QB365

Important Questions - Solution

12th Standard CBSE

Chemistry

Reg.No. : | | | | | | |

Time : 01:00:00 Hrs

Total Marks : 50

Section - A

1) Which one of the following gases has the lowest value of the Henry's law constant ? **1**

(a) N_2 (b) He (c) H_2 (d) CO_2

2) An aqueous solution of methanol in water has vapour pressure **1**

(a) equal to that of water (b) equal to that of methanol (c) more than that of water

(d) less than that of water

3) The molal freezing point constant of water is 1.86° C/M. Therefore the freezing point of 0.1 M NaCl solution in water is expected to be **1**

(a) - 1.86°C (b) - 0.186°C (c) - 0.372°C (d) + 0.372°C

4) Which of the following aqueous solutions should have the highest boiling point ? **1**

(a) 1.0 M NaOH (b) 10 M Na_2SO_4 (c) 1.0 M NH_4NO_3 (d) 1.0 M KNO_3

5) The unit of ebullioscopic constant is **1**

(a) K kg mol^{-1} or K $(molality)^{-1}$ (b) mol kg K^{-1} or K^{-1} (molality) (c) kg mol^{-1} K^{-1} or K^{-1} $(molality)^{-1}$

(d) K mol kg^{-1} or K (molality)

6) We have three aqueous solutions of NaCl labelled as 'A', 'B' and 'C' with concentrations 0.1 M, 0.01 M, respectively. The value of van't Hoff factor for these solutions will be in the order **1**

(a) $i_A<i_B<i_C$ (b) $i_A>i_B>i_C$ (c) $i_A=i_B=i_C$ (d) $i_A<i_B>i_C$

7) A 5.5 molal aqueous solution of methyl alcohol, CH_3OH, is supplied. What is the mole fraction of methyl alcohol in the solution ? **1**

(a) 0.190 (b) 0.086 (c) 0.050 (d) 0.100

8) To neutralise completely 20 mL of 0.1 M aqueous solution of phosphorous acid (H_3PO_3), the volume of 0.1 M aqueous KOH solution required is **1**

(a) 10 mL (b) 20 mL (c) 40 mL (d) 60 mL

9) The molarity of 900 g of water is **1**

(a) 50 M (b) 55.5 M (c) 5 M (d) cannot be calculated

10) Two liquids X and Y form an ideal solution. At 300 K, vapour pressure of the solution containing 1 mol of X and 3 mol of Y is 550 mm Hg. At the same temperature if 1 mol of Y is furthur added to this solution, vapour pressure of the solution increases by 10 mm Hg. Vapour pressure (in mm Hg) of X and Y in their pure states will be respectively. **1**

(a) 200 and 300 (b) 300 and 400 (c) 400 and 600 (d) 500 and 600

Section - B

11) Henry's law constant for the molality of methane in benzene at 298 K is 4.27×10^5 mm Hg. Calculate the solubility of methane in benzene at 298 K under 760 mm Hg. **2**

12) Calculate the mass percentage of benzene (C_6H_6) and carbon tetrachloride (CCl_4) if 22 g of benzene is dissolved in 122 g of carbon tetrachloride. **2**

13) The degree of dissociation of $Ca(NO_3)_2$ in a dilute aqueous solution containing 14 g of the salt per 200 g of water at 100°C is 70% If the vapour pressure of water is 760 mm Hg, calculate the vapour pressure of the solutions. **2**

14) When and wy is molality preferred over molarity in handing solutions in chemistry ? **2**

15) 45 g of ethylene glycol ($C_2H_4O_2$) is mixed with 600 g of water. Calculate **2**

(i) the freezing point depression and

(ii) the freezing point of the solution

(Given: K_f of water = 1.86 K kg mol^{-1})

Section - C

16) The vapour pressure of eater is 12.3 kPa at 300 K. Calculate the vapour pressure of a one molal solution of a non-volatile non-ionic solute in water. **3**

17) Benzene (C_6H_6) and Toluene (C_7H_8) form a nearly ideal solution. At 313 K, the vapour pressure of pure benzene is 150 mm Hg and of pure benzene is 150 mm Hg and pure toluene is 50 mm Hg. Calculate the vapour pressure of a mixture of these containing equal masses at 313 K. **3**

18) Calculate the molality and mole fraction of 2.5 ethanoic acid(CH_3COOH)in 75g of benzene. **3**

19) How can you remove the hard calcium carbonate layer of the egg without damaging its semi-permeable membrane? Can this egg be inserted into a bottle with a narrow neck without distorting its shape? Explain the process involved. **3**

20) A solution is prepared by dissolving 10 g of non-volatile solute in 200 g of water. It has a vapour pressure of 31.84 mm Hg at 308 K. Calculate the molar mass of the solute. **3**

(Vapour pressure of pure water at 308 K = 32 mm Hg)

Section - D

21) (a) Differentiate between molarity and molality for a solution. How does a change in temperature influence their values? **5**

(b) Calculate the freezing point of an aqueous solution containing 10.50 g of $MgBr_2$ = 184 g) (K_f for water 1.86 K kg mol^{-1})

22) (a) Non-ideal solutions exhibit either positive or negative deviations from Raoult's law. What are these deviations and how are they caused? **5**

(b) What mass op NACl (molar mass = 58.5 g mol^{-1}) must be dissolved in 65 g of water to lower the freezing point by 7.50 ^{o}C? The freezing point depression constant, K_f for water is 1.86 K kg mol^{-1}. Assume van't Hoff factor for NaCl is 1.87.

23) (a) Define the following terms: **5**

(i) Mole fraction,

(ii) Ideal solution.

(b) 15.0 g of an unknown molecular material is dissolved in 450 g of water. The resulting solution freezes at -0.34 $^{\circ}C$. What is the molar mass of the material? [K_f for water = 1.86 K Kg mol^{-1}]

****