CHAPTER 1
NATURE OF MATTER

SOLUTIONS

TEXTUAL QUESTIONS & ANSWERS

Questions (Pages 2, 5, 7, 8, 10, 11, 13 & 14)

Textual Questions from Page 2

1. **Define matter. Give an example.**
   Ans: **Matter** is defined as anything that occupies space, has mass and can be felt by one or more of our senses. **e.g.** Books.
2. **Which of the following are matters? Book, chair, heat, pen, hot tea, light electric bulb.**

   Ans: Book, Chair, Pen, Hot tea, Electric bulb.

3. **List the points of difference between homogeneous and heterogeneous matters.**

   Ans: The difference between homogeneous and heterogeneous matters is given below:

DIFFERENCES	
HOMOGENEOUS MATTERS	**HETEROGENEOUS MATTERS**
1. Homogeneous matters have uniform composition throughout. **2.** They have no visible boundaries **3.** They can be easily separated using physical means.	**1.** Heterogeneous matters have non uniform compositions which are unevenly distributed. **2.** They have visible boundaries. **3.** They can't be separated by using physical means but can be separated by using chemical method.

Textual Questions, Page 5

1. **Describe what happens when sugar is dissolved in water and there is no increase in volume**?

   Ans: When sugar is dissolved in water it breaks down into very fine particles. These particles of **sugar go into the intermolecular spaces of water.** Hence there is no change in the volume of water on dissolving sugar in it.

2. **Even one or two crystals of potassium permanganate can impart colour to a large volume of water. Which characteristic of matter is illustrated by this observation?**

Ans: The particles of matter are **very small.**

3. **What are the characteristics of particles of matter?**

Ans: The characteristics of the particles of matter are:

a. The **particles of matters are too small** that it cannot be visible by naked eyes.
b. The particles of matter **have space** between them.
c. The particles of matter are **continuously moving.**
d. The particles of matters **attract each other.**

Textual Questions Page 7

1. **When a bottle of perfume was opened in a room, we can smell it even from a considerable distance. Why?**

Ans: We can smell the aroma of the **perfume mixed with air due to diffusion** and reach us from considerable distance because gases diffuse rapidly and occupy the entire space available to it.

2. **What is diffusion? Give one example of diffusion of gases in a liquid.**

Ans: The intermixing of particles of two or more different types of matter on their own is called **diffusion.**

e.g. diffusion of Carbon dioxide gas in Water.

3. **Give reasons:**

a. A gas fills completely all the space available to it.
b. A book should be called a solid.
c. A gas exerts pressure on the walls of a container.

Ans:

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. There is **a strong of attraction between the molecules of book and the intermolecular space is the least.** So, a book has a definite shape and volume and is called a solid.
c. **The motion of particles is random and has 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.

Textual Questions, Page 10

1. **Why is heat energy needed to melt a solid?**

   Ans: In a solid, the particles are held together by strong force of attraction. On application of **heat energy the particles become somewhat loose, leave their fixed position and start moving more freely** and thus the solid melts. That is why heat energy is needed to melt a solid.

2. **Why does temperature remain the same when ice is melted even though we supply heat continuously?**

   Ans: The heat gets used up in changing from ice to water **by overcoming the force of attraction between the particles.**

3. **Steam and boiling water have the same temperature. But steam causes more severe burns than boiling water. Why?**

   Ans: Steam cause more severe burns than boiling water because **the particles in steam have absorbed extra energy in the form of latent heat of vaporisation and it also accompanied with kinetic energy.**

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

   Ans: This is because the **heat energy provided to the substance helps to break the force of attraction between the molecules** of the substance and the heat gets hidden.

Textual Questions, Page no. 10

1. **What is sublimation? Name two substances which undergo sublimation.**

   Ans: The process of changing a solid directly into gaseous state on heating without changing into liquid state **(liquification)** and changes the vapours into solid state on cooling is called **sublimation.**

   e.g. Iodine, Camphor undergoes sublimation.

2. **Name one property which is shown by Ammonium chloride but not by Sodium chloride.**

   Ans: Sublimation.

3. **Explain why Naphthalene balls kept inside our cupboard disappear over a period of time?**

   Ans: Naphthalene undergoes sublimation and is converted into the gaseous state.

Textual Questions, Page no. 13

1. **What is dry ice? Why is it so called?**

   Ans: **Solid Carbon dioxide** is known as dry ice.

   It is so called because it **gets converted directly into gaseous state on decrease of pressure to atmospheric pressure without coming into liquid** state **(liquification).**

2. **How does applying pressure help in the liquefaction of a gas?**

   Ans: When **high pressure is applied to a gas, it gets compressed into a small volume and the particles get so close together** that the gas starts to liquefy.

3. **Suggest a method to liquefy atmospheric gases.**

   Ans: Atmospheric gases can be liquefied **by applying high pressure and lowering the temperature.**

Textual Questions, Page no. 14

1. **Why do we perspire on a hot day?**
   Ans: On a hot day our body temperature tends to rise and we sweat. When the sweat evaporates, it takes the latent heat of vaporisation from our body and keeps our body cool. So perspiration is our body's mechanism to keep us cool.

2. **How does the water kept in an earthen pot become cool during summer?**

   Ans: **The earthen pot has a large number of extremely small pores** in its walls. Some of the **water keeps continuously seeping through these pores** to the outside of the pot. This water evaporates continuously and **takes away the latent heat of vaporisation from the earthen pot** and the remaining water. The remaining water loses heat and gets cooled.

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

   Ans: **The surface area in a saucer is larger than that in a cup.** Thus, the hot tea **evaporates faster in a saucer** than in a cup. For this reason we are able to sip hot tea or milk faster from a saucer rather than from a cup.

4. **Why do people prefer to use cotton clothes in summer? Why we feel cool and comfortable under a tree than under a roof on a summer day?**

   Ans: **Cotton** being a **good absorber of water** helps in absorbing the sweat and exposes it in air for easy evaporation. The evaporation of this sweat cools our body. Thus, people prefer to use cotton clothes to keep their body cool and comfortable during summer. **Sweet evaporates from our body in the open air under trees** but cannot do so under a roof on sunny day. **Water vapour releases from the leaf of the tree during transpiration** also taken out heat from the surrounding in the form of latent heat of vaporisation.

5. **What are the factors which affect evaporation?**

Ans: The factors affecting evaporation are:

1. **Surface area:** The rate of evaporation increases with the increase of the surface area of the liquid exposed to the air.
2. **Temperature:** The rate of evaporation of a liquid increases with the rise in temperature.
3. **Humidity:** The rate of evaporation decreases when humidity is high and vice versa.
4. **Wind speed:** Higher the wind speed, the more is the rate of evaporation.

EXERCISES

(Page No. 16)

1. **Define matter. Give four example of matter?**

Ans : **Matter** is defined as anything that occupies space, has mass and can be felt by one or more of our senses. **e.g.** Books, Chairs, Tables and Pens.

2. **Light and sound are not considered to be matter. Why?**

Ans: Light and sound are not considered to be matter because they **have no mass nor do they occupy space.**

3. **Give two processes which provide the best evidence for the motion ofparticles in matter.**

Ans: Diffusion and Brownian motion.

4. **When we dive in water, we cut through water easily. Which property of matter is shown by this observation?**

Ans: This shows that the **molecules (matter) of water are held together by weak forces (held loosely).**

5. **Why do gases have neither a fixed shape nor a fixed volume?**

Ans: Gases have neither fixed shape nor a fixed volume because the **particles in gases are widely separated and can move freely.** The force of attraction between the particles of gases is negligible.

6. **Why do solids liquids and gases differ in shape and volume?**

Ans: Solids, liquids and gases differ in shape and volume due to **the difference in the arrangement of particles in them and the force of attraction between the particles.**

7. **Name two gases which are available in compressed form.**

   Ans: **LPG** (Liquefied Petroleum Gas) and Oxygen (used in hospitals), **C.N.G.** (Compressed Natural Gas)

8. **What is diffusion? Give one example.**

   Ans: The intermixing of particles of two or more different types of matter on their own is called **diffusion.** **e.g.** Diffusion of Carbondioxide (CO_2) in cold drinks.

9. **What is meant by latent heat of fusion of a solid? How much is the latent heat of fusion of ice?**

   Ans: The amount of heat energy required to change 1 kg of solid into liquid at its melting point is known as **latent heat of fusion.**

   Latent heat of fusion of ice is **3.34×10^5 joules per kg.**

10. **Define the term latent heat of vaporization of a liquid.**

    Ans: The **latent heat of vaporisation of a liquid** is the quantity of heat required to change 1 kg of the liquid to vapour at its boiling point.

11. **Define (a) melting point and (b) boiling point of a substance.**

    Ans:

    (a) The fixed temperature at which a solid melts to become a liquid at the atmospheric pressure is called its **melting point.**

    (b) The fixed temperature at which a liquid starts boiling at the atmospheric pressure is called its **boiling point.**

12. **How does evaporation results in cooling effect?**

    Ans: When a liquid evaporates, **the particles of liquid absorb energy from the surrounding to regain the energy lost during evaporation.** This absorption of energy from the surroundings makes the surroundings cold. Thus evaporation results in cooling effect.

13. **State the various factors which affect evaporation.**

    Ans: **Factors affecting evaporation:**

    i. Surface area: The rate of evaporation increases with an increase of surface area.
    ii. Temperature: The rate of evaporation of a liquid increases with rise in temperature.
    iii. Humidity: The rate of evaporation decreases when humidity is high and *vice versa.*
    iv. Wind speed: Higher the wind speed the more is the rate of evaporation.

14. What are the conditions necessary to liquefy gases?

Ans: The conditions necessary to liquefy gases are:

(i) Application of high pressure and
(ii) Lowering of the temperature

EXTRA QUESTIONS & ANSWERS

Q.1. Why are heat, light, electricity, magnetism and sound most considered to be matter?

Ans: Because, they **have no mass** nor do they occupies space.

Q.2. What are alloys? Give an example.

Ans: Alloys are homogenous mixtures of metals with metals or non-metals which are fused in molten states.

e.g. Brass is an alloy of Zinc and Copper.

Q.3. Why is the process of diffusion become faster in solutions when the temperature rises?

Ans: Particle matters in solution are continuously moving that is, they possess kinetic energy. With increase in temperature, **kinetic energy of the particles also increases and due to faster movements,** they mix together each other more quickly.

Q.4. Why is the rate of diffusion of liquids higher than that of solids?

Ans: This due to the fact that in the liquid state, **particles move freely and have greater space between each other** as compared to particles in the solid state.

Q.5. Why does solid (ice) become liquid when supplying heat energy?

Ans: On increasing the temperature of solids, the **kinetic energy of the particles increases and starts vibrating** more vigorously. A stage is reached when the energy supplied by heat overcomes **the force of attraction between the particles and start moving freely** as liquid.

Q.6. Define melting point and freezing point.

Ans: The fixed temperature at which a solid melts to become a liquid at the atmospheric pressure is called its **melting point.**

The fixed temperature at which a liquid starts boiling at the atmospheric pressure is called its **boiling point.**

Q.7. What is fusion?

Ans: The process of changing of solid state to liquid state is known as **fusion.**

Q.8. When we heat ice in a beaker, the temperature of the ice does not change after the melting point is reached, till all the ice melts. Give reason why?

Ans: The heat gets used up in changing the state by overcoming the forces of attraction between the particles. As this **heat energy is absorbed by ice** without showing any rise in temperature.

Q.9. Why we can move our hand through air and water but not through solid body?

Ans: We can move our hand through air very easily because the particle of air is far apart from one another and also **the force of attraction between the particles of air is very small.** It is negligible.

We can also move our hand through water in fairly easily because the force of attraction between the particles of water is also small.

We cannot move our hand through a solid body because the force of attraction between the particles of solid is very strong.

Q.10. What is the latent heat of fusion of ice?

Or

How much energy is required to change 1 kilogram of ice to water at its melting point 0^0C?

Ans: **3.34×10^5 Joules per kg.**

Q.11. Why do we feel cold when we hold a piece of ice in our hand?

Ans: A piece of ice in our hand starts melting slowly. During the process, **ice takes the latent heat required for melting from our hand** which loses heat to ice and we feel cold.

Q.12. Why is the temperature of boiling water does not rise even though we continue heating the beaker?

Ans: Because, the heat is used up to change the liquid particles into gaseous state as **latent heat of vaporization.**

Q.13. Define evaporation.

Ans: The phenomenon of changing of a liquid into vapour (gas) state below its boiling point is called **evaporation.**

Q.14. Why does the speed of evaporation increases on increasing surface area?

Ans: If the surface area of liquid exposed to air is increased, the rate of evaporation increases due to getting **latent heat of vaporization from wider area.**

Q.15. Why does the speed of evaporation increases on increasing temperature?

Ans: With the increase of temperature, more particles of the liquid get enough **kinetic energy** to go into the vapour state (gaseous state).

Q.16. Why does the speed of evaporation increases on increasing wind speed?

Ans: With the increase in wind speed, the particles of water vapour move away with the wind, decreasing the amount of water vapour in the surrounding. This **increases the rate of evaporation of water.**

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