Kinetic Particle Model of Matter

Q: What is Kinetic Particle Model of matter?

Ans: Matter is made up of particles called Molecules which are in continuous motion.

States of matter:

Solid



- fix arrangment
- very strong force of attraction
- Particles vibrate but do not move

Liquid



- Irregular arrangment
- Strong force of attraction
- Particles slide past each other

Gas



- Particles move randomly at high speed
- Weak force of attraction

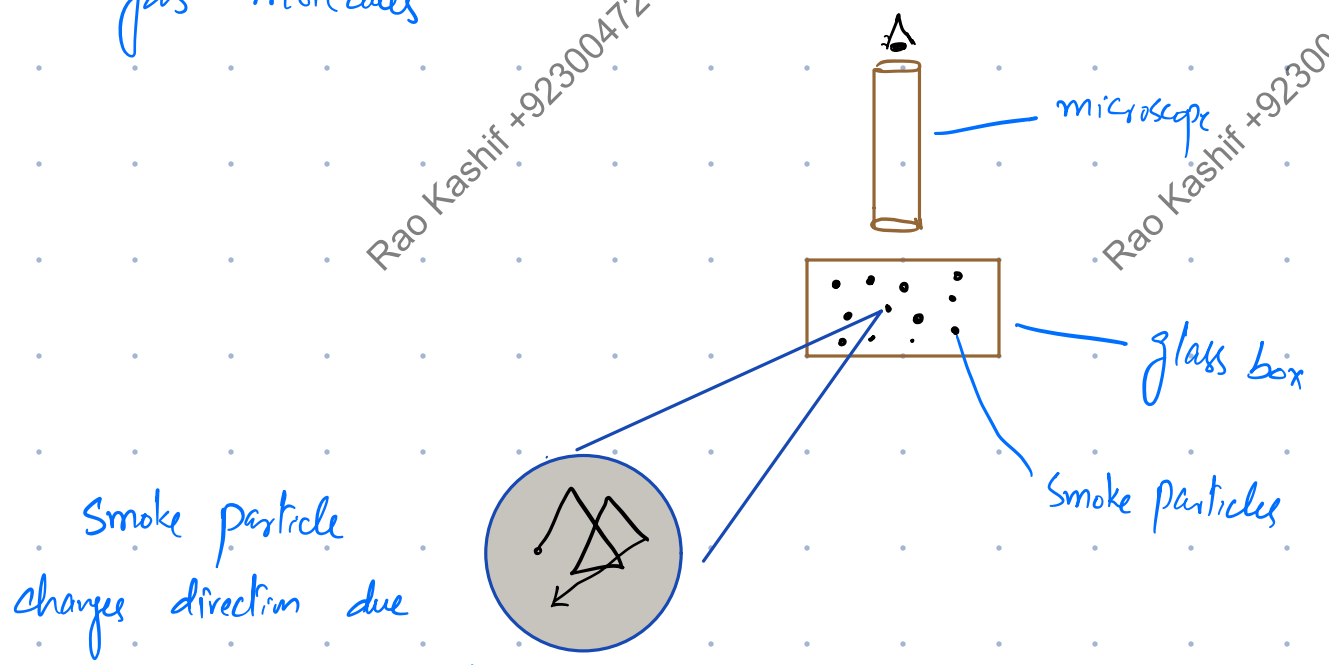
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Change of State

Solid $\underset{\text{freezing}}{\overset{\text{melting}}{\rightleftharpoons}}$ Liquid $\underset{\text{condensation}}{\overset{\text{boiling}}{\rightleftharpoons}}$ gas

Brownian Motion

Disordered / Irregular motion of gas molecules



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Temperature Scales

* In this Syllabus, two scales of temperature should be known (1) Celsius (2) Kelvin

Conversion:

$$T(\text{Kelvin}) = T(\text{Celsius}) + 273$$

example:

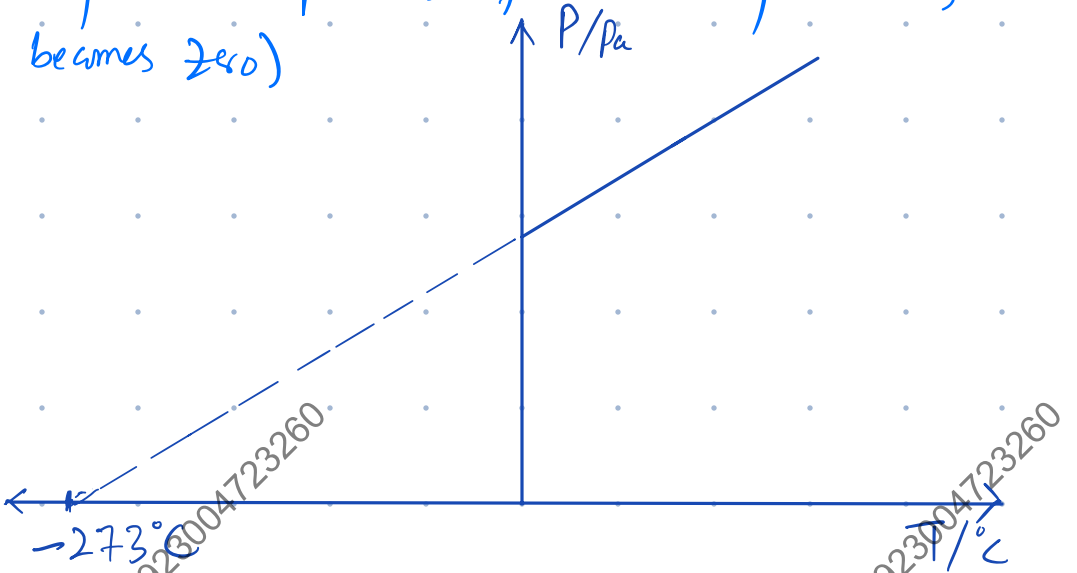
$$50^\circ C = 50 + 273$$
$$= 323\,k$$

$$0^\circ C = 273\,k$$

Absolute Zero

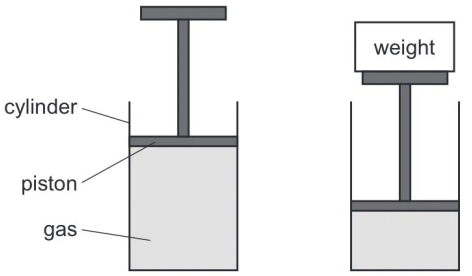
Zero Kelvin = $-273^\circ C$ is lowest possible temperature

. at this temperature, particles of matter stop vibration, (Pressure becomes zero)



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11 A piston is supported by gas trapped in a cylinder.



A weight is put on the piston. The volume of gas supporting the piston decreases but the temperature of the gas is unchanged.

What happens to the molecules?

A They hit the piston more frequently.

B They move more slowly.

C They have a smaller size.

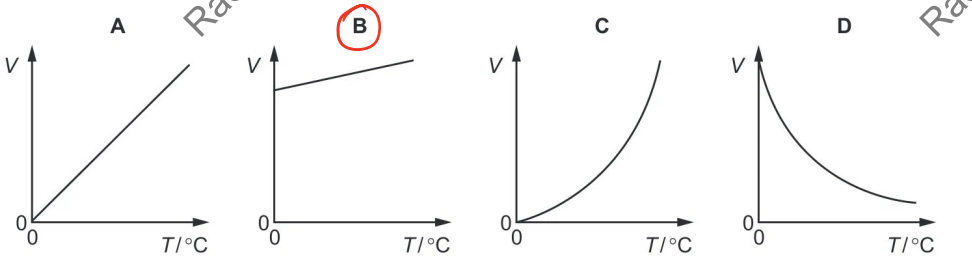
D They have more kinetic energy.

(Pressure increases when volume decreases)

5054/11/M/J/14/Q18

12 A fixed mass of gas in a syringe at 0 °C is heated at constant pressure.

Which graph shows the variation of volume V with temperature T, measured in °C?

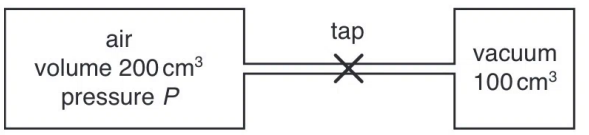


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4 Two cylinders are connected by a thin pipe.

One cylinder has a volume of 200 cm^3 and contains air at pressure P.

The other cylinder has a volume of 100 cm^3 and contains a vacuum (no air).



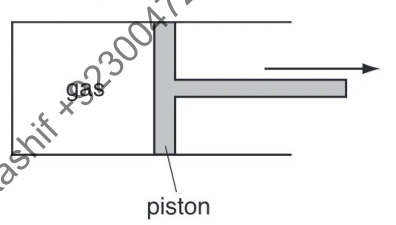
Initially, the tap is closed.

What is the final pressure of the air after the tap is opened?

A $\frac{P}{2}$ **B** $\frac{2P}{3}$ **C** $\frac{3P}{2}$ **D** $2P$

5054/12/M/J/12/Q12

5 A fixed mass of gas is enclosed in a cylinder by a movable piston.



The piston is moved so that the volume occupied by the gas increases. The temperature remains constant.

What happens to the pressure of the gas and why does this happen?

	pressure	reason
A	decreases	the molecules move more slowly
B	decreases	the molecules collide with the piston less frequently
C	increases	the molecules move more quickly
D	increases	the molecules collide with the piston more frequently

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1 According to the kinetic theory, matter is made up of very small particles in a constant state of motion.

Which row best describes the particle behaviour in the liquid state?

	forces between particles	motion of particles
A	strong	move randomly at high speed
B	strong	vibrate but are free to move position
C	strong	vibrate to and fro around a fixed position
D	weak	move randomly at high speed

5054/11/M/J/11/Q15

2 A balloon filled with air is gently heated.

What happens to the mass and the density of the air inside the balloon?

	mass	density
A	decreases	decreases
B	decreases	stays the same
C	stays the same	decreases
D	stays the same	stays the same

When a gas is heated, its density decreases

5054/11/M/J/11/Q16

3 A gas is enclosed in a container of fixed volume. It gains heat energy from an external source.

What happens to the molecules of the gas?

A They expand.

B They move faster inside the container.

C They move further apart.

D They vibrate with greater frequency.

* temperature increases kinetic energy