SmartKalike

CBSE Class 12 · Chemistry

Solutions

10 most probable questions for Boards 2027

Q1. 1 mark · Multiple choice

Which statement correctly compares the temperature dependence of concentration units?
(A) Molarity is temperature-independent, but molality depends on temperature.
(B) Mass percentage, ppm, mole fraction and molality are temperature-independent, whereas molarity depends on temperature.
(C) All concentration units are temperature-dependent.
(D) Only ppm depends on temperature.

Answer

(B) Mass percentage, ppm, mole fraction and molality are temperature-independent, whereas molarity depends on temperature — volume depends on temperature, but mass does not.

Q2. 2 marks · Short answer

Define the mole fraction of a component and state the sum of the mole fractions in a solution. Also define molarity.

Answer

The mole fraction of a component is its number of moles divided by the total number of moles of all components in the solution. The sum of all mole fractions in a solution is unity. Molarity is the number of moles of solute dissolved in one litre of solution.

Q3. 3 marks · Medium answer

Define (i) molality, (ii) parts per million (ppm), and (iii) mass-by-volume percentage. State the type of concentration for which ppm is especially convenient.

Answer

1. Molality (m) is the number of moles of solute per kilogram (kg) of solvent.
2. Parts per million (ppm) is the number of parts of a component × 10^6 divided by the total number of parts of all components; ppm is especially convenient for trace quantities.
3. Mass-by-volume percentage is the mass of solute dissolved in 100 mL of solution.

Q4. 5 marks · Long answer

At a certain temperature, the vapour pressures of pure liquids A and B are 75 mm Hg and 25 mm Hg, respectively. An ideal solution has liquid-phase mole fraction of A equal to 0.40. Using Raoult’s law, calculate the partial vapour pressures and total vapour pressure, then determine the mole fraction of B in the vapour phase.

Answer

$x_B = 1 - x_A$
$= 1 - 0.40$

= 0.60
$p_A = x_A p_A^0$
= 0.40 × 75
= 30 mm Hg
$p_B = x_B p_B^0$
= 0.60 × 25
= 15 mm Hg
$p_{total} = p_A + p_B$
= 30 + 15
= 45 mm Hg
$y_B = p_B/p_{total}$
= 15/45
= 1/3
∴ The partial vapour pressures are 30 mm Hg for A and 15 mm Hg for B; the total vapour pressure is 45 mm Hg, and the mole fraction of B in the vapour phase is 1/3 (≈ 0.333).

Q5. 1 mark · Very short answer

Define the solubility of a substance.

Answer

Solubility of a substance is its maximum amount that can be dissolved in a specified amount of solvent at a specified temperature.

Q6. 2 marks · Short answer

For the textbook example containing 2.5 g of ethanoic acid in 75 g of benzene, state the reported molality and explain what the unit mol kg^{-1} expresses.

Full answer on SmartKalike: https://smartkalike.com/cbse/class-12/chemistry/solutions

Q7. 3 marks · Medium answer

A solution contains 0.20 mol of a non-volatile solute and 9.80 mol of water. Calculate the relative lowering of vapour pressure and the vapour pressure of the solution if the vapour pressure of pure water at that temperature is 23.8 mm Hg.

Full answer on SmartKalike: https://smartkalike.com/cbse/class-12/chemistry/solutions

Q8. 5 marks · Long answer

Distinguish between saturated and unsaturated solutions at a specified temperature. Define solubility in terms of a saturated solution in dynamic equilibrium, and explain how the temperature dependence of the solubility of a solid varies for endothermic and exothermic dissolution.

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Q9. 1 mark · Multiple choice

The molality of a solution prepared by dissolving 2.5 g of ethanoic acid in 75 g of benzene, as given in the textbook example, is:

(A) 0.0556 mol kg^{-1}

(B) 0.556 mol kg^{-1}

(C) 5.56 mol kg^{-1}

(D) 55.6 mol kg^{-1}

Full answer on SmartKalike: https://smartkalike.com/cbse/class-12/chemistry/solutions

Q10. 2 marks · Short answer

State the principle “like dissolves like” and explain it in terms of polar and non-polar solutes and solvents.

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