

NOTE : ANSWER THE FOLLOWING QUESTIONS

- When and why is molality preferred over molarity in handling solutions in chemistry?
- Which solution has higher concentration, 1 molar or 1 molal solution of the same solute?
- Give reasons for the following :
 - Why oxygen mixed with helium is used by deep sea divers ?
 - Aquatic species are more comfortable in cold water than warm water.
 - At higher altitudes, people suffer from anoxia resulting in inability to think. (1+1)
- (a) Two liquids A and B on mixing produce a warm solution. Which type of deviation do they show ?
(b) Why does a solution of ethanol and cyclohexane show positive deviation from Raoult's Law?
- After removing the outer shell of two eggs in dil. HCl, one is placed in distilled water and the other is placed in a saturated solution of NaCl. What will you observe and why?
- What is de-icing agent ? How does it work ?
- Explain why equimolar aqueous solutions of sodium chloride and sodium sulphate freeze at different temperatures. *they produce different total concentrations of dissolved particles*
- What type of azeotropic mixture will be formed by a solution of acetone and chloroform on the basis of strength of intermolecular interactions that develop in the solution.
- (a) What is the effect of temperature on the solubility of glucose in water?
(b) Ibrahim collected a 10 mL each of fresh water and ocean water. He observed that one froze at 0°C while the other "Q" at -1.3°C. Ibrahim forgot which of two, P or "Q" was fresh water. Identify which container contains ocean water, giving rationalization for your answer.
- (c) Calculate Van't Hoff factor for an aqueous solution of $K_3[Fe(CN)_6]$ if the degree of dissociation is 0.8. What will be boiling point of this solution if its concentration is 1 molal? ($K_b = 0.52$ °C/m) *$i = 3 + 3 \times 0.8 = 1 + 2.4 = 3.4$
 $\Delta T_b = i K_b m = 3.4 \times 0.52 \times 1 = 1.768$
 $T_b = 100 + 1.768 = 101.768$*
- (a) What type of deviation from Raoult's Law is expected when phenol and aniline are mixed together? What change in the net volume of the mixture is expected? Graphically represent the deviation.
- (b) The vapour pressure of pure water at a certain temperature is 23.80 mm Hg. If 0.1 mole of a non-electrolytic solute is dissolved in 100 g water, calculate the resultant vapour pressure. *$\frac{p^0 - p_s}{p^0} = \frac{n_2}{n_1 + n_2} = \frac{0.1}{100 + 0.1} = 0.000999$
 $p_s = 23.80 \times 0.999001 = 23.782$*

Case Based Questions

CASE : Colligative properties depend upon the number of particles of the solute in a given amount of the solvent. The calculation of molecular masses of solutes which do not undergo dissociation or association in the solution is simple. However if a solute undergoes dissociation or association in the solution, number of particles increases in the former case and decreases in the latter case.

$$p_s = p^0 \cdot n_A$$

$$= 23.80 \times 0.982$$