
Matter in our Surrounding

Multiple Choice Questions

1. Which one of the following sets of phenomena would increase on raising the temperature?

- (a) Diffusion, evaporation, compression of gases
- (b) Evaporation, compression of gases, solubility
- (c) Evaporation, diffusion, expansion of gases
- (d) Evaporation, solubility, diffusion, compression of gases

Ans. (c) Evaporation, diffusion, expansion of gases

Explanation: Evaporation happens because of conversion of liquid into gas and this happens because of absorption of temperature by the liquid. Hence, rise in temperature increase the rate of evaporation. Rise in temperature increase the kinetic energy of particles and gases expand on rise in temperature. Increased kinetic energy of particles also increases diffusion.

2. Seema visited a Natural Gas Compressing Unit and found that the gas can be liquefied under specific conditions of temperature and pressure. While sharing her experience with friends she got confused. Help her to identify the correct set of conditions

- (a) Low temperature, low pressure
- (b) High temperature, low pressure
- (c) Low temperature, high pressure
- (d) High temperature, high pressure

Ans. (c) Low temperature, high pressure

Explanation: Low temperature reduces the kinetic energy of particles. High pressure reduces intermolecular space. Both these conditions help in turning a gas into liquid.

3. The property to flow is unique to fluids. Which one of the following statements is correct?

- (a) Only gases behave like fluids
- (b) Gases and solids behave like fluids
- (c) Gases and liquids behave like fluids
- (d) Only liquids are fluids

Ans. (c) Gases and liquids behave like fluids

Explanation: In gases and liquids, space between molecules is enough which facilitates the flow of these matters.

4. During summer, water kept in an earthen pot becomes cool because of the phenomenon of

- (a) diffusion
 - (b) transpiration
 - (c) osmosis
 - (d) evaporation
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Ans. (d) evaporation

Explanation: Evaporation reduces the temperature of surroundings. Due to this, water in earthen pot cools down.

5. A few substances are arranged in the increasing order of 'forces of attraction' between their particles. Which one of the following represents a correct arrangement?

- (a) Water, air, wind
- (b) Air, sugar, oil
- (c) Oxygen, water, sugar
- (d) Salt, juice, air

Ans. (c) Oxygen, water, sugar

Explanation: Forces of attraction between particles is the least in gases and is maximum in solids.

6. On converting 25°C, 38°C and 66°C to kelvin scale, the correct sequence of temperature will be

- (a) 298 K, 311 K and 339 K
- (b) 298 K, 300 K and 338 K
- (c) 273 K, 278 K and 543 K
- (d) 298 K, 310 K and 338 K

Ans. (a) 298 K, 311 K and 339 K

Explanation: $25^{\circ}\text{C} + 273 = 298\text{ K}$, $38^{\circ}\text{C} + 273 = 311\text{ K}$, $66^{\circ}\text{C} + 273 = 339\text{ K}$.

7. Choose the correct statement of the following

- (a) conversion of solid into vapours without passing through the liquid state is called vapourisation.
- (b) conversion of vapours into solid without passing through the liquid state is called sublimation.
- (c) conversion of vapours into solid without passing through the liquid state is called freezing.
- (d) conversion of solid into liquid is called sublimation.

Ans. (b) conversion of vapours into solid without passing through the liquid state is called sublimation.

8. The boiling points of diethyl ether, acetone and n-butyl alcohol are 35°C, 56°C and 118°C respectively. Which one of the following correctly represents their boiling points in kelvin scale?

- (a) 306 K, 329 K, 391 K
- (b) 308 K, 329 K, 392 K
- (c) 308 K, 329 K, 391 K
- (d) 329 K, 392 K, 308 K

Ans. (c) 308 K, 329 K, 391 K

Explanation: Add 273 to each Celsius scale to convert them to Kelvin scale.

9. Which condition out of the following will increase the evaporation of water?

- (a) Increase in temperature of water
- (b) Decrease in temperature of water
- (c) Less exposed surface area of water
- (d) Adding common salt to water

Ans. (a) Increase in temperature of water

Explanation: The rest of the options reduce the rate of evaporation of water.

10. In which of the following conditions, the distance between the molecules of hydrogen gas would increase?

- (i) Increasing pressure on hydrogen contained in a closed container
 - (ii) Some hydrogen gas leaking out of the container
 - (iii) Increasing the volume of the container of hydrogen gas
 - (iv) Adding more hydrogen gas to the container without increasing the volume of the container
- (a) (i) and (iii)
 - (b) (i) and (iv)
 - (c) (ii) and (iii)
 - (d) (ii) and (iv)

Ans. (c) (ii) and (iii)

Explanation: Increase pressure to adding more hydrogen gas to the container without increasing the volume of container will reduce the intermolecular distance.

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Short Answer Questions

11. A sample of water under study was found to boil at 102°C at normal temperature and 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. Consequently, pure water freezes at 0°C . So, the sample of water which boils at 102°C at normal temperature and pressure is not pure water. It will freeze 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.

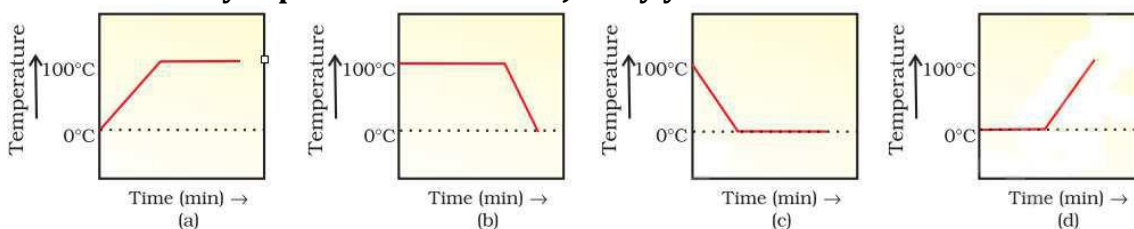


Fig. 1.1

Ans. Since ice and water are in equilibrium, the temperature would be zero. When we heat the mixture, energy supplied is utilized in melting the ice and the temperature does not change till all the ice melts because of latent heat of fusion. On further heating, the temperature of the water would increase. Therefore, the correct option is (d).

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
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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)
 (b) — (iv)
 (c) — (v)
 (d) — (ii)
 (e) — (i)

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)
 (b) — (iii)
 (c) — (v)
 (d) — (ii)
 (e) — (i)

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

- Ans. Yes, this is true. In both the phenomena, there is movement of particles from region of higher concentration to that of lower concentration. However, in the case of osmosis the movement of solvent is through a semi permeable membrane which is permeable only to water molecules.

17. Classify the following into osmosis/diffusion

(a) Swelling up of a raisin on keeping in water.

Ans. Osmosis

(b) Spreading of virus on sneezing.

Ans. Diffusion

(c) Earthworm dying on coming in contact with common salt.

Ans. Osmosis

(d) Shrinking of grapes kept in thick sugar syrup.

Ans. Osmosis

(e) Preserving pickles in salt.

Ans. Osmosis

(f) Spreading of smell of cake being baked throughout the house.

Ans. Diffusion

(g) Aquatic animals using oxygen dissolved in water during respiration.

Ans. Diffusion

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

Ans. In case of ice the water molecules have low energy while in the case of steam the water molecules have high energy. The high energy of water molecules in steam is transformed as heat and may cause burns. On the other hand, in case of ice, the water molecules take energy from the body and thus give a cooling effect.

- 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 both boiling water and steam is 100°C , but steam has more energy because of latent heat of vapourisation.

- 20. A glass tumbler containing hot water is kept in the freezer compartment of a refrigerator (temperature $< 0^{\circ}\text{C}$). 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.**

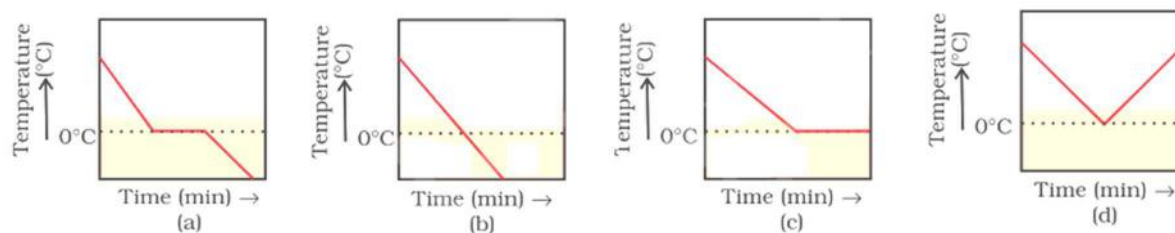


Fig. 1.2

Ans. (a) The water will cool initially till it reaches 0°C , the freezing point. At this stage the temperature will remain constant till all the water will freeze. After this temperature, would fall again.

- 21. Look at Fig. 1.3 and suggest in which of the vessels A, B, C or D the rate of evaporation will be the highest? Explain.**
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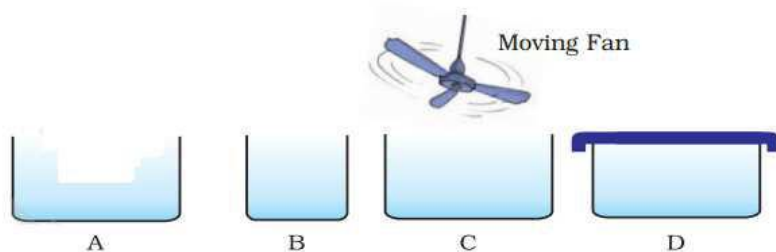


Fig. 1.3

Ans. (c) The rate of evaporation increases with an increase of surface area because evaporation is a surface phenomenon. Also, with the increase in air speed, the particles of water vapour will move away with the air, which will increase the rate of evaporation.

22. (a) Conversion of solid to vapour is called sublimation. Name the term used to denote the conversion of vapour to solid.

Ans. Sublimation

(b) Conversion of solid state to liquid state is called fusion; what is meant by latent heat of fusion?

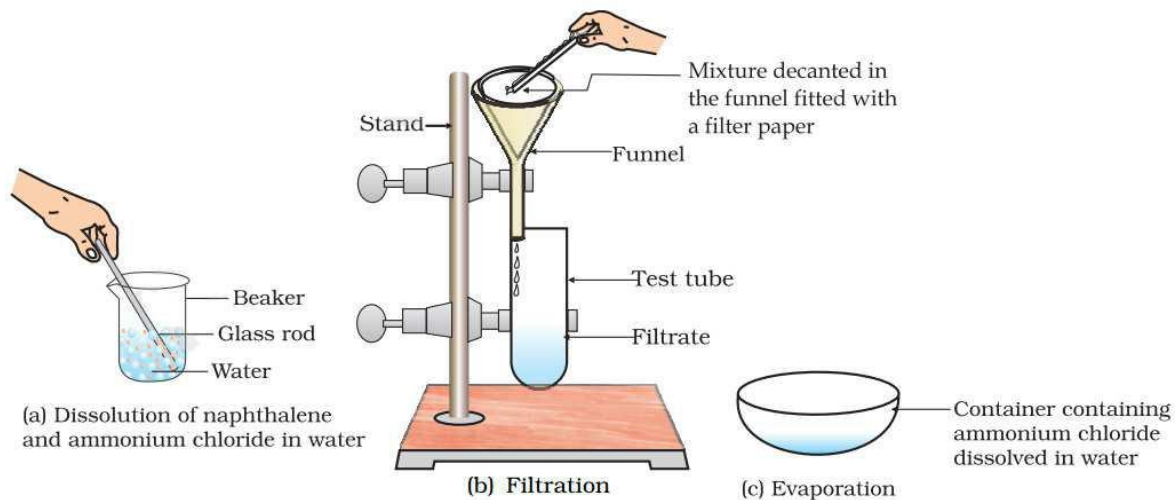
Ans. The amount of heat required to convert 1 kg of solid into liquid at one atmosphere pressure at its melting point is known as its latent heat of fusion.

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Long Answer Questions

23. You are provided with a mixture of naphthalene and ammonium chloride by your teacher. Suggest an activity to separate them with well labelled diagram.

Ans. Naphthalene is insoluble in water but soluble in ether an organic solvent. It is volatile at room temperature. Ammonium chloride is soluble in water and volatile at higher temperature. It decomposes on heating to dryness.



24. It is a hot summer day, Priyanshi and Ali are wearing cotton and nylon clothes respectively. Who do you think would be more comfortable and why?

Ans. Cotton being a better absorber of water than nylon helps in absorption of sweat followed by evaporation which leads to cooling. So Priyanshi is more comfortable, whereas Ali is not so comfortable.

25. You want to wear your favourite shirt to a party, but the problem is that it is still wet after a wash. What steps would you take to dry it faster?

Ans. Conditions that can increase the rate of evaporation of water are

- (a) an increase of surface area by spreading the shirt
- (b) an increase in temperature by putting the shirt under the sun
- (c) increase the wind speed by spreading it under the fan.

26. Comment on the following statements:

(a) Evaporation produces cooling.

Ans. Evaporation produces cooling as the particles at the surface of the liquid gain energy from the surroundings and change into vapour thereby producing a cooling effect.

(b) Rate of evaporation of an aqueous solution decreases with increase in humidity.

Ans. Air around us cannot hold more than a definite amount of water vapour at a given temperature which is known as humidity. So, if the air is already rich in water vapour, it will not take up more water therefore, rate of evaporation of water will decrease.

(c) Sponge though compressible is a solid.

Ans. A sponge has minute holes in which air is trapped. Also, the material is not rigid. When we press it, the air is expelled out and we are able to compress it.

27. Why does the temperature of a substance remain constant during its melting point or boiling point?

Ans. The temperature of a substance remains constant at its melting and boiling points until all the substance melts or boils because, the heat supplied is continuously used up in changing the state of the substance by overcoming the forces of attraction between the particles. This heat energy absorbed without showing any rise in temperature is given the name latent heat of fusion/latent heat of vapourisation.
