Class 12 Chemistry · Chapter 1: Solutions

Worksheet · 20 marks · about 40 minutes · based on NCERT

Name _____ Class and section _____ Date _____

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1. For a salt X, $\Delta_{sol}H = +18$ kJ mol^{-1}. A nearly saturated solution of X is in contact with excess solid. When the temperature is raised, the solubility of X [1]

(a) first increases and then decreases

(b) decreases, since heat drives solute out of solution

(c) does not change, since solids are incompressible

(d) increases, since the equilibrium shifts in the endothermic direction

2. In which of the following is a liquid the solute and a solid the solvent? [1]

(a) camphor in nitrogen gas

(b) solution of hydrogen in palladium

(c) copper dissolved in gold

(d) amalgam of mercury with sodium

3. 2.8 g of KOH (56 g mol^{-1}) is dissolved in water and the solution is made up to 250 mL. Its molarity is [1]

(a) 0.0112 M

(b) 0.050 M

(c) 0.20 M

(d) 2.0 M

4. A gas has a Henry's law constant of 50.0 kbar in water at 298 K. Its mole fraction in water in equilibrium with the gas at a partial pressure of 0.50 bar is [1]

(a) 1.0×10^{-5}

(b) 1.0×10^{-2}

(c) 1.0×10^{5}

(d) 2.5×10^{4}

5. Which of the following dissolves readily in benzene but hardly at all in water? [1]

(a) sodium chloride

(b) anthracene

(c) sugar

(d) potassium chloride

6. (a) Why does a raw mango kept in brine shrivel? (b) Why is 0.9% (mass/volume) NaCl, and not pure water, injected into a patient's vein? [2]

7. What is an azeotrope? Why can absolute ethanol not be obtained by fractional distillation of fermented liquor? [2]

8. When a cold bottle of soda water is opened, there is a mild fizz; when a warm one is opened, it fizzes much more. Explain both observations using Henry's law. [2]

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9. Liquids X and Y form an ideal solution; at 320 K, p_X° = 90 kPa and p_Y° = 30 kPa. (a) Find the mole fraction of X in the liquid whose vapour contains equal numbers of moles of X and Y, and the total vapour pressure over it. (b) For a liquid with x_X = 0.50, find y_X and say which component the vapour is richer in. [3]

10. A compound has the empirical formula CH_2O. When 1.80 g of it is dissolved in 50.0 g of ethanol, the boiling point rises by 0.240 K. Find its molar mass and molecular formula. (K_b of ethanol = 1.20 K kg mol^{-1}; C = 12, H = 1, O = 16 g mol^{-1}) [3]

11. (a) A 3.42% (mass/volume) aqueous solution of sucrose (342 g mol^{-1}) is isotonic with an aqueous solution of urea (60 g mol^{-1}). Find the mass/volume percentage of urea. (b) Calculate the osmotic pressure of either solution at 300 K. (c) Would a 0.100 M NaCl solution be isotonic with them? (R = 0.083 L bar mol^{-1} K^{-1}) [3]

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