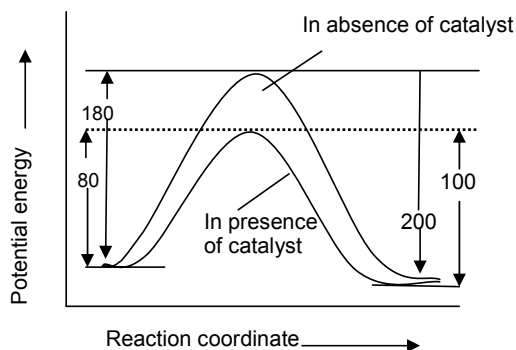


# FIITJEE Solutions to AIEEE-2007-CHEMISTRY Paper Code (O)\_1

81. The energies of activation for forward and reverse reactions for  $A_2 + B_2 \rightleftharpoons 2AB$  are  $180 \text{ kJ mol}^{-1}$  and  $200 \text{ kJ mol}^{-1}$  respectively. The presence of catalyst lowers the activation energy of both (forward and reverse) reactions by  $100 \text{ kJ mol}^{-1}$ . The enthalpy change of the reaction ( $A_2 + B_2 \rightarrow 2AB$ ) in the presence of catalyst will be (in  $\text{kJ mol}^{-1}$ )

- (1) 300 (2) 120  
 (3) 280 (4) 20

Ans.  
Sol.



$$\begin{aligned} \text{So, } \Delta H_{\text{Reaction}} &= E_f - E_b \\ &= 80 - 100 = -20 \\ \text{Hence, (4) is correct.} \end{aligned}$$

82. The cell,  $\text{Zn} | \text{Zn}^{2+} (1\text{M}) || \text{Cu}^{2+} (1\text{M}) | \text{Cu}$  ( $E_{\text{cell}}^{\circ} = 1.10\text{V}$ ), was allowed to be completely discharged at 298

K. The relative concentration of  $\text{Zn}^{2+}$  to  $\text{Cu}^{2+}$   $\left[ \frac{[\text{Zn}^{2+}]}{[\text{Cu}^{2+}]} \right]$  is

- (1) antilog (24.08) (2) 37.3  
 (3)  $10^{37.3}$  (4)  $9.65 \times 10^4$

Ans.

(3)

Sol. 
$$E_{\text{cell}} = E_{\text{cell}}^{\circ} - \frac{0.0591}{n} \log Q$$

Where 
$$Q = \frac{[\text{Zn}^{2+}]}{[\text{Cu}^{2+}]}$$

For complete discharge  $E_{\text{cell}} = 0$

So 
$$E_{\text{cell}}^{\circ} = \frac{0.591}{2} \log \frac{[\text{Zn}^{2+}]}{[\text{Cu}^{2+}]}$$

$$\Rightarrow \left[ \frac{[\text{Zn}^{2+}]}{[\text{Cu}^{2+}]} \right] = 10^{37.3}$$

Hence, (3) is correct.

83. The  $\text{pK}_a$  of a weak acid (HA) is 4.5. The  $\text{pOH}$  of an aqueous buffered solution of HA in which 50% of the acid is ionized is

- (1) 4.5 (2) 2.5  
 (3) 9.5 (4) 7.0

Ans.

(3)

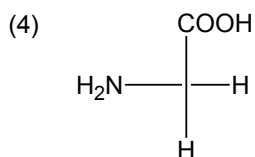
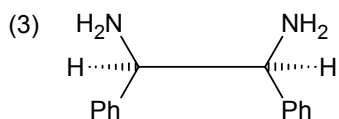
Sol. For buffer solution

$$\text{pH} = \text{pK}_a + \log \frac{[\text{Salt}]}{[\text{Acid}]}$$

$$= 4.5 + \log \frac{[\text{Salt}]}{[\text{Acid}]}$$

as HA is 50% ionized so  $[\text{Salt}] = [\text{Acid}]$





Ans. (1)  
 Sol. The plane of polarized light is rotated by optically active compound, i.e. it should be chiral. So, (1) has, chiral C-atom. So, it is optically active. In (2), (3) and (4) plane of symmetry is present. Hence, (1) is correct.

88. The secondary structure of a protein refers to  
 (1)  $\alpha$ -helical backbone (2) hydrophobic interactions  
 (3) sequence of  $\alpha$ -amino acids (4) fixed configuration of the polypeptide backbone

Ans. (1)  
 Sol. Secondary structure of proteins involves  $\alpha$  - helical back bond and  $\beta$  - sheet structures. These structures are formed as a result of H-bonding between different peptide groups. Hence, (1) is correct

89. Which of the following reactions will yield 2, 2-dibromopropane?  
 (1)  $\text{CH}_3 - \text{C} \equiv \text{CH} + 2\text{HBr} \longrightarrow$  (2)  $\text{CH}_3\text{CH} \equiv \text{CHBr} + \text{HBr} \longrightarrow$   
 (3)  $\text{CH} \equiv \text{CH} + 2\text{HBr} \longrightarrow$  (4)  $\text{CH}_3 - \text{CH} = \text{CH}_2 + \text{HBr} \longrightarrow$

Ans. (1)  
 Sol.  $\text{CH}_3 - \text{C} \equiv \text{CH} + \text{HBr} \xrightarrow[\text{(from HBr)}]{\text{electrophilic addition of H}^+} \text{CH}_3 - \underset{\text{Br}}{\text{C}} = \text{CH}_2 \xrightarrow{\text{HBr}} \text{CH}_3 - \underset{\text{Br}}{\overset{\text{Br}}{\text{C}}} - \text{CH}_3$

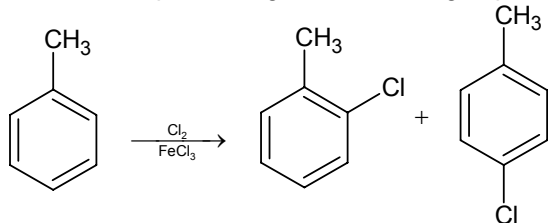
Hence, (1) is correct.

90. In the chemical reaction,  
 $\text{CH}_3\text{CH}_2\text{NH}_2 + \text{CHCl}_3 + 3\text{KOH} \longrightarrow (\text{A}) + (\text{B}) + 3\text{H}_2\text{O}$ , the compound (A) and (B) are respectively  
 (1)  $\text{C}_2\text{H}_5\text{CN}$  and  $3\text{KCl}$  (2)  $\text{CH}_3\text{CH}_2\text{CONH}_2$  and  $3\text{KCl}$   
 (3)  $\text{C}_2\text{H}_5\text{NC}$  and  $\text{K}_2\text{CO}_3$  (4)  $\text{C}_2\text{H}_5\text{NC}$  and  $3\text{KCl}$

Ans. (4)  
 Sol. It is example of carbylamine reaction. so, the product will be  $\text{C}_2\text{H}_5\text{NC}$  and  $\text{KCl}$ . Hence, (4) is the correct answer.

91. The reaction of toluene with  $\text{Cl}_2$  in presence of  $\text{FeCl}_3$  gives predominantly  
 (1) benzoyl chloride (2) benzyl chloride  
 (3) o- and p-chlorotoluene (4) m-chlorotoluene

Ans. (3)  
 Sol. Due to o- and p- directing nature of  $\text{CH}_3$  group.



Hence, (3) is correct answer.

92. Presence of a nitro group in a benzene ring  
 (1) activates the ring towards electrophilic substitution  
 (2) renders the ring basic  
 (3) deactivates the ring towards nucleophilic substitution  
 (4) deactivates the ring towards electrophilic substitution

Ans. (4)  
 Sol. -  $\text{NO}_2$  group shows - M effect, so withdraws the electron density from the ring and hence deactivate the ring towards electrophilic aromatic substitution. Hence, (4) is correct.

**FIITJEE Solutions to AIEEE-2007-CHEMISTRY Paper Code (O)\_4**

93. In which of the following ionization processes, the bond order has increased and the magnetic behaviour has changed?

- (1)  $C_2 \longrightarrow C_2^+$  (2)  $NO \longrightarrow NO^+$   
(3)  $O_2 \longrightarrow O_2^+$  (4)  $N_2 \longrightarrow N_2^+$

Ans. (2)

Sol. In  $C_2 - C_2^+$  electron is removed from bonding molecular orbital so bond order decreases. In  $NO \longrightarrow NO^+$ , electron is removed from anti bonding molecular orbital so bond order increases and nature changes from paramagnetic to diamagnetic.  
Hence, (2) is correct.

94. The actinoids exhibits more number of oxidation states in general than the lanthanoids. This is because

- (1) the 5f orbitals are more buried than the 4f orbitals  
(2) there is a similarity between 4f and 5f orbitals in their angular part of the wave function  
(3) the actinoids are more reactive than the lanthanoids  
(4) the 5f orbitals extend further from the nucleus than the 4f orbitals

Ans. (4)

Sol. The actinoids exhibit more number of oxidation states in general than the lanthanoids. This is because the 5f orbitals extend further from the nucleus than the 4f orbitals.  
Hence, (4) is correct.

95. Equal masses of methane and oxygen are mixed in an empty container at 25°C. The fraction of the total pressure exerted by oxygen is

- (1)  $\frac{2}{3}$  (2)  $\frac{1}{3} \times \frac{273}{298}$   
(3)  $\frac{1}{3}$  (4)  $\frac{1}{2}$

Ans. (3)

Sol. Let the mass of methane and oxygen is w

$$\text{mole fraction of oxygen} = \frac{\frac{w}{32}}{\frac{w}{32} + \frac{w}{16}}$$

$$= \frac{\frac{1}{32}}{\frac{1}{32} + \frac{1}{16}} = \frac{\frac{1}{32}}{\frac{3}{32}} = \frac{1}{3}$$

Let the total pressure be P

$$\text{The pressure exerted by oxygen (partial pressure)} = X_{O_2} \times P_{\text{total}}$$

$$\Rightarrow P \times \frac{1}{3}$$

Hence, (3) is correct.

96. A 5.25 % solution of a substance is isotonic with a 1.5% solution of urea (molar mass = 60 g mol<sup>-1</sup>) in the same solvent. If the densities of both the solutions are assumed to be equal to 1.0 g cm<sup>-3</sup>, molar mass of the substance will be

- (1) 90.0 g mol<sup>-1</sup> (2) 115.0 g mol<sup>-1</sup>  
(3) 105.0 g mol<sup>-1</sup> (4) 210.0 g mol<sup>-1</sup>

Ans. (4)

Sol. Solutions with the same osmotic pressure are isotonic

Let the molar mass of the substance be M

$$\pi_1 = C_1RT = C_2RT = \pi_2$$

$$\text{So, } C_1 = C_2$$

As density of the solutions are same

$$\text{So } \frac{5.25}{M} = \frac{15}{60}$$

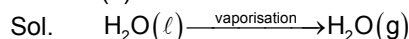
$$M = \frac{5.25 \times 60}{1.5} = 210$$

Hence (4) is correct

97. Assuming that water vapour is an ideal gas, the internal energy ( $\Delta U$ ) when 1 mol of water is vapourised at 1 bar pressure and  $100^\circ\text{C}$ , (Given: Molar enthalpy of vapourization of water at 1 bar and  $373\text{ K} = 41\text{ kJ mol}^{-1}$  and  $R = 8.3\text{ J mol}^{-1}\text{K}^{-1}$ ) will be

- (1)  $4.100\text{ kJ mol}^{-1}$  (2)  $3.7904\text{ kJ mol}^{-1}$   
 (3)  $37.904\text{ kJ mol}^{-1}$  (4)  $41.00\text{ kJ mol}^{-1}$

Ans. (3)



$$\Delta n_g = 1 - 0 = 1$$

$$\Delta H = \Delta U + \Delta n_g RT$$

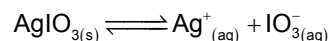
$$\Delta U = \Delta H - \Delta n_g RT$$

$$= 41 - 8.3 \times 10^{-3} \times 373$$

$$= 37.9\text{ kJ mol}^{-1}$$

Hence, (3) is correct.

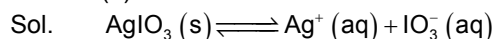
98. In a saturated solution of the sparingly soluble strong electrolyte  $\text{AgIO}_3$  (Molecular mass = 283) the equilibrium which sets in is



If the solubility product constant  $K_{sp}$  of  $\text{AgIO}_3$  at a given temperature is  $1.0 \times 10^{-8}$ , what is the mass of  $\text{AgIO}_3$  contained in 100 ml of its saturated solution?

- (1)  $28.3 \times 10^{-2}\text{ g}$  (2)  $2.83 \times 10^{-3}\text{ g}$   
 (3)  $1.0 \times 10^{-7}\text{ g}$  (4)  $1.0 \times 10^{-4}\text{ g}$

Ans. (2)



Let the solubility of  $\text{AgIO}_3$  be  $s$

$$K_{sp} = [\text{Ag}^+][\text{IO}_3^-]$$

$$1.0 \times 10^{-8} = s^2$$

$$s = 10^{-4}\text{ mol/litre}$$

$$= \frac{10^{-4} \times 283}{1000} \times 100$$

$$= 283 \times 10^{-5}$$

$$= 2.83 \times 10^{-3}\text{ g/100 ml}$$

Hence, (2) is correct.

99. A radioactive element gets spilled over the floor of a room. Its half-life period is 30 days. If the initial activity is ten times the permissible value, after how many days will it be safe to enter the room?

- (1) 1000 days (2) 300 days  
 (3) 10 days (4) 100 days

Ans. (4)

Sol. Activity  $\left(-\frac{dN}{dt}\right) \propto N$

$$N = N_0 \left(\frac{1}{2}\right)^n$$

$$\frac{N}{N_0} = \left(\frac{1}{2}\right)^n$$

$$\frac{1}{10} = \left(\frac{1}{2}\right)^n \Rightarrow 10 = 2^n$$

$$\log 10 = n \log 2$$

$$\Rightarrow n = \frac{1}{0.301} = 3.32$$

$$t = n \times t_{1/2}$$

=  $3.32 \times 30 = 99.6$  days

Hence, (4) is correct.

100. Which one of the following conformation of cyclohexane is chiral?

- (1) Twist boat (2) Rigid  
(3) Chair (4) Boat

Ans. (1)

Sol. Twisted boat is chiral as it does not have plane of symmetry.

Hence, (1) is correct.

101. Which of the following is the correct order of decreasing  $S_N2$  reactivity?

- (1)  $RCH_2X > R_3CX > R_2CHX$  (2)  $RCH_2X > R_2CHX > R_3CX$   
(3)  $R_3CX > R_2CHX > RCH_2X$  (4)  $R_2CHX > R_3CX > RCH_2X$

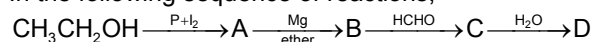
(X = a halogen)

Ans. (2)

Sol. More is the steric hindrance at the carbon bearing the halogen, lesser is the  $S_N2$  reactivity.

Hence, (2) is correct.

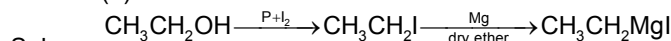
102. In the following sequence of reactions,



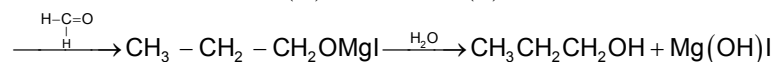
the compound 'D' is

- (1) butanal (2) n-butyl alcohol  
(3) n-propyl alcohol (4) propanal

Ans. (3)



(A) (B)



(C) (D)

∴ the compound D is n-propyl alcohol.

Hence, (3) is correct option.

103. Which of the following sets of quantum numbers represents the highest energy of an atom?

- (1)  $n = 3, l = 2, m = 1, s = +1/2$  (2)  $n = 3, l = 2, m = 1, s = +1/2$   
(3)  $n = 4, l = 0, m = 0, s = +1/2$  (4)  $n = 3, l = 0, m = 0, s = +1/2$

Ans. (2)

Sol. (2) is the correct option because it has the maximum value of  $n + \ell$

Hence, (2) is correct.

104. Which of the following hydrogen bonds is the strongest?

- (1) O-H.....N (2) F-H.....F  
(3) O-H.....O (4) O-H.....F

Ans. (2)

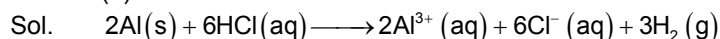
Sol. The hydrogen bond in HF is strongest, because fluorine is the most electronegative element.

Thus, (2) is the correct option.

105. In the reaction.  $2Al_{(s)} + 6HCl_{(s)} \longrightarrow 2Al^{3+}_{(aq)} + 6Cl^{-}_{(aq)} + 3H_{2(g)}$ ,

- (1) 6 L  $HCl_{(aq)}$  is consumed for every 3L  $H_{2(g)}$  produced  
(2) 33.6 L  $H_{2(g)}$  is produced regardless of temperature and pressure for every mole Al that reacts  
(3) 67.2 L  $H_{2(g)}$  at STP is produced for every mole Al that reacts  
(4) 11.2  $H_{2(g)}$  at STP is produced for every mole  $HCl_{(aq)}$  consumed

Ans. (4)



For each mole of HCl reacted, 0.5 mole of  $H_2$  gas is formed at STP.

1 mole of an ideal gas occupies 22.4 lit at STP.

Volume of  $H_2$  gas formed at STP per mole of HCl reacted is  $22.4 \times 0.5$  litre

Hence, (4) is correct.

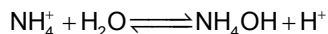
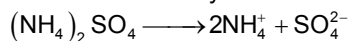
106. Regular use of which of the following fertilizer increases the acidity of soil?

- (1) Potassium nitrate (2) Urea  
(3) Superphosphate of lime (4) Ammonium sulphate

## FIITJEE Solutions to AIEEE-2007-CHEMISTRY Paper Code (O)\_7

Ans. (4)

Sol.  $(\text{NH}_4)_2\text{SO}_4$  is a salt of strong acid and weak base, on hydrolysis it will produce  $\text{H}^+$  ion. This will increase the acidity of soil.



Hence, (4) is correct answer.

107. Identify the correct statement regarding a spontaneous process

- (1) For a spontaneous process in an isolated system, the change in entropy is positive
- (2) Endothermic processes are never spontaneous
- (3) Exothermic processes are always spontaneous
- (4) Lowering of energy in the reaction process is the only criterion for spontaneity

Ans. (1)

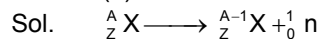
Sol. For a spontaneous process in an isolated system, the change in entropy is positive.

Hence, (1) is correct.

108. Which of the following nuclear reactions will generate an isotope?

- (1) neutron particle emission
- (2) positron emission
- (3)  $\alpha$ -particle emission
- (4)  $\beta$ -particle emission

Ans. (1)



Hence, (1) is correct.

109. The equivalent conductances of two strong electrolytes at infinite dilution in  $\text{H}_2\text{O}$  (where ions move freely through a solution) at  $25^\circ\text{C}$  are given below:

$$\Lambda^\circ_{\text{CH}_3\text{COONa}} = 91.0 \text{ S cm}^2 / \text{equiv}$$

$$\Lambda^\circ_{\text{HCl}} = 426.2 \text{ S cm}^2 / \text{equiv}$$

What additional information/quantity one needs to calculate  $\Lambda^\circ$  of an aqueous solution of acetic acid?

- (1)  $\Lambda^\circ$  of NaCl
- (2)  $\Lambda^\circ$  of  $\text{CH}_3\text{COOK}$
- (3) The limiting equivalent conductance of  $\text{H}^+$  ( $\Lambda^\circ_{\text{H}^+}$ )
- (4)  $\Lambda^\circ$  of chloroacetic acid ( $\text{C}/\text{CH}_2\text{COOH}$ )

Ans. (1)

Sol. From Kohlrausch's law

$$\Lambda^\circ_{\text{CH}_3\text{COOH}} = \Lambda^\circ_{\text{CH}_3\text{COONa}} + \Lambda^\circ_{\text{HCl}} - \Lambda^\circ_{\text{NaCl}}$$

Hence, (1) is the correct answer.

110. Which one of the following is the strongest base in aqueous solution?

- (1) Trimethylamine
- (2) Aniline
- (3) Dimethylamine
- (4) Methylamine

Ans. (3)

Sol. In aqueous solution basicity order of  $1^\circ$ ,  $2^\circ$  and  $3^\circ$  amine with methyl group is  $2^\circ > 1^\circ > 3^\circ$

In case of aniline lone pair of nitrogen is involved in resonance, so it is weaker base than aliphatic amines.

Hence, (3) is correct.

111. The compound formed as a result of oxidation of ethyl benzene by  $\text{KMnO}_4$  is

- (1) benzophenone
- (2) acetophenone
- (3) benzoic acid
- (4) benzyl alcohol

Ans. (3)

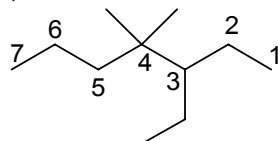
Sol. Any aliphatic carbon with hydrogen attached to it, in combination with benzene ring, will be oxidized to benzoic acid by  $\text{KMnO}_4/\text{H}^+$ .

Hence, (3) is correct.

112. The IUPAC name of  is

- (1) 1, 1-diethyl-2,2-dimethylpentane (2) 4, 4-dimethyl-5, 5-diethylpentane  
 (3) 5, 5-diethyl-4, 4-dimethylpentane (4) 3-ethyl-4, 4-dimethylheptane

Ans.  
Sol.



The correct answer is 3-ethyl-4, 4-dimethylheptane.

Hence, (4) is correct.

113. Which of the following species exhibits the diamagnetic behaviour?

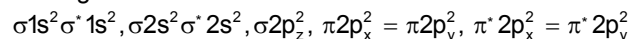
- (1)  $O_2^{2-}$  (2)  $O_2^+$   
 (3)  $O_2$  (4) NO

Ans.

(1)

Sol. The correct option is  $O_2^{2-}$

This species has 18  $e^-$ , which are filled in such a way that all molecular orbitals are fully filled, so diamagnetic.



Hence, (1) is correct.

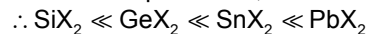
114. The stability of dihalides of Si, Ge, Sn and Pb increases steadily in the sequence

- (1)  $GeX_2 \ll SiX_2 \ll SnX_2 \ll PbX_2$  (2)  $SiX_2 \ll GeX_2 \ll PbX_2 \ll SnX_2$   
 (3)  $SiX_2 \ll GeX_2 \ll SnX_2 \ll PbX_2$  (4)  $PbX_2 \ll SnX_2 \ll GeX_2 \ll SiX_2$

Ans.

(3)

Sol. Due to inert pair effect, the stability of +2 oxidation state increases as we move down this group.



Hence, (3) is correct.

115. Identify the incorrect statement among the following

- (1) Ozone reacts with  $SO_2$  to give  $SO_3$   
 (2) Silicon reacts with  $NaOH_{(aq)}$  in the presence of air to give  $Na_2SiO_3$  and  $H_2O$   
 (3)  $Cl_2$  reacts with excess of  $NH_3$  to give  $N_2$  and HCl  
 (4)  $Br_2$  reacts with hot and strong NaOH solution to give NaBr,  $NaBrO_4$  and  $H_2O$

Ans.

(4)

Sol.  $Br_2$  reacts with hot and strong NaOH to give NaBr,  $NaBrO_3$  and  $H_2O$ .

Hence, (4) is incorrect statement.

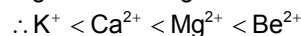
116. The charge/size ratio of a cation determines its polarizing power. Which one of the following sequences represents the increasing order of the polarizing power of the cationic species,  $K^+$ ,  $Ca^{2+}$ ,  $Mg^{2+}$ ,  $Be^{2+}$ ?

- (1)  $Mg^{2+}, Be^{2+}, K^+, Ca^{2+}$  (2)  $Be^{2+}, K^+, Ca^{2+}, Mg^{2+}$   
 (3)  $K^+, Ca^{2+}, Mg^{2+}, Be^{2+}$  (4)  $Ca^{2+}, Mg^{2+}, Be^{2+}, K^+$

Ans.

(3)

Sol. Higher the charge/size ratio, more is the polarizing power.



Hence, (3) is correct.

117. The density (in  $g mL^{-1}$ ) of a 3.60 M sulphuric acid solution that is 29%  $H_2SO_4$  (Molar mass = 98  $g mol^{-1}$ ) by mass will be

- (1) 1.64 (2) 1.88  
 (3) 1.22 (4) 1.45

Ans.

(3)

Sol. Let the density of solution be 'd'

Molarity of solution given = 3.6

i.e. 1 litre of solution contains 3.6 moles of  $H_2SO_4$

or 1 litre of solution contains  $3.6 \times 98$  gms of  $H_2SO_4$

Since, the solution is 29% by mass.



100 gm solution contains 29 gm  $\text{H}_2\text{SO}_4$

$\frac{100}{d}$  ml solution contains 29 gm of  $\text{H}_2\text{SO}_4$

1000 ml solution contains  $3.6 \times 98$  gm of  $\text{H}_2\text{SO}_4$

$$\therefore 3.6 \times 98 = \frac{29 \times d}{100} \times 1000$$

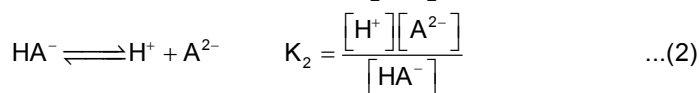
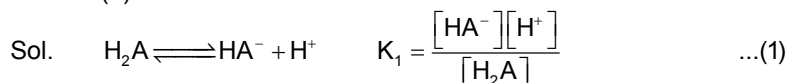
$$d = 1.22$$

Hence, (3) is correct.

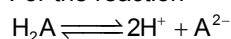
118. The first and second dissociation constants of an acid  $\text{H}_2\text{A}$  are  $1.0 \times 10^{-5}$  and  $5.0 \times 10^{-10}$  respectively. The overall dissociation constant of the acid will be

- (1)  $5.0 \times 10^{-5}$  (2)  $5.0 \times 10^{15}$   
 (3)  $5.0 \times 10^{-15}$  (4)  $0.0 \times 10^5$

Ans. (3)



For the reaction



$$K = \frac{[\text{H}^+]^2 [\text{A}^{2-}]}{[\text{H}_2\text{A}]} = K_1 \times K_2$$

$$= 1 \times 10^{-5} \times 5 \times 10^{-10}$$

$$= 5 \times 10^{-15}$$

Hence, (3) is correct.

119. A mixture of ethyl alcohol and propyl alcohol has a vapour pressure of 290 mm at 300 K. The vapour pressure of propyl alcohol is 200 mm. If the mole fraction of ethyl alcohol is 0.6, its vapour pressure (in mm) at the same temperature will be

- (1) 350 (2) 300  
 (3) 700 (4) 360

Ans. (1)

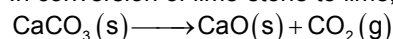
Sol. Let the vapour pressure of pure ethyl alcohol be P,

According to Raoult's law  
 $290 = 200 \times 0.4 + P \times 0.6$

$$P = \frac{290 - 80}{0.6} = 350 \text{ mm Hg}$$

Hence, (1) is correct.

120. In conversion of lime-stone to lime,



the values of  $\Delta H^\circ$  and  $\Delta S^\circ$  are  $+179.1 \text{ kJ mol}^{-1}$  and  $160.2 \text{ J/K}$  respectively at 298 K and 1 bar.

Assuming that  $\Delta H^\circ$  do not change with temperature, temperature above which conversion of limestone to lime will be spontaneous is

- (1) 1008 K (2) 1200  
 (3) 845 K (4) 1118 K

Ans. (4)

Sol. We know,  $\Delta G = \Delta H - T\Delta S$

So, lets find the equilibrium temperature, i.e. at which

$$\Delta G = 0$$

$$\Delta H = T\Delta S$$

$$T = \frac{179.1 \times 1000}{160.2}$$

$$= 1118 \text{ K}$$

So, at temperature above this, the reaction will become spontaneous.

Hence, (4) is correct answer.