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Class: 9. Subject: Science. Topic: Matter in our Surrounding

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

Solution:

Chair, Sir, smell, almonds, cold drink and smell of perfume.

2. Give reasons for the following observation: The smell of hot sizzling food reaches you several metres away, but to get the smell from cold food, you have to go close.

Solution:

This happens because rate of diffusion of gas increases with increase in temperature. In case of hot food, diffusion of smell is faster whereas in case of cold food, diffusion is slower.

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

Solution:

The particles of water are held together by forces of attraction. As these forces are not strong, the diver is able to cut through water in a swimming pool. This observation shows that particles of matter attract one another.

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

Solution:

The characteristics of the particles of matter are as follows :

- (a) Matter consists of tiny particles which cannot be seen by an individual with naked eye.
- (b) The particles of matter have spaces between them.
- (c) The particles of matter attract each other due to inter molecular forces of attraction. The forces of attraction are maximum in solids and minimum in gases. Liquids have inter molecular forces in between solids and gases.
- (d) The particles of matter are not stationary but are continuously moving.
- (e) The inter molecular forces decrease with the increase in inter molecular spaces and vice-versa.
- (f) Kinetic energy of the molecules increases with the rise in temperature.

5. mass per unit volume of a substance is called density, (density = mass/volume)
 Arrange the following in order of increasing density – air, exhaust from chimneys, honey, water, chalk, cotton and iron.

Solution:

The increasing order of density is air < exhaust from chimney < cotton < water < honey < chalk < iron.

6. Give reasons:

- (a) A gas fills completely the vessel in which it is kept.
- (b) A gas exerts pressure on the walls of the container.
- (c) A wooden table 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.

Solution:

- (a) The particles of a gas are constantly moving in all the directions with different speeds. Therefore, they do not have a fixed volume and hence completely fill the vessel in which they are kept.
- (b) The molecules of a gas are free to move randomly in all directions. During their motion, they collide with one another and also with the walls of the container. The constant bombardment of the molecules on the walls of the container exerts a steady force. The force acting per unit area on the walls of the container is called pressure. Thus, gases exert pressure.
- (c) A wooden table is called solid because it has a definite mass, volume and shape.
- (d) In air, there is lot of empty space between the molecules and the forces between the particles are almost negligible. Hence, we can move our hand in air. However, we cannot move our hand in a solid block because there are strong forces of attractions between particles in a solid and there is no empty space between them.

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

Solution:

When water freezes to form ice, some empty spaces are created. As a result, volume increases for the same mass of water. In other words, mass per unit volume or density of ice is lower than that of water and hence, ice floats over water.

8. Convert the following temperature to Celsius scale:

(a) 300 K

(b) 573 K.

Solution:

(a) Temperature in °C = Temperature in kelvin – 273 = 300 – 273 = 27°C

(b) Temperature in °C = 573 – 273 = 300°C

9. What is the physical state of water at:

(a) 250°C

(b) 100°C?

Solution:

(a) Physical state of water at 250°C is gaseous state because the boiling point of water is 100°C. Therefore at a temperature higher than its boiling point, it exists as gas.

(b) At 100°C both liquid and gaseous states are present. These are in a state of equilibrium. So, at 100°C both liquid water and vapours are present.

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

Solution:

The temperature remains constant during the change of state because the heat supplied during the change is used up in overcoming the inter molecular forces between the particles of the state.

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

Solution:

The cooling in a desert cooler is caused by the evaporation of water. A desert cooler cools better on a hot and dry day because the higher temperature on a hot day and the dryness of air (low humidity of air increases the rate of evaporation of water). Hence, due to increased rate of evaporation of water, a desert cooler cools better on a hot and dry day.

12. HOW does the water kept in an earthen pot (matka) become cool during summer?

Solution:

An earthen pot (matka) has many small pores. Water seeps out through them and evaporates from the surface of the pot. The energy needed for evaporation is taken from the water kept in the earthen pot. As a result, water kept in earthen pot becomes cool.

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

Solution:

Both acetone and perfume are low boiling liquids. When they are poured on the palm, they evaporate readily and for this change of state they take the energy from the palm and we get a cooling sensation.

14. Suggest a method to liquefy atmospheric gases.

Solution:

In order to liquefy a gas, the constituent particles or molecules have to be brought closer. The atmospheric gases can be liquefied either by increasing pressure or by decreasing temperature.

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