Chapter 1
Matter in Our Surroundings

Intext Questions

On Page 3

Question1: Which of the following are matters?
Ans: Chair, air, love, smell, hate, almonds, thought, cold, cold-drink, smell of perfume.
Solution: Any things which have some weight and occupy space will come under category of matter. Chair, air, smell, almonds, cold-drink and smell of perfume: Matter

Question 2: Give reasons for the following observation:-
(i) The smell of hot sizzling food reaches you several meters away, but to get the smell from cold food you have to go close.
Solution: Evaporation is directly proportional to temperature, means hot food evaporates easily. Diffusion of hot food vapor with air becomes very fast and can reach to a distant place within a very short time.

Question 3:A diver is able to cut through water in a swimming pool. Which property of matter does this observation show?
Solution: The phenomena of cutting the water by the diver show that matter has space between its particles.

Question 4:What are the characteristics of the particles of matter? Solution: Characteristicsofparticlesofmatteraregivenbelow:

1. Particles of matter have space between them.
2. Particles of matter are continuously moving.
3. Particles of matter have an attraction force between them.
4. Particles of matter are very small in size.

On Page 6
Question 1:The 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:We can solve this question by keeping this concept in mind.
The correct order of density for gas, liquid and solid are: Gas < Liquid < Solid.
Thus, Air, exhaust from chimneys water, honey, cotton , chalk ,iron Gas Liquid Solid
Increasing order of Density

Question 2:
(a) Tabulate the differences in the characteristics of states of matter.

(b) Comment upon thefollowing:
Rigidity,compressibility,fluidity,fillingagascontainer, shape,kinetic energy and density.
Solution:

Solid:

1. Solids have adefinite volume.
2. Solids do not tend to flow.
3. Solids are rigid.
4. Generally solids have a definite shape with very few exceptions like sponge, rubber bandetc.
5. Solids are generally incompressible with very few exceptions like sponge, rubber band etc.

Liquid :

1. Liquids also have a definite volume. Liquidstend to flow.
2. Liquidsarenotrigid.
3. Liquids do not have a definite shape. They take the shape of the container.
4. Liquids are almost incompressible.

Gases :

1. Gases do not have a definite volume. Their volume varies with the container in which they are stored or kept.
2. Gasesalsotendtoflow
3. Gases are not rigid.
4. Gasesdonothaveadefiniteshape
5. Gases arecompressible.

(c) Rigidity: Propertybywhichanobjectretainsitsshapeandsizeiscalledas rigidity. Solids are rigid whereas liquids and gases are not.
Compressibility: Compressibility is the property; due to which a substance can be compressed, means its volume can be decreased. Gases are compressible whereassolids and liquids arenot.
Fluidity: Flowing tendency of a substance called fluidity. Gases and liquids are fluids,solids are not.

Filling a gas container: a large volume of gas can be filled in a gas container by compressing it under very high pressure. The property of compressibility (of gases) Ivey sue full in this case

Shape: The property of having a definite geometry is called shape of a particular substance. Solids have a definite shape whereas gases and liquids do not have.

Kinetic energy: The energy possessed by a moving object or by the moving molecules of called kinetic energy.

On increasing the temperature, kinetic energy of a substance (or its molecules) also increases. Molecules of gases posses highest kinetic energy. Density : The mass per unit volume of a substance is called density. Mass

Density = ----------

Volume

Question 3: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) Force of attraction between the molecules of gases is negligible. So, molecules of gases occupy the maximum space available to them. High kinetic energy possessed by their molecules also helps for the same. (b)The motion of particles is random and having very high speed in the gaseous state.Due to this random movement, the particles hit each other and also the walls of the container. The pressure exerted by the gas is due to this force exerted by these particles per unit area on the walls of the container.

(c) There is a strong force of attraction between the molecules of wood and the intermolecular space is the least. So, a wooden table has a definite shape and volume and it should be called a solid.

(d) Air molecules are very-very far from each other due to negligible force of attraction working between them. So, our hand gets sufficient space to move in air and we also displace some air molecules by

applying force. But a solid block of wood has closely packed molecules so there is no question of the movement of hand through it, in absence of suitable force in proper direction.

Question 4:Liquids generally have lower density as compared to solids. But you must have observed that ice floats on water. Find out why?
Solution:Liquids have lower density than that of solids. Water is also a liquid so it should also have less density than that of solid that is ice.
But the case is not so and the reason for the same is the cage-like structure of ice.
i.e., presence of vacant spaces between water (H_2O) molecules when they linked in ice. The number of these spaces is comparatively less in water.
Being more porous than water, ice is lighter than water and floats over the surface of water.

On Page 9
Question 1:Convert the following temperature to Celsius scale
(a) 300 K (b) 573 K
Solution: By the use of given formula, we can convert the Kelvin temperature to Celsius.
T K –273 =t°C
(a) 300K–273 = 27°C (b) 573K–273 = 300°C

Question 2:What is the physical state of water at
(a) 250°C (b) 100°C?
Solution:
As the boiling point of water is 100°C so
(a) at 250°C, the state of water will be steam or water vapour, i.e., gaseous state.
(b) at 100°C, there will be a transition of liquid state into the gaseous state. So, at this temperature, the state is/may be liquid as well as gaseous.

Question 3:For any substance, why does the temperature remain constant during the change of state?
Solution: During the change of state of a substance, the temperature remains constant. This can be understood with the help of an example.
When a solid is heated to its melting point, the temperature first rises and becomes constant when reaches its melting point. Now, on further heating, the heat energy provided to the substance helps to break the attraction force between the solid

molecules. This heat is called latent heat. That is why, the temperature does notrise.

Question4:Suggestamethodtoliquefyatmosphericgases.
Solution:By applying pressure and reducing the temperature, atmospheric gases can be liquefied

On Page 10

Question 1:Why does a desert cooler cool better on a hot dry day? Solution:A desert cooler functions on the basis of evaporation. The rate of evaporation increases with increase in temperature and decrease in humidity. As evaporation increases when the day is hot and dry. So, the desert cooler functions to a better extent.

Question 2:How does the water kept in an earthen pot (matka) become cool during summer?
Solution: Large number of tiny pores is present on the surface of the earthen pot (matka). The water stored in the earthen pot (matka) evaporates faster through these pores due to the increased exposed surface area. As the' process of evaporation causes cooling, the stored water inside the earthen pot (matka) becomes cool.

Question 3:Why does our palm feel cold when we put some acetone or petrol or perfume on it?
Solution:Acetone, petrol, perfume etc., being volatile, evaporate very fast when exposed to larger surfaces. During the process they absorb the required latent heat of vaporization from the palm (if kept on palm). So, the process causes Cooling and the palm feels cool.

Question4:Whyareweabletosiphotteaormilkfasterfromasaucer rather than acup?
Solution: A liquid has large surface area in a saucer than in a cup. Thus, it evaporates faster and cools faster in a saucer than in a cup. For this reason we able to sip hot tea or milk faster from a saucer rather than a cup.

Question 5:What type of clothes should we wear in summer? Solution:We should wear light colored cotton clothes in summer because

1. Cotton is a good absorber of water/sweat. It provides more surface area for the sweat to evaporate.
2. Light colours absorb less heat.

So, wearing light coloured cotton clothes helps us feeling cool and comfortable.
Exercises

Question 1:Convert the following temperatures to the Celsius scale. (a) 293 K (b) 470 K

Solution:

In order to covert temperature from Kelvin to Celsius scale, we have to subtract 273 from the given value because K - 273 = ° C

(a) 293 K - 273 = 20°C (b)

470K-273=197°C

Question 2:Convert the following temperatures to the kelvin scale. (a) 25°C (b) 373°C

Solution: To convert temperature from Celsius to Kelvin scale, add 273 to the given values because

° C + 273 = K

(a) 25°C + 273 = 298 K (b)

373°C+273=646K

Question 3:Give reason for the following observations.

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

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

(a) Naphthalene is a substance which directly changes from solid to gas on heating by the process of sublimation. So, the naphthalene balls disappear with time as they sublime due to heat of surroundings.

(b) The smell (aroma) of perfume reaches several meters away due to the fast diffusion of the gaseous perfume particles through the air.

Question 4:Arrange the following substances in increasing order of forces of attraction between the particles-water, sugar, oxygen. Solution:The forces of attraction are strongest in solids and weakest (or negligible) in case of gases. Sugar is a solid, water is in liquid form and oxygen is a gas so, the order of forces of attraction is oxygen<water< sugar.

Question 5:What is the physical state of water at (a) 25°C (b) 0°C (c) 100°C?

Solution:At zero °C temperature water (liquid) get starts to convert into its solid form (ice) and at 100°C temperature water (liquid) starts to change into water vapours .Between 0° to 100°C it remains in liquid state.

Thus,

(a) Liquid state

(b) Solid or/and liquid state (Transition state)

(c) Liquid or/and gaseous state (Transition state)

Question 6:Give two reasons to justify

(a) Water at room temperature is a liquid.

(b) An iron almirah is a solid at room temperature. Solution:

(a) Water is a liquid at room temperature because It has a tendency to flow.

It takes the shape of the container in which it is filled, but its volume remains the same.

(b) An iron almirah is a solid at room temperature because Its shape and volume are definite.

Itishardandrigid.

Itsdensityishigh.

Question 7:Why is ice at 273 K more effective in cooling than water at the same temperature?

Solution:Ice at 273K has less energy than water (although both at the same temperature). Water is having additional latent heat of fusion, hence at 273 K ice is more effective cooling than water

Question 8:What produces more severe burns, boiling water or steam? Solution:Steam causes more severe burns than boiling water. The reason is that it releases the extra amountofheat(latentheat)whichit has already taken during vaporization

Question 9:Name A, B, C, D, E and F in the following diagram showing change in its state.

Solution :

A = Melting or fusion, where solid changes into liquid.

B = Evaporation or vaporization, where liquid changes into gas. C = Condensation or liquification where gas changes into liquid. D = Freezing or solidification, where liquid changes into solid.

E = Sublimation, where solid directly changes into gas without coming in liquid state.

F = Sublimation, where gas changes into solid without coming to liquid state.