



INDIAN SCHOOL MUSCAT
SENIOR SECTION
DEPARTMENT OF CHEMISTRY
CLASS XII
SOLUTIONS



The values of Van'tHoff factors for KCl, NaCl and K_2SO_4 respectively are-----

- a) 2, 2 and 1 b) 2, 2 and 3 c) 1, 1 and 2 d) 1, 1 and 1

If the molality of the solution is doubled, The value of molal depression constant (K_f) will be

- a) Halved b) tripled c) unchanged d) doubled

Which of the following liquid pairs show positive deviation from Raoult's law.

- a) Water and HCl b) Benzene and Methanol c) water and nitric acid
d) Acetone and Chloroform

Assertion –Reason type questions:

In the following questions a statement of assertion followed by a statement of reason is given, Choose the correct choices.

- (a) Both assertion and reason are correct statements and the reason is a correct explanation for assertion.
(b) Both assertion and reason are correct but reason is not a correct explanation for assertion.
(c) Assertion is correct but reason is incorrect.
(d) Assertion is wrong but reason is correct.
- i. Assertion: Lowering of vapour pressure is directly proportional to osmotic pressure of the solution.

Reason : Osmotic pressure is a colligative property

- ii. Assertion: The solubility of a gas in a liquid increases with increase in pressure

Reason: The solubility of a gas in a liquid is directly proportional to the pressure of the gas

Why do gases always tend to be less soluble in liquids as the temperature is raised?

Define the following terms:

- a) Van't Hoff factor
b) Ebullioscopic constant
c) Cryoscopic constant
d) Isotonic solutions
e) Ideal solutions

Give reasons for the following :

- a) Measurement of osmotic pressure method is preferred for the determination of molar masses of macromolecules
b) Elevation of boiling point of 1 M KCl solution is nearly double than that of 1 M sugar solution
'The osmotic pressure measured when benzoic acid is dissolved in benzene is less than the expected value'.
Con 18g of glucose, $C_6H_{12}O_6$ (molar mass = 180 g mol^{-1}) is dissolved in 1kg of water in a sauce pan. At what temperature will

(K_b for water = $0.52 \text{ k kg mol}^{-1}$, boiling point of pure water = 373.15 K)

Define an ideal solution and write one of its characteristics.

What are azeotropic mixtures? What are its types?

- a) Why are aquatic species more comfortable in cold water than in warm water?
- b) What happens when we place the blood cell in saline water solution (hypertonic solution)? Give reason.
- Calculate the amount of KCl which must be added to 1 kg of water so that the freezing point is depressed by 2K.
- Determine the osmotic pressure of a solution prepared by dissolving 2.5×10^{-2} g of K_2SO_4 in 2L of water at 25°C completely dissociated.

($R = 0.0821 \text{ L atm K}^{-1} \text{ mol}^{-1}$, molar mass of $K_2SO_4 = 174 \text{ gmol}^{-1}$)

A solution of glucose in water is labelled as 10% w/w, what would be the molality and mole fraction of each component if the solution is 1.2 g mL^{-1} , then what shall be the molarity of the solution?

A solution containing 30 g of non-volatile solute exactly in 90 g of water has a vapour pressure of 2.8 kPa at 298K. Further, 18 g of water is then added to the solution and the new vapour pressure becomes 2.9 kPa at 298K. Calculate (i) Molar mass of the solute (ii) Vapour pressure of water at 298K.

Calculate the depression in the freezing point of water when 10 g of $CH_3CH_2CHClCOOH$ is added to 250 g of water. K_f for water = 1.86 K kg mol⁻¹.

Two elements A and B form compounds having formula AB_2 and AB_4 . When dissolved in 200 g of benzene (C_6H_6), 1 g of AB_2 lowers the freezing point by 2.3K whereas 1.0 g of AB_4 lowers it by 1.3K. The molar depression constant for benzene is 5.12 K kg mol⁻¹. Calculate atomic masses of A and B.

Vapour pressure of water at 20°C is 17.5 mmHg. Calculate the vapour pressure of water at 20°C when 15 g of glucose ($C_6H_{12}O_6$) is dissolved in 150 g of water.

- a) Explain the following:
- Henry's law about dissolution of a gas in a liquid.
 - Molal boiling point elevation constant for a solvent.
- b) A solution of glycerol ($C_3H_8O_3$) in water was prepared by dissolving some glycerol in 500 g of water. This solution boils at 100.42°C. What mass of glycerol was dissolved to make this solution? (K_b for water = $0.512 \text{ K kg mol}^{-1}$)
- a) On mixing acetone with chloroform, a reduction occurs in total volume. What type of deviations from ideal behavior for solutions is shown in this case and why?
- b) Phenol associates in benzene to certain extent to form a dimer. A solution containing 20 g of phenol in 1.0 kg of benzene has its freezing point lowered by 0.69 K. Calculate the fraction of phenol that is associated. (Given K_f for benzene = $5.1 \text{ K kg mol}^{-1}$)
- a) What is Van't Hoff factor? What is the value of Van't Hoff factor if the solute undergoes
- Dissociation
 - Association
- a) How many mL of a 0.1 M HCl solution are required to react completely with 1 g of a mixture of Na_2CO_3 and $NaHCO_3$ containing equimolar amounts of both?
- a) How can direction of osmosis be reversed? Give one use of reverse osmosis
- b) Blood cells are isotonic with 0.9% solution of NaCl. What happens when if we place blood cells in a solution containing :
- 0.4% of NaCl solution.
 - 1.2% of NaCl solution

Derive the relation between relative lowering of vapour pressure and mole fraction of a non volatile solute.