Science - Medium term plan - Particles

Year group	Subject: Particles	
Prior learning- linked to National curriculum	 First introductory chemistry module where students can explore particles and form the states of matter model. From KS2 NC students should be able to: 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 	
Covid	Key misconceptions - identified in lesson plans:	
gaps/misconception	 That particles are all the same size / shape That temperature and heat are the same thing That particles are spaced out in liquids (and thus can be compressed) That only water can evaporate & condense - that some materials such as metals cannot change state 	
Rationale	 Rationale - This module provides underpinning knowledge for the following KS4 topics: How do particles behave? The melting point/boiling point (changes in state) What is pressure and how that affects gas particles What is evaporation and how do particles behave in gaseous state (enforcing terms such as Kinetic energy) 	
Vocabulary:	Keywords 🗏 C1 glossary	
Cultural Capital:	Describing how particles behave in solids /liquids/gases (e.g. if students stand up and move on the stop (SOLIDS), moving side to side (LIQUID) and get one student to run around the room (GAS). <u>https://www.artisfoundation.org.uk/teaching-resource/dancing-solids-liquids-gases-using-movement-to-explore-changing-states/</u> use this to help	
Key assessments- name the assessments	Big question (6 mark question) Mid point C1.4 The Big Question worksheet.docx Explain, in detail, why the properties of water are different in its 3 states. (6 marks)	

	C1.4 The Big Question worksheet.docx - A range of multiple choice, short answer and a long answer			
	question.			
What do children	Test marks-			
know/ can do now	Emerging - 20%			
(EDSM)	Developing - 40%			
	Securing - 60%			
	Mastered - 80%			
	What are the properties of a solid?			
	 What does the particle model look like for solids, liquids and gases? 			
	What and where are the four state changes in our model?			
	 Describe what happens to particles during melting. 			
	Understand how to read bar charts.			
	Read values from a table and understand boiling point values.Label and read a graph.			
 What is diffusion and how can we speed it up? 				
	 What are the three variables? How can we reduce risk? Calculating averages. 			
	 Describe how we would use a syringe to measure how much air we can compress. 			
	 Describe in detail what happens when water boils. 			
What amendments	hat amendments Salol practical- Wasn't able to get good enough results to draw a cooling graph. Had to use prep-made result			
are you going to make				
following evaluation of	ng evaluation of Communication with Maths about when they learn graphs?			
this module?				

Less	Lesson objective	Differentiation	Homework
on			

1	LO: To understand that all things are made of particles and these can be different sizes	 SEND: Sentence starters Support sheet Fill in the blank task Agreed symbols for <i>'read, write, listen'</i> 	Educake
		 Challenge: Extension task 1. What is air made of? 2. Can you think of a new model that we could use to model particles? 3. Why are models useful? 	
		 Hinge Questions: Think-pair share. Give examples of solids, liquids and gases. Why are models useful? Why can't we squeeze a bag completely flat? What is inside the bag/bottle? What are particles? How are lego bricks like particles? 	
2	LO: To describe the three states of matter and their properties.	 SEND: Sentence starters Recall questions to consolidate understanding Support sheet Agreed symbols for <i>'read, write, listen'</i> Challenge: Extension task Challenge questions 	Educake

	 2) Can you make a flowchart to identify solid, liquids and gases? 3) Can you think of any substances that don't fire easily into the three states? Hinge Questions: Is ice/water the same or different? What properties do solids, liquids and gases have? "Who am i?" White board task- Is water/ice the same 	
<u>LO: To understand what a scientific</u> model is and why we use them.	 SEND: Sentence starters Recall questions to consolidate understanding Support sheet Agreed symbols for <i>'read, write, listen'</i> Challenge: Extension task Challenge questions: Use the particle model to predict whether a lump of solid iron would float or sink in a container of liquid iron 	
	 Hinge Questions: How do particles behave in solids, liquids and gases? Give a real life example for each to help What is meant by the particle model? What happens if you; (Cornstarch and water practical) Poke it slowly? Poke it fast? Try to bounce it? Try to pour it? 	

LO: Explain, in detail, why the properties of water are different in its 3 states	 SEND: Sentence starters Recall questions to consolidate understanding Support sheet Agreed symbols for 'read, write, listen' Challenge: Extension task Challenge questions : Explain why the properties listed occur, in terms of particle behaviour. Hinge Questions: What are the three states of matter? Which state of matter has particles that vibrate in a fixed position? Explain, in detail, why the properties of water are different in its 3 states. 	
LO: How do substances change state?	 SEND: Sentence starters Recall questions to consolidate understanding Support sheet Agreed symbols for <i>'read, write, listen'</i> Challenge: Extension task Challenge questions:Add a description of each stage - what is happening to the particles. Link description to energy and attractions 	

	 Hinge Questions: What state is the water starting in? What state is it changing into? How is it changing? What are we adding? Could we turn water into a solid? How? 	
LO: Plot a cooling curve graph showing how temperature changes as a substance changes state.	 SEND: Sentence starters Recall questions to consolidate understanding Support sheet Agreed symbols for <i>'read, write, listen'</i> Challenge: Extension task Challenge questions :Which state of matter has the most energy? Explain your answer Hinge Questions: How could you work out the melting point of a substance? Why is the melting point different for different things? If a substance needs a lot of energy to melt, what does that mean in terms of energy? 	
LO: Carry out an investigation that explores how changing the environment affects crystal growth.	 SEND: Sentence starters Recall questions to consolidate understanding Support sheet Agreed symbols for <i>'read, write, listen'</i> 	

	Challenge: Hinge Questions: How does the environment change the size of the crystals?
LO: How does changing the environment affect crystal growth? Writing a conclusion.	 SEND: Sentence starters Recall questions to consolidate understanding Support sheet Agreed symbols for 'read, write, listen' Challenge: Why did bigger crystals form here? Hinge Questions: What do you think these scientists discovered? How does the environment change the size of the crystals?
LO: Investigating how does the temperature of water affect the rate of diffusion?	 SEND: Sentence starters Recall questions to consolidate understanding Support sheet Agreed symbols for 'read, write, listen' Challenge: Does diffusion happen best in solids, liquids or gases? Why? Hinge Questions: Making a skittle rainbow: What do you observe? Why is this happening? Why do we use warm water?
LO: Understand how gases exert pressure.	SEND: Sentence starters • Recall questions to consolidate understanding

 Support sheet Agreed symbols for <i>'read, write, listen'</i>
 Challenge:Create a storyboard to explain what happens in the egg sucker demo. Hinge Questions: How can you get an egg into a flask? What is in the conical flask? Is this a solid, liquid or gas? What are the particles doing? What happens if we give these particles more energy? What happens to the temperature when the flame goes out? How does this impact the particles?