Question Bank
Matter and Its Composition

1. Fill in the blank spaces with the appropriate words given within the brackets.
   
   (a) The state of matter, which has definite shape and definite ______
       (volume/area) is called solid.
   
   (b) The change a of solid into liquid state at a fixed temperature is called
       ________ (fusion/condensation).
   
   (c) The process by which a liquid rapidly changes into gaseous state is called
       ________ (boiling/evaporation).
   
   (d) The gaseous state directly formed from a solid on heating is called ________
       (sublimate/sublime).
   
   (e) The boiling point of a liquid ________ (increases/decreases) with the decrease
       in pressure.

   Ans. (a) volume (b) fusion (c) boiling
   
   (d) sublime (e) decreases

2. Statements given below are incorrect. Write the correct statements.
   
   (a) The process of rapid conversion of a liquid into its vapours, with or
       without the absorption of heat energy is called evaporation.
   
   (b) The particles of matter are in continuous motion and as such have
       potential energy.
   
   (c) Force of attraction between the molecules of a gas is far more than
       the liquids.
**Column A**

(a) The temperature at which a liquid rapidly changes into gaseous state.
(b) The phenomenon due to which a solid directly changes into gaseous state on heating
(c) The gaseous state of matter, below the boiling point of a liquid.
(d) The energy of motion of the molecules of matter.
(e) A state of matter which has neither definite shape nor definite volume.

**Column B**

Vapour  
Gas  
Boiling point  
Sublimation  
Kinetic energy

**Ans.** (a) Boiling point  (b) Sublimation  (c) Vapour  (d) Kinetic energy  (e) Gas

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(d) Vapour is a gaseous state of matter, which exists above the boiling point of a liquid.

(e) The solid state directly formed from a liquid is called sublimate.

**Ans. (a)** The process of **slow** conversion of a liquid into its vapours, with or without the absorption of heat energy is called evaporation.

(b) The particles of matter are in continuous motion and as such have **kinetic energy**.

(c) Force of attraction between the molecules of a gas is far **less** than the liquids.

(d) Vapour is a gaseous state of matter, which exists **below** the boiling point of a liquid.

(e) The solid state directly formed from a gas is called sublimate.

3. **Match the statements in Column A, with the statements in Column B.**

<table>
<thead>
<tr>
<th>Column A</th>
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<tbody>
<tr>
<td>(a)</td>
<td>Vapour</td>
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<td>(b)</td>
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| Ans.    | Boiling point | Sublimation | Vapour | Kinetic energy | Gas |
4. (a) What do you understand by the term matter?

(b) Name three states of matter.

(c) State three characteristics of matter.

Ans.(a) Matter: Anything which occupies space, has mass and can be perceived by our physical senses is called matter.

(b) (i) Solid (ii) Liquid (iii) Gas.

(c) (i) It occupies space. (ii) It has mass. (iii) It can be perceived by our physical senses.

5. By giving at least one example, differentiate between:

(a) Material and substance.

(b) Homogeneous material and heterogeneous material.

Ans.(a) The term used to describe a particular kind of matter is called material. However, a homogeneous material which has only one kind of atoms or molecules, such that its composition remains the same throughout is called a substance.

For example, common salt solution is a material, but it cannot be called a substance because it is made of sodium chloride and water molecules.

(b) The material which has the same composition and same properties throughout is called a homogeneous material, whereas the material which has different composition and different properties in its different parts is called a heterogeneous material.
For example, solution of common salt in water is a homogeneous material, whereas naturally occurring marble is a heterogeneous material because it contains grey and red grains of other materials.


Ans. Kinetic theory of matter:

(a) All matter is composed of small particles called molecules (atoms or ions as the situation demands).

(b) The particles (molecules) are in continuous motion and as such have kinetic energy.

(c) With the supply of heat energy, the kinetic energy of molecules increases and vice-versa.

(d) The molecules of same kind attract each other with force, commonly called cohesive force. If the particles are of different kinds, the force of attraction between them is called adhesive force.

(e) The force of attraction between the molecules decreases, if distance between them increases and vice-versa.

7. (a) What do you understand by the term solid?

(b) State four characteristics of solids.

(c) Why do solids have a definite shape and definite volume? Explain on the basis of kinetic theory of matter.

(d) Solids do not diffuse into one another. Explain on the basis of kinetic theory of matter.
Ans. (a) Solid: The state of matter, which has a definite shape and a definite volume is called a solid.

(b) Characteristics of Solids:

(i) They have a definite shape and a definite volume.
(ii) They are generally rigid.
(iii) They can have any number of free surfaces.
(iv) They have very small intermolecular space and very large intermolecular force of attraction.

(c) The intermolecular space between the molecules of a solid is very small and hence the intermolecular forces are very large. The intermolecular forces hold the molecules so tightly that they cannot change their positions. Hence, solids have a definite shape and a definite volume.

(d) The molecules of the solids are held firmly in their place due to strong intermolecular forces. Since these molecules cannot leave their place, therefore, the molecules of two solids cannot migrate into one another. Hence, no diffusion takes place in solids.

8. (a) What do you understand by the term liquid?

(b) State four characteristics of liquids.

(c) Why do liquids flow? Explain on the basis of kinetic theory of matter.

(d) What happens to a liquid, if the intermolecular spaces in it decrease? How can you decrease intermolecular spaces?
Ans. (a) **Liquid** : The state of matter, which has a definite volume, but no definite shape is called a liquid.

(b) **Characteristics of Liquids** :

(i) They have a definite mass and a definite volume.

(ii) They do not have a definite shape, but take the shape of the containing vessel.

(iii) They can flow.

(iv) Force of attraction between the molecules of a liquid is far less than that in solids.

(c) The intermolecular spaces in case of liquids is far larger than solids. Thus, molecules of liquids are not firmly held by the intermolecular forces but are free to move about in any direction within the liquid. It is on account of the freedom of movement of molecules that the liquids flow.

(d) The liquid will change to solid state, because with the decrease in the intermolecular spaces, the intermolecular forces increase, till a stage comes, when the molecules cannot interchange their position. By cooling a liquid, the intermolecular spaces between its molecules decrease.
9. (a) What do you understand by the term gas?

(b) State four characteristics of a gas.

(c) Why are gases highly compressible? Explain on the basis of kinetic model.

(d) Why do the gases easily diffuse in one another? Explain on the basis of the kinetic model.

Ans. (a) Gas: That state of matter, which has a definite mass, but no definite shape or volume is called a gas.

(b) Characteristics of a Gas:

(i) A gas contained in a vessel has a definite mass.

(ii) The gas always occupies the entire space of the vessel in which it is contained.

(iii) The intermolecular spaces are very large and hence gases are highly compressible.

(iv) The intermolecular forces are almost negligible.

(c) The intermolecular spaces between the molecules of a gas are very large and the intermolecular forces are almost negligible. Thus, when pressure is applied the molecules come closer to each other. This reduces the volume, and hence gases are highly compressible.
(d) The molecules of a gas have very large intermolecular spaces and very large kinetic energy. It is on account of this large kinetic energy that molecules of one gas stray into the intermolecular spaces of the other. Thus, diffusion easily takes place in gases.

10. Define the following terms:

(i) Fusion

(ii) Solidification

(iii) Melting point

(iv) Freezing point

(v) Vaporisation

(vi) Liquefaction

(vii) Boiling point

(viii) Condensation point

(ix) Evaporation

Ans. (i) Fusion: The process by which a solid changes to a liquid state on the absorption of heat energy is called melting or fusion.

(ii) Solidification: The process by which a liquid changes to a solid state by the liberation of heat energy is called freezing or solidification.

(iii) Melting point: The constant temperature at which a solid changes into a liquid state, by absorbing heat energy is called melting point.

(iv) Freezing point: The temperature at which a liquid changes into a solid, by giving out heat energy is called freezing point.

(v) Vaporisation: The process by which a liquid rapidly changes into a gaseous state, by absorbing heat energy is called boiling.

(vi) Liquefaction: The process by which a gas changes into a liquid state, by giving out heat energy is called condensation or liquefaction.
(vii) **Boiling point** : The constant temperature at which a liquid rapidly changes into its gaseous state by the absorption of heat energy is called boiling point.

(viii) **Condensation point** : The constant temperature at which a gas changes into its liquid state, by giving out heat energy is called condensation point.

(ix) **Evaporation** : The process of slow conversion of a liquid state into its vapours, without the absorption of heat energy is called evaporation.

11. **(a)** Melting point of ice is 0 °C. What is the freezing point of water?

   **(b)** Steam at 100 °C liquefies to water at the same temperature. What is the boiling point of water?

**Ans.** (a) Freezing point of water is 0 °C. It is because melting point and freezing point have the same numerical value.

(b) Boiling point of water is 100 °C. It is because boiling point and liquification point have the same numerical value.

12. **(a)** Define the following terms :

   (i) Sublimation    (ii) Sublime    (iii) Sublimate

   **(b)** Which of the following substances sublime :

   (i) Ice    (ii) Dry ice    (iii) Iodine

   (iv) Mercury    (v) Ammonium chloride    (vi) Camphor
Ans.(a)(i) **Sublimation** : The process by which a solid directly changes to its gaseous state on heating and the gaseous state on cooling, directly changes to the solid state, is called sublimation.

(ii) **Sublime** : The gaseous state formed directly from the solid state is called sublime.

(iii) **Sublimate** : The solid state formed directly from the gaseous state is called sublimate.

(b) (i) Dry ice (ii) Iodine (iii) Ammonium chloride (iv) Camphor.

13. **State your observations in the following cases** :

(i) Ammonium chloride (solid) is heated in a dry hard glass test tube.

(ii) Carbon dioxide gas is compressed to 70 atmospheric pressure.

(iii) Iodine crystals are heated in a dry hard glass test tube.

Ans.(i) (a) White ammonium chloride directly changes into dense white fumes without melting.

(b) Dense white fumes condense on the cooler parts of the test tube to form a white powdery solid mass of ammonium chloride.

(ii) Carbon dioxide gas changes to solid state, without changing to liquid state.

(iii) (a) The brownish black crystals of iodine directly change into beautiful violet vapours, without changing to the liquid state.
(b) The violet vapours condense on the upper cooler parts of the test tube to form brownish black tiny shining crystals of iodine.

14.  
(a) Distinguish between a gas and a vapour.

(b) (i) Name a gas used at low pressure in an electric filament lamp.

   (ii) Name a vapour used at low pressure in fluorescent tube light.

Ans. (a)(i) A gas is a state of matter, which exists in the gaseous state, such that its temperature is equal to or more than the boiling point of the liquid from which it is formed.

   A vapour is a state of matter, which exists in the gaseous state, such that its temperature is less than the boiling point of the liquid from which it is formed.

   (ii) A gas obeys Boyle’s law and Charles’ law, but not a vapour.

(b) (i) Argon is used in electric filament lamp.

   (ii) Mercury vapour is used in fluorescent tube light.

15. By taking one common example distinguish between boiling and evaporation.

Ans. (1) Boiling takes place at a fixed temperature by the absorption of heat, whereas evaporation takes place at all temperatures, with or without the absorption of heat.

Example: Water boils at 100 °C only, whereas water evaporates at all temperatures between zero to hundred degree celsius.
(2) Boiling is a rapid process, such that the whole liquid gets agitated, whereas evaporation is a slow process, where the liquid does not visibly agitate.

**Example**: When water boils, it rapidly changes to steam and the whole mass of water gets agitated. However, when water evaporates from a dish, which is a slow process, it takes place without any agitation.

16. **Name the phenomenon which causes the following changes**:

(i) Formation of clouds.

(ii) Drying of wet clothes.

(iii) Naphthalene balls become smaller when kept in air.

(iv) Formation of snow.

(v) Wax changes into liquid state in the hot sun.

(vi) Formation of dew.

**Ans.**

(i) Condensation of water vapour.

(ii) Evaporation of water.

(iii) Sublimation of naphthalene.

(iv) Solidification of water vapour in air.

(v) Fusion of wax.

(vi) Liquefaction of water vapour.
17. Liquids as well as gases are called fluids. State two ways how they differ from each other?

Ans.(i) The intermolecular spaces in case of gases are very large as compared to liquids.

(ii) Liquids have one free surface, but gases have no free surface.

18. How is the boiling point of water affected in the following cases:

(i) Increase in atmospheric pressure?

(ii) Decrease in atmospheric pressure?

(iii) Addition of common salt in it?

Ans.(i) Boiling point increases with the increase in atmospheric pressure.

(ii) Boiling point decreases with the decrease in atmospheric pressure.

(iii) Boiling point increases with the addition of common salt.

19. State three uses of the change of state of matter.

Ans.(i) Water is changed into steam by heat energy. The heat energy in the steam is then used to drive turbines in thermoelectric stations.

(ii) By heating we can melt metals. The molten metals are poured into moulds, where they solidify to some predetermined design. All the immovable parts of machinery are cast from molten metals.

(iii) By liquefying air, we can separate from it oxygen and nitrogen gases. Oxygen is used for artificial respiration and in the steel industry. Nitrogen gas is used for making fertilisers.
20. State the law of conservation of mass.

**Ans.** Mass is neither created nor is it destroyed by any chemical means.

21. How will you verify the law of conservation of mass, using barium chloride and sodium sulphate solutions?

**Ans.**

(i) Pour about 10 ml of a solution of barium chloride in a conical flask.

(ii) Take an ignition tube and tie to its neck a thin and long cotton thread. Half fill this tube with sodium sulphate solution. Carefully lower the ignition tube in the conical flask, taking care that its contents do not spill in the barium chloride solution. Fix a rubber cork at the mouth of the conical flask, so that the ignition tube remains suspended above the barium chloride solution.

(iii) Find the mass of the conical flask with the help of a physical balance. This is the mass of reactants and the flask taken together.

(iv) Now, tilt the conical flask so that the contents of the ignition tube mix with barium chloride. You will notice that a white precipitate is formed.

\[
\text{Sodium sulphate} + \text{Barium chloride} \rightarrow \text{Sodium chloride} + \text{Barium sulphate} \quad \text{(Sol)} + \quad \text{(Sol)} \quad \text{(Sol)} \quad \text{(White ppt.)}
\]
(v) Again find the mass of the conical flask. You will notice that there is no change in mass. Form this observation, it implies that mass of reactants is equal to the mass of products during a chemical change. Thus, the experiment clearly proves that mass can neither be created nor destroyed during a chemical change.

22. When wood is burnt, the mass of ash formed is far smaller than the mass of wood. Does it mean that law of conservation of mass is not obeyed. Explain your answer.

Ans. Apparently, it appears that the law of conservation of mass is not obeyed. However, if we could calculate the mass of wood and the mass of oxygen, which burns it and also the mass of ash, the mass of carbon dioxide and the mass of water formed, it will be seen that mass of reactants is equal to the mass of products. Thus, the law of conservation of mass is obeyed.

23. A solution of silver nitrate containing 1.70 g is mixed with sodium chloride solution, containing 0.585 g, when a white ppt. of silver chloride is formed along with sodium nitrate. If the mass of sodium nitrate formed is 0.85 g, what is the mass of silver chloride formed.
Ans. By the law of conservation of mass

$$\text{Mass of silver nitrate} + \text{Mass of sodium chloride}$$

$$= \text{Mass of silver chloride} + \text{Mass of sodium nitrate}$$

$$1.70 \text{ g} + 0.585 \text{ g} = \text{Mass of silver chloride} + 0.85 \text{ g}.$$ 

$$\text{Mass of silver chloride} = (1.70 + 0.585 – 0.85) \text{ g} = 1.435 \text{ g}.$$ 

24. *In which of the following cases law of mass conservation is not obeyed and why?*

(i) Physical changes  (ii) Chemical changes  (iii) Nuclear changes

Ans. In case of nuclear changes the law of conservation of mass is not obeyed.

It is because a very small amount of mass changes into energy.