BANGALORE SAHODAYA SCHOOLS COMPLEX ASSOCIATION

PRE-BOARD EXAMINATION (2023-2024)

SET – 1 –ANSWER KEY

Grade XII

Date: **Max. Marks: 70**

Subject: CHEMISTRY **Time: 3 Hours**

Section – A

1. c
2. d
3. c
4. c
5. c
6. c
7. b
8. a
9. d
10. a
11. b
12. b
13. c
14. d
15. a
16. d

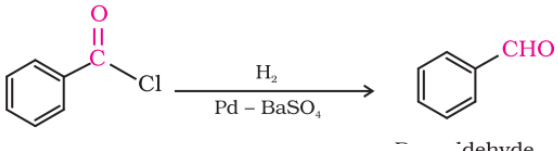
Section – B

17. Mass of solute -9.8 g
    Mass of solution – 100 g
    Density of solution – 1.02 g/ mL
    Volume of solution = Mass/ Density = 100/ 1.02 = 0.098 L
    No. of moles of solute, n = 9.8/ 98 = 0.1 mol
    Molarity = No. of moles of solute / Vol of solu in L
    0.1 mol / 0.098 L = 1.02 M

18. Zero order and derivation. (i) The reaction is of zero order.
    (ii) Slope of the curve = - k

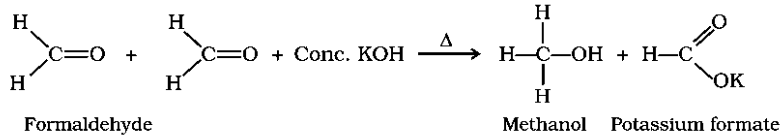
19. (i) $(C_6H_5)_3CBr$, $(C_6H_5)_2C(CH_3)Br$, $C_6H_5CH(CH_3)Br$ $C_6H_5CH_2Br$
    (i) Inversion + Retention (racemization)

20. Rosenmund's Reaction

    'dehyde

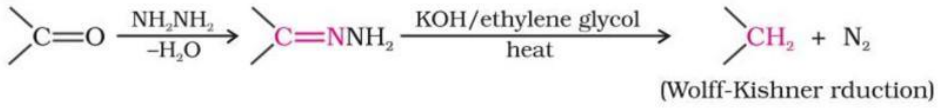
    Cannizzaro reaction

    Formaldehyde Methanol Potassium formate

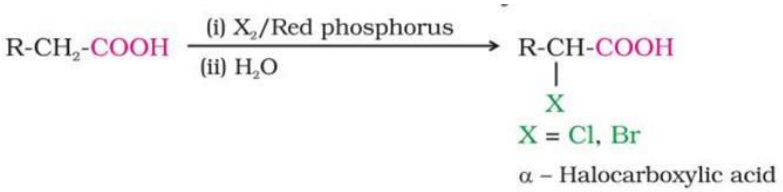
OR

(a) Wolff – Kishner reduction



(Wolff-Kishner rduction)

(b) HVZ reaction



α – Halocarboxylic acid

21.

Globular Proteins	Fibrous Proteins
In this the polypeptide chain are coiled together in a spherical shape.	In this two polypeptide chain run parallel to each other and are bonded to each other by disulphide bonds.
They are water soluble	They are water insoluble
Ex – Insulin, Albumin	Ex –Keratin , Myosin

Amylose	Amylopectin
It comprises of 15- 20 % of starch	It comprises of 80-85 % of starch
It is water soluble	It is water insoluble
It consists of linear chain polymers of alpha D glucose with C 1- C4 linkage	It consists of branched chain polymers with alpha D glucose with C1- C4 linkage and branching occurs at C1 – C6 glycosidic linkage .

SECTION –C

22. (a) $\wedge_m = \frac{K \times 1000}{M}$

$= \frac{8 \times 10^{-5} \times 1000}{0.00241}$

$= 33.2\ Scm^2/mol$

$\alpha = \frac{\wedge_m}{\wedge_m^\infty} = \frac{33.2}{390.5}$

$= 8.5\%$

(b) Kohlrausch law states that limiting molar conductivity of an electrolyte can be represented as the sum of the individual contributions of the anion and the cation of the electrolyte. In expression for the molar conductivity at infinite dilution.

23.

As per Arrhenius equation:

$$\ln \frac{k_2}{k_1} = -\frac{E_a}{2.303.R}\left(\frac{1}{T_2} - \frac{1}{T_1}\right)$$

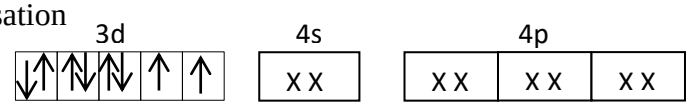
$$\frac{k_2}{k_1} = 2\ ; T_2 = 310K, T_1 = 300K$$

$$log(2) = \frac{-E_a}{2.303 \times 8.314}\left(\frac{1}{310} - \frac{1}{300}\right)$$

$$E_a = 53598\ J = 53.6\ kJ/mol$$

24. (i) $Ni^{2+} \rightarrow 3d^8\, 45^\circ$

sp^3 hybridisation

$[NiCl_4]^{2-} \rightarrow$ 

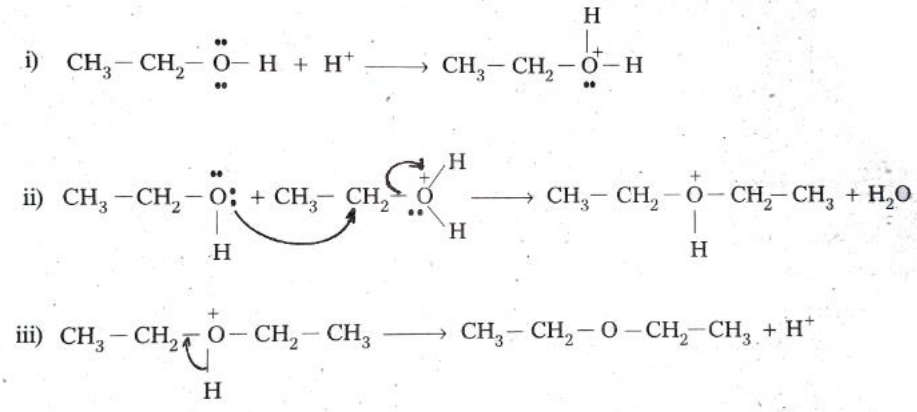
(ii) $\mu = \sqrt{n\,(n+2)}$ BM

$= \sqrt{2(2+2)}$

$= \sqrt{8}$

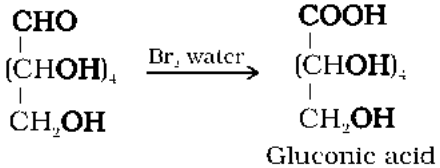
(iii) tetrachloridonickelate (II) ion.

25.



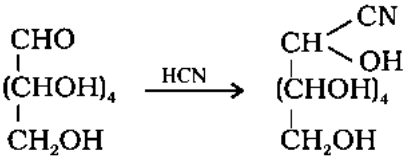
26. Any suitable method.

27. (a) D – Glucose gets oxidized to carboxylic acid on reaction with bromine water.

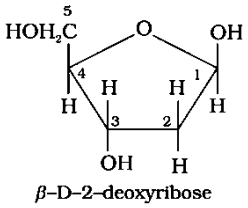
(i) 

Gluconic acid

(ii) .



(b)



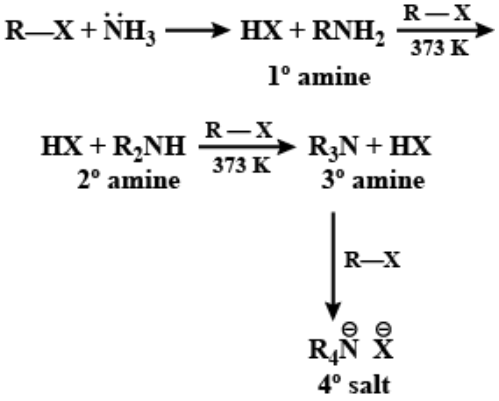
β–D–2–deoxyribose

28. (i) In friedel crafts reaction AlCl3 is added as a catalyst which is a Lewis acid. It forms a salt with aniline due to which the nitrogen of aniline acquires positive charge. This positively charged nitrogen acts as a strong deactivating group hence aniline does not undergo friedel crafts reaction.

(ii) In aniline the lone pair of electrons on N – atom are deloclaised over the benzene ring. As a result, electron density on the nitrogen decreases. In contrast in CH_3NH_2, + I effect of – CH_3 group increases electron density on the N – atom.

Therefore , aniline is a weaker base than methyl amine and hence its pKb is higher than that of methyl amine.

(iii) The ammonolysis of alkyl halides with ammonia is a nucleophilic substitution reaction in which ammonia acts as a nucleophile by donating the electron pair on nitrogen atom to form primary amine as the initial product. A mixture of products is formed and it is not possible to separate individual amines from the mixture.



SECTION –D

29. (a) Br_2/Br^- electrode to Ag^+/Ag electrode.

(b) Methane and methanol can be used as fuels in fuel cells.

(c) The cell consists of a zinc container that also acts as anode and the cathode is a carbon (graphite) rod surrounded by powdered manganese dioxide and carbon. The space between the electrodes is filled by a moist paste of ammonium chloride (NH_4Cl) and zinc chloride ($ZnCl_2$).

Anode: $Zn(s) \longrightarrow Zn^{2+} + 2e^-$

Cathode: $MnO_2 + NH_4^+ + e^- \longrightarrow MnO(OH) + NH_3$

OR

Overall reaction : $Zn + 2Ag^+ \rightarrow Zn^{2+} + 2Ag$

$$E^\circ_{cell} = E^\circ_{cathode} - E^\circ_{anode} = E^\circ_{Ag^+/Ag} - E^\circ_{Zn^{2+}/Zn}$$

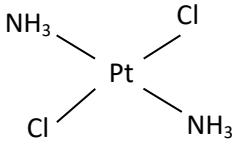
$$= 0.80 - (-0.76) = 1.56\,V$$

$$E_{cell} = E^\circ_{cell} - \frac{0.0591}{2}\log\frac{[Zn^{2+}]}{[Ag^+]^2}$$

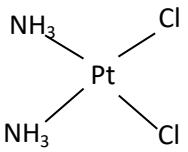
$$= 1.56 - \frac{0.059}{2}\log\frac{0.1}{(0.01)^2} = 1.47\,V$$

30. (a) EDTA

(b)



trons



cis

cis – platin is used for concertreatment

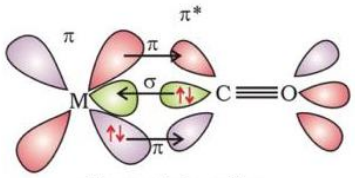
(c) (i) $[Ag(S_2O_3)_2]^{3-}$

dithiosulphato orgentate ( ) ion

(ii) PV $\longrightarrow$ 1

SV $\longrightarrow$ 4

OR



Synergic bonding

The metal-carbon bond in metal carbonyls possess both σ and π character. The M–C σ bond is formed by the donation of lone pair of electrons on the carbonyl carbon into a vacant orbital of the metal. The M–C π bond is formed by the donation of a pair of electrons from a filled *d* orbital of metal into the vacant antibonding π* orbital of carbon monoxide. The metal to ligand bonding creates a synergic effect which strengthens the bond between CO and the metal (Fig.9.14).

SECTION –E

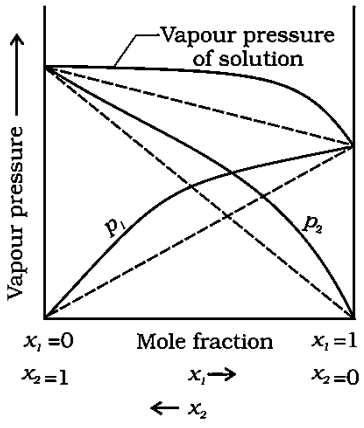
31. (a) Solution shows positive deviation

$\Delta H_{mix} = +ve$

$\Delta V_{mix} = +ve$

$P_A > P^O_A \chi_A$

$P_B > P^O_B \chi_B$



(b) $\Delta T_f = K_f m$

$$1 = 1.86 \times \frac{20}{x \times 0.5}$$

$$x = 74.4\ glmol$$

$$i = \frac{\text{Actual molecular mass}}{\text{Observed molecular mass}}$$

$= 1.048$

$\alpha = 0.048$

$Ka = C\alpha^2$

$= 1.17 \times 10^{-3}$

32. a. i. Transition metals have empty d orbitals and can show variable oxidation state and hence shows catalytic property. They have the capability to lower the activation energy of the reaction by providing an alternate path to the reaction. They also provide large surface area for adsorption during heterogeneous catalysis.

ii. Separation of a mixture of lanthanoid elements is difficult because they have similar atomic radius due to lanthanoid contraction and similar chemical properties.

iii. Zn, Cd and Hg are non-transition metals i.e they have fully filled d- orbitals, no unpaired electrons and hence form weak metallic bonds. Due to this the enthalpy of atomization is low and hence they have low M.P.

b. $2FeCr_2O_4 + 8NaOH + 7/2O_2 \rightarrow 4Na_2Cr_2O_4 + Fe_2O_3 + 4H_2O$

Chromite — Sodium chromate

$2\ Na_2CrO_4 + 2H^+ \longrightarrow Na_2Cr_2O_7 + 2Na^+ + H_2O$

c.

$$MnO_4^- + 2H_2O + 3e^- \longrightarrow MnO_2 + 4OH^- \mid \times 2$$

$$I^- + 6OH^- \longrightarrow IO_3^- + 3H_2O + 6e^-$$

$$2MnO_4^- + I^- + H_2O \longrightarrow IO_3^- + 2MnO_2 + 2OH^-$$

OR

(a) (i) d – d transition (ii) CFSE is large for Co(III) ion (iii) Cu^{2+} oxidises I^- to I_2

(b) In the laboratory, a manganese (II) ion salt is oxidised by peroxodisulphate to permanganate.

$$2Mn^{2+} + 5S_2O_8^{2-} + 8H_2O \rightarrow 2MnO_4^- + 10SO_4^{2-} + 16H^+$$

$$Cr_2O_7^{2-} + 14H^+ + 6I^- \longrightarrow 2Cr^{3+} + 3I_2 + 7H_2O$$

(c)

33. (a) (i) $2\ CH_3CO\ CH_3$

(ii) $CH_3CH_2\ CH_3 + H_2O$

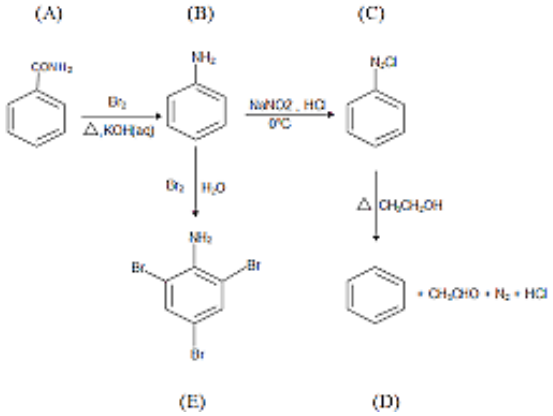
(iii) $CH_3COCl + POCl_3 + HCl$

(b) $C_6H_5NHCOC_6H_5$, Benzanilide

(c) CH_3OH has higher boiling point than CH_3NH_2 because the H bonding in alcohols is stronger than that of amines because oxygen is more electronegative then nitrogen.

OR

(a)



(b) Any suitable method.

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