DPP
DAILY PRACTICE PROBLEMS

CLASS : XIth
DATE :

Solutions

SUBJECT : CHEMISTRY
DPP No. : 3

Topic :- SOLUTIONS

1 **(c)**

Molality $\frac{Moles\ of\ solute}{kg\ of\ solvent} = \frac{5.2\ mol\ CH_3OH}{kg\ (=100g) H_2O}$

$n_1(CH_3OH) = 5.2$

$n_2(H_2O) = \frac{1000}{18} = 55.56$

$\therefore n_1 + n_2 = 5.20 + 55.56 = 60.76$ mol

$\therefore X_{CH_3OH} = \frac{n_1}{n_1 + n_2} = \frac{5.2}{60.76} = 0.086$

2 **(c)**

Suppose the equal mass of methane and oxygen $= w = 1$g

Mole fraction of oxygen $= \frac{w/32}{\frac{w}{32} + w/16}$

$= \frac{\frac{1}{32}}{\frac{3}{32}} = \frac{1}{3}$

Let the total pressure $= p$

Pressure exerted by oxygen (partial pressure)

$= X_{o_2} \times p_{total} = p \times \frac{1}{3}$

3 **(d)**

In Ist case,

When two liquids X and Y are mixed in the molar ratio 1:1.

Moles of $X = 1$

Moles of $Y = 1$

Mole fraction of $X(\varkappa_x) = \frac{1}{2}$

Mole fraction of $Y(\varkappa_Y) = \frac{1}{2}$

We know that

$p = p_X^\circ \varkappa_x + p_Y^\circ \varkappa_Y$ (p=total pressure of mixture)

$400 = \frac{1}{2} p_X^\circ + \frac{1}{2} p_Y^\circ$

$400 \times 2 = p_X^\circ + p_Y^\circ$ ...(i)

For case II[nd] ,

When liquids are mixed in the molar ratio of 1:2,

Mole fraction of $X = 1$

Mole fraction of $Y = 2$

Mole fraction of $X(\varkappa_x) = \frac{1}{3}$

Mole fraction of $Y(\varkappa_y) = \frac{2}{3}$

$$P = p_X^\circ \varkappa_X + p_Y^\circ \varkappa_Y$$

$$350 = \frac{1}{3} p_X^\circ \frac{2}{3} p_Y^\circ$$

$$350 \times 3 = p_X^\circ + 2p_Y^\circ \quad \text{...(ii)}$$

From Eqs (i) and (ii) , we get

$$p_X^\circ = 550mm$$

$$p_Y^\circ = 250\ mm$$

4 **(c)**

$Na_2SO_4 = 2Na^+ + SO_4^{2-}$

$\underset{1-\alpha}{1} \quad \underset{2\alpha}{0} \quad \underset{\alpha}{0}$

Where α is degree of dissociation

$\therefore \quad i = 1 - \alpha + 2\alpha + \alpha = 1 + 2\alpha$

5 **(b)**

$p_M = p'_A + p'_B$

$= p_A \cdot x_A + p_B \cdot x_B \qquad (\because p'_A = p_A \cdot x_A)$

$= p_A \cdot x_A + p_B(1 - x_A) \quad (\because x_A + x_B = 1)$

$= p_B + x_A(p_A - p_B)$

6 **(c)**

For ideal solution,

$\Delta H_{\text{solution}} = \Delta H_1 + \Delta H_2 + \Delta H_3$

7 **(d)**

Azeotropic mixture of HCl and water has 20.24% of HCl. It boils at 108.5°C under a pressure of one atmosphere.

8 **(d)**

Molarity

$$= \frac{\text{weight \% of solute} \times \text{density of the solution} \times 10}{\text{molecular weight of the solution}}$$

$$= \frac{98 \times 1.84 \times 10}{98}$$

$= 18.4$

9 **(a)**

π =CRT

Hence, C =0.2 M

R =0.082 L atm $mol^{-1}K^{-1}$

T =27+273 = 300 K

π =0.2 × 0.082 × 300 K

=4.92 atm.

10 **(b)**

Let the volume of 0.4 M HCl is V_1 and that of 0.9 M HCl is V_2.

We know that,

$$NV = N_1V_1 + N_2V_2$$

(Mixture) (for 0.4 M HCl) (for 0.9 M HCl)

$$0.7(V_1 + V_2) = 0.4 \times V_1 + 0.9 \times V_2$$

[$\because$ 1m HCl = 1N HCl]

$$0.7V_1 + 0.7V_2 = 0.4\ V_1 + 0.9\ V_2$$

$$0.7V_1 + 0.4V_1 = 0.9V_2 + 0.7V_2$$

$$0.3V_1 = 0.2V_2$$

$$\frac{V_1}{V_2} = \frac{0.2}{0.3} = \frac{2}{3}$$

11 **(b)**

(π) glucose $= (\pi)$ unknown compound

$$0.05 = \frac{3}{M}$$

$$M = \frac{3}{0.05} = 60$$

$$n = \frac{60}{30} = 2 \text{ (e.f.m. for } CH_2O = 30)$$

so, molecular formula $= C_2H_4O_2$

12 **(d)**

By Ostwald-walker dynamic method, the relative lowering of vapour pressure, lowering of vapour pressure and vapour pressure of the solvent, all can be measured.

In this method, the apparatus used, contains two bulbs: bulb A contains solution and bulb B contains solvent. The loss of weight in bulb B gives the lowering vapour pressure and total loss of weight in both the tubes gives the vapour pressure of the solvent and

Relative lowering of vapour pressure

$$= \frac{\text{lowering of vapour pressure}}{\text{vapour pressure of solvent}}$$

13 **(a)**

$$K = 9 = \frac{a \times 10}{(0.1 - a) \times 10}$$

Where a is the molarity of organic compound in CCl_4 at equilibrium

$$\therefore \quad a = 0.09\ M$$

Thus, molarity of organic compound left in water

$$= 0.1 - 0.09$$

$$= 0.01\ M$$

14 **(d)**

$$M_2 = \frac{K_f \times w_2 \times 1000}{\Delta T_f \times w_1}$$

$$or \quad M_2 = \frac{1.86 \times 1.8 \times 1000}{0.465 \times 40} = 180$$

$$n = \frac{180}{\text{emp.formula mass}} = \frac{180}{30} = 6$$

Molecular formula of the compound is $C_6H_{12}O_6$.

15 **(a)**

According to Raoult's law in a solution of a non-volatile solute, the the relative lowering in vapour pressure is always equal to the mole fraction of the solute.

$$\frac{p - p_s}{p} = X_A = \frac{N_A}{N_A + N_B}$$

16 **(c)**

$P'_A = P_A^0 \cdot X_A + P_M \cdot Y_A$

$P'_A = P_B^0 \cdot X_B = P_M \cdot Y_B$

$\therefore \frac{P_A^0}{P_B^0} \cdot \frac{X_A}{X_B} = \frac{Y_A}{Y_B}$

$\because \frac{P_A^0}{P_B^0} > 1 \qquad \therefore \frac{X_A}{X_B} < \frac{Y_A}{Y_B}$

17 **(a)**

Normality of 2.3 M $H_2SO_4 = M \times$ basicity $= 2.3 \times 2 = 4.6$ N

18 **(d)**

$i = 1 + \alpha$

$$= \frac{\text{cal.mol.weight}}{\text{exp. mol. wt}} = \frac{58.5}{30} = 1.95$$

$\therefore 1 + \alpha = 1.95$

$\alpha = 0.95$

19 **(b)**

Molarity of H_2SO_4 =5 M

Normality of $H_2SO_4 = 2 \times 5 = 10$ N

$N_1V_1 = N_2V_2$

$10 \times 1 = N_2 \times 10$ or $N_2 = 1$ N

20 **(a)**

$$K = \frac{\text{[Succinic acid] in water}}{\text{[Succinic acid] in ether}} = \frac{\frac{1.843}{M \times 100}}{\frac{0.127}{M \times 50}}$$

$$= 7.26$$

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