1. The boiling point of C_6H_6, CH_3OH, $C_6H_5NH_2$ and $C_6H_5NO_2$ are 80^0C, 65^0C, 184^0C and 212^0C respectively which will show highest vapour pressure at room temperature :

(1) C_6H_6 (2) CH_3OH

(3) $C_6H_5NH_2$ (4) $C_6H_5NO_2$

2. Mole fraction of A vapours above the solution in mixture of A and B ($X_A = 0.4$) will be

[Given : $P_A^\circ = 100$ mm Hg and $P_B^\circ = 200$ mm Hg]

(1) 0.4 (2) 0.8

(3) 0.25 (4) none of these

3. At a given temperature, total vapour pressure in Torr of a mixture of volatile components A and B is given by

$P_{Total} = 120 - 75\ X_B$

hence, vapour pressure of pure A and B respectively (in Torr) are

(1) 120, 75 (2) 120, 195

(3) 120, 45 (4) 75, 45

4. Two liquids A & B form an ideal solution. What is the vapour pressure of solution containing 2 moles of A and 3 moles of B at 300 K? [Given : At 300 K, Vapour pr. of pure liquid A (P_A^o) = 100 torr, Vapour pr. of pure liquid B (P_B^o) = 300 torr]

(1) 200 torr (2) 140 torr

(3) 180 torr (4) None of these

5. If Raoult's law is obeyed, the vapour pressure of the solvent in a solution is directly proportional to

(1) Mole fraction of the solvent

(2) Mole fraction of the solute

(3) Mole fraction of the solvent and solute

(4) The volume of the solution

6. 1 mole of heptane (V. P. = 92 mm of Hg) was mixed with 4 moles of octane (V. P. = 31mm of Hg). The vapour pressure of resulting ideal solution is :

(1) 46.2 mm of Hg (2) 40.0 mm of Hg

(3) 43.2 mm of Hg (4) 38.4 mm of Hg

7. Mole fraction of A vapours above solution in mixture of A and B ($X_A = 0.4$) will be :-

($P_A^\circ = 100$mm, $P_B^\circ = 200$mm)

(1) 0.4 (2) 0.8

(3) 0.25 (4) None

8. The vapour pressure of a pure liquid 'A' is 70 torr at 27^0C. It forms an ideal solution with another liquid B. The mole fraction of B is 0.2 and total vapour pressure of the solution is 84 torr at 27^0C. The vapour pressure of pure liquid B at 27^0C is

(1) 14 (2) 56 (3) 140 (4) 70

9. At 88 °C benzene has a vapour pressure of 900 torr and toluene has a vapour pressure of 360 torr. What is the mole fraction of benzene in the mixture with toluene that will boil at 88 °C at 1 atm. pressure, benzene - toluence form an ideal solution:

(1) 0.416 (2) 0.588 (3) 0.688 (4) 0.740

10. The exact mathematical expression of Raoult's law is (n = moles of solute ; N = moles of solvent)

(1) $\frac{P^0 - P_s}{P^0} = \frac{n}{N}$ (2) $\frac{P^0 - P_s}{P^0} = \frac{N}{n}$

(3) $\frac{P^0 - P_s}{P_s} = \frac{n}{N}$ (4) $\frac{P^0 - P_s}{P^0} = n \times N$

11. The vapour pressure of a solvent decreased by 10 mm of Hg when a non-volatile solute was added to the solvent. The mole fraction of solute in solution is 0.2, what would be mole fraction of the solvent if decrease in vapour pressure is 20 mm of Hg

(1) 0.2 (2) 0.4 (3) 0.6 (4) 0.8

12. The vapour pressure of a solution having solid as solute and liquid as solvent is :

(1) Directly proportional to mole fraction of the solvent

(2) Inversely proportional to mole fraction of the solvent

(3) Directly proportional to mole fraction of the solute

(4) Inversely propartional to mole fraction of the solute

13. One mole of non volatile solute is dissolved in two moles of water. The vapour pressure of the solution relative to that of water is

(1) $\frac{2}{3}$ (2) $\frac{1}{3}$ (3) $\frac{1}{2}$ (4) $\frac{3}{2}$

14. The vapour pressure of pure A is 10 torr and at the same temperature when 1 g of B is dissolved in 20 gm of A, its vapour pressure is reduced to 9.0 torr. If the molecular mass of A is 200 amu, then the molecular mass of B is :

(1) 100 amu (2) 90 amu

(3) 75 amu (4) 120 amu

15. The vapour pressure of a pure liquid solvent (X) is decreased to 0.60 atm. from 0.80 atm on addition of a non volatile substance (Y). The mole fraction of (Y) in the solution is:-
(1) 0.20 (2) 0.25 (3) 0.5 (4) 0.75

16. Among the following, that does not form an ideal solution is :
(1) C_6H_6 and $C_6H_5CH_3$ (2) C_2H_5Cl and C_6H_5OH
(3) C_6H_5Cl and C_6H_5Br (4) C_2H_5Br and C_2H_5I

17. Colligative properties of the solution depend upon
(1) Nature of the solution
(2) Nature of the solvent
(3) Number of solute particles
(4) Number of moles of solvent

18. When common salt is dissolved in water
(1) Melting point of the solution increases
(2) Boiling point of the solution increases
(3) Boiling point of the solution decreases
(4) Both Melting point and Boiling point is decreases

19. What should be the freezing point of aqueous solution containing 17 gm of C_2H_5OH in 1000 gm of water (water K_f = 1.86 deg – kg mol^{-1})
(1) – 0.69°C (2) – 0.34°C
(3) 0.0°C (4) 0.34°C

20. 5% solution of sucrose is isotonic with 1% solution of a compound 'A' then the molecular weight of compound 'A' is -
(1) 32.4 (2) 68.4 (3) 121.6 (4) 34.2

21. Osmotic pressure of a sugar solution at 24°C is 2.5 atmosphere. The concentration of the solution in mole per litre is :
(1) 10.25 (2) 1.025
(3) 1025 (4) 0.1025

22. A solution containing 4 g of a non volatile organic solute per 100 ml was found to have an osmotic pressure equal to 500 cm of mercury at 27°C. The molecular weight of solute is :
(1) 14.97 (2) 149.7 (3) 1697 (4) 1.497

23. Which of the following aqueous solution will show maximum vapour pressure at 300 K?
(1) 1 M NaCl (2) 1 M $CaCl_2$
(3) 1 M $AlCl_3$ (4) 1 M $C_{12}H_{22}O_{11}$

24. 1.0 molal aqueous solution of an electrolyte A_2B_3 is 60% ionised. The boiling point of the solution at 1 atm is $(K_{b(H_2O)} = 0.52\ K\,kg\,mol^{-1})$
(1) 274.76 K (2) 377 K
(3) 376.4 K (4) 374.76 K

25. The Vant Hoff factor (i) for a dilute solution of $K_3[Fe(CN)_6]$ is (Asuming 100% ionsation) :
(1) 10 (2) 4 (3) 5 (4) 0.25

26. The substance A when dissolved in solvent B shows the molecular mass corresponding to A_3. The vant Hoff's factor will be -
(1) 1 (2) 2 (3) 3 (4) 1/3

27. The freezing point of 1 molal NaCl solution assuming NaCl to be 100% dissociated in water is : (K_f = 1.86 K Molality^{-1})
(1) –1.86 °C (2) –3.72 °C
(3) +1.86 °C (4) + 3.72 °C

28. What is the freezing point of a solution containing 8.1 gm. of HBr in 100gm. water assuming the acid to be 90% ionised (K_f for water=1.86 K molality^{-1}):-
(1) 0.85°C (2) –3.53°C
(3) 0°C (4) –0.35°C

29. If a ground water contains H_2S at concentration of 2 mg/l, determine the pressure of H_2S in head space of a closed tank containing the ground water at 20°C. Given that for H_2S, Henry's constant is equal to 6.8×10^3 bar at 20°C.
(1) 720 Pa (2) 77×10^2 Pa
(3) 553 Pa (4) 55×10^2 Pa

30. A pressure cooker reduces cooking time for food because -
(1) The higher pressure inside the cooker crushes the food material
(2) Cooking involves chemical changes helped by a rise in temperature
(3) Heat is more evenly distributed in the cooking space
(4) Boiling point of water involved in cooking is increased

ANSWER KEY — Exercise-I

Que.	1	2	3	4	5	6	7	8	9	10
Ans.	**2**	**3**	**3**	**4**	**1**	**3**	**3**	**3**	**4**	**3**
Que.	11	12	13	14	15	16	17	18	19	20
Ans.	**3**	**1**	**1**	**2**	**2**	**2**	**3**	**2**	**1**	**2**
Que.	21	22	23	24	25	26	27	28	29	30
Ans.	**4**	**2**	**4**	**4**	**2**	**4**	**2**	**2**	**1**	**4**