LET US RECAPITUALTE

• Anything which has mass and occupies some space is known as matter.

• Solid, liquid and gas are not the substances but three states of the same substance.

• The states of a substance differ with respect to interparticle spaces and intermolecular forces.

• The arrangement of the constituent particles is most ordered in solid state. It is comparatively less in the liquid state while in the gaseous state, the particles can move quite freely.

• Solids have fixed shape and definite volume.

• Liquids have definite volume but no fixed shape.

• Gases have neither fixed shape nor definite volume.

• The kinetic energy of particles is maximum in the gaseous state and minimum in the solid state.

• The diffusion of the gases varies inversely as the square root of their densities.

• Lighter gases can move upwards and heavier gases can move downwards.

• Gases can be compressed to large extent on applying pressure.

• The three states of a substance are interconvertible i.e., one state can be converted into the other and vice versa.

• At the melting point temperature, a solid starts melting and the temperature remains the same till the whole of it has melted.

• At the boiling point temperature, a liquid starts boiling and the temperature remains the same till the entire liquid has changed to gaseous state.

• Vapours represent the gaseous state of a substance which is a liquid at room temperature.

• Latent heat of fusion is the amount of heat energy needed to convert one kg of a liquid into vapour state without any rise in temperature.

• Latent heat of vaporisation is the amount of heat energy needed to convert one kg of a liquid into vapour state without any rise in temperature.

• Kelvin temperature is more than Celsius temperature by 273°.

• A substance is said to be in the solid state if its melting point is above the room temperature under normal pressure.

• A substance is said to be in the liquid state if its melting point is below the room temperature under normal pressure.

• A substance is said to be in the gaseous state if its boiling point is below the room temperature under normal pressure.

 \bullet The standard room temperature is 25°C or 298 K.

• Change of pressure and temperature have opposing effects on the physical state of a substance.

• Normal atmospheric pressure is one atmosphere and it decreases at higher altitudes.

• Solid carbon dioxide is known as dry ice.

• Evaporation is a surface phenomenon but boiling is not.

• Increasing the surface area increases the evaporation of a liquid.

• We perspire more on a humid day than on a dry day.

• Low boiling liquids evaporate faster than high boiling liquids.

• Cooling is caused during evaporation and not during boiling.

N.C.E.R.T. IN TEXT PROBLEMS

Q.1. Which of the following are matter ? Chair, air, love, smell, hate, almonds, thought, cold, cold drink, smell of perfume. **Ans.** Chair, air, almonds, cold drink, smell of perfume,

Q.2. The smell of hot sizzling food reaches

us several metres away. However, it is not so in case the food is cold. Explain.

Ans. When food is sizzling hot, it releases the vapours of its contents. Since the kinetic energy of the particles is very high in the vapour state, they can reach us even at a distance of several metres. However, when the food is cold, the vapours released will be comparatively less. Moreover, their

kinetic energy will be also very small. Under these conditions, one has to come quite close in order to smell the contents of the food.

Q.3. A diver is able to rut through water in a swimming pool. Which property of matter does this

observation show ?

Ans. This shows that in water which represents the liquid state of matter, there are sufficient inter particle spaces. That is why. a diver is able to cut through water. He might not do the same had these spaces been very small (e.g. in solid state).

Q.4. What are the characteristics of the particles of matter ?

Ans. For answer, consult text-part.

Q.5. The mass per unit volume of a substance is known as density (density = mass/volume). Arrange the following in order of increasing density :

Air, exhaust from chimneys, honey, water, chalk, cotton and iron.

Ans. The increasing order of density for the given substances is :

Air, exhaust from chimneys, cotton, water, honey, chalk, iron.

Actually, the density of a substance depends upon the number of particles per unit volume as well as upon their mass. The number of the particles is related to their size as well as the attractive forces among them. Keeping this in view, the increasing order of density is as given above.

Q.6. Tabulate the differences in the characteristics of the three states of matter.

Ans. For answer, consult text part.

Q,**7**. Comment on the following :

rigidity, compressibility, fluidity, filling of a gas in cylinder, shape, kinetic energy and density. Ans. For answer, consult text part.

Q.8. Why rim's a Has fill completely the vessel in which it is kept ?

Ans. This happens because of fast diffusion of the

particles in a gas. The number of vacant spaces or voids in the gaseous state is very large. This means that the particles of a gas move at a very fast speed.

They readily fill completely the vessel in which the gas is kept. Thus the volume of the gas is the same as that of the vessel.

Q.9. A gas exerts pressure on the walls of the container. Assign reason.

Ans. The molecules in a gas have large kinetic energy. They strike the walls of the container with certain force and impart momentum to them. The force per unit area or momentum is responsible for the pressure of the gas.

Q.10. Why should we call a wooden table solid ? Ans. A wooden table should be called a solid because it matches the characteristics of the solid state. For example,

(i) It is very hard and rigid.

(ii) Its shape cannot be changed by altering temperature or pressure.

(iii) It is quite heavy which means high density.

(iv) There is no movement of the constituent particles present.

Q.11. We can easily move our hand in air but to do so the same through a solid block of wood, we need a 'Karate expert'. Explain.

Ans. In air, the interparticle spaces are very large in number and the interparticle forces are quite weak.

These can be easily overcome. That is why our hand can move in air. These spaces help in moving our

hand in air. But in a solid block, the constituent particles are quite close and the interparticle forces are very strong. In case, one has to move his hand through a solid, it will be extremely difficult. Only a karate expert may do so.

Q.12. Liquids generally have low density as compared to solids. But you must have observed that ice floats on water. Find out why?

Ans. Ice (solid state) is expected to be heavier than water (liquid state). But it is lighter and floats over water. Actually, ice has a cage like structure which means that vacant spaces are left when H_2O molecules are linked in ice. The number of these spaces are comparatively less in water. Therefore, water is dense as compared to ice or ice floats over water

Q.13. Convert the following temperatures to Celsius scale : (a) 300 K (b) 573 K. Ans. (a) $(300 - 273) = 27^{\circ}C$ (b) $(573 - 273) = 300^{\circ}C$

Q.14. What is the physical state of water at : lai 250° C (b) 100° C ?

Ans. Boiling point temperature of water is 100°C. Above this temperature (250°C), water exists in the

gaseous state i.e., as vapours or as steam. However, at 100°C, both liquid state and gaseous state are present. Actually, at the boiling point temperature, both the liquid and gaseous state of a substance co-exist. These are in a state of equilibrium.

Q.15. For any substance, why does the temperature remain constant during the change of state ?

Ans. Once the change of state of a substance begins or starts, the energy which is now supplied is being used up as latent heat. It means that it does not increase the kinetic energy of the particles and is used up only to bring about a change in state. Therefore, the temperature becomes constant. For more details, consult text part.

Q.16. Suggest a method to liquefy atmospheric gases.

Ans. The atomospheric gases can be liquified either by increasing pressure or by decreasing temperature.

Q.17. A cooler is quite effective on a hot and dry day. Explain.

Ans. Under the conditions, the humidity level in the atmosphere is quite low and the evaporation rate of

water is expected to be high. Since cooling is caused during evaporation, a cooler is quite effective on a hot and dry day.

Q.18. How does water kept in an earthen pot become quite cold during summer ?

Ans. The earthen pot is full of small pores. Water present in these pores has a tendency to escape at a fast rate during summer. Since cooling is caused in evaporation, the temperature of the water inside the earthen pot gets considerably lowered and it becomes cold.

Q.19. When we pour some acetone or perfume on our palm, we get a cooling sensation. Assign reason. Ans. Both acetone and perfume are low boiling liquids. When any of them is poured on the palm, it readily changes into vapours or evaporates. For this, it needs some energy which is taken from the palm. The temperature of the palm gets lowered and we get a cooling sensation.

Q.20. Why can we sip hot tea from a saucer faster than from a cup ?

Ans. For answer, consult text part.

N.C.E.R.T. EXERCISE

Q.21. Convert the following temperatures to Celsius scale ? (a)293 K (b)470 K. Ans. (a) (293 - 273) = 20°C (b) (470 - 273) = 197°C

Q. 22. Convert the following temperatures to Kelvin scale (a) 25° C (b) 373° C.

Ans. (a) (25 + 273) = 298 K (b) (373 + 273) = 646 K.

Q.23. 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 a tendency to sublime i.e. it changes directly to the gaseous state. Therefore, the size of the naphthalene balls slowly decreases and ultimately they disappear. No solid residue is left.

(b) A perfume is actually a mixture of number of

pleasant smelling vapours. They diffuse quite fast and can reach a person who may be even at several metres away from a person who has used perfume.

Q.24. Arrange the following substances in increasing order of attraction between the particles : water, sugar, oxygen.

Ans. The three substances differ in their physical state at normal temperature. Oxygen is a gas, water a liquid while sugar is a crystalline solid. Keeping this is mind, the increasing order of attraction between the particles is : oxygen < water < sugar.

Q.25. What is the physical state of water at (a) 25°C (b) 0°C (c) 100°C ? Ans. (a) liquid state (b) solid state (ice) (c) gaseous state (water vapours).

Q.26. Give two reasons to justify that : (a) Water at room temperature is a liquid (b) an iron almirah is a solid at room temperature. Ans. (a) Water is a liquid at room temperature $(25^{\circ}C)$ due to the following reasons :

(i) When placed in a beaker, its level cannot be changed on pressing.

(ii) It can take the shape of any container in which it is placed.

(b) An iron almirah is a solid due to following reasons :

(i) Its shape does not change when pressed. This means that it is hard and rigid.

(ii) It is very heavy. This means that its density is very high.

Q.27. Ice at 273 K causes more cooling than water at the same temperature. Explain.

Ans. When ice (solid state) is to melt at 273 K, it takes up certain energy from the surrounding to overcome the attractive forces in the solid particles. As a result, the temperature of the surroundings gets lowered and cooling is noticed. However, water is already in the liquid state and has no tendency to change to the vapour state at this temperature. It will hardly take up any energy from the surroundings in order to change into the vapour state. Therefore, it will cause comparative less cooling.

Q.28. Why does steam produce more severe bums

on the skin as compared to boiling water ? Ans. Steam is formed when water at its boiling point CONCEPT BASED QUESTIONS

Q.30. Solids are generally very heavy while gases are light. Explain.

Ans. In the solids, the particles are very closely packed. As a result, the number of particles per unit volume is quite large. Therefore, the solids are normally quite heavy. In the gases, the particles are loosly packed. The number of particles per unit volume is comparatively small. Therefore, gases are light.

Q.31. Carbon dioxide gas is heavier than both nitrogen and oxygen. Why does not it form lower layer in the atmosphere ?

Ans. The diffusion of a gas is not affected by gravity. This means that carbon dioxide (CO_2) remains uniformly mixed in air. Therefore, the gas does not

form the lower layer in the atmosphere.

Q.32. Ammonia and hydrogen chloride gases are both pungent smelling in nature. These are released from the two opposite corners in a room. Which gas will reach first a person sitting in the centre of the room ? temperature of 100°C (373 K) absorbs latent heat of vaporisation. On account of this, steam produces more severe burns on the skin as compared to boiling water.

Q.29. Name A, B, C, D, E and F in the following diagram showing change of state.

Ans. [A] = Fusion (melting), [B]= Vaporisation, [C]=

Condensation (Liquification), [D] =Solidification (freezing), [E] = Sublimation, [F] = Solidification of gaseous state.



Ans. The particles of the lighter gas will diffuse faster as compared to those of heavier gas. Out of the two gases, ammonia is lighter than hydrogen chloride gas. Therefore, its smell will reach first a person sitting in the centre of the room.

Q.33. Solids are normally not compressible. Why can a sponge be readily pressed ?

Ans. A sponge made up of rubber has a large number of fine pores in which air remains filled. When the sponge is pressed, the air from the pores escapes and vacant spaces are left. Therefore, the sponge can be readily pressed on applying pressure.

Q.34. Why is it not proper to regard the gaseous state of ammonia as vapours ?

Ans. The gaseous state of a substance can be regarded as vapours only in case it is a liquid at room temperature. Since ammonia is a gas at room temperature, its gaseous state cannot be regarded as vapours.

Q.35. What happens to the heat energy which is supplied to the solid once it has

started melting? Ans. The heat energy supplied is taken up by solid particles and helps in their melting or fusion. It is known as latent heat of fusion.

Q.36. Kelvin scale of temperature is regarded as better than the Celsius scale. Assign reason.

Ans. In the Celsius scale of temperature we often come across a negative sign for the temperature (e.g., $8-5^{\circ}$ C). Since the sign is always positive in the Kelvin scale, it is regarded as better.

Q.37. Gases can he compressed but not solids. Explain.

Ans. In gases, interparticle spaces are quite large. On applying pressure, these spaces decrease and the molecules of gas come closer. As a result, the gases can be compressed. In solids, the interparticle spaces are already very small. Therefore, on applying pressure, the constituent particles in a solid do not come close and the solids cannot be pressed.

Q.38. A rubber band changes its shape when stretched. Can it be regarded as solid ?

Ans. Yes, it can be still regarded as solid. There are certain special cases where a solid undergoes a change in shape on applying pressure. When the pressure is released, it regains its original shape. Such solids are known as elastics.

Q.39. What are the factors which are responsible for bringing a change in the physical state of a substance ?

Ans. Temperature and pressure are the two factors which can bring about the change in physical state But they have opposing effects. Increase in temperature pulls the constituents of a substance apart.

Increase in pressure tends to bring them closer.

Q.40. How will you demonstrate that air contains water vapours ?

Ans. Thoroughly dry a glass beaker and take some crushed ice in it. After sometime, droplets of water appear on the outer surface of glass. How are these formed ? It is because of water vapours present in air, which get condensed when they come in contact with the glass surface where the temperature is very low.

Q.41. Explain why there is no rise in temperature of a substance when it undergoes a change of state although it is still being heated.

Ans. Once the change in state of a substance starts (solid to liquid or liquid to gas), the temperature of the substance does not change. Actually, the heat energy now supplied does not increase the kinetic energy of the constituting particles. It is absorbed either as latent heat of fusion or as latent heat of vaporisation.

Q.42. Name one property which is shown by naphthalene and not by sodium chloride.

Ans. Naphthalene undergoes sublimation upon heating and directly changes into vapours. Sodium chloride (common salt) does not undergo sublimation. It melts on strong heating.

VERY SHORT ANSWER QUESTIONS

Q.43. What is common in the three states of matter.

Ans. All of them occupy space and have mass.

Q.44. Can we regard high fever as matter?

Ans. High fever is a feeling only. It cannot be regarded as matter.

Q.45. Why do not solids possess fluidity?

Ans. Fluidity means tendency to flow. The constituents in the solids are very closely packed and interparticle forces are quite strong. Therefore, solids have hardly any fluidity.

Q.46. A certain substance 'A' cannot be compressed but takes up the shape of any container in which it is placed. What will you **regard its physical state ? Ans.** The physical state of the substance 'A' is a liquid.

Q. 47. Why do substances undergo change in physical state ?

Ans. Substances undergo change in physical state because both interparticle spaces and interparticle forces can be changed by changing the conditions of temperature and pressure.

Q. 48. What is the pressure at sea level ?

Ans. The pressure at sea level is regarded as 1 atmosphere or 760 mm.

Q.49. Are the melting point temperature of the solid state and the freezing point temperature of the liquid state of a substance different ? **Ans.** No, these are the same. For example, melting point of ice and freezing point of water are both $0^{\circ}C$ or 273 K.

Q.50. Why are gases highly compressible ?

Ans. Because the interparticle empty spaces are very large. When a gas is compressed, these spaces

decrease. The particles or molecules of gas come closer.

Q.51. A substance is in liquid state at room temperature and changes into gas upon heating. What will you call its gaseous state ?

Ans. The gaseous state of the substance is regarded as vapours.

Q. 52. When a crystal of copper sulphate is placed at the bottom of a beaker containing water, the colour of water slowly becomes blue. why ?

Ans. The crystal breaks into fine particles which form copper ions $(Cu^2 + ions)$ in solution. As these ions (blue in colour) diffuse, the colour of water slowly becomes blue.

Q.53. Why do solids generally lack the property of diffusion ?

Ans. This is because of the absence of kinetic energy in the solid state since the particles are Very closely packed.

Q.54. Do we represent the temperature on Kelvin scale by the letter 'k' or 'K' ?

Ans. The temperature on Kelvin scale is represented by the letter K (capital letter).

Q. 55. The boiling point of ethyl alcohol is 78°C. What is the corresponding temperature on kelvin scale ?

Ans. Temperature on kelvin scale =78+273=351 K

Q.56. When a solid starts melting, its temperature does not rise till whole of it has

melted. Explain.

Ans. The heat energy which is now being supplied is used up to bring a change in physical state only. It is known as latent heat of fusion.

Q.57. A substance upon heating directly changes into gaseous state. What is this change called ?

Ans. It is known as sublimation.

Q.58. Define gaseous state of a substance.

Ans. A substance is said to be in the gaseous state if under normal pressure, its boiling point is below the room temperature.

Q.59. What is the normal room temperature ?

Ans. Normal room temperature is 25° C (25 + 273) = 298 K.

Q.60. Does the evaporation of a liquid occur only at a fixed temperature ?

Ans. No, the evaporation of a liquid occurs at all temperatures.

Q.61. What is the name given to the process when the vapours of a liquid get cooled ?

Ans. The process is known as condensation.

Q.62. Does the temperature of liquid increase further when it starts boiling ?

Ans. No, it does not because the energy now supplied is used up as latent heat only.

Q.63. Why do we sweat more on a humid day?

Ans. In humid day, the air around us has already high percentage of water vapours. Therefore, the water coming from the skin gets less opportunity to change into vapours and remains sticking our body. We therefore, sweat more on a humid day.

SHORT ANSWER QUESTIONS

Q.64. When sugar is dissolved in water, there is hardly an increase in volume. Which characterstic matter is illustrated by this observation ?

Ans. This is because of the presence of inter particle spaces or empty space. Particles or molecules of water (H_2O) can fill the empty spaces in the particles or molecules of sugar $(C_{12}H_{22}O_{11})$ and vice versa. That is why there is hardly any change in volume as a result of mixing.

Q.65. A piece of chalk can be broken into small particles on hammering but it is no possible to do so in case of a piece or bar of iron Explain ?

Ans. If we look carefully at the piece of chalk, we find that it is porous. As a result, the attractive forces among the particles in the chalk are weak. Therefore, it can be easily broken into small particles on hammering. However, no such pores are seen in a piece of iron. This means that the

constituent particles are very closely packed in iron and the attractive forces are quite strong. Therefore, it may not be possible to break the piece of iron into fine particles upon hammering.

Q.66. Arrange in the order indicated for solids, liquids and gases.

(i) effect of pressure — increasing order
(ii) empty space in the particles - decreasing order

(iii) tendency to flow - decreasing order
(iv) thermal expansion - increasing order.
Ans. (i) solid, liquid, gas (ii) gas, liquid, solid
(iii) gas, liquid, solid (iv) solid, liquid, gas.

Q.67. Name the state of matter that :
(i) has definite mass, volume and shape.
(ii) has no definite volume and shape
(iii) has minimum inter particle attraction.

(iv) has maximum inter particle attraction.

Ans. (i) solid state (iii) gaseous state

(ii) gaseous state(iv) solid state

Q.68. Both evaporation and cooling represent the change of liquid state into gaseous state, but they are different. Justify. **Ans.** For answer, consult text part.

Q.69. The Latent heal of vaporisation of steam is more than that of the boiling water. Explain.

Ans. When boiling water changes into steam it absorbs a certain amount of heat energy. This shows that the latent heat of vaporisation of steam is more than that of boiling water.

Q.70. Which of the following factors are responsible for the change of state of solid carbon dioxide into vapours ?

(a) Increase in pressure (b) Decrease in presssure

(c) Increase in temperature

(d) Decrease in temperature

Ans. The change of state can take place by decreasing the pressure and increasing the temperature.

LONG ANSWER QUESTIONS

Q.71. Interparticle spaces are present in all types of matter. Justify your answer. Ans. For answer, consult text part.

Q.72. (a) What is the reason for the existence of the three states of matter ?

(b) What will happen when solid ammonium chloride is heated ?

(c) The room temperature is 25° C. What is the corresponding temperature on the Kelvin scale ?

(d) What happens to the particle motion if the temperature of the gay is increased ?

Ans. (a) The three states of matter differ with respect to the inter particles spaces. These are minimum in the solid state while maximum in the gaseous state.

(b) It will directly change to the vapour state without passing through the liquid state. The process is known as sublimation.

(c) Kelvin temperature (K) = 273 + 25 = 298 K.

(d) With the increase in temperature, the average kinetic energy of the particles increases. As a result, the

particle motion increases.

Q.73. A substance 'X' was highly compressible and could be easily liquefied. It could also take up the shape of any cotainer. Predict the nature of the substance Enlist four properties of this state of matter.

Ans. The substance "X' appears to be a gas since the characteristics shown by it resemble those of the gaseous state. For the properties of the gaseous state, consult text part.

Q.74. Give three points of distinction between Liquid state and gaseous state. Evaporation and boiling

Ans. For answer consult text part.

Q.75. Discuss the role of pressure and temperature in the liquefication of a gas. Ans. For answer, consult text part.

HINGHER ORDER THINKING QUESTIONS

(based on new c.b.s.e. sample papers)

Q.76. The diagram shows an experiment in which gases hydrogen and carbon dioxide are placed in two jars as shown in the figure. If the lid separating the two jars be removed, what will the constituents in the gas jar A after a few minutes ?

(a) carbon dioxide only

(b) hydrogen only

(c) mixture of carbon dioxide and hydrogen.

Ans. The gas jar A will contain both the gases

carbon dioxide and hydrogen. Actually, the gas present in one jar will move into the other jar and vice versa.



Q.77. The graph alongside shows the heating curve for a pure substance. The temperature-rises with time as the substance is heated :

(a) What is the physical state of the substance at the points A, B, C and D ?

(b) What is the melting point of the substance $\ensuremath{\mathsf{?}}$

(c) What is its boiling point?

(d) What happens to the temperature while the substance is changing state ?

(e) The substance is not water. How can you judge from the graph ?



Ans. (a) At point A : The substance is in the solid state. At point B : The substance has started melting. It exists both in the solid and liquid states.

At point C : The substance is in the liquid state. At point D : The substance has started boiling. It exists both in the liquid and gaseous states.

(b) The melting point of the substance is 15°C.(c) The boiling point of the substance is 110°C.

(d) The temperature remains the same during the change of state.

(e) Had substance been water, its melting point should have been 0°C and boiling point 100°C.

It is therefore, not water.

Q.78. In severe cold weather, a family burnt wood in the room during the night by keeping the door and windows close. After sometime, they felt suffocated. They immediately opened the windows and got relief. What did actually happen ?

Ans. When wood bums, the carbon present is oxidised to carbon dioxide (CO_2) which is nonpoisonous. When the windows are close, the air or oxygen cannot enter the room. In the incomplete supply of oxygen, carbon is oxidised to carbon monoxide (CO) which is a highly poisonous gas. It caused suffocation. On opening the window, the poisonous gas slowly diffused out of the room and fresh air came inside. That is how, the poisonous effect of the gas was neutralised and the family got relief.

MULTIPLE CHOICE QUESTIOS

Select the correct answer : MCQs Based on Text Part

1. According to ancient philosophers matter consists of :

- (a) three constituents (b) four constituents
- (c) five constituents (d) six constituents.
- **2.** Which of the following is not matter ?
- (a) air (b) feeling of cold
- (c) dust (d) humidity.
- **3.** Which of the following statements is not correct ?
- (a) Matter is continuous in nature
- (b) Interparticle spaces are maximum in the
- gaseous state of a substance

(c) Particles which constitute the matter follow a zigzag path

(d) Solid state is the most compact state of a substance.

4. Which out of the following does not make sense.

(a) Solids have fixed shape and fixed volume

(b) We can easily compress a liquid but not gas(c) Solids have negligible kinetic energy of the particles

(d) Property of diffusion is maximum in the gaseous state.

5. A gas can be beat liquefied :

- (a) by increasing the temperature
- (b) by lowering the pressure

(c) by increasing the pressure and reducing the temperature

(d) none of these is correct.

6. The correct order of evaporation of water, alcohol, petrol and kerosene is :

- (a) water > alcohol > kerosene > petrol
- (b) alcohol > petrol > water > kerosene
- (c) petrol > alcohol > water > kerosene
- (d) petrol > alcohol > kerosene > water.

7. When the liquid starts boiling, the further heat energy which is supplied :

(a) is lost to the surrounding as such

(b) increases the temperature of the liquid

(c) increases the kinetic energy of the particles in the liauid

(d) is absorbed as latent heat of vaporisation by the liquid.

8. 10°C temperature is equal to : (a) 163 K (b) 10 K (c) 183 K (d) 283 K.

9. Which of the following will respond to sublimation.

(a) Common salt(b) Sugar

(c) Camphor (d) Potassium nitrate.

10. Which of the following statements does not go with the liquid state ?

(a) Particles are loosly packed in the liquid state

(b) Fluidity is the maximum in the liquid state

(c) Liquids cannot be compressed

(d) Liquids take up the shape of any container in which these are placed.

11. S.I. unit of temperature is : (a) Kelvin (b) Celsius (c) both (d) none

12. The process of the change of liquid state into vapour state is known as : (b) fusion

(a) boiling

(c) evaporation (d) condensation

13. Dry ice means :

- (a) Solid ammonia
- (b) Solid carbon dioxide
- (c) Solid sulphur dioxide
- (d) Normal ice.

14. During evaporation, particles of a liquid change into vapours only :

(a) from the surface,

(b) from the bulk

(c) from both surface and bulk

(d) neither from surface nor from bulk.

15. Rate of evaporation depends upon :

(a) temperature (b) surface area

(c) humidity (d) all options are correct

16. Pressure of air at sea level is :

(a) one atmosphere (b) 76 cm (d) all are correct.

(c) 760 mm

17. When a gas is compressed at constant temperature :

- (a) the speed of the molecules increases.
- (b) the collisions among the molecules increase.
- (c) the speed of the molecules decreases.
- (d) the collisions among the molecules decrease.

18. During evaporation of liquid :

(a) the temperature of the liquid falls

(b) the temperature of the liquid rises

(c) the temperature of the liquid remains unchanged.

(d) all statements are wrong.

19. In summer, we prefer wearing :

(a) dark nylon clothes

- (b) white cotton clothes
- (c) white silk clothes
- (d) dark silk clothes.

20. Solids cannot be compressed because :

- (a) constituent particles are very closely packed
- (b) interparticle attractive forces are weak
- (c) movement of constituent particles is restricted
- (d) constituent particles diffuse very slowly.

21. The standard room temperature is taken as : (a) 0°C (b) 273 K (c) 298 K (c) 20°C

22. Which of the following will not undergo subtimation ?

(a) Camphor	(b) Ammonium chloride
(c) Iodine	(d) Sodium chloride

23. The two major gases present in air are :

- (a) Nitrogen and oxygen
- (b) Nitrogen and hydrogen
- (c) Hydrogen and oxygen
- (d) Nitrogen and carbon dioxide

24. The interparticle forces are the strongest in :

- (a) Ammonia (b) Ethyl alcohol
- (c) Carbon dioxide (d) Sodium bromide

25. Evaporation of a liquid can take place : (a) at its boiling point (b) below its boiling point (c) at all temperatures(d) at a fixed temperature.

MCQs BASED PRACTICAL SKILLS

26. Four strips labelled as A, B, C and D along with characteristic colours are shown below.



Which of these is made up of aluminum (Al) metal $\ref{eq:alpha}$

(a) Strip A (b) Strip B (c) Strip C (d) Strip D

27. Sulphur dioxide is collected in the laboratory in a gas jar by upward displacement of air. Which of the following statements is correct regarding the density of the gas ?

(a) It is heavier than air

(b) It is lighter than air

density of the gas.

(c) Its density is equal to that of air

(d) No correct statement can be made about the

28. A liquid is kept in an open china dish. The evaporation of the liquid can be accelerated

(a) by keeping the dish in the open

- (b) by blowing air into the liquid
- (c) by keeping the dish under a running fan
- (d) All are correct



29. In which form is zinc metal generally available in the chemistry laboratory ?
(a) as pellets
(b) as a rod
(c) as fine filings
(d) as granules

ANSWERS

1. (c) 2. (b) 3. (a) 4. (b) 5. (c) 6. (d) 7. (d) 8. (d) 9. (c) 10. (b) 11. (a) 12. (c) 13. (b) 14. (a) 15. (d) 16. (d) 17. (b) 18. (a) 19. (b) 20. (a) 21. (c) 22. (d) 23. (a) 24. (d) 25. (c) 26. (d) 27. (a) 28. (d) 29. (d)

(a) 17.(b) 20.(a) 21.(c) 22.(a) 20.(a) 24.(a) 20.(c) 20.(a) 27.(a) 20.(c)

HINTS & EXPLANATIONS

1. (c) Matter is made up of five constituents also called tatvas (air, water, earth, fire and sky).

2. (b) Feeling of cold is a sensation only. It is not matter.

3. (a) Matter is not continuous and has particulate nature.

4. (b) We can easily compress a gas and not a liquid.

5. (c) is the correct answer.

6. (d) is the correct order.

7. (d) heat energy is absorbed as latent heat of vaporisation.

8. (d) (10 + 273) = 283 K

9. (c) Camphor undergoes sublimation.

10. (b) Fluidity is maximum in the gaseous state and not in the liquid state.

11. (a) Kelvin (K) temperature represents S.I. unit.

12. (c) It is known as evaporation.

13. (b) Solid CO_2 is dry ice.

14. (a) Evaporation takes place only from the

surface.

15. (d) All options are correct.

16. (d) All the statements are correct.

17. (b) Collisions among the molecules increase on

compressing the gas.

18. (a) Temperature of the liquid falls.

19. (b) White cotton clothes are bad absorber of heat and porous in nature.

20. (a) Constituent particles are very closely packed in the solid state.

21. (c) The standard room temperature is 298 K or 25° C.

22. (d) Sodium chloride (NaCI) will not undergo subtimation.

23. (a) The main constituents of air are nitrogen and oxygen.

24. (d) Inter particle forces are the strongest in sodium bromide which is a solid.

25. (c) Evaporation of a liquid can take place at all temperatures.

26. (d) Aluminium is a silvery white metal

27. (a) The gas is heavier than air. That is why, air has moved upwards and the gas down words.

28. (d) All are correct.

29. (d) Zinc metal generally exists in granule form.

TEST YOUR KNOWLEADGE

Very Short Answer Questions

1. A substance has no mass. Can we regard it as matter ?

2. Give three examples each of the solid and liquid states

3. Write three characteristics of the solid state.

4. What will happen to the interparticle spaces if a liquid is heated ?

5. For every gas there is a certain temperature above which it cannot be liquefied. Is this statement correct?

6. Can we regard the gaseous state of alcohol as vapours?

7. Why is sodium light and iron hard in nature ?

8. What are the units of density ?

9. Out of dry and wet air, which is heavier ?

10. Convert 5°C to Kelvin temperature.

11. Does Kelvin scale have negative temperature ?

12. What is the relation between pressure in atmospheres and pressure in pascals?

SHORT ANSWER QUESTIONS

26. How will you justify that ice, water and water vapours are the three states of a substance and n substances.

27. How will demonstrate that interparticle spaces are present in a matter ?

28. Enlist the main characteristics of the particle nature of matter.

29. What are solids ? Write the main characteristics of the solid state.

30. Define density. Out of the solid, liquid and gaseous states, in which the density is the maximum?

31. The kinetic energy of the particles in the liquid state is more than in the solid state. Comment.

32. Which of the following do not make sense :

(i) Liquids can be easily compressed.

(ii) We sweat more on a humid day than on a dry day. (iii) The temperature of the liquid becomes constant once it starts boiling.

(iv) It is correct to regard gaseous state of carbon dioxide as vapours.

13. What is the difference between gas and vapours.

14. Define latent heat of fusion.

15. Out of ether and carbon tetrachloride, which is more volatile ?

16. What is the normal room temperature ?

17. Write the common units in which pressure is expressed.

18. Are dry ice and ordinary ice same ?

19. Is cooling also caused during boiling of a liquid ? **20.** Define boiling point of a liquid.

21. What does LPG signify ?

22. Out of gases and liquids, which diffuse faster ?

23. Name a process by which an impure sample of naphthalene can be purified.

24. Define boiling point temperature of a liquid.

25. Does water boil at 100°C under all conditions of pressure ?

(v) Lighter gases travel at a faster speed than heavier gases.

(vi) Heavier gases cannot move upwards.

(vii) Kelvin scale is better than Celsius scale for expressing the temperature.

33. Define melting point of a solid. Discuss its significance.

34. Discuss in brief the scales of measuring temperature and pressure.

35. Clothes dry fast on a windy day. Why?

36. Predict the physical state of matter in each case from the following charactersitics.

(a) It is rigid and highly incompressible.

(b) It has a definite volume but no definite shape.

(c) It expands very little upon heating.

(d) It represents the most highly compressible-form of matter.

37. A substance A has a definite volume and it assumes the shape of any container in which it is kept. Predict the physical state of the substance.

LONG ANSWER QUESTIONS

36. Define liquid state of a substance. Write the important characteristics associated with the liquid state.

37. How will you account for the following :

(a) Density of a substance in the solid state is more than in the liquid state.

(b) Ice floats over water although it is a solid.

(c) Diffusion is maximum in the gaseous state of a substance.

38. Give the main points of distinction in the three states of matter in a tabular form.

39. Discuss the effect of increasing temperature and pressure on the liquid state of a substance. Are these effects similar? If not, assign reason.

40. The three states of a substance i.e., solid, liquid and gas can be easily reversed. Explain.

41. What is evaporation ? In what way is it different from boiling?

42. Discuss the various factors which influence evaporation.

43. What is sublimation ? How is naphthalene sublimated ? How does the process of sublimation help in purifying an impure sample ?44. (a) What is evaporation ? Discuss in brief the factors upon which the evaporation of a liquid depends

?

(b) Give the main points of distinction between evaporation and boiling.