Short Answer Questions

Chapter - 1
Matter in our Surrounding

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11. A sample of water under study was found to boil at 102 °C at normal pressure. Is the water pure? Will this water freeze at 0 °C? Comment.

Ans: The **boiling point of pure water** is 100 °C at 1 atm. The **freezing point of pure water** is 0 °C. The sample of water under study boils at 102 °C at normal pressure. Hence, the sample is not pure water. The sample of water is not pure, it will not freeze at 0 °C. It will freeze at a temperature below 0 °C.

12. A student heats a beaker containing ice and water. He measures the temperature of the content of the beaker as a function of time. Which of the following (Fig. 1.1) would correctly represent the result? Justify your choice.

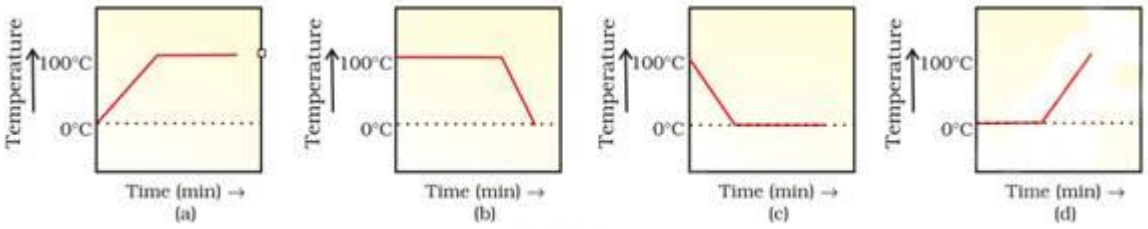

Fig. 1.1

Ans: Graph (d) represents the result correctly. Before the student starts to heat the mixture, the temperature of the mixture would be zero since ice and water are in equilibrium. When the student heats the mixture, heat supplied (equivalent of **latent heat of fusion**) is initially utilized by ice in melting. Hence, the temperature does not change till all the ice in the beaker melts. This explains the first part of the graph (constant temperature). When the student heats the mixture further, he will observe an increase in the temperature of the water inside the beaker. This explains the second part / slope of the graph (increasing temperature).

13. Fill in the blanks :-
(a) Evaporation of a liquid at room temperature leads to a _____ effect.
(b) At room temperature, the forces of attraction between the particles of solid substances are _____ than those which exist in the gaseous state.
(c) The arrangement of particles is less ordered in the _____ state. However, there is no order in the _____ state.

(d) _____ is the change of gaseous state directly to solid state without going through the _____ state.
(e) The phenomenon of change of a liquid into the gaseous state at any temperature below its boiling point is called _____.

Ans: (a) cooling
(b) stronger
(c) liquid, gaseous
(d) sublimation, liquid
(e) evaporation

14. Match the physical quantities given in column A to their SI units given in column B

Column A	Column B
(a) Pressure	(i) cubic metre
(b) Temperature	(ii) kilogram
(c) Density	(iii) pascal
(d) Mass	(iv) kelvin
(e) Volume	(v) kilogram per cubic metre

Ans: (a) — (iii) The SI unit of pressure is "pascal" (denoted by P).
(b) — (iv) The SI unit of temperature is "kelvin" (denoted by K).
(c) — (v) The SI unit of density is kilogram per cubic metre (kg/m^3).
(d) — (ii) The SI unit of mass is kilogram (kg).
(e) — (i) The SI unit of volume is m^3.

15. The non-SI and SI units of some physical quantities are given in column A and column B respectively. Match the units belonging to the same physical quantity:

Column A	Column B
(a) degree celsius	(i) kilogram
(b) centimeter	(ii) pascal
(c) gram per centimetre cube	(iii) metre
(d) bar	(iv) kelvin
(e) milligram	(v) kilogram per metre cube

Ans: (a) — (iv) Degree Celsius and kelvin are the units of temperature.
(b) — (iii) Centimetre and metre are the units of length.
(c) — (v) Gram per centimetre cube and kilogram per metre cube are the units of density.
(d) — (ii) Bar and pascal are the units of pressure.
(e) — (i) Milligram and kilogram are the units of mass.

16. 'Osmosis is a special kind of diffusion'. Explain.

Ans: Osmosis is a special kind of **diffusion**. In both the phenomena, there is a movement of particles from the region of higher concentration to a region of lower concentration. However, in case of **osmosis**, the movement is of "solvent particles" from a less concentrated "solution" and the movement is through a **semi-permeable membrane**.

17. Classify the following into osmosis/diffusion:-
(a) Swelling up of a raisin on keeping in water.
Ans: Osmosis; Solution outside the raisin has a higher concentration of water molecules. Therefore, water from outside enters the raisin through the process of osmosis and hence the raisin swells up when kept in water. The outer membrane of the cells of the raisin acts as a semi-permeable membrane.

(b) Spreading of virus on sneezing.
Ans: Diffusion. Microscopic virus diffuses in air.

(c) Earthworm dying on coming in contact with common salt.
Ans: Osmosis; The aqueous common salt has a lower concentration of water molecules.

(d) Shrinking of grapes kept in thick sugar syrup.
Ans: Osmosis; Thick sugar syrup is a highly concentrated solution. As compared to the solution inside the grapes, It has a lower concentration of water molecules. Hence, water molecules move out from grapes through osmosis. The grapes shrink after the movement of water molecules. The outer membrane of the cells of grapes acts as a semi-permeable membrane.

(e) Preserving pickles in salt.
Ans: Osmosis. Fruits and vegetables such as mango, lemon, cauliflower, etc. which are commonly used for making pickles have a high natural water content. The process of pickling is intended to keep out oxygen. Pickling prevents oxidation of fruits and vegetables through the use of salt. Dry salt forms pickling brine (aqueous sodium chloride) and absorbs excess moisture from fruits and vegetables through the process of osmosis.

(f) Spreading of smell of cake being baked throughout the house.
Ans: Diffusion; The smell of the cake spreads through diffusion in air.

(g) Aquatic animals using oxygen dissolved in water during respiration.
Ans: Diffusion; oxygen from atmosphere diffuses in water and this diffused oxygen is used by aquatic animals for respiration.

18. Water as ice has a cooling effect, whereas water as steam may cause severe burns. Explain these observations.

Ans: In the case of ice, the water molecules have low energy; while in the case of steam, the water molecules have high energy. In the case of ice, the water molecules absorb energy from the body and thus produce a cooling effect. On the other hand, the **high energy of water molecules in steam** is transformed as heat which may cause burns.

19. Alka was making tea in a kettle. Suddenly she felt intense heat from the puff of steam gushing out of the spout of the kettle. She wondered whether the temperature of the steam was higher than that of the water boiling in the kettle. Comment.

Ans: The temperature of steam is not different from that of boiling water**.** The high energy of steam leads Alka to wonder whether the temperature of steam was higher than that of the water boiling in the kettle. **The temperature of boiling water as well as that of steam is 100 °C**, but steam has more energy because of the **latent heat of vaporization**.

20. A glass tumbler containing hot water is kept in the freezer compartment of a refrigerator (temperature < 0 °C). If you could measure the temperature of the content of the tumbler, which of the following graphs (Fig. 1.2) would correctly represent the change in its temperature as a function of time.

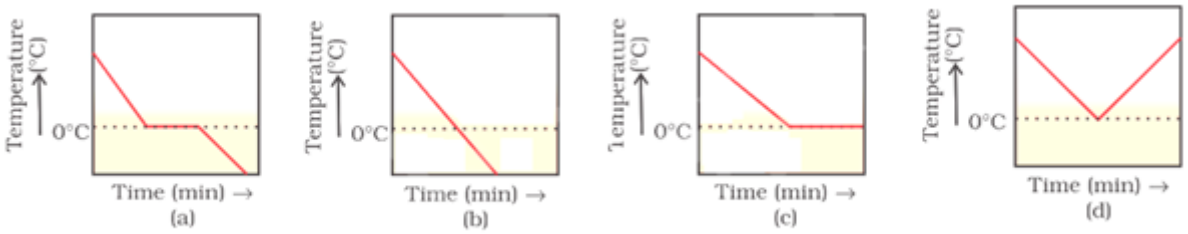

Fig. 1.2

Ans: Graph (a) represents the change in the temperature of the contents of the tumbler correctly. The water will initially cool till its temperature reaches 0 °C i.e. the freezing point of water. At this stage, the temperature will remain constant till all the water freezes. After this point, the temperature would decrease again.

21. Suggest which of the vessels A, B, C or D in Fig. 1.3 will have the highest rate of evaporation? Explain.

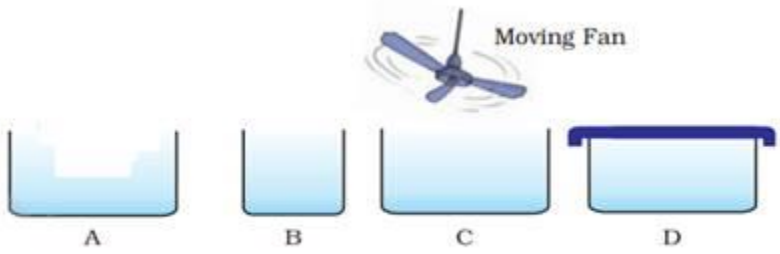

Fig. 1.3

Ans: Vessel (c) will have the highest rate of evaporation. **Evaporation is a surface phenomenon;** the rate of evaporation increases with an increase in surface area. The moving fan will reduce humidity and increase the rate of evaporation.The particles of water vapours will move away with wind (moving air) with an increase in air speed. Surface area in vessel (b) is lesser than that in vessel (a) and vessel (c) whereas vessel (d) is completely closed and offers no surface area for evaporation.

22. (a) Conversion of solid to vapours is called sublimation. Name the term used to denote the conversion of vapours to solid.
Ans: Sublimation. Sublimation is the transition of solid/gas phase directly from the solid/gas phase to the gaseous/solid phase without passing through the intermediate liquid phase.

(b) Conversion of solid state to liquid state is called fusion; what is meant by latent heat of fusion?
Ans: The amount of heat required to convert 1 kg of any solid into liquid at its melting point at one atmosphere pressure is known as the **latent heat of fusion** of that solid.