

1 States of matter

1.1 Solids, liquids and gases

1 State the distinguishing properties of solids, liquids and gases AND 2 Describe the structures of solids, liquids and gases in terms of particle separation, arrangement and motion

Property	Solids	Liquids	Gases
Shape	Fixed shape	No fixed shape (takes shape of container)	No fixed shape (fills entire container)
Volume	Fixed volume	Fixed volume	No fixed volume (expands to fill container)
Particle arrangement	Regularly arranged (Particles tightly packed in a lattice)	Randomly arranged (Particles close but not held in a lattice)	Randomly arranged (Particles far apart and not held in a lattice)
Particle separation	particles touching	Some particles are touching	no particles touching
Compressibility	Very low (almost incompressible)	Low (slightly compressible)	High (easily compressible)
Density	High	Moderate	Very low
Movement of particles	Vibrate in fixed positions	Slide over each other	Move rapidly in all directions
Intermolecular forces	Strong	Moderate	Weak

3 Describe changes of state in terms of melting, boiling, evaporating, freezing and condensing

- Melting involves a solid turning into a liquid when temperature increases to melting point.
- Boiling involves a liquid turning into a gas when the temperature increases to boiling point, which is higher than melting point.
- Evaporating involves a liquid turning into a gas but only at a range of temperatures below the boiling point. It is much slower than boiling and occurs only at the liquid's surface unlike in boiling which is faster and occurs through out the liquid.
- condensing involves a gas turning into a liquid when temperature decreases below the boiling point.
- Freezing involves a liquid turning into a solid when the temperature decreases below the melting point.

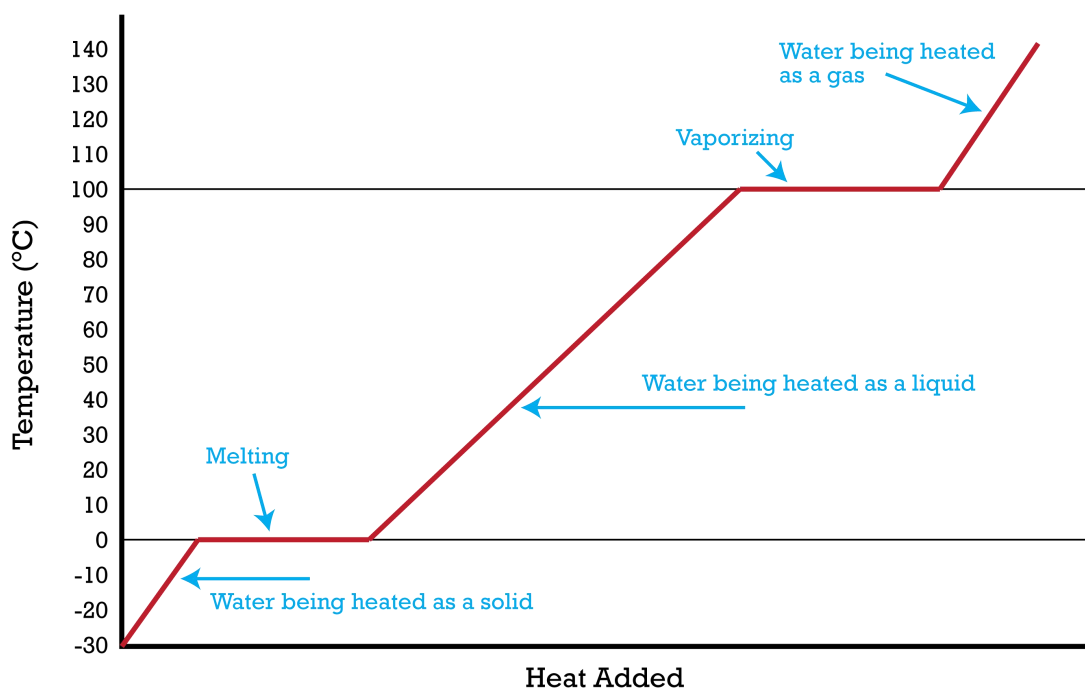
4 Describe the effects of temperature and pressure on the volume of a gas AND 6 Explain, in terms of kinetic particle theory, the effects of temperature and pressure on the volume of a gas

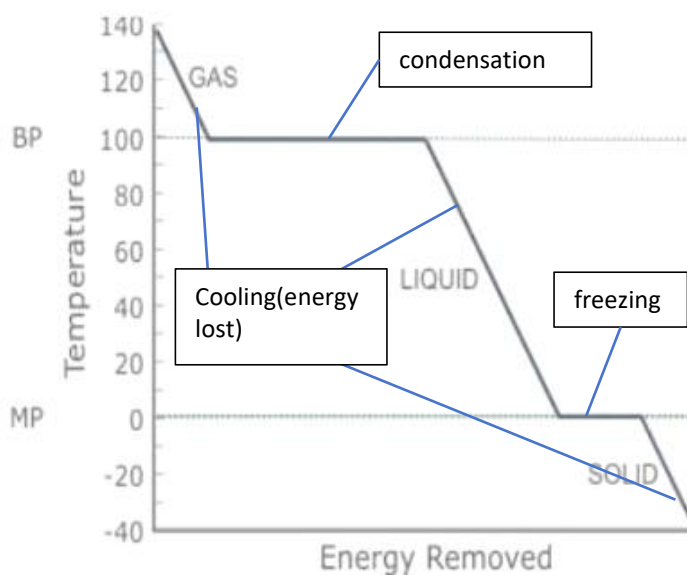
- An increase in temperature leads to an increase in gas volume as it expands(temperature and volume are directly proportional).
- This is because the gas particles gain kinetic energy and collide more often with the container walls. This causes them to move further and take up more space, increasing the volume.

- An increase in pressure leads to a decrease in gas volume as the gas is forced into a smaller space (pressure and volume are inversely proportional).
- This is because when they are forced into a smaller space they collide with the container walls more often, which increases pressure applied by the gas.

NOTE: If the container is rigid (like a metal cylinder) the gas cannot expand the container walls. Instead, when temperature rises, the particles move faster, collide more forcefully, and the pressure increases inside the fixed volume. If the container is flexible (like a balloon or piston): the gas particles push outward more strongly when heated. To keep pressure balanced with the surroundings, the container itself expands, so the volume of the gas increases. So gas volume can only expand if the container can expand.

5 Explain changes of state in terms of kinetic particle theory, including the interpretation of heating and cooling curves





- When the water is heated(as a solid/liquid/gas) it absorbs heat to overcome the intermolecular forces. The forces are eventually overcome and the lattice breaks, causing the particles to move further apart, leading to the state changes(temp. Remains constant here).
- The opposite happens when cooled; the water loses energy and intermolecular forces begin to form and get stronger. The particles are eventually forced into a lattice as they get closer when water becomes solid.

1.2 Diffusion

1 Describe and explain diffusion in terms of kinetic particle theory **NOTE: Diffusion is a passive process that does not require energy to start happening as.**

- Diffusion is the spreading of particles from a region of higher concentration to a region of lower concentration as a result of random particle movement until they are evenly distributed and occupy all available space. It

occurs faster when the temperature is higher and occurs faster in gases than liquids.

2 Describe and explain the effect of relative molecular mass on the rate of diffusion of gases

- Different gases diffuse at different rates; lighter gases are able to travel faster, collide more often and spread out more quickly(diffuse faster) than heavier gases(the higher the relative molecular mass the heavier the gas)

END OF CHAPTER