Kinetic Particle Theory🤓

Also known as Particle Nature Of Matter

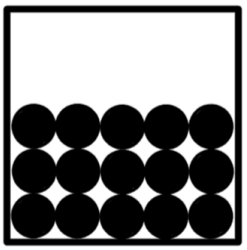
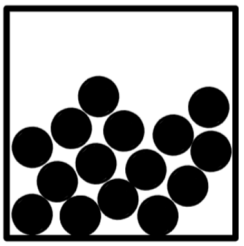
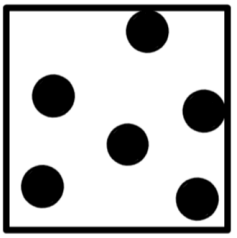
1. Particular Nature Of Matter Of Different States

Different states of matter have different:

→ Arrangement of Particles

→ Movement of Particles

→ Strength of Attraction

characteristics	Solid	Liquid	Gas
			
Arrangement Of Particles	- closely packed -arranged in an orderly arrangement	- less closely packed - arranged in a disorderly manner	- very far apart - arranged in a disorderly manner
Motion Of Particles	- Vibrate about fixed position	- slide over one another	- more rapidly in random direction
Attraction Forces Between Particles	- very strong attractive force	- strong attractive force (less strong than solids)	- very weak attractive force

Note: All particles are still moving no matter what(even solids!)

Observable Properties of states of matter(macroscopic)		
Solid	Liquid	Gas
-Has a fixed shape	-has no fixed shape	-has no fixed shape
-has a fixed volume	-has a fixed volume	-has no fixed volume
-cannot be compressed	-cannot be compressed	-can be compressed
-cannot flow	-can flow	-can flow

a) Why solids have fixed shapes and volumes

The particles of solids are held in fixed positions and do not move out of those positions due to strong attractive forces between the particles, hence solids have fixed shapes. Particles of solids are already closely packed and there is no space for them to move closer anymore, hence their volume is fixed.

b) Why liquids can flow

The particles of liquids are not held in fixed positions and can slide over one another easily due to attractive forces between the particles as strong as that in solids. Hence, liquids can flow

c) Why gases can be compressed

Particles of gases are spread out and have a lot of space between them due to very weak attractive forces between the particles. Hence, they are able to move closer together and the gas can be compressed.

2. Expansion and contraction

Solids, Liquids and Gases

Expansion

- when a solid/liquid/gas is heated, particles vibrate more vigorously
- distance between particles increase
- volume of solid/liquid/gas increases

-solid/liquid/gas expands

Contraction

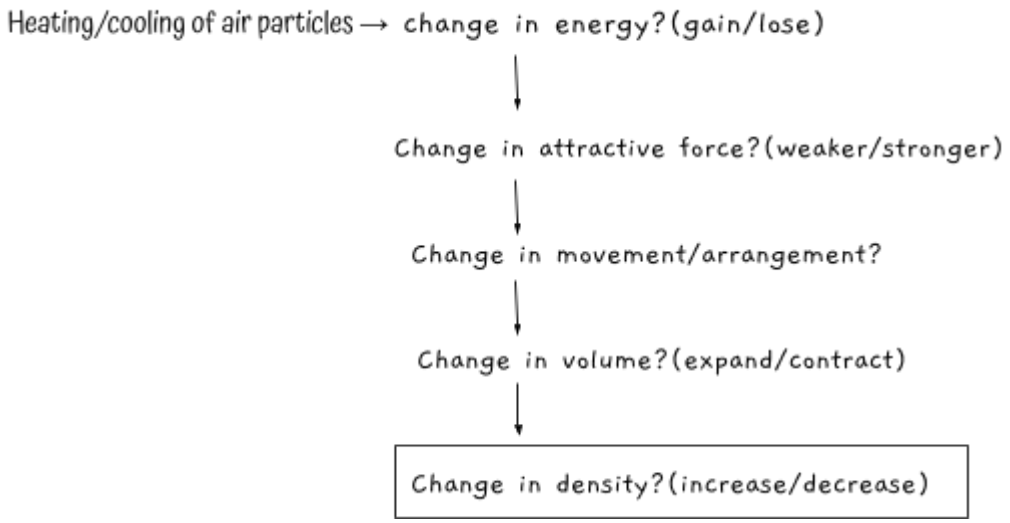
-When a solid/liquid/gas is cooled, particles lose energy and vibrate less vigorously

-Distance between particles decreases

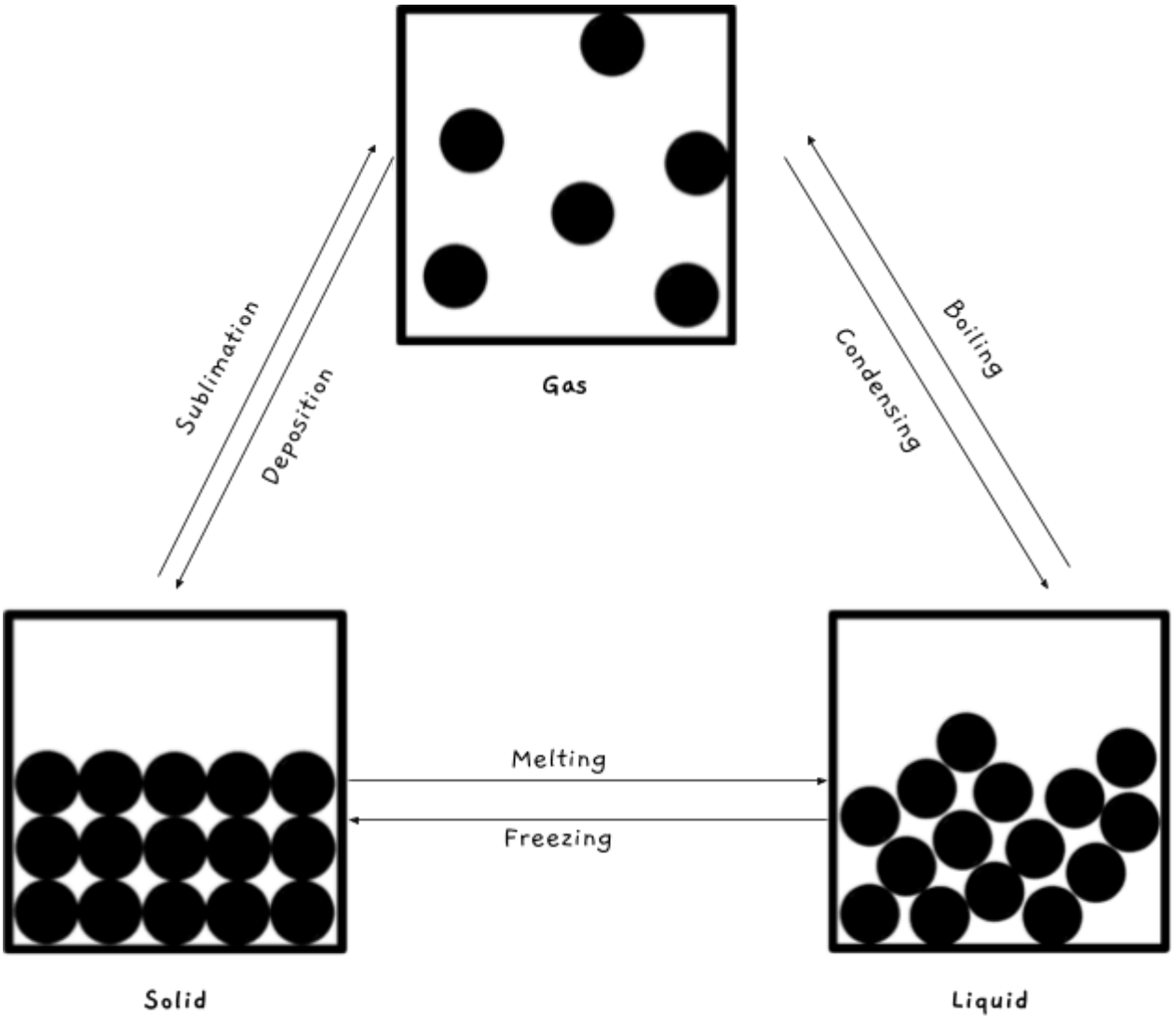
-Volume of solids/liquid/gas decrease

-solid/liquid/gas contracts

Answering Technique(why do I still believe in Ngan?😔)



3.Changes In State



Melting And Boiling

When a solid is heated, its particles **gain** energy and vibrate faster/ more vigorously about its fixed positions. They eventually gain enough energy to overcome the very strong forces of attraction between them. The solid **melts** and becomes a liquid.

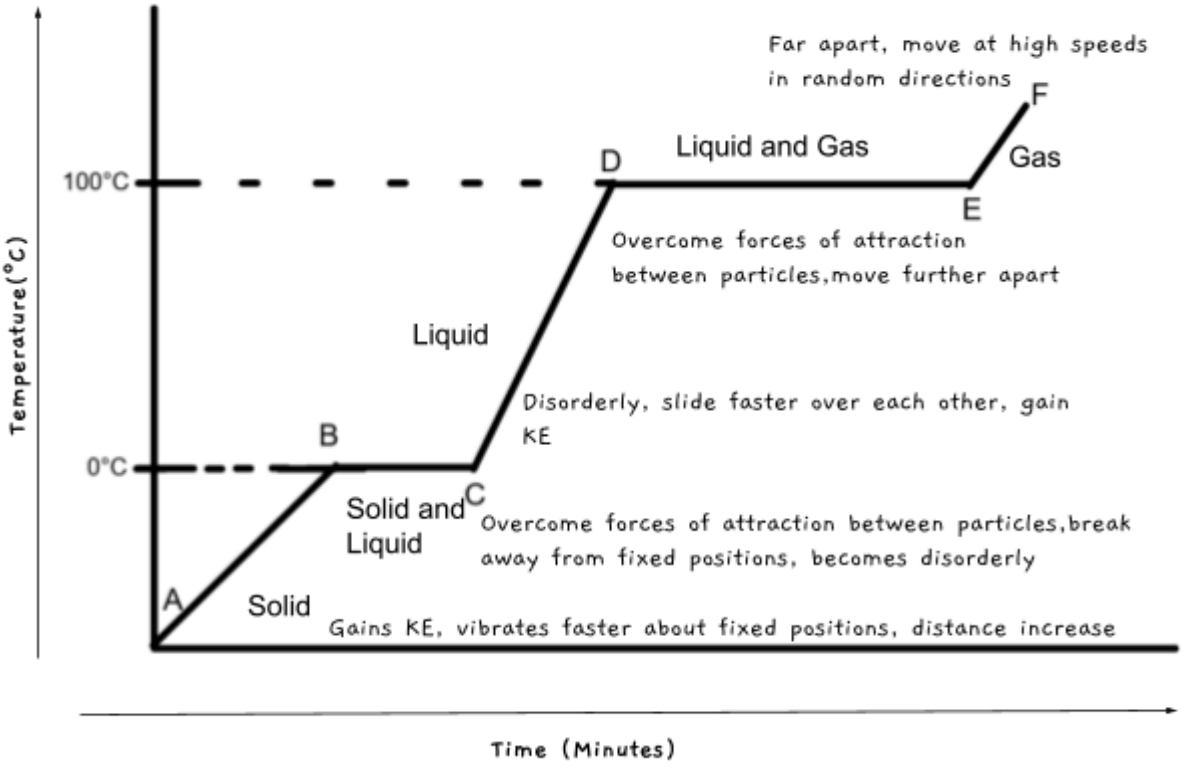
When a liquid is heated, its particles **gain** energy and slide past one another **faster**. They eventually gain enough energy to overcome the strong forces of attraction between them, The liquid **boils** and becomes a gas.

Freezing And Condensation

When a liquid is cooled its particles **lose** energy and slide past one another **slower**. This causes the particles to be pulled much closer to one another by the forces of attraction between them. The particles are eventually held in fixed positions. The liquid **freezes** and becomes a solid.

When a gas is cooled. Its particles **lose** energy and move **slower**. This causes the particles to be pulled closer to one another by forces of attraction between them. The gas **condenses** and becomes a liquid.

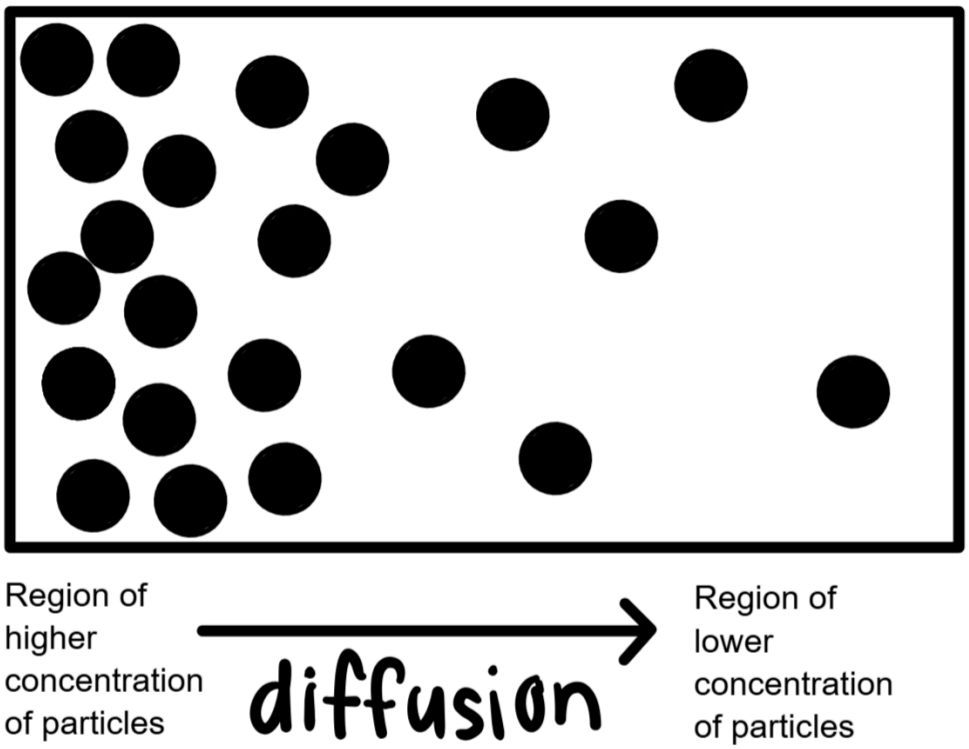
The Heating Curve



A pure substance melts and boils at a constant(fixed) temperature at a given pressure.

An impure substance melts and boils over a range of temperatures at a given pressure.

4. Diffusion



Factors affecting the rate of diffusion

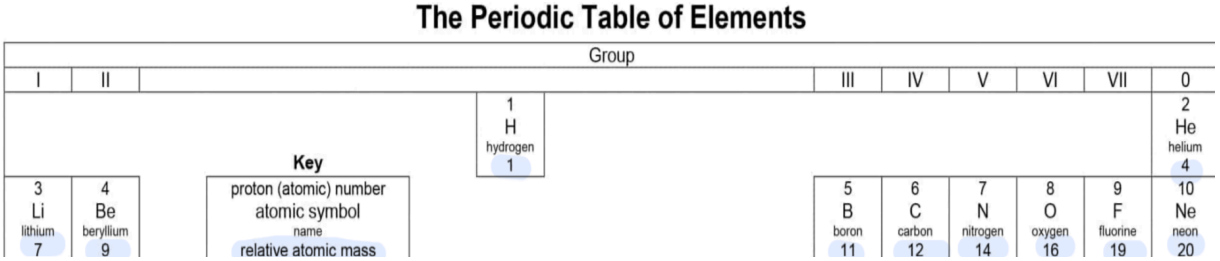
1. **Temperature**

The higher the temperature, the higher the rate of diffusion. Particles gain more energy as the temp. Increases. They move faster and this increases the rate of diffusion

2. **Relative molecular mass(Mr) of a gas**

Gases with lower relative molecular mass diffuse faster

It is calculated by summing up the relative molecular mass of the elements (eg.water vapour, H_2O $1\times2+16=18$)



- Impurities cause a decrease in melting point and increase in boiling point of impure substances.