by knowing W_B, V, R, T and π molecular mass of unknown solute 'M_B' can be determined.

Note :- If R = 0.0821 L atm $k^{-1} mol^{-1}$
V in L, π in atm

If R = 0.083 L bar $k^{-1} mol^{-1}$
V in L, π in bar

SI unit [If R = 8.314 J $k^{-1} mol^{-1}$
V in m^3, π in Pa [1J = 1 Pa m^3]

1L = 1000mL = 1000cm^3

1mL = $1cm^3$

1cm = 10^{-2}m

1L = $10^3 cm^3$

1L = $10^3 (10^{-2} m)^3$

1L = $10^{-3} m^3$

1cm^3 = 1c.c

Q 200cm^3 of an aqueous solution of a protein contains 1.26g of the protein. the osmotic pressure of such a solution at 300k is found to be 2.57×10^{-3} bar. calculate the molar mass of the protein

Ans $\pi = \frac{(W_B/M_B)}{V} RT$

$2.57 \times 10^{-3} = \frac{(1.26/M_B)}{0.2} \times 0.083 \times 300$

$M_B = \frac{1.26 \times 0.083 \times 300}{0.2 \times 2.57 \times 10^{-3}}$

V = 200cm^3
= 200×10^{-3} L
= 0.2 L

W_B = 1.26g

π = 2.57×10^{-3} bar

T = 300k

$= \frac{0.63 \times 8.3 \times 3 \times 10^4}{2.57 \times 10^{-4}} = \frac{0.63 \times 2.49 \times 10 \times 10^4}{2.57}$

$= 0.63 \times 10^5$ g mol^{-1}

Q calculate the osmotic pressure in pascals exerted by a solution prepared by dissolving 1.0g of polymer of molar mass 185,000 in 450ml of water at 37°C?

$\pi = \frac{(W_B/M_B)}{V} \times RT$

$= \frac{(1.0/185{,}000) \times 8.314 \times 310}{450 \times 10^{-6}}$

= ~~1 × 0.0003~~ 0.0000306

= 30.96 Pa

π = ? (Pa)
W_B = 1.0g
M_B = 185,000
V = 450ml
= 450 cm^3
= $450 \times 10^{-6} m^3$
R = 8.314 J k^{-1} mo
T = 37°C
= 37 + 273 = 310

24/06/24.

Isotonic, hypertonic and hypotonic

Isotonic :- Solutions having similar osmotic pressure, known as Isotonic Solutions

Eg:- 0.9% NaCl is isotonic with human blood.

when two isotonic solution are separated by SPM osmosis will not be occurs