



Learning Journey – 7B Particle Theory

What have I done previously in my learning journey?			
Previously....	You have learnt previously about states of matter. This has involved: • comparing and grouping materials together, according to whether they are solids, liquids or gases • observing 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) • identifying the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature • demonstrating that dissolving, mixing and changes of state are reversible changes		
In this topic...	You will learn about the properties of the different states of matter (solid, liquid and gas) in terms of the particle model, including gas pressure. You will also use the particle model to explain changes of state.		
We will develop our learning by studying the following each lesson:		British Values	Skills in Science checklist
7B.01 The Particle Model • Describe that all materials are made of particles • Describe the arrangement, movement, and spacing of particles in materials • Use the particle model to explain why different materials have different properties		☐ Democracy ☐ Rule of law ☐ Tolerance ☐ Individual liberty ☐ Mutual respect	☐ Development of scientific thinking ☐ Experimental skills and strategies ☐ Analysis and evaluation ☐ Scientific literacy ☐ Maths skills
7B.02 States of Matter • Describe the properties of solids, liquids, and gases • Describe the arrangement, movement, and spacing of particles in each state • Use the particle model to explain the properties of solids, liquids, and gases		☐ Democracy ☐ Rule of law ☐ Tolerance ☐ Individual liberty ☐ Mutual respect	☐ Development of scientific thinking ☐ Experimental skills and strategies ☐ Analysis and evaluation ☐ Scientific literacy ☐ Maths skills
7B.03 Melting and Freezing • Describe melting and freezing as changes of state • Explain changes of state in terms of particle movement and energy transfer (heating and cooling) • Investigate the melting point of a substance (e.g. stearic acid) • Interpret data from melting point experiments		☐ Democracy ☐ Rule of law ☐ Tolerance ☐ Individual liberty ☐ Mutual respect	☐ Development of scientific thinking ☐ Experimental skills and strategies ☐ Analysis and evaluation ☐ Scientific literacy ☐ Maths skills
7B.04 Boiling • Describe boiling as a change of state • Explain boiling using the particle model and energy transfer • Explain the difference between boiling and evaporation • Interpret data about temperature changes during boiling		☐ Democracy ☐ Rule of law ☐ Tolerance ☐ Individual liberty ☐ Mutual respect	☐ Development of scientific thinking ☐ Experimental skills and strategies ☐ Analysis and evaluation ☐ Scientific literacy ☐ Maths skills
7B.05 More Changes of State • Describe changes of state involving gases (evaporation and condensation) • Explain evaporation and condensation using particle movement and energy transfer • Describe how evaporation differs from boiling • Use evaporation to produce crystals (e.g. copper sulphate)		☐ Democracy ☐ Rule of law ☐ Tolerance ☐ Individual liberty ☐ Mutual respect	☐ Development of scientific thinking ☐ Experimental skills and strategies ☐ Analysis and evaluation ☐ Scientific literacy ☐ Maths skills
7B.06 Diffusion • Describe diffusion as the movement of particles from high to low concentration • Explain diffusion using the random motion of particles • Describe factors that affect the rate of diffusion (e.g. temperature, concentration gradient) • Plan or carry out an investigation into diffusion		☐ Democracy ☐ Rule of law ☐ Tolerance ☐ Individual liberty ☐ Mutual respect	☐ Development of scientific thinking ☐ Experimental skills and strategies ☐ Analysis and evaluation ☐ Scientific literacy ☐ Maths skills
7B.07 Gas Pressure • Describe gas pressure as caused by collisions of particles with container walls • Explain gas pressure using the particle model • Describe how factors (e.g. temperature, volume) affect gas pressure		☐ Democracy ☐ Rule of law ☐ Tolerance ☐ Individual liberty ☐ Mutual respect	☐ Development of scientific thinking ☐ Experimental skills and strategies ☐ Analysis and evaluation ☐ Scientific literacy ☐ Maths skills



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Key Words									
Arrangement	Model	Particle	Spacing	Structure	Compress	Fixed	Fluid	Random	State
Cooling	Energy	Freezing	Melting	Temperature	Boiling	Constant	Evaporation	Gas	Transfer
Condensation	Crystal	Evaporation rate	Surface	Vapour	Concentration	Diffusion	Gradient	Motion	Spread
Collision	Force	Particle speed	Pressure	Volume					

Future Learning	At GCSE you will build on your knowledge of the particle model to develop a deeper understanding of how matter behaves. You will explain how particle motion relates to temperature, energy and changes of state, and how energy is transferred during processes such as melting, boiling and condensation. You will also explore how particle behaviour explains relationships between pressure, volume and temperature in gases, including how changing one variable affects another. You will build on your understanding of diffusion by explaining how particles move in different states and how this links to biological systems. You will further develop your understanding of scientific models by evaluating how well the particle model explains real materials and recognising its limitations. This will support your study of energy stores, transfers and thermodynamics, allowing you to apply particle theory to a wide range of real-world contexts.
In careers	Understanding how particles behave is important in many scientific and engineering careers. For example, chemical engineers use knowledge of particle theory and changes of state to design processes for making fuels, medicines and materials (average salary £35,000–£70,000+). Materials scientists apply particle theory to develop new substances with specific properties, such as stronger metals or heat-resistant materials (average salary £30,000–£55,000). In medicine, pharmacists use knowledge of diffusion and concentration to ensure drugs are absorbed effectively in the body (average salary £35,000–£60,000). Careers such as meteorologists use particle theory to understand gases in the atmosphere and predict weather patterns (average salary £30,000–£50,000). This understanding of particles, energy transfer and matter underpins many areas of science and industry, allowing professionals to explain, predict and control how materials behave in real-world situations.