Today's Goal

Colligative Properties Part 3 And Van't hoff Factor











Osmosis

The solvent molecules will flow through the membrane from pure solvent to the solution (From lower concentration to higher concentration of solution). This process of flow of the solvent is called osmosis.





Osmotic Pressure (O.P)

The minimum Pressure which must be applied to solution side to prevent osmosis.





Mathematically





Comparison of osmotic pressure of two solutions

Case 1. If $\pi 1 = \pi 2$ Isotonic Solutions

Case 2. If $\pi 1 > \pi 2$ 1 is Hypertonic Solution or 2 is Hypotonic Solution If $\pi 1 < \pi 2$ Case 3. **1** is Hypotonic Solution or 2 is Hypertonic Solution





Reverse Osmosis and Water Purification

- 1. The direction of osmosis can be reversed if a pressure larger than the osmotic pressure is applied to the solution side.
- 2. That is, now the pure solvent flows out of the solution through the semi-permeable membrane.
- 3. This phenomenon is called reverse osmosis and is of great practical utility.





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Reverse Osmosis and Water Purification

1. The Reverse osmosis is used in desalination of sea water.





Van't Hoff Factor







Abnormal Molar Mass

t.



Van't Hoff Factor (i)





Calculation of i

1. For Dissociation







Calculation of i

1. For Association







Final Formula Of Colligative Properties for Exam





A solution containing 10 g per dm³ of urea (Molecular mass 60g mol⁻¹) is isotonic with a 5% solution of a non-volatile solute. The molecular mass of this non-volatile solute is



350 g mol⁻¹



200 g mol⁻¹



250 g mol ⁻¹



300 g mol⁻¹





Which of the following aqueous solutions has the highest boiling point ?



0.1 m KNO₃



 $0.1 \text{ m Na}_3 \text{PO}_4$



0.1 m BaCl₂



$0.1 \text{ m K}_2\text{SO}_4$









Which solution will show the maximum vapour pressure at 300 K ?



yB

$1 \text{ M C}_{12} \text{H}_{22} \text{O}_{11}$

1 M CH₃COOH



1 M CaCl_2



1 M NaCl







Q At 25°C, the highest osmotic pressure is exhibited by 0.1 M solution of:





Which of the following 0.10 m aqueous solution will have the lowest freezing point ?







The van't Hoff's Factor (i) for a compound which undergoes dissociation in one solvent and association in other solvent is respectively:



Less Than one and greater than one



Less than one and les than one



Greater than one and less than one



Greater than one and Greater than one





Q) A 0.1 molal aqueous solution of a weak acid HX is 30% ionized. If K_f for water is 1.86°C/m, the freezing point of the solution will be





Which one of the following electrolytes has the same value of van't Hoff factor (i) as that of $Al_2(SO_4)_3$ (if all are 100% ionised)?







Q, The correct equation for the degree of association ' α ' of an associating solute, 'n' molecules of which undergoes association in solution, is:

$$\alpha = \frac{n(i-1)}{1-n}$$

$$\alpha = \frac{i(n-1)}{1+n}$$

$$\alpha = \frac{i(n+1)}{1-n}$$

$$\alpha = \frac{i(n+1)}{1-n}$$

$$\alpha = \frac{i(n+1)}{1-n}$$



Which of the following has minimum freezing point?



$0.1 \text{ M K}_2 \text{Cr}_2 \text{O}_7$



 $0.1 \text{ M NH}_4 \text{Cl}$



0.1 M BaSO₄



$0.1 \text{ MAl}_2(SO_4)_3$





HomeWork

All Questions Practice from previous slides NCERT Textbook – Intext and Back Exercise DPP Solve





