



# 1. Matter in Our Surroundings

## Check Point 01

### 1. Question

What was the basic classification of element in ancient time? Name them.

### Answer

In ancient time, the element is classified in the form of five basic elements – the “Panch Tatva” which are air, earth, fire, sky and water



According to ancient people, living or non-living things was made up of these five basic elements.

### 2. Question

- (i) As the temperature rises, particles move .....
- (ii) With increase in temperature, the kinetic energy of the particles also .....
- (iii) The rate of diffusion of liquids is ..... than that of solids.

### Answer

i. faster

Particles of matter are continuously moving and as we increase the temperature, particles move faster. Their speed increases to a great extent.

ii. increases

Particles of matter are continuously moving that is, they possess what we call the kinetic energy. As the temperature increases, kinetic energy of the particles also increases.



iii. higher

The rate of diffusion of liquids is higher than that of solids because in the liquid state, the particles move freely. There is so much space between each other. In solids, the particles are packed tightly and cannot move freely.

### 3. Question

A piece of chalk can be broken into small particles on hammering, but it is not possible to break a piece of iron in the same fashion. Why?

#### Answer

A piece of chalk can be broken into small particles on hammering, but it is not possible to break a piece of iron in the same fashion because the force of attraction between particles of the chalk is too weak than the force of attraction between the particles of iron. Hence we can easily break chalk by hammering but not pieces of iron.

### 4. Question

Find the density of a handful of sand having a mass of 208 g and it displaces a volume of 80 mL of water.

#### Answer

Given:

Mass of sand (m) = 208g

Volume of water (v) = 80mL

To calculate density (p), apply the formula given:

$$\text{Density} = \frac{\text{Mass}}{\text{Volume}}$$

$$\text{Density} = \frac{208\text{g}}{80\text{mL}}$$

$$\text{Density} = 2.6\text{g/mL}$$

We know that  $1\text{mL} = 1\text{cm}^3$

Thus, the density of sand is  $2.6\text{g/cm}^3$ .

### 5. Question

What is fluid?

#### Answer

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Liquids have no fixed shape but have a fixed volume. They take up the shape of the container in which they are kept. Liquids flow and change shape, so they are not rigid and can be called fluid.

Examples of Fluid:

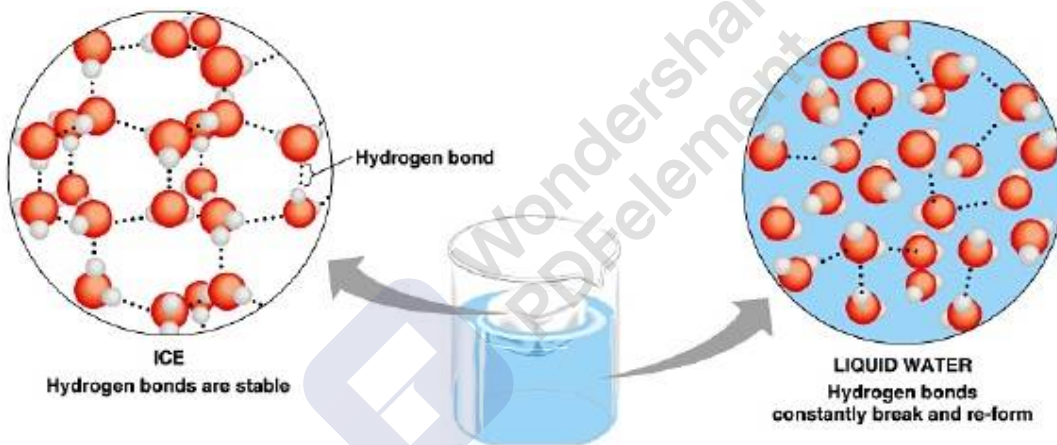
- i. River flowing
- ii. Blood circulating in our body.

## 6. Question

Why does solid ice float on water?

### Answer

Solid ice floats on water because it has a lesser density than water. This means solid ice is lighter than water. The heavier water moves the lighter ice, hence ice floats to the top.



Water molecules in ice (solid water) are farther apart than the molecules in liquid water

## 7. Question

By which physical process the fragrance of burning an incense stick spreads all around?

### Answer

The fragrance of burning incense stick spreads all around by a physical process called diffusion. The spreading and intermixing of a substance with another substance due to the continuous motion of the particles is called diffusion.

The figure is shown here:



## Check Point 02

### 1. Question

(i) Higher the melting point of a substance, ..... will be the force of attraction between its particles.

(ii) Particles from the bulk of the liquid gain energy to change into ..... state.

(iii) Naphthalene undergoes the process of .....

### Answer

i. lesser

The temperature at which solid melts to become a liquid at the atmospheric pressure is called its melting point. Higher the melting point of a substance, more easily the substance gets converted into a liquid which has less force of attraction between its particles.

ii. vapour

Boiling is a bulk phenomenon. Particles from the bulk of the liquid gain enough energy to change into the vapour state.

iii. Sublimation

Naphthalene undergoes the process of sublimation. Sublimation is a change of state directly from solid to gas without changing to liquid state or vice versa.

### 2. Question

Define vapourization.

### Answer

Vapourization is the process that takes place when a substance is converted from a liquid or a solid to gas. In vapourization, the change of state occurs.

### 3. Question



Why particles start vibrating in solids?

**Answer**

Particles start vibrating in the solids because:

- i. On increasing the temperature of solids, the kinetic energy of the particles increases.
- ii. Due to the increase in kinetic energy, the particles start vibrating with greater speed.

**4. Question**

Convert the temperature of 70° C to the Kelvin scale.

**Answer**

To convert the temperature in celsius scale to the temperature in kelvin scale.

●  $70^{\circ}\text{C} = (273 + 70)\text{K}$

● 343

**5. Question**

What is the value of the latent heat of fusion of ice?

**Answer**

Latent heat of fusion is the amount of heat energy required to change 1kg of a solid into liquid at its melting point. The latent heat of fusion of ice is 80cal/g.

**6. Question**

Why burns caused by the steam are much more severe than

boiling water?

**Answer**

Burns caused by the steam is much more severe than boiling water because:

- i. Water vapour (steam) at 373k (100°C – boiling point) have more energy than the boiling water at the same temperature.
- ii. Particles in steam have absorbed extra energy in the form of latent heat of vaporization.
- iii. Hence, due to this extra energy, steam causes more burns than boiling water.

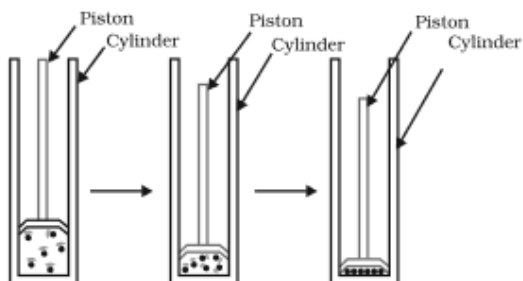
**7. Question**



How gases can be liquefy?

### Answer

Gases can be liquefy by applying pressure and reducing temperature.



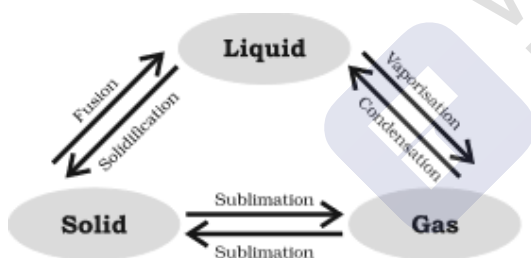
By applying pressure, the particles can be brought closer.

### 8. Question

What is the major factor which determines the state of matter?

### Answer

Pressure and temperature are the major factors which determine the state of matter whether it is solid, liquid or gaseous state.



**Interconversion of three states of matter**

### Check Point 03

#### 1. Question

What is the SI unit of pressure? Give its value in atm unit.

### Answer

The SI unit of pressure is Pascal (Pa).

Its value in 1 atmospheric pressure is:

$$1 \text{ atmosphere (atm)} = 1.01 \times 10^5 \text{ Pa}$$



Note: Atmospheric pressure is the pressure of air in the atmosphere. The atmospheric pressure at sea level is 1 atm.

## 2. Question

By which physical process wet clothes dry up?

### Answer

Wet clothes dry up by the physical process of evaporation:

- i. If the surface area is increased, the rate of evaporation also increases.
- ii. While putting clothes for drying up, we spread them out (surface area increased)
- iii. As a result, the rate of evaporation increases and wet clothes dry up fast.

## 3. Question

Name the chemical compound contains in nail-polish remover.

### Answer

Acetone is the chemical compound is present in nail polish remover.

## 4. Question

Which state of matter is responsible for the glow of the sun and the stars?

### Answer

There is a fourth state of matter- "plasma". Plasma state is mainly responsible for the glow of the sun and the stars.

## 5. Question

Write the full form of BEC.

### Answer

The full form of BEC is Bose-Einstein condensate. A Bose Einstein condensate is the fifth state of matter. This state does not exist under normal conditions.

## Chapter Exercise

### 1. Question

In what ways all substances around us are alike?

### Answer



All the substances around us are alike because everything around is made up of matter. The air we breathe, the food we eat, stones, clouds, water, plants, and animals – each thing is matter.

## 2. Question

In what ways, air can be considered as matter?

### Answer

Matter is defined as anything that occupies space, mass, and volume. Air occupies space and mass. For example:

- i. Take a balloon and blow air into it.
- ii. We will see that balloon expands which shows that air occupies space.
- iii. Weight the balloon and the mass difference.
- iv. The difference shows that air occupies mass.
- v. Hence, air can be considered as matter.

## 3. Question

Name the state of matter that has the tendency to maintain their shape when subjected to outside force.

### Answer

Solid state of matter has the tendency to maintain its shape when subjected to outside force:

For example: A rubber band (solid) changes shape under outside force and regains the same shape when the force is removed.

## 4. Question

When a drop of blue ink is put in water, the blue colour spreads and the whole solution becomes blue. Name the phenomenon due to which this happens.

### Answer

Diffusion is the process through which the ink is dissolved into the whole water. Ink has lesser density. Hence, it spreads throughout the water.

## 5. Question

Out of dry and wet air which one is heavier?

### Answer



Dry air is heavier than wet air because:

- i. Dry air has nitrogen ( $N_2$ ) and a molecule of oxygen.
- ii. Wet air has a water molecule ( $H_2O$ ).
- iii. Nitrogen and a molecule of oxygen in dry air are heavier than the water molecule of wet air.

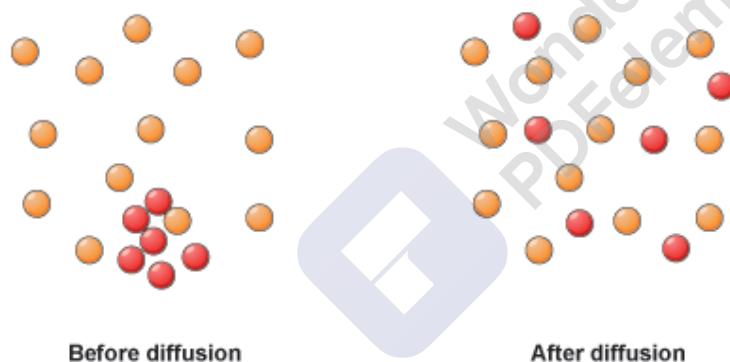
## 6. Question

Which property of gases helps us in detecting the leakage of LPG gas?

### Answer

The diffusion of gases helps us in detecting the leakage of LPG gas:

- i. The gases have large space between its particles.
- ii. The speed of the particles is also much faster.
- iii. This shows that the gases diffuse very fast into other gases.



## 7. Question

Convert the following temperatures to the Kelvin scale.

- (i)  $65^{\circ}\text{C}$
- (ii)  $300^{\circ}\text{C}$

### Answer

(i)  $65^{\circ}\text{C} = (273 + 65)\text{K}$

●  $338\text{K}$

(ii)  $300^{\circ}\text{C} = (273 + 300)\text{K}$

●  $603\text{K}$



## 8. Question

Is dry ice the same as ordinary ice?

### Answer

No dry ice is not same as ordinary ice.

- i. Solid carbon dioxide is known as dry ice.
- ii. It is stored under high pressure.
- iii. Solid  $\text{CO}_2$  gets converted directly to gaseous state on decrease of pressure without changing into liquid state.
- iv. Hence, solid  $\text{CO}_2$  is called dry ice.



Solid  $\text{CO}_2$  - Dry ice

## 9. Question

What is humidity?

### Answer

Humidity is the amount of water vapour present in the air. If the amount of water in air is already high, the rate of evaporation decreases. This leads to a decrease in humidity too.

## 10. Question

Give examples in which matter is present in the plasma state.

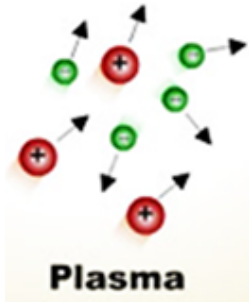
### Answer

Plasma state consists of super energetic and super excited particles. Some examples are:

- i. The sun and the stars glow because of the presence of plasma in them.
- ii. The plasma is created in the stars at very high temperature.



iii. The fluorescent tube and neon sign bulbs consist of plasma.



### 11. Question

Do solids diffuse? What happens on heating them?

#### Answer

Yes, solids diffuse. On heating the solids (by increasing the temperature), the following changes occur:

- i. The kinetic energy of the particles increases.
- ii. The particles start vibrating with greater speed.
- iii. As a result, the particles leave their fixed positions and start moving freely.
- iv. It changes to liquid state or gaseous state.

### 12. Question

With the help of an activity show that diffusion becomes faster with the increase in temperature.

#### Answer

To prove: Diffusion becomes faster with the increase in temperature.

#### Activity:

- i. Take a beaker A and beaker B.
- ii. Pour hot water in beaker A and cold water in beaker B.
- iii. Now, put a drop of ink in beaker A and beaker B.

Observations: We will observe that in beaker A, the ink spreads throughout the water faster than in the case of beaker B.

Conclusion: Hence, this activity proves that diffusion becomes faster with increase in temperature.

### 13. Question



Which is more denser, 1 kg cotton or 1 kg sand? Why?

### Answer

1kg of sand is denser than 1kg of cotton.

Explanation: As we know that mass of 1kg cotton is larger than that of 1kg sand.

From the formula:

$$\text{Density} = \frac{\text{Mass}}{\text{Volume}}$$

Density  $\propto$  Mass

As we can observe that density is directly proportional to mass. Larger is the mass, greater will be the density and vice versa. Hence, 1kg sand whose mass is larger will be more denser.

### 14. Question

Cotton is solid, but it floats on water. Why?

### Answer

Cotton floats on water because:

- i. Cotton is a solid which has minute (porous) holes.
- ii. The holes trap air inside themselves.
- iii. As a result, the overall, density of cotton becomes less than water.
- iv. Being lighter than water, cotton floats on water.

### 15. Question

Why are the particles in liquid held together less firmly as compared to solids?

### Answer

In liquids:

- i. The force of attraction between the constituent particles is lesser.
- ii. The rate of diffusion of liquids are higher than that of solids.
- iii. Hence, the particles of liquid move freely.
- iv. They have greater space between each other as compared to the particles in the solid state.



v. Due to large space in the liquid, their particles held together less firmly as compared to solids.

### 16. Question

How do you differentiate between a gas and a vapour?

#### Answer

Difference between gas and vapour:

| Gas                                                       | Vapour                                              |
|-----------------------------------------------------------|-----------------------------------------------------|
| i. A gas is formed at or above boiling point of a liquid. | Vapour is formed below the boiling point of liquid. |
| ii. A gas is formed at or above 100°C.                    | Vapour is formed below 100°C.                       |
| iii. A gas is formed by the process of boiling.           | Vapour is formed by the process of evaporation.     |

### 17. Question

Convert 273 K and 373 K into temperatures in Celsius scale. What is the physical state of water at these temperatures?

#### Answer

i.  $273\text{K} = (273 - 273)^{\circ}\text{C}$

●  $0^{\circ}\text{C}$

At  $0^{\circ}\text{C}$ , water can exist as both solid and liquid.

ii.  $373\text{K} = (373 - 273)^{\circ}\text{C}$

●  $100^{\circ}\text{C}$

At  $100^{\circ}\text{C}$ , water can exist as both liquid and gas.

### 18. Question

Name the state of matter in which the forces between the constituent particles are

(i) strongest

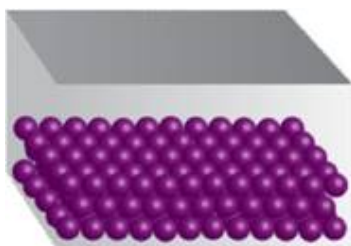
(ii) weakest

#### Answer

i. Solid



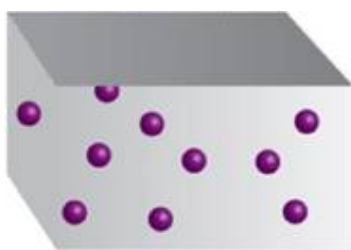
The force of attraction between the constituent particles of solid is strongest. The particles are closely arranged and tightly packed.



Solid

## ii. Gases

The force of attraction between the constituent particles of gases is weakest. In the gaseous state, the particles move freely and randomly at high speed.



Gas

## 19. Question

Sugar and salt when kept in different jars, take the shape of the jar. Are they solid? Justify your answer.

### Answer

Yes, sugar and salt are solids.

As we know that solids are rigid and have a fixed shape and volume.

- i. It is given that sugar and salt when kept in jars, take the shape of the jar.
- ii. But each granule of salt and sugar remain in their fixed shape and volume.
- iii. The shape and volume of each granule do not change at all. Hence, they are solids.

## 20. Question

A balloon when kept in sun, bursts after some time. Why?

### Answer

A balloon when kept in sun, bursts after some time because:



- i. As we know that on increasing the temperature, the kinetic energy of the gases increase.
- ii. When the balloon is kept in the sun, due to sun's heat (temperature increases), the kinetic energy of the gaseous particles also increases.
- iii. As a result, the balloon expands and continues to expand in the sun's heat.
- iv. There comes a point when the balloon bursts.

## 21. Question

Why do solids are generally denser than liquids and gases?

### Answer

Solids are generally denser than liquids and gases because:

- i. The space between the constituent particles of solid is less than that of liquids and gases.
- ii. The force of attraction between the particles is maximum.
- iii. Hence, large mass is concentrated in a very small volume.
- iv. Larger will be the mass, greater will be the density.
- v. In case of liquids and gases, there is so much space between the particles.
- vi. Hence they don't have large mass which is concentrated in a very small volume.
- vii. So the density of solids is general more than liquids and gases.

## 22. Question

With the help of an example, explain how diffusion of gases in water is essential?

### Answer

Diffusion of gases in water is essential:

- i. The gases from the atmosphere diffuse and dissolve in water.
- ii. The gases especially oxygen and carbon dioxide are essential for the survival of aquatic animals and plants.
- iii. The aquatic animals can breathe under water due to the presence of dissolved oxygen in water (diffusion of gases of atmosphere and water)
- iv. Thus, we may conclude that diffusion of gases in water is essential for the survival of aquatic animals and plants.



### 23. Question

How is high compressibility property of gas is useful to us?

#### Answer

High compressibility property of gas:

- i. Gases are highly compressible.
- ii. Due to the high compressibility, large volume of gas can be compressed into a small cylinder and transported easily.
- iii. The liquefied petroleum gas (LPG) cylinder that we use in our home for cooking is a compressed gas.
- iv. The oxygen supplied to hospitals in cylinders is also a compressed gas.
- v. Compressed natural gas (CNG) that we used as fuel in vehicles these days is also a compressed gas.

### 24. Question

The melting point of ice is 273.16 K. What does this mean?

Explain in detail.

#### Answer

The melting point is defined as the temperature at which a solid melts to become a liquid at the atmospheric pressure. The melting point of ice is 273.16K. This means that at 273.16K temperature, the ice melts and starts converting to liquid water.

### 25. Question

How are particles of matter affected with increasing or reducing pressure at a given temperature?

#### Answer

On increasing pressure:

- i. On increasing pressure, particles of matter come closer.
- ii. If pressure is increasingly applied on a gas, particles of the gas come more closer and a stage is reached when gas may change into liquid.
- iii. If pressure is increasingly applied on a liquid, it will change into liquid.

On reducing pressure:



- i. On reducing pressure, particles of matter expand.
- ii. If reducing pressure is applied on a liquid, it will change into gas.
- iii. If reducing pressure is applied on a solid, it will change into liquid.

## 26. Question

Why is it advisable to use pressure cooker at higher altitudes for cooking food?

### Answer

It is advisable to use pressure cooker at higher altitudes for cooking food because:

- i. A liquid boils only when its vapour pressure is equal to the atmospheric pressure.
- ii. At high altitudes, the atmospheric pressure is very low.
- iii. This causes the water to boil at a lower temperature which will take a lot of time for food to be cooked.
- iv. A pressure cooker stops the boiling of water at lower temperature.
- v. As a result, food cooks quickly.

## 27. Question

On a hot sunny day, why do we feel pleasant sitting under a tree?

### Answer

On a hot sunny day, we feel pleasant sitting under a tree because:

- i. As we know that tree has lot of leaves. Leaves continuously loss water through their small pores present in them.
- ii. When this lost water from tiny pores comes in contact with the surface of leaf, the water evaporates.
- iii. This evaporation causes cooling effect.
- iv. This makes the surrounding cool.

## 28. Question

- (i) Give reason.
- (a) Plasma is found in the stars.
- (b) The molecules of a solid have the strongest intermolecular forces.



(ii) Out of four gases  $\text{Cl}_2$ ,  $\text{CO}_2$ ,  $\text{CH}_4$ ,  $\text{N}_2$ , which gas would diffuse most rapidly and why?

### Answer

i. (a) Plasma is found in the stars because of very high temperature. The plasma state consists of highly super excited and energetic particles. The sun and the stars glow mainly because of the presence of plasma in them.

(b) The force of attraction between the constituent particles of solid is strongest. The particles are closely arranged and tightly packed. Hence they have strongest intermolecular forces.

(ii)  $\text{CH}_4$  gas would diffuse most rapidly because mass of  $\text{CH}_4$  is least among all the given gases. Diffusion is inversely proportional to the mass of the gas. Lesser is the mass, higher will be diffusion which means lighter gases diffuse faster. Hence,  $\text{CH}_4$  being a lighter gas would diffuse faster.

### 29. Question

When ice at  $-10^\circ\text{C}$  is slowly heated, temperature of ice gradually increases till  $0^\circ\text{C}$ , the temperature of the system remains constant when the ice change into water and then further rises. Explain the observation.

### Answer

When the ice is at  $0^\circ$  Celsius, the temperature of the system remains constant because the temperature (heat) is used up already to change the state of matter from solid to liquid. This phenomenon is known as latent heat of fusion.

### 30. Question

Write an activity of show that the rate of diffusion of liquids decreases with increase in density of the liquids.

### Answer

To show that the rate of diffusion of liquids decreases with increase in density of the liquids:

Activity:

- i. Take two beakers and pour some water in them.
- ii. Pour some honey in first beaker and pour small drops of ink in another beaker.
- iii. Leave both the beakers untouched for a while.

Observations: We will observe that the ink whose density is low gets mixed easily and spreads throughout the water. On the other hand, honey whose



density is high does not get mixed and takes more time to dissolve.

Conclusion: We conclude that rate of diffusion of liquids decreases with increase in density of the liquids.

### 31. Question

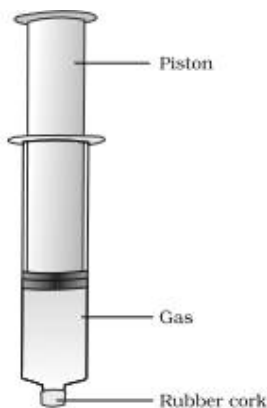
Show by an activity that the gases are highly compressible as compared to liquids.

#### Answer

To prove that the gases are highly compressible as compared to liquids:

Activity:

- i. Take two 100mL syringes and close their nozzles by rubber corks as shown in the figure below.
- ii. Remove the pistons from all the syringes.
- iii. Now fill water in the second syringe and leave the first syringe untouched.
- iv. Now insert the pistons back into both the syringes.
- v. Now try to compress the content of each syringe by pushing the piston.



Observations: We will observe that the syringe with gas is easily pushed in as compared to that of the syringe with water.

Conclusion: We will conclude that gases are highly compressible as compared to liquids.

### 32. Question

Describe an activity to determine the boiling point of water and melting point of ice.

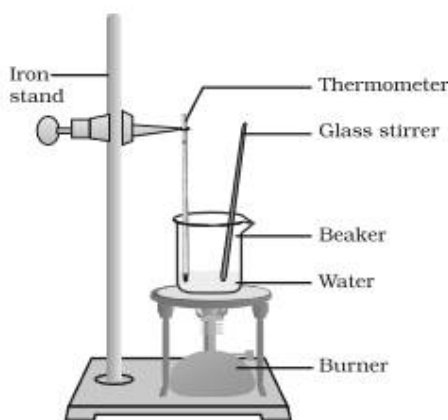
#### Answer

To determine the boiling point of water:



Activity:

- i. Take small amount of water in a beaker and suspend a thermometer so that its bulb (lower part) is in contact with the ice.
- ii. Put a glass rod in the beaker and start heating the beaker till the water starts boiling.
- iii. Note the temperature when the water converts into gaseous state.

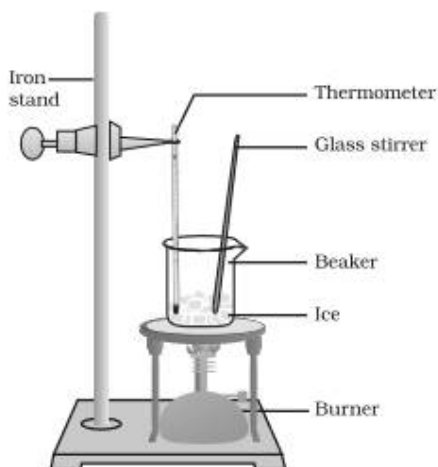


Conclusion: The temperature at which the water starts boiling at the atmospheric pressure is called boiling point of water.

To determine the melting point of ice:

Activity:

- i. Take about 150 g in beaker and suspend a thermometer so that its bulb (lower part) is in contact with the ice.
- ii. Start heating the beaker at a very low flame.
- iii. Note the temperature when the ice starts melting.





**Conclusion:** The temperature at which the ice starts melting into liquid state is called melting point of ice.

### 33. Question

Pressure and temperature determine the state of a substance. Explain this in detail.

#### Answer

Pressure:

On increasing pressure:

- i. On increasing pressure, particles of matter come closer.
- ii. If pressure is increasingly applied on a gas, particles of the gas come more closer and a stage is reached when gas may change into liquid.
- iii. If pressure is increasingly applied on a liquid, it will change into liquid.

On reducing pressure:

- i. On reducing pressure, particles of matter expand.
- ii. If reducing pressure is applied on a liquid, it will change into gas.
- iii. If reducing pressure is applied on a solid, it will change into liquid.

Temperature:

On increasing temperature:

- i. The kinetic energy of the particles increases.
- ii. Due to the increase in kinetic energy, the particles start vibrating with greater speed.
- iii. As a result, the particles leave their fixed positions and start moving freely.
- iv. If temperature is increasingly applied on solid, it will change into liquid state.

On decreasing temperature:

- i. On decreasing the temperature of any state, the particles come closer:
- ii. If we apply reducing temperature on gas, it will change into liquid.
- iii. If we apply reducing temperature on liquid, it will change into solid.

### 34. Question



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

### Answer

Ammonia is a strong gas which has a very pungent irritating smell.

- i. When the student spilled a bottle of ammonia, the diffusion of gases takes place.
- ii. The speed of the gas particles is very high and they have very large space between them.
- iii. As a result, the gases diffuse very fast with other gases.
- iv. Hence, smell of ammonia was filled with whole laboratory.

### 35. Question

Neha by mistake spilled a glass of water on the floor. Her mother suggested her to switch on the fan and after few minutes she found that all water disappeared. She asked her mother how this happened and where all water has disappeared. On the basis of this, answer the following questions:

- (i) What was the phenomenon associated with disappearance of water?
- (ii) Why did her mother suggest Neha to switch on the fan?
- (iii) What are the values associated with her mother?

### Answer

- i. Evaporation is the phenomenon which is associated with disappearance of water.
- ii. Her mother suggested Neha to switch on the fan because water will evaporate faster in the presence of high amount of air coming from the moving fan. As a result, water will evaporate quickly and the floor will be dried very fast.
- iii. Her mother is aware and concerned.

### Challengers

#### 1. Question

The SI unit of volume is cubic metre ( $\text{m}^3$ ). The common unit of measuring volume is litre (L). Then,  $1\text{L} = \dots\dots \text{dm}^3$ ,  $1\text{L} = \dots\dots\dots \text{mL}$  and  $1\text{mL} = \dots\dots\dots \text{cm}^3$ .

A.  $1\text{L} = 1\text{dm}^3$ ,  $1\text{L} = 100\text{mL}$ ,  $1\text{mL} = 10\text{cm}^3$



B.  $1\text{L} = 1\text{ dm}^3$ ,  $1\text{L} = 1000\text{ mL}$ ,  $1\text{ mL} = 1\text{ cm}^3$

C.  $1\text{L} = 10\text{ dm}^3$ ,  $1\text{L} = 1000\text{ mL}$ ,  $1\text{ mL} = 1\text{ cm}^3$

D.  $1\text{L} = 10\text{ dm}^3$ ,  $1\text{L} = 100\text{ mL}$ ,  $1\text{ mL} = 10\text{ cm}^3$

**Answer**

$1\text{L} = 1\text{ dm}^3$  where “dm” stands for decimetre.

$1\text{L} = 1000\text{mL}$  where “mL” stands for mililitre.

$1\text{mL} = 1\text{ cm}^3$  where “cm” stands for centrimetre.

**2. Question**

Find out the incorrect increasing/decreasing order in the following.

A. Force of attraction : Oxygen < water < sugar

B. Increasing intermolecular space : Solids < liquids < gases

C. Diffusion: Solid < liquid < gas

D. Kinetic energy : Hydrogen > honey > water

**Answer**

The correct option is (d) because as we know that kinetic energy of the gases is maximum, liquid is intermediate and solids is minimum. Hence, the order is:

Hydrogen (gas) > honey (solid but has high density than water) > water

**3. Question**

Kinetic energy of particles of water in three vessels X, Y and Z are  $E_x$ ,  $E_y$  and  $E_z$  respectively. Then the temperature of water in the three vessels are

A.  $T_Z > T_X > T_Y$

B.  $T_X > T_Y > T_Z$

C.  $T_X > T_Z > T_Y$

D.  $T_Y > T_Z > T_X$

**Answer**

It is given that kinetic energy of particles of water in three vessels X, Y and Z are  $E_x$ ,  $E_y$  and  $E_z$  respectively. As we know that on increasing the



temperature, kinetic energy of the particles also increases. Hence, the temperature of the water in the three vessels follows in the order:

$$T_X > T_Y > T_Z$$

#### 4. Question

Which of the following statement is correct?

- A. Sponge is compressible, but considered as a solid.
- B. A rubber band, change shape under force and not regains the same shape when force is removed?
- C. Mass multiply be volume is called density of its substance.
- D. The common name of solids and liquids is fluid.

#### Answer

A sponge has minute holes present in them. The air is trapped in these holes. When we press the sponge, the air is expelled out and we are able to compress it easily.

#### 5. Question

Match the column (I) (hypothesis) with column (II) (evidence that supports it)

| Column I<br>(Hypothesis) |                                                                     | Column II<br>(Evidence) |                                                                                    |
|--------------------------|---------------------------------------------------------------------|-------------------------|------------------------------------------------------------------------------------|
| P.                       | Particles in a solid move farther apart on heating.                 | I.                      | You can smell dinner cooking in the kitchen when you are in your bedroom.          |
| Q.                       | Different particles of different elements have different masses.    | II.                     | It is easier to squash a balloon filled with air than a balloon filled with water. |
| R.                       | Gas particles always spread out to fill the space available to them | III.                    | A metal rod expands on heating.                                                    |
| S.                       | Gas particles are father apart than liquid particles.               | IV.                     | A gold bracelet is much heavier than an identical silver bracelet.                 |

A. P-III, Q-IV, R-II, S-I

B. P-IV, Q-I, R-II, S-III

C. P-I, Q-II, R-III, S-IV



D. P-IV, Q-III, R-II, S-I

### Answer

Particles in a solid move farther apart on heating - A metal rod expands on heating, when we increase the temperature. The kinetic energy of the particles increases. As a result, the particles leave their fixed positions and start moving freely.

Different particles of different elements have different masses. A gold bracelet (has large mass and density) is much heavier than an identical silver bracelet (has lower density and mass).

Gas particles always spread out to fill the space available to them. For example: It is easier to squash a balloon filled with air than a balloon filled with water.

Gas particles are farther apart than liquid particles. For example: You can smell dinner cooking in the kitchen when you are in your bedroom.

### 6. Question

You are given the following substances with their boiling and melting points.

| Substance | Boiling point (°C) | Melting point (°C) |
|-----------|--------------------|--------------------|
| A         | -183               | -219               |
| B         | 445                | 119                |
| C         | 78                 | -15                |

Point out the physical states of A, B and C at room temperature (30°C).

A. A-Gas, B-Solid, C-Liquid

B. A-Gas, B-Liquid, C-Solid

C. A-Liquid, B-Solid, C-Gas

D. A-Solid, B-Liquid, C-Gas

### Answer

A is gas, B is solid and C is liquid.

### 7. Question

Among the following, which one is the false statement?

A. Sublimation is the process of conversion of a matter from its liquid state to gaseous state at specific conditions of temperature and pressure.



B. Naphthalene, camphor, iodine, ammonium chloride are undergo sublimation.

C. The melting point of ice is  $0^{\circ}\text{C}$  or  $273.16\text{ K}$

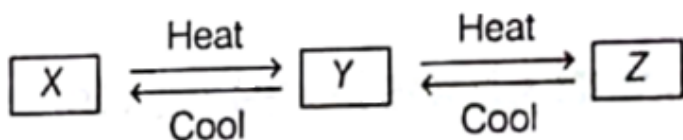
D. Condensation is the process of conversion of matter from its gaseous state to liquid state at specific conditions of temperature and pressure.

### Answer

Sublimation is a change of state directly from solid to gas without changing to liquid state or vice versa. Hence, the given statement is completely wrong.

### 8. Question

Effect of change of temperature on the physical state many be represented as



What is X, Y and Z?

A. X = Liquid state, Y = Gaseous stage, Z = Solid state

B. X = Solid state, Y = Gaseous state, Z = Liquid state

C. X = Liquid state, Y = Solid state, Z = Gaseous state

D. X = Solid state, Y = Liquid state, Z = Gaseous state

### Answer

As we increase the temperature of any state, particles expands:

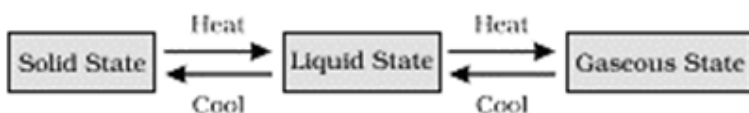
i. If we apply increasingly temperature on solid, it will change into liquid.

ii. If we apply increasingly temperature on liquid, it will change into gas.

iii. As we decrease the temperature of any state, the particles come closer:

iv. If we apply reducing temperature on gas, it will change into liquid.

v. If we apply increasingly temperature on liquid, it will change into solid.



### 9. Question



What will be the correct sequence of temperature when 25°C and 45°C are converted to Kelvin scale and Fahrenheit scale?

- A. 278.16 K, 308.16 K, 74° F, 103° F
- B. 298.16 K, 318.16 K, 74° F, 103° F
- C. 298.16 K, 318.16 K, 77° F, 113° F
- D. 318.16 K, 298.16 K, 77° F, 113° F

**Answer**

In Kelvin scale:

For 25°C:

- $25^{\circ}\text{C} = (273.16 + 27)\text{K}$
- 298.16 K

For 45°C:

- $45^{\circ}\text{C} = (273.16 + 45)\text{K}$
- 318.16 K

In Fahrenheit scale:

For 25°C:

Apply the formula:

$$\text{Temperature in Fahrenheit} = \text{Temperature in celsius} \times \frac{9}{5} + 32$$

$$\text{Temperature in Fahrenheit} = 25 \times \frac{9}{5} + 32$$

- Temperature in Fahrenheit = 77°F

For 45°C:

Apply the formula:

$$\text{Temperature in Fahrenheit} = \text{Temperature in celsius} \times \frac{9}{5} + 32$$

$$\text{Temperature in Fahrenheit} = 45 \times \frac{9}{5} + 32$$

- Temperature in Fahrenheit = 113°F

**10. Question**



The non-SI units and SI units of some physical quantities are given in Column I and Column II respectively. Match the units belonging to the same physical quantity.

| Column I |                | Column II |          |
|----------|----------------|-----------|----------|
| P.       | Degree Celsius | I.        | Kilogram |
| Q.       | Centimetre     | II.       | Pascal   |
| R.       | PSI            | III.      | Metre    |
| S.       | Milligram      | IV.       | Kelvin   |

A. P-IV, Q-III, R-II, S-I

B. P-III, Q-IV, R-I, S-II

C. P-II, Q-III, R-IV, S-I

D. P-I, Q-II, R-III, S-IV

### Answer

The non SI unit of temperature is degree celsius and its SI unit is Kelvin.

The non SI unit of length is centimetre and its SI unit is metre.

The non SI unit of pressure is PSI (per square inch) and its SI unit is Pascal.

The non SI unit of mass is kilogram and its SI unit is kilogram.