



The Particle Model



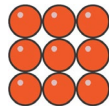
Physical Changes

This refers to a change in state. For example, when a solid melts into a liquid.

Ice melting into water is a physical change because it can be reversed.



States of Matter



Solids: regular pattern, with all particles touching. Particles **vibrate** in their position.



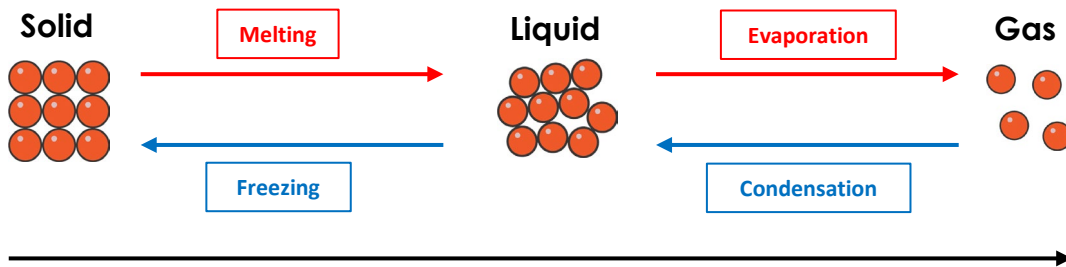
Liquids: irregular pattern, with all particles touching. Particles are touching and **can flow** around each other.



Gases: random pattern, with all particles spaced out. They **can be compressed**. Particles move at different speeds in different directions.

Changes of State

A change of state is where particles **change their state of matter**. For example, when a solid turns to a liquid, this is called melting. The diagram below shows all the different processes:



When you increase the temperature of a substance, the particles will **gain more kinetic energy**. This means they move faster. Gases have more kinetic energy than solids.

Density

This is the amount of mass per volume. Very dense objects have lots of mass in a small volume.

- Solids are more dense than liquids and gases
- Liquids are more dense than gases

You can use an equation to calculate an objects density. You need to divide the objects mass by its volume.

$$\text{Density} = \frac{\text{Mass}}{\text{Volume}}$$

Melting and Boiling Points

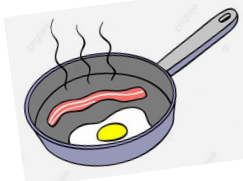
Every substance has its own temperature at which it melts or boils.

- Melting Point – point at which a substance turns from a solid to a liquid
- Boiling Point – point at which a substance turns from a liquid to a gas

For example, water has a melting point of 0 °C and a boiling point of 100 °C.

Conductors and Insulators

Some materials transfer heat faster than others. Materials which are **good at transferring heat** are called **conductors**.



Materials which are **bad at transferring heat** are called **insulators**. Conduction is the transfer of heat through solids.

Examples of Materials	
Conductors	Insulators
• Metals	• Plastic

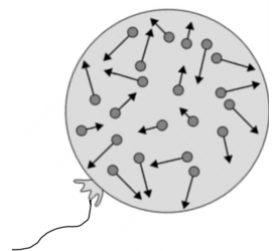
Motion of Gases

Gas particles move at different speeds in different directions.

Gas particles get more kinetic energy if you heat them up, making them move faster.

Gas pressure is created by:

- Gas particles hit the wall of the container
- This creates a force on the wall





CORE Questions



The following are core questions for this topic. Cover the answer section with a sheet of paper and try and quiz yourself. Only try learning 5 at a time, once you know them move on.

1	What is the change of state called when a solid turns into a liquid?	Melting
2	What is the change of state called when a liquid turns into a gas?	Evaporation/Boiling
3	What is the change of state called when a liquid turns into a solid?	Freezing
4	What is the change of state called when a gas turns into a liquid?	Condensation
5	What is a melting point?	The temperature a solid turns to a liquid
6	What is a boiling point?	The temperature a liquid turns to a gas
7	What is the melting point of water?	0 degrees celsius
8	What is the boiling point of water?	100 degrees celsius
9	Which state of matter is the most dense?	Solid
10	Which state of matter is the least dense?	Gas
11	Put into an equation: density, mass, volume	Density = mass / volume
12	Calculate the density of a block with a mass of 10Kg and a volume of 2m ³	$10/2 = 5\text{Kg/m}^3$
13	How do gas particles move?	At different speeds in different directions.
14	True or False. Gases always exert pressure on the walls of their containers.	True.
15	How does gas pressure occur?	Gas particles hit the walls of their containers creating a force.
16	What is a vacuum?	A space with no particles.
17	Define conduction.	The transfer of heat through solids
18	Why are solids better conductors of heat than liquids?	The particles are closer together.
19	Is metal a good conductor or insulator?	Conductor
20	Is plastic a good conductor or insulator?	Insulator