**CHAPTER 1 MATTER IN OUR SURROUNDINGS**

**IN-TEXT QUESTIONS SOLVED**  Page 3

**Question 1**. **Which of the following matters?**

**Chair, air, love, smell, hate, almonds, thought, cold, cold-drink, smell of perfume.**

**Answer**: Anything that occupies space and has mass is called matter.

Chair, Air, Smell, Almonds, cold drink, and the smell of perfume are matter.

Love, Hate, Thought, and cold is not matter.

**Question 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.**

**Answer**: The smell of hot sizzling food reaches severed metres away, as the particles of hot food have more kinetic energy and hence the rate of diffusion is more than the particles of cold food.

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

**Answer**: A diver is able to cut through water in a swimming pool. This shows that the particles of water have intermolecular space and have less force of attraction.

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

**Answer:** The characteristics of the particles of matter are:

(1)Matter is composed of very small particles like atoms & molecules.

(2) The particles of matter have space between them.

(3) Particles of matter attract each other.

(4) The particles of matter are in constant motion.

**IN-TEXT QUESTIONS SOLVED**  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.**

**Answer**: Increasing density:

air < exhaust from chimneys < cotton < water < honey < chalk < iron.

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

**(b) Comment upon the following: rigidity, compressibility, fluidity, filling a gas container, shape, kinetic energy and density.**

**Answer**: (a) Difference in the characteristics of 3 states of matter.

| S. No. | Solid state | Liquid state | Gaseous state |
| --- | --- | --- | --- |
| 1. | Definite shape and volume. | No definite shape but definite volume. Liquids attain the shape of the vessel in which they are kept. | Gases have neither a definite shape nor a definite volume. |
| 2. | Incompressible | Compressible to a small extent. | Highly compressible |
| 3. | There is little space between the particles of a solid. | These particles have greater space between them. | The space between gas particles is the greatest. |
| 4. | These particles attract each other very strongly. | The force of attraction between liquid particles is less than solid particles. | The force of attraction is least between gaseous particles. |
| 5. | Particles of solid cannot move freely. | These particles move freely. | Gaseous particles are in a continuous, random motion. |

(b) Comment on:

(i) Rigidity: It is the property of matter to continue to remain in its shape when treated with an external force.

(ii) Compressibility: The matter has intermolecular space. The external force applied on the matter can bring these particles closer. This property is called compressibility. Gases and liquids are compressible.

(iii) Fluidity: The tendency of particles to flow is called fluidity. Liquids and gases flow.

(iv) Filling of a gas container: Gases have particles which vibrate randomly in all the directions. The gas can fill the container.

(v) Shape: Solids have maximum intermolecular force and definite shape.

Whereas liquids and gases take the shape of a container.

(vi) Kinetic energy: The energy possessed by particles due to their motion is called kinetic energy. Molecules of gases vibrate randomly as they have maximum kinetic energy.

(vii) Density: It is defined as mass per unit volume, the solids have highest density.

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 the air but to do the same through a solid block of wood we need a karate expert.**

Answer: (a) The molecules of gas have high kinetic energy due to which they keep moving in all directions and hence fill the vessel completely in which they are kept.

(b) A gas exerts pressure on the walls of the container because the molecules of the gas are in constant random motion due to high kinetic energy. These molecules constantly vibrate, move and hit the walls of the container thereby exerting pressure on it.

(c) The molecules/particles of a wooden table are tightly packed with each other, there is no intermolecular space, it cannot be compressed, it cannot flow, all these characteristics are of solid. So a wooden table should be called a solid.

(d) 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. It is because the molecules of air have less force of attraction between them and a very small external force can separate them and pass through it. But in the case of solids, the molecules have maximum force of attraction, the particles are tightly bound due to this force. Hence a large amount of external force is required to pass through solid.

**Question 4. Liquids generally have lower density as compared to solids. But you must have observed that ice floats on water. Find out why.**

**Answer**: Ice is a solid but its density is lower than water due to its structure. The molecules in ice make a cage like structure with a lot of vacant spaces, this makes ice float on water.

**IN-TEXT QUESTIONS SOLVED**  Page 9

**Question 1. Convert the following temperature to Celsius scale:**

**(a) 300 K (b) 573 K**

**Answer** : (a) (300 – 273)°C = 27°C (b) (573 – 273)°C = 300°C

**Question.2. What is the physical state of water at:**

**(a) 250°C (b) 100°C**

Answer: (a) 250°C = gas (b) 100°C liquid as well as gas.

**Question 3. For any substance, why does the temperature remain constant during the change of state?**

**Answer**: During the change of state of any matter heat is supplied to the substance. The molecules of this matter use heat to overcome the force of attraction between the particles, at this period of time, temperature remains constant. This extra heat is acquired by the molecules in the form of hidden heat called latent heat to change from one state of matter to the other state.

**Question 4. Suggest a method to liquefy atmospheric gases.**

**Answer**: By applying pressure and reducing the temperature, atmospheric gases can be liquefied.

**IN-TEXT QUESTIONS SOLVED**  Page 10

**Question 1. Why does a desert cooler cool better on a hot dry day?**

**Answer**: When a liquid evaporates, the particles of the liquid absorb energy from the surroundings to compensate for the loss of energy during evaporation. Since evaporation causes cooling, this makes the surroundings cool.

In a desert cooler, the water inside it is made to evaporate. This leads to absorption of energy from the surroundings, thereby cooling the surroundings.

Evaporation depends on the amount of water vapour present in air (humidity). If the amount of water vapour present in air is less, then evaporation is more. On a hot dry day, the amount of water vapour present in air is less. Thus, water present inside the desert cooler evaporates more, thereby cooling the surroundings more. That is why a desert cooler cools better on a hot dry day.

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

**Answer**: The earthen pot is porous with a lot of pores on it, the water comes out through these pores and the water gets evaporated at the surface of the pot thereby causing a cooling effect. This makes the pot cold and the water inside the pot cools by this process.

**Question 3. Why does our palm feel cold when we put some acetone or petrol or perfume on it?**

**Answer**: When we put some acetone or petrol or perfume on our palm, it evaporates. During evaporation, particles of the liquid absorb energy from the surface of the palm to compensate for the loss of energy, making the surroundings cool. Hence, our palm feels cold when we put some acetone or petrol or perfume on it.

**Question 4. Why are we able to sip hot tea or milk faster from a saucer rather than a cup?**

**Answer**: Tea in a saucer has larger surface area than in a cup. The rate of evaporation is faster with increased surface area. The cooling of tea in a saucer takes place sooner than in a cup. Hence we are 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?**

**Answer**: We should wear light coloured cotton clothes in summer. Light colour because it reflects heat. Cotton clothes because it has pores in it, which absorbs sweat and allows the sweat to evaporate faster thereby giving a cooling effect.

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**EXERCISE QUESTIONS SOLVED**  Page 12

**1. Convert the following temperature to Celsius scale.**

**(a) 293K (b) 470K**

**Answer:** 0°C = 273 K

(a) 293 K = (293 – 273)°C = 20°C

(b) 470K= (470 – 273)°C = 197°C

**2.Convert the following temperatures to the Kelvin scale.**

**(a) 25°C (b) 373°C**

**Answer:** 0°C = 273 K

(a) 25°C = (25+273)K = 298 K

(b) 373°C = (373+273)K = 646K

**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 while sitting several metres away.**

**Answer:**

(a) At room temperature, naphthalene balls undergo sublimation wherein they directly get converted from a solid to a gaseous state without having to undergo the intermediate state, i.e., the liquid state.

(b) Molecules of air move at a higher speed and have large intermolecular spaces. Perfumes comprise substances that are volatile, which scatter quickly in air, becoming less concentrated over a distance. Hence, we are able to smell perfume sitting several metres away.

**4. Arrange the following in increasing order of forces of attraction between the particles – water, sugar, oxygen.**

**Answer:** Oxygen (gas) < water (liquid) < sugar (solid)

**5. What is the physical state of water at –**

**(a) 25°C (b) 0°C (c) 100°C?**

**Answer:**

(a) At 25°C, the water will be in liquid form (normal room temperature)

(b) At 0°C, the water is at its freezing point, hence both solid and liquid phases are observed.

(c) At 100°C, the water is at its boiling point, hence both liquid and gaseous states of water (water vapour) are observed.

**6. Give two reasons to justify –**

**(a) Water at room temperature is a liquid.**

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

**Answer:**

(a) Water persists as a liquid at room temperature since its melting point is lower than room temperature and its boiling point (100° C) is higher.

Similarly,

(i) A fixed volume is occupied by a fixed mass of water.

(ii) At room temperature, water does not have a fixed shape and flows to fit the container’s shape.

As a result, water is a liquid at room temperature.

(b) Because its melting and boiling points are above room temperature, an iron almirah is a solid at room temperature. In the same way.

As a result, at room temperature, iron almirah is a solid.

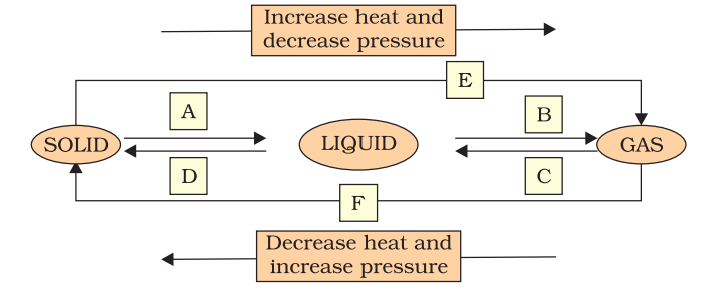
**7. Why is ice at 273K more effective in cooling than water at the same temperature?**

**Answer:** At 273 K, ice will absorb heat energy or latent heat from the medium to overcome fusion and transform into water. As a result, ice has a greater cooling impact than water at the same temperature since water does not absorb the excess heat from the medium.

**8. What produces more severe burns, boiling water or steam?**

**Answer:** Steam produces severe burns. It is because it is an exothermic reaction that releases a high amount of heat which it had consumed during vaporisation.

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



**Answer:** Interconversion of three states of matter: Using temperature or pressure, any state of matter can be turned into another.

(A) Solid to Liquid → Melting (or) fusion (or) liquefaction

(B) Liquid to Gas → Evaporation (or) vaporisation

(C) Gas to liquid → Condensation

(D) Liquid to Solid → Solidification

(E) Solid to Gas → Sublimation

(F) Gas to Solid → solidification