

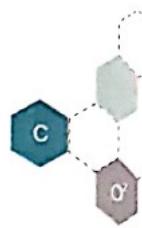
Assignment No. -1

Subject – Chemistry

Class – VIII

Chapter – Matter

1 MATTER



CLASSIFICATION OF MATTER

Matter can be classified on the basis of their physical and chemical properties into the following two ways—

- On the basis of their physical states like solid, liquid and gas.
- On the basis of its chemical constitution as an element, compound and mixture.

CLASSIFICATION OF MATTER BASED ON ITS PHYSICAL STATE *

I

- Solid state
- Liquid state
- Gaseous state

a. Solid State

Solid is defined as the state of matter with definite shape and a definite volume.

Characteristics of Solids (LEARN)

- Solids have definite shape, mass and volume and rigidity.
- They have high density.
- They can not be compressed by high pressure.
- They can expand while heating.

b. Liquid State

Liquid is defined as the state of matter which has definite volume but no definite shape. It can take up the shape of the container in which it is poured.

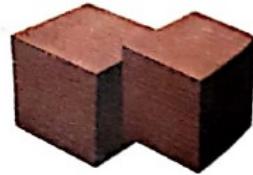


Fig. 1.1 – Solid



Fig. 1.2 – Liquid

Characteristics of Liquids (LEARN)

1. Liquids do not have definite shape but they have definite mass and volume.
2. They have high density but less than solids.
3. They can not be compressed by pressure.
4. On heating, liquids expand more than solids and change to gaseous state.

c. Gaseous State

Gas is a state of matter which has neither definite shape nor a definite volume. It is a highly compressible fluid.

Characteristics of Gases (LEARN)

1. They have definite mass.
2. No definite shape and volume, can be placed in any container.
3. Low density as compared to solids and liquids.
4. They can be easily compressed by small pressure.
5. On heating, gases expand more than liquids.



Fig. I.3 – Gas

KINETIC MODEL OF MATTER * II

(Molecular Composition of Matter)

The main postulates and kinetic model of matter are as follows- (LEARN).

- a. All matter i.e. solid, liquid and gas are made up of extremely small particles which are capable of independent existence and known as **molecules**.
- b. The molecules of the same substance are identical in all aspects but differ from those of other substances.
- c. There are intermolecular space in between the molecules of all substances. In solid, the space is very small; in liquid, it is comparatively greater and in gaseous state, it is maximum.
- d. The molecules are in a state of motion. In solid, the motion is very much restricted because they are closely packed; in liquid, the motion is slightly greater and in gases, it is much greater.

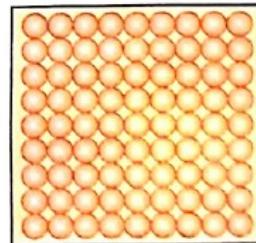


Fig. I.4 – Molecular arrangement in solids

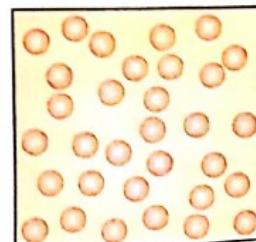


Fig. I.5 – Molecular arrangement in liquids

- e. The molecules exert a force of attraction upon one another. The intermolecular force of attraction is more in solids, weak in liquid and least or weakest in gases.

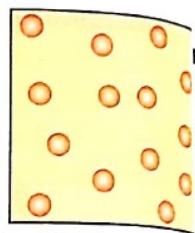


Fig. 1.6 – Molecular arrangement in gases

Comparison of solid, liquid and gas (LEARN).

Solid	Liquid	Gas
<ol style="list-style-type: none"> Molecules are closely packed. Intermolecular force of attraction is comparatively high. The position of molecules are fixed, no or negligible intermolecular space. Molecules possess least kinetic energy. The density of solids is high. Solids do not possess the property of fluidity. Molecules of solids do not diffuse. They have many surfaces. 	<ol style="list-style-type: none"> Molecules are loosely packed. Less than solid. Molecules have free space. Molecules possess higher kinetic energy than those of solids. The density of liquid is lower than solid. Liquid possess the property of fluidity because of their intermolecular space. Can diffuse to some extent. They have only one surface. 	<ol style="list-style-type: none"> Molecules are found in sufficient distance. Least or negligible. Molecules have maximum intermolecular space. Molecules possess maximum kinetic energy. Gases have least density. Gases have maximum property of fluidity since they have maximum intermolecules space. Can diffuse maximum. They have no surface.

INTERCONVERSION OF STATES OF MATTER ON THE BASIS OF KINETIC MODEL

The change in state of matter from one state to another state and again back to the original state is known as the **interconversion of states of matter**.

Interconversion may be of the following types- * III.

1. Interconversion of solid state into liquid state and from liquid state back to solid state.



Molecules of solid are tightly packed with maximum force of attraction among them. Solids absorb energy on heating, their molecules begin to vibrate and on gaining more energy become free to move. Thus, solid changes to liquid. This is reversed on cooling.

2. Interconversion of liquid state into gaseous state and from gaseous state back to liquid state.



Liquids have more intermolecular space and the molecules are loosely packed. Liquids absorb energy and their molecules vibrate more than before. Finally the intermolecular forces become weak and molecules move freely. The liquid evaporates to the gaseous form. This is reversed on cooling.

3. Interconversion of solid state into gaseous state and from gaseous state back to solid state.



Some solids have weak intermolecular forces and their molecules apart on absorbing energy. These solids convert directly into vapour from solid state. This is called sublimation. Sublimated solids convert back to solid state directly from gaseous state on cooling.

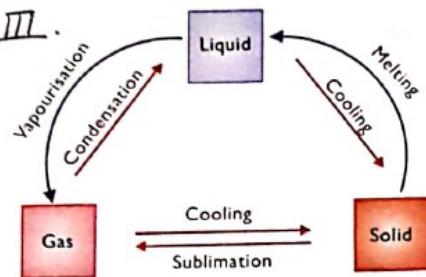


Fig. 1.7 – Interconversion of matter



Solid (Ice)



Liquid (Water)



Gas (Vapour)

LAW OF CONSERVATION OF MASS

According to the law of conservation of mass, mass can neither be created nor destroyed.

In chemical reaction, mass is conserved. It means the total mass of the reactants is equal to the total mass of the products irrespective of their state i.e. solid, liquid or gas.

Total mass of molecules of the reactants = Total mass of the molecules of products

• ACTIVITY

Experiment to prove the law of conservation of mass. (LEARN).

- Take Barium Chloride and Sodium Sulphate.
- Prepare two solutions separately by adding about 2 gms each in 50 ml of water separately.
- Pour sodium sulphate solution in a conical flask.
- Take Barium Chloride in a small ignition tube with the help of thread as shown in the figure fix with the help of cork in the conical flask.
- Weigh the flask carefully.
- Now tilt the flask, so its content Barium Chloride get mixed with Sodium Sulphate.
- Now weigh the flask again.
- When two solutions are mixed, a precipitate will appear. But mass of the flask before and after mixing of two solutions remain unchanged. The law of conservation is illustrated by this experiment.

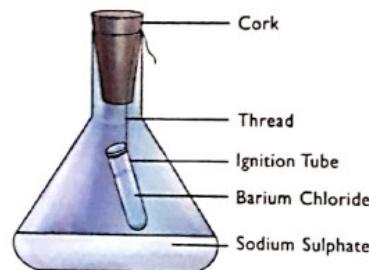


Fig. 1.8 – Laws of conservation of mass

CONCLUSION

When two solutions are mixed, some reactions take place. But since the flask is corked, none of its content is lost. This shows there is no loss or gain of mass in a chemical reaction according to the law of conservation of mass.

Lesson At A Glance

- Matter is anything which has mass, occupies space and can be felt by anyone.
- Matter is mainly divided into solid, liquid and gas.
- Solids have least intermolecular space but maximum intermolecular attraction.
- Gases have maximum intermolecular space and least intermolecular attraction.
- As per the law of conservation of mass, mass can neither be created nor destroyed in a chemical reaction.

Keywords

- | | |
|----------------------------------|--|
| Intermolecular space | - Gap between molecules. |
| Intermolecular attraction | - Force of attraction between the molecules. |
| Fluids | - Substances which can flow. |
| Mass | - It is the property of matter. |

Exercises



(To be done in textbook)

A. Fill in the blanks:

1. Solids have _____, mass and _____ and rigidity.
2. Liquid have high _____ but less than solids.
3. Gases have _____ mass.
4. In solid, molecules are closely _____.
5. Liquid have only one _____.
6. Gases have least _____.

B. Match the following:

Column A

1. Conversion of a gas into liquid
2. No compressibility
3. Constituent of matter
4. Maximum expansion
5. Mercury

Column B

- a. Solid
- b. Molecules
- c. Gas
- d. Condensation
- e. Liquid

C. Name the state of matter:

1. Definite mass volume and shape.
2. No surface.
3. Only one surface.
4. No definite volume and shape.
5. Maximum intermolecular attraction.

D. Write True or False for the following statements:

1. Mass can neither be created nor destroyed.
2. Molecules are closely packed in liquid.
3. Liquids have one surface and gases have no surface.
4. Molecules in gas can diffuse rapidly.
5. The density of solid is high.

E. Give reason for the following:

1. Gases are highly compressible.
2. Naphthalene balls on exposure become smaller day-by-day.
3. Solids are highly dense.

F. Answer in short:

1. What is the classification of matter?
2. What is the interconversion of states of matter?

G. Answer in brief:

1. Why do solids have a definite shape and volume?
2. Name three states of matter. Also mention three characteristic features of matter.
3. Why do liquids flow?
4. Why do molecules in solids not diffuse into one another?
5. Differentiate solid, liquid and gas on the basis of following points–
 - a. fluidity
 - b. density
 - c. compressibility

EXPLANATION

* I – States of Matter

- 1) **Solid** – Solid is defined as the state of matter which has definite shape and definite volume.
- 2) **Liquid** – Liquid is defined as the state of matter which has definite volume but no definite shape. Liquid takes up the shape of the container and can flow. It has only one free surface.
- 3) **Gas** – Gas has neither definite shape nor a definite volume. It occupies the entire space available and can be compressed easily.

(Fig. 1.1, 1.2, 1.3 - Pg 6 and 7)

*II – Kinetic Model of Matter

All matter i.e. solid, liquid and gas are made up of extremely small particles, capable of independent existence are known as molecules.

Molecules of same substances are same in all respect whereas molecules of different substances are different.

The spaces between these molecules are called intermolecular spaces and the force of attraction between these molecules is called intermolecular force.

In solids molecules are fixed due to large intermolecular forces and intermolecular spaces are negligible as molecules are closely packed.

In liquid and gases molecules are in a state of continuous motion due to larger intermolecular spaces thus they can change their shape or possess the property of fluidity.

(Fig 1.4, 1.5 and 1.6 – Pg. 7 and 8)

***III – Interconversion of states of matter.**

The change of state of matter from one state to another state and again back to the original state is known as the interconversion of states of matter.

1) Solid changes to liquid.

- a) Melting** – When a solid is heated it changes into liquid by absorbing heat energy and this process is called melting.
- b) Melting Point** – The constant temperature at which a solid changes to liquid is called melting point.

2) Liquid changes to solid.

- a) Solidification / Freezing** – When a liquid changes into solid on cooling the process is called solidification or freezing.

b) **Freezing point** – The constant temperature at which a liquid changes to solid is called freezing point.

3) Liquid changes to gas.

a) **Boiling** – When a liquid is heated it changes into its gaseous state and this process is called boiling or vaporisation.

b) **Boiling point** – The constant temperature at which a liquid changes into gaseous state is called boiling point.

4) Gas changes to liquid

a) **Condensation** – When a gas is cooled it changes into liquid state and this process is called condensation or liquefaction.

b) **Liquefaction point** – The constant temperature at which a gas changes into liquid is called liquefaction point.

5) Evaporation -

When a liquid changes into its vapours or gaseous state at any temperature the process is called evaporation.

6) Sublimation –

When a solid directly changes into gaseous state on heating without undergoing into liquid state, the process is called sublimation.

For example naphthalene, camphor, iodine, ammonium chloride, etc, sublime when absorb heat energy.

(Fig 1.7 – Pg. 9)

Question and answers (To be written in notebooks)

Question No. 1: Name three states of matter. Also mention three characteristic features of matter.

Answer No. 1: The three states of matter are solid liquid and gas. The characteristic features of matter are:

- a) Matter is anything which occupies space, has mass and can be felt by our sense organs.
- b) Matter is made up of extremely small particles called molecules which are capable of independent existence.
- c) Matter can neither be created nor destroyed.

Question No. 2: Give reasons for the following statements:

- a) Gases are highly compressible.
- b) Naphthalene balls on exposure become smaller day by day.
- c) Solids have high density.

- d) Why do liquids flow?
- e) Solids have definite shape and definite volume.
- f) Why molecules in solids do not diffuse into one another?

Answer No. 2:

- a) Gases are highly compressible due to large intermolecular spaces and intermolecular forces are negligible.
- b) Naphthalene balls on exposure become smaller day by day because naphthalene when exposed sublimes, i.e changes directly from solid to gaseous state or naphthalene vapours.
- c) Solids have high density because in solids molecules are compactly packed such that they have no intermolecular spaces and inter molecular forces are very strong.
- d) Liquids flow because in liquids molecules are loosely packed such that intermolecular spaces are larger and molecules are free to move.

- e) Solids have definite shape and definite volume because in solids molecules are closely packed thus molecules cannot move from their places.
- f) Molecules in solids do not diffuse into one another because in solids molecules are compactly packed such that they do not have intermolecular spaces and intermolecular forces are very strong.

WORKSHEET

Answer the following questions (To be written in notebooks)

Question No. 1: What is the classification of matter?

Question No. 2: State the “law of conservation of mass.”

Question No. 3: What is the inter-conversion of states of matter?

Question No. 4: Define the following terms:

- a) Solid
- b) Liquid
- c) Gas
- d) Molecules
- e) Intermolecular space
- f) Intermolecular force

-----x-----