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**CHEMISTRY**

**Formulae:**

Relative lowering of vapour pressure = p0- ps/p0 = n2/ n1 + n2

Elevation in boiling point = 1000 Kb w2 / w1 M2

Depression in freezing point = 1000 Kf w2/ w1 M2

Osmotic pressure = CRT

1. Calculate the molal elevation constant of water, it being given that 0.1 molal aqueous solution of a substance boiled at 100.0520C.

2. 200 cm3 of an aqueous solution of a protein contains 1.26 g of protein. The osmotic pressure of this solution at 300 K is found to be 2.57 X 10-3. Calculate the molar mass of the protein.

3. 20g of solute was added to 100g of water at 250 C. The vapour pressure of water and that of solution were 23.76 mm Hg and 22.41 mm Hg respectively at that temperature. Calculate the relative molecular mass.

4. Urea forms an ideal solution in water. Determine the vapour pressure of an aqueous solution containing 10% by mass of urea at 400C. (Vapour pressure of water= 55.3 mm Hg)

5. Calculate the osmotic pressure at 273 K of a 5% solution of urea (m.m=60; R=0.0821)

6. Calculate the boiling point of a solution containing 25 g urea and 25 g thiourea in 500 g chloroform. The boiling point of pure chloroform is 61.2oC and Kb = 3.63.

7. A solution of urea in water has a boiling point of 100.1280C. Calculate the freezing point of the same solution. Molal constants for water Kf and Kb are 1.86oC and 0.512oC respectively.

8. The freezing point of a solution containing 50 cm3  of ethylene glycol in 50 g water is found to be -340C. Assuming ideal behaviour, calculate the density of ethylene glycol. (Kf = 1.86)

9. What mass of ethylene glycol (m.m=62) must be added to 5.50kg of water to lower the freezing point of water from 00C to -10.0oC (Kf=1.86)

10. KI and sucrose solution with 0.1 M concentration have osmotic pressure of 0.465 atm and 0.245 atm respectively. Find the van’t hoff of KI and its degree of dissociation