

# Matter in Our Surrounding

## Matter

### Q.1 What is matter ?

**Ans :** Anything which occupies space and has mass is called matter. In other words, anything which has mass and volume is called matter.  
For example : chair, table, computer, mouse etc.

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### Q.2 Name the three common states of matter. Give one example of each ?

**Ans :** Solid (ice), liquid (water), gas (oxygen)

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### Q.3 A substance has a definite shape as well as definite volume. Which physical state is represented by this statement ?

**Ans :** Solids have a definite shape as well as a definite volume.

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### Q.4 List the important properties of matter ?

**Ans :** Properties of matter :

- Matter is made up of small particles
  - These particles are very small in size
  - These particles are moving constantly
  - These particles have spaces between them
  - Particles of matter attract each other because of force of attraction.
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### Q.5 Identify the matter from the given terms :

**Ans :** Chair, Air, Love, Hate, Almonds, Thought, Cold, Cold drinks.

Chair, Air, Almonds, Cold drinks are different forms of matter

## Diffusion

**Q.6 Give reasons for the following observation: The smell of hot sizzling food reaches you several meters away , but to get the smell from cold food you have to go close ?**

**Ans :** Solids diffuse at a very slow rate. But, if the temperature of the solid is increased, then the rate of diffusion of the solid particles into air increases. This is due to an increase in the kinetic energy of solid particles. That why smell of hot sizzling food reaches us even at a distance, but to get smell from cold food we have to go close

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**Q.7 A diver is able to cut through water in a swimming pool. Which property of matter does this observation show ?**

**Ans :** The ability of a diver to cut through water in a swimming pool shows that matter is made up of particles.

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**Q.8 What provides the best evidence about the random motion of particles in matter ?**

**Ans :** Diffusion and Brownian motion, provide the best evidence about the random motion of particles in matter

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**Q.9 What is diffusion ?**

**Ans :** The process of mixing of two substances due to Brownian motion of particles is called diffusion. As temperature increases, Brownian motion increases and diffusion becomes fast. Diffusion takes place from higher concentration to lower concentration. It is a natural process. It takes place in solid, liquid and gases.

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**Q.10 Which term is used to describe the mixing of copper sulphate with water in a beaker on its own ?**

**Ans :** Diffusion is used to describe the mixing of copper sulphate with water in a beaker on its own.

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**Q.11 When crystals of potassium permanganate are placed at the bottom of a beaker of water, water in the whole beaker turns pink on its own . Which property of matter is represented by this process and name the process.**

**Ans :** When crystals of potassium permanganate are placed at the bottom of a beaker of water, water in the whole beaker turns pink on its own. This process



represents that matter is made up of small particles which diffuse from a region of higher concentration to a region of lower concentration. This phenomenon is named as Diffusion

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**Q.12 Which properties of matter were proved by mixing sugar in water ?**

**Ans :** This experiment proves that :

- (i) Matter is made up of tiny particles
  - (ii) There is a space between these particles.
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**Q.13 Which process is involved in the spreading of fragrance of incense stick from a corner to the whole room ?**

**Ans :** Diffusion process is involved in the spreading of fragrance of incense stick from a corner to the whole room indicates that particles of matter moves from higher to lower concentration.

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**Q.14 Give two examples of Diffusion ?**

**Ans :** (i) If a bottle of perfume is opened in one corner of a room, it spreads in whole room.

(ii) If we drop a little ink in a beaker of water it will spread by itself in the beaker of water.

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**Q.15 Explain Brownian motion ?**

**Ans :** Mr. Robert Brown, a Scottish botanist observed the random movement of pollen grains in water in 1827, this movement of particles is called Brownian motion

Dust moves randomly because the random moving particles of air collide with dust particles

## Three states of matter

**Q.16 Define solid, liquid and gas with example ?**

**Ans : Solid :** Solids have fixed volume and shape in solids. In solids, particles are closely packed and they have very less spacing between them

**Examples** : stone, wood, brick etc .

**Liquid** : Liquids have fixed volume but indefinite shape. In liquids there is a weaker force of attraction and more spacing between the particles

**Examples** : milk, water, petrol etc.

**Gas** : Gases have indefinite shape and volume particles of gases have very large spacing and very weak attraction between them

**Examples** : air, oxygen, hydrogen etc

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**Q.17 Name the physical state of matter which can be easily compressed ?**

**Ans : Gas** : Gas is highly compressible

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**Q.18 How do solids, liquids and gases differ in shape and volume ?**

**Ans** : Solids have a definite shape and a fixed volume, liquids have a definite volume but no fixed shape while gases neither have a definite volume nor a definite shape.

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**Q.19 Out of dry and wet air which is heavier ?**

**Ans** : Since water vapours are heavier than air, therefore, wet air is heavier than dry air.

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**Q.20 Out of solids, liquids and gases, which one has .**

**Ans** : (a) Maximum movement of particles

(b) Maximum inter particle forces of attraction .

(c) Minimum spaces in between constituent particles.

(a) Because of large spaces between the particles of a **gas**, gases have maximum movement of particles.

**(b) and (c) In Solids**, the spaces between the constituent particles are the minimum and hence the forces of attraction are the strongest.

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**Q.21 How will you justify that ice, water and steam are the three states of a substance and not different substances ?**

**Ans :** When ice is melted, water is produced and when water is heated steam is produced on the other hand, when water is cooled further, ice is produced. Therefore ice, water and steam are the three states of a substance.

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**Q.22 Name the two gases which are supplied in compressed form ?**

**Ans :** The two gases which are supplied in compressed form are.

(i) LPG (Liquefied petroleum gas ) in homes

(ii) Oxygen in hospitals

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**Q.23 Compare the properties of solids, liquids and gases ?**

**Ans :**

Property	Solid	Liquid	Gas
1. Packaging	The constituent particles are very closely packed	The constituent particles are less closely packed	The constituent particles are free to move
2. Inter particle distance	Inter particle distance are The smallest	Inter particle distance are larger than those in solids but smaller than gases	Largest inter particle distances
3. Shape and volume	Definite shape and fix volume	No Definite shape but fix volume	Neither definite shape nor a fix volume
4. Compressibility	Completely In compressible	Almost in compressible	Highly compressible
5. Rigidity /fluidity	Possess rigidity	They possess fluidity	Highest fluidity

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**Q.24 Write down three application of compressed gas ?**

**Ans :** (i) Compressed helium gas is filled in air balloons



(ii) Compressed natural gas (CNG) is filled in cylinders which are used in vehicles.

(iii) Liquefied petroleum gas (LPG) is filled in cylinders which are used for cooking.

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**Q.25 Liquids generally have lower density as compared to solids. But you must have observed that ice floats on water. Find out why ?**

**Ans :** Ice has cage like structure, i.e, when water freezes to form ice, a number of empty spaces are created. As a result, volume increases for the same mass of water. of we can say that density of ice is lower than that of water an hence ice floats over water.

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**Q.26** Comment upon the following : Rigidity, Compressibility, fluidity, Density, shape and volume

**Ans : Compressibility :** It means tendency to decrease volume when some outside force is applied. Spacing between particles of gases can be decreased so gases have high compressibility. But spacing between particles of solid or liquid can not be decreased, so they cannot be compressed.

**Applications of compressed Gas -**

- Compressed helium gas is filled in air balloons.
- Compressed natural gas (CNG) is filled in cylinders which are used for cooking.

**Rigidity -** It is the property of a substance to resist any deformation like change in shape, being compressed etc. Solids have high rigidity, liquids have less rigidity and gases have no rigidity.

**Fluidity**

- Fluids are substances which can flow
- Liquids and gases have fluidity
- But solids do not have fluidity

**Density :** It means mass per unit volume

Density = Mass / Volume

Particles in solids are very closely packed So they have high density. In gases, there is plenty of space between particles due to which density is low.

## Shape and volume

**Shape** - Due to less attraction force between particles, particles of liquid and gas can easily move around. This they can take any shape as per the container.

### Volume -

- gases have so little attraction among particles that they can easily change spacing between them selves, So they can easily change their volume.
- In liquids, attraction force is large enough So that spacing between particles does not change easily, So liquid has fixed volume and same with solids.
- Solids can change shape on applying force Liquids and gases do not need force to be applied for changing shape.
- Some solids have gas inside them, So they can be easily squeezed to change shape.

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**Q.27 Arrange the following substance in increasing order of forces of attraction between the particles ?**

**Oxygen , Water & Sugar ?**

**Ans :** The forces of attraction are the strongest in solids, followed by liquids and weakest in gases

Solids > liquids > gases

Therefore, the force of attraction between particles increases in the order

Oxygen < Water < Sugar

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**Q.28 Give two reasons to justify -**

**Ans :** (a) Water at room temperature is a liquid

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

(a) Water is a liquid because of the following two reasons :

(i) **liquids do not have a fixed shape** : They take the shape of the container in which they are kept

(ii) **Liquids have a fixed volume** : Take 100 ml of water in a beaker. Transfer it to a glass, It still remains same, therefore, water is a liquid.

(b) An Iron almirah is a solid at room temperature due to following reasons :

(i) Iron almirah has a **fixed shape and a fixed volume**

(ii) If we apply force in limits, the volume of iron almirah cannot be changed, hence it is **incompressible**, So it is a solid.

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### **Q.29 Define density and write down its S.I unit ?**

**Ans :** Density means mass per unit volume

Density = mass / volume

Particles in solids are very closely packed so they have high density. In gases, there is plenty of spaces between particles due to which density is low.

S.I unit of density is  $\text{kgm}^{-3}$  (kilogram per cubic meter).

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### **Q.30 Why is oxygen called as gas ? Give two reasons ?**

**Ans :** (i) Oxygen neither has a fixed shape nor a fixed volume.

(ii) Oxygen exerts pressure due to the collisions of the molecules on the walls of the containing vessel.

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### **Q.31 What are the properties of gases ?**

**Ans :** (i) Gases can be compressed easily

(ii) Gases neither have fixed shape nor fixed volume

(iii) Gases have very low densities

(iv) Gases have fluidity

(v) Particles of gases have very large spacing and very weak attraction between them.

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### **Q.32 When ink overflows from a fountain pen, We use blotting paper to remove excess of ink on the paper. Why ?**

**Ans :** We use blotting paper to remove excess of ink on the paper from a fountain pen because ink is a liquid which diffuses into the blotting paper.

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**Q.33 What is meant by physical property of substance ? Name the important physical property ?**

**Ans :** Physical properties : Those properties of a substance which we can observe without altering the identity of the state.

- Colour
- Smell
- Density
- Solubility
- Melting point and boiling point
- Conductivity

**Measurement of Temperature and change of state of matter**

**Q.34 Write down different units used to measure temperature ? Write down the relation between them ?**

**Ans :** Different units can be used to measure the temperature in different scales. Most known units of measurement are kelvin and Degree Celsius.

(i) Kelvin is the SI unit of temperature . The symbol of kelvin is K

(ii) Degree Celsius is written as '°C' and it is a common unit of temperature.

Relation between temperature in °K & Temperature in Celsius.

Temperature in K = Temperature in ° C + 273

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**Q.35 Define the term inter - conversion of matter ?**

**Ans :** The phenomenon of change of one state of matter into another and back to the original state is called inter - conversion of matter.

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**Q.36 Define melting point and Boiling point ?**

**Ans : Melting point :** It is the temperature at which a solid changes to liquid. Different Higher melting point means large force of attraction between particles.

**Boiling point :** It is the temperature at which a liquid changes to gas.

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**Q.37 Define latent heat of Fusion, is it same as latent heat of vaporization ? Comment ?**

**Ans : Latent heat of fusion** is the amount of heat required to convert 1 kg of solid at its melting point to liquid at same temperature.

**Latent heat of vaporization** It is the amount of heat required to convert 1 kg of liquid at its boiling point to gas at same temperature. Different liquid has different latent heat of vaporization.

**No**, Latent heat of fusion is not same as latent heat of vaporization.

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**Q.38 Convert the following**

**Ans :** (a) 573 K

(b) 36°C

(c) 373°C

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

(b)  $36 + 273 = 309^{\circ}\text{K}$

(c)  $373 + 273 = 646 \text{ K}$

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**Q.39 Why is kelvin considered as the best scale of measuring the temperature?**

**Ans :** Kelvin is the best scale for measuring the temperature because it has no maximum temperature and it can measure temperature to any extent.

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**Q.40 The boiling point of alcohol is 78°C . What is this temperature on kelvin scale ?**

**Ans :**  $\text{K} = ^{\circ}\text{C} + 273$

$= 78 + 273 = 351 \text{ K}$

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**Q.41 The kelvin scale temperature is 0K. What is the corresponding Celsius scale temperature ?**

**Ans :**  $^{\circ}\text{C} = \text{K} - 273 \rightarrow$  Conversion formula

$^{\circ}\text{C} = 0 - 273$

temperature in  $^{\circ}\text{C} = - 273^{\circ}\text{C}$

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**Q.42 What is the normal room temperature ?**

**Ans :**  $25^{\circ}\text{C}$  or  $298\text{ K}$

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**Q.43 Out of water and alcohol, which is more volatile ?**

**Ans :** The boiling point of alcohol ( $78^{\circ}\text{C}$  or  $35 / \text{K}$ ) is lower than that of water ( $100^{\circ}\text{C}$ ), therefore alcohol is more volatile than water.

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**Q.44 State two factors on which change of state of matter depends ?**

**Ans :** The change of state of matter mainly depends upon two factors.

(i) Temperature

(ii) Pressure

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**Q.45 Can kelvin scale have negative temperatures ?**

**Ans :** No. because on the kelvin scale the lowest theoretical temperature which can be obtained i.e ( $- 273^{\circ}\text{C}$ ) is taken as OK.

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**Q.46 Is dry ice the same thing as ordinary ice ?**

**Ans :** No, dry ice is not same as ordinary ice. Dry ice is a solid Carbon dioxide, while ordinary ice is a freezed water.

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**Q.47 What is sublimation ?**

**Ans :** Sublimation is a process in which a such substance, which go under sublimation are known as sublime for eg : Camphor, naphthalene balls,

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**Q.48 Explain Sublimation process of ammonium chloride ?**

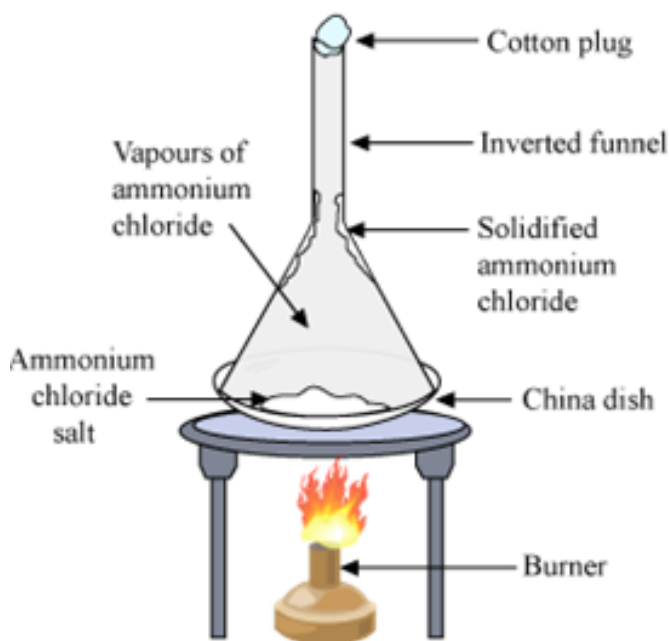
**Ans :** Sublimation of ammonium chloride is explained below :

- \* Take some crushed ammonium chloride (solid) in a china dish.
- \* There is an inverted funnel over the china dish.
- \* There is a cotton plug on the stem of the funnel.



\* Heat the crushed ammonium chloride, we found that ammonium chloride directly changes into vapours.

\* After some time, we see that vapours of ammonium chloride again solidified at the surface of funnel.



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**Q.49 Camphor disappears with out leaving any residue. Explain ?**

**Ans :** Camphor disappears without leaving any residue because of sublimation as it changes its state directly from solid to gas without changing to liquid.

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**Q.50 Why do we feel cool when we touch a piece of ice ?**

**Ans :** We feel cool because the temperature of ice is  $0^{\circ}\text{C}$  and our body's temperature is higher than  $0^{\circ}\text{C}$ .

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**Q.51 Both the process of evaporation and boiling involves the change of state from liquid to gas but still they are different from each other. Justify ?**

**Ans :** Evaporation is different from each boiling because

(i) Evaporation is a natural phenomenon, occurs on the surface of the water. Where as boiling is an artificial phenomenon.

(ii) Evaporation is a slow process, whereas boiling is a fast process and it occurs in the bulk of liquid.

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### **Q.52 How can you show that evaporation causes cooling ?**

**Ans :** When we put some acetone on our hand, after sometime we feel coolness on our hand, after sometime we feel coolness on our hand because the acetone absorbs kinetic energy from our hand & evaporates and evaporation causes cooling.

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### **Q.53 Define the term evaporation. What is the effect of temperature on it ?**

**Ans :** The process of conversion of liquid to gas due to escaping of particles from liquid surface (even below boiling point) is called evaporation. Evaporation takes place only at the surface of liquid. Evaporation takes place even at room temperature also. Evaporation speeds up with rise in temperature.

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### **Q.54 Explain the effect of pressure on solid, liquid and gas ?**

**Ans : Effect of pressure on solid :**

- (i) There is no effect of pressure on solids
- (ii) Solids are non - compressible
- (iii) When the pressure is increased on a solid, it is deformed and finally broken down.

**Effect of pressure on liquid :**

- (i) There is no effect of pressure on liquid
- (ii) Liquids are non - compressible i.e liquids cannot be compressed since there is not enough space between their particles to get compressed

**Effect of pressure on gas :**

- (i) The volume of gas decreases with increase in pressure
  - (ii) Since there is lot of space between particles of gas, gas is highly compressible.
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### **Q.55 Write down the factors affecting Evaporation ?**

**Ans :** Factors affecting Evaporation :

- (i) Temperature



- (ii) Surface area
  - (iii) Humidity
  - (iv) Wind
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**Q.56 The latent heat of fusion of ice is  $3.34 \times 10^5 \text{ J / Kg}$ , what does this means ?**

**Ans :** The latent heat of fusion of ice is  $3.34 \times 10^5 \text{ J / kg}$  means that  $3.34 \times 10^5 \text{ J / kg}$  . Heat is required to change 1 kg of ice into water at its melting point at the same temperature

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**Q.57 Name the process involved in this conversion ?**

**Ans :** (i) Solid turns into gas

(ii) Gas turns directly into solid ?

The name of the processes are

(i) Solid turn into gas is sublimation

(ii) Gas turns directly into solid is sublimation

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**Q.58 Which property is shown by ammonium chloride but not by sodium chloride ?**

**Ans :** Sublimation is the property that is shown by ammonium chloride but not by sodium chloride.

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**Q.59 Which process causes dry ice to change into carbon dioxide ?**

**Ans :** Sublimation causes dry ice to change into carbon dioxide.

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**Q.60 Why solid carbon dioxide is known as dry ice ? What happen when we heat it ?**

**Ans :** Solid carbon dioxide is known as dry ice because it looks like ice and does not melt on heating. When we heat solid carbon dioxide, it directly gets converted to vapour without passing through the liquid state.

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**Q.61 Is it possible to store solid carbon dioxide at low pressure ?**



**Ans :** No, its not possible to store solid carbon dioxide at low pressure because at low pressure it turns into vapour

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**Q.62 Define latent heat and write down its types ?**

**Ans : Latent heat :** Latent heat is the heat supplied to a substance during the change of its state.

Types of latent heat:

(a) Latent heat of fusion

(b) Latent heat of vaporization.

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**Q.63 Explain effect of wind on Evaporation ?**

**Ans :** - Evaporation increases with the increase in wind speed and decrease with decrease in wind speed. This means rate of evaporation is directly proportional to the speed of wind.

- Speedy wind propelled away some of the particles of water with it which speeds up the rate of evaporation.

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**Q.64 Explain the cooling effect of evaporation while sweating ?**

**Ans :** When we sweat, water in it evaporates taking latent heat from our body.

This cause cooling.

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**Q.65 Explain the cooling effect of ear then pot (pitcher) ?**

**Ans :** The earthen pot has minute pores through which water sips out and droplets of water deposit on outer surface of pot. When this water evaporates, it takes latent heat from pot and water inside. So water inside cools down

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**Q.66 When, we use saucer to drink tea, its cools down faster as compared to cup ? why ?**

**Ans :** When tea is put in saucer evaporation is faster due to more surface area. This cools tea faster and makes it easier to drink.

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**Q.67 Why we should not wear warm clothes in summer?**

Or

**Why it is recommended to wear cotton clothes in summer ?**

**Ans :** Cotton absorbs water and thus sweats very fast so sweat comes outside clothes in contact with atmosphere. Then it evaporates and gives cooling

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**Q.68 Desert coolers are less effective during rainy season ? Why ?**

**Ans :** Cooler works on the concept of evaporation when humidity is high, evaporation is very slow and thus cooler is ineffective. But in areas of low humidity, evaporation is fast and thus cooler is effective.

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**Q.69 Which is the fourth state of matter ? where does it exist ? Explain ?**

**Ans :** Fourth state of matter is

**Bose - Einstein condensate (BEC)**

**Ans :** - In 1920; Indian scientist **Satyendra Nath Bose** did some calculation based on which **Albert Einstein** predicted that a new state of matter should exist

- This new state was named as Bose - Einstein Condensate (BEC)
  - In 2001, Cornell, Ketterle and Wieman of USA received Nobel prize for actually making this state in laboratory.
  - BEC is made by cooling a gas to super low temperature.
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**Q.70 What is the fifth state of matter called ? How is it formed ?**

**Ans :** Fifth state of matter is called **plasma**.

- **Plasma** is found in some glowing substances like sun stars, fluorescent tube, neon light etc.

- Plasma consists of super excited ionized particles of gases for

Ex. Sun : Helium gas

- These excited ionized particles glow with different colours based on the gas present in them.

- In stars and sun, plasma is formed because of nuclear fusion in stars.



- Plasma does not have a definite shape or a definite volume unless enclosed in a container

- Plasma may be defined as an electrically neutral medium of positive and negative particles

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**Q.71 Write down various physical states of water with its temperature in degree Celsius ?**

**Ans :** The physical states of water

(i) at 0° C - ice

(ii) at 25°C - water

(iii) at 100°C - vapour

(iv) at 25°C - steam

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**Q.72 Define the process of condensation and freezing ?**

**Ans : Condensation :**

It is a process in which a gas changes into a liquid on cooling

**Freezing :**

It is a process in which a liquid changes into a solid on cooling

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**Q.73 Give reason, Why naphthalene balls kept stored in warm clothes disappear over a period of time ?**

**Ans :** Naphthalene balls kept between clothes disappear over a period of time because these balls undergo sublimation and form naphthalene vapours, which disappear into the air.

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**Q.74 In which unit is pressure measured ?**

**Ans :** Pascal

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**Q.75 What is the physical state of water at 250°C ?**

**Ans :** The boiling point of water is 100 degree Celsius. Therefore water changes into vapor after 100 degree Celsius. Therefore the physical state of



water at 250 degree Celsius is "Gas".

### Value based questions :

**Q.1 A student spilled a bottle of ammonia in one corner of the laboratory. Soon the whole laboratory was filled with pungent irritating smell. The students immediately opened the windows and doors and switched on the exhaust fans. After sometime, students got relief Explain what did actually happen ?**

**Ans :** Due to random motion , the particles of ammonia gas readily moved into the spaces between the particles of air present in the laboratory. As a result of this diffusion, the pungent smell of ammonia. However, when the windows and doors were switched on, fresh air was drawn into the laboratory when whole of ammonia diffused out of the laboratory students feel relief.

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**Q.2 Ordinary water boils at 100°C. Can it be made to boil at 95°C or 105°C**

**Ans :** Yes, The boiling point of a liquid depends upon the pressure acting on it water boils at 100°C under one atmospheric pressure . If the pressure acting on water is reduced below one atmosphere, it can be boil at 95°C, but if pressure acting will be increased above one atmosphere, it can be boil at 105°C

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**Q.3 Two cubes of ice are pressed hard between the palms, when the pressure is released, the two cubes join together How?**

**Ans :** When two cubes of ice are pressed hard between the palms due to applied pressure the freezing point of ice decreases, some of the ice out of two cubes melts. latent heat of fusion needed for melting is taken from the surrounding and when pressure is released, energy equal to latent heat of fusion is given and the two cubes again freezes to join together.