

Class: 12
Subject: Chemistry
Topic: Solutions
No. of Questions: 23

1. A solution is prepared by dissolving 43 gm of naphthalene in 117 gm of benzene. Calculate the mole fractions of the two components of the solution.
2. 1.2 gm of a non-volatile substance was dissolved in 100 gm of acetone at 20°C. The vapour pressure of the solution was found to be 182.5 torr. Calculate the molar mass of the substance (vapour pressure of acetone at 20°C is 185.0 torr)
3. A solution containing 8.6 gm per dm³ of urea (molar mass = 60 gm/mole) was found to be isotonic with a 5 percent solution of an organic non - volatile solute. Calculate the molar mass of the latter.
4. Acetic acid associate in benzene to form dimer. 1.65 gm of acetic acid when dissolved in 100 gm of benzene raised the boiling point by 0.36°C. Calculate the Van't Hoff factor and the degree of association of acetic acid in benzene. ($K_b = 2.57 \text{ K Kg mol}^{-1}$)
5. At 25°C, the osmotic pressure of human blood due to the presence of various solutes in the blood is 7.65 atm. Assuming that molarity equals molality, calculate the freezing point of blood. $K_f = 1.86 \text{ K Kg mol}^{-1}$.
6. The density of 2.0 M solution of acetic acid in water is 1.02 g ml⁻¹. Calculate the mole fraction of acetic acid.
7. Liquid A and B form an ideal solution obeying Raoult's law. At 50°C, the total vapour pressure of a solution containing 1 mole of A and 2 mole of B is 300 torr. When 1 more mole of A is added to the solution, the vapour pressure increases to 400 torr. Calculate the vapour pressure of pure components.
8. A solution of A and B with 30 mole percent of A is in equilibrium with its vapour which contains 60 mole percent of A. Assuming ideality of the solution and the vapour. Calculate the ratio of the vapour pressure of pure A to that of pure B.
9. What would be the vapour pressure of 0.5 molal solution of a non volatile solute in benzene at 30°C? The vapour pressure of pure benzene at 30°C is 119.6 torr.
10. The molar heat of vaporization of water at 100°C is 40.585 KJ/mol. At what temperature will a solution containing 5.6 gm of glucose per 1000 gm of water boil?

11. An aqueous solution of non - volatile solute boils at 100.17°C . At what temperature would it freeze? For water, $K_b = 0.52 \text{ K Kg mol}^{-1}$ and $K_f = 1.86 \text{ K Kg mol}^{-1}$
12. The complex compound $\text{K}_4[\text{Fe}(\text{CN})_6]$ is 45% dissociated in 0.1M aqueous solution of the complex at 27°C . What would be the osmotic pressure of the solution?
13. The formula for low molecular weight starch is $(\text{C}_6\text{H}_{10}\text{O}_5)_n$ where n averages 2.00×10^2 . When 0.798 gm of starch is dissolved in 100 ml of water solution, what is the osmotic pressure at 25°C ?
14. Phenol associates in benzene to a certain extent to form a dimer. A solution containing $20 \times 10^{-3} \text{ kg}$ of phenol in 1.0 kg of benzene has its f. pt depressed by 0.69 K. Calculate the fraction of phenol dimerised. K_f for $\text{C}_6\text{H}_6 = 5.120 \text{ mol}^{-1}\text{kg}$.
15. Calculate the amount of ice that will separate out on cooling a solution containing 50 gm of ethylene glycol in 200 gm water to -9.3°C .
 $T_f = -9.3^{\circ}\text{C}$. (k_f for water = $1.86 \text{ K mol}^{-1} \text{ kg}$)
16. What is vant hoff factor?
17. Calculate the volume of 75% of H_2SO_4 by weight ($d=1.8\text{gm/ml}$) required to prepare 1 L of 0.2 M H_2SO_4
18. An aqueous solution of 2% non-volatile exerts a pressure of 1.004 bars at the normal boiling point of the solvent. What is the molar mass of the solute?
19. Calculate the mass of ascorbic acid (vitamin C, $\text{C}_6\text{H}_8\text{O}_6$) to be dissolved in 75 g of acetic acid to lower its melting point by 1.5° $K_f=3.9 \text{ K kg mol}^{-1}$
20. Calculate the mass of a non-volatile solute (molar mass 40 g mol^{-1}) which should be dissolved in 114 g octane to reduce its vapour pressure to 80 %
21. 1.00g of a non-electrolyte solute dissolved in 50 g of benzene lowered the freezing point of benzene by 0.40 K. The freezing point depression constant of benzene is $5.12 \text{ k kg mol}^{-1}$. Find the molar mass of the solute.
22. 45g of ethylene glycol ($\text{C}_2\text{H}_6\text{O}_2$) is mixed with 600 g of water. Calculate (a) the freezing point depression and (b) the freezing point of the solution.
23. 200 cm^3 of an aqueous solution of a protein contains 1.26 g of the protein. The osmotic pressure of such a solution at 300 K is found to be $2.57 \times 10^{-3} \text{ bar}$. Calculate the molar mass of the protein.

askITians

askITians