

Matter in Our Surroundings

CHAPTER
1



NCERT FOCUS

ANSWERS

Topic 1

1. Chair, air, smell, almonds, lemon water and smell of perfume
2. This happens because rate of diffusion of gases 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. 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. 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 eyes.

6. (a) The main characteristics of states of matter :

	Property	Solid	Liquid	Gas
(i)	Shape and volume	They have a definite shape as well as definite volume.	They have a definite volume but no definite shape.	They have neither a definite shape nor a definite volume.
(ii)	Compressibility	Solids are completely incompressible.	Liquids are almost incompressible.	Gases are highly compressible.
(iii)	Rigidity/Fluidity	Solids possess rigidity.	Liquids can flow, therefore they possess fluidity which is lower than that of gases.	Gases flow more easily than liquids and thus, have the highest fluidity.
(iv)	Kinetic energy	Their particles have minimum kinetic energy.	Their particles have kinetic energy higher than those of solids.	Their particles have highest kinetic energy.
(v)	Density	They have high density.	Their density is lower than those of solids but much higher than those of gases.	They generally have very low densities.
(vi)	Diffusion	They normally do not show the property of diffusion although some rare examples of diffusion of one solid into another are known.	They show the property of diffusion. As a result, solids, liquids and gases all can diffuse into liquids.	They diffuse very rapidly. The rate of diffusion of a gas is, however, inversely proportional to the square root of its density. Thus, lighter gas diffuses more rapidly than the heavier one.

(b) (i) **Rigidity** : It is the property which helps a substance to retain its shape when force is applied to it. Solids are rigid while gases and liquids are not.

(b) The particles of matter have spaces between them.
(c) The particles of matter attract each other due to intermolecular forces of attraction. The forces of attraction are maximum in solids and minimum in gases. Liquids have intermolecular forces in between solids and gases.
(d) The particles of matter are not stationary but are continuously moving.
(e) The intermolecular forces decrease with the increase in intermolecular spaces and *vice-versa*.
(f) Kinetic energy of the molecules increases with the rise in temperature.

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

(ii) **Compressibility** : It is the property due to which the particles of matter can be compressed or reduced in volume by applying force or pressure. Gases are highly compressible.

(iii) **Fluidity** : It is the tendency of a substance to flow. Liquids and gases possess fluidity while solids are rigid.

(iv) **Filling a gas container** : The molecules of a gas move in all directions and due to negligible interparticle force of attraction, can fill the container.

(v) **Shape** : Solids have definite shape whereas liquids take the shape of the container in which they are placed and gases do not have any shape.

(vi) **Kinetic energy** : It is the energy possessed by the particles due to their motion. The particles of a gas have maximum kinetic energy due to free motion of gas particles in all directions. Solids have minimum kinetic energy due to least movement of particles.

(vii) **Density** : Density is the mass of a substance per unit volume. Solids have highest density, since their molecules are closely packed.

7. (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.

8. 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.

9. The forces of attraction are the strongest in solids, followed by liquids and the weakest in gases. Oxygen is a gas, water is a liquid and sugar is a crystalline solid. So, the increasing order of forces of attraction is
 $\text{oxygen} < \text{water} < \text{sugar}$

10. (a) Water is a liquid at room temperature due to following reasons :

(i) Water has fixed volume, but not fixed shape, it takes the shape of the container.

(ii) Water can flow easily, hence it is not rigid but a fluid.

(b) An iron almirah is a solid at room temperature due to following reasons :

(i) An almirah has a fixed shape and a fixed volume.

(ii) It cannot flow, hence it is rigid.

11. (a) Temperature in $^{\circ}\text{C}$

$$\begin{aligned} &= \text{Temperature in kelvin} - 273 \\ &= 300 - 273 = 27^{\circ}\text{C} \end{aligned}$$

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

12. (a) We know that temperature in

$$\begin{aligned} \text{K} &= ^{\circ}\text{C} + 273 \\ &= 25 + 273 = 298 \text{ K} \end{aligned}$$

(b) $\text{K} = ^{\circ}\text{C} + 273 = 373 + 273 = 646 \text{ K}$

Topic 2

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

2. 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.

3. 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.

4. 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.

5. Acetone, petrol 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.

6. We are able to sip hot tea faster from a saucer rather than a cup because a saucer has a greater surface area. As a result, the rate of evaporation increases.

7. We should wear cotton clothes in summer. During summer, we perspire more because of the mechanism of our body which keeps us cool. Cotton, being a good absorber of water helps in absorbing the sweat and exposing it to the atmosphere for easy evaporation.

8. (a) Naphthalene balls disappear with time without leaving any solid because they undergo sublimation *i.e.*, they directly change into vapours without passing through the liquid state.
(b) We can get the smell of perfume sitting several metres away due to diffusion. The perfumes contain solvent which carries pleasant smelling vapours. They diffuse quite faster and can reach a person sitting several metres away.

9. (a) At 25°C, the physical state of water is a liquid.
(b) At 0°C, the physical state of water can be either a solid or a liquid.
(c) At 100°C, the physical state of water can be either a liquid or a gas (steam).

10. Ice at 273 K melts to form water at 273 K, by absorbing heat energy equal to latent heat from the surroundings. Hence ice has less heat energy than water and is more effective in cooling.

11. Steam contains more heat, in the form of latent heat, than boiling water. So when steam comes in contact with skin, it gives out 22.5×10^5 joules per kilogram more heat than boiling water, so steam causes more severe burns.

12. *A* → Fusion or melting, *B* → Vaporisation, *C* → Condensation, *D* → Solidification, *E* → Sublimation, *F* → Deposition/Desublimation.

