COMED K – CHEMISTRY – 2012

VERSION CODE: C

61. Which of the following is NOT a protein?

    a) Wool   b) Cellulose   c) Hair   d) Nail

Ans: (b)

   Because wool, hair and nail are proteins

62. Which of the following is NOT TRUE for the adsorption of a gas on a solid?

    a) Increase in temperature favours adsorption

    b) Enthalpy change is negative

    c) Adsorption is more specific

    d) Entropy change is negative

Ans: (a)

   Increase in temperature favours desorption

63. Peptisation is a process in which

    a) Precipitate becomes true soluiton

    b) True soluiton becomes a suspension

    c) a colloid gets coagulated

    d) a suspension gets converted into a colloid

Ans: (d)

   Peptisation is a method of preparation of colloids in which a freshly formed precipitate is stirred with a peptizing agent

64. The mole fraction of benzene in a soluiton containing 39% by mass in an organic solvent of molecular mass 122 is

    a) 0.5   b) 0.6   c) 0.4   d) 0.35

Ans: (b)

$$\text{Mole fraction} = \frac{h_b}{n_b + n_o} = \frac{61/78}{\frac{61}{78} + \frac{39}{122}} = 0.6$$

65. $Zn\ (s) + Cl_2\ (1\ atm) \rightarrow Zn^{2+} + 2Cl : E^0 = 2.0\ V$

    To increase the e.m.f. of the above cell

    a) $[Zn^{2+}]$ should be increased   b) $[Zn^{2+}]$ should be decreased

    c) $[Cl^-]$ should be increased   d) Partial pressure of Cl_2 should be decreased

Ans: (b)

$$E = E^o + \frac{0.059}{2} \log \frac{[Zn]}{[Zn^{2+}]}$$

   ∴ As $[Zn^{2+}]$ decreases E increases

66. Two ions A^- and B^- have radii 104 and 200 pm respectively, in a cubic close packed crystal of compound AB. The co-ordination number of A^+ is

    a) 4   b) 8   c) 6   d) 3

Ans: (c)

$$\text{Radius Ratio} = \frac{\gamma+}{\gamma-} = \frac{104}{200} = 0.52$$

   ∴ Coordination number is 6

1

67. The mass of a non-volatile solute of molar mass 60 gmol^{-1} that should be dissolved in 126 g of water to reduce its vapour pressure to 99% will be

a) 2.8 g   b) 5.6 g   c) 8.4 g   d) 4.2 g

Ans: (d)

$$\frac{P^o - P}{P^o} = \frac{W_2}{M_2} \frac{M_1}{W_1}$$

$$\frac{1}{100} = \frac{W_2 \times 18}{60 \times 126}$$

$$\text{or } W_2 = \frac{60 \times 126}{18 \times 100} = 4.2 \text{ g}$$

68. The P^H of boiling water is 6.4. This implies that boiling water is

a) Slightly basic   b) Slightly acidic   c) Neutral   d) Amphoteric

Ans: (a)

When boiled [H$^+$] decreases

∴ pH increases

∴ slightly basic

69. The spin only magnetic moment of Ni^{2+} (in B.M.) in aquesous solution will be

a) 1.73   b) 2.84   c) 3.42   d) 2.25

Ans: (b)

Ni^{2+} : 3d^8. It has 2 unpaired electrons

$$\mu = \sqrt{n(n+2)} = \sqrt{2(2+2)} = \sqrt{8} = 2.82$$

70. An organic compound which produces a bluish green flame when heated on a copper wire is

a) Benzaldehyde   b) Aniline   c) Chlorobenzene   d) Benzoic acid

Ans: (c)

This is called Beilstein's test and this test is used to defed the presence of halogen in an organic compound.

71. Phenol can be distinguished from Ethyl alcohol using

a) Na   b) AlCl$_3$ c) NaOH   d) FeCl$_3$

Ans: (d)

Phenol with FeCl$_3$ gives violet colour but not ethyl alcohol

72. The time required for 100% completion of zero order reaction is

a) $\dfrac{a}{k}$ b) $\dfrac{a}{2k}$ c) $\dfrac{2a}{k}$ d) $\dfrac{k}{a}$

Ans: (a)

For a zero order reaction

$$\text{Rate} = \frac{dx}{dt} = k$$

$$\text{Or } dt = \frac{dx}{k} = \frac{a}{k}$$

73. The E.A.N. of central metal atom in [Co (NH$_3$)$_6$] Cl$_3$ is [At. No. of Co = 27]

a) 34   b) 35   c) 36   d) 32

Ans: (c)

E.A.N = 27 − 3 + 12 = 36

74. The alcohol obtained during the hydrolysis of ground nut oil is

a) Glycol   b) Butan−1 −ol   c) Pentan-2-ol   d) Propane 1.2.3 − triol

Ans: (d)

Oils and fats on hydrolysis given glycerol (propane, 1, 2, 3-triol) and fatty acids

2

75. Which one of the following ores is concentrated by froth floatation process?

a) Magnesite   b) Magnetitc   c) Galena   d) Malachite

Ans: (c)

Froth floatation method is used to concentrate sulphide ores.

Galena is PbS

76. Which of the following electron transitions in the H-atom will release the largest amount of energy?

a) n = 3 to n = 2   b) n = 2 to n = 1   c) n = 5 to n = 2   d) n = 6 to n = 2

Ans: (b)

$E = h\gamma = \dfrac{hc}{\lambda}$

Or $E \propto \dfrac{1}{\lambda}$

77. An electron having spin quantum number of s = $\dfrac{-1}{2}$ and magnetic quantum number m = + 3 can be present in

a) both s-orbital and p-orbital   b) p-orbital only

c)) f-orbital only   d) both d-orbital and f-orbital

Ans: (c)

n = 4, ℓ = 3, m = +3, s = -½

∵ ℓ = 3 it is 'f' orbital

78. The atomic number of the element with highest ionization energy among the following is

a) z = 16   b) z = 14   c) z = 13   d) z = 15

Ans: (d)

z = 15

∴ $1s^2 . 2s^2 . 2p^6 . 3s^2 . 3p^3$

∵ 3p orbital is ½ filled it is stable

79. Number of atoms in 560 cm^3 of oxygen at S.T.P. is

a) $\dfrac{1}{20}$ x 6.022 x 10^{23} b) $\dfrac{1}{40}$ x 6.022 x 10^{23}

c) $\dfrac{1}{16}$ x 6.022 x 10^{23} d) $\dfrac{1}{32}$ x 6.022 x 10^{23}

Ans: (a)

22,400 cm^3 $\xrightarrow{\text{at S.T.P}}$ 2 x 6.022 x 10^{23}

5,60 cm^3 $\longrightarrow$?

80. The volume of CO_2 (in cm^3) liberated at S.T.P. when 1.06 g of anhydrous Sodium carbonate is treated with excess of dilute HCl is [atomic mass of Na = 23]

a) 112   b) 224   c) 56   d) 2240

Ans: (b)

106 g $\xrightarrow{\text{at S.T.P}}$ 22400 cm^3

1.06 g $\longrightarrow$?

∴ volume liberated = $\dfrac{1.06 \times 22400}{106}$ = 224 cm^3

81. The oxidation number of oxygen is − 1 in

a) NO_2 b) PbO_2 c) Na_2O_2 d) MnO_2

Ans: (c)

Oxygen has -1 oxidation state in peroxides.

82. The heat of formation of H_2O (l) is – 286 KJ. The heat of formation of H_2O (g) is likely to be

   a) -286 KJ   b) + 286 KJ   c) -341 KJ   d) – 242.8 KJ

Ans: (d)

   H_2 (g) + $\frac{1}{2}O_2$ (g) $\rightarrow$ H_2O (g) ; ΔH = -242.8 kJ

   But H_2 (g) + $\frac{1}{2}O_2$ (g) $\rightarrow$ H_2O (ℓ); ΔH = -286 kJ
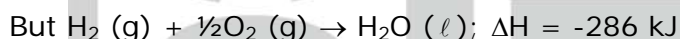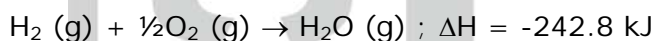
83. The temperature of one mole of an ideal gas increases from 298 K to 308 K when it absorbs 200 J of heat at constant volume. The change in the internal energy of the gas is

   a) 200 J   b) 140 J   c) – 200 J   c) – 140 J

Ans: (a)

   $\Delta q + \Delta w = \Delta u$ $\because \Delta u = 0$

   $\Delta q = \Delta w$

84. 100 ml of $\frac{N}{5}$ HCl was added to 1 gm of pure $CaCO_3$. What would remain after the reaction?

   a) 0.5 g of $CaCO_3$ b) neither $CaCO_3$ nor HCl

   c) 50 ml of HCl   d) 25 ml of HCl

Ans: (b)

   HCl $CaCO_3$

   $\dfrac{100 \times 0.2}{1000} = \dfrac{1-x}{50}$

   or x = 0

85. The R.M.S. velocity of CH_4, He and SO_2 are in the ratio of

   a) 16 : 4 : 64   b) 2 : 1 : 4   c) 2 : 4 : 1   d) 1 : 4 : 2

Ans: (c)

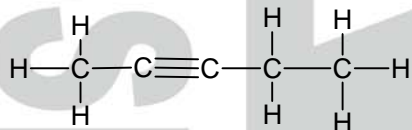 $r = \sqrt{\dfrac{3RT}{M}} = \sqrt{\dfrac{3RT}{16 \times 10^{-3}}} : \sqrt{\dfrac{3RT}{4 \times 10^{-3}}} : \sqrt{\dfrac{3RT}{64 \times 10^{-3}}}$ or 2 : 4 : 1

86. A negative catalyst will

   a) lower the activation energy of the reaction

   b) does not alter the activation energy of the reaction

   c) provide a new and easy path to the reaction

   d) increases the activation energy of the reaction
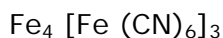
Ans: (d)

87. The number of Sigma and Pi bonds in pent-2-yne is

   a) 12 and 2   b) 11 and 2   c) 13 and 2   d) 12 and 3

Ans: (a)

88. In Lassigne's test for Nitrogen in an organic compound, the blue colouration is due to the formation of

   a) Ferro ferric cyanide   b) Ferric ferrocyanide

   c) Pot ferrocyanide   d) Pot ferrocyanide
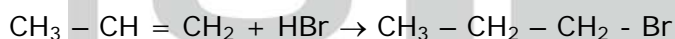
Ans: (b)

   $Fe_4 [Fe (CN)_6]_3$

4

89. The organic compound obtained during the addition of HBr to propene in the presence of peroxide catalyst is

    a) 2 – bromopropane   b) 2 – bromopopene

    c) 1 – bromopropane   d) 1 – bromopropene

Ans: (c)

Kharasch effect

$CH_3 - CH = CH_2 + HBr \rightarrow CH_3 - CH_2 - CH_2 - Br$

90. On passing H_2S into a solution containing both Zn^{2-} and Cu^{2-} in acidic medium, only CuS gets precipitated. This is because

    a) K_{sp} of CuS < K_{sp} of ZnS   b) K_{sp} of CuS = K_{sp} of ZnS

   c) K_{sp} of CuS > K_{sp} of ZnS   d) CuS is more stable then ZnS

Ans (a)

Since solubility product of CuS if less than that of ZnS, CuS gets precipitated

91. The volume of H_2 obtained at S.T.P. when Mg obtained by passing a current of 0.5 amp through molten $MgCl_2$ for 32.2 minutes is treated with excess of dilute HCl is approximately [Eq. Mass of Mg = 12]

    a) 56 cm^3 b) 28 cm^3 c) 5.6 cm^3 d) 112 cm^3

Ans: (d)

$Mg + 2HCl \rightarrow MgCl_2 + H_2 \uparrow$
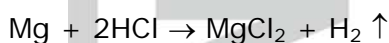
Strength of current (I) = 0.5 A

time (t) = 32.2 x 60

              = 1932.0 secs.

Quantity of current (Q) = It = 0.5 x 1932 = 966 c

96500 C of current at STP liberates 11200

At STP 966 C of current will liberates 112 cm^3

92. Markovni Kov's rule is applicable to

    a) $C_3H_6 + HBr$ b) $C_2H_4 + HCl$ c) $C_3H_6 + Cl_2$ d) $C_2H_4 + HBr$
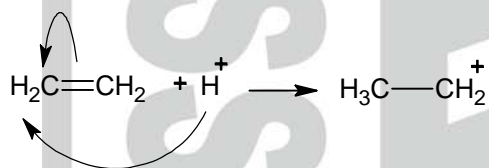
Ans: (a)

Propene is an example of unsymmetrical alkene, HBr is an example for unsymmetrical reagent.

93. The reaction of Ethene is the presence of H^+ can be example for

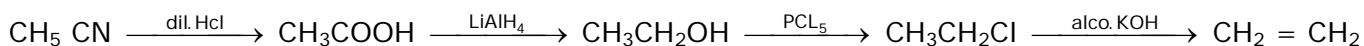   a) – I effect   b) + E effect   c) – E effect   d) + I effect

Ans: (b)

Complete transfer of multiple bonded electron takes place towards attacking reagent (electroplie)

94. $CH_3 - CN \xrightarrow{\text{dil. HCl}} A \xrightarrow{\text{LiAlH}_4} B \xrightarrow{\text{PCl}_5} C \xrightarrow{\text{Alc. KOH}} D$. The product 'D' in the above sequence of reactions is

    a) Acetaldehyde   b) Ethyne   c) Ethene   d) Acetyl Chloride

Ans: (c)

$CH_5 CN \xrightarrow{\text{dil. Hcl}} CH_3COOH \xrightarrow{\text{LiAlH}_4} CH_3CH_2OH \xrightarrow{\text{PCL}_5} CH_3CH_2Cl \xrightarrow{\text{alco. KOH}} CH_2 = CH_2$

95. An organic compound is optically active if it

    a) is planar   b) is super imposable on its mirror image

    c) contains chiral centres   d) is non-super imposable on its mirror image

Ans: (d)

Conditions for optical isomerism

1) compound should be asymmetric is it should not contain plane of symmetry (mirror image is not super imposable)

96. Identify the electrophile in the following

    a) R-NH$_2$ b) NH$_3$ c) AlCl$_3$ d) CN$_6$

Ans: (c)

AlCl$_3$ is an example for Liwis acid, it can accept a pair of electrons.

97. The ionization constant of Phenol is more than that of Ethanol because

    a) Phenoxide ion is a stronger base than Ethoxide ion

    b) Phenoxide ion is stabilized by resonance

    c) Ethoxide ion is stabilized by resonance

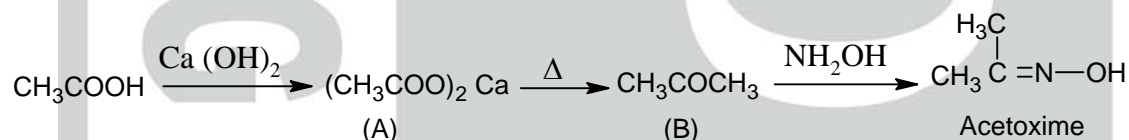   d) Phenoxide ion is Aromatic while ehoxide ion is aliphatic

Ans: (b)

Ionization constant (Ka) of phenal is more than that of ethanol indicates phenol is move acidic than alcohol. Phenol on ionization gives phenaxide ion it is stabilized by resonance.

98. The product 'C' in the following sequence of chemical reaction is

$$CH3 - COOH \xrightarrow{Ca(OH)_2} . A \xrightarrow{heat} B \xrightarrow{NH_2OH} C$$

    a) Acetaldoxime   b) Formaldoxime   c) Ethane nitrile   d) Acetoxime

Ans: (d)

$$CH_3COOH \xrightarrow{Ca(OH)_2} \underset{(A)}{(CH_3COO)_2 Ca} \xrightarrow{\Delta} \underset{(B)}{CH_3COCH_3} \xrightarrow{NH_2OH} \underset{Acetoxime}{\overset{H_3C}{\underset{CH_3}{\overset{|}{C}}} =N-OH}$$

Acetic acid reacts with calcium hydroxide to give calcium acetate. Calcium acetate on dry distillation gives acetone. Acetone undergoes condensation reaction with hydroxylamine to form acetoxime.

99. Which of the following statements is NOT TRUE?

    a) Acetic acid is stronger than chloro acetic acid

    b) Formic acid is the strongest of all aliphatic monocarboxylic acids

    c) Benzoic acid is stronger acid than acetic acid
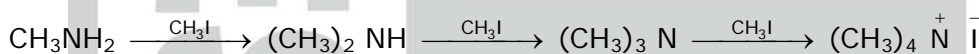
    d) Propanoic acid is weaker than acetic acid

Ans: (a)

In chloro acetic acid, due to the presence of chloro group (- I effect) stabilization of carboxylation ion increases. Hence it is more acidic than acetic acid.

100. Maximum number of molecules of methyl iodide that can react with one molecule of methyl amine is

    a) 4   b) 3   c) 2   d) 1

Ans: (b)

$$CH_3NH_2 \xrightarrow{CH_3I} (CH_3)_2 NH \xrightarrow{CH_3I} (CH_3)_3 N \xrightarrow{CH_3I} (CH_3)_4 \overset{+}{N} \overset{-}{I}$$

101. The amine which will NOT liberate nitrogen with nitrous acid is

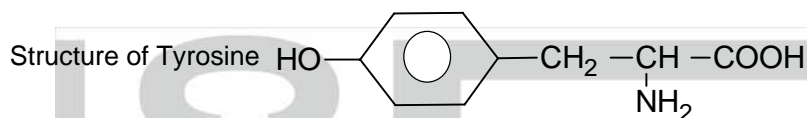   a) Ethyl amine   b) Methyl amine   c) Dimethyl amine   d) 2-amino propane

Ans: (c)

(CH$_3$)$_2$ NH is an example for secondary amine. Secondary amines reacts with nitrous acid to give yellow solution of nitroso amine without liberating nitrogen.

102. Which of the following is aromatic?

    a) Lysine   b) Proline   c) Serine   d) Tyrosine

Ans: (d)

Structure of Tyrosine $HO-\langle \bigcirc \rangle-CH_2-CH-COOH$
                                                    $\underset{NH_2}{|}$

103. The mass of hydrogen in gm required to completely saturate 1 mole of triolein is

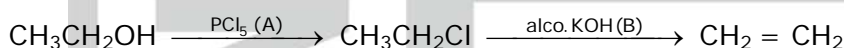a) 6   b) 3   c) 2   d) 9

Ans: (a)

One mole of triolein contains three double bonds. Hence during hydrogenation it adds three moles of hydrogen.

One mole of hydrogen = 2g

∴ Three moles of hydrogen = 6g

104. $CH_3 - CH_2 - OH \xrightarrow{A} CH_3 - CH_2 - Cl \xrightarrow{B} CH_2 = CH_2$ A and B in this sequence of reactions are

a) KOH (aq) and PCl_5 b) PCl_5 and KOH (aq)

c) Cl_2 and KOH (alc)   d) PCl_5 and KOH (alc)

Ans: (d)

$CH_3CH_2OH \xrightarrow{PCl_5 \, (A)} CH_3CH_2Cl \xrightarrow{alco.KOH(B)} CH_2 = CH_2$

Ethanol reacts with PCl_5 to give ethyl chloride. Ethyl chloride on heating with alcoholic potash undergoes dehycho halogenation to give ethene.

105. The enthalpy of Neutralisation of HCl and NaOH is x KJ. The heat evolved when 500 ml of 2N HCl is mixed with 250 ml of 4 N NaOH will be

a) x   b) $\frac{x}{2}$ c) $\frac{x}{4}$ d) $\frac{2x}{3}$

Ans: (a)

No. Of gram equivalents HCl = $\frac{500 \times 2}{1000}$ = 1

No. Of gram equivalents of NaOH = $\frac{250 \times 4}{1000}$ = 1

Enthalpy change of a reaction when 1 gram equivalents of acid is netralised by one gram equivalents of acid is neutralized by one gram equivalents of base is called heat of neutralisation

106. $A + B \rightleftharpoons C + D$

The initial concentrations of A and B are equal. At equilibrium, the concentration of C is twice that of A. The equilibrium constant of the reaction is

a) $\frac{9}{4}$ b) 4   c) $\frac{1}{9}$ d) $\frac{4}{9}$

Ans: (b)

$$A + B \rightleftharpoons C + D$$
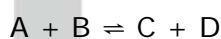
Equilibrium concentration   1   1   2   2

∴ K = $\frac{[C][D]}{[A][B]} = \frac{2 \times 2}{1 \times 1}$ = 4

107. For dissociation of lime stone is the slag zone of the blast furnace. The reaction is:

a) Exothermic accompanied by increase in entropy

b) Endothermic accompanied by decrease in entropy

c) Endothermic accompanied by increase in entropy

d) Exothermic with no change in entropy

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Ans: (c)

$CaCO_{3(s)} \rightarrow CaO_{(s)} + CO_{2(g)}$ $\Delta H = '+' Q$ KJ

Heat is absorbed for the decomposition, entropy increases during the reaction.

108. Which of the following is NOT TRUE for concentrated H_2SO_4?

    a) Sulphonating agent

    b) Oxidising agent

    c) Dehydratign agent

    d) Deliquiscent in nature

Ans: (d)

Sulphuric acid is hygroscopic in nature, it absorbs atmospheric moisture without changing physical state.

109. Which of the following noble gases has the highest Vander Waal's force of attraction?

    a) Ar   b) Ne   c) Xe   d) He

Ans: (c)

Vander waal's force of attraction increases down the group. Ease of lique faction increases down the group.

110. Which one of the following metal ions is coloured?

    a) Ti^{1+} b) Cu^+ c) V^{4+} d) Zn^{2+}

Ans: (b)

Atomic number of Vanadium is 23

Electronic configuration = [Ar] $4s^2$ $3d^3$

Electronic configuration of V^{+4} = [Ar] $3d^1$, it contain one unpaired electron hence it is coloured.

111. Co-ordination number of Nickel in [Ni $(C_2O_4)_3]^{4-}$ is

    a) 3   b) 12   c) 6   d) 4

Ans: (c)

Oxalate is an example for bidentate ligand three oxalate ligands forms six coordinate bonds around the Ni^{+2} ion hence coordination number is six.

112. IUPAC name of [Cr Cl_2 $(NH_3)_4$] NO_3 is

    a) tetraamminedichloro Chromium (I) nitrate b) dichloro tetraammine Chromium (III) nitrate

    c) tetraammine dichlorochromium (IV) nitrate d) tetraammine dichloro Chromium (III) nitrate

Ans: (d)

[Cr Cl_2 $(NH_3)_4$] NO_3

tetra ammine dichloro chromium (III) nitrate

113. Decomposition of NH_3 on the surface of platinum has a rate constant of 2.5 x 10^{-4} moldm^{-3} S^{-1} at 350 K. The order of the reaction is

    a) 0   b) 1   c) $\frac{1}{2}$ d) 2

Ans: (a)

Unit of rate constant of nth order (k) = (mol/dm^3)$^{1-n}$ sec^{-1}.

For zero order n = 0

$\therefore$ k = mol/dm^3 sec^{-1}

114. The rate equation of a gaseous reaction is given by : r = K [A] [B]. If the volume of the reaction vessel is suddenly reduced to $\frac{1}{2}$ of the initial volume, the reaction rate relating to the original rate will be

    a) $\frac{1}{4}$ b) 4   c) $\frac{1}{2}$ d) 2

    Ans: (b)

    If the volume of the vessel is reduced to $\frac{1}{2}$ of the initial volume, concentration of the reactants doubles.

    V = k (2) (2) $\Rightarrow$ V = 4k

115. The reduction potential of an electrode can be increased by

    a) increasing the area of the electrode   b) decreasing the temperature

    c) increasing the temperature   d) decreasing the concentration of metal ions

Ans: (c)

116. An electric current is passed through silver and water voltameters connected in series. The cathode of the silver voltameter weighed 0.05 g more at the end of electrolysis. The volume of O_2 evolved at the anode of water voltameter is

    a) 5.6 cm^3 b) 11.2 cm^3 c) 22.4 cm^3 d) 2.8 cm^3

Ans: (d)

$\dfrac{W_{Ag}}{W_{O_2}} = \dfrac{E_{Ag}}{E_{O_2}}$ According faradays IInd law

$\dfrac{0.054}{W_{O_2}} = \dfrac{108}{8}$

$W_{O_2} = \dfrac{0.054 \times 8}{108} = 4 \times 10^{-3}$ g

8g of oxygen at STP liberates 5600 cm^3

$\therefore$ 4 x 10^{-3} g of oxygen will liberates $= \dfrac{4 \times 10^{-3} \times 5600}{8} = 2.8$ cm^3

117. The P^H of a mixture of 10 ml of 0.1 M H_2SO_4. 5 ml of 0.2 N HCl and 5 ml of 0.1 M Ca $(OH)_2$ is

    a) 1   b) 0.5   c) 0   d) 1.5

Ans: (a)
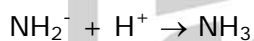
Mixture is acidic

$[H^+]$ left after neutralization

$[H^+] = \dfrac{10 \times 0.1 \times 2}{20} = 20.1$

pH = 1

118. The conjugate acid of NH_2^- is

    a) NH_4^+ b) NH_3 c) NH_2OH d) NH^-

Ans: (b)

Conjugate acid is got by adding H^+ ion

$NH_2^- + H^+ \rightarrow NH_3$

119. Phenyl isocyanide is formed when chloroform is treated with alcoholic potassium hydroxide and

    a) Benzaldehyde   b) Aniline   c) Phenol   d) Nitrobenzene

Ans: (b)

Carbylamine reaction: $C_6H_5 NH_2 + CHCl_3 + 3KOH \rightarrow C_6H_5NC + 3KCl + 3H_2O$

120. Which of the following does not undergo aldol condensation reaction?

    a) $CH_3 - CHO$ b) $ClCH_2 - CHO$ c) $C_6H_5 - CHO$ d) $CHCl_2 - CHO$

Ans: (c)

Aldol condensation is a characteristic reaction of aldehyde having α - hydrogen atom. Bezaldehyde do not containg α - hydrogen atom