

9. Science/Chem/Ch-1/MATTER IN OUR SURROUNDINGS

Q.1 Which of the followings are matter?

Chair, air, love, smell, hate, almonds, thoughts, cold, cold drink and smell of perfume.

Ans:- The following items are matter:- chair, air, smell, almonds, cold drink and smell of a perfume. Because all these items occupies space, possesses mass and can be felt by any one of our five senses.

Q2. Give reasons for the following observations. The smell of hot sizzling food reaches you several meters away, but to get smell from the cold food you have to go close.

Ans:- The particles of matter posses kinetic energy and thus are constantly moving. When the temperature rises, the kinetic energy increases accordingly and hence the particles move faster. Now, since the particles of hot vapours coming out of hot sizzling food move faster, therefore they easily reach you even when you are several meters away. On the other hand, the particles of vapours coming out of cold food move only slowly and hence do not reach you.

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

Ans:- This observation shows that particles of matter attract one another. The force of attraction between the particles of water are not so strong, therefore, by applying greater force, a diver can cut through water in a swimming pool by overcoming the weaker force of attraction present among particles of water.

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

Ans:- Some important characteristics of particles of matter are listed below:-

- (i) Matter consist of tiny particles which cannot be seen individually with naked eyes.
- (ii) The particles of matter having space in between them.
- (iii) The particles of matter are continuously moving.
- (iv) The particles of matter are held together by forces of attraction.

Q.5 The mass per unit volume of a substance is called density. Arrange the following in order of increasing density: air, exhaust chimneys, honey, water, chalk, cotton and iron.

Ans:- The order of increasing density is: air, exhaust from chimneys, cotton, water, honey, chalk and iron.

Q.6 (a) Tabulate the differences in characteristics of states of matter.

(b) comment upon the following: rigidity, compressibility, fluidity, kinetic energy and density.

Ans:- (a)

| Property | Solid | Liquid | Gas |
|--------------------------------------|---|--|--|
| 1.Packing | The constituent particles are very closely packed. | The constituent particles are less closely packed. | The constituent particles are free to move about |
| 2.Interparticles distances | Interparticle distances are the smallest. | Interparticle distances are larger than solids but smaller than gases. | Interparticle distances are the largest. |
| 3. Interparticle force of attraction | Interparticle forces of attraction are the strongest. | Interparticle forces of attraction are in between solids and gases. | Interparticle forces of attraction are the weaker. |
| 4.Shape and volume | Having definite shape and volume. | Having a definite volume but no definite shape. | Having no definite shape and volume. |
| 5.Compressibility | Completely Incompressible. | Almost incompressible. | Highly compressible. |

(b) Rigidity:- Means tendency to maintain shape when some outside force is applied.

Compressibility:- Means tendency to decrease volume when some outside force is applied.

Fluidity:- Means tendency to flow.

Kinetic energy:- Means energy possessed by particles due to motion.

Density:- Means mass per unit volume.

Q.7 Give reasons:

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

Ans:- The particles of gases are constantly moving in all directions with different speeds. Therefore, they do not have fixed volume and hence completely fill the vessel in which they are kept.

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

Ans:- Due to the random motion of the particles of a gas, they collide with one another and also against the walls of container. As a result, gas exerts some force on the walls of the container. (Force per unit area is pressure). Thus, gases exert pressure due to the collisions of the particles of the gas on the walls of the container.

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

Ans:- A wooden table has definite shape, distinct boundaries and a fixed volume, therefore, it should be called a solid.

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

Ans:- We can easily move our hand in air because the force of attraction between the particles of air are very weak. In contrast, interparticle force of attraction in wood are very strong. As a result, they cannot be easily overcome for the movement of the hand and we need a karate kid.

Q.8 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. In other words, density of ice is lower than that of water and hence ice floats on water.

Q.9 Convert the following temperatures to the Celsius scale: (a) 300K (b) 573K.

Ans:- The temperature on the Kelvin scale can be converted into Celsius scale by subtracting 273 from the temperature on the Kelvin scale.

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

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

Q.10 What is the physical state of water at: (a) 250°C (b) 100°C.

Ans:- (a) At temperature 250°C, water exists as gaseous state because this temperature is higher than the boiling temperature of water(100°C).

(b) At 100°C, the boiling water of water, water exists both as a liquid as well as a gas.

Q.11 For any substance, why does the temperature remains constant during the change of state?

Ans:- During the change of state of a substance, temperature remains constant because the heat energy supplied to the substance is used up in overcoming the force of attraction without increasing their kinetic energy. As a result, the thermometer does not show any rise in temperature till the entire substance undergoes change of state.

Q.12 Suggest a method to liquefy atmospheric gases.

Ans:- Atmospheric gases can be liquefied by increasing the pressure and decreasing temperature.

Q.13 Why does a desert cooler cool better on a hot dry day?

Ans:- A hot dry day means that temperature of the atmosphere is high and humidity is low. These both factors increase the rate of evaporation and thus enormous cooling is produced.

Q.14 How does water kept in earthen pot become cool during summer?

Ans:- Due to the small holes present in the walls of the earthen pot. Water oozes out slowly and get evaporated. The heat energy needed for evaporation is taken for the water kept in earthen pot. As a result water kept in earthen pot becomes cold.

Q. 15 Why does our palm feel cold when we put some acetone or petrol or perfume on it?

Ans:- Acetone, petrol or perfume have low boiling points. When these are put on the palm, they quickly evaporate. The energy needed for evaporation is taken from the palm. As a result, the palm feels cold.

Q.16 Why are we able to sip tea hot or milk faster from a saucer rather than a cup?

Ans:- We are able to sip hot tea or milk from a saucer because in case of saucer surface area is large and evaporation occurs fastly and the tea or milk becomes cooler quickly whereas, in case of a cup the surface area is small and evaporation occurs slowly and the tea or milk remains hot for a long time. Hence, we are able to sip hot tea or milk faster from a saucer rather than from a cup.

Q.17 What type of clothes should we wear in summer?

Ans:-We should wear cotton clothes in summer. Cotton clothes are good absorber of sweat and expose it to the atmosphere for evaporation. Since, evaporation produce cooling, therefore, cotton clothes help us in keeping our body cool.

Q.18 Convert the following temperature to the Kelvin scale. (a) 25°C (b) 373°C.

Ans:- The temperature on the Celsius scale can be converted into the Kelvin scale by adding 273 to the temperature on the Celsius scale. Thus, (a) $25^{\circ}\text{C} = 273 + 25 = 298 \text{ K}$ (b) $373^{\circ}\text{C} = 273 + 373 = 646 \text{ K}$.

Q.19 Give reasons for the following observation.

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

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

Ans:- Naphthalene is a volatile solid. It undergoes sublimation slowly at room temperature. As result, solid naphthalene gets converted into vapours. Therefore, naphthalene balls disappear without leaving any solid.

(b) We get the smell of perfume sitting several meters away due to diffusion. The particles of the perfume mix with the particles of air and due to high speed of these particles, smell of the perfume reaches several meters away.

Q. 20 Arrange the following substances in increasing order of forces of attraction between the particles – water, sugar, oxygen.

Ans:- The force of attraction are the strongest in solids, followed by liquids and weakest in gases. Therefore, the force of attraction between particles increases in the order: Oxygen, water , sugar.

Q.21 What is the physical state of water at- (a) 25°C (b) 0°C (c) 100°C .

Ans:- (a) At 25°C , the physical state of water is a liquid.

(b) At 0°C , the physical state of water can either be a solid or a liquid state.

(c) At 100°C , the physical state of water can be a liquid or a gas.

Q.22 Give reasons to justify-

(a) water at room temperature is a liquid.

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

Ans:- **(a) Water is a liquid because of the following reasons:**

(i) Liquids do not have a fixed shape.

(ii) Liquids have a fixed volume.

(b) An iron almirah is a solid at room temperature the following because of the following reasons:-

(i) Solids have a fixed shape as well as a fixed volume.

(ii) Solids are incompressible.

Q.23 Why is ice at 273 K more effective in cooling than water at the same temperature?

Ans:- When ice at 273 K melts to form water at 273 K , it absorbs heat energy equal to the latent heat of fusion from the surroundings.

Thus, ice at 273 K has less heat energy than water at 273 K and hence ice is more effective in cooling than water at same temperature.

Q. 24 What produces more severe burns, boiling water or steam?

Ans:- When water at 373 K is converted into steam at 373 K , it absorbs energy equal to the latent heat of vaporisation. Thus, steam at 373 K has more energy than water at 373 K and hence steam produces more severe burns than boiling water.