$$P_{solvent} = X_{solvent} P^{\circ}_{solvent}$$

Example:

The vapor pressure of water at 20 $^{\circ}$C is 20.1 mm Hg. What is the pressure of 100 g water mixed with 100g ethylene glycol, $C_2H_2(OH)_2$?
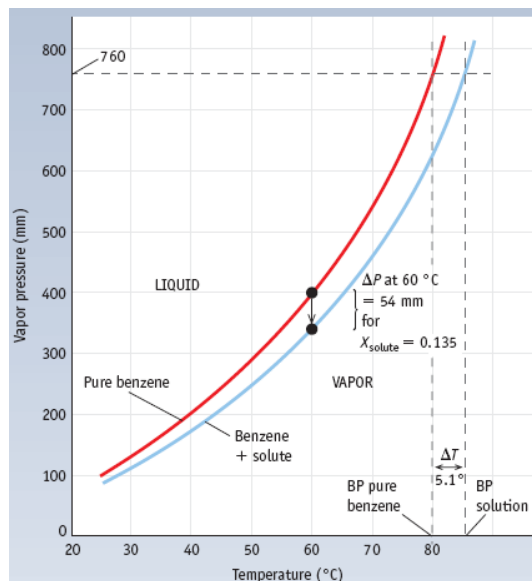

Vapor Pressures at 50 $^{\circ}$C

    Water=99 mmHg

    Ethanol   =232 mmHg

▸   Distill a 10% alcohol solution.

Elevation in boiling point $= \Delta T_{bp} = K_{bp} m_{solute}$

TABLE   **Some Boiling Point Elevation and Freezing Point Depression Constants**

Solvent	Normal Boiling Point (°C) Pure Solvent	K_{bp} (°C/m)	Normal Freezing Point (°C) Pure Solvent	K_{fp} (°C/m)
Water	100.00	+0.5121	0.0	−1.86
Benzene	80.10	+2.53	5.50	−5.12
Camphor	207.4	+5.611	179.75	−39.7
Chloroform ($CHCl_3$)	61.70	+3.63	—	—

Freezing point depression $= \Delta T_{fp} = K_{fp} m_{solute}$

TABLE   **Some Boiling Point Elevation and Freezing Point Depression Constants**

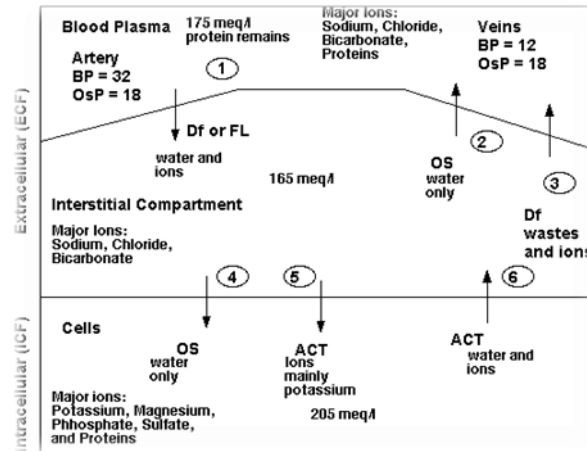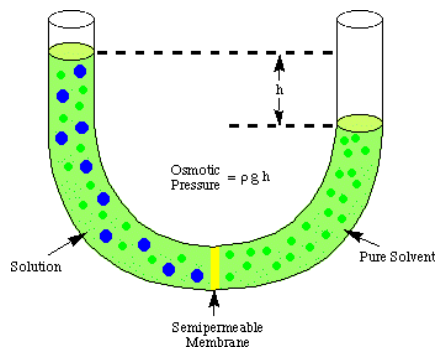| Solvent	Normal Boiling Point (°C) Pure Solvent	K_{bp} (°C/m)	Normal Freezing Point (°C) Pure Solvent	K_{fp} (°C/m)
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Π=cRT

Π= osmotic pressure in atm

c= concentration in mol/L

R= 0.0821 L·atm/K·mol

T= temperature in Kelvin

12.5g of a cellulose derivative was dissolved in 1L of water. The osmotic pressure of this solution was 0.00210 atm at 30°C. What is the molar mass of this molecule?