gases based on the particle model, how matter can change from one state to another and the movement of particles in terms of diffusion. The second half of this unit focuses on mixtures, solubility and how mixtures can be separated using a variety of techniques including filtration, evaporation, distillation and chromatography

Prior Learning: Children already notice that materials can be solid or liquid (e.g., ice vs water). Basic experiences with melting, freezing, and evaporation (e.g., puddles disappearing). Understanding that materials have different properties (soft, hard, runny). Realisation that heating and cooling can change materials.

Future Learning: **Intermolecular forces affecting boiling/melting points. Latent heat (specific latent heat of fusion/vaporisation). Heating and cooling curves. Gas pressure and the gas laws (e.g., Boyle's Law). Particle theory applied to: Diffusion, Brownian motion. Understanding plasmas and more advanced states (superfluids, BEC) in higher science.**

Unit Expectations:

All students: Can explain changes of state using particle energy and spacing. Can interpret heating and cooling curves with reasoning. Can explain real-world examples (dew, fog, boiling kettles) using the particle model. Can identify and correct misconceptions (e.g., "particles do not expand when heated"). Can apply understanding to unfamiliar materials (e.g., sublimation of dry ice).

Most students: Can describe particle arrangement and movement in solids, liquids, and gases. Can explain melting, freezing, evaporation, and condensation using the **particle model**. Can interpret simple graphs (e.g., temperature-time). Can explain that changes of state are **reversible** and do not change mass. Can use scientific vocabulary correctly and confidently.

Some students: Can explain changes of state using particle energy and spacing. Can interpret heating and cooling curves with reasoning. Can explain real-world examples (dew, fog, boiling kettles) using the particle model. Can identify and correct misconceptions (e.g., "particles do not expand when heated"). Can apply understanding to unfamiliar materials (e.g., sublimation of dry ice).

Cross-Curricular & Skills Links Maths Art DT Food Tech Environmental Science Geography English

Week	
1	**Lesson Objective** To understand that matter can exist in three states. With some support, I can understand that matter exists in three states. I can identify the properties. **Activities:** Discuss 'what is matter?' How do we know matter exists? In pairs pupils identify the three states of matter which can found in the classroom. Go through the PowerPoint. Describe the properties of solids, liquids and gases. Complete the Solids, Liquids and Gases activity. Followed by the quiz questions HA- attempt to create a haiku poem to explain the three states. LA- Provide visuals resources to support learning.
2	**Lesson Objective** To understand how particles are arranged in the three states of matter. With some support, I can understand how particles are arranged in each of the three states of matter. **Activities:** Recap the three states of matter. Explain how particles are arranged, pupils can use to their stationery into how they think the particles are arranged in solids, liquids or gases. Pupils are encouraged to write a sentence in their book to compare each picture to a state of matter. Next, pupils to make their own comparisons to everyday scenarios, including the words 'density' Complete the 'The particle Model' activity questions HA- write comparison sentence. LA-visual aids and vocabulary to support learning

3	**Lesson Objective** To understand how matter can change from one state to another. With some support, I can explain how matter can change states. **Activities:** Discuss what connects the pictures on the PowerPoint slide. Pupils to identify keywords for changing states. Next, complete the gap fill definitions on the PowerPoint. Introduction to the stearic acid practical and complete the Stearic Acid Practical Activity Sheet. HA -complete five quick questions on the Stearic Acid Practical Activity Sheet. followed by the Particle Model Quick Assessment Sheet. LA- Plot their data as a graph using the prompts on the Stearic Acid Practical Activity Sheet. Provide prepared graph chart. Pupils add the data
4	**Lesson Objective** To understand how particles can move from one area to another. With some support, I can how particles are able to move places **Activities:** Introduce the definition of diffusion and encourage pupils to note this down whilst considering which of the three states of matter could diffuse. Video BBC Once pupils have watched a demonstration of potassium permanganate in water, pupils should be encouraged to complete the analogy activity on the PowerPoint. Pupils have access to the five scented balloons to complete the first task on the **Diffusion Investigation Activity** before continuing onto the rest of the activity sheet. HA- Once the four factors affecting diffusion and the mechanisms behind these are explained, alongside Brownian motion, pupils should be encouraged to complete the **Diffusion Quick Assessment Sheet**. LA - identify the errors in a pretend student's conversation about diffusion on the **PowerPoint** as a plenary activity.

5	**Lesson Objective** To understand how mixtures look at a particle level. With some support, I can learn how mixtures look like at a grain level **Activities:** Recap diffusion from previous lesson. Discuss if making a salad is a physical or chemical change and are reminded of the differences between these (on the PowerPoint) Pupils to observe a teacher led demonstration of iron filings and sulfur powder as separate elements, which are then heated and combined into a compound. Share the activity which some will be encouraged to complete a definitions cloze style activity and then apply this to four particle pictures as prompted on the PowerPoint. Introduce the notion of mixtures and justified some examples on the PowerPoint, Complete the Mixtures Activity Sheet- use colour sticky dots or coloured pens HA -complete the Mixtures Quick Assessment Sheet. LA- Support with mixture assessment
	Lesson Objective

6	To plan an investigation on solubility. With some support, I can set up a fair investigation on solubility **Activities:** Recap on mixture levels Have a cup of tea. Then ask three questions surrounding adding sugar to a cup of tea. Encourage pupils to draw a cup of tea and annotate the three keywords 'solute', 'solvent' and 'solution' next to each part of the tea. Provide a differentiated **Planning an Experiment into Solubility Activity Sheets** to plan a safe and valid experiment into dissolving sugar in water at different temperatures. Share results of the investigation. HA- record the investigation and data LA- three pictures and asked to spot as many keywords in the pictures as prompted on the **PowerPoint**.
	End of unit assessment