

I. Objective Questions:

A. Multiple Choice Questions

1. What is the process called when a solid changes directly into a gas?

- a) Evaporation
- b) Condensation
- c) Sublimation
- d) Deposition

Solution: Correct answer is c) Sublimation. Explanation: Sublimation is the transition of a substance directly from the solid phase to the gas phase without passing through the intermediate liquid phase.

2. During a physical change, what happens to the mass of the substance?

- a) It increases
- b) It decreases
- c) It remains the same
- d) It becomes zero

Solution: Correct answer is c) It remains the same. Explanation: Mass is a conserved quantity, which means it remains constant during physical changes.

3. Which of the following is a characteristic of a solid?

- a) It takes the shape of its container
- b) It has a fixed volume
- c) It has indefinite shape and volume
- d) Its particles are highly separated

Solution: Correct answer is b) It has a fixed volume. Explanation: Solids have a definite shape and volume because their particles are closely packed and have strong intermolecular forces.



4. What is the state of matter of a substance that has neither a fixed shape nor a fixed volume?

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

Solution: Correct answer is c) Gas. Explanation: Gases do not have a fixed shape or volume and expand to fill the container they are in.

4. Which of the following is a physical property of matter?

- a) Ability to react with acids
- b) Ability to decompose
- c) Ability to conduct electricity
- d) Ability to tarnish

Solution: Correct answer is c) Ability to conduct electricity. Explanation: Conductivity is a physical property because it can be observed without changing the substance into a new one.

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

- a) Boiling point
- b) Solubility
- c) Reactivity with water
- d) Color

Solution: Correct answer is c) Reactivity with water. Explanation: Reactivity with water is a chemical property that describes the ability of a substance to undergo chemical reactions with water.

6. What happens to the density of a substance as it changes from a liquid to a gas?

- a) It increases
- b) It decreases
- c) It remains the same
- d) It becomes zero



Answer: b) It decreases

7. What is the measure of how much space an object occupies?

- a) Mass b) Density c) Volume d) Weight

Answer: c) Volume

8. What happens to the volume of a substance during a physical change?

- a) It decreases b) It remains the same c) It increases d) It becomes zero

Answer: b) It remains the same

9. Which of the following is a physical change?

- a) Burning paper b) Rusting of iron c) Dissolving sugar in water d) Freezing water

Answer: d) Freezing water

10. What is the measure of how much space an object occupies?

- a) Mass b) Density c) Volume d) Weight

Answer: c) Volume

B. Fill in the blanks:

Any matter which has a definite volume but no definite shape is called a **liquid**.

The molecules are at a greater distance in **gases** compared to liquids.

The physical state of a substance, which has a fixed volume but no fixed shape is **liquid**.

Molecules in a **solid** are packed very closely.

Liquids have no definite **shape**.

Matter is anything that has **mass** and occupies **space**.

II. Short Answer Questions:

Q1. Explain interconversion of states of matter. What are the two factors responsible for the change of state of matter?



Answer: The phenomenon of change of one state of matter into another and then back to the original state without any change in its chemical composition is called interconversion of the states of matter.

The two factors responsible for the change of state of matter are:

1. change in temperature
2. change in pressure.

Q2. When sodium chloride is added to a definite volume of water and stirred well, a solution is formed, but there is no increase in the level of water. Why?

Answer: There are some intermolecular spaces between the particles of water. When sodium chloride is added into water and stirred, the particles of sodium chloride occupy the intermolecular spaces present in water particles and gets accommodated so there is no increase in the level of water.

Q3. Why can a piece of chalk be broken easily into smaller pieces while a coal piece cannot be broken easily?

Answer: The magnitude of intermolecular force of attraction between the molecules of coal is much higher than that between the molecules of chalk. Hence, a piece of chalk can be broken easily into smaller pieces while a coal piece cannot be broken easily.

Q4. In which of the three states of matter - solids, liquids or gases is the movement of atoms about their own position. Give a reason for the same.

Answer: Movement in **solids** is about their own position. The reason for this is that inter-particle space is minimum in solids, as a result particles are closely packed and hence movement of atoms or molecules is about their own position.

Q5. 'Inter-particle attraction between atoms of gases is very weak'. State five properties of gases which correlate as a consequence of the weak inter-particle attraction between particles of gases.

Answer: Gases have weak inter-particle attraction. They are therefore,

- least - rigid & have
- no definite - volume
- no definite - shape
- no - free surface
- rapidly - diffuse with other gas particles



Q6. On the basis of kinetic theory explain why, ammonium chloride sublimes and goes from solid state directly into vapour state.

Answer: Ammonium chloride being a sublimable solid, has very low force of attraction between its particles. On heating, the particles overcome the inter-particle attraction. The molecules break free and escape from the surface of the solid directly into the vapour.

Q7. With reference to the liquid state of matter — answer the following:

1. On heating the liquid, do the particles gain or lose energy.
2. The heat energy supplied to the liquid is absorbed by its molecule & stored as which form of energy.
3. How does the stored energy, have effect on inter-particle space.
4. State why the inter-particle attraction decreases to negligible.
5. At what point will the particles become free and escape as gas.

Answer:

1. Gain energy
2. Potential energy
3. Stored potential energy increases the inter-particle space.
4. As the inter-particle space increases, the force of attraction (or inter-particle attraction) decreases to negligible.
5. At boiling point the particles become free and escape as gas.

Q8. Imagine you have a glass of ice water. Describe what happens to the ice cubes over time as they sit in the water at room temperature. Explain the changes in terms of states of matter.

Answer: Over time, the ice cubes will melt and the solid ice will turn into liquid water. This occurs because the room temperature is higher than the freezing point of water. The heat from the surroundings transfers to the ice cubes, causing the particles to gain energy and break free from their fixed positions, transitioning from a solid state to a liquid state.

Q9. 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.



III. Long Answer Questions:

Q1. Give reasons for the following:

1. Particles of matter possess energy called kinetic energy.
2. Solids cannot be compressed, but gases are highly compressible.
3. Kinetic energy of molecules of gases is very large & of solids, the least.
4. On heating a sublimable solid, the molecules break free & escape from surface of the solid directly into vapour.
5. Particles of matter move more rapidly on application of heat.

Answer:

1. Particles of matter are in continuous motion and hence possess energy called kinetic energy.
2. As inter-particle space in solids is minimum, hence, they cannot be compressed. Gases on the other hand, have very large inter-particle space, hence are highly compressible.
3. As inter-particle space in gases is very large and inter-particle attraction is negligible, hence they are in random motion all the time and possess high kinetic energy whereas solids have minimum inter-particle space, maximum inter-particle attraction and they can move only about their own position. Hence they have least kinetic energy.
4. Sublimable solid have very low force of attraction between their particles. On heating, these solids overcome the inter-particle attraction and the molecules break free & escape from surface of the solid directly into vapour.
5. Application of heat increases the kinetic energy of the particles which then move more randomly.

Q2. With reference to inter-conversion of matter - on the basis of 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, 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.

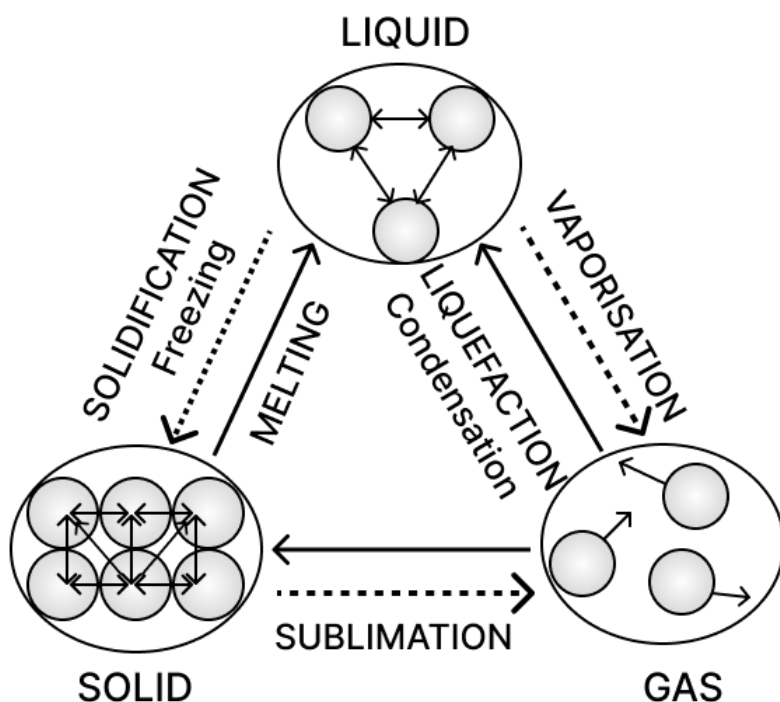
(b) **A liquid into vapour [or gas]** — On heating liquids, particles gain energy, inter-particle space increases as stored potential energy increases the space, as a result inter-particle attraction decreases and at boiling point particles become free. Hence, liquids change into gases.

(c) **Vapour [or gas] into a liquid** — On cooling gases, temperature falls, 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 liquefaction point, particles slow down and gases change to liquids.

(d) **A liquid into a solid** — On cooling liquids, temperature falls, 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 solidification point, particles slow down and liquids change to solids.

Q3. Draw a labelled schematic diagram representing the terms - (a) to (e) involved in the inter-conversion of matter.

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





Q4. Give reasons:

- (a) A gas can fill the whole vessel in which it is enclosed.
- (b) Solids cannot be compressed.
- (c) Liquids can flow.
- (d) When magnesium is burnt in air, there is an increase in mass after the reaction.

Answer:

(a) The particles of gases lie far apart from each other and the intermolecular spaces are therefore very large. The intermolecular forces of attraction are so weak that the particles are free to move and they have high kinetic energy, so they fill the whole vessel in which it is enclosed.

(b) In solids, the particles are closely packed. There is a strong force of attraction between the particles and the intermolecular space is almost negligible. The molecules are therefore not free to move. They only vibrate about their mean positions. This makes solids difficult to compress.

(c) In liquids the molecules are loosely packed and the intermolecular forces of attraction is not so strong as solids. The intermolecular space is larger and kinetic energy is more as compared to solids. The particles can move freely and randomly which makes the liquids to flow.

(d) When magnesium is burnt in air, it forms magnesium oxide. The mass of magnesium oxide is found to be more than the mass of magnesium because the mass of oxygen used is not taken into consideration. If that is considered the total mass of the reactants and the products are found to be almost equal.