

Matter in Our Surroundings

ONE MARK QUESTIONS

- Why are light and sound not considered as matter?
Ans :
Light and sound are not considered as matter because they have no mass and do not occupy space.
- A rubber band is a solid, but it can change its shape. Why?
Ans :
A rubber band changes shape under force and regains the shape when the force is removed, this is due to less intermolecular force of attraction between the particles.
- We can get the smell of perfume sitting several metres away, why?
Ans :
This is because perfumes diffuse very fast and can reach to people sitting several metres away.
- When salt or sugar is poured into different kinds of vessels, why do they take the shape of vessel as they are solid?
Ans :
Salt or sugar takes the shape of containing vessel, but does not change its individual shape. For example : Sugar crystal is cubical and they remain cubical in any vessel.
- Sponge is a solid, yet we are able to compress it. Why?
Ans :
Sponge has very small holes throughout its structure. These holes are filled with air. When it is compressed, the air in the holes is squeezed out. Thus, we are able to compress it.
- We can easily move our hand in the air but to do the same through a solid block of wood. We need a karate expert. Why?
Ans :
In air, the inter-particle attractive forces are negligible and hence, it is easy to separate the particles in air and we can easily move our hand in air. The inter-particle forces are very strong in solids. So, it is not easy to separate the particles and it is not easy to move our hand through a solid block of wood.
- What is plasma?
Ans :
Plasma is a state of matter consisting of super excited particles of very high energy level.
- Express the boiling point of water in Celsius as well as Kelvin scale.
Ans :
100°C and 373 K.
- What is diffusion?
Ans :
The intermingling of molecules of one substance with that of the other is called diffusion.
- What happens to the rate of diffusion if the temperature is increased?
Ans :
With increased temperature, the rate of diffusion also increases as the particles gain energy and vibrate more.
- Define melting point.
Ans :
The temperature at which a solid melts to become liquid at the atmospheric pressure is called its melting point.

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- What is dry ice?
Ans :
Solid carbon dioxide obtained by cooling and applying pressure on carbon dioxide gas. It does not melt so it is called dry ice.
- What is humidity?
Ans :
The air holds water vapour, this air with water is called humid air and the amount of water vapour present in the air is called humidity.
- What is normal atmospheric pressure?
Ans :
The atmospheric pressure at sea level is 1 atmosphere and taken as the normal atmospheric pressure.

15. Give two examples of diffusion.

Ans :

Milk drops dissolved in water and perfume sprayed in a room.

16. Give the temperature at which water exists in two different phases/states.

Ans :

- (i) At 0°C water can be in solid or in liquid state.
- (ii) At 100°C water can be in liquid or in gaseous state.

17. What are fluids?

Ans :

The states of matter that can flow due to less intermolecular force of attraction are liquids and gases and are called fluids.

18. Define matter.

Ans :

Anything that occupies space and has mass and is felt by senses is called matter.

19. What happens if you put copper sulphate crystals in water?

Ans :

Copper sulphate crystals mixed between the spaces of molecules of water and disappear.

20. Give state of a matter if this substance has neither a fixed shape nor a fixed volume.

Ans :

Gas.

21. Predict the physical state of melting point of a substance is below the room temperature.

Ans :

Ice.

22. What do you mean by vapour?

Ans :

A substance that is found in gaseous state only at room temperature is called vapour.

23. State the effect of pressure on boiling point.

Ans :

Boiling point increases with increase in pressure.

24. Name any two substances which sublime.

Ans :

Camphor and naphthalene.

25. Define condensation.

Ans :

The change of solid state from liquid state on cooling

is also known as condensation.

26. Which is the slow process, evaporation or boiling?

Ans :

Evaporation.

27. What is the effect of surface area on rate of evaporation?

Ans :

If the surface area is increased, the rate of evaporation increases.

28. Write the SI unit of temperature?

Ans :

Kelvin.

29. Why is Kelvin scale of temperature regarded as better scale than Celsius?

Ans :

As it has wide range of measurement and Kelvin scale of temperature has always positive sign, hence regarded as better scale than Celsius. Kelvin is an absolute thermodynamics scale, which uses its null point as the temperature at which all thermal motion ceases to exist.

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30. Convert 10°C into Kelvin scale.

Ans :

$$273 + 10 = 283 \text{ K}$$

31. Why evaporation is called surface phenomenon?

Ans :

Evaporation is called surface phenomenon as evaporation occur on the surface of liquid.

32. Name two processes from which it may be concluded that the particles of a gas move continuously.

Ans :

Compressibility and Brownian movement.

33. Does solid ice and liquid water co-exist together? If yes, then at what temperature?

Ans :

At 0°C, the three phases of water co-exist called triple point.

34. What is common among the three states of matter?

Ans :

They all contain molecules.

35. Which property of gas is used in supplying oxygen cylinders to hospitals?

Ans :

Compressibility.

36. A substance x is highly compressible and could easily

be liquefied. It can also take the shape of the container. Guess the nature of the substance.

Ans :

Gas.

- 37.** Name the state of water at 100 degree Celsius, zero degree Celsius and 4 degree Celsius.

Ans :

The state of water at 100 degree Celsius is gas, at 0 degree Celsius it is solid and at 4 degree Celsius it is liquid.

- 38.** Is it possible to turn a liquid into vapour without heating?

Ans :

Yes, by the process of evaporation as evaporation of water occur below the boiling point under atmospheric pressure.

- 39.** What is the significance of boiling point and melting point of a substance?

Ans :

The significance of boiling point and melting point is that it shows the purity of the substance.

- 40.** When we put CuSO_4 in water, after some time we find the solution turns blue. Why? Also, on heating it, what change will occur?

Ans :

The solution turns blue because of diffusion. On heating the solution, nothing will happen.

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- 41.** How can you justify that table is a solid?

Ans :

When we apply force on the table it doesn't change its shape because its inter- molecules are tightly packed, this shows that table is solid.

- 42.** The boiling point of alcohol is 78°C . What is this temperature on Kelvin scale?

Ans :

$$\text{K} = ^\circ\text{C} + 273 = 78 + 273 = 351 \text{ K}$$

- 43.** The Kelvin scale temperature is 0 K. What is the corresponding Celsius scale temperature?

Ans :

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

THREE MARKS QUESTIONS

- 44.** Is it true to say that fluorescent tube contains plasma? Explain

Ans :

It is right to say that fluorescent tube contains plasma.

As fluorescent tube has helium or some other rare gas. The particles of the gas get ionized in the presence of high voltage applied. These charged particles are called plasma which glows.

- 45.** What is the difference between a gas and plasma?

Ans :

- (i) Gas consist neutral particles which are associated with energies comparable with atmospheric temperature.
(ii) Plasma contains energetic particles in the form of ionized gases.

- 46.** Why do we see water droplets on the outer surface of a glass containing ice-cold water?

Ans :

If we take some ice-cold water in a glass, after some time we will see small droplets of water deposited on the outer walls of the glass. Because water vapour present in air come into the contact of cold wall of glass, lose energy and converted into liquid state which can be seen in the form of small droplets.

- 47.** A piece of chalk can be broken into small pieces when hammered but it is not possible in case of iron bar. Why?

Ans :

The force that keeps the particles together is lesser in chalk; hence it could be easily broken down into pieces on hammering. Whereas, the magnitude of this intermolecular force is more in iron, hence it cannot be broken into small pieces on hammering.

- 48.** Explain, why solids have fixed shape but liquids and gases do not have fixed shape?

Ans :

Solids have fixed shape due to strong intermolecular force of attraction between them. The liquids and gases have molecules with less intermolecular force of attraction, and hence they can flow and take shape of the container.

- 49.** Liquids and gases can be compressed but it is difficult to compress solids. Why?

Ans :

Liquids and gases have intermolecular space; on applying pressure externally on them the molecules can come closer thereby minimizing the space between them. But in case of solids, there is no intermolecular space to do so.

- 50.** A balloon when kept in Sun, bursts after some time. Why?

Ans :

The balloon has air filled in it. The balloon when kept in Sun gets heated and the air inside it also gets heated. The molecules of air get energy, and vibrate faster thereby exerting large force on the walls of the balloon. Due to this expansion of gases the balloon bursts.

51. Why do people perspire a lot on a hot humid day?

Ans :

On a hot humid day, due to the heat our body starts sweating and gives cooling effect by evaporation. But the air cannot hold any more water on a humid day and therefore, the sweat or perspiration is seen.

52. Why is it advisable to use pressure cooker at higher altitudes?

Ans :

At higher altitudes, the atmosphere pressure is low and the water boils very fast and evaporates at faster rate, therefore, the pressure is required to increase the cooking process and this is done by using pressure cooker which increases the pressure inside the container and cooks food faster.

53. Why cannot you smell its perfume at a short distance when incense stick is not lighted?

Ans :

The particles of the perfume (matter) do not have sufficient energy to drift through the air. Thus, we cannot smell it at a few steps away from incense stick.

54. Why a rubber band is considered as a solid?

Ans :

We can regard rubber band as a solid, because it regains its shape when the stretching force is removed from it.

55. Why is the smell of the perfume of incense stick filled the whole room in few minutes, when lighted?

Ans :

When the incense stick is lighted, the heat energy makes the particles of the perfume to move rapidly. Thus, they easily drift through the air in the room and hence, we can smell it anywhere in the room.

56. What do you observe when force is applied and then removed on the plunger of the syringe containing air? Give a reason for your answer.

Ans :

The plunger moves downward on the application of force to a considerable length. The plunger moves backward and takes its original position when the force is removed.

The gases have large intermolecular spaces. So, they easily get compressed on the application of force. The compressed gases are under high pressure. When the force is removed, this high pressure forces the plunger back to its original position.

57. A karate expert can easily move his hand through a solid block of wood but we cannot. Why?

Ans :

In a solid block of wood, the inter-particle forces are very strong and hence, it is not easy to separate the particles. Therefore, it is not easy to move our hand through a solid block of wood, only a karate expert

can do it as he has expertise in this.

58. What is latent heat of fusion?

Ans :

The heat required to change 1 kg of a solid substance into liquid state at the melting point of the substance. For example : Amount of heat required to melt ice at 0°C into water, at 0°C will be known as the latent heat of fusion of ice.

59. What is compressibility? How it is negligible in solids?

Ans :

Compressibility is the ability of a substance to be reduced to its volume under pressure. Solids are incompressible as their particles are held together. So, we can tell that compressibility is negligible in solids.

60. Two cubes of ice are pressed hard between two palms and after releasing the pressure, the cubes join together. Why?

Ans :

Pressure is directly proportional to temperature when we apply pressure, temperature increases then the ice in contact melts and it turns into water. When pressure is removed, the temperature decreases again and melted ice again freezes. Hence, cubes join together.

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61. What is the reason that "Ice has lower density than water"?

Ans :

The mass per unit volume of a substance is called density (density = mass/volume). The density of substance decreases as the volume of a substance increases. Space between particles increases when water changes into ice. These spaces are larger as compared to the spaces present between the particles of water. Thus, the volume of ice become greater as compared to the water. Hence, the density of ice become lower than that of water. And, a substance with lower density than water can float on water. Thus, ice floats on water.

62. Why does the temperature remain constant during the change of state, for any substance?

Ans :

On increasing the temperature of solids, the kinetic energy of the particles increases which is used up in changing the state as it overcome the forces of attraction between the particles, therefore, the temperature remains constant during the change of state.

63. 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 boiling as evaporation

is a natural phenomenon, occurs on the surface of the water and also it is a slow process, whereas boiling is an artificial phenomenon, it occurs in the bulk of the liquid and is a fast process.

64. How can you show that evaporation causes cooling?

Ans :

When we put some acetone on our hand, after some time we will feel coolness on our hand because the acetone absorbs kinetic energy from our hand and evaporates and evaporation causes cooling.

65. What do you mean by latent heat of vaporization?

Ans :

The latent heat of vaporization of a liquid is the quantity of heat in joules required to convert 1 kilogram of the liquid to vapour or gas at its boiling point, without any change in temperature.

66. What property of gas is used when natural gas is supplied for vehicles?

Ans :

A gas is highly compressible and a large quantity of it can be compressed to a small, manageable volume. Thus, natural gas is compressed and is supplied for use by vehicles in the name of CNG (compressed natural gas).

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

Ans :

The gaseous particles are free to move in the container. These move at high speed and collide with other particles of the container. The bombardment of the particles on the walls of the container produces a steady force that depends on the temperature. This force per unit area is called as pressure of the gas.

68. Is it not proper to regard the gaseous state of ammonia as vapours? Explain.

Ans : 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.

Naphthalene is volatile solid and has a tendency to sublime. So, it changes into vapours completely, thus disappear into the air and no solid is left.

69. State characteristics of matter demonstrated by :

- (i) Diffusion.
- (ii) Brownian motion.

Ans :

- (i) Diffusion involves movement of different particles so that they become intermixed uniformly.
- (ii) Brownian motion : It is the zig-zag movement of the small particles suspended in a liquid or a gas.

70. Why is water liquid at room temperature?

Ans :

At room temperature, the molecules of water have some intermolecular force of attraction and the room temperature cannot provide sufficient heat for these molecules to overcome their force of attraction and therefore, remain in liquid phase.

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

Ans :

Cotton has large number of pores where air is trapped. This process reduces cotton's density and increase the volume. Therefore, cotton floats on water. But, when these pores get filled with water, it starts sinking.

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72. On a hot sunny day, why do people sprinkle water on the roof or open grounds?

Ans :

During hot sunny day, the surface of roof or ground absorbs large amount of heat and remains hot. On sprinkling water on these surfaces, the water absorbs large amount of heat from the surface of roof and water evaporates thereby causing cooling effect.

FIVE MARKS QUESTIONS

73. Discuss the factors which affect evaporation.

Ans :

There are four factors which affect evaporation.

- (i) Surface area : Escaping of particles from liquid state to vapour state depends on surface area. Therefore, the rate of evaporation increases with surface area.
- (ii) Temperature : Rise in temperature, rise the kinetic energy of substance and therefore, chance of escaping of particles is great from liquid to vapour state.
- (iii) Wind : The rate of evaporation increases with speed of wind.
- (iv) Humidity : Humidity is the amount of vapour present in the air. At fixed temperature air can't hold more than fixed amount of water vapour. Therefore, the evaporation rate decreases if humidity increases in air.

74. Give difference between Evaporation and Boiling.

Ans :

S. No.	Evaporation	Boiling
1.	It takes place at any place.	It takes place at definite temperature called boiling point of liquid.
2.	Temperature of liquid decreases during evaporation.	Temperature of liquid does not change during boiling.

3.	Evaporation is a surface phenomenon; it takes place only at the surface of the liquid.	Boiling is the bulk phenomenon; it takes place in the whole mass of the liquid.
4.	Evaporation is a slow and silent process.	Boiling is a rapid and violent process.

75. Explain the inter-conversion of three states in terms of force of attraction and kinetic energy of the molecules.

Ans :

The force working between the particles of a matter is called intermolecular force. Intermolecular forces are strong in solids and the particles are close to each other and thus make the substance rigid. In liquids, intermolecular force is less than solids and more than gases. So, they cannot have rigid shape and kinetic energy of the molecules is not enough to hold gas in open container.

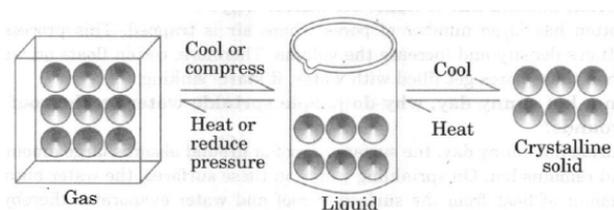


Figure: States of Solid

76. The melting point of ice is 273.16 K. What does this mean? Explain in detail.

Ans :

Ice is solid at 0°C, i.e. 273 K. The molecules of ice are tightly packed. These molecules have to overcome the force of attraction with which they are held and hence, they gain this heat from the surrounding but the temperature remains the same as their energy is used to overcome the force of attraction between the particles. The particles of ice start vibrating freely and a stage reaches when the solid ice melts and is converted to liquid state at the same temperature, i.e. 273 K.

77. How is the high compressibility property of gas useful to us?

Ans :

The gases have high compressibility. This property is used in the following situation :

- LPG (Liquefied Petroleum Gas) is a fuel which is made up of petroleum gas. On compressing this petroleum gas it forms liquid.
- Oxygen cylinders in the hospitals have compressed gas filled in it.
- CNG (Compressed Natural Gas) is a natural gas i.e. methane, which is compressed and used as a fuel in vehicles and at home.

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

Ans :

The gases from the atmosphere diffuse and dissolve in water. Diffused gases like oxygen and carbon dioxide in water are essential for the survival of aquatic animals and plants.

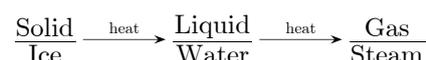
Animals breathe in this oxygen dissolved in water for their survival and plants can use carbon dioxide dissolved in water for photosynthesis.

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

Ans :

Any matter, i.e. solid, liquid or gas when experiences an increase in temperature then they change their state.

Example :



When we take ice cubes in a beaker or heat them slowly, the temperature increases and ice melts to form liquid. We heat this liquid further it will become steam.

On lowering down the temperature of any matter, show change in their state.

Example :



We take the steam that is coming out of boiling water and allow it to cool down, it condenses to form water and on further cooling of this water we get ice.

On applying pressure and reducing temperature we can liquefy gases or change them into solid.

Example : We take carbon dioxide gas, reduce its temperature and apply lot of pressure on it so that it changes into solid carbon dioxide, called dry ice, which is used as refrigerant for cooling.

If pressure on it is decreased it directly changes into gas.

In LPG cylinders, the petroleum gas is cooled and with lot of pressure changes it into liquid state.

While using this LPG, we release the pressure exerted on it and hence, it comes out in the form of gas.

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Science IX

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