Be Ahead with Sustained Excellence

CET - 2010

Question paper with Solutions

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CET - 2010 Chemistry

(Version – D1)

Question paper with keys & Solution

60 Questions
60 Marks
Duration: 70 Minutes

1. In chromite ore, the oxidation number of iron and chromium are respectively _____

   (1) +3, +6 (2) +3, +2 (3) +2, +3 (4) +2, +6

   Ans (3)

   Chromite ore : $FeO.Cr_2O_3$

   Oxidation state Fe is +2 and Cr is +3

2. For the reversible reaction

   $A_{(s)} + B_{(g)} \rightleftharpoons C_{(g)} + D_{(g)} : \Delta G° = -350$ kJ.

   Which one of the following statements is true?

   (1) Equilibrium constant is greater than one.

   (2) The entropy change is negative.

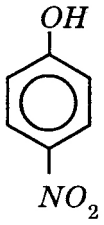
   (3) The reaction is thermodynamically not feasible.

   (4) The reaction should be instantaneous.

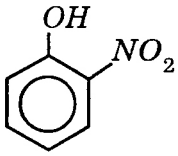
   Ans (1)

   $\Delta G°$ is a large negative quantity. Hence equilibrium constant should be very large.

3. Out of the below two compounds, the vapour pressure of (B) at a particular temperature is_____



(A)



(B)

   (1) lower than that of (A)

   (2) higher than that of (A)

   (3) same as that of (A)

   (4) higher or lower than (A), depending on the size of the vessel.

   Ans (2)

   In ortho-nitrophenol (B) there exists intra-molecular H-bonding. This prevents the association between the molecules of ortho-nitrophenol. Hence it is more volatile. Therefore, its vapour pressure is greater than that of (A) at a particular temperature.

4. The amount of heat evolved when 500 cm^3 of 0.1 M HC1 is mixed with 200 cm^3 of 02 M NaOH is_____

(1) 1.292 kJ (2) 2.292 kJ (3) 3.392 kJ (4) 0.292 kJ

Ans (2)

1000 cm^3 of 1 N NaOH liberates 57.3 kJ of heat on neutralization

$\therefore$ 200 cm^3 of 0.2 NaOH liberates, $\frac{57.3\times200\times0.2}{1000\times1} = 2.292$ kJ of heat

5. During the adsorption of krypton on activated charcoal at low temperature,_____

(1) $\Delta H < 0$ and $\Delta S < 0$ (2) $\Delta H > 0$ and $\Delta S < 0$

(3) $\Delta H < 0$ and $\Delta S > 0$ (4) $\Delta H > 0$ and $\Delta S > 0$

Ans (1)

Physisorption is exothermic i.e., $\Delta H < 0$ and entropy decreases i.e., $\Delta S < 0$.

6. Time required for 100 percent completion of a zero order reaction is_____

(1) $\frac{a}{2k}$ (2) $\frac{2k}{a}$ (3) ak (4) $\frac{a}{k}$

Ans (4)

For a zero order reaction, $\frac{dx}{dt} = k.[A]^\circ$; $dx = kdt$ or $x = kt + c$

when x = 0, t = 0, then x = kt.

when the reaction is 100% complete, then x = a

$\therefore\ a = kt$ or $t = \frac{a}{k}$.

7. 0.023 g of sodium metal is reacted with 100 cm^3 of water. The pH of the resulting solution is_____

(1) 11 (2) 10 (3) 12 (4) 9

Ans (3)

$2Na + 2H_2O \rightarrow 2NaOH + H_2$

23 g of Na reacts with water to given 40 g of NaOH

$\therefore$ 0.023 of Na reacts with water gives = 0.04 g of NaOH.

0.04 g of NaOH is present in 100 cm^3 of its solution.

Normality of NaOH = $\frac{W}{E} = \frac{0.04\times10}{40} = 0.01$

$\therefore$ $[OH^-]$ = 0.01 mol dm^{-3} ; pOH = 2 ; pH = 14 – 2 = 12.

8. Which one of the following is wrongly matched?

(1) $[Ni(CO)_4]$ — neutral ligand (2) $[Cu(NH_3)_4]^{+2}$ — square planar

(3) $[Co(en)_3]^{+3}$ — follows EAN rule (4) $[Fe(CN)_6]^{-3}$ — sp^3d^2

Ans (4)

Fe in the complex $[Fe(CN)_6]^{-3}$ is d^2sp^3 hybridised.

9. Which one of the following conformations of cyclohexane is the least stable?

(1) Boat (2) Half-chair (3) Chair (4) Twisted-boat

Ans (1)

10. Which one of the following is a molecular crystal?
(1) Quartz (2) Rock salt (3) Diamond (4) Dry ice

Ans (4)

11. Carbon can reduce ferric oxide to iron at a temperature above 983 K because
(1) carbon has a higher affinity towards oxidation than iron.
(2) carbon monoxide formed is thermodynamically less stable than ferric oxide.
(3) iron has a higher affinity towards oxygen than carbon.
(4) free energy change for the formation of carbon dioxide is less negative than that for ferric oxide.

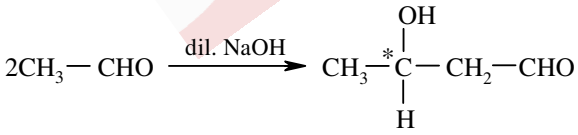
Ans (1)

12. An oxygen containing organic compound upon oxidation forms a carboxylic acid as the only organic product with its molecular mass higher by 14 units. The organic compound is_____
(1) a primary alcohol (2) an aldehyde
(3) a ketone (4) a secondary alcohol

Ans (1)

13. The compound obtained when acetaldehyde reacts with dilute aqueous sodium hydroxide exhibits_____
(1) optical isomerism (2) geometric isomerism
(3) both optical and geometric isomerism (4) neither optical nor geometric isomerism

Ans (1)
Acetaldeyde reacts with dilute NaOH to form acetaldol, which contains a stereogenic center. Hence it is optically active.



14. The activation energy for a reaction at the temperature T K was found to be 2.303 RT J mol^{-1}. The ratio of the rate constant to Arrhenius factor is_____
(1) 10^{-2} (2) 10^{-1} (3) 2×10^{-2} (4) 2×10^{-3}

Ans (2)

$k = Ae^{-Ea/RT}$

$E_a = 2.303\ RT$

$\therefore \frac{k}{A} = e^{-\left(\frac{2.303\ RT}{RT}\right)}$; $\frac{k}{A} = e^{-2.303}$

$\log_e\left(\frac{k}{A}\right) = \log_e e^{-2.303}$

$\log_e\left(\frac{k}{A}\right) = -2.303$ or $2.303\ \log_{10}\left(\frac{k}{A}\right) = -2.303$

$\log\left(\frac{k}{A}\right) = -1$; $\log\left(\frac{A}{k}\right) = 1$

$\therefore \frac{A}{k} = \text{anti}\log 1 = 10$ or $\frac{k}{A} = \frac{1}{10} = 10^{-1}$

15. A dibromo derivative of an alkane reacts with sodium metal to form an alicyclic hydrocarbon. The derivative is

(1) 2, 2-dibromobutane (2) 1, 1-dibromopropane

(3) 1, 4-dibromobutane (4) 1, 2-dibromoethane

Ans (3)

1, 4-dibromobutane reacts with sodium metal to give cyclobutane.

16. The set of quantum numbers for the outermost electron for copper in its ground state is

(1) 3, 2, 2, +½ (2) 4, 1, 1, +½ (3) 4, 2, 2, +½ (4) 4, 0, 0, +½

Ans (4)

$Cu^{29} : 4s^1 \left[n = 4,\ l = 0,\ m = 0,\ s = +\frac{1}{2} \right]$

17. Peroxide ion_____

(a) is diamagnetic.

(b) has five completely filled antibonding molecular orbitals.

(c) is isoelectronic with neon.

(d) has bond order one.

Which one of these is correct?

(1) (a), (b) and (d) (2) (d) and (c)

(3) (a) and (d) (4) (a), (b) and (c)

Ans (3)

O_2 molecule contains two unpaired electrons $\left(\pi^* 2p_x^1 = \pi^* 2p_y^1\right)$

$O_2 + 2e \rightarrow O_2^{2-}$ (peroxide ion $\Rightarrow \pi^* 2p_x^2 = \pi^* 2py^2$)

O_2^{2-} has no unpaired electrons. Hence, diamagnetic

It has four completely filled antibonding MOs, $\sigma^* 1s^2$ $\sigma^* 2s^2$ $(\pi^* 2px^2 = \pi^* 2p_y^2)$

Bond order = $\frac{10-8}{2} = 1$

18. Which one of these is NOT true for benzene?

(1) There are three carbon-carbon single bonds and three carbon-carbon double bonds.

(2) It forms only one type of monosubstituted product.

(3) The bond angle between the carbon-carbon bonds is 120°.

(4) The heat of hydrogenation of benzene is less than the theoretical value.

Ans (1)

19. A mixture of $CaCl_2$ and NaCl weighing 4.44 g is treated with sodium carbonate solution to precipitate all the Ca^{+2} ions as calcium carbonate. The calcium carbonate so obtained is heated strongly to get 0.56 g of CaO. The percentage of NaC1 in the mixture (atomic mass of Ca = 40) is_____

(1) 30.6 (2) 75 (3) 69.4 (4) 25

Ans (2)

$\underset{111g}{CaCl_2} + Na_2CO_3 \rightarrow \underset{100g}{CaCO_3} + \underset{117\ g}{2NaCl}$

$$\underset{111g}{CaCl_2} \rightarrow \underset{100g}{CaCO_3} \rightarrow \underset{56\ g}{CaO} + \underset{44\,g}{CO_2}$$

1.11g 1g 0.56

Mass of $CaCl_2$ + NaCl in the mixture = 4.44

Mass of $CaCl_2$ in the mixture = 1.11

$\therefore$ Mass of NaCl in the mixture = 3.33

Percentage of NaCl in the mixture = $\frac{3.33}{4.44} \times 100 = 75$

20. For one mole of an ideal gas, increasing the temperature from 10°C to 20 °C

(1) increases the rms velocity by $\sqrt{2}$ times.

(2) increases the average kinetic energy by two times.

(3) increases both the average kinetic energy and rms velocity, but not significantly

(4) increases the rms velocity by two times.

Ans (3)

$$C_1 = \sqrt{\frac{3RT_1}{M}}\ ;\ C_2 = \sqrt{\frac{3RT_2}{M}}\ ;\ \frac{C_1}{C_2} = \sqrt{\frac{T_1}{T_2}} = \sqrt{\frac{283}{293}} = 0.98$$

$\therefore C_1 = 0.98 \times C_2$

$$\text{KE at } 298\text{ K} = \frac{3}{2} \times R \times 283 = 424.5R\ ;\ \text{KE at } 293\text{ K} = \frac{3}{2} \times R \times 293 = 439.5\ R$$

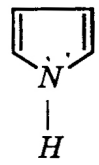
21. A buffer solution contains 0.1 mole of sodium acetate dissolved in 1000 cm^3 of 0.1 M acetic acid. To the above buffer solution, 0.1 mole of sodium acetate is further added and dissolved. The pH of the resulting buffer is equal to_____

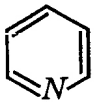
(1) pK_a (2) $pK_a - \log 2$ (3) $pK_a + \log 2$ (4) $pK_a + 2$

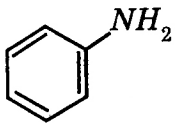
Ans (3)

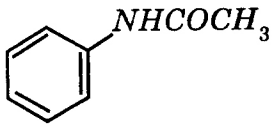
$$pH = pK_a + \log \frac{0.2}{0.1}\ ;\ pH = pK_a + \log 2$$

22. Which one of the following has the most nucleophilic nitrogen?

(1) 

(2) 

(3) 

(4) 

Ans (2)

N-atom being more electronegative attracts the delocalized electrons towards itself. Hence around N-atom, electron density is greater.

23. Chloroacetic acid is a stronger acid than acetic acid. This can be explained using _____

(1) –I effect (2) –M effect (3) +1 effect (4) +M effect

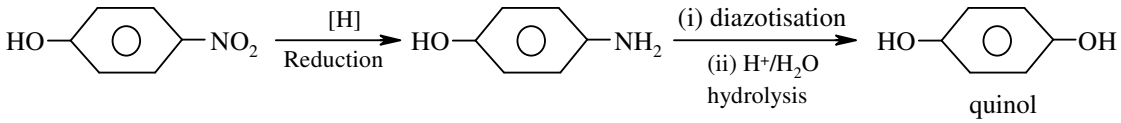
Ans (1)

24. The correct sequence of reactions to convert p-nitrophenol into quinol involves

(1) hydrolysis, diazotization and reduction (2) reduction, diazotization and hydrolysis

(3) diazotization, reduction and hydrolysis (4) hydrolysis, reduction and diazotization

Ans (2)



25. $CH_3CH_2Br \xrightarrow[\Delta]{Aq\,KOH} A \xrightarrow[\Delta]{KMnO_4/H^+} B \xrightarrow[\Delta]{NH_3} C \xrightarrow[alkali]{Br_2} D$; "D" is

(1) CH_3CONH_2 (2) CH_3Br (3) $CHBr_3$ (4) CH_3NH_2

Ans (4)

26. In the electrolytic refining of Zinc, _____

(1) the impure metal is at the cathode. (2) graphite is at the anode.

(3) acidified zinc sulphate is the electrolyte. (4) the metal ion gets reduced at the anode.

Ans (3)

27. The wave number of the spectral line in the emission spectrum of hydrogen will be equal to $\frac{8}{9}$ times the Rydberg's constant if the electron jumps from _____

(1) n = 10 to n = 1 (2) n = 3 to n = 1 (3) n = 2 to n = 1 (4) n = 9 to n = 1

Ans (2)

$$\bar{\nu} = R\left[\frac{1}{n_1^2} - \frac{1}{n_2^2}\right]; \frac{8}{9}R = R\left[\frac{1}{1^2} - \frac{1}{n_2^2}\right]$$

$$1 - \frac{1}{n_2^2} = \frac{8}{9}; -\frac{1}{n_2^2} = \frac{8}{9} - 1 = \frac{8-9}{9} = -\frac{1}{9}$$

$$-\frac{1}{n_2^2} = -\frac{1}{9}; \; n_2^2 = 9, \; n_2 = \sqrt{9} = 3$$

28. Consider the following gaseous equilibrium with equilibrium constants K_1 and K_2 respectively.

$SO_{2(g)} + \frac{1}{2}O_{2(g)} \rightleftharpoons SO_{3(g)}$

$2SO_{3(g)} \rightleftharpoons 2SO_{2(g)} + O_{2(g)}$

The equilibrium constants are related as _____

(1) $2K_1 = K_2^2$ (2) $K_1^2 = \frac{1}{K_2}$ (3) $K_2^2 = \frac{1}{K_1}$ (4) $K_2 = \frac{2}{K_1^2}$

Ans (3)

$$K_1 = \frac{[SO_3]}{[SO_2][O_2]^{\frac{1}{2}}} \; ; \; K_2 = \frac{[SO_2]^2[O_2]}{[SO_3]^2}$$

$$K_1 = \frac{1}{K_2^2} \quad \text{or} \quad K_2^2 = \frac{1}{K_1}$$

29. Enthalpy of vapourization of benzene is +35.3 kJ mol^{-1} at its boiling point of 80°C. The entropy change in the transition of the vapour to liquid at its boiling point [in JK mol^{-1}] is _____

(1) −100 (2) −441 (3) +100 (4) +441

Ans (3)

$$\Delta S = \frac{\Delta H}{T} = \frac{35{,}300 \text{ J mol}^{-1}}{353 \text{ K}} = +100 \text{ J K}^{-1} \text{ mol}^{-1}$$

30. Which one of the following conversions involve change in both hybridization and shape?

(1) $NH_3 \longrightarrow NH_4^+$ (2) $CH_4 \longrightarrow C_2H_6$

(3) $H_2O \longrightarrow H_3O^+$ (4) $BF_3 \longrightarrow BF_4^-$

Ans (4)

In BF_3 molecule, B-atom is sp^2 hybridised and geometry of the molecule is trigonal planar.

In BF_4^- ($BF_3 + F^- \rightarrow BF_4^-$), B-atom has four bonding pairs. Hence it is sp^3 hybridisided and BF_4^- is tetrahedral.

31. Generally, the first ionization energy increases along a period. But there are some exceptions. One which is NOT an exception is

(1) Na and Mg (2) N and O (3) Be and B (4) Mg and Al

Ans (4)

IE_1 of Mg is higher than that Na due to higher nuclear charge.

IE_1 of N is greater than of O due to extra stability of partially filled 2p orbitals.

IE_1 of Be is greater than of B due to greater stability of completely filled 2s orbital.

IE_1 of Al is lower than that of Mg since 3p electron is to be removed in Al, where as the 3s electron in Mg.

32. 50 cm^3 of 0.2 N HC*l* is titrated against 0.1 N NaOH solution. The titration is discontinued after adding 50 cm^3 of NaOH. The remaining titration is completed by adding 0.5 N KOH. The volume of KOH required for completing the titration is _____

(1) 10 cm^3 (2) 12 cm^3 (3) 10.5 cm^3 (4) 25 cm^3

Ans (1)

$$N_3 = \frac{(V_1N_1)_{HCl} - (V_2N_2)_{NaOH}}{(V_1 + V_2)} = \frac{50 \times 0.2 - 50 \times 0.1}{50 + 50} = \frac{10 - 5}{100} = 0.05$$

$V_3 = 100 \text{ cm}^3$, $N_4 = 0.5$; $V_4 = ?$

$$(V_3 \times N_3)_{HCl} = (V_4 \times N_4)_{KOH} \; ; \; V_4 = \frac{V_3 \times N_3}{N_4} = \frac{100 \times 0.05}{0.5} = 10 \text{ cm}^3$$

33. In which one of the following, does the given amount of chlorine exert the least pressure in a vessel of capacity 1 dm^3 at 273K?

(1) 0.071 g (2) 0.0355 g

(3) 0.02 mole (4) 6.023×10^{21} molecules

Ans (2)

0.0355 g of $Cl_2 = \frac{0.0355}{71} = 5\times10^{-4}$ mole of Cl_2 contains least number of molecules compared to the rest.

Hence, exerts least pressure.

34. Based on the first law of thermodynamics, which one of the following is correct?

(1) For an adiabatic process: $\Delta U = -w$ (2) For an isochoric process: $\Delta U = -q$

(3) For a cyclic process : $q = -w$ (4) For an isothermal process : $q = +w$

Ans (3)

According to I law, $\Delta U = q + w$

For an adiabatic process, $q = 0$, then $\Delta U = w$

For an isochoric process, $w = 0$, then $\Delta U = q$

For a cyclic process $\Delta U = 0$, $\therefore q = -w$

For an isothermal process $\Delta U = 0$, then $q = -w$

35. For alkali metals, which one of the following trends is INCORRECT?

(1) Ionization energy : Li > Na > K > Rb

(2) Hydration energy : Li > Na > K > Rb

(3) Atomic size : Li < Na < K < Rb

(4) Density : Li < Na < K < Rb

Ans (2)

Hydration energy is applicable for ions not for neutral atoms.

36. One gram of silver gets distributed between 10 cm^3 of molten zinc and 100 cm^3 of molten lead at 800°C. The percentage of silver in the zinc layer is approximately _____

(1) 91 (2) 89 (3) 94 (4) 97

Ans (4)

Silver is more soluble in molten zinc than in molten lead.

37. One mole of an organic compound 'A' with the formula C_3H_8O reacts completely with two moles of HI to form X and Y. When 'Y' is boiled with aqueous alkali forms Z. Z answers the iodoform test. The compound 'A' is _____

(1) Propan-1-ol (2) Propan-2-ol

(3) methoxyethane (4) ethoxyethane

Ans (3)

$$\underset{A}{CH_3-O-C_2H_5} \xrightarrow{X^S\ HI} \underset{X}{CH_3-I} + \underset{Y}{C_2H_5-I}$$

$$Y \xrightarrow{aq.\ alkali} C_2H_5-OH \xrightarrow{I_2\ /\ NaOH} CHI_3\ \text{(iodoform)}$$

38. The IUPAC name of K_2 [Ni $(CN)_4$] is_____

(1) Potassium tetracyanatonickelate (II)

(2) Potassium tetracyanonickelate (II)

(3) Potassium tetracyanockel (III)

(4) Potassium tetracyanatonickel (II)

Ans (2)

39. The spin only magnetic moment of Mn^{+4} ion is nearly

(1) 6 BM (2) 3 BM (3) 5 BM (6) 4 BM

Ans (4)

Mn^{4+} has four unpaired electrons ($3d^3$ $4s^0$)

$\mu = \sqrt{n(n+2)} = \sqrt{3(3+2)} = \sqrt{15} = 3.87 \sim 4$ BM

40. In Kjeldahl's method, ammonia from 5 g of food neutralizes 30 cm^3 of 0.1 N acid. The percentage of nitrogen in the food is

(1) 8.4 (2) 0.84 (3) 1.68 (4) 16.8

Ans (2)

$$\% \ N = \frac{(V \times N)_{acid}}{m_{OC}} \times 1.4 = \frac{30 \times 0.1}{5} \times 1.4 = 0.84$$

41. The correct sequence of steps involved in the mechanism of Cannizzaro's reaction is

(1) transfer of H^-, transfer of H^+ and nucleophilic attack

(2) nucleophilic attack, transfer of H^- and transfer of H^+

(3) electrophilic attack by OH^-, transfer of H^+ and transfer of H^-

(4) transfer of H^+, nucleophilic attack and transfer of H^-

Ans (2)

42. Which one of the following is an example for homogeneous catalysis?

(1) Manufacture of ammonia by Haber's process

(2) Manufacture of sulphuric acid by contact process

(3) Hydrogenation of oil

(4) Hydrolysis of sucrose in presence of dilute hydrochloric acid

Ans (4)

43. The empirical formula of a non-electrolyte is $C_1H_2O_1$. A solution containing 6 g of the compound exerts the same osmotic pressure as that of 0.05 M glucose solution at the same temperature The molecular formula of the compound is

(1) $C_3H_6O_3$ (2) $C_2H_4O_2$ (3) $C_4H_8O_4$ (4) $C_5H_{10}O_5$

Ans (3)

For isotonic solutions $\pi_1 = \pi_2$

$\therefore \ \frac{W_1}{M_1} = \frac{W_2}{M_2}$; Mass of glucose = $0.05 \times 180 = 9$g

$$\frac{9}{180}=\frac{6}{M_2}\ ;\ M_2=120$$

The formula of the compound with molar mass 120 is $C_4H_8O_4$.

44. A white crystalline salt A reacts with dilute HC1 to liberate a suffocating gas B and also forms a yellow precipitate. The gas B turns potassium dichromate acidified with dilute H_2SO_4 to a green coloured solution C. A, B and C are respectively
(1) $Na_2S_2O_3$, SO_2, $Cr_2(SO_4)_3$
(2) Na_2SO_3, SO_2, $Cr_2(SO_4)_3$
(3) Na_2SO_4, SO_2, $Cr_2(SO_4)_3$
(4) Na_2S, SO_2, $Cr_2(SO_4)$

Ans (1)
$Na_2S_2O_3 + 2HCl \rightarrow 2NaCl + S + SO_2 + H_2O$
$K_2Cr_2O_7 + H_2SO_4 + SO_2 \rightarrow Cr_2(SO_4)_3 \Rightarrow$ Green
A = $Na_2S_2O_3$, B = SO_2, C = $Cr_2(SO_4)_3$.

45. Molecules of a noble gas do not possess vibrational energy because a noble gas ...
(1) is chemically inert
(2) is monoatomic
(3) is diamagnetic
(4) has completely filled shells

Ans (2)

46. The letter 'D' in D-glucose signifies_____
(1) dextrorotatory
(2) configuration at all chiral carbons
(3) configuration at a particular chiral carbon
(4) that it is a monosaccharide

Ans (3)
Configuration refers to the last stereogenic carbon atom (C – 5).

47. Reaction of methyl bromide with aqueous sodium hydroxide involves _____
(1) S_N^1 mechanism
(2) racemisation
(3) S_N^2 mechanism
(4) inversion of configuration

Ans (3) & (4)

48. 9.65 C of electric current is passed through fused anhydrous magnesium chloride. The magnesium metal thus obtained is completely converted into a Grignard reagent. The number of moles of the Grignard reagent obtained is
(1) 1×10^{-4} (2) 5×10^{-4} (3) 1×10^{-5} (4) 5×10^{-5}

Ans (4)
Equivalent mass of Mg = 12
96500 C of current produces 12 g of Mg

$\therefore$ 9.65 C of current produces = $\frac{12\times 9.65}{96500} = 1.2\times 10^{-3}$ g of Mg

$R - X + Mg \rightarrow R - Mg - X$

No of moles of Mg = $\frac{1.2\times 10^{-3}\,g}{24} = 5\times 10^{-5}$

$\therefore$ 5×10^{-5} mol of Mg reacts with an alkyl halide to form 5×10^{-5} mol of Grignard reagent (R–Mg–X)

49. Which one of the following does NOT involve coagulation?

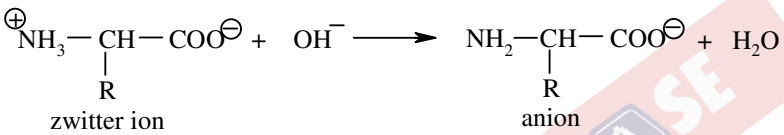
(1) Peptization
(2) Formation of delta regions
(3) Clotting of blood by the use of ferric chloride
(4) Treatment of drinking water by potash alum

Ans (1)

50. In alkaline medium, alanine exists predominantly as/in _____

(1) zwitterion (2) anion (3) covalent form (4) cation

Ans (2)



51. One dm^3 solution containing 10^{-5} moles each of Cl^- ions and CrO_4^{-2} ions is treated with 10^{-4} mole of silver nitrate. Which one of the following observations is made?

[K_{sp} $Ag_2CrO_4 = 4 \times 10^{-12}$]

[K_{sp} $AgCl = 1 \times 10^{-10}$]

(1) Silver chromate gets precipitated first.

(2) Precipitation does not occur.

(3) Both silver chromate and silver chloride start precipitating simultaneously.

(4) Silver chloride gets precipitated first.

Ans (4)

$[Ag^+]\,[Cl^-] = 10^{-4} \times 10^{-5} = 10^{-9} > K_{sp}$ of AgCl

AgCl gets precipitated since $[Ag^+]\,[Cl^-] > K_{sp}$ of AgCl.

$[Ag^+]^2[CrO_4^{2-}] = (10^{-4})^2(10^{-5}) = 10^{-13} < K_{sp}$ of Ag_2CrO_4

52. pH value of which one of the following is not equal to one?

(1) 0.05M H_2SO_4

(2) 0.1M HNO_3

(3) 50cm^3 of 0.4 M HCl + 50 cm^3 of 0.2 M NaOH

(4) 0.1M CH_3COOH

Ans (4)

53. E_1, E_2 and E_3 are the emf values of the three galvanic cells respectively.

(a) $Zn\left|Zn^{+2}_{1M}\right|\left|Cu^{+2}_{0.1M}\right|Cu$

(b) $Zn\left|Zn^{+2}_{1M}\right|\left|Cu^{+2}_{1M}\right|Cu$

(c) $Zn\left|Zn^{+2}_{0.1M}\right|\left|Cu^{+2}_{1M}\right|Cu$

Which one of the following is true?

(1) $E_3 > E_2 > E_1$ (2) $E_2 > E_3 > E_1$ (3) $E_1 > E_3 > E_2$ (4) $E_1 > E_2 > E_3$

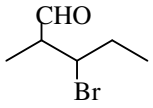
Ans (1)

$$E_{cell} = E^{o}_{cell} + \frac{0.0591}{n}\log\frac{[Cu^{2+}]}{[Zn^{2+}]}$$

(a) $E_{cell} : E^{o}_{cell} + \frac{0.0591}{2}\log\frac{0.1}{1} \Rightarrow E_{cell} = E^{o}_{cell} - 0.02955 \Rightarrow E_1$

(b) $E_{cell} : E^{o}_{cell} + \frac{0.0591}{2}\log\frac{1}{1} \Rightarrow E_{cell} = E^{o}_{cell} \Rightarrow E_2$

(c) $E_{cell} : E^{o}_{cell} + \frac{0.0591}{2}\log\frac{1}{0.1} \Rightarrow E_{cell} = E^{o}_{cell} + 0.02955 \Rightarrow E_3$ $\therefore E_3 > E_2 > E_1$

54. The IUPAC name of  is

(1) 3-bromo-2-methylbutanal (2) 2-methyl-3-bromohexanal

(3) 3-bromo-2-methylpentanal (4) 2-methyl -3-bromobutanal

Ans (3)

55. Which one of the following forms propanenitrile as the major product?

(1) Propyl bromide + alcoholic KCN

(2) Ethyl bromide + alcoholic KCN

(3) Ethyl bromide + alcoholic AgCN

(4) Propyl bromide + alcoholic AgCN

Ans (2)

$$CH_3CH_2Br + KCN \xrightarrow{\text{alcohol}} \underset{\text{propanenitrile}}{CH_3CH_2CN} + KBr$$

56. The standard emf of a galvanic cell involving 3 moles of electrons in its redox reaction is 0.59 V. The equilibrium constant for the reaction of the cell is

(1) 10^{20} (2) 10^{25} (3) 10^{30} (4) 10^{15}

Ans (3)

$\Delta G° = -nFE°$; $\Delta G° = -2.303\ RT \log K_p$

$$2.303\ RT \log K_p = nFE° \ ;\ \log K_p = \frac{nFE°}{2.303\ RT}$$

$$\therefore \log K_p = \frac{3\times 96500\times 0.59}{2.303\times 8.314\times 298} = 29.9 \sim 30.0$$

or $\log K_P = 30.0$, $K_p = \text{antilog } 30.0 = 1\times 10^{30}$

57. Benzaldehyde and acetone can be best distinguished using

(1) sodium hydroxide solution (2) Fehling's solution

(3) Tollens' reagent (4) 2, 4-DNPH

Ans (3)

58. Which one of the following statements is true?

(1) Drying of oil involves hydrolysis

(2) Saponification of oil yields a diol.

(3) Refining of oil involves hydrogenation

(4) Addition of antioxidant to oil minimizes rancidity

Ans (4)

59. The following data is obtained during the first order thermal decomposition of $2A_{(g)} \rightarrow B_{(g)} + C_{(s)}$, at constant volume and temperature.

Sr. No.	Time	Total pressure in Pascal
1.	At the end of 10 minutes	300
2.	After completion	200

The rate constant in min^{-1} is _____

(1) 6.93 (2) 0.0693 (3) 69.3 (4) 0.00693

Ans (2)

If the total pressure of gaseous substances after completion of the reaction were to be 200 Pa, then the initial total pressure should be 400 Pa according to the equation, 2A(g) → B(g) + C(s). After 10 minutes, the total pressure is 300 Pa implies, that the pressure of A is 200 Pa and that of B is 100 Pa. i.e., Half of A would have reacted in 10 minutes, which is $t_{\frac{1}{2}}$.

$\therefore$ Rate constant, $k = \frac{0.693}{t_{\frac{1}{2}}} = \frac{0.693}{10} = 0.0693 \text{ min}^{-1}$

60. Phenol $\xrightarrow{X}$ forms a tribromo derivative. "X' is _____

(1) bromine in water

(2) bromine in benzene

(3) bromine in carbon tetrachioride at 0 °C.

(4) potassium bromide solution

Ans (1)

* * *