Open Book Assignment 03 May 2026
Solutions
Time : 90 Minutes

1. Give an example of a solid solution in which the solute is a gas.
2. Concentrated nitric acid used in laboratory work is 68% nitric acid by mass in aqueous solution. What should be the molarity of such a sample of the acid if the density of the solution is 1.504 gm/L?
3. How many mL of 0.1 M HCl are required to react completely with 1 g mixture of sodium carbonate and sodium hydrogen carbonate containing equimolar amounts of both?
4. A solution is obtained by mixing 300 g of 25% solution and 400 g of 40% solution by mass. Calculate the mass percentage of the resulting solution
5. A sample of drinking water was found to be severely contaminated with chloroform ($CHCl_3$) supposed to be a carcinogen. The level of contamination was 15 ppm (by mass):
(i) express this in percent by mass
(ii) determine the molality of chloroform in the water sample.
6. What is meant by positive and negative deviations from Raoult's law and how is the sign of $\Delta_{mix}H$ related to positive and negative deviations from Raoult's law?
7. State Henry's law and mention some important applications.

8. Calculate the mass of a non-volatile solute (molar mass 40 g mol^{-1}) which should be dissolved in 114 g octane to reduce its vapour pressure to 80%.

9. A 5% solution (by mass) of cane sugar in water has freezing point of 271K. Calculate the freezing point of 5% glucose in water if freezing point of pure water is 273.15 K

10. How many moles will be present in seven grams of each of the following Sodium carbonate, sodium sulphate, sodium hydroxide, silver chloride and sulphuric acid.