PART 1 - CHEMISTRY

Topic : Solutions

SECTION–1 : (Maximum Marks : 20)

- This section contains **ONE** paragraph.
- Based on each paragraph, there are **FIVE** questions.
- The answer to each question is a **NUMERICAL VALUE**.
- For each question, enter the correct numerical value of the answer (in decimal notation, truncated / rounded-off to the **SECOND DECIMAL PLACE**; e.g. 6.25, 7.00, −0.33, −.30, 30.27, −127.30) in the place designated to enter the answer.
- Answer to each question will be evaluated according to the following marking scheme :

Full Marks : +4 If ONLY the correct answer is entered;
Zero Marks : 0 In all other cases.

1. In a solvent S, a compound B is partially dissociated into C and D as given below:

$$B \rightleftharpoons 2C + 2D$$

B, C and D are non-volatile in nature. The molar mass of B is 10 times the molar mass of S. The standard boiling point and the standard enthalpy of vaporization of S are 400 K and 10R J mol^{-1}, respectively (R is the gas constant in J K^{-1} mol^{-1}). A solution of B in S with an initial concentration of B as 0.25% (mass/mass) has a boiling point of 408 K at 1 bar pressure. In this solution, the mole percent of B that has been dissociated is ____. [JEE Advanced 2026 Paper 2]

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Paragraph for Questions 2 and 3

Two volatile liquids A and B form an ideal solution. Consider a 5 molal solution of B in A inside a closed container having a total vapour pressure of 100 mm Hg at 300 K. The vapour pressure of pure A at 300K is 105 mm Hg. Assume that A and B behave as ideal gases in the vapour phase.

Given:

The gas constant R = 0.08 L atm K^{-1} mol^{-1}

Molar mass of A is 50 g mol^{-1}

Molar mass of B is 57 g mol^{-1}

Density of liquid B at 300 K is 0.5 g/mL

1 atm = 760 mm Hg

2. At 300 K, the ratio of the molar volume of pure B in vapour phase to its molar volume in liquid phase is ____. [JEE Advanced 2026 Paper 2]

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3. The mole fraction of B in vapour phase which is in equilibrium with this solution is ____.

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4. At 300 K, an ideal dilute solution of a macromolecule exerts osmotic pressure that is expressed in terms of the height (h) of the solution (density = 1.00 g cm^{-3}) where h is equal to 2.00 cm. If the concentration of the dilute solution of the macromolecule is 2.00 g dm^{-3}, the molar mass of the macromolecule is calculated to be $X \times 10^4$ g mol^{-1}. The value of X is _____.

Use: Universal gas constant (R) = 8.3 J K^{-1} mol^{-1} and acceleration due to gravity (g) = 10 m s^{-2}

[JEE Advanced 2025 Paper 2]

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5. Vessel-1 contains w_2 g of a non-volatile solute X dissolved in w_1 g of water. Vessel-2 contains w_2 g of another non-volatile solute Y dissolved in w_1 g of water. Both the vessels are at the same temperature and pressure. The molar mass of X is 80% of that of Y. The van't Hoff factor for X is 1.2 times of that of Y for their respective concentrations.

The elevation of boiling point for solution in Vessel-1 is _____ % of the solution in Vessel-2.

[JEE Advanced 2024 Paper 2]

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JEE ADVANCED SOLUTIONS — PYQS

Test Pattern : **JEE (Advanced)**

ANSWER KEY

SECTION–1										
Ques.	1	2	3	4	5					
Ans.	**31.60 to 33.33**	**1991 to 2053**	**0.16**	**2.4 to 2.55**	**150**					

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