THE KINETIC MODEL OF MATTER

By Aikya

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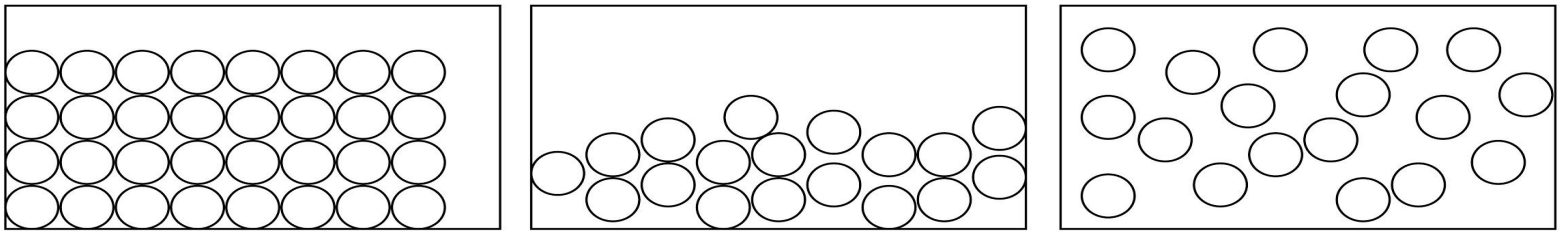
STATES OF MATTER

Solids, liquids and gases



STATES OF MATTER

State	Volume	Shape	Density	Fluidity	Compressibility	Intermolecular spaces	Intermolecular forces	Melting & boiling points
Solid	fixed	definite	high	-	low	low	high	high
Liquid	fixed	Shape of container	Moderate to high	Generally flows easily	moderate	moderate	moderate	moderate
Gas	Expands to fill container	Shape of container	low	Flows easily	high	high	low	low

MOVEMENT OF PARTICLES

SOLIDS

- Low kinetic energy
- tightly packed allowing little movement
- Vibtrate about a fixed position

LIQUIDS

- Moderate kinetic energy
- Slightly less tightly packed
- Vibrating and moving within the bulk

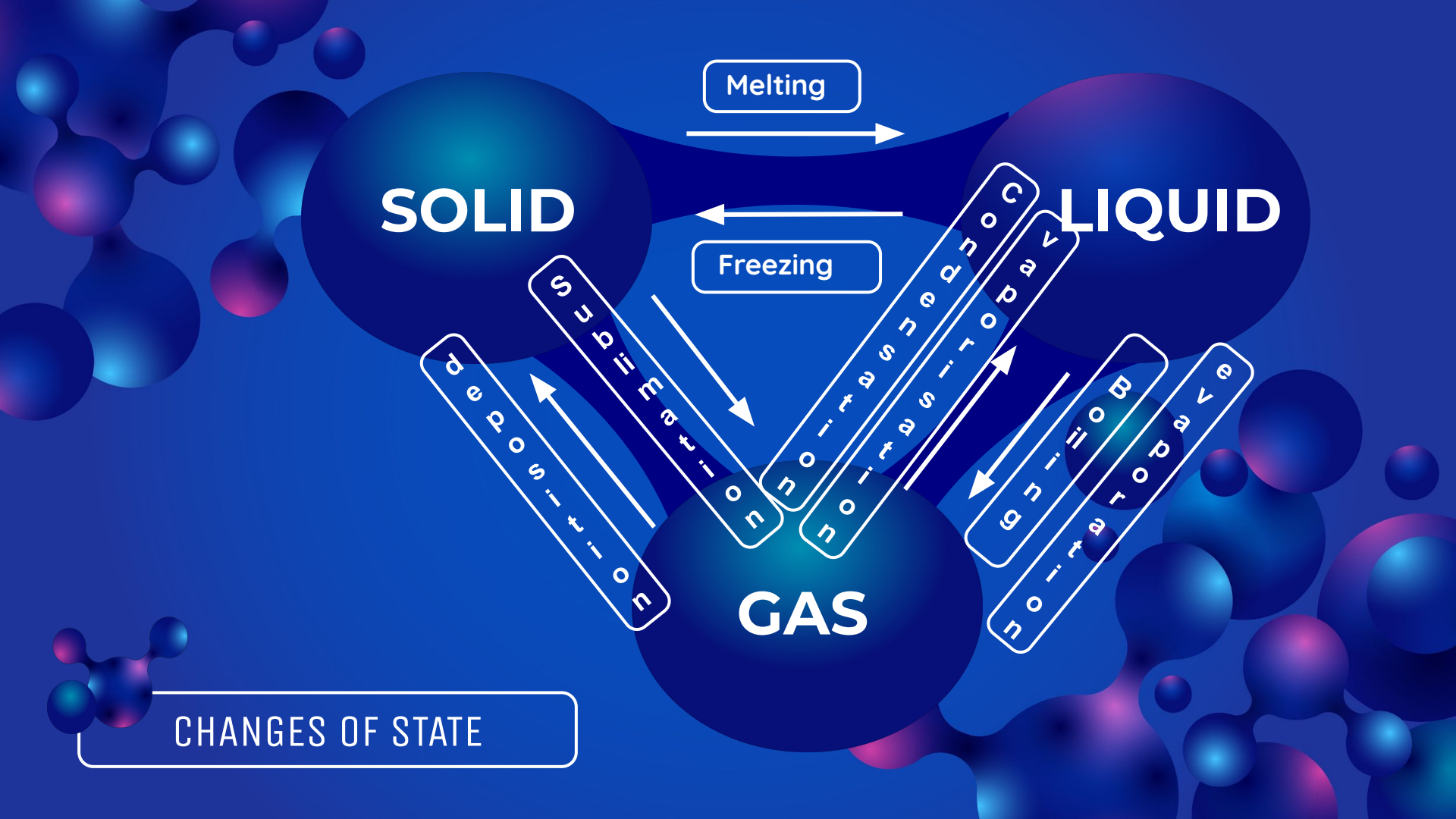
GASES

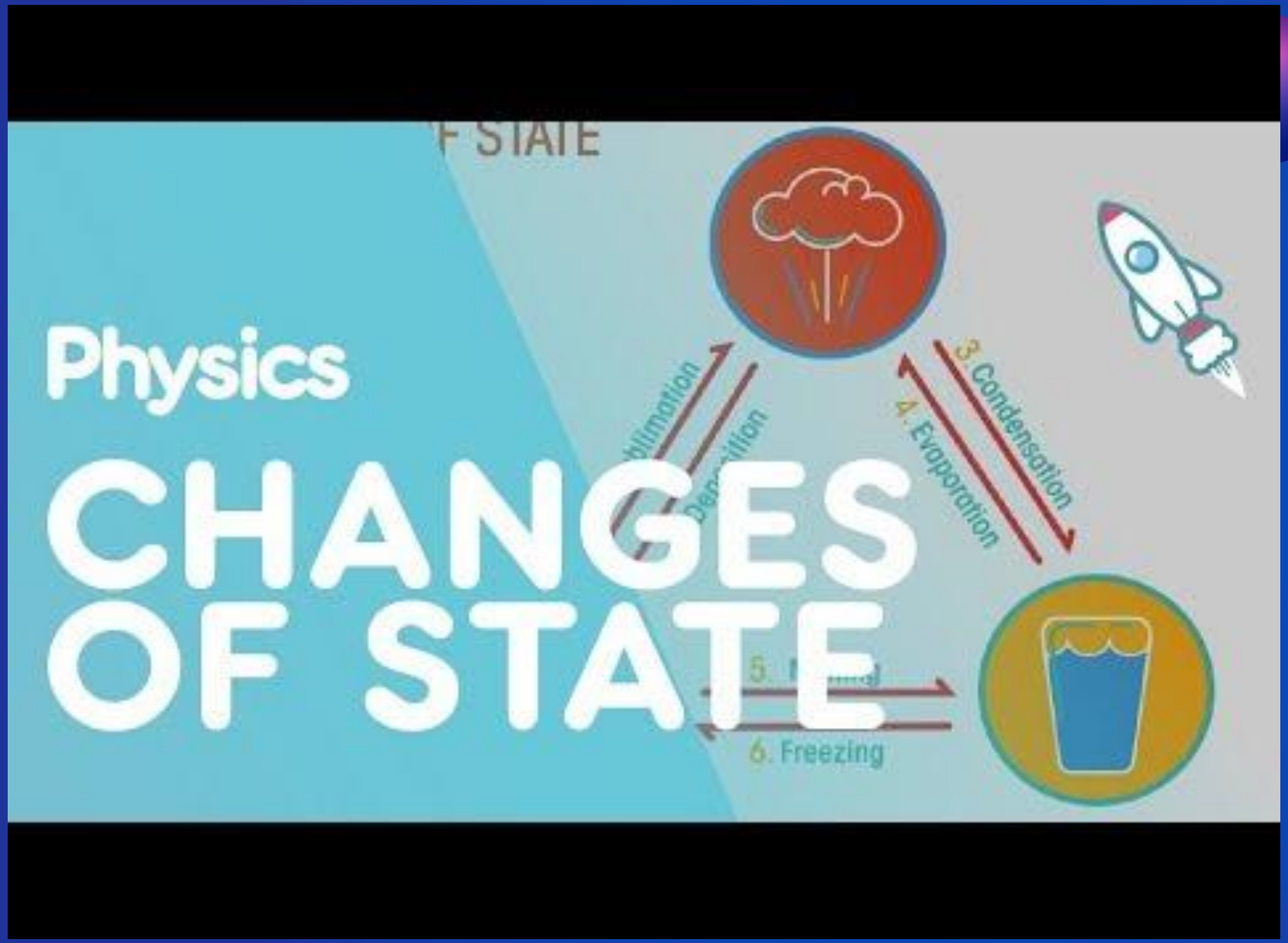
- High kinetic energy
- Moving freely about
- Bouncing off one another and the walls

02

CHANGES OF STATE

Using kinetic theory


Melting
SOLID
LIQUID
Freezing
Sublimation
deposition
condensation
evaporation
boiling
evaporation
GAS
CHANGES OF STATE



CHANGES OF STATE

TERMS

LATENT HEAT OF FUSION

The heat used in the process of melting or fusion to break the bonds. Temperature remains constant during the process.

LATENT HEAT OF VAPORISATION

The heat used in the process of vaporisation to break the bonds. Temperature remains constant during the process.

MELTING POINT

The temperature at which a pure substance changes from a solid to liquid at atmospheric pressure is called melting point.

BOILING POINT

The temperature at which a pure substance changes from a liquid to gas at atmospheric pressure is called boiling point.

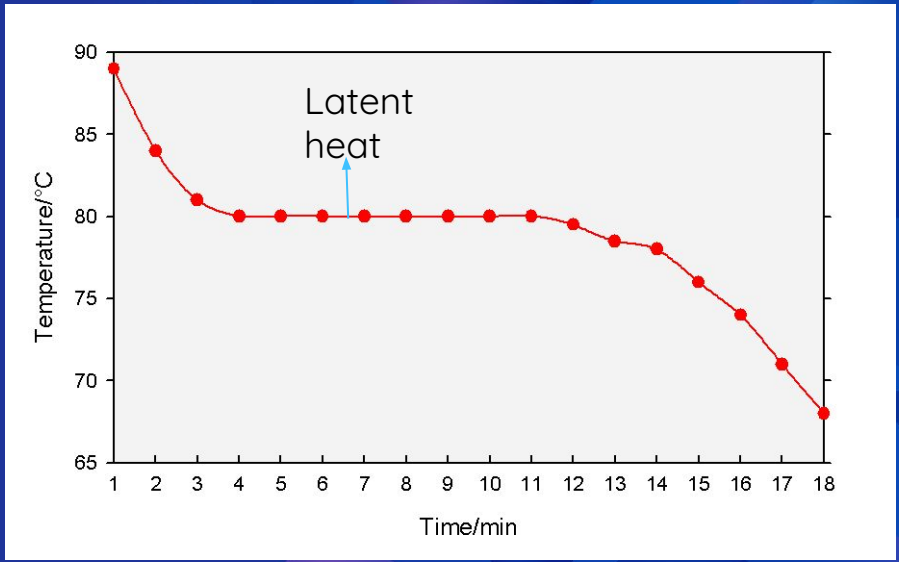
EFFECT OF IMPURITIES

The presence of impurities:

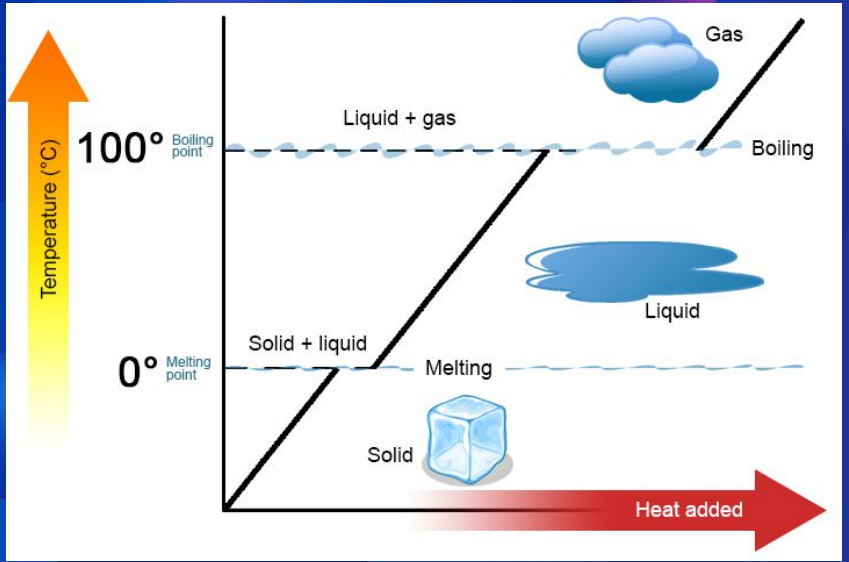
- Lowers the melting point
- Raises the boiling point

GRAPHS

COOLING CURVE



HEATING CURVE



BOILING AND EVAPORATION

BOILING

- At a certain temperature (boiling point)
- Bulk phenomenon
- Factors affecting boiling:
  - Temperature
  - Surface area
  - Purity
  - Pressure
  - Quantity
  - Mode of transfer

EVAPORATION

- At any temperature
- Surface phenomenon
- Factors affecting evaporation:
  - Temperature
  - Surface area
  - Humidity
  - Windspeed

03

KINETIC MODEL

Of matter

KINETIC MODEL OF MATTER

MOTION

Atoms in a substances are constantly moving and as a result, they posses kinetic energy.

SPACE

Atoms have space between them called intermolecular spaces.

PARTICLES

Matter is made up of particles which cannot be seen through naked eye..

CHANGE STATE

Matter changes state on supplying **heat and pressure**.

FORCES OF ATTRACTION

Atoms of a molecule are held together by forces of attraction called intermolecular forces,

EVAPORATION

STEP 1

04.2020

On heating, particles gain energy. This energy is converted into kinetic energy. Particles vibrate faster.

STEP 2

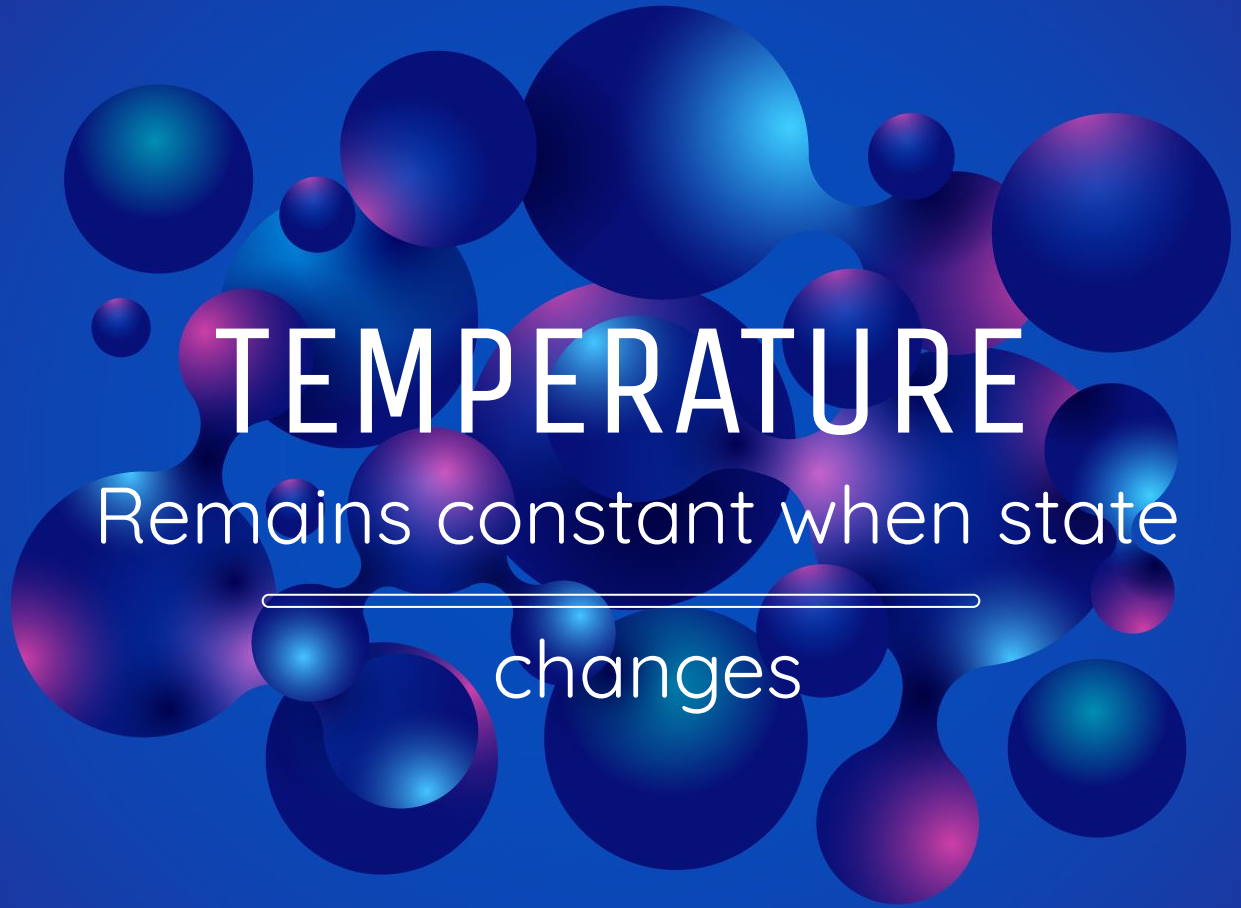
05.2020

Bonds are broken. Intermolecular spaces increase.

STEP 3

09.2020

Intermolecular forces decrease. State changes.


TEMPERATURE
Remains constant when state
changes

CONDENSATION

STEP 1

04.2020

On applying pressure, volume decreases. Kinetic energy decreases.

STEP 2

05.2020

Intermolecular spaces decrease.

STEP 3

09.2020

Intermolecular forces increase. State changes.

WHY BOILING POINTS ARE HIGHER

Boiling

ALL BONDS ARE BROKEN

Melting

SOME BONDS ARE BROKEN

BROWNIAN MOTION

WHAT IS IT?

Random movement of particles

01

WHY DOES THIS HAPPEN?

02

Particles are constantly buffeted by the fast moving air molecules

WHO INVESTIGATED?

04

Investigated by a Scottish botanist, Robert brown in 1820s

03

EXAMPLES

- Potassium permanganate in water
- Smoke cell

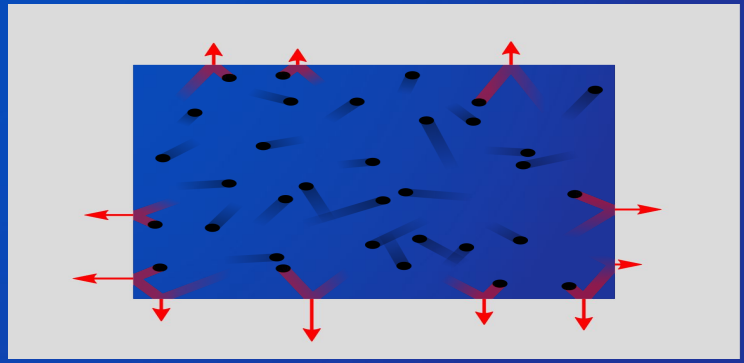
GASES AND KINETIC THEORY

COLLISIONS

Particles moving high speed (brownian motion) collide with the walls exerting pressure on the walls. The bounce off in different directions.

COMPRESSING A GAS

When squashed into a smaller volume,particles collide more frequently. This increases the pressure.
(V/2)=2P



solved examples

Which statement about evaporation is correct?

A. Evaporation causes the temperature of the remaining liquid to decrease.

B. Evaporation does not occur from a cold liquid near its freezing point.

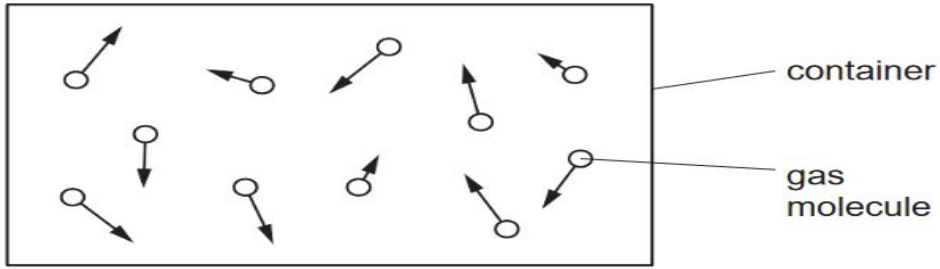
C. Evaporation does not occur from a dense liquid, such as mercury.

D. Evaporation occurs from all parts of a liquid.

OPTION A

OPTION A

The diagram represents moving gas molecules in a sealed container of fixed volume.

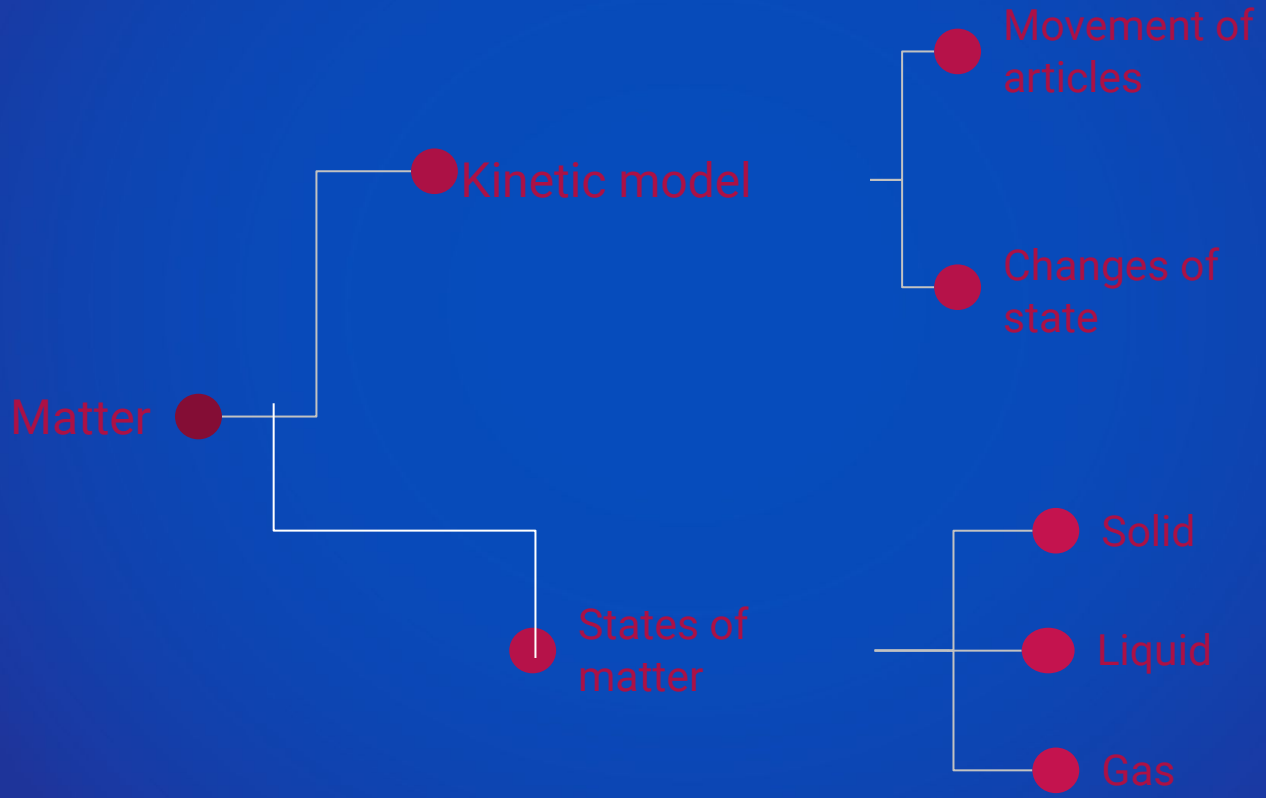


The temperature of the gas is now increased.

What happens to the pressure of the gas, and what happens to the speed of the gas molecules?

	pressure of gas	speed of molecules
A	increases	increases
B	increases	unchanged
C	unchanged	increases
D	unchanged	unchanged

MINDMAP


Movement of articles
Kinetic model
Changes of state
Matter
States of matter
Solid
Liquid
Gas

EXERCISE QUESTIONS

State what happens to the molecules of a gas in a sealed container when the temperature of the gas is increased.

..... [1]

A quantity of gas is contained in a sealed container of fixed volume. The temperature of the gas is increased.

State, in terms of molecules, **two** reasons why the pressure of the gas increases.

1. .....

2. .....

[2]

QUESTION 2

A beaker of liquid is left on a laboratory bench. There is an electric fan in the laboratory causing a draught over the liquid.

The liquid evaporates.

Which row shows two changes that will both cause the liquid to evaporate more quickly?

	change to surface area of the liquid	change to speed of fan
A	decrease	decrease
B	decrease	increase
C	increase	decrease
D	increase	increase

QUESTION 3

Two states of matter are described as follows.

In state 1, the molecules are very far apart. They move about very quickly at random in straight lines until they hit something.

In state 2, the molecules are quite closely packed together. They move about at random. They do not have fixed positions.

What is state 1 and what is state 2?

	state 1	state 2
A	gas	liquid
B	gas	solid
C	liquid	gas
D	solid	liquid

DO YOU HAVE QUESTIONS?

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