

Topic 5: Particles

What's the science story?

All matter is made up of atoms. The collective, structural arrangement and behaviour of the atoms explains the properties of different substances.



Previous knowledge:

Year 7 - Reactions

Next steps...

KS3

Links to pressure and reactions in year 8 and 9.

KS4

P3 Particles of matter



Keywords

Particle, diffusion, energy, states of matter, rates of diffusion.

Lesson No. and Title	Learning objectives	National Curriculum	Working scientifically skills	Practical equipment
1. Particle model	<p>ARE – Explain properties of materials based on particle arrangement.</p> <p>AGD – Apply knowledge to an object.</p>	<ul style="list-style-type: none"> changes of state in terms of the particle model atoms and molecules as particles 	<ul style="list-style-type: none"> REPAIR 	<ul style="list-style-type: none"> tripod gauze Bunsen burner heatproof mat beaker syringe filled with a gas syringe filled with a liquid syringe filled with a solid ice cube hair dryer jug with solid blocks jug with water balloon balance
2. States of matter	<p>ARE – Use observations to decide whether something is a solid, liquid or gas.</p> <p>AGD – Argue how to classify substances which behave unusually as solids, liquids or gases.</p>	<ul style="list-style-type: none"> the differences in arrangements, in motion and in closeness of particles explaining changes of state, shape and density changes of state in terms of the particle model 	<ul style="list-style-type: none"> REMEMBER APPLY 	<p>Beakers</p> <p>Balloon</p> <p>Wooden Block</p> <p>Plasticine</p>

KS3 – Year 7

<p>3. Melting and solidifying</p>	<p>ARE – Explain melting and solidifying in terms of changes to the energy of particles. AGD – Suggest reasons for different melting points of different substances.</p>	<p>conservation of material and of mass, and reversibility, in melting, changes with temperature in motion and spacing of particles the difference between chemical and physical changes</p>	<p>REPAIR</p>	<p>Salol Beaker Stopwatches</p>
<p>4. Melting and solidifying part two</p>	<p>ARE – display results on a graph, noting melting and solidifying temperatures. AGD – Suggest reasons for different melting points of different substances.</p>	<ul style="list-style-type: none"> • conservation of material and of mass, and reversibility, in melting, • changes with temperature in motion and spacing of particles • internal energy stored in materials 	<p>REHEARSE</p>	
<p>5. More changes of state</p>	<p>ARE – Explain differences in evaporation and condensation in terms of energy and mass. AGD – Apply and link knowledge.</p>	<p>PRACTISE</p> <ul style="list-style-type: none"> • conservation of material and of mass, and reversibility, in melting, freezing, evaporation, condensation, 	<p>REMEMBER APPLY</p>	<p>Beakers Perspex screen</p>

KS3 – Year 7

6. More changes of state part 2	<p>ARE – Explain sublimation and dissolving based on arrangement and movement of particles.</p> <p>AGD – Apply knowledge to a real life example.</p>	<ul style="list-style-type: none"> conservation of material and of mass, and reversibility, in melting, freezing, evaporation, sublimation, condensation, dissolving 	REPAIR	Beakers Salt
Assessment 1: States of matter				
7. Freezing	<p>ARE – Draw annotated diagrams of particles before and after freezing.</p> <p>AGD – Evaluate the results in a freezing investigation.</p>	<ul style="list-style-type: none"> the differences in arrangements, in motion and in closeness of particles explaining changes of state, shape and density; the anomaly of ice-water transition 	REHEARSE	Beakers Ice
8. Diffusion	<p>ARE – Draw annotated diagrams of particles before and after diffusion.</p> <p>AGD – Apply diffusion to living things.</p>	<ul style="list-style-type: none"> Brownian motion in gases diffusion in liquids and gases driven by differences in concentration 	<p>REMEMBER</p> <p>APPLY</p>	U bend Potassium permanganate
Assessment 2: Diffusion				

PERFORM

Assessment Criteria

Assessment No. & Title	Working Towards	Age Related Expectations	At Greater Depth
1. States of matter	Match particle models to the properties of a material.	Use the particle model to explain why different materials have different properties	Evaluate particle models that explain why different materials have different properties
	Match properties of the three states of matter to the name of the state.	Use ideas about particles to explain the properties of a substance in its three states	Explain why there is a period of constant temperature during melting and freezing
n/a	Recognise that different substances boil at different temperatures.	Explain changes of state using particle kinetics and temperature	Interpret melting point data.
n/a	Describe how particles change in their arrangements during evaporation, condensation, and sublimation	Explain why different substances boil at different temperatures	Use the particle model and latent heat to explain boiling
		Use a particle model to explain evaporating, condensing, and subliming	Explain what occurs during sublimation and condensation using particle models
2. Diffusion	Describe examples of diffusion	Use the particle model to explain diffusion	Explain the differences between evaporation and boiling
		Describe evidence for diffusion	Explain the factors that affect diffusion