Section A

I. Objective Questions:

A. Multiple Choice Questions:

1: A few substances are grouped in increasing order of their particle's 'forces of attraction.' Which of the following is the correct order?

A. Water, oxygen, chalk
B. Salt, juice, wind
C. Nitrogen, water, sugar
D. Air, salt, oil

Answer: c) Nitrogen, water, sugar

Explanation: Particles in solids are close together in an ordered manner, with little room for mobility. Particles in liquids are close together but have the ability to move about. In contrast to solid or liquid phases, gases have far-apart particles that move easily and quickly.

This means that solids have strong forces of attraction between particles, whereas gases have weak forces of attraction. Liquids, on the other hand, are halfway between solids and liquids.

Solids: Chalk,salt and sugar

Liquids: Water, juice and oil

Gases: Nitrogen,oxygen,wind and air.

The correct order will be Nitrogen<Water<Sugar

2. A form of matter has no fixed shape and no fixed volume. An example of this form of matter is:

A. Petrol
B. Iron
C. Krypton
D. Carbon steel

Answer: c) Krypton

Explanation: Gases have neither a fixed volume nor a fixed shape. They take up the entire volume of the container in which they are placed. Krypton is a kind of gas. Petrol is a liquid. Solids are iron and steel.

3. CO_2 can be easily liquified and even solidified because

A. It has weak forces of attraction
B. It has comparatively more force of attraction than other gases
C. It has more intermolecular space
D. It is present in the atmosphere

Answer: (a) It has weak forces of attraction

Explanation: Carbon dioxide is a gas and has a weak intermolecular force of attraction between its molecules. It can be easily solidified and even liquefied because it has a low melting point and low boiling point.

4. Under which of the following conditions we can boil water at room temperature?

A. At low pressure
B. At high pressure
C. At very high pressure
D. At atmospheric pressure

Answer: (A) At low pressure

Explanation: We can boil water **at room temperature at low pressure**. By reducing the pressure, the boiling point decreases so that the water begins to boil at room temperature. The boiling point of a liquid is defined as the temperature at which the vapour pressure of the liquid is equal to the external pressure.

5. Which of the following is a characteristic of a liquid?

A. Has a definite shape and volume
B. Takes the shape of its container
C. Neither has a definite shape nor a definite volume
D. Has a definite shape but no definite volume

Answer: b) Takes the shape of its container

6. What is the state of matter characterized by having no definite shape or volume?

A. Solid
B. Liquid
C. Gas
D. Plasma

Answer: c) Gas

7. Which state of matter has a definite volume but takes the shape of its container?

A. Solid

B. Liquid

C. Gas

D. Plasma

Answer: B. Liquid

Explanation: Liquids have a definite volume because their particles are closely packed like solids. However, they can flow and take the shape of their container due to weaker intermolecular forces than solids.

8. Which state of matter has the least kinetic energy?

a) Solid b) Liquid c) Gas d) Plasma

Answer: a) Solid

Explanation: Solids have the lowest kinetic energy since they cannot move and can only fluctuate about their mean position.

9. What happens to the particles of a substance during freezing?

A. They gain energy and move faster.

B. They spread out and become more random.

C. They lose energy and move slower.

D. They change into a different type of particle.

Answer: C. They lose energy and move slower.

Explanation: Freezing is the process that causes a substance to change from a liquid to a solid. Freezing occurs when the molecules of a liquid slow down enough that their attractions cause them to arrange themselves into fixed positions as a solid.

10. What happens to the volume of a substance when it changes from a solid to a liquid?

A. It decreases
B. It increases
C. It remains the same
D. It cannot be determined

Answer: c) It remains the same

Explanation: A solid has a definite volume and shape, a liquid has a definite volume but no definite shape, and a gas has neither a definite volume nor shape. The change from solid to liquid usually does not significantly change the volume of a substance.

11. Which of the following is NOT a state of matter?

a) Solid b) Gas c) Plasma d) Energy

Answer: d) Energy

12. Which of the following is a chemical property of matter?

a) Boiling point b) Melting point c) Density d) Reactivity with acid

Answer: d) Reactivity with acid

Explanation: Chemical properties are properties that can be measured or observed only when matter undergoes a change to become an entirely different kind of matter. They include reactivity, flammability, and the ability to rust.

13. A kind of matter that can sublime is

A. Water

B. Plastic

C. Milk

D. Iodine

Answer: D. **Iodine**

14. There are large intermolecular gaps in

A. Water

B. Iron ball

C. common salt

D. Air

Answer: D. **Air**

15. Which change of state is associated with an increase in volume?

A. Melting

B. Freezing

C. Condensation

D. Sublimation

Answer: D. Sublimation

Explanation: Sublimation involves a solid directly transitioning into a gas without passing through the liquid state, resulting in an increase in volume.

16. Which of the following statements is true about the intermolecular space in solids compared to gases?

A. Solids have more intermolecular space than gases.

B. Gases have more intermolecular space than solids.

C. Intermolecular space is the same in solids and gases.

D. Intermolecular space varies depending on temperature.

Answer: B. Gases have more intermolecular space than solids.

Explanation: Gases have weak intermolecular forces and thus greater intermolecular space compared to solids, where particles are closely packed.

Section B

Short Answer Questions:

Q1. For the following statements, say whether it describes a solid, liquid, or gas.

Answer:

A. Particles move about more quickly. - Liquid

B. Particles are quite close together - Solid

C. Particles are far apart and move in all directions. – Gas

Q2. Define interconversion of states of matter. What are the two factors responsible for the change of states of matter?

Answer: The process by which matter changes from one state to another and back to its original state, without any change in its chemical composition is called the interconversion state of matter. Two factors responsible for the change of state of matter are: change in (i) Temperature and (ii) Pressure

Q3. Give two examples for each of the following:

(a) The substances which sublime.

(b) The substances which do not change their state on heating.

Answer: (a) Camphor, iodine, naphthalene, ammonium chloride, dry ice (solid carbon dioxide), etc. (b) Gases do not change their state on heating. Example: O2 .

Q4. Why do solids, liquids, and gases differ in their physical states?

Answer: Intermolecular force of attraction. Intermolecular spaces are two important properties of matter that account for the different states of matter.

Q5. What is the relation between intermolecular space and intermolecular force?

Answer: The force of attraction between the molecules of a given substance is called intermolecular force and the space between these molecules is called intermolecular space. The basic relation between the two is that they are inversely proportional to each other. More is the intermolecular force lesser is the intermolecular space and vice-versa.

Q6. Why does the temperature of a substance remain constant during its melting or boiling point?

Answer: The temperature of a substance remains constant at its melting and boiling points until all the substance melts or boils because the heat supplied is continuously used up in changing the state of the substance by overcoming the forces of attraction between the particles. This heat energy absorbed without showing any rise in temperature is given the name latent heat of fusion/latent heat of vaporization

Q7. Why are gases compressible but not liquids?

Answer: Gases are compressible because the intermolecular space is very large in gases, whereas liquids are not compressible because in liquids, the intermolecular space is less.

Section C

Long Answer Question:

Q8. About the inter-conversion of matter - based on kinetic theory - explain in brief the conversion of:

(a) A solid into a liquid

(b) A liquid into vapour [or gas]

(c) Vapour [or gas] into a liquid

(d) A liquid into a solid

With special reference to inter-particle space & inter-particle attraction at the different stages of conversion.

Answer:

(a) **A solid into a liquid** — On heating a solid, particles gain energy, and inter-particle space increases as stored potential energy increases the space, as a result, inter-particle attraction decreases and at melting point particles become free. Hence, solids change into liquids.

(b) **A liquid into vapour [or gas]** — On heating liquids, particles gain energy, and inter-particle space increases as stored potential energy increases the space, as a result, inter-particle attraction decreases and at boiling point particles become free. Hence, liquids change into gases.

(c) **Vapour [or gas] into a liquid** — On cooling gases, the temperature falls, and the potential energy in the molecules is released as heat energy. Released potential energy decreases the space and inter-particle attraction increases. As a result at the liquefaction point, particles slow down and gases change to liquids.

(d) **A liquid into a solid** — On cooling liquids, the temperature falls, and the potential energy in the molecules is released as heat energy. Released potential energy decreases the space and inter-particle attraction increases. As a result at the solidification point, particles slow down and liquids change to solids.

Q9. State the 'law of conservation of mass'. State the main points of Landolt's experiment for experimental evidence of the law. State the limitations of the law.

Answer: **Law of conservation of mass**

Law of conservation of mass states that whenever a chemical change takes place, the total mass of the reacting substances is exactly equal to the total mass of the products, [provided masses are measured under similar conditions].

Main points of Landolt's experiment

- In an 'H' shaped tube as shown in the figure, Landolt introduced a solution of sodium chloride [NaCl] and silver nitrate [$AgNO_3$] in the limbs of the tube and sealed it and weighed it.
- The solutions were mixed by shaking to obtain a white precipitate of silver chloride.
- The tube was again weighed after the experiment.

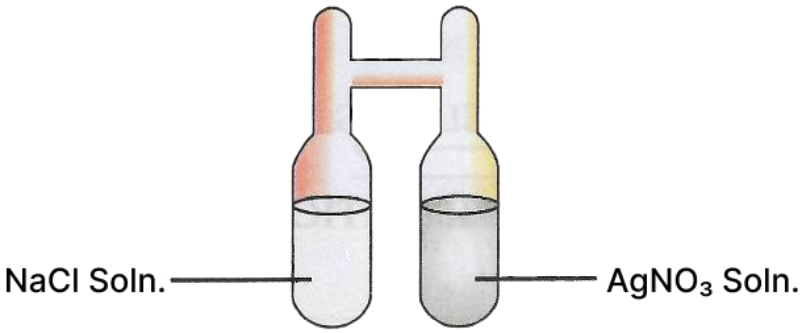
Result: Weight of H tube + reactants = Weight of H tube + products.

Hence, the total mass of reactants = total mass of products

Limitations of the law

- Chemical energy stored up in the reactants is released in the form of heat and light.

- Hence, mass is converted to energy and thus mass and energy are to be considered together.
- Hence, a very slight error in the experiment was observed.



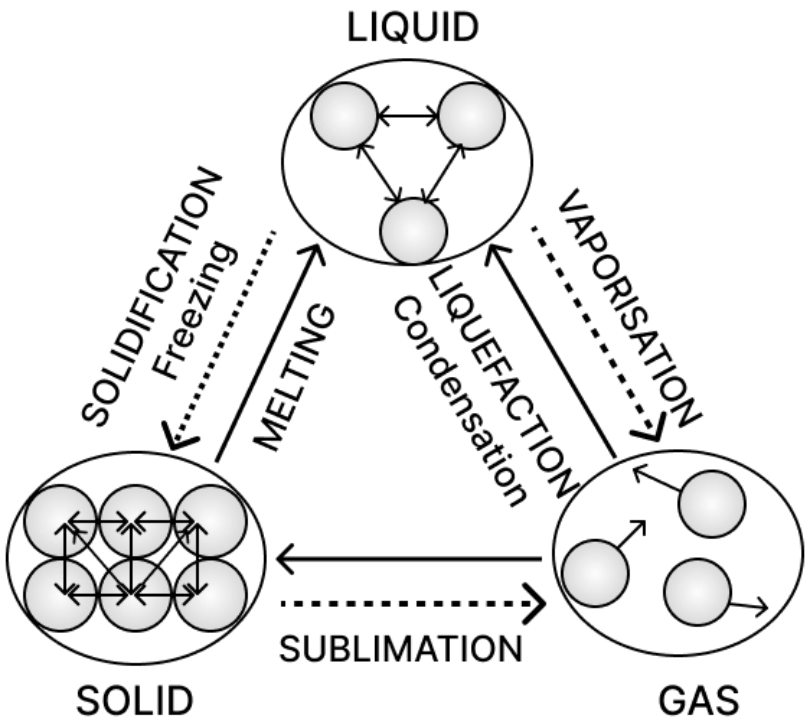
$NaCl + AgNO_3 \longrightarrow AgCl \downarrow + NaNO_3$

Section D

Q10. Draw a labelled schematic diagram representing the terms - (a) to (e) involved in the inter-conversion of matter.

Answer:

Below labelled diagram below represents the different terms involved in the inter-conversion of the matter:



Q11. State the main postulates of the kinetic theory of matter.

Answer: The main postulates of the theory are:

1. Matter is composed of very small particles called atoms and molecules.

2. The constituent particles of a kind of matter are identical in all respects.

3. These particles have space or gaps between them which is known as interparticle or intermolecular space.

4. There exists a force of attraction between the particles of matter which holds them together. This force of attraction is known as interparticle or intermolecular force of attraction.

5. Particles of matter are always in a state of random motion and possess kinetic energy, which increases with increase in temperature and vice-versa.

Section E

Q12.Give reasons:

A. **Why do liquids and gases flow but solids do not?**
B. **A gas fills up the space available to it**
C. **The odor of scent spreads in a room.**
D. **We can walk through the air.**
E. **Liquids have definite volume but no definite shape.**

Answer:

A. The molecules of liquids and gases are far apart i.e. have more gaps, intermolecular attraction force is very less as compared to solids, hence liquids and gases can flow but solids do not as gaps in solid molecules are less, and molecular force of attraction is very strong.

B. Intermolecular force of attraction is least and intermolecular spaces are very large, hence gases can fill up the space available to them.

C. Scent fumes (molecules) being gases fill the spaces between air molecules and the molecules of air fill the spaces between scent molecules due to diffusion, fumes spread into a room. OR Due to the inter-mixing of scent molecules and air molecules, scent fumes spread into the room.

D. The molecules of air are far. Apart i.e. large gaps and we can walk through the air easily.

E. The molecules of a liquid are loosely packed and the intermolecular force of attraction is small but a number of molecules in it remains the same. Hence liquids have definite volume but no definite shape.

Q13. Give reasons:

(a) When a teaspoon of sugar is added to half a glass of water and stirred, the water level in the glass does not rise.

(b) When an empty gas jar is inverted over a gas jar containing a coloured gas, the gas also spreads into the empty jar.

(c) A red ink drop added to a small amount of water in a glass turns the water red for some time.

Answer:

(a) Add one teaspoon of sugar to it and stir. The sugar disappears but the level of water in the glass does not rise that means the volume of water has not increased. Because the sugar particles are adjusted between the water molecules. This shows that there are intermolecular gaps in water.

(b) This shows that gases can fill up all the space that they get, and they have neither a fixed shape nor a fixed volume. They have no free surfaces, either.

(c) If we put a drop of red ink in a glass of water, its particles diffuse with particles of water slowly but continuously and the water turns red.