DPP
DAILY PRACTICE PROBLEMS

CLASS : XIth
DATE :

Solutions

SUBJECT : CHEMISTRY
DPP No. : 6

Topic :- SOLUTIONS

1 **(a)**

According to the Boyle-van't Hoff law, at constant temperature the osmotic pressure of a solution is directly proportional to its concentration and inversely proportional to its dilution.$\pi \propto C$ (where, C= concentration).

Hence, the osmotic pressure of a solution at a given temperature increases with concentration.

2 **(c)**

$P_M = P^0_{C_5H_{12}} . X^0_{C_5H_{12}} + P^0_{C_6H_{14}} . X_{C_6H_{14}};$

Thus, $P_M = 440 \times \frac{1}{5} + 120 \times \frac{4}{5} = 184$

Now, $P_{\mathrm{C_5H_{12}}} = P^0_{\mathrm{C_5H_{12}}} \cdot X_{\mathrm{C_5H_{12}}(l)} = PM \cdot X_{\mathrm{C_5H_{12}(g)}}$

$\therefore \quad 440 \times \frac{1}{5} = 184 \times X_{\mathrm{C_5H_{12}(g)}}$

$\therefore \quad X_{\mathrm{C_5H_{12}(g)}} = 0.478$

3 **(d)**

H_2O and ethanol are miscible.

4 **(b)**

According to the Raoult's law the relative lowering vapour pressure which is produced by dissolving a non-volatile solute in a solvent is equal to mole fraction of the solute.

$$\frac{P - P_s}{P} = X_B$$

where, p= vapour pressure of solvent

$P_s =$ vapour pressure of solution

$X_B =$ mole fraction of B

Given, P=0.80 atm

$P_s =$ 0.60 atm

$\therefore \quad X_B = \frac{0.80 - 0.60}{0.80} = \frac{0.20}{0.80} = 0.25$

6 **(b)**

For NaCl,$i = 2$

$\Delta T_f = 2k_f \times m = 2 \times 1.86 \times 1 = 3.72$

$T_s = T - \Delta T_f = 0 - 3.72 = -3.72°\mathrm{C}$

7 **(a)**

$P_T = X_H . P_H^\circ \ + \ P_O^\circ$

$$X_H = \frac{\frac{25}{100}}{\frac{25}{100}+\frac{35}{114}} = 0.45 \ and \ \therefore \quad X_o = 0.55$$

$P_T \ = \ 0.45 \ \times 105 + 0.55 \times 45 = 72kPa$

8 **(a)**

$$BaCl_2 \ \rightleftharpoons \ Ba^{2+} \ + \ 2Cl^-$$

Initial 0.01 M

At equilibrium (0.01-x) M xM 2xM

$$i = \frac{(0.01 - x) + x + 2x}{0.01}$$

$$= \frac{0.01 + 2x}{0.01} = 1.98$$

x=0.0049

$$\% \ \alpha = \frac{x}{0.01} \times 100 = \frac{0.0049 \times 100}{0.01} = 49\%$$

9 **(a)**

According to Raoult's law relative lowering of vapour pressure $\propto$ mole fraction of solute

Thus, mole fraction of solute = 0.0125

Mole fraction of a solute is related to the molality by the following expression.

$$\left(\frac{1}{X} - 1\right) = \frac{1000}{m_B \times m}$$

where, X = mole fraction of solute

m_B = moleular weight of solvent

m = molality

$$\left(\frac{1}{0.0125} - 1\right) = \frac{1000}{18 \times m}$$

$$m = \frac{12.5}{(1 - 0.0125) \times 18}$$

$$= \frac{12.5}{17.775}$$

$$= 0.70$$

10 **(b)**

$$\frac{p^0 - p_s}{p^0} = \frac{w}{m} \times \frac{M}{W} = \frac{18}{180} \times \frac{18}{90} = 0.02$$

11 **(d)**

Osmotic pressure (π)=CRT

Unit of osmotic pressure is atm.

12 **(b)**

Unit of molality mole per kilogram (mol kg^{-1}).

13 **(b)**

Azeotropic mixture which boils at a lower temperature than either of two components is formed by non-ideal solution showing positive deviation

15 **(a)**

$$\triangle T_f = ik_f m$$

where $\triangle T_f$ = depression in freezing point i=van,t Hoff factor

m= molality and

and k_f= freezing point depression constant

For 0.01 molal NaCl solution

$0.37 = 2 \times k_f \times 0.01$

$\therefore \quad k_f = \frac{0.37}{2 \times 0.01}$ -----(i)

For 0.02 molal urea solution

$\triangle T_f = 1 \times k_f \times 0.02$

$\therefore \quad k_f = \frac{\triangle T_f}{0.02}$ -----(ii)

From Eqs (i) and (ii)

$\frac{0.37}{2 \times 0.01} = \frac{\triangle T_f}{0.02}$

$\triangle T_f = \frac{0.37 \times 0.02}{2 \times 0.01}$

$\therefore \quad \triangle T_f = 0.37°C$

16 **(b)**

Given, $h = 2.6\, mm$

$\therefore \quad \pi = hdg = \frac{2.6}{10} \times 1 \times 980$ dyne cm^{-2}

Also $\pi = \frac{w}{V.m} ST$

$$\frac{26 \times 1 \times 980}{10} = \frac{0.75 \times 8.314 \times 10^7 \times 277}{125 \times m}$$

$\therefore \quad m = 5.4 \times 10^5$

17 **(a)**

Relationship between normality and molar concentration is

Normality = $n \times$ molarity (M)

Where, n = the number of moles of H^+ per mole of the compound that solute is capable of releasing [acid] on reacting with base.

In case of HCl,

$n = 1$

Hence, 2 N HCl solution $\approx$ 2 M H_2SO_4 solution.

In case of H_2SO_4

n= 2

Hence, 4.0 NH_2SO_4 solution $\approx$ 2 MH_2SO_4 solution.

18 **(a)**

Orthophosphoric acid (H_3PO_4) is a tribasic acid.

$\because$ Normality = molarity × basicity

$\therefore$ Normality = 3 M × 3 = 9 N

20 **(c)**

Kinetic energy in liquid and vapour phase = $\frac{3}{2}RT$.

ANSWER-KEY										
Q.	1	2	3	4	5	6	7	8	9	10
A.	A	C	D	B	A	B	A	A	A	B
Q.	11	12	13	14	15	16	17	18	19	20
A.	D	B	B	A	A	B	A	A	C	C