

CHAPTER 1 : Solution

Q1- What is solution? Explain the term solubility.

Q2- State Henry's law. Write its applications and limitations.

Q3- Calculate the mole fraction of ethylene glycol in a solution containing 20% of ethylene glycol by mass.

Q4- Calculate the mass percentage of benzene and carbon tetrachloride if 22g of benzene is dissolved in 122g of carbon tetrachloride.

Q5- Calculate the mass of urea required in making a 2.5kg of 0.25 molal aqueous solution.

Q6- Hydrogen sulphide a toxic gas with rotten egg like smell is used for qualitative analysis. If the solubility of hydrogen sulphide in water at STP is 0.195m. Calculate Henry's law constant.

Q7- Explain Raoult's law for (a) a solution containing volatile solute dissolved in a volatile solvent and (b) a solution containing non-volatile solute dissolved in volatile solvent.

Q8- Explain ideal and non-ideal solutions. Explain why change in volume on mixing is not equal to zero.

Q9- What are colligative properties? Give some examples.

Q10- What are Azeotropes? Explain its both types.

Q11- Explain relative lowering in vapour pressure. Derive its relation with molar mass of the solute.

Q12- Explain elevation in boiling points. Derive its relation with molar mass of the solute.

Q13- Explain depression in freezing point and derive its relation with molar mass of the solute.

Q14- Explain Osmotic pressure. Derive its relation with molar mass of the solute.

Q15- Explain abnormal molar mass. Give reason why observed molar mass calculated by colligative properties is different than actual normal molar mass of the solute.

Q16- Vapour pressure of chloroform and dichloromethane are 200mm Hg and 415 mm Hg respectively. Calculate

(a) Vapour pressure of the solution prepared by mixing 25.5g of chloroform and 40g of dichloromethane and

(b) Mole fraction of each component in vapour phase.

Q17- The vapour pressure of pure benzene at a certain temperature is 0.850 bar. A non-volatile, non-electrolyte solid weighing 0.5 g when added to 39.0 g of benzene (molar mass 78 g mol⁻¹). Vapour pressure of the solution, then, is 0.845 bar. What is the molar mass of the solid substance?

Q18- Define the following terms:

(i) Mole fraction (ii) Molality (iii) Molarity (iv) Mass percentage.

Q19- What role does the molecular interaction play in a solution of alcohol and water?

Q20- Why do gases always tend to be less soluble in liquids as the temperature is raised?

Q21- A solution of glucose in water is labelled as 10% w/w, what would be the molality and mole fraction of each component in the solution? If the density of solution is 1.2 g mL⁻¹, then what shall be the molarity of the solution?

Q22- Benzene and toluene form ideal solution over the entire range of composition. The vapour pressure of pure benzene and toluene at 300 K are 50.71 mm Hg, and 32.06 mm Hg respectively. Calculate the mole fraction of benzene in vapour phase if 80 g of benzene is mixed with 100 g of toluene.

Q23- What is reverse osmosis?

Q24- What does concentration of a solution mean and how it can be calculated?

Q25- Calculate the molarity of a solution in which 5g NaOH is dissolved in 760ml water, also find mole fraction of each components present in the solution.