

Chapter – 1 Matter in Our Surroundings

Multiple Choice Questions

Q1. 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.

Answer: c) Evaporation, diffusion, expansion of gases

Evaporation, diffusion and expansion of gases increases with temperature because kinetic energy of molecules increases and molecules of the liquid is converted into vapor state.

Diffusion and expansion of gas also increases, as the molecules move quickly to occupy space.

Q2. 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

Answer: c) Low temperature, high pressure

Low temperature and high pressure are required to liquefy the gases in liquids.

Gases have space between particles, on applying high pressure, the particles move and start attracting each other to form a liquid.

Heat is produced when the gas is compressed, so it is cooled which lower the temperature of compressed gas to liquefy it.

Q3. 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

Answer: c) Gases and liquids behave like fluids

Gases and liquids behave like fluids, as they have tendency to flow due to less force of attraction between particles.

Q4. During summer, water kept in an earthen pot becomes cool because of the phenomenon of

- a) Diffusion
- b) Transpiration
- c) Osmosis
- d) Evaporation

Answer: d) Evaporation

In summer season, the water in an earthen pot gets cool because due to evaporation. Earthen pot is porous, so the water molecules always percolate through these pores. This water evaporates to take the latent heat for the vaporization from the remaining water.

Q5. 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

Answer: c) Oxygen, water, sugar

The order of 'force of attraction' between particles:

$$\text{Oxygen} < \text{Water} < \text{Sugar}$$

As the force of attraction is in the order:

$$\text{Gas} < \text{Liquid} < \text{Solid}$$

Q6. 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

Answer: a) 298K ,311K and 339K

To convert 25°C , 38°C and 66°C , to kelvin scale:

- i) $25^{\circ}\text{C} + 273 = 298\text{ K}$
- ii) $38^{\circ}\text{C} + 273 = 311\text{ K}$
- iii) $66^{\circ}\text{C} + 273 = 339\text{ K}$

So, the correct sequence of temperature is 298 K, 311 K and 339 K.

Q7. Choose the correct statement of the following.

- a) Conversion of solid into vapors without passing through the liquid state is called vaporization.
- b) Conversion of vapors into solid without passing through the liquid state is called sublimation.
- c) Conversion of vapors into solid without passing through the liquid state is called freezing.
- d) Conversion of solid into liquid is called sublimation.

Answer: b) Conversion of vapors into solid without passing through the liquid state is called sublimation.

Sublimation is a process to convert solid into vapors on heating or vapors into solid on cooling without changing into liquid state.

Q8. The boiling point 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

Answer: c) 308K, 329K, 391K

The order of boiling points of diethyl ether, acetone and n-butyl alcohol in kelvin scale:

$$\text{Temperature in Celsius} + 273 = \text{Temperature in Kelvin}$$

- i) Boiling Point of diethyl ether = $35^{\circ}\text{C} + 273 = 308\text{ K}$
- ii) Boiling Point of acetone = $56^{\circ}\text{C} + 273 = 329\text{ K}$
- iii) Boiling Point of n-butyl alcohol = $118^{\circ}\text{C} + 273 = 391\text{ K}$

Q9. 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.

Answer: a) Increase in temperature of water.

On increasing the temperature of water, the evaporation increases, as kinetic energy of water molecules increases and particles change into the vapor.

Q10. 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.
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- a) i) and ii)
 - b) i) and iv)
 - c) ii) and iii)
 - d) ii) and iv)

Answer: c) ii) and iii)

ii) Some hydrogen gas leaking out of the container.

iii) Increasing the volume of the container of hydrogen gas.

In option ii) hydrogen gas leaking from the container leaves vacant space. So, the molecules of hydrogen gas occupy all the space and the distance between the molecules of hydrogen gas is increased.

In option iii) as there is increase in the volume of the container of hydrogen gas, more space is there in the container and hydrogen gas molecules occupies the space and so, distance between the molecules increases.

Short Answer Type Questions

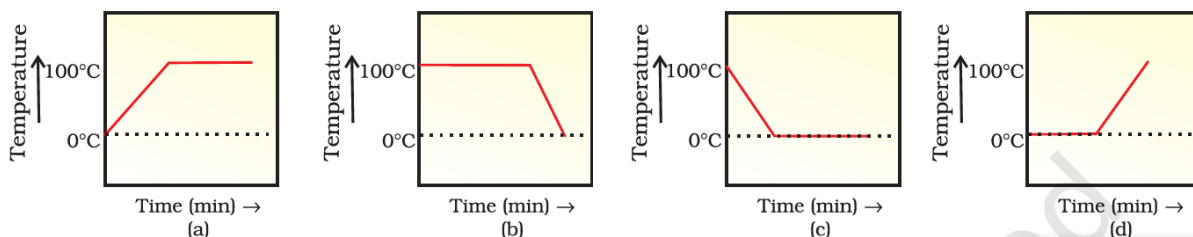
Q11. A sample of water under study was found to boil at 102°C at normal temperature and pressure. Is the water pure? Will this water freeze at 0°C ? Comment.

Answer:

No, the water is not pure, as boiling point of pure water is 100°C but the given sample boils at 102°C , which shows that it has dissolved impurities.

The water will not freeze at 0°C , but below 0°C as it has impurities in it.

Q12. 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 would correctly represent the result? Justify your choice.



Answer:

Figure d) is correct result, because on heating the mixture of water and ice at 0°C , the ice absorbs heat and converts into the water at 0°C . Initially there is no rise of temperature, on heating temperature starts rising, so ice particles attract one another with strong force to form liquid water. It does increase the kinetic energy of particles so there is no rise in temperature during melting of ice. When ice melts and changes to liquid, further heating increases the kinetic energy of water, so there is a sharp rising in the temperature of water.

Q13. Fill in the blanks.

- Evaporation of a liquid at room temperature leads to a Effect.
- At room temperature the forces of attraction between the particles of solid substances are than those which exist in the gaseous state.
- The arrangement of particles is less ordered in the state. However, there is no order in the state.
- Is the change of gaseous state directly to solid state without going through the state?
- The temperature of change of a liquid into the gaseous state at any temperature below its boiling point is called

Answer:

- cooling
- stronger
- liquid, gaseous
- Sublimation
- evaporation.

Q14. Match the physical quantities given in Column A to their S.I units given in Column B.

Column A	Column B
a) Pressure	i) Cubic meter
b) Temperature	ii) Kilogram
c) Density	iii) Pascal
d) Mass	iv) Kelvin
e) Volume	v) Kilogram per cubic meter

Answer:

Column A	Column B
a) Pressure	i) Pascal
b) Temperature	ii) Kelvin
c) Density	iii) Kilogram per cubic meter
d) Mass	iv) Kilogram
e) Volume	v) Cubic meter

Q15. 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 quantities.

Column A	Column B
a) Degree Celsius	i) Kilogram
b) Centimeter	ii) Pascal
c) Gram per centimeter	iii) Meter
d) Bar	iv) Kelvin
e) Milligram	v) kilogram per meter cube

Answer:

Column A	Column B
a) Degree Celsius	i) Kelvin
b) Centimeter	ii) Meter
c) Gram per centimeter	iii) Kilogram per meter cube
d) Bar	iv) Pascal
e) Milligram	v) kilogram

Q16. 'Osmosis is a special kind of diffusion'. Comment.

Answer:

The diffusion is the process in which molecules of a substance move from the higher concentration to lower concentration. In, the process of osmosis, the solvent i.e water molecules move higher concentration to lower concentration through a semi-permeable membrane.

So, the process of osmosis is a special kind of diffusion.

Q17. Classify the following into osmosis/diffusion.

- a) Swelling up of a raisin on keeping in water.
- b) Spreading of virus on sneezing.

- c) Earthworm dying on coming in contact with common salt.
- d) Shrinking of grapes kept in thick sugar syrup.
- e) preserving pickles in salt.
- f) Spreading of smell of cake being baked throughout the house.
- g) Aquatic animals using oxygen dissolved in water during respiration.

Answer:

Osmosis occurs in –

- a) Swelling of a raisin in water.
- c) Earthworm dying with common salt.
- d) Shrink of grapes in thick sugar syrup.
- e) To preserving pickles in salt.

Diffusion occurs in –

- b) Spread of virus on sneezing.
- f) Spread of smell of cake baked in the house.
- g) Aquatic animals using oxygen in water during respiration.

Q18. Water as ice has a cooling effect, whereas water as steam may cause severe burns. Explain these observations.

Answer:

When ice melts, it absorbs the energy which is equal to the latent heat of fusion from the surroundings, so it causes a cooling effect.

Steam releases the extra heat which is absorbed when water is converted into steam. So, steam causes severe burns.

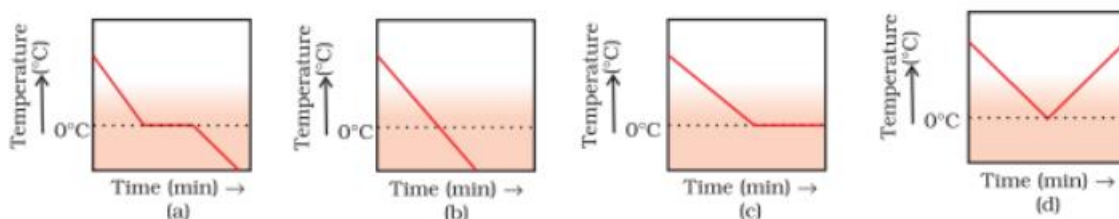
Q19. Alka was making tea in a kettle. Suddenly she felt intense heat from the puff of steam gushing out of the spout of the kettle. She wondered whether the temperature of the steam was higher than that of the water boiling in the kettle. Comment.

Answer:

The temperature of boiling water and steam is 100°C , but steam gives more heat as compared to the boiling water, because when water changes into steam, it absorbs latent heat of vaporization, but when steam condenses to water, an equal amount of latent heat is given out.

So, Alka felt intense heat from the puff of steam gushing out of the spout of the kettle.

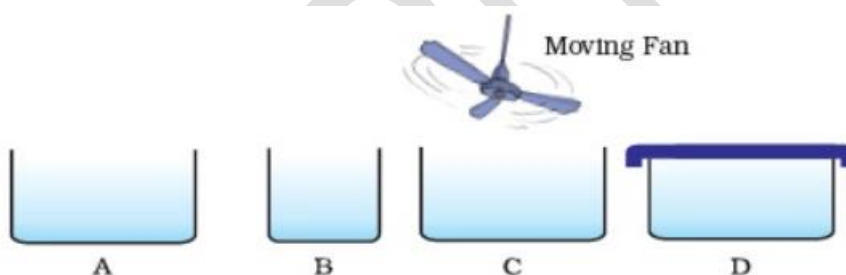
Q20. A glass tumbler containing hot water is kept in the freezer compartment of a refrigerator (temperature $< 0^{\circ}\text{C}$). If you could measure the temperature of the content of the tumbler, which of the following graphs would correctly represent the change in its temperature as a function of time



Answer:

Figure a) signifies the change of temperature with time. The temperature of water first decreases to 0°C , remains constant for some time, then starts decreasing.

Q21. Look at the figure and suggest in which of the vessels A, B, C or D the rate of evaporation will be the highest? Explain.



Answer:

The rate of evaporation will be of highest in vessel C as the surface area exposed for evaporation is larger than B because moving fan increases the wind speed and the rate of evaporation.

Yes, A and D are equal in size to C but A is away from the fan and D has lid.

Q22. a) Conversion of solid to vapor is called sublimation. Name the term used to denote the conversion of vapor to solid.

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

Answer:

- It is also Sublimation.
- It is the amount of heat energy essential to change 1 kg of solid into liquid at atmospheric pressure and at its melting point is known as the latent heat of fusion.

Long Answer Type Questions

Q23. You are provided with a mixture of naphthalene and ammonium chloride by your teacher. Suggest an activity to separate them with well labelled diagram.

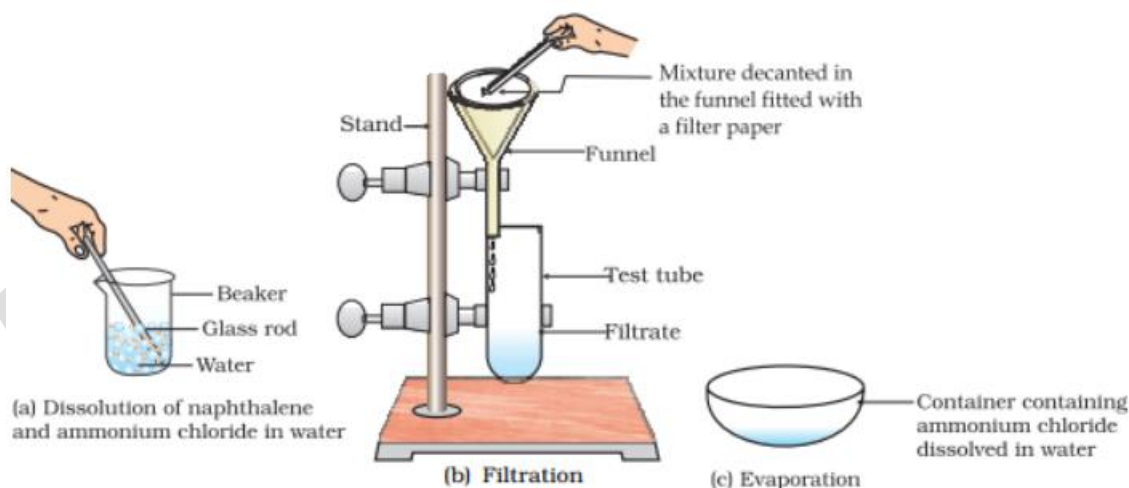
Answer:

Naphthalene is soluble in benzene but insoluble in water and Ammonium chloride is soluble in water but insoluble in benzene.

Naphthalene changes into vapors at room temperature but ammonium chloride changes into vapors on heating.

Activity: -

- Add water to the mixture and dissolve ammonium chloride.
- Filter the mixture.
- Naphthalene is collected as residue.
- Filtrate has ammonium chloride.
- Crystallize the filtrate by heating, so saturated solution of ammonium chloride is collected.
- Cool the hot saturated solution to get crystal of ammonium chloride.



Q24. It is a hot summer day, Priyanshi and Ali are wearing cotton and nylon clothes respectively. Why do you think would be more comfortable and why?

Answer:

Priyanshi feel more comfortable as there is more sweat on our body in a hot summer day.

Cotton absorbs sweat from the body and has larger surface area for evaporation which gives cooling effect.

Nylon does not absorb sweat, so it does not evaporate and Ali feel uncomfortable.

Q25. You want to wear your favorite 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?

Answer:

The steps are:

- 1) **Dry it under the fan:** On drying under the fan, the wind increases under the fan, so the particles of water changes to vapour. It will increase the rate of water evaporation and hence wet short dries quickly.
- 2) **To use hanger and increase surface area to air:** when the shirt is spread, it has large surface area. So, the shirt dries quickly as evaporation of water is faster.
- 3) **Dry the shirt in Sun:** Temperature is more on a sunny day, so the rate of evaporation increases, as the kinetic energy of water particles help to convert into vapour state.
- 4) **Using iron:** Hot iron increase the temperature and water is converted into vapour state. So, the rate of evaporation increases and shirt dries up very fast.

Q26. Comment on the following statements.

- a) **Evaporation produces cooling.**
- b) **Rate of evaporation of an aqueous solution decreases with increase in humidity.**
- c) **Sponge though compressible is a solid.**

Answer:

- a) Evaporation produces cooling, because when a liquid evaporates, it takes the latent heat of vaporization. The other matter losses heat and gets cooled.
- b) When the humidity is high, then air is saturated with water vapors. So, rate of evaporation decreases.
- c) Sponge has minute holes where the air gets trapped. The material is not rigid, so on pressing it, air is expelled out. Thus, it is solid with definite shape and volume and does not change its shape unless compressed.

Q27. Why does the temperature of a substance remain constant during its melting point or boiling point?

Answer:

Temperature of a substance is constant at melting point or boiling point, as substance use latent heat of fusion to overcome force of attraction between the particles of solid to change into the liquid during melting and latent heat of vaporization to overcome force of attraction between particles of liquid to change into vapors during boiling.