PrepWiser.

CHEMISTRY · JEE MAIN

Solutions & Colligative Properties

Chapter-wise previous year questions, with answer key

113	2020–2025	7
PYQS	PAPERS	TOPICS

Elevation in Boiling Point · Depression in Freezing Point · Van't Hoff Factor · Concentration Units · Raoult's Law · Osmotic Pressure · Henry's Law

1. Attempt each question on paper first — they're grouped by topic, newest papers first.
2. Check yourself against the answer key at the end.
3. Got one wrong? Tap “Step-by-step solution” under it for the full working.

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Elevation in Boiling Point · 22 PYQs

Q1 JEE Main 2025 · 3 Apr · Shift 1

2 moles each of ethylene glycol and glucose are dissolved in 500 g of water. The boiling point of the resulting solution is: (Given : Ebullioscopic constant of water $= 0.52 \mathrm{Kkgmol}^{-1}$)

(A) 377.3 K

(B) 379.2 K

(C) 375.3 K

(D) 277.3 K

Step-by-step solution ▸ prepwiser.in/questions/4l0lBbhNuc

Q2 JEE Main 2025 · 2 Apr · Shift 2

When 1 g each of compounds AB and AB_2 are dissolved in 15 g of water separately, they increased the boiling point of water by 2.7 K and 1.5 K respectively. The atomic mass of A (in amu) is_____ $\times 10^{-1}$ (Nearest integer)

(Given : Molal boiling point elevation constant is $0.5 \mathrm{Kkgmol}^{-1}$)

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/xPH8AfNVfW

Q3 JEE Main 2025 · 29 Jan · Shift 1

1.24 g of AX_2 (molar mass 124 g mol^{-1}) is dissolved in 1 kg of water to form a solution with boiling point of 100.015°C, while 25.4 g of AY_2 (molar mass 250 g mol^{-1}) in 2 kg of water constitutes a solution with a boiling point of 100.0260°C.

$K_b(H_2O)$ = 0.52 kg mol^{-1}

Which of the following is correct?

(A) AX_2 and AY_2 (both) are completely unionised.

(B) AX_2 and AY_2 (both) are fully ionised.

(C) AX_2 is completely unionised while AY_2 is fully ionised.

(D) AX_2 is fully ionised while AY_2 is completely unionised.

Step-by-step solution ▸ prepwiser.in/questions/B4V8C4C60Y

Q4 JEE Main 2025 · 22 Jan · Shift 1

Arrange the following solutions in order of their increasing boiling points.

(i) $10^{-4} \mathrm{M} \mathrm{NaCl}$

(ii) $10^{-4} \mathrm{M}$ Urea

(iii) $10^{-3} \mathrm{M} \mathrm{NaCl}$

(iv) $10^{-2} \mathrm{M} \mathrm{NaCl}$

(A) (i) $<$ (ii) $<$ (iii) $<$ (iv)

(B) (ii) $<$ (i) $<$ (iii) $<$ (iv)

(C) (iv) $<$ (iii) $<$ (i) $<$ (ii)

(D) (ii) $<$ (i) $\equiv$ (iii) $<$ (iv)

Step-by-step solution ▸ prepwiser.in/questions/aHhEPQXRjw

Q5 JEE Main 2024 · 8 Apr · Shift 1

A solution containing 10g of an electrolyte AB_2 in 100g of water boils at 100.52°C. The degree of ionization of the electrolyte (α) is _____ $\times 10^{-1}$. (nearest integer)

[Given : Molar mass of $\text{AB}_2 = 200\text{gmol}^{-1}$, K_b (molal boiling point elevation const. of water) $= 0.52\text{Kkgmol}^{-1}$, boiling point of water $= 100^\circ\text{C}$; AB_2 ionises as $\text{AB}_2 \rightarrow \text{A}^{2+} + 2\text{B}^-$]

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/X48QWUcQa_

Q6 JEE Main 2024 · 4 Apr · Shift 1

2.5g of a non-volatile, non-electrolyte is dissolved in 100g of water at 25°C. The solution showed a boiling point elevation by 2°C. Assuming the solute concentration is negligible with respect to the solvent concentration, the vapor pressure of the resulting aqueous solution is _____ mm of Hg (nearest integer)

[Given : Molal boiling point elevation constant of water $(\text{K}_\text{b}) = 0.52\text{K.kgmol}^{-1}$, 1atm pressure $= 760\text{mm}$ of Hg, molar mass of water $= 18\text{gmol}^{-1}$]

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/zmORYVwiE4

Q7 JEE Main 2023 · 13 Apr · Shift 2

Sea water contains $29.25\%\text{NaCl}$ and $19\%\text{MgCl}_2$ by weight of solution. The normal boiling point of the sea water is _____ $^\circ\text{C}$ (Nearest integer)

Assume 100% ionization for both NaCl and MgCl_2

Given :

$$\text{K}_\text{b}\,(\text{H}_2\text{O}) = 0.52\text{Kkgmol}^{-1}$$

Molar mass of NaCl and MgCl_2 is 58.5 and 95 gmol^{-1} respectively.

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/swlcOlJAUE

Q8 JEE Main 2023 · 8 Apr · Shift 2

If the boiling points of two solvents X and Y (having same molecular weights) are in the ratio $2:1$ and their enthalpy of vaporizations are in the ratio $1:2$, then the boiling point elevation constant of X is $\underline{\text{m}}$ times the boiling point elevation constant of Y. The value of m is _____ (nearest integer)

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/91V4Iqznom

Q9 JEE Main 2023 · 31 Jan · Shift 2

Evaluate the following statements for their correctness.

A. The elevation in boiling point temperature of water will be same for $0.1\mathrm{M}\ \mathrm{NaCl}$ and $0.1\mathrm{M}$ urea.

B. Azeotropic mixtures boil without change in their composition.

C. Osmosis always takes place from hypertonic to hypotonic solution.

D. The density of $32\%\ \mathrm{H_2SO_4}$ solution having molarity $4.09\mathrm{M}$ is approximately $1.26\mathrm{gmL^{-1}}$

E. A negatively charged sol is obtained when KI solution is added to silver nitrate solution.

Choose the correct answer from the options given below :

(A) A, B and D only

(B) A and C only

(C) B and D only

(D) B, D and E only

Step-by-step solution ▸ prepwiser.in/questions/7GxYO6EDfp

Q10 JEE Main 2023 · 30 Jan · Shift 1

A solution containing $2\mathrm{g}$ of a non-volatile solute in $20\mathrm{g}$ of water boils at $373.52\mathrm{K}$. The molecular mass of the solute is _____ $\mathrm{gmol^{-1}}$. (Nearest integer)

Given, water boils at $373\mathrm{K}, \mathrm{K_b}$ for water $= 0.52\mathrm{Kkgmol^{-1}}$

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/-nlAqofUwA

Q11 JEE Main 2022 · 27 Jul · Shift 1

Boiling point of a 2% aqueous solution of a non-volatile solute A is equal to the boiling point of 8% aqueous solution of a non-volatile solute B. The relation between molecular weights of A and B is

(A) $\mathrm{M_A} = 4\mathrm{M_B}$

(B) $\mathrm{M_B} = 4\mathrm{M_A}$

(C) $\mathrm{M_A} = 8\mathrm{M_B}$

(D) $\mathrm{M_B} = 8\mathrm{M_A}$

Step-by-step solution ▸ prepwiser.in/questions/CM1xXaruDw

Q12 JEE Main 2022 · 26 Jul · Shift 2

The elevation in boiling point for 1 molal solution of non-volatile solute A is $3\mathrm{K}$. The depression in freezing point for 2 molal solution of A in the same solvent is 6 K. The ratio of K_b and K_f i.e., K_b/K_f is $1 : X$. The value of X is [nearest integer]

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/db7SixYJUI

Q13 JEE Main 2022 · 29 Jun · Shift 2

Elevation in boiling point for 1.5 molal solution of glucose in water is 4 K. The depression in freezing point for 4.5 molal solution of glucose in water is 4 K. The ratio of molal elevation constant to molal depression constant (K_b/K_f) is _____.

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/WsfqLEX9UP

Q14 JEE Main 2022 · 27 Jun · Shift 1

2 g of a non-volatile non-electrolyte solute is dissolved in 200 g of two different solvents A and B whose ebullioscopic constants are in the ratio of 1 : 8. The elevation in boiling points of A and B are in the ratio $\frac{x}{y}$ (x : y). The value of y is _____. (Nearest integer)

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/Jl9xwvmqpJ

Q15 JEE Main 2022 · 27 Jun · Shift 2

A solution containing 2.5×10^{-3} kg of a solute dissolved in 75×10^{-3} kg of water boils at 373.535 K. The molar mass of the solute is _____ g mol^{-1}. [nearest integer] (Given : $K_b(H_2O)$ = 0.52 K kg mol^{-1} and boiling point of water = 373.15 K)

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/fg5xXODAlZ

Q16 JEE Main 2021 · 31 Aug · Shift 2

1.22 g of an organic acid is separately dissolved in 100 g of benzene (K_b = 2.6 K kg mol^{-1}) and 100 g of acetone (K_b = 1.7 K kg mol^{-1}). The acid is known to dimerize in benzene but remain as a monomer in acetone. The boiling point of the solution in acetone increases by 0.17°C. The increase in boiling point of solution in benzene in °C is $x \times 10^{-2}$. The value of x is _____. (Nearest integer) [Atomic mass : C = 12.0, H = 1.0, O =16.0]

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/YBjrUOoctU

Q17 JEE Main 2021 · 25 Jul · Shift 2

When 3.00 g of a substance 'X' is dissolved in 100 g of CCl_4, it raises the boiling point by 0.60 K. The molar mass of the substance 'X' is _____ g mol^{-1}. (Nearest integer).

[Given K_b for CCl_4 is 5.0 K kg mol^{-1}]

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/U4-gOWZCkk

Q18 JEE Main 2021 · 18 Mar · Shift 2

A solute A dimerizes in water. The boiling point of a 2 molal solution of A is 100.52°C. The percentage association of A is _____. (Round off to the Nearest Integer).

[Use : K_b for water = 0.52 K kg mol^{-1} Boiling point of water = 100°C]

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/kSk5QqGoGJ

Q19 JEE Main 2021 · 16 Mar · Shift 1

AB_2 is 10% dissociated in water to A^{2+} and B^-. The boiling point of a 10.0 molal aqueous solution of AB_2 is _____°C. (Round off to the Nearest Integer).

[Given : Molal elevation constant of water K_b = 0.5 K kg mol^{-1} boiling point of pure water = 100°C]

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/_DBVmHUsCu

Q20 JEE Main 2021 · 25 Feb · Shift 1

1 molal aqueous solution of an electrolyte A_2B_3 is 60% ionised. The boiling point of the solution at 1 atm is _____ K. (Rounded off to the nearest integer)

[Given K_b for (H_2O) = 0.52 K kg mol^{-1}]

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/BUA-PrypNL

Q21 JEE Main 2021 · 25 Feb · Shift 2

If a compound AB dissociates to the extent of 75% in an aqueous solution, the molality of the solution which shows a 2.5 K rise in the boiling point of the solution is _____ molal. (Rounded off to the nearest integer)

[K_b = 0.52 K kg mol^{-1}]

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/LdUzkVC43t

Q22 JEE Main 2020 · 6 Sep · Shift 1

The elevation of boiling point of 0.10 m aqueous $CrCl_3.xNH_3$ solution is two times that of 0.05 m aqueous $CaCl_2$ solution. The value of x is _____.

[Assume 100% ionisation of the complex and $CaCl_2$, coordination number of Cr as 6, and that all NH_3 molecules are present inside the coordination sphere]

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/f0t-jGaPSR

Depression in Freezing Point · 32 PYQs

Q23 JEE Main 2025 · 8 Apr · Shift 2

$\mathrm{HA}(aq) \rightleftharpoons \mathrm{H}^{+}(aq) + \mathrm{A}^{-}(aq)$

The freezing point depression of a 0.1 m aqueous solution of a monobasic weak acid HA is 0.20 °C. The dissociation constant for the acid is

Given: $K_f(\mathrm{H_2O})$ = 1.8 K kg mol^{-1}, molality ≡ molarity

(A) 1.90×10^{-3}

(B) 1.38×10^{-3}

(C) 1.1×10^{-2}

(D) 1.89×10^{-1}

Step-by-step solution ▸ prepwiser.in/questions/sN8Py9KH0D

Q24 JEE Main 2025 · 4 Apr · Shift 2

Given below are two statements:

Statement (I) : Molal depression constant K_f is given by $\frac{\mathrm{M_1RT}_f}{\Delta \mathrm{S}_{\mathrm{fus}}}$, where symbols have their usual meaning.

Statement (II) : K_f for benzene is less than the K_f for water.

In the light of the above statements, choose the most appropriate answer from the options given below :

(A) Statement I is correct but Statement II is incorrect

(B) Both Statement I and Statement II are incorrect

(C) Statement I is incorrect but Statement II is correct

(D) Both Statement I and Statement II are correct

Step-by-step solution ▸ prepwiser.in/questions/hdhyJDEXOB

Q25 JEE Main 2025 · 29 Jan · Shift 2

Given below are two statements :

Statement (I): NaCl is added to the ice at 0°C, present in the ice cream box to prevent the melting of ice cream.

Statement (II): On addition of NaCl to ice at 0°C, there is a depression in freezing point.

In the light of the above statements, choose the **correct** answer from the options given below :

(A) Both Statement I and Statement II are false

(B) Statement I is true but Statement II is false

(C) Both Statement I and Statement II are true

(D) Statement I is false but Statement II is true

Step-by-step solution ▸ prepwiser.in/questions/e3sz2_JhIV

Q26 JEE Main 2025 · 28 Jan · Shift 1

What is the freezing point depression constant of a solvent, 50 g of which contain 1 g non volatile solute (molar mass $256 \mathrm{gmol}^{-1}$) and the decrease in freezing point is 0.40 K ?

(A) $4.43 \mathrm{Kkgmol}^{-1}$

(B) $3.72 \mathrm{Kkgmol}^{-1}$

(C) $5.12 \mathrm{Kkgmol}^{-1}$

(D) $1.86 \mathrm{Kkgmol}^{-1}$

Step-by-step solution ▸ prepwiser.in/questions/YANvrgUWUO

Q27 JEE Main 2024 · 5 Apr · Shift 2

Considering acetic acid dissociates in water, its dissociation constant is 6.25×10^{-5}. If $5 \mathrm{mL}$ of acetic acid is dissolved in 1 litre water, the solution will freeze at $-x \times 10^{-2}{ }^{\circ} \mathrm{C}$, provided pure water freezes at $0^{\circ} \mathrm{C}$.

$x =$ _____. (Nearest integer)

$$\begin{aligned} \text{Given}: \quad & \left(\mathrm{K_f}\right)_{\text{water}} = 1.86 \mathrm{Kkgmol} - 1 \\ & \text{density of acetic acid is } 1.2 \mathrm{gmol}^{-1}. \\ & \text{molar mass of water } = 18 \mathrm{gmol}^{-1}. \\ & \text{molar mass of acetic acid} = 60 \mathrm{gmol}^{-1}. \\ & \text{density of water } = 1 \mathrm{gcm}^{-3} \end{aligned}$$

Acetic acid dissociates as

$$\mathrm{CH_3COOH} \rightleftharpoons \mathrm{CH_3COO}^{\ominus} + \mathrm{H}^{\oplus}$$

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/_rqFaA-t4X

Q28 JEE Main 2024 · 4 Apr · Shift 2

$2.7 \mathrm{kg}$ of each of water and acetic acid are mixed. The freezing point of the solution will be $-x^{\circ} \mathrm{C}$. Consider the acetic acid does not dimerise in water, nor dissociates in water. $x =$ _____ (nearest integer)

[Given: Molar mass of water $= 18 \mathrm{gmol}^{-1}$, acetic acid $= 60 \mathrm{gmol}^{-1}$

$$^{\mathrm{K_f}}\mathrm{H_2O}: 1.86 \mathrm{Kkgmol}^{-1}$$

$\mathrm{K_f}$ acetic acid: $3.90 \mathrm{Kkgmol}^{-1}$

freezing point: $\mathrm{H_2O} = 273 \mathrm{K}$, acetic acid $= 290 \mathrm{K}$]

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/SxMa1jklhI

Q29 JEE Main 2024 · 1 Feb · Shift 2

Mass of ethylene glycol (antifreeze) to be added to $18.6 \mathrm{kg}$ of water to protect the freezing point at $-24^{\circ} \mathrm{C}$ is _____ kg (Molar mass in gmol^{-1} for ethylene glycol $62, \mathrm{K}_f$ of water $= 1.86 \mathrm{K~kgmol}^{-1}$)

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/pKkOyrZXB1

Q30 JEE Main 2024 · 30 Jan · Shift 1

What happens to freezing point of benzene when small quantity of napthalene is added to benzene?

(A) Increases

(B) Decreases

(C) Remains unchanged

(D) First decreases and then increases

Step-by-step solution ▸ prepwiser.in/questions/5rD5_BJK2k

Q31 JEE Main 2024 · 30 Jan · Shift 2

The solution from the following with highest depression in freezing point/lowest freezing point is

(A) 180g of acetic acid dissolved in benzene

(B) 180g of acetic acid dissolved in water

(C) 180g of benzoic acid dissolved in benzene

(D) 180g of glucose dissolved in water

Step-by-step solution ▸ prepwiser.in/questions/iex0zndzgG

Q32 JEE Main 2023 · 10 Apr · Shift 1

If the degree of dissociation of aqueous solution of weak monobasic acid is determined to be 0.3, then the observed freezing point will be _____% higher than the expected/theoretical freezing point. (Nearest integer)

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/oEkV3SYBdq

Q33 JEE Main 2023 · 1 Feb · Shift 2

20% of acetic acid is dissociated when its 5g is added to 500mL of water. The depression in freezing point of such water is _____ $\times 10^{-3}{}^{\circ}\text{C}$.

Atomic mass of C, H and O are 12,1 and 16 a.m.u. respectively.

[Given : Molal depression constant and density of water are 1.86Kkgmol^{-1} and 1gcm^{-3} respectively.]

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/bqDr_dFFr-

Q34 JEE Main 2023 · 1 Feb · Shift 1

25 mL of an aqueous solution of KCl was found to require 20 mL of 1 M AgNO_3 solution when titrated using K_2CrO_4 as an indicator. What is the depression in freezing point of KCl solution of the given concentration? _____ (Nearest integer).

(Given : $\text{K}_\text{f} = 2.0\text{Kkgmol}^{-1}$)

Assume 1) 100% ionization and 2) density of the aqueous solution as 1 g mL^{-1}

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/GrvYNBScU5

Q35 JEE Main 2023 · 30 Jan · Shift 2

Lead storage battery contains 38% by weight solution of H_2SO_4. The van't Hoff factor is 2.67 at this concentration. The temperature in Kelvin at which the solution in the battery will freeze is _____. (Nearest integer).

Given $K_f = 1.8 K kg mol^{-1}$

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/u76w3n6OHn

Q36 JEE Main 2023 · 29 Jan · Shift 1

Solid Lead nitrate is dissolved in 1 litre of water. The solution was found to boil at 100.15°C. When 0.2 mol of NaCl is added to the resulting solution, it was observed that the solution froze at -0.8° C. The solubility product of $PbCl_2$ formed is _____ $\times 10^{-6}$ at 298 K. (Nearest integer)

Given : $K_b = 0.5$ K kg mol^{-1} and $K_f = 1.8$ K kg mol^{-1}. Assume molality to the equal to molarity in all cases.

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/Ls8QVj_xkU

Q37 JEE Main 2023 · 24 Jan · Shift 1

In the depression of freezing point experiment

A. Vapour pressure of the solution is less than that of pure solvent

B. Vapour pressure of the solution is more than that of pure solvent

C. Only solute molecules solidify at the freezing point

D. Only solvent molecules solidify at the freezing point

Choose the most appropriate answer from the options given below :

(A) A and C only

(B) A only

(C) A and D only

(D) B and C only

Step-by-step solution ▸ prepwiser.in/questions/rnyepm6dsO

Q38 JEE Main 2022 · 29 Jul · Shift 2

$1.80 g$ of solute A was dissolved in $62.5 cm^3$ of ethanol and freezing point of the solution was found to be $155.1 K$. The molar mass of solute A is _____ g mol^{-1}.

[Given : Freezing point of ethanol is 156.0 K.

Density of ethanol is 0.80 g cm^{-3}.

Freezing point depression constant of ethanol is 2.00 K kg mol^{-1}]

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/1wcU-XPyvE

Q39 JEE Main 2022 · 28 Jul · Shift 1

$150 g$ of acetic acid was contaminated with $10.2 g$ ascorbic acid $(C_6H_8O_6)$ to lower down its freezing point by $\left(x \times 10^{-1}\right)^\circ C$. The value of x is _____. (Nearest integer)

[Given $K_f = 3.9 K kg mol^{-1}$; molar mass of ascorbic acid $= 176 g mol^{-1}$]

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/xW4MnLB1xs

Q40 JEE Main 2022 · 25 Jul · Shift 2

Two solutions A and B are prepared by dissolving 1 g of non-volatile solutes X and Y, respectively in 1 kg of water. The ratio of depression in freezing points for A and B is found to be 1 : 4. The ratio of molar masses of X and Y is

(A) 1 : 4
(B) 1 : 0.25
(C) 1 : 0.20
(D) 1 : 5

Step-by-step solution ▸ prepwiser.in/questions/-rxEik0NFq

Q41 JEE Main 2022 · 25 Jul · Shift 1

The depression in freezing point observed for a formic acid solution of concentration $0.5\mathrm{mLL}^{-1}$ is $0.0405^{\circ}\mathrm{C}$. Density of formic acid is $1.05\mathrm{gmL}^{-1}$. The Van't Hoff factor of the formic acid solution is nearly : (Given for water $\mathrm{k_f} = 1.86\,\mathrm{k\,kg\,mol}^{-1}$)

(A) 0.8
(B) 1.1
(C) 1.9
(D) 2.4

Step-by-step solution ▸ prepwiser.in/questions/wq8br131uh

Q42 JEE Main 2022 · 29 Jun · Shift 1

1.2 mL of acetic acid is dissolved in water to make 2.0 L of solution. The depression in freezing point observed for this strength of acid is 0.0198°C. The percentage of dissociation of the acid is _____. (Nearest integer)

[Given : Density of acetic acid is 1.02 g mL^{-1}, Molar mass of acetic acid is 60 g mol^{-1}, $K_f(H_2O)$ = 1.85 K kg mol^{-1}]

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/wCXrNXy2HM

Q43 JEE Main 2022 · 26 Jun · Shift 1

A 0.5 percent solution of potassium chloride was found to freeze at -0.24°C. The percentage dissociation of potassium chloride is _____. (Nearest integer)

(Molal depression constant for water is 1.80 K kg mol^{-1} and molar mass of KCl is 74.6 g mol^{-1})

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/A5pegejUzl

Q44 JEE Main 2022 · 25 Jun · Shift 2

Solute A associates in water. When 0.7 g of solute A is dissolved in 42.0 g of water, it depresses the freezing point by 0.2°C. The percentage association of solute A in water, is :

[Given : Molar mass of A = 93 g mol^{-1}. Molal depression constant of water is 1.86 K kg mol^{-1}.]

(A) 50%
(B) 60%
(C) 70%
(D) 80%

Step-by-step solution ▸ prepwiser.in/questions/nUNB2x4NQq

Q45 JEE Main 2021 · 31 Aug · Shift 1

Which one of the following 0.10 M aqueous solutions will exhibit the largest freezing point depression?

(A) hydrazine

(B) glucose

(C) glycine

(D) $KHSO_4$

Step-by-step solution ▸ prepwiser.in/questions/_CIv6vIQcf

Q46 JEE Main 2021 · 27 Aug · Shift 2

40 g of glucose (Molar mass = 180) is mixed with 200 mL of water. The freezing point of solution is _____ K. (Nearest integer) [Given : K_f = 1.86 K kg mol^{-1}; Density of water = 1.00 g cm^{-3}; Freezing point of water = 273.15 K]

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/ggxg1jI0kE

Q47 JEE Main 2021 · 27 Aug · Shift 1

1 kg of 0.75 molal aqueous solution of sucrose can be cooled up to $-4^{\circ}C$ before freezing. The amount of ice (in g) that will be separated out is _____. (Nearest integer)

[Given : $K_f(H_2O)$ = 1.86 K kg mol^{-1}]

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/KWMp7KBa76

Q48 JEE Main 2021 · 26 Aug · Shift 2

83 g of ethylene glycol dissolved in 625 g of water. The freezing point of the solution is _____ K. (Nearest integer)

[Use : Molal Freezing point depression constant of water = 1.86 K kg mol^{-1}]

Freezing Point of water = 273 K

Atomic masses : C : 12.0 u, O : 16.0 u, H : 1.0 u]

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/2czFkqfIph

Q49 JEE Main 2021 · 26 Aug · Shift 1

Of the following four aqueous solutions, total number of those solutions whose freezing point is lower than that of 0.10 M C_2H_5OH is _____ (Integer answer)

(i) 0.10 M $Ba_3(PO_4)_2$

(ii) 0.10 M Na_2SO_4

(iii) 0.10 M KCl

(iv) 0.10 M Li_3PO_4

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/UXYxYSpImJ

Q50 JEE Main 2021 · 22 Jul · Shift 2

Which one of the following 0.06 M aqueous solutions has lowest freezing point?

(A) $Al_2(SO_4)_3$

(B) $C_6H_{12}O_6$

(C) KI

(D) K_2SO_4

Step-by-step solution ▸ prepwiser.in/questions/BLzq53P6Pw

Q51 JEE Main 2021 · 18 Mar · Shift 1

2 molal solution of a weak acid HA has a freezing point of 3.885°C. The degree of dissociation of this acid is _____ $\times 10^{-3}$. (Round off to the Nearest Integer).

[Given : Molal depression constant of water = 1.85 K kg mol^{-1} Freezing point of pure water = 0° C]

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/V55ePhBg-K

Q52 JEE Main 2021 · 26 Feb · Shift 2

When 12.2 g of benzoic acid is dissolved in 100 g of water, the freezing point of solution was found to be -0.93°C ($K_f(H_2O)$ = 1.86 K kg mol^{-1}). The number (n) of benzoic acid molecules associated (assuming 100% association) is _____.

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/596FponxWu

Q53 JEE Main 2021 · 24 Feb · Shift 2

C_6H_6 freezes at 5.5°C. The temperature at which a solution of 10g of C_4H_{10} in 200g of C_6H_6 freeze is _____ °C. (The molal freezing point depression constant of C_6H_6 is 5.12°C/m.)

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/-whw8GxBzO

Q54 JEE Main 2020 · 9 Jan · Shift 1

How much amount of NaCl should be added to 600 g of water (ρ = 1.00 g/mL) to decrease the freezing point of water to – 0.2 °C ? _____.

(The freezing point depression constant for water = 2K kg mol^{-1})

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/x1L_pvDTkW

Van't Hoff Factor · 6 PYQs

Q55 JEE Main 2025 · 7 Apr · Shift 1

The percentage dissociation of a salt (MX_3) solution at given temperature (van't Hoff factor $i = 2$) is _____ %(Nearest integer)

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/cvgdBk9LKq

Q56 JEE Main 2025 · 29 Jan · Shift 1

If A_2B is 30% ionised in an aqueous solution, then the value of van't Hoff factor (i) is _____ × 10^{-1}.

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/3R8zSpearE

Q57 JEE Main 2025 · 24 Jan · Shift 2

The observed and normal molar masses of compound MX_2 are 65.6 and 164 respectively. The percent degree of ionisation of MX_2 is _____%. (Nearest integer)

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/s_BLQ4wO78

Q58 JEE Main 2024 · 1 Feb · Shift 1

We have three aqueous solutions of $NaCl$ labelled as ' A ', ' B ' and ' C ' with concentration $0.1M$, $0.01M$ and $0.001M$, respectively. The value of van 't Hoff factor(i) for these solutions will be in the order :

(A) $i_A < i_C < i_B$

(B) $i_A < i_B < i_C$

(C) $i_A > i_B > i_C$

(D) $i_A = i_B = i_C$

Step-by-step solution ▸ prepwiser.in/questions/iCEN8435TT

Q59 JEE Main 2023 · 12 Apr · Shift 1

80 mole percent of $MgCl_2$ is dissociated in aqueous solution. The vapour pressure of $1.0 molal$ aqueous solution of $MgCl_2$ at $38^{\circ}C$ is _____ $mmHg. (Nearest integer)$

Given : Vapour pressure of water at $38^{\circ}C$ is $50 mmHg$

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/v5m9-HKGVJ

Q60 JEE Main 2023 · 11 Apr · Shift 1

0.004 M K_2SO_4 solution is isotonic with 0.01 M glucose solution. Percentage dissociation of K_2SO_4 is _____ (Nearest integer)

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/Ez_k_81VRv

Concentration Units · 10 PYQs

Q61 JEE Main 2025 · 4 Apr · Shift 2

Sea water, which can be considered as a 6 molar $(6\mathrm{M})$ solution of NaCl , has a density of $2\mathrm{gmL}^{-1}$. The concentration of dissolved oxygen (O_2) in sea water is 5.8 ppm . Then the concentration of dissolved oxygen (O_2) in sea water, is $x \times 10^{-4}\mathrm{m}$.

$x =$ _____. (Nearest integer)

Given: Molar mass of NaCl is $58.5\mathrm{gmol}^{-1}$

Molar mass of O_2 is $32\mathrm{gmol}^{-1}$

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/cRlciUvdNX

Q62 JEE Main 2025 · 22 Jan · Shift 2

Density of 3 M NaCl solution is $1.25\mathrm{g/mL}$. The molality of the solution is :

(A) 2.79 m **(B)** 2 m

(C) 1.79 m **(D)** 3 m

Step-by-step solution ▸ prepwiser.in/questions/TP0YFEBRAj

Q63 JEE Main 2024 · 6 Apr · Shift 2

Molality (m) of $3\mathrm{M}$ aqueous solution of NaCl is : (Given : Density of solution $= 1.25\mathrm{gmL}^{-1}$, Molar mass in gmol^{-1} : $\mathrm{Na} - 23, \mathrm{Cl} - 35.5$)

(A) 2.90 m **(B)** 3.85 m

(C) 1.90 m **(D)** 2.79 m

Step-by-step solution ▸ prepwiser.in/questions/XMwYvovUrX

Q64 JEE Main 2024 · 29 Jan · Shift 2

Molality of 0.8 M H_2SO_4 solution (density 1.06 g cm^{-3}) is _____ $\times 10^{-3}$ m.

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/RzVRuLL_wf

Q65 JEE Main 2023 · 1 Feb · Shift 1

The density of $3\mathrm{M}$ solution of NaCl is $1.0\mathrm{gmL}^{-1}$. Molality of the solution is _____ $\times 10^{-2}\mathrm{m}$. (Nearest integer).

Given: Molar mass of Na and Cl is 23 and $35.5\mathrm{gmol}^{-1}$ respectively.

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/7YrnGKEVli

Q66 JEE Main 2023 · 24 Jan · Shift 2

The number of units, which are used to express concentration of solutions from the following is _____

Mass percent, Mole, Mole fraction, Molarity, ppm, Molality

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/3CCqdasQT9

Q67 JEE Main 2022 · 27 Jun · Shift 1

Given below are two statements : one is labelled as Assertion (A) and the other is labelled as Reason (R).

Assertion (A) : At 10°C, the density of a 5 M solution of KCl [atomic masses of K & Cl are 39 & 35.5 g mol^{-1} respectively], is 'x' g ml^{-1}. The solution is cooled to −21°C. The molality of the solution will remain unchanged.

Reason (R) : The molality of a solution does not change with temperature as mass remains unaffected with temperature.

In the light of the above statements, choose the correct answer from the options given below :

(A) Both (A) and (R) are true and (R) is the correct explanation of (A).

(B) Both (A) and (R) are true but (R) is not the correct explanation of (A).

(C) (A) is true but (R) is false.

(D) (A) is false but (R) is true.

Step-by-step solution ▸ prepwiser.in/questions/r4N0Tqu6g1

Q68 JEE Main 2021 · 27 Jul · Shift 1

The density of NaOH solution is 1.2 g cm^{-3}. The molality of this solution is _____ m. (Round off to the Nearest Integer)

[Use : Atomic mass : Na : 23.0 u, O : 16.0 u, H : 1.0 u, Density of H_2O : 1.0 g cm^{-3}]

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/h1nnQfi-OX

Q69 JEE Main 2021 · 16 Mar · Shift 1

A 6.50 molal solution of KOH (aq.) has a density of 1.89 g cm^{-3}. The molarity of the solution is _____ mol dm^{-3}. (Round off to the Nearest Integer).

[Atomic masses : K : 39.0 u; O : 16.0 u; H : 1.0 u]

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/CwkI0Y_hT

Q70 JEE Main 2020 · 9 Jan · Shift 2

10.30 mg of O_2 is dissolved into a liter of sea water of density 1.03 g/mL. The concentration of O_2 in ppm is_____.

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/90GwfFXaV1

Raoult's Law · 24 PYQs

Q71 JEE Main 2025 · 8 Apr · Shift 2

Which of the following binary mixture does not show the behaviour of minimum boiling azeotropes?

(A) $CH_3OH + CHCl_3$

(B) $C_6H_5OH + C_6H_5NH_2$

(C) $H_2O + CH_3COC_2H_5$

(D) $CS_2 + CH_3COCH_3$

Step-by-step solution ▸ prepwiser.in/questions/3osmLkaeLf

Q72 JEE Main 2025 · 7 Apr · Shift 2

Match **List - I** with **List - II**.

List - I	List - II
(A) Solution of chloroform and acetone	(I) Minimum boiling azeotrope
(B) Solution of ethanol and water	(II) Dimerizes
(C) Solution of benzene and toluene	(III) Maximum boiling azeotrope
(D) Solution of acetic acid in benzene	(IV) $\Delta V_{mix} = 0$

Choose the correct answer from the options given below :

(A) (A)-(III), (B)-(I), (C)-(IV), (D)-(II)

(B) (A)-(III), (B)-(IV), (C)-(I), (D)-(II)

(C) (A)-(II), (B)-(I), (C)-(IV), (D)-(III)

(D) (A)-(II), (B)-(IV), (C)-(I), (D)-(III)

Step-by-step solution ▸ prepwiser.in/questions/FplWHjhIew

Q73 JEE Main 2025 · 7 Apr · Shift 2

Liquid A and B form an ideal solution. The vapour pressures of pure liquids A and B are 350 and 750 mm Hg respectively at the same temperature. If x_A and x_B are the mole fraction of A and B in solution while y_A and y_B are the mole fraction of A and B in vapour phase, then,

(A) $(x_A - y_A) < (x_B - y_B)$

(B) $\frac{x_A}{x_B} = \frac{y_A}{y_B}$

(C) $\frac{x_A}{x_B} < \frac{y_A}{y_B}$

(D) $\frac{x_A}{x_B} > \frac{y_A}{y_B}$

Step-by-step solution ▸ prepwiser.in/questions/TBlynXoRQh

Q74 JEE Main 2025 · 2 Apr · Shift 1

A solution is made by mixing one mole of volatile liquid A with 3 moles of volatile liquid B. The vapour pressure of pure A is 200 mm Hg and that of the solution is 500 mm Hg . The vapour pressure of pure B and the least volatile component of the solution, respectively, are:

(A) $1400\mathrm{mmHg}, \mathrm{A}$

(B) $1400\mathrm{mmHg}, B$

(C) $600\mathrm{mmHg}, \mathrm{A}$

(D) $600\mathrm{mmHg}, \mathrm{B}$

Step-by-step solution ▸ prepwiser.in/questions/6VlhXuFIKm

Q75 JEE Main 2025 · 23 Jan · Shift 2

Consider a binary solution of two volatile liquid components 1 and 2.x_1 and y_1 are the mole fractions of component 1 in liquid and vapour phase, respectively. The slope and intercept of the linear plot of $\frac{1}{x_1}$ vs $\frac{1}{y_1}$ are given respectively as :

(A) $\frac{\mathrm{P}_1^0}{\mathrm{P}_2^0}, \frac{\mathrm{P}_1^0-\mathrm{P}_2^0}{\mathrm{P}_2^0}$

(B) $\frac{\mathrm{P}_2^0}{\mathrm{P}_1^0}, \frac{\mathrm{P}_2^0-\mathrm{P}_1^0}{\mathrm{P}_2^0}$

(C) $\frac{\mathrm{P}_2^0}{\mathrm{P}_1^0}, \frac{\mathrm{P}_1^0-\mathrm{P}_2^0}{\mathrm{P}_2^0}$

(D) $\frac{\mathrm{P}_1^0}{\mathrm{P}_2^0}, \frac{\mathrm{P}_2^0-\mathrm{P}_1^0}{\mathrm{P}_2^0}$

Step-by-step solution ▸ prepwiser.in/questions/oSb0JOqKHn

Q76 JEE Main 2025 · 23 Jan · Shift 2

When a non-volatile solute is added to the solvent, the vapour pressure of the solvent decreases by 10 mm of Hg . The mole fraction of the solute in the solution is 0.2 . What would be the mole fraction of the solvent if decrease in vapour pressure is 20 mm of Hg ?

(A) 0.2

(B) 0.4

(C) 0.8

(D) 0.6

Step-by-step solution ▸ prepwiser.in/questions/dWFL2AIics

Q77 JEE Main 2024 · 9 Apr · Shift 2

The vapor pressure of pure benzene and methyl benzene at $27^{\circ}\mathrm{C}$ is given as 80 Torr and 24 Torr, respectively. The mole fraction of methyl benzene in vapor phase, in equilibrium with an equimolar mixture of those two liquids (ideal solution) at the same temperature is _____ $\times 10^{-2}$ (nearest integer)

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/tjRNrXypAb

Q78 JEE Main 2024 · 31 Jan · Shift 1

Identify the mixture that shows positive deviations from Raoult's Law

(A) $(\mathrm{CH}_3)_2\,\mathrm{CO} + \mathrm{CS}_2$

(B) $(\mathrm{CH}_3)_2\,\mathrm{CO} + \mathrm{C}_6\mathrm{H}_5\mathrm{NH}_2$

(C) $\mathrm{CHCl}_3 + \mathrm{C}_6\mathrm{H}_6$

(D) $\mathrm{CHCl}_3 + (\mathrm{CH}_3)_2\,\mathrm{CO}$

Step-by-step solution ▸ prepwiser.in/questions/NSdqBXjUEK

Q79 JEE Main 2024 · 27 Jan · Shift 1

A solution of two miscible liquids showing negative deviation from Raoult's law will have :

(A) increased vapour pressure, increased boiling point

(B) increased vapour pressure, decreased boiling point

(C) decreased vapour pressure, decreased boiling point

(D) decreased vapour pressure, increased boiling point

Step-by-step solution ▸ prepwiser.in/questions/hAJHZs8beX

Q80 JEE Main 2023 · 15 Apr · Shift 1

The vapour pressure of $30\%(\mathrm{w/v})$ aqueous solution of glucose is _____ mmHg at $25^{\circ}\mathrm{C}$.

[Given : The density of 30% (w/v), aqueous solution of glucose is $1.2\mathrm{gcm}^{-3}$ and vapour pressure of pure water is $24\mathrm{mmHg}$.]

(Molar mass of glucose is $180\mathrm{gmol}^{-1}$.)

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/DwK_srNuIo

Q81 JEE Main 2023 · 11 Apr · Shift 2

What weight of glucose must be dissolved in $100\mathrm{g}$ of water to lower the vapour pressure by $0.20\mathrm{mmHg}$? (Assume dilute solution is being formed)

Given : Vapour pressure of pure water is $54.2\mathrm{mmHg}$ at room temperature. Molar mass of glucose is $180\mathrm{gmol}^{-1}$

(A) 3.69 g

(B) 2.59 g

(C) 3.59 g

(D) 4.69 g

Step-by-step solution ▸ prepwiser.in/questions/uljLRV0pqY

Q82 JEE Main 2023 · 6 Apr · Shift 1

Mass of Urea $(\mathrm{NH_2CONH_2})$ required to be dissolved in $1000\mathrm{g}$ of water in order to reduce the vapour pressure of water by 25% is _____ g. (Nearest integer)

Given: Molar mass of N, C, O and H are $14, 12, 16$ and $1\mathrm{gmol}^{-1}$ respectively

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/KcnXFKS5nm

Q83 JEE Main 2023 · 24 Jan · Shift 2

The total pressure observed by mixing two liquids A and B is 350 mm Hg when their mole fractions are 0.7 and 0.3 respectively.

The total pressure becomes 410 mm Hg if the mole fractions are changed to 0.2 and 0.8 respectively for A and B. The vapour pressure of pure A is _____ mm Hg. (Nearest integer)

Consider the liquids and solutions behave ideally.

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/4VO4YrKbJu

Q84 JEE Main 2022 · 28 Jul · Shift 2

A gaseous mixture of two substances A and B, under a total pressure of 0.8 atm is in equilibrium with an ideal liquid solution. The mole fraction of substance A is 0.5 in the vapour phase and 0.2 in the liquid phase. The vapour pressure of pure liquid A is _____ atm. (Nearest integer)

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/J8KCXbaNqw

Q85 JEE Main 2022 · 27 Jul · Shift 2

When a certain amount of solid A is dissolved in $100\mathrm{g}$ of water at $25^{\circ}\mathrm{C}$ to make a dilute solution, the vapour pressure of the solution is reduced to one-half of that of pure water. The vapour pressure of pure water is $23.76\,\mathrm{mmHg}$. The number of moles of solute A added is _____. (Nearest Integer)

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/mnNpunyK8n

Q86 JEE Main 2022 · 28 Jun · Shift 1

The vapour pressures of two volatile liquids A and B at 25°C are 50 Torr and 100 Torr, respectively. If the liquid mixture contains 0.3 mole fraction of A, then the mole fraction of liquid B in the vapour phase is $\frac{x}{17}$. The value of x is _____.

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/xFMZxWcP_r

Q87 JEE Main 2021 · 20 Jul · Shift 2

The vapour pressures of A and B at 25°C are 90 mm Hg and 15 mm Hg respectively. If A and B are mixed such that the mole fraction of A in the mixture is 0.6, then the mole fraction of B in the vapour phase is x $\times 10^{-1}$. The value of x is _____. (Nearest integer)

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/xu9Kt1EQG7

Q88 JEE Main 2021 · 20 Jul · Shift 1

At 20° C, the vapour pressure of benzene is 70 torr and that of methyl benzene is 20 torr. The mole fraction of benzene in the vapour phase at 20° above an equimolar mixture of benzene and methyl benzene is _____ $\times 10^{-2}$. (Nearest integer)

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/wVzLyXvPVS

Q89 JEE Main 2021 · 16 Mar · Shift 2

At 363 K, the vapour pressure of A is 21 kPa and that of B is 18 kPa. One mole of A and 2 moles of B are mixed. Assuming that this solution is ideal, the vapour pressure of the mixture is _____ kPa. (Round off to the Nearest Integer).

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/yUcKr_FY4H

Q90 JEE Main 2021 · 26 Feb · Shift 1

224 mL of $SO_{2(g)}$ at 298 K and 1 atm is passed through 100 mL of 0.1 M NaOH solution. The non-volatile solute produced is dissolved in 36g of water. The lowering of vapour pressure of solution (assuming the solution in dilute) ($P^o_{(H_2O)} - 24$ mm of Hg) is $x \times 10^{-2}$ mm of Hg, the value of x is _____. (Integer answer)

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/x6jf8fmVaZ

Q91 JEE Main 2020 · 6 Sep · Shift 2

A set of solutions is prepared using 180 g of water as a solvent and 10 g of different nonvolatile solutes A, B and C. The relative lowering of vapour pressure in the presence of these solutes are in the order :

[Given, molar mass of A = 100 g mol^{-1}; B = 200 g mol^{-1}; C = 10,000 g mol^{-1}]

(A) A > C > B

(B) C > B > A

(C) A > B > C

(D) B > C > A

Step-by-step solution ▸ prepwiser.in/questions/DKMk_z4eV6

Q92 JEE Main 2020 · 4 Sep · Shift 1

At 300 K, the vapour pressure of a solution containing 1 mole of n-hexane and 3 moles of n-heptane is 550 mm of Hg. At the same temperature, if one more mole of n-heptane is added to this solution, the vapour pressure of the solution increases by 10 mm of Hg. What is the vapour pressure in mm Hg of n-heptane in its pure state _____?

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/JVRzi39ZcD

Q93 JEE Main 2020 · 7 Jan · Shift 2

Two open beakers one containing a solvent and the other containing a mixture of that solvent with a non voltatile solute are together selated in a container. Over time :

(A) The volume of the solution increases and the volume of the solvent decreases.

(B) The volume of solution does not change and the volume of the solvent decreases.

(C) The volumer of the solution and the solvent does not change.

(D) The volume of the solution decreases and the volume of the solvent increases.

Step-by-step solution ▸ prepwiser.in/questions/iQCpZaRLDC

Q94 JEE Main 2020 · 7 Jan · Shift 1

At 35°C, the vapour pressure of CS_2 is 512 mm. Hg and that of acetone is 344 mm Hg. A solution of CS_2 in acetone has a total vapour pressure of 600 mm Hg. The false statement amongst the following is :

(A) CS_2 and acetone are less attracted to each other than to themselves.

(B) a mixture of 100 ml. CS_2 and 100 ml. acetone has a volume < 200 ml.

(C) Heat must be absorved in order to produce the solution 35°C

(D) Raoult's law is not obeyed by this system.

Step-by-step solution ▸ prepwiser.in/questions/w3_iFT3jmY

Osmotic Pressure · 15 PYQs

Q95 JEE Main 2024 · 6 Apr · Shift 1

Consider the dissociation of the weak acid HX as given below

$$\mathrm{HX(aq) \rightleftharpoons H^+(aq) + X^-(aq), Ka = 1.2 \times 10^{-5}}$$

[$\mathrm{K_a}$: dissociation constant]

The osmotic pressure of $0.03\mathrm{M}$ aqueous solution of HX at $300\mathrm{K}$ is _____ $\times 10^{-2}$ bar (nearest integer).

[Given : $\mathrm{R = 0.083 L bar mol^{-1} K^{-1}}$]

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/GYyqOkohGw

Q96 JEE Main 2024 · 5 Apr · Shift 1

An artificial cell is made by encapsulating $0.2\mathrm{M}$ glucose solution within a semipermeable membrane. The osmotic pressure developed when the artificial cell is placed within a $0.05\mathrm{M}$ solution of NaCl at $300\mathrm{K}$ is _____ $\times 10^{-1}$ bar. (nearest integer).

[Given : $\mathrm{R = 0.083 L bar mol^{-1} K^{-1}}$]

Assume complete dissociation of NaCl

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/wuNTe98FeX

Q97 JEE Main 2024 · 29 Jan · Shift 1

The osmotic pressure of a dilute solution is $7 \times 10^5\mathrm{Pa}$ at $273\mathrm{K}$. Osmotic pressure of the same solution at $283\mathrm{K}$ is _____ $\times 10^4\mathrm{Nm^{-2}}$.

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/oH5Ot4zPJS

Q98 JEE Main 2023 · 13 Apr · Shift 1

Solution of $12\mathrm{g}$ of non-electrolyte (A) prepared by dissolving it in $1000\mathrm{mL}$ of water exerts the same osmotic pressure as that of $0.05\mathrm{M}$ glucose solution at the same temperature. The empirical formula of A is $\mathrm{CH_2O}$. The molecular mass of A is _____ g. (Nearest integer)

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/qgqUKh82iy

Q99 JEE Main 2023 · 10 Apr · Shift 2

An aqueous solution of volume $300\mathrm{cm^3}$ contains $0.63\mathrm{g}$ of protein. The osmotic pressure of the solution at $300\mathrm{K}$ is 1.29 mbar. The molar mass of the protein is _____ $\mathrm{g mol^{-1}}$

Given : R = 0.083 L bar $\mathrm{K^{-1}}$ $\mathrm{mol^{-1}}$

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/IQtUR6ggew

Q100 JEE Main 2023 · 6 Apr · Shift 2

Consider the following pairs of solution which will be isotonic at the same temperature. The number of pairs of solutions is / are _____.

A. $1\mathrm{M}$ aq. NaCl and $2\mathrm{M}$ aq. urea

B. $1\mathrm{M}$ aq. $\mathrm{CaCl_2}$ and $1.5\mathrm{M}$ aq. KCl

C. $1.5\mathrm{M}$ aq. $\mathrm{AlCl_3}$ and $2\mathrm{M}$ aq. $\mathrm{Na_2SO_4}$

D. $2.5\mathrm{M}$ aq. KCl and $1\mathrm{M}$ aq. $\mathrm{Al_2\,(SO_4)_3}$

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/LyJ3-zNeyE

Q101 JEE Main 2023 · 31 Jan · Shift 1

At $27^{\circ}\mathrm{C}$, a solution containing $2.5\mathrm{g}$ of solute in $250.0\mathrm{mL}$ of solution exerts an osmotic pressure of $400\mathrm{Pa}$. The molar mass of the solute is _____ $\mathrm{gmol^{-1}}$ (Nearest integer)

(Given : $\mathrm{R} = 0.083\mathrm{LbarK^{-1}mol^{-1}}$)

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/ve3SJVdWCW

Q102 JEE Main 2023 · 25 Jan · Shift 2

The number of pairs of the solutions having the same value of the osmotic pressure from the following is _____.

(Assume 100% ionization)

A. 0.500 $\mathrm{MC_2H_5OH(aq)}$ and 0.25 $\mathrm{MKBr(aq)}$

B. 0.100 $\mathrm{MK_4[Fe(CN)_6](aq)}$ and 0.100 $\mathrm{MFeSO_4(NH_4)_2SO_4(aq)}$

C. 0.05 $\mathrm{MK_4[Fe(CN)_6](aq)}$ and 0.25 $\mathrm{MNaCl(aq)}$

D. 0.15 $\mathrm{MNaCl(aq)}$ and 0.1 $\mathrm{MBaCl_2(aq)}$

E. 0.02 $\mathrm{MKCl.MgCl_2.6H_2O(aq)}$ and 0.05 $\mathrm{MKCl(aq)}$

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/8WHXiYHLKP

Q103 JEE Main 2022 · 28 Jun · Shift 2

2.5 g of protein containing only glycine ($C_2H_5NO_2$) is dissolved in water to make 500 mL of solution. The osmotic pressure of this solution at 300 K is found to be 5.03×10^{-3} bar. The total number of glycine units present in the protein is _____.

(Given : R = 0.083 L bar K^{-1} mol^{-1})

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/TBzuT2DR46

Q104 JEE Main 2022 · 26 Jun · Shift 2

The osmotic pressure exerted by a solution prepared by dissolving 2.0 g of protein of molar mass 60 kg mol^{-1} in 200 mL of water at 27°C is _____ Pa. [integer value]

(use R = 0.083 L bar mol^{-1} K^{-1})

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/M8RI5376y7

Q105 JEE Main 2022 · 24 Jun · Shift 1

The osmotic pressure of blood is 7.47 bar at 300 K. To inject glucose to a patient intravenously, it has to be isotonic with blood. The concentration of glucose solution in gL^{-1} is _____.

(Molar mass of glucose = 180 g mol^{-1}, R = 0.083 L bar K^{-1} mol^{-1}) (Nearest integer)

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/hFc5ua5Vps

Q106 JEE Main 2021 · 27 Jul · Shift 1

1.46 g of a biopolymer dissolved in a 100 mL water at 300 K exerted an osmotic pressure of 2.42×10^{-3} bar.

The molar mass of the biopolymer is _____ $\times 10^4$ g mol^{-1}. (Round off to the Nearest Integer)

[Use : R = 0.083 L bar mol^{-1} K^{-1}]

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/8zG7UwxZ6D

Q107 JEE Main 2020 · 4 Sep · Shift 2

The osmotic pressure of a solution of NaCl is 0.10 atm and that of a glucose solution is 0.20 atm. The osmotic pressure of a solution formed by mixing 1 L of the sodium chloride solution with 2 L of the glucose solution is $x \times 10^{-3}$ atm. x is ____. (nearest integer)

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/CEvJMLhV31

Q108 JEE Main 2020 · 3 Sep · Shift 2

If 250 cm^3 of an aqueous solution containing 0.73 g of a protein A is isotonic with one litre of another aqueous solution containing 1.65 g of a protein B, at 298 K, the ratio of the molecular masses of A and B is _____ $\times 10^{-2}$ (to the nearest integer).

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/gJDD2rIMeq

Q109 JEE Main 2020 · 2 Sep · Shift 2

The size of a raw mango shrinks to a much smaller size when kept in a concentrated salt solution. Which one of the following processes can explain this?

(A) Osmosis
(B) Reverse osmosis
(C) Diffusion
(D) Dialysis

Step-by-step solution ▸ prepwiser.in/questions/wuFlQuB9LI

Henry's Law · 4 PYQs

Q110 JEE Main 2022 · 29 Jul · Shift 1

If O_2 gas is bubbled through water at $303K$, the number of millimoles of O_2 gas that dissolve in 1 litre of water is _____. (Nearest Integer)

(Given : Henry's Law constant for O_2 at $303K$ is $46.82\,k$ bar and partial pressure of $O_2 = 0.920$ bar)

(Assume solubility of O_2 in water is too small, nearly negligible)

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/XLse3VXSmj

Q111 JEE Main 2022 · 24 Jun · Shift 2

A company dissolves 'x' amount of CO_2 at 298 K in 1 litre of water to prepare soda water. X = _____ $\times 10^{-3}$ g. (nearest integer)

(Given : partial pressure of CO_2 at 298 K = 0.835 bar.

Henry's law constant for CO_2 at 298 K = 1.67 kbar.

Atomic mass of H, C and O is 1, 12, and 6 g mol^{-1}, respectively)

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/BETJU7ipdI

Q112 JEE Main 2021 · 25 Jul · Shift 1

CO_2 gas is bubbled through water during a soft drink manufacturing process at 298 K. If CO_2 exerts a partial pressure of 0.835 bar then x m mol of CO_2 would dissolve in 0.9 L of water. The value of x is _____. (Nearest integer)

(Henry's law constant for CO_2 at 298 K is 1.67×10^3 bar)

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/17ULPdLYbB

Q113 JEE Main 2021 · 17 Mar · Shift 1

The oxygen dissolved in water exerts a partial pressure of 20 kPa in the vapour above water. The molar solubility of oxygen in water is _____ $\times 10^{-5}$ mol dm^{-3}. (Round off to the Nearest Integer).

[Given : Henry's law constant = $K_H = 8.0 \times 10^4$ kPa for O_2. Density of water with dissolved oxygen = 1.0 kg dm^{-3}]

Numerical answer — enter the value.

Step-by-step solution ▸ prepwiser.in/questions/2VpbtCZVF8

Answer key — Solutions & Colligative Properties

Numbers match the question numbers above. For full working, open the solution link under each question.

1 **A**	2 **25**	3 **D**	4 **B**	5 **5**	6 **707**	7 **116**	8 **8**
9 **C**	10 **100**	11 **B**	12 **1**	13 **3**	14 **8**	15 **45**	16 **13**
17 **250**	18 **100**	19 **106**	20 **375**	21 **3**	22 **5**	23 **B**	24 **A**
25 **C**	26 **C**	27 **19**	28 **31**	29 **15**	30 **B**	31 **B**	32 **30**
33 **372**	34 **3**	35 **243**	36 **13**	37 **C**	38 **80**	39 **15**	40 **B**
41 **C**	42 **5**	43 **98**	44 **D**	45 **D**	46 **271**	47 **518**	48 **269**
49 **4**	50 **A**	51 **50**	52 **2**	53 **1**	54 **1**	55 **33**	56 **16**
57 **75**	58 **B**	59 **48**	60 **75**	61 **2**	62 **A**	63 **D**	64 **815**
65 **364**	66 **5**	67 **A**	68 **5**	69 **9**	70 **10**	71 **B**	72 **A**
73 **D**	74 **C**	75 **D**	76 **D**	77 **23**	78 **A**	79 **D**	80 **23**
81 **A**	82 **1111**	83 **314**	84 **2**	85 **6**	86 **14**	87 **1**	88 **78**
89 **19**	90 **18**	91 **C**	92 **600**	93 **A**	94 **B**	95 **76**	96 **25**
97 **73**	98 **240**	99 **40535**	100 **4**	101 **62250**	102 **4**	103 **330**	104 **415**
105 **54**	106 **15**	107 **167**	108 **177**	109 **A**	110 **1**	111 **1221**	112 **25**
113 **25**							