**TEST QUESTIONS**

1. **Define freezing point. How does it change with the addition of a solute?**

ANS: The freezing point is the temperature at which a substance transitions from liquid to solid under standard atmospheric pressure. When a solute is added, the freezing point decreases due to the disruption of intermolecular forces, a phenomenon known as freezing point depression.

1. **What is osmotic pressure, and how is it mathematically expressed?**

**ANS:** Osmotic pressure is the pressure required to prevent the net movement of solvent molecules across a semipermeable membrane due to osmosis.

 It is expressed as, **Π=MRT**

1. **Calculate the freezing point of a solution containing 2 moles of NaCl dissolved in 1 kg of water. (Given: KfK\_fKf​ for water = 1.86°C·kg/mol, van 't Hoff factor for NaCl = 2)**

Solution: **ΔT*f* ​=*i*K*f* ​*m***

 ΔT*f*​=(2)×(1.86°C⋅kg/mol)×(2mol/kg)

 ΔT*f*​=7.44°C

Since the normal freezing point of water is 0°C, freezing point is:0−7.44= −7.44°C

1. **Determine the osmotic pressure of a 0.2 M glucose solution at 27°C. (Given: R = 0.0821 L·atm·mol⁻¹·K⁻¹, T = 27°C + 273 = 300K, i for glucose = 1)**

Solution: Π=MRT

 Π=(1)×(0.2M)×(0.0821)×(300)

 Π=4.93 atm

1. **Calculate the molecular weight of water (H₂O).**

Solution: Hydrogen (H) atomic mass = 1 g/mol, Oxygen (O) atomic mass= 16 g/mol

For H₂O , (2×1)+(1×16)=2+16=18 g/mol