

CBSE – Class – IX. Sc. Q.A.

CH. 1. MATTER IN OUR SURROUNDINGS

SYLLABUS:-

Physical nature of matter; Characteristics of particles of matter; States of matter; Effect of temperature and pressure on matter; Evaporation; Plasma.

Q. 1. What is a matter?

Ans:- Anything that occupies space and has mass is called a matter. For example:- Chalk, Milk, Sugar etc.

Q. 2. Sodium chloride and sugar have same appearance. Are they same or different?

Ans:- They have different physical and chemical properties. So, they are different.

Q. 3. All substances around us are alike. How?

Ans:- All substances can occupy space and have weight.

Q. 4. How can we say that air is a matter?

Ans:- Air occupies space and have weight. Hence air is a matter.

Q. 5. State the characteristics of matter?

Ans:- Matter has mass, weight and occupies space.

Q. 6. What are the intensive properties of matter?

Ans:- Density, colour, melting point, boiling point, refractive index etc. are the intensive properties of matter as it does not depend upon the amount of matter contained in it.

Q. 7. What are the extensive properties of matter?

Ans:- The properties which depends upon the amount of matter contained in a substance is called extensive properties of matter. For example mass, weight, volume, energy etc.

Q. 8. State the characteristics of particles of matter.

Ans:- (i) There is enough space between the particles of matter.

(ii) The particles of matter are continuously moving about their mean position.

(iii) The particles of matter attract each other.

Q. 9. What is the effect of temperature on a matter?

Ans:- Particles of matter posses kinetic energy. As the temperature rises, kinetic energy increases.

Q. 10. The smell of hot sizzling food reaches us several metres away. Why?

Ans:- As the rate of diffusion increases with the increase in temperature.

Q. 11. What is diffusion?

Ans:- When two gases are mixed, their molecules mix with each other due to their speed and random motion. This phenomenon is known as diffusion.

Q. 12. If a bottle of perfume is opened in one corner of a room, it immediately spreads throughout the room. Why?

Ans:- The molecules of a gas are free to move in a chaotic motion at a greater speed throughout the vessel in which it is contained. When the bottle of perfume is opened in

one corner of the room, the molecules of perfume move at random motion in all direction and mix with the molecules of air and reaches us.

Q. 13. Name the three states of matter with examples.

Ans:- The three states of matter are:

- (i) Solid :- A solid has definite shape and volume. Example – wood, metal, rubber.
- (ii) Liquid :- A liquid has definite volume and its shape is the shape of the container. Example – water, oil, petrol.
- (iii) Gas :- A gas has neither a definite volume nor a definite shape. Example – air, hydrogen, oxygen.

Q. 14. State the characteristics of solids.

Ans:- Solids are rigid. The molecules of solids are packed closely and remain fixed at their position. The force of attraction between the molecules are very strong and hence they resist any change in their shape or volume.

Q. 15. What are the characteristics of liquids?

Ans :- Liquids have definite volume but not a definite shape. They take the shape of a container in which they are stored. The molecules have weaker force of attraction than solids, and hence can flow easily.

Q. 16. What are the characteristics of gases?

Ans :- Gases have neither definite volume nor definite shape. The molecules have very weak force of attraction and low density. They can be compressed to liquid state and flow in any direction.

Q. 17. What are fluids?

Ans :- Substances having tendency to flow are called fluids. Liquids and gases are fluids.

Q. 18. Give one similarity between a liquid and a gas and one dissimilarity.

Ans :- Similarity :- Both liquids and gases are fluids and they take the shape of the container.

Dissimilarity :- A gas can be compressed easily to a desired volume. A liquid can not be compressed easily. A small volume of gas occupies the whole space of the container. But the volume of liquid is fixed. A large volume of gas can be stored in a container of very small volume.

Q. 19. Differentiate between solid, liquid and gas.

Ans :-

Solid	Liquid	Gas
<ol style="list-style-type: none"> 1. They are rigid and can not be compressed. 2. Have definite volume and definite shape. 3. Can not flow. 4. They can be stored in open or without vessel. 5. Intermolecular force is maximum. 6. Intermolecular space is the least. 7. High density. 8. On heating expansion is the least. 	<ol style="list-style-type: none"> 1. They are less rigid and can be compressed to a little extent. 2. Have definite volume but take the shape of the container. 3. Can flow from higher level to lower level. 4. Can be stored in open vessel. 5. Intermolecular force is lesser than solid but greater than liquid. 6. Intermolecular space is more than solid and less than liquid. 7. Low density excepting mercury. 8. On heating expansion is more. 	<ol style="list-style-type: none"> 1. they are not rigid and can be compressedeasily. 2. Have neither definite volume nor definite shape. 3. Can flow in all direction. 4. can be stored in a closed vessel only. 5. Intermolecular force of attraction is the least. 6. Intermolecular space is the greatest. 7. Least density. 8. On heating expansion is the maximum.

Q. 20. What property of gas is utilized when natural gas is supplied for vehicles.

Ans :- High compressibility of gas is utilized and compressed it for supply for the vehicles in the name of CNG.

Q. 21. What are 'intermolecular forces'? How are these related to the three states of matter ?

Ans :- The force operating between the atoms or molecules of a matter is called intermolecular force. The intermolecular force in solid are strong. This keeps the constituent particles very close to each other. Due to this solids are rigid and incompressible. This also give ordered arrangement of the particles giving regular geometrical shape to the solid.

In liquid, intermolecular force is weak to give definite shape.

In gas, intermolecular force is negligible and so its constituents particles are free to move and occupy the available space.

Q. 22. Separate the following substances in groups of high and low intermolecular force: Ice, sulphur vapour, nitrogen, sugar, copper, air, salt, plastic.

Ans:- High intermolecular forces :-

Ice, sugar, copper, salt, plastic

Low intermolecular forces :-

Sulphur vapour, nitrogen, air

Q. 23. Which of the following substances you expect strongest and in which weakest intermolecular force:

Water, alcohol, sugar, sodium chloride, carbon dioxide.

Ans :- Sodium chloride – Strongest

Carbon dioxide – Weakest

Q. 24. Why are gases compressible but liquids not ?

Ans :- The molecules of a gas are separated very far and there is a lot of empty space between them. Hence gases can be compressed easily. In liquids molecules are closer to each other and can be brought further closer only under very high pressure.

Q. 25. How does the state of matter changes from solid to liquid and then to gas on heating ?

Ans :- In solids particles are very close. When heat is given to solid, the distance between particles increases and it takes the shape of the container. On further heating the distance between the particles increases in such an extent that the molecules are free to move. This is a gaseous state.

Q. 26. How is pressure developed in a container full of a gas ?

Ans :- Gaseous molecules are free to move in the container. The molecules collide with each other and with the wall of the container. On the wall the molecules exert force. The force per unit area is called the pressure of the gas.

Q. 27. What are the applications of interconversion of states of matter ?

Ans :- The interconversion of states of matter is used to :

- (i) generate electricity in thermal power plant.
- (ii) separate nitrogen and oxygen from air by liquefaction.
- (iii) prepare machine parts.
- (iv) prepare room fresheners.
- (v) prepare ice-creams.

Q.28. What happens to a gas if its intermolecular space is reduced ?

Ans :- If the intermolecular distance between molecules of a gas is reduced, it changes to liquid. Further reduction it is changed to solid.

Q. 29. Which of the following substances is most compressible ?

CO₂, H₂O, NaCl.

Ans :- CO₂

Q. 30. Which property of a gas results in steady pressure of the gas ?

Ans:- The constant bombardment of the gas molecules with the walls of the container.

Q. 31. In which of the following substances, weakest intermolecular force is expected :

H₂O, CH₃OH, Al, He.

Ans :- He

Q. 32. One gas mixes with another gas easily. What is this property called ?

Ans :- Diffusion.

Q. 33. Describe briefly (i) Melting point and (ii) Boiling point.

Ans :- (i) Melting point :- The melting point of a solid is that temperature at which it changes into the liquid. From the beginning to the end of melting, the temperature does not change.

(ii) Boiling point :- The boiling point of a liquid is that temperature at which a liquid starts boiling at the atmospheric pressure.

Q. 34. How would you find out whether a sample of sodium chloride is pure or impure ?

Ans :- Pure substance melts at its melting point. If sodium chloride melts at 97°C , then the sample is pure otherwise impure.

Q. 35. How will you find out whether a sample of water is pure or impure ?

Ans :- The boiling point of water at one atmospheric pressure is 100°C . If the given sample of water boils at 100°C then it is pure otherwise impure.

Q. 36. Why do solids have a fixed shape and gases have neither a fixed shape nor a fixed volume ?

Ans :- In solids the molecules are close due to intermolecular force. The molecules are arranged in a fixed pattern. The movement of molecules are not possible. Hence its shape are fixed . In gases the intermolecular force are negligible. Molecules are free to move in any direction. The distance between the molecules is very large. Hence gases do not have fixed shape and fixed volume.

Q. 37. What is Vaporization ?

Ans :- The change of liquid into its gaseous form (vapour) when temperature of liquid is increased is called vaporization.

Q. 38. What is Sublimation ?

Ans :- A change of state directly from solid to gas without changing into liquid state or vice-versa is called sublimation.

Q. 39. What is Condensation ?

Ans :- A change of gaseous state to liquid state or solid state is called condensation.

Q. 40. What is Deposition ?

Ans :- A change of vapour to solid is called deposition. It is the reverse process of sublimation.

Q. 41. What is Liquefaction ?

Ans :- A substance which is gas in normal condition, when changed to liquid by cooling it under pressure is called liquefaction.

Q. 42. What is Solidification ?

Ans :- A substance which is a liquid in normal condition, when changed to solid by cooling it under pressure is called solidification.

Q. 43. What is difference between vapour and gas.

Ans :- Vapour is used to denote the gaseous state of fluids which exists as liquids under normal conditions, while gas is used to denote the gaseous state at normal temperature. We always speak water vapour and carbon dioxide gas.

Q. 44. Why do the three states of matter differ ?

Ans :- The three states of matter differ due to :

- (i) Difference in packing and arrangement of molecules in the three states.
- (ii) Intermolecular force of attraction are different in the three states.

Q. 45. Why does the temperature remain constant until whole of the solid changes into liquid, though the heat energy is constantly supplied ?

Ans :- During melting, temperature of the liquid phase remains the same as that of the solid phase. The heat energy supplied is utilized to destroy the crystal pattern and is stored in the liquid phase as potential energy.

Q. 46. Why does the temperature remain constant during boiling though heat is constantly supplied ?

Ans :- The heat energy supplied is utilized to destroy the intermolecular force amongst the molecules of the liquid and is stored as potential energy.

Q. 47. Why does a gas fill a vessel completely ?

Ans :- The molecules of a gas are moving continuously with a high speed in all direction and intermolecular force amongst the molecules are negligible. Hence it fills the vessel completely.

Q. 48. Compare the process of boiling and vaporization.

Ans :-

Boiling	Vapourisation
(i) It is a process of changing liquids into vapour.	(i) It is a process of changing liquids into vapour.
(ii) Molecules of liquids escape from all parts of the liquids into atmosphere.	(ii) Molecules of liquids escape from upper surface of the liquid into atmosphere.
(iii) It is a fast process.	(iii) It is a slow process.
(iv) It takes place only at a fixed temperature called boiling point.	(iv) It takes place at all temperature, even at melting point.
(v) In boiling, the vapour pressure of liquids is equal to the atmospheric pressure.	(v) In evaporation the vapour pressure of liquid is less than the atmospheric pressure.

Q. 49. Explain the term boiling on the basis of kinetic theory of gases.

Ans :- When a liquid is heated up to its boiling point, the heat is absorbed by the molecules and stored in the form of potential energy . When potential energy of the molecule is increased, the intermolecular distance is increased. It means intermolecular

force of attraction reduces to zero. The molecules start escaping in air causing the liquid to boil.

Q. 50. Explain the term melting on the basis of kinetic theory.

Ans. The molecules of solids vibrate about its mean position. When it is heated, its kinetic energy is increased and it starts vibrating vigorously. At the melting point the intermolecular force of attraction is reduced and particles can not hold each other with strong force to hold them in their fixed position. The crystalline structure is destroyed and it starts melting.

Q. 51. Explain how the same substance exists in all the three physical state ?

Ans :- The intermolecular force of attraction and the vibration of molecules about its mean position is controlled by changing pressure and temperature of the substance. Hence, depending on the pressure and temperature, the same substance can exist in all the three physical states of i.e. solid, liquid and gas.

Q. 52. How aquatic animals and plants survive under water ?

Ans : - The gases from the atmosphere diffuses and dissolves in water. The aquatic animals can breath under water due to the presence of dissolved oxygen in water.

Q.53. State the factors affecting evaporation.

Ans :- The rate of evaporation increases with :

(i) an increase in surface area (ii) an increase of temperature (iii) an decrease in humidity (iv) an increase in wind speed.

Q. 54. How does evaporation cause cooling ?

Ans :- The particles of liquid absorb energy from the surrounding to regain the energy lost during evaporation. This absorption of energy from the surrounding make the surrounding cold.

Q. 55. We feel cool when acetone is applied on nails to remove nail polish. Why ?

Ans :- When acetone is applied or put on nails. the molecules of acetone gain energy from our hand or surrounding and evaporates. Due to this we feel cool.

Q. 56. After a hot sunny day, people sprinkle water on the roof or open ground. Why ?

Ans :- After sprinkling the water, the large latent heat of vaporization of water helps in cooling the hot surface.

Q. 57. Why should we wear cotton clothes in summer ?

Ans. During summer, we perspire more because of the mechanism of our body which keeps us cool. The heat energy equal to the latent heat of vapourisation is absorbed from the body leaving the body cool. Cotton being good absorber of water helps in absorbing the sweat and exposing it to the atmosphere for easy evaporation.

Q. 58. Water droplets on the outer surface of a glass containing ice-cold water is seen. Why ?

Ans :- Water vapour present in air come in contact with glass containing ice-cold water or ice, loses energy and is converted into water, which we see as water droplets.

Q. 59. Why does a desert cooler cool better on a hot dry day ?

Ans :- On a hot dry day, temperature of room is very high and humidity is negligible.

These two factor are favourable for the better evaporation. Due to this cooling is better.

Q. 60. Why early scientist believed that all matter is composed of a few building blocks?

Ans :- The belief of early scientists that all matter is composed of a few building blocks was based on the following :-

- (i) A few alphabet can produce numbers of words and sentences.
- (ii) A few music notes can produce a variety of music.
- (iii) A few number of building materials can produce a large varieties of structures.
- (iv) A few colours mixed in different proportions can produce a variety of colours.

Q. 61. Which is not a matter :

Air, water, sky, fire, security, force, work.

Ans :- Security, force and work are not matter.

Q. 62. Which of the following are matter :

Chair, air, love, smell, hate, almonds, thought, cold drinks, smell of perfumes.

Ans :- Chair, air, almonds, cold drink and smell of perfumes are matter.

Q. 63. How will you show that matter is composed of particles.

Ans :- A beaker half filled with water is taken. Some salt is added and stirred. We see that salt disappears. This shows that salt is made of lots of small particles and spreads throughout the water particles. The size of particles is very very small to be seen by naked eye. This proves that matter (water and salt) is made up of small particles.

Q. 64. Show experimentally that particles of matter have space between them ?

Ans :- A beaker half filled with water is taken and level of water is marked. Some salt (matter) is added to the water and stirred. We see that salt (matter) is disappeared and there is no change in the level of water. Here particles of salt (matter) get into the spaces between the spaces of other matter (water). This proves that particles of matter have spaces between them.

Q. 65. What happens when a crystal of potassium permanganate is dropped in a beaker half filled with water ? Explain.

Ans :- When a crystal of potassium permanganate is dropped in a beaker half filled with water, we see that colour of potassium permanganate spreads throughout the water in a few seconds. This is because particles of matter are continuously moving.

Q. 66. Prove experimentally that particles of matter are very very small.

Ans :- We drop a crystal of potassium permanganate in a 1000 liters of water in a tank. We see that after some times the colour of water becomes pink. This shows that a crystal of potassium permanganate contains a large number of small particles which spreads throughout the water. This proves that particles of matter are very very small in size .

Q. 67. Which property of gases help us in detecting the leakage of LPG gas ?

Ans :- It is due to diffusion.

Q. 68. Give an example of each (i) a liquid diffusing into solid (ii) a solid diffusing into liquid and (iii) a solid diffusing into solid (iv) a liquid diffuses into liquid.

Ans :- (i) A liquid diffusing into solid :- When we put a drop of oil on a clean white cloth, we find the liquid spreading out by diffusion on the surface of the cloth. This is because oil (liquid) diffuses into cloth (solid)

(ii) A solid diffusing into liquid :- When a crystal of potassium permanganate is put into water, the colour of potassium permanganate spreads throughout the water in a few seconds. This is because potassium permanganate (solid) diffuses into water (liquid).

(iii) A solid diffusing into solid :- When we write by a chalk on the blackboard and leave it for sometimes, it becomes difficult to clean the board. This is because chalk particle (solid) diffuses into blackboard (solid).

(iv) A liquid diffusing into liquid :- When we drop a drop of dettol in water kept in a beaker, the colour of dettol disappears after some time and changes into white. This is because dettol (liquid) diffuses into water (liquid).

Q. 69. What happens when we drop a crystal of potassium permanganate into a beaker containing hot water and another one containing cold water.

Ans :- When potassium permanganate crystal is dropped into hot water, its colour spreads faster than in cold water. This is because the phenomenon of diffusion increases with the increase of temperature.

Q. 70. How will you prove that there is force of attraction between particles of matter ?

Ans :- When we hammer an iron piece, it is flattened and is not broken. When sulphur is hammered it breaks up into pieces. But if we hammer water in a bucket, it easily finds a space in water and again water occupies the space when hammer is removed. This proves that there is a force of attraction between particles of matter and this force varies from particle to particle.

Q. 71. A diver is able to cut through water in a swimming pool. Which property of matter does this observation show ?

Ans :- Particles of water attract each other by intermolecular force of attraction. This force of attraction is not so strong to prevent the diver to cut through water.

Q. 72. What are the characteristics of the particles of matter ?

Ans :- The characteristics of particles of matter are the following :-

(i) they have space between them.

(ii) they are continuously moving in all directions i.e. they possess kinetic energy.

(iii) they can diffuse into one another.

(iv) they attract each other and the force of attraction varies from matter to matter.

Q. 73. Why gases can be compressed but liquids not ?

Ans :- The intermolecular force of attraction between the particles of gases is negligible and hence it can be compressed easily. The intermolecular force of attraction between the particles of liquids does not allow the gases to be compressed. They can be compressed very little under high pressure.

Q.74. State our body parts in three states of matter.

Ans :- Solids :- Bones, Teeth

Liquids :- Blood, Water

Gases :- Oxygen, Carbon dioxide

Q. 75. The particles in liquids are held together less firmly than solids. Why ?

Ans :- The intermolecular force of attraction between particles in a solids are stronger than liquids. It means intermolecular spaces in solids are negligible and in liquids are more than solids. Hence particles of liquids are held together less firmly than solids.

Q. 76. Solids and liquids have open surface while gases do not have open surface. Explain.

Ans :- The particles of matter are vibrating about its mean position. In solids intermolecular force of attraction between the particles is very large and hence they are held together firmly. In liquids the force is more than gases and particles are held together. Thus particles of solids and liquids stay together and form a surface. The intermolecular force of attraction between the particles is negligible, thus particles moves randomly in all direction without any restriction. Thus gases occupies any available space and move away if there is a hole in the container. Hence gases do not have open space.

Q. 77. Liquids and gases are called fluids. Why ?

Ans :- Liquids and gases flow easily due to less intermolecular force of attraction. Liquids can flow from higher level to lower level and gases flow in all available directions. Due to tendency of flowing, they are called fluids.

Q. 78. Which one important characteristic of matter makes it a solid, a liquid or a gas ?

Ans :- The intermolecular force of attraction between particles of matter is responsible to make a matter solid, liquid or gas. Highest intermolecular force of attraction packs the particles closely and makes solid. Less intermolecular force of attraction can not hold particles firmly and it moves in any direction. This makes it liquid. Negligible intermolecular force of attraction can not hold particles any more and it moves in any direction and occupies the available space in the container. This makes it liquid.

Q. 79. Give reason for the following :

- (i) Solids have fixed shape but rubber band being solid can change its shape.
- (ii) Solids are incompressible but sponge being solid can be compressed.
- (iii) Solids are rigid but a heap of rubber materials can be drawn into any shape.
- (iv) Mud is a solid but it can be cast into any shape.

Ans :- (i) Rubber band can not change its shape by itself. When force is applied it changes its shape and regain its shape when force is removed.

(ii) Sponge is a solid but it has minute holes in which air is trapped. When sponge is pressed air inside it come out and its shape is changed. When force is removed, air pushes in and the shape of sponge is regained.

(iii) Rubber has a elastic property. On applying force it can be changed into different shapes and remains as such till the force is applied.

(iv) Mud contains small particles of solid mixed with water. Hence it can be cast into any shape.

Q. 80. Giving example explain how the rate of diffusion changes with (i) density of liquid and (ii) temperature.

Ans :- (i) With the increase in density the rate of diffusion decreases. If a drop of honey and a drop of ink are added to water in two separate beaker half filled with water. We see that honey takes longer time to reach the bottom than ink.

(ii) With the increase in temperature the rate of diffusion increases. A drop of red ink is added to two separate beaker one containing cold water and another containing hot water. We see that ink spreads faster in hot water.

Q. 81. Classify the following into different states of matter :

Glass, chair, rubber, nitrogen, water, petroleum, oxygen, heat, work, power, honey.

Ans :- Glass, chair, rubber – are solids. These can not be compressed and have a definite shape.

Water, petroleum, honey – are liquids. These can not be compressed ,have definite volume but not a definite shape.

Nitrogen, oxygen – are gases. These can be compressed easily and have not a fixed volume or a fixed shape.

Heat, work, power – are not a matter. They do not have the characteristics of matter.

Q. 82. Classify the materials given below according to the state in which they exist :

Kerosene, steel, LPG, honey, air, blood, CNG, oil, rubber, carbon dioxide, glass, nitrogen, oxygen, water.

Ans :- Solids :- steel, rubber, glass.

Liquids :- kerosene, LPG, honey, blood, oil.

Gases : - air, CNG, carbon dioxide, nitrogen, oxygen.

Q. 83. Arrange the following in increasing order of intermolecular forces between the molecules of :

Hydrogen, salt, petroleum.

Ans :- Salt > Petroleum > Hydrogen.

Q. 84. A glass rod is easily moved through water in a beaker but not through chips of stone. Why ?

Ans :- Water being fluid is not rigid and thus dot resists, where stone is hard and rigid and resist the movement of rod.

Q. 85. Define pressure and give its unit. State the factors on which the pressure of liquids depend.

Ans :- Pressure is the force exerted by the particles of gas per unit area on the wall of the container. Its unit is Pascal (Pa). 1 atmosphere = 1.01×10^5 Pa. The pressure of a liquid depends upon the average kinetic energy of the particles, which on the other hand depends on the temperature of the gas.

Q. 86. There are three vessels of volumes 1.5 liters, 2 liters and 2.5 liters. 10 g nitrogen gas is filled in each of the vessels. What will be the volumes in each vessel ?

Ans :- The volume of gas in each vessel is same as the volume of the vessel. This is because the gases occupies the entire volume of the container.

Q. 87. Why gaseous state of ammonia is not regarded as vapours.

Ans :- A substance which is liquid at room temperature, then its gaseous state is regarded as vapour. Ammonia is gas at room temperature, hence its gaseous state is not regarded as vapour.

Q. 88. The mass per unit volume of a substance is called density (density = mass/volume). Arrange the following in order of increasing density – air, exhaust from chimneys, honey, water, chalk, cotton and iron.

Ans :- Air < exhaust from chimney < cotton < water < honey < chalk < iron.

Q. 89. Comment upon the following :

rigidity, compressibility, fluidity, filling a gas container, shape, kinetic energy and density.

Ans :- Rigidity :- The property of a substance so that its shape can not be changed easily. Solids are rigid.

Compressibility :- By applying force matter can be reduced to lower volume.

Gases are compressible.

Fluidity :- Property of flowing easily. Liquids and gases are fluid.

Filling a gas container :- A gas container can be filled by compression.

Shape :- Shape indicates definite boundary.

Kinetic energy :- Kinetic energy is the force with which particles are moving.

Density :- Density is the mass per unit volume. Higher density means more mass is confined in a lesser volume.

Q. 90. Give reasons :

(a) A gas fills completely the vessel in which it is kept.

(b) A gas exerts pressure on the walls of the container.

(c) A wooden table should be called a solid.

(d) We can easily move our hand in air but to do the same through a solid block of wood we need a karate expert.

Ans :- (a) The intermolecular force of attraction between the particles of gas is negligible and are free to move in any direction. Hence it fills completely the vessel in which it is kept.

(b) The particles of gas are moving randomly and constantly in all direction colliding with each other and with the walls of the container. The force exerted on the wall per unit area is the pressure on the wall of the container.

(c) The shape of a table is maintained if external force is applied on it. Hence it is called solid.

(d) The intermolecular distance between the particles of the gas is very large and hence in moving hand no pressure is experienced. But the same is negligible in the solid and hence moving hand a large amount of pressure is experienced. Hence it need to apply more force.

Q. 91. Liquids generally have lower density as compared to solids. But you must have observed that ice floats on water. Find out why ?

Ans :- The structure of ice is such that there are vacant space between water molecules, which makes it lighter than water. Hence ice floats on water.

Q. 92. Show that the three states of matter are interchangeable.

Ans :- Some ice-crystal is taken in a beaker and heated gently. We see that ice is changed to water after some time. On further heating water is converted into steam. When we cool the steam, it is changed to water again. On further cooling water is changed to ice.

Ice	heating ↔ cooling	Water	heating ↔ cooling	Steam
(solid state)		(liquid state)		(gaseous state)

Q. 93. Three substances A, B and C melts at 0°C, 56°C and -140°C, respectively and their boiling points are 100°C, 158°C and 15°C. What will be the physical states of A, B and C at room temperature.

Ans :- A is liquid, B is solid and C is gas.

Q. 94. When ice at -5°C is heated, temperature increases to 0°C and remains constant till the ice is changed to water. On further heating temperature again rises. Why ?

Ans :- At 0°C ice melts to water and temperature remains constant as the heat supplied is utilized to overcome the intermolecular force of attraction. Heat is absorbed in the conversion of ice to water and is known as latent heat of fusion.

Q. 95. Define latent heat of fusion and latent heat of vaporization.

Ans :- Latent heat of fusion :- The amount of heat required to convert 1 kg of ice into water at 0°C under 1 atmospheric pressure is called latent heat of fusion.

Latent heat of vaporization :- The amount of heat required to convert 1 kg of water at 100°C to steam at 100°C under 1 atmospheric pressure is called latent heat of vaporization.

Q. 96. Explain the relation between boiling point of a liquid and intermolecular force of attraction between the particles of the liquid.

Ans :- If the intermolecular force of attraction is strong, the boiling point is high. The intermolecular force of attraction between particles of water is stronger than that of alcohol and hence boiling point of water is higher than alcohol. Boiling point of water is 100°C, while boiling point of alcohol is 78°C.

Q. 97. Change the following temperature to Kelvin scale :

40°C, 78°C, 227°C.

Ans :- 40°C = 40 + 273 = 313 K

78°C = 78 + 273 = 351 K

227°C = 227 + 273 = 500 K.

Q. 98. At 80°C, liquid benzene is in equilibrium with its vapours. Why particles of benzene vapours are more energetic than particles of liquid benzene?

Ans :- Particles of benzene vapours have gained extra energy in the form of latent heat of vaporisation. Hence it is more energetic.

Q. 99. Why ice at 273 K is less energetic than water at the same temperature ?

Ans :- Water at 273 K is formed from ice at 273 K by absorbing latent heat of fusion. Thus there is more energy in water at 273 K than ice at 273 K.

Q. 100. Define sublimation and give examples.

Ans :- The change of solid state of a substance to liquid state and vice-versa without changing to liquid state is called sublimation. For example, iodine when heated changes directly into iodine vapour.

Q. 101. Choose the substances from the following that shows the phenomenon of sublimation :

Ice, salt, ghee, coconut oil, ammonium chloride, naphthalene, camphor.

Ans :- ammonium chloride, naphthalene, camphor.

Q. 102. Choose the substances which shows the process of sublimation :

Solid water, solid oxygen, solid carbon dioxide, solid alcohol.

Ans :- solid carbon dioxide.

Q. 103. In winter, ghee freezes at room temperature and mustered oil does not. Which of these has a higher melting point and lower intermolecular force ?

Ans :- As ghee freezes at room temperature, it means that intermolecular force between particles of ghee are stronger than mustered oil. Higher the intermolecular force, higher is the melting point. Thus ghee has a higher melting point than mustered oil.

Q. 104. Explain the effect of temperature and pressure on a gas.

Ans :- At a given temperature, increase in pressure results in liquefaction of gas. At a given pressure, decrease in temperature also results in liquefaction of gas. But essential condition is that the temperature of gas can not be decreased below -273°C as at this temperature the volume of the gas become zero.

Q. 105. Differentiate between a gas and a vapour.

Ans :- Vapour is used to describe those gases which exist as liquid at room temperature. Water in gaseous state is called vapour. Oxygen is called gas as it exists as a gas at room temperature.

Q. 106. How particles of matter are affected with increasing or decreasing pressure at a given temperature ?

Ans :- On increasing pressure the intermolecular space decreases and the particles come closer and closer and the gas may change to liquid and then solid form.

Q.107. Define pressure.

Ans :- The force per unit area exerted by a gas on the wall of the container is called pressure. It is measured in Pascal (Pa) or atmospheres.

$$1 \text{ atm} = 1.01 \times 10^5 \text{ Pa.}$$

Q. 108. What is atmospheric pressure ?

Ans :- The pressure of air column in atmosphere is called atmospheric pressure. Its value is 1 atmosphere at sea level. It is also called normal atmospheric pressure.

Q. 109. Ice at 273 K is more effective than water at 273 K. Explain.

Ans :- 1 g ice needs 80 calories of heat to melt in water at 273 K and water needs nothing. Hence ice is more effective in cooling than water.

Q. 110. Explain the effect of pressure on the boiling point of liquid.

Ans :- Boiling point is the pressure at which the pressure of the liquid become equal to the atmospheric pressure. Thus when pressure is increased, more heat will have to be given to make it equal to the existing pressure. Thus boiling point increases with the increase in pressure.

Q. 111. Convert the following temperature to Celsius scale.

(a) 300 K (b) 573 K

Ans :- (a) $300\text{ K} = 300 - 273 = 27^\circ\text{C}$

(b) $573\text{ K} = 573 - 273 = 300^\circ\text{C}$

Q. 112. What is the physical state of water at ?

(a) 250°C (b) 100°C

Ans :- (a) Steam or gas. (b) Vapour.

Q. 113. For any substance, why does the temperature remain constant during the change of state ?

Ans :- The heat supplied is absorbed by the matter to convert it from solid to liquid or from liquid to gas.

Q. 114. Suggest a method to liquefy atmospheric gases.

Ans :- Applying high pressure at low temperature.

Q. 115. Liquids are converted both by boiling and evaporation. What is the basic difference between the two process ?

Ans :- **Boiling** takes place in the entire volume of liquid. The entire volume of the liquid is heated which increases the kinetic energy of the liquid and liquid is converted into vapour.

Evaporation is a slow process and takes place only on the surface. It takes place at any temperature even below the boiling point of the liquid. When particles of higher kinetic energy come to the surface, they break away from the surface of the liquid and become vapour.

Q. 116. Define the term evaporation.

Ans :- The process of change of a liquid into vapour at any temperature below its boiling point is called evaporation. If one drop of water is left on a watch glass for some times, it evaporates.

Q. 117. State and explain the factors affecting evaporation.

Ans :- The factors affecting evaporation are :

(i) Surface area of the liquid :- If surface area of the liquid is more the rate of evaporation is more, because evaporation is a surface phenomenon.

(ii) Temperature of the surrounding : - When temperature of the surrounding is increased, the number of particles with larger kinetic energy increases and there is more chance of escaping of particles. The rate of evaporation increases with the increase in temperature.

(iii) Wind :- The rate of evaporation increases with the increase in the speed of the wind, as the more liquid particles are carried away by the wind.

(iv) Humidity :- The rate of evaporation decreases with the increase in humidity of air. Air can hold only a fixed amount of water vapour at a given temperature.

Q. 118. Evaporation cause cooling of a liquid system. Why ?

Ans :- Only a high energy particles leave the surface of a liquid in evaporation causing decrease in kinetic energy of the particles. Decrease in kinetic energy causes decrease in temperature of the liquid making it cool.

Q. 119. Wet clothes kept in shade dry slowly in a rainy day even in summer. Why ?

Ans :- The humidity of air is increased in a rainy day. The air can not hold more water as it is saturated. Thus the rate of evaporation is decreased and wet clothes dry slowly in rainy day.

Q.120. How does human body maintain its temperature during summer ?

Ans :- During summer, sweats on the body surface evaporates by taking heat energy from our body and makes it cool.

Q. 121. How will you show that evaporation increases with the increase in surface area ?

Ans :- We take 5 ml of acetone in a beaker and 5 ml in a china dish and leave them for some time. After some time we see that there is no acetone in the china dish but some acetone is left in the test tube. The surface area of acetone is more in china dish and it evaporates quickly from the china dish. This shows that rate of evaporation is increased with the increase of surface area.

Q. 122. How will you show that evaporation increases with the increase in wind speed ?

Ans :- Two handkerchiefs are taken and are made wet by dipping in water. One is spread in a room with fan on and other in a room with fan off. After some time we see that handkerchief dry faster under fan. Thus we can show that evaporation increases with the increase of wind speed.

Q. 123. Give reason for the following :

Solid carbon dioxide (dry ice) is kept under high pressure.

Ans :- On decreasing pressure solid carbon dioxide is converted into gaseous carbon dioxide.

Q. 124. Why after rain in summer, heat becomes unbearable ?

Ans :- After rain, the humidity of air is increased. The sweats of our body could not evaporates and hence stop losing excessive heat. This makes heat unbearable.

Q. 125. How does the water kept in an earthen pot (matka or kalsi) become cool during summer ?

Ans :- There are pores in the earthen pot and water come out through it. The water particles on the upper surface of the pot evaporates getting heat from the water inside it. This makes water inside the pot cool.

Q. 126. Why are we able to sip hot tea or milk faster from a saucer rather than a cup ?

Ans :- Hot tea or milk in a saucer cover larger surface area and thus evaporation is increased. The tea or milk cool faster and we are able to sip it more comfortably.

Q. 127. What type of clothes should we wear in summer ?

Ans :- We should wear cotton clothes during summer. We perspire more in summer to maintain our body temperature. Cotton clothes is a good absorber and absorbs our sweats and expose them to atmosphere for easy evaporation keeping us dry and cool.

Q. 128. What is a plasma ?

Ans :- A state of matter consisting of super excited particles of very high energy order is called plasma. These particles are present in ionized form.

Q. 129. Does fluorescent tube contains plasma ?

Ans :- No, fluorescent tube does not contain plasma. It contains helium or some rare gas which is ionized when high voltage is applied. These charged particles are called plasma which actually glow.

Q. 130. Why do the sun or the stars glow ?

Ans :- Due to high temperature inside sun or stars gas particles of hydrogen or helium are ionized and plasma is created. This plasma helps them to glow.

Q. 131. Do all particles or plasma glow in a similar way ?

Ans :- Plasma glows with different colours which depends on the nature of the gas. Neon sign bulb and fluorescent tube glow differently.

Q. 132. Differentiate between a gas and plasma.

Ans :- Gas consists of neutral particles associated with energies which can be compared with atmospheric temperature.

Plasma consists super energetic particles in the form of ionized gas.

Q. 133. Convert the following temperature to the Celsius scale :

(a) 300 K (b) 573 K

Ans :- (a) $300\text{ K} = 300 - 273 = 27^\circ\text{C}$

(b) $573\text{ K} = 573 - 273 = 300^\circ\text{C}$

Q. 134. Convert the following temperatures to Kelvin scale :

(a) 25°C (b) 373°C

Ans :- (a) $25^\circ\text{C} = 25 + 273 = 298\text{ K}$

(b) $373^\circ\text{C} = 373 + 273 = 646\text{ K}$

Q. 135. Give reasons for the following observations.

(a) Naphthalene balls disappear with time without leaving any solid.

(b) We can get the smell of perfume sitting several metres away.

Ans :- (a) Naphthalene has the property of sublimation and hence naphthalene ball evaporates easily and disappears.

(b) Perfumes evaporates easily and its vapour reaches us by diffusing into air easily. Thus we get the smell of perfumes sitting several metre away.

Q. 136. Arrange the following substances in increasing order of forces of attraction between the particles – water, sugar, oxygen.

Ans :- Oxygen < Water < Sugar.

Q. 137. What is the physical state of water at :

(a) 25°C (b) 0°C (c) 100°C

Ans :- (a) liquid (b) solid (c) gas.

Q. 138. Give two reasons to justify :

(a) Water at room temperature is liquid.

(b) An iron almirah is a solid at room temperature.

Ans :- (a) Water can flow and it assumes the shape of the containing vessel. So, it is a liquid at room temperature.

(b) Almirah is rigid and has fixed shape. So, it is a solid at room temperature.

Q. 139. What produces more severe burns, boiling water or steam ?

Ans :- Steam has more kinetic energy than boiling water. Hence steam produces more severe burns than boiling water.

BEST OF LUCK.