CHEMISTRY
ANSWER KEY

SECTION A - 14 MARKS

Question 1

(A) (i) increases, decreases **[4×1]**

(ii) six, three

(iii) propane, Clemmensen's

(iv) $(n-1)d^{1-10}, ns^{1-2}$

(B) (i) (d) or Aniline < Ammonia < Methylamine **[7×1]**

(ii) (b) or Only P and R are correct

(iii) (b) or But-2-ene

(iv) (c) or Glycine

(v) (c) or $[Co(NH_3)_2(en)_2]^{3+}$

(vi) (a) or Both Assertion and Reason are true and Reason is the correct explanation of assertion.

(vii) (d) or Both Assertion and Reason are false.

(C) (i) $k = \frac{0.693}{t½}$ **[3×1]**

(ii) 9146·5 years

(iii) 90·03 minutes

SECTION B – 20 MARKS

Question 2 **[2]**

B is strong because on dilution $\wedge_m$ increases to a little extent.

Question 3 **[2]**

[A] $=C_6H_5CHO$ **[B]** $= C_6H_5CH_2OH$ **[C]** $= C_6H_5COONa$ **[D]** $= C_6H_6$

Question 4 **[2]**

Carry out Wurtz reaction twice

No, propane cannot be prepared in fairly pure state.

Question 5 **[2]**

Ea = 52897.78 J

Question 6 **[2]**

[A] = C_2H_5CN , on reduction gives primary amines.

[B] = C_2H_5NC , on reduction gives secondary amines.

Question 7 **[2]**

According to Valence Bond Theory (VBT) $[Ni(CN)_4]^{2-}$ is diamagnetic and square planar. Suhail's response was correct.

Question 8 **[2]**

[X] = $C_2H_5OC_2H_5$

$C_2H_5OC_2H_5 + 2HI \text{ ------} \rightarrow 2\ C_2H_5I + H_2O$

Question 9 **[2]**

(i) (a) [A] = C_6H_5COCl [B] = $C_6H_5COC_6H_5$

(b) [A] = CH_3COOH [B] = $CH_3COOC_2H_5$

OR

(ii) (a) [A] = $CH_3CH_2CH_2CHO$ [B] = $CH_3COCH_2CH_3$
[C] = $CH_3CH(CH_3)CHO$

(b) [B] will be least reactive towards addition of HCN

Question 10 **[2]**

E^0_{cell} = 1.52 V, E_{cell} = 1.5056 V, ΔG = -871742 Joules

Question 11 **[2]**

(i) Luca's reagent test

(ii) Bromine water test / Ferric Chloride test / Esterification test

SECTION C – 21 MARKS

Question 12 **[3]**

(i) [A] = $C_6H_5NH_2$ [B] = $C_6H_5N_2Cl$ [C] = $C_6H_5N = NC_6H_4NH_2$

(ii) [A] = CH_3CH_2Cl [B] = CH_3CH_2COOH [C] = $CH_3CH_2NH_2$

Question 13 **[3]**

(i) molecular mass [A] =32.5 [B] =113.79

(ii) [A] undergoes **Dissociation** while [B] undergoes **Association**

(iii) The given order of depression in freezing point is correct, as ΔT_f depends on the number of moles of solute.

Question 14 **[3]**

(i) $RCOCl + H_2 \xrightarrow{Pd/BaSO4,\ heat} RCHO + HCl$

(ii) $C_6H_5CHO + C_6H_5CHO \xrightarrow{KCN(alc)} C_6H_5CH(OH)COC_6H_5$

(iii) $C_6H_5CHO + (CH_3CO)_2O \xrightarrow[Heat]{CH_3COONa} C_6H_5CH=CHCOOH + CH_3COOH$

Question 15 **[3]**

(i) $[Fe(CN)_6]^{4-}$, hexacyanidoferrate(II)ion

$[Fe(CN)_6]^{3-}$, hexacyanidoferrate(III)ion

(ii) (a) $\Delta_0 > P$, low spin, strong field, $t_{2g}^4 eg^0$

(b) $\Delta_0 < P$, high spin, weak field, $t_{2g}^3 eg^1$

Question 16 **[3]**

(i) (a) Anode is Zn and graphite rod is cathode.

(b) Moist paste of $ZnCl_2$ and NH_4Cl.

(c) NH_4Cl paste in dry cell is acidic in nature and corrodes the Zn container.

OR

(ii) (a) The voltage drops to zero, as current will stop flowing in the circuit of the cell.

(b) No, zinc is placed above copper in electrochemical series.

(c) During discharge(use) of the battery H_2SO_4 is used up, as a result density decreases.

Question 17 **[3]**

(i) $NH_2CH_2COOH + NH_2CH(CH_3)COOH \longrightarrow NH_2CH_2[\mathbf{CONH}]CH(CH_3)COOH + H_2O$

Glycine alanine glycylalanine

(ii) β-D-2 deoxyribose sugar, the base residue A,G,C and T + phosphate.

(iii) Carbohydrates which are capable of reducing Tollen's reagent and Fehling's solution. For example, glucose and fructose.

Question 18 **[3]**

(i) Order with respect to [A] is 2 and with respect to [B] is 0.

(ii) Rate constant (k) = 4 X 10^{-2} mol^{-1} L sec^{-1}

(iii) Rate =1·6 × 10^{-3} mol L^{-1} sec^{-1}

SECTION D – 15 MARKS

Question 19 **[5]**

(i) (a) Equation required with proper catalyst and by product

Benzene ⟶ Benzene sulphonic acid ⟶ sodium benzene sulphonate ⟶ sodium phenoxide ⟶ phenol

(b) o-bromophenol and p- bromophenol is formed

(c) Violet/ purple colour solution is obtained

(d) 2,4,6 tri nitro phenol is formed

(e) Salicylaldehyde is formed

Question 20 **[5]**

(i) (a) Oxidation state of Mn changes from Mn^{+7} (purple) to Mn^{+2} (colourless).

(b) Due to the presence of unpaired electrons in d-orbital.

(c) Mn^{2+} has half filled d-orbitals (d^5)while Fe^{2+} had (d^6) configuration

(ii) (a) $2KMnO_4 + 8H_2SO_4 + 10FeSO_4 \rightarrow K_2SO_4 + 2MnSO_4 + 5Fe_2(SO_4)_3 + 8\ H_2O$

(b) $K_2Cr_2O_7 + 7H_2SO_4 + 6KI \rightarrow 4K_2SO_4 + Cr_2(SO_4)_3 + 3I_2 + 7H_2O$

Question 21 **[5]**

(i) (a) Definition of Isotonic solution.

(b) w = 6 gram of glucose

(c) π = 8.48 atm.

(d) False,it is hypotonic.

(e) Edema

OR

(ii) (a) Boiling point of Urea solution = 373.277 K

(b) Amount of Ethylene glycol = 800g

(c) Molality is not affected by change in temperature. Molarity of a solution decreases on increasing the temperature due to increase in volume.