ATOMIC ENERGY CENTRAL SCHOOL,MYSORE

CLASS XII CHEMISTRY

SOLUTIONS – WORKSHEET -1

1. Differentiate between molarity and molality of a solution.
2. What is meant by 'reverse osmosis'.
3. Some liquids on mixing form 'azeotropes'. What are 'azeotropes'?
4. What is the effect of change in temperature of a solution on its molality and molarity?
5. Non-ideal solutions exhibit either positive or negative deviations from Raoult's law. What are these deviations and why are they caused? Explain with one example for each type.
6. Define the terms, 'osmosis' and 'osmotic pressure'.

7. Define the following terms :
   (i) Mole fraction
   (ii) Isotonic solutions
   (iii) van't Hoff factor
   (iv) Ideal solution
8. Explain why aquatic species are more comfortable in cold water rather than in warm water.
9. State Raoult's law. How is it formulated for solutions of non-volatile solutes?
10. State Henry's law and mention two of its important applications.
11. Why do gases nearly always tend to be less soluble in liquids as the temperature is raised?
12. 18 g of glucose, $C_6H_{12}O_6$ (Molar mass – 180 g mol^{-1}) is dissolved in 1 kg of water in a sauce pan. At what temperature will this solution boil? (K_b for water = 0.52 K kg mol^{-1}, boiling point of pure water = 373.15 K)
13. An aqueous solution of sodium chloride freezes below 273 K. Explain the lowering in freezing points of water with the help of a suitable diagram.
14. Calculate the mass of compound (molar mass = 256 g mol^{-1}) to be dissolved in 75 g of benzene to lower its freezing point by 0.48 K (K_f = 5.12 K kg mol^{-1}).
15. How is the vapour pressure of a solvent affected when a non-volatile solute is dissolved in it?
16. What is meant by positive deviations from Raoult's law? Give an example. What is the sign of $\Delta_{mix}H$ for positive deviation?
17. (i) On mixing liquid X and liquid Y, volume of the resulting solution decreases. What type of deviation from Raoult's law is shown by the resulting solution? What change in temperature would you observe after mixing liquids X and Y?
    (ii) What happens when we place the blood cell in water (hypotonic solution)? Give reason.
18. Define osmotic pressure of a solution. How is the osmotic pressure related to the concentration of a solute in a solution?
19. (i) Gas (A) is more soluble in water than Gas
    (B) at the same temperature. Which one of the two gases will have the higher value of K_H (Henry's constant) and why?
    (ii) In non-ideal solution, what type of deviation shows the formation of maximum boiling azeotropes?

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20. What is osmotic pressure? Why it is a colligative property?
21. Define the following terms:
    (i) Abnormal molar mass
    (ii) van't Hoff factor (i)
22. Explain why on addition of 1 mol of glucose to 1 litre of water, the boiling point of water increases.
23. 100 mg of a protein is dissolved in just enough water to make 10.0 mL of solution. If this solution has an osmotic pressure of 13.3 mm Hg at 25°C, what is the molar mass of the protein?
    (R = 0.0821 L atm mol^{-1} K^{-1} and 760 mm Hg = 1 atm.)
24. Calculate the freezing point depression expected for 0.0711 m aqueous solution of Na2S04. If this solution actually freezes at – 0.320°C, what would be the value of Van't Hoff factor? (Ky for water is 1.86°C mol^{-1})
25. A solution prepared by dissolving 1.25 g of oil of winter green (methyl salicylate) in 99.0 g of benzene has a boiling point of 80.31°C. Determine the molar mass of this compound. (B.P. of pure benzene = 80.10°C and K_b for benzene = 2.53°C kg mol^{-1})
26. A solution of glycerol ($C_3H_8O_3$; molar mass = 92 g mol^{-1}) in water was prepared by dissolving some glycerol in 500 g of water. This solution has a boiling point of 100.42 °C. What mass of glycerol was dissolved to make this solution? Kb for water = 0.512 K kg mol^{-1}.
27. What mass of NaCl (molar mass = 58.5 g mol^{-1}) must be dissolved in 65 g of water to lower the freezing point by 7.5°C? The freezing point depression constant, K_f, for water is 1.86 K kg mol^{-1}. Assume van't Hoff factor for NaCl is 1.87.
28. What mass of ethylene glycol (molar mass = 62.0 g mol^{-1}) must be added to 5.50 kg of water to lower the freezing point of water from 0° C to -10.0° C? (K, for water = 1.86 K kg mol^{-1})?
29. 15 g of an unknown molecular substance was dissolved in 450 g of water. The resulting solution freezes at -0.34° C. What is the molar mass of the substance? (K_f for water = 1.86 K kg mol^{-1}).
30. A solution of glycerol ($C_3H_8O_3$) in water was prepared by dissolving some glycerol in 500 g of water. This solution has a boiling point of 100.42 °C while pure water boils at 100 °C. What mass of glycerol was dissolved to make the solution?