

$$\begin{aligned} \text{or } V_2 &= \frac{V_1 T_2}{T_1} \\ &= \frac{35 \times 307}{290} \\ &= 37.05 \text{ dm}^3 \end{aligned}$$

10) The largest moon of Saturn is Titan. It has atmospheric pressure of  $1.6 \times 10^5$  Pa. What is the atmospheric pressure in atm? Is it higher than earth's atmospheric pressure?  
Solution.

$$P = 1.0 \times 10^5 \text{ Pa}$$

Suppose atmospheric pressure in atm = x

Then

Pa

101325

$1.6 \times 10^5$  x

It will be cleared that the atmospheric pressure of Titan is greater than the atmosphere pressure of earth

<h2 style="margin: 0;">Short Questions</h2> <h2 style="margin: 0;">Answer</h2>
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Q1 Define Matter.

s. Everything which occupies some space and has mass is called matter For example; Air, Wood, H<sub>2</sub>S<sub>04</sub> etc

(22. Write down the names of different states of matter.

Ans. There are three states of matter

(i) Solid

(ii) Liquid

(ii) Gas

(23. Describe gaseous state of matter.

Ans. Matter in gaseous state does not have definite shape and volume. Therefore, gases occupy all the available space. Gases have very weak intermolecular forces.

Q4. Define Diffusion. On what factor diffusion of gases depends?

Ans. Diffusion IS spontaneous mixing up of molecules by random motion and collisions to form a homogeneous mixture

Factors

Rate of diffusion depends upon the molecular mass of the gas

Q5. Define Effusion. On what factor it depends?

Ans. It is escaping of gas molecules through a tiny hole into a space with lesser pressure. Example when a tyre gets punctured air effuses out.

Factor

Effusion depends upon the molecular masses of gases

Q6. Define Pressure. Write down its SI unit.

Ans. Pressure

The force (F) exerted per unit surface area (A)

S.I unit of pressure

The SI unit of force is Newton and that of area is  $m^2$ . Hence pressure has SI unit of  $Nm^{-2}$

It is also called Pascal (Pa)

One Pascal (Pa) =  $1 Nm^{-2}$  --

Q7. Write down the name of instruments with the help of, we measure the pressure?

Ans. There are two instruments with the help of we measure the pressure (i)

Barometer.

Barometer is used to measure the atmosphere pressure

(ii) Manometer

It is used to measure the pressure in laboratory.

Q 8. Define standard atmospheric pressure.

Ans. It is defined as the pressure exerted by mercury column of 760mm height of sea level.

It is sufficient pressure to support a column of mercury in height at sea level. Q 9. How Gases are compressible?

Ans. Gases are highly compressible due to empty spaces between their molecules.

(10. Describe the mobility of gas molecules.

Ans. Gas molecules are always in state of continuous motion. They can move from one place to another because gas molecules possess very high kinetic energy.

Q11. Describe the density of gases.

Ans. Density is the ratio of mass and volume (m/v). Gases have low density than liquid and solids. Density of gases is expressed in grams per  $dm^3$ .

Q12. Why the rate of diffusion of gases is rapid than that of liquid?

Ans. Because gas molecules have insignificant intermolecular forces as compare to liquid. So the rate of diffusion of gases is rapid than that of liquid.

Q13. what do you mean by Pascal? How many Pascal are equal to 1atm?

Ans. Pascal is the SI unit of pressure

$$\text{One Pascal} = 1 \text{ Nm}^{-2}$$

Q14. Whether the density of a gas decrease on cooling.

Ans. The density of gases increases by cooling because their volume decreases. For example at normal atmospheric pressure the density of oxygen gas is  $1.4 \text{ gdm}^{-3}$  at  $20^\circ\text{C}$  and  $1.5 \text{ gdm}^{-3}$  at  $0.0^\circ\text{C}$ .

Q15. Why is the density of gas measured in  $\text{gdm}^{-3}$ , while that of a liquid is expressed in  $\text{gcm}^{-3}$ ?

Ans. Gases have low densities due to light mass and more volume occupied by the gas molecules. That is why gas density is expressed in  $\text{grams per dm}^3$ , whereas liquid and solid densities are expressed in  $\text{gram per cm}^3$  because liquids and solid are times denser than gases.

Q16. Convert the following

a) 70 cm of Hg to atm

Ans. we know that

$$760 \text{ cm Hg} = 1 \text{ atm}$$

$$1 \text{ cm Hg} = \frac{1}{760}$$

$$\begin{aligned} 70 \text{ cm Hg} &= \frac{1}{760} \times 70 \\ &= 0.0921 \text{ atm} \end{aligned}$$

b) 3.5 atm to torr

$$\begin{aligned} 1 \text{ atm} &= 760 \text{ torr} \\ 3.5 \text{ atm} &= 760 \times 3.5 \\ &= 2660 \text{ torr} \end{aligned}$$

a) 1.5 atm to Pa

$$\begin{aligned} 1 \text{ atm} &= 101325 \text{ Pa} \\ 1.5 \text{ atm} &= 101325 \times 1.5 \\ &= 151987.5 \text{ Pa} \end{aligned}$$

Q17. Define Boyle's law.

a)

70 cm of Hg to atm

Ans. Volume of a given mass of a gas is inversely proportional to its pressure provided the temperature remains constant.

(218. Who was Robert Boyle?)

Ans. Robert Boyle (1627-1691) was natural philosopher, chemist, physicist and inventor.

He is famous for Boyle's law of gases.

(219. Is the Boyle's law applicable to liquids?

Ans. No, Boyle's law only applicable on gas,

(220. Is the Boyle's law valid at very high temperature?

Ans. No, it is only valid at constant temperature.

(221, What will happen if the pressure on a sample of gas is raised three times and its temperature is kept constant?

Ans. If the pressure on a sample of gas is raised three times at constant temperature, the volume will also decrease three times of its original volume.

Q22. Who was J. Charles?

Ans. J Charles (1746-1823) was a French inventor, scientist, mathematician and balloonist. He described in 1802, how gases tend to expand when heated.

Q23. Define Charles law.

Ans. J Charles in 1789 presented his law that "the volume of a given mass of a gas is directly proportional to the absolute temperature if the pressure is kept constant.

Q24. What is absolute temperature scale?

Ans. Lord Kelvin introduced absolute temperature scale or Kelvin scale. This scale of temperature starts from 0 K or  $-273.15^{\circ}\text{C}$  which is given the name of absolute zero. It is the temperature at which an ideal gas would have zero volume.

(225. Which parameters are kept constant in Charles's Law?

Ans. In Charles law pressure remains constant.

Q26. Why volume of gas decreases with increase of pressure?

Ans. The volume of gas decreases with increase of pressure because pressure and volume both are inversely proportional to each other so when we increase pressure, volume will decrease and when volume increases, pressure will be decreased.— (227. Does Kelvin scale show a negative temperature?

Ans. The Kelvin scale does not show negative value, as  $0\text{K} = -273^{\circ}\text{C}$ .

Q28. When a gas is allowed to expand, what will be its effect on its temperature?

Ans. Temperature will be increased because volume and temperature is directly proportional to each other

A. Q29. Can you cool a gas by increasing its volume?

Ans; Yes, by suddenly increasing the volume of a gas, it gives the cooling effect.

Q30. In which units' body temperature is measured?

Ans. Body temperature is measured in Fahrenheit scale. Normal body temperature is  $98.6^{\circ}\text{F}$ . and is equivalent to  $37^{\circ}\text{C}$ . This temperature is close to average normal atmospheric temperature.

Q31. What is meant by liquid?

Ans. Matter that has indefinite shape but a definite volume is called liquid. For example water, milk etc.

Q32. Define evaporation. On which factors it depends.

Ans. The process of escaping molecules spontaneously from the surface of a liquid is called evaporation, It depends upon following factors.

- (i) Temperature
- (ii) Surface tension
- (iii) Intermolecular forces.

(234. Explain evaporation causes cooling.

Ans. When the high kinetic energy molecules vapourize the temperature of remaining molecules falls down. To compensate this deficiency of energy, the molecules of liquid absorb energy from the surrounding. As a result the temperature of surrounding decreases and we feel cooling.

Q35. Define vapour pressure.

Ans. The pressure exerted by the vapour of a liquid at equilibrium with the liquid at a particular temperature is called vapour pressure of a liquid.

Q36. Write down the names of factors on which vapour pressure depends.

Ans. There are following factors

- (i) Nature of liquid
- (ii) Size of molecule (iii) Temperature

(237. Define boiling point.

Ans. "The temperature at which the vapour pressure of a liquid is equal to 'atmosphere pressure on its surface is called boiling point'

(238. Write down the names of factors which boiling point depends.

Ans. The factors on which boiling point depends are

- i) Nature of liquid ii)

Intermolecular forces iii)

External pressure Q39. Define

freezing point.

A. Ans. Freezing Point of a liquid is that temperature at which vapour pressure of liquid phase is equal to the vapour pressure of the solid phase. At this temperature liquid and solid coexist in dynamic equilibrium with one another.

Q40. Define diffusion. In which factors diffusion of liquid depends?

Ans. "The spontaneous movement of molecules from the region of higher concentration to the region of lower concentration is called diffusion

Factors

- (i) Intermolecular forces
- (ii) Size of molecules (iii) Shape of molecules
- (iv) Temperature

Q41. Describe density of liquid.

Ans. The density of liquid depends upon its mass and volume. Liquids are denser than gases because molecules of liquids are closely packed and spaces between their molecules are

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negligible. The density of liquid is expressed in the gram per cm<sup>3</sup>.

Q42. Why does evaporation increase with increase in temperature?

Ans. The evaporation increases with increase in temperature because kinetic energy of the molecules increases with increase in temperature. This K.E is so high that they overcome the intermolecular forces and evaporate rapidly.

(243. What do you mean by condensation?

Ans. The process of moving the molecules from the vapours phase back into the liquid phase is called condensation.

Q44. Why the vapour pressure is higher at high temperature?

Ans. At high temperature the vapour pressure is higher than at low temperature. When temperature increases the kinetic energy of the molecules increases enough to enable them to vapourize and exerts pressure so the vapour pressure increases at high temperature.

Q45. Why the boiling point of water is higher than of alcohol?

Ans. The boiling point of water IS higher than of alcohol because water has stronger inter molecular forces.

(246. What do you mean by dynamic equilibrium?

Ans. When the rate of evaporation becomes equal to rate of condensation number of molecules evaporating will be equal to the number of molecules coming back to liquid. This state is called dynamic equilibrium;

Q47. Why are the rate of diffusion in liquid slower than that of gas?

Ans. The rate of diffusion liquid slower than that of gas because liquid has stronger intermolecular forces as compared to gases so the rate of diffusion is slower than that of gases.

(248. Why does the rate of diffusion increase with increase in temperature'?

Ans. Diffusion increases by increasing temperature because at high temperature the intermolecular forces are weak, so rate of diffusion increases.

Q49. Why are liquids mobile?

Ans. The ease of flow of liquid is called mobility. Because the ease of flow of liquid depends upon the strength of intermolecular attractive forces. The weaker the strength of these forces, the more mobile is the liquid and vice versa. Due to this mobility of molecules, liquid can be poured from one vessel to another vessel.

Q50. What is meant by solid?

Ans. Matter that has a definite shape and volume is called solid. For example wood, coal, plastic etc.

(251. Define melting point.

Ans. The temperature at which a solid substance is converted into a liquid is called melting point of the solid substance.

Q52. Explain the rigidity of solid.

Ans. The particles of solids are not mobile. They have fixed positions. Therefore solids are rigid in their structure.

Q53. Explain density of solid.

Ans. Solids are denser than liquids and gases because solid particles are closely packed and do not have empty space between their particles. So they have high density as compare to liquid and gases.

Q54. Define amorphous solids. Give example.

Ans. Amorphous solids means shapeless solid in which the particles are not regularly arranged or their regular shapes are destroyed.

Example: Plastics, rubber and even glass are amorphous solids.

Q55. Define crystalline solids. Give example.

Ans. Solids in which particles are arranged in a definite three dimensional patterns are called crystalline solids.

Example: Diamond, sodium chloride etc.

Q56. Define allotropy and give any two examples. Ans. The phenomenon in which physical properties but same chemical properties is called allotropy.

Examples

(i) Carbon has three allotropic forms .g., Diamond, Graphite and Bucky balls

(ii) Sulphur has two allotropic forms e.g., Rhombic sulphur and Monoclinic sulphur

Q57. Define transition temperature. Give example.

Ans. The temperature at Which one allotrope changes into another is called transition

SR (monoclinic)

8. In which form of sulphur exists at room temperature?

Ans. Rhombic Sulphur exists at room temperature,

Q59. Why is white tin available at room temperature?

Ans. The transition temperature of two allotropic forms of tin is  $18^{\circ}\text{C}$ . So this temperature indicates white tin is more stable above  $18^{\circ}\text{C}$ .

Q60. Why the melting point of a solid is considered its identification characteristics?

Ans. Because the solid particles possess only vibrational kinetic energy. When solids are heated their vibrational energies increase and particles vibrate at their mean position with a high speed.

Q61. Which is lightest one, aluminum or gold?



Ans. Aluminum is lighter than gold because the density of aluminum is lesser than gold. For example density of aluminum is 2.70 gcm<sup>-3</sup> and gold is 19.3 gcm<sup>-3</sup>.

Q62. Write the molecular formula of a sulphur molecule?

Ans. Formula of sulphur molecule is S<sub>8</sub>.

(263. Which allotropic form of carbon is stable at room temperature (25 °C)?

Ans. Diamond, graphite and Bucky balls are stable forms of carbon at room temperature.

Among these allotropic forms graphite is energetically slightly more stable than diamond.

(264. State whether allotropy is shown by elements or compounds or both.

Ans. Allotropy is shown by only elements because the existence of an element in more than one form in same physical state, on the other hand compounds do not show this property (265.

What is diffusion? Explain with an example.

Ans. "The spontaneous movement of molecules from the region of higher concentration to the region of lower concentration is called diffusion". Example

For example when a few drops of ink are added in a beaker of water, ink molecules move around and after a while spread in whole of the beaker

(266. Define standard atmospheric pressure. What are its units? How it is related to Pascal?

Ans. It is the pressure exerted by the atmosphere at sea level. It is the pressure exerted by a mercury column of 760 mm height at sea level

$$1 \text{ atm} = 760 \text{ mm of Hg} = 760 \text{ torr}$$

$$(1 \text{ mm of Hg} = 1 \text{ torr})$$

$$101325 \text{ Nm}^{-2} = 101325 \text{ Pa}$$

Q67. What do you mean by evaporation? How it is affected by surface area?

Ans. The process of changing of a liquid into a gas phase is called evaporation.

Evaporation is a surface phenomenon. Greater the surface area greater is, evaporation and vice versa.

(268. In which form sulphur exists at 100°C

Ans. Sulphur exists in monoclinic form at 100°C.

Q.69. What is the relationship between evaporation and boiling point of a liquid?

Ans. A liquid having higher boiling point will have slow evaporation due to stronger intermolecular forces. A liquid having low boiling point will have faster evaporation.

# Multiple Choice

## Questions

1. How many states of matter exist?  
(a) One (b) Two (c) Three (d) Four
2. Matter in which state does not have definite shape and volume?  
(a) Solid (b) Liquid (c) Gas (d) All
3. Pressure is a significant property of  
(a) Solid (b) Liquid (c) Gas (d) None of them
4. Rate of diffusion depends upon the  
(a) Shape of the gas (b) Size of the gas (c) Molecular mass of the gas (d) All of them
5. How many times hydrogen gas diffuses faster than oxygen gas?  
(a) 2 times (b) 3 times (c) 5 times (d) 4 times
6. A tyre gets punctured is the example of:  
(a) Diffusion (b) Effusion (c) Pressure (d) Volume
7. The S.I unit of pressure is  
(a) Nm<sup>2</sup> (b) -2 (c) Nm<sup>2</sup> (d) -2
8. Which one is used to measure atmospheric pressure?  
(a) Barometer (b) Manometer (c) Thermometer (d) Galvanometer
9. Which one is used to measure pressure in the laboratory?  
(a) Barometer (b) Manometer (c) Thermometer (d) Galvanometer
10. 1 atm is equal to  
(a) 760 torr (b) 780 torr (c) 790 torr (d) 800 torr
11. Density of gas is expressed in  
(a) g/lm (b) g/cm<sup>3</sup> (c) Kg (d) gdm<sup>3</sup>