

# Chemistry



9th Class

Sindh Board Notes

Chapter # 6

States of Matter



Theory Questions & Answers

پنجاب، سندھ، بلوچستان، خیبر پختونخواہ، بورڈز کے تمام نوٹس سابقہ پیپرز، اس ویب سائٹ سے فری ڈاؤن لوڈ کریں۔

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## ➔ STATES OF MATTER

### 6.1 COMMON STATES OF MATTER

**Q.1: Define matter and its three common states?**

**Ans: MATTER:**

**Definition:**

Anything that has mass and occupies space is called matter.

**STATES OF MATTER:**

There are three common states of matter i.e. solid, liquid and gas.

➤ **Solid:**

Solid has a definite shape as well as definite volume.

➤ **Liquid:**

Liquid has a definite volume but not a definite shape and it takes the shape of vessel in which it is kept.

➤ **Gas:**

Gas has neither definite shape nor definite volume, it takes the shape of vessel in which it is kept and occupies all the space available to it.

**Q.2: Describe the Kinetic Theory of matter and its states?**

**Ans: MATTER:**

According to the Kinetic Molecular Theory, the matter is composed of very tiny particles, which are called molecules are always in motion and they possess kinetic energy. Three states of matter depends upon the;

- arrangements of molecules.
- motion of the molecules
- forces of attraction between molecules.

**KINETIC DESCRIPTION OF SOLID STATE:**

- Molecules or particles are tightly packed with one another.
- They have only back and forth motion (vibrational motion) about their fixed positions.

- Particles in solid cannot slip or slide over one another and thus they possess definite shape and definite volume.

#### KINETIC DESCRIPTION OF LIQUID STATE:

- Molecules are not tightly packed with one another.
- Their positions are not fixed and they can move in all direction.
- The kinetic energy of molecules is less than gaseous state.
- The intermolecular attractive forces are more than gaseous state. Due to these intermolecular attractive forces liquid has a fixed volume.

#### KINETIC DESCRIPTION OF GASEOUS STATE:

- Molecules are lying away from one another and they can move in all directions easily.
- The cohesive forces in a gas are negligible and the particles are free to move about in all directions.
- The kinetic energy possessed by these molecules are very high, therefore gases have neither definite shape nor definite volume.

**Q.3: Define the following?**

- |                 |                   |                   |
|-----------------|-------------------|-------------------|
| i. Sublimation  | ii. Melting Point | iii. Fusion       |
| iv. Evaporation | v. Boiling Point  | vi. Vapourization |

**Ans: SUBLIMATION:**

#### Definition:

Sublimation is the process in which some solids upon heating instead of changing into liquid state are converted directly into gaseous (vapours) state.

#### Examples

- Ammonium Chloride ( $\text{NH}_4\text{Cl}$ )
- Naphthaline
- Iodine

#### MELTING POINT:

#### Definition:

The temperature at which solid starts melting is called melting point.

#### Example:

- Melting of ice into water.

#### FUSION:

#### Definition:

The change of state from solid to liquid at melting point is called fusion.

**EVAPORATION:****Definition:**

Escaping of certain molecules from the surface of liquid due to increase of kinetic energy is called evaporation. Evaporation continues at all temperature and is a slow process.

**BOILING POINT:****Definition:**

Boiling point is the temperature at which the vapour pressure of a liquid becomes equal to the external pressure applied on the liquid or atmospheric pressure.

**VAPOURIZATION:****Definition:**

The change of liquid into gas is called vapourization.

**Q.4: Describe the interchange of liquid into gas.**

**Ans: INTERCHANGE OF LIQUID INTO GAS:**

When liquid is heated, kinetic energy of molecules is increased. At certain temperature, the vapour pressure of liquid becomes equal to external pressure and liquid starts boiling. At this point, bubbles of vapours are able to form within the interior of liquid and then rise to the surface, where they burst and release vapours and thus liquid is converted into gas. At boiling temperature of the liquid remains same until all the liquid is evaporated.

**Q.5: How solid is converted into liquid? Explain it.**

**Ans: CONVERSION OF SOLID INTO LIQUID:**

The temperature at which solid starts melting is called melting point. At this temperature solid particles lose their fixed positions as well as their arrangements and then solid is converted into liquid. At melting point the temperature of solid and liquid remains same until all the solid is melted through heat.

**Q.6: Define diffusion? Describe Diffusion in gases and liquids?**

**Ans: DIFFUSION:**

**Definition:**

The spreading of a substance through medium like air or liquid is called diffusion. The rate of diffusion of a substance depends upon its molar mass or density.

**DIFFUSION OF GASES:**

It is observed that when a sample of a gas is set free in the container, then its molecules very quickly spread throughout the container.

**Examples:**

- When a perfume is sprayed in the room, we can smell it, because its molecules are spread throughout the room.
- Smell of  $H_2S$  gas spreads in laboratory.

**GRAHAM'S LAW OF DIFFUSION:**

This law states that, the rate of diffusion of a gas is inversely proportional to the square root of its molar mass or density. Lighter gases can diffuse faster than heavier gases. For example  $H_2$  gas diffuses 4 times faster than  $DO_2$  gas.

**DIFFUSION OF LIQUIDS:**

Liquid molecules like gases are able to move and thus flow and diffuse. The rate of movement of liquid molecule is smaller than gases; hence they diffuse slower than gases.

**Example:**

When two or three drops of blue ink are added in 200ml of water in a beaker, it is seen that blue colour of ink spreads slowly in water. After sometime the whole water becomes bluish, because of diffusion of ink molecules.

## 6.1 BROWNIAN MOVEMENT

**Q.7: What is Brownian movement? Describe with suitable example?**

**Ans: BROWNIAN MOVEMENT:**

In 1827, British botanist Robert Brown observed this property during the movement of pollen grains in the water by microscope.

**Statement:**

A continuous rapid zig zag motion of suspended particles through the medium is called Brownian motion.

**EXPERIMENT:****Procedure:**

- Mix some powdered sulphur in water and stir it.
- After stirring filter the suspended sulphur some very small sulphur particles will pass through the filter paper into filtrate.
- Now put a drop of this filtrate on a slide and examine it under high powered microscope.

**Observation:**

It is observed that sulphur particles perform rapid random zig zag motion through the medium.

**Q.8: Compare rite three states of matter solid, liquid and gas?**

**Ans: COMPARISON BETWEEN SOLID, LIQUID AND GAS:**

Solid	Liquid	Gas
<b>Arrangement Of Molecules</b>		
The molecules of solid are tightly packed with one other.	The molecules of liquid are not tightly packed with one another. Their positions are not fixed.	The molecules in gases are lying away from one another.
<b>Movement</b>		
Molecules in solids have only back and forth motion (vibrational motion) about their fixed positions.	Molecules in liquid can move in all directions.	Molecules in gases can move in all directions easily.
<b>Shape And Volume</b>		
Solid has a definite shape as well as definite volume	Liquid has a definite volume but not definite shape.	Gas has neither definite shape nor definite volume.
<b>Intermolecular Attractive Force</b>		
In solids there are very strong intermolecular forces between the molecules. Therefore particles cannot slip on slide over one another, then they posses definite shape and volume.	Intermolecular forces in liquids are more than gaseous state. Therefore liquid has a fixed volume.	Intermolecular forces in gas are negligible and the particles are free to move in all directions.
<b>Kinetic Energy</b>		
The kinetic energy of solid molecules is negligible.	The kinetic energy of liquid molecules is less than gaseous state.	The kinetic energy possessed by gas molecules is very high.

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