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SRI VENKATESWARA MATRIC. HR. SEC. SCHOOL

Tulsi Garden, Ambattur Indl. Estate, Chennai - 58.

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Part - A

Part - D

Part - B

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Part - C

TOTAL

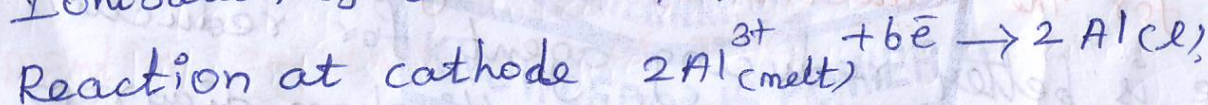
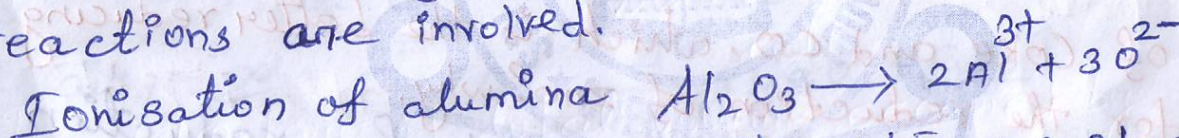
1. Metallurgy

① what is the role of depressing agent in froth floatation process?

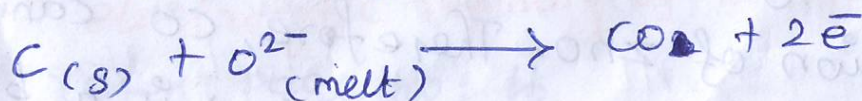
When a sulphide ore of a metal of interest contains other metal sulphides as impurities, depressing agent such as sodium cyanide, sodium carbonate etc are used to selectively prevent other metal sulphides from coming to the froth.

② what is the role of graphite rod in the electro metallurgy of aluminium?

In electrometallurgy of aluminium the following chemical reactions are involved.



Since Graphite (carbon) act as anode the following reaction takes place.



Due to the above two reactions, anodes are slowly consumed during the electrolysis. The pure

aluminium is formed at the cathode and settles at the bottom.

③ Explain the following terms with suitable example.

a) **Gangue**: The ores are associated with non-metallic impurities, rocky materials and siliceous matter which are collectively known as gangue.

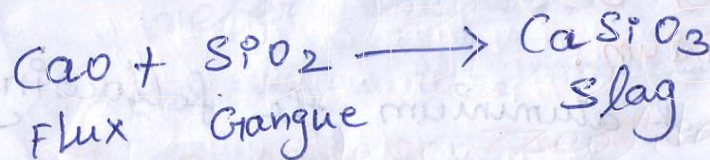
ex The silica gangue present in the ore of Iron.

(b) **slag** :-

The basic flux material which combine with gangue present in ore to form slag.

Flux + Gangue $\rightarrow$ slag.

ex In the extraction of Iron



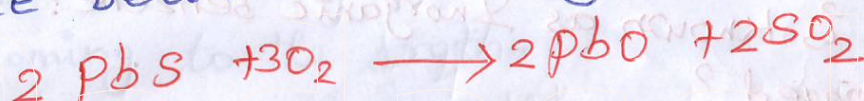
④ Out of Coke and CO, which is the better reducing agent for the reduction of ZnO? why.

Coke is better reducing agent for reduction of ZnO because from the Ellingham diagram, the Gibbs free energy of CO₂ from CO is always higher than the Gibbs free energy of formation of ZnO. Therefore, CO cannot reduce ZnO. Hence Coke (C) is a better reducing agent than CO for reducing ZnO.

- ⑤ Describe the underlying principle of froth floatation process. refer page no : 4
- ⑥ Describe the method for refining of Nickel refer page no : 16. (Mond's process for nickel)
- ⑦ Define the following terms

(i) Roasting

Roasting is the method, usually applied for the conversion of sulphide ores into their oxides. In this method, the concentrated ore is oxidised by heating it with excess of oxygen in a suitable furnace below the melting point of the metal.



(ii) Calcination

Calcination is the process in which the concentrated ore is strongly heated in the absence of air. ex $\text{CaCO}_3 \xrightarrow{\Delta} \text{CaO} + \text{CO}_2 \uparrow$

- ⑧ mention any two uses of zinc.

refer page no : 17

- ⑨ Explain extraction of copper from copper pyrites.

refer page no : 8 & 9

- ⑩ Explain electrolytic refining of silver.

refer page no : 16

- ⑪ write short notes on zone refining process.

refer page no : 16

- ⑫ How Cr_2O_3 is reduced to Cr by Al powder.

refer page no : 9 (Reduction by metal)

Chapter - 2

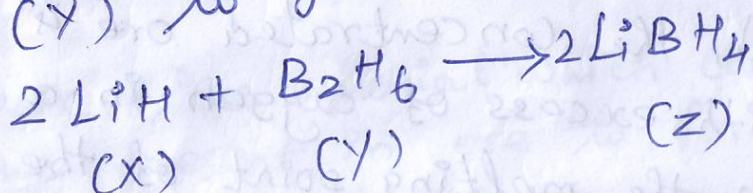
p-block elements - I

- ① A hydride of 2nd period alkali metal (X) on reaction with compound of Boron (Y) to give a reducing agent (Z). Identify X, Y and Z.

A hydride of 2nd period alkali metal (X)

is LiH.

Lithium hydride (X) reacts with diborane (Y) to give Lithium borohydride (Z)



- ② which is known as Inorganic benzene? How it is prepared?

refer page no: 37 (V-I)

Reaction with ammonia

- ③ write a note on zeolites.

refer page no: 50 (V-I)

- ④ AlCl_3 is more stable where as TlCl_3 is highly unstable. why?

As we move from boron to heavier elements, there is an increasing tendency to have +1 oxidation state rather than the group oxidation state, +3. Al^{3+} is more stable than Al^+ while Tl^+ is more stable than Tl^{3+} . Hence Aluminium(III) chloride is stable where as thallium(III) chloride is highly unstable and disproportionates to thallium(I) chloride and chlorine gas.

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Part - A

Part - D

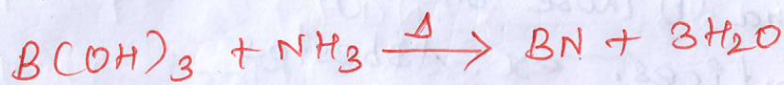
Part - B

Part - E

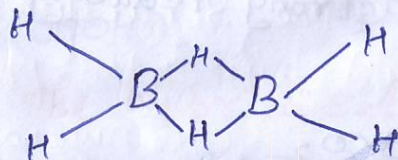
Part - C

TOTAL

- ⑤ How will you convert Boric acid to Boron nitride?
 Fusion of urea with $\text{B}(\text{OH})_3$, in an atmosphere of ammonia at 800-1200 K gives boron nitride.



- ⑥ write a note on the structure of diborane. refer page no: 37 (V-I)

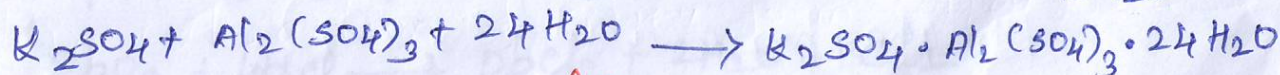
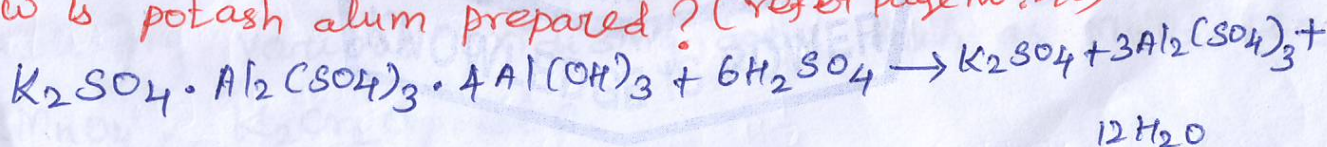


- ⑦ write a note on Fisher Tropsch Synthesis

The reaction of carbon monoxide with hydrogen at a pressure of less than 50 atm using metal catalyst at 500-700 K yields saturated and unsaturated hydrocarbons.



- ⑧ How is potash alum prepared? (refer page no: 40)

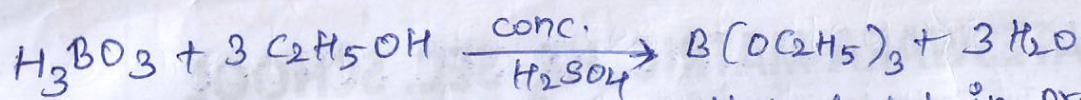


- ⑨ what is water gas equilibrium?

The equilibrium involved in the reaction between CO_2 and H_2 , has many industrial application and is called water gas equilibrium



- ⑩ How will you identify borate radical? write the reaction involved.



when boric acid is heated with ethyl alcohol in presence of conc. H_2SO_4 , an ester, trialkyl borate is formed. The vapour of this ester burns with a green edged flame and this reaction is used to identify the presence of borate.

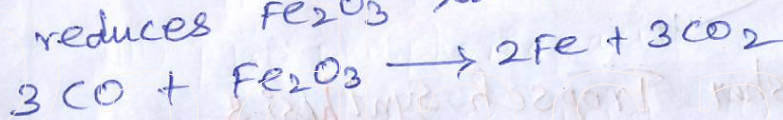
(11) what are amphiboles? Give an example.

Amphiboles (or) double chain silicates contain $[\text{Si}_4\text{O}_{11}]_n^{6n-}$ ions. In these silicates there are two different types of tetrahedra (i) Those sharing 3 vertices (ii) Those sharing only 2 vertices. ex: Asbestos

(12) CO is a reducing agent. Justify with an example.

Carbon monoxide act as a strong reducing agent.

It reduces Fe_2O_3 to Fe.



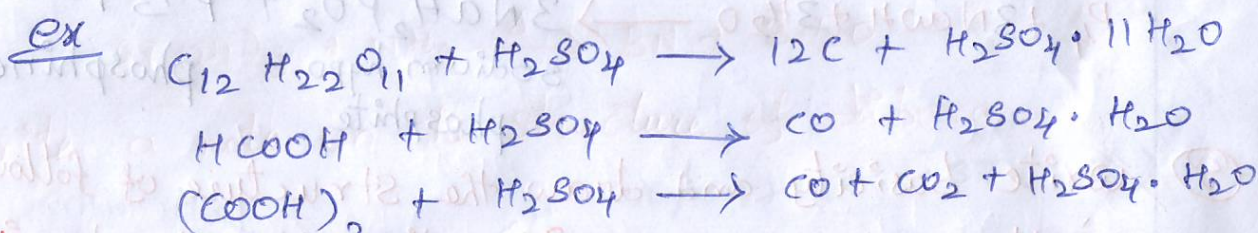
p-block elements - II

① why Fluorine is more reactive than other halogens?

Fluorine is the more reactive element among halogen. This is due to the minimum value of F-F bond dissociation energy.

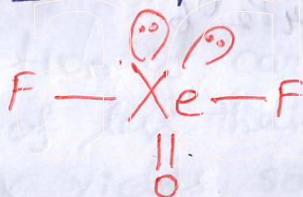
② Show that Sulphuric acid is a dehydrating agent, by giving suitable examples.

H_2SO_4 has strong affinity towards water, hence it can be used as a dehydrating agent.



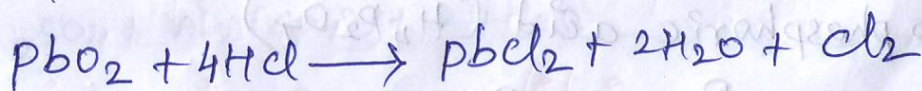
③ what is the hybridisation in $XeOF_2$? Give its structure.

$XeOF_2$ - sp^3d hybridisation, T shaped-structure

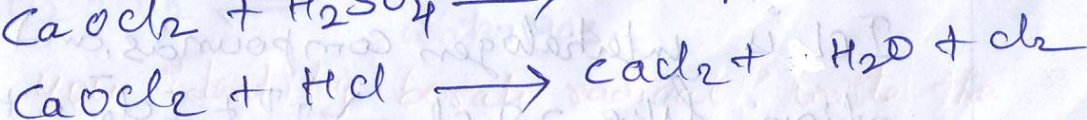
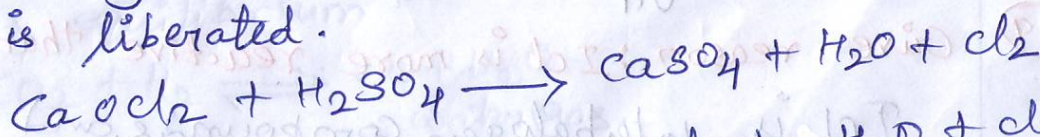


④ How will you prepare chlorine in the laboratory?

Chlorine can be prepared by oxidising hydrochloric acid using various oxidising agent such as MnO_2 , PbO_2 , $KMnO_4$, $K_2Cr_2O_7$ etc.



When bleaching powder is treated with mineral acid chlorine is liberated.



⑤ mention the uses of Helium and Argon.

refer page no: 93 (V-I)

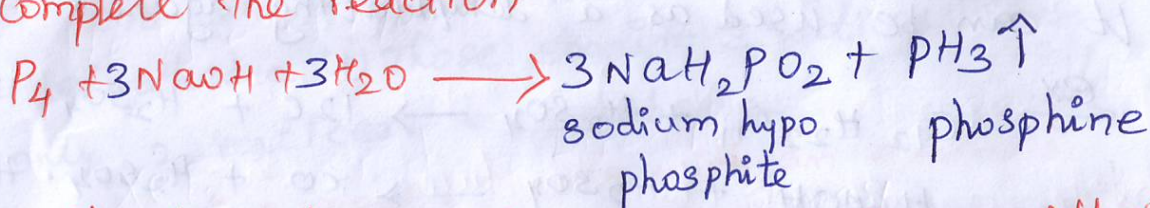
⑥ mention the characteristics of Interhalogen Compounds.
refer page no: 89 x 90

(i) The central atom will be the larger one.

(ii) It can be formed only between two halogen and not more than two halogens.

(iii) They are strong oxidizing agent.

⑦ complete the reaction

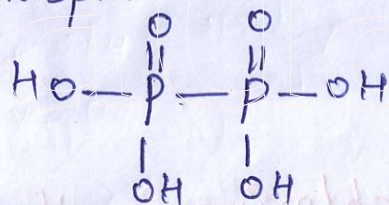


⑧ write basicity and draw the structure of following oxy acids.

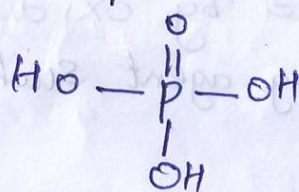
(i) Hypo phosphoric acid (ii) ortho phosphoric acid

(iii) pyro phosphoric acid refer page no: 72

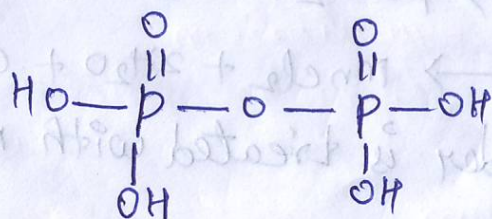
Hypo phosphoric acid - $H_4P_2O_6$



ortho phosphoric acid (H_3PO_4)



pyro phosphoric acid ($H_4P_2O_7$)



⑨ Give reason: ICl is more reactive than I_2

ICl is interhalogen compounds, and undergo the autoionisation like $2ICl \rightleftharpoons I^+ + ICl_2^-$. Hence ICl is more reactive than I_2 .

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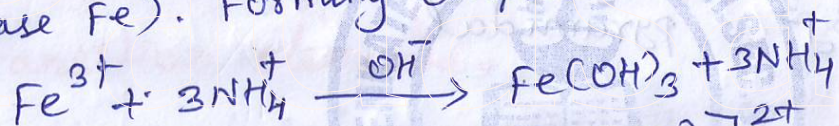
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⑩ Nitrogen does not form any penta halides like phosphorus. why?

Due to non-availability of d-orbitals, Nitrogen does not form any penta halides whereas phosphorus forms pentahalide (PX_5). because phosphorus contains d-orbitals.

⑪ what is the reaction of ammonia with Iron and Copper salt? Ammonia reacts with metallic salts to give metal hydroxide (in case Fe). Forming complexes (in case Cu)



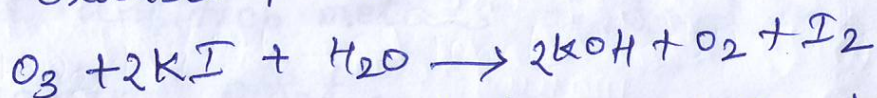
Tetra ammine copper (II) ion.

⑫ Ozone acts as a powerful oxidizing agent why?

refer pg. no: 75

Ozone is a powerful oxidising agent. because it reacts with many substances under conditions where oxygen will not react.

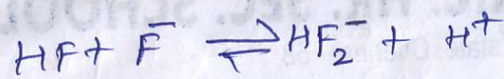
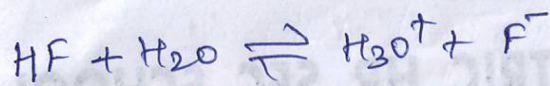
ex It oxidises potassium iodide to iodine. ~~This~~



This reaction is quantitative and can be used for estimation of ozone.

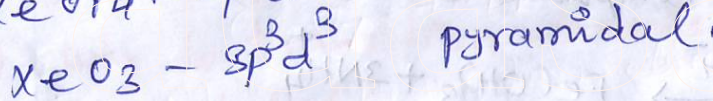
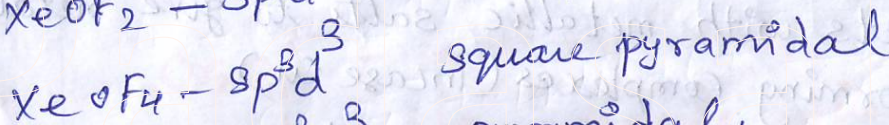
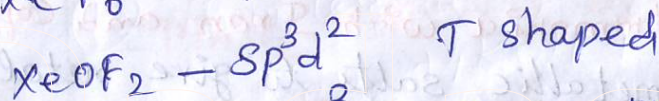
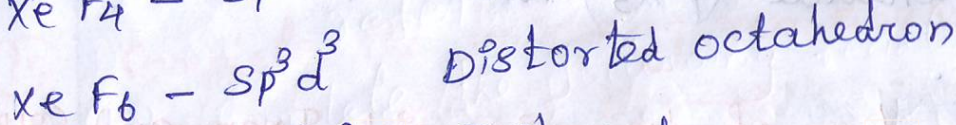
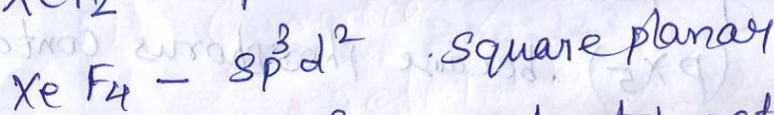
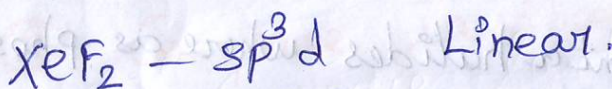
⑬ 0.1M HF is a weak acid. But 5M solution of HF is strong acid. why? refer p. no: 88

0.1M solution of HF is only 10% ionised, but 5M solution of HF is ionised more and shows equilibrium.



At high concentration, the equilibrium involves the removal of fluoride ion is important. Since it affects the dissociation of HF and increase H^+ concentration, several stable salts NaHF_2 , KHF_2 and NH_4HF_2 are known.

(14) List any five compounds of xenon and mention the type of hybridization and structure of the compounds.



4. Transition and Inner Transition Elements

① what are interstitial compounds? How they differ from the properties of its pure metals?

refer P.no: 111

② Justify the position of Lanthanoids and Actinoids in periodic table.

refer page no: 119.

③ which is more basic among $\text{Lu}(\text{OH})_3$ and $\text{La}(\text{OH})_3$? why

refer p.no: 121

④ Describe the preparation of potassium dichromate.

refer p.no: 112

⑤ what is Lanthanide Contraction? mention its consequence.

refer P.No: 121

⑥ what are transition elements? write two characteristic of transition elements.

(i) Transition metal is an element whose atom has an incomplete d sub shell (or) which can give rise to cation with an incomplete d sub shell. They occupy the central position of periodic table, between s and p block elements.

(ii) All transition metals are hard and have very high melting point.

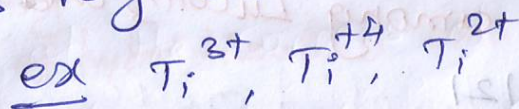
⑦ $[\text{Ti}(\text{H}_2\text{O})_6]^{3+}$ is coloured while $[\text{Sc}(\text{H}_2\text{O})_6]^{3+}$ is colourless. Explain

$\text{Ti}^{3+} - [\text{Ar}] 3d^1$. In Ti^{3+} d-d transition possible

$\text{Sc}^{3+} - [\text{Ar}] 3d^0$. In Sc^{3+} no d-d transition possible
Hence $[\text{Ti}(\text{H}_2\text{O})_6]^{3+}$ - coloured. $[\text{Sc}(\text{H}_2\text{O})_6]^{3+}$ - colourless.

⑧ why transition element shows variable oxidation state? P.no: 106

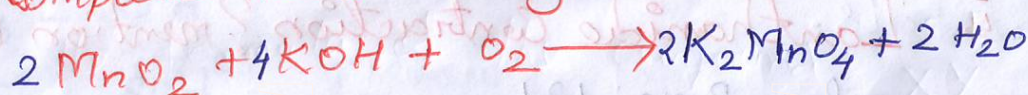
All transition elements exhibit variable oxidation state by losing electrons from $(n-1)d$ orbital and ns orbital as the energy difference between them is very small.



⑨ Compare lanthanoids and Actinoids.

refer P.no: 123

⑩ Complete the following reactions.



⑪ why do transition elements and its compounds act as catalyst? P.no: 116

* Many industrial process use transition metal or their compound as catalyst.

* Transition metal has energetically available d -orbitals that can accept electron from reactant molecule (or) metal can form bond with reactant molecule using its d -electrons.

ex In manufacture of sulphuric acid from SO_3 , V_2O_5 used as a catalyst.

⑫ Explain why Cr^{3+} is strongly reducing while Mn^{3+} is strongly oxidizing?

The negative values for titanium, vanadium and chromium indicate that the higher oxidation

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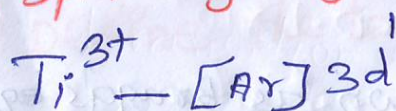
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State is preferred. If we want to reduce such a stable Cr^{3+} ion, strong reducing agent which has high negative value for reduction potential like metallic zinc ($E^\circ = -0.76\text{V}$) is required. Hence Cr^{3+} is strongly reducing while Mn^{3+} is strongly oxidizing.

13) why transition metals show high melting points why?
As we move from Left to right along the transition metal series, melting point first increases as the number of unpaired d-electrons available for metallic bonding increases, reach a maximum value and then decreases, as the d electrons pair up and become less available for bonding. The maximum melting point at about the middle of transition metal series indicates that d^5 configuration is favourable for strong interatomic attraction.

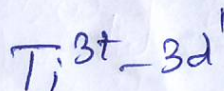
14) calculate the number of unpaired electrons in Ti^{3+} , Mn^{2+} and spin only magnetic moment.



No. of unpaired electron is 1



No. of unpaired electron is 5



$$\mu = \sqrt{1(1+2)} = \sqrt{3} = 1.73 \text{ BM}$$

for $\text{Mn}^{2+} (3d^5)$

$$\sqrt{5(5+2)} = \sqrt{25} = 5.92 \text{ BM}$$

Chapter - 6 (Solid state)

① Differentiate crystalline solid and amorphous solid.
refer page no: 178

② Atoms X and Y form BCC crystalline structure. Atom X is present at the corners of the cube and Y is at the centre of the cube. what is the formula of the compound.

In BCC crystalline structure the atoms of X are present at the corners of the cube.

$$\text{No. of atoms of 'X' in one unit cell} = \frac{N_a}{8} = \frac{8}{8} = 1$$

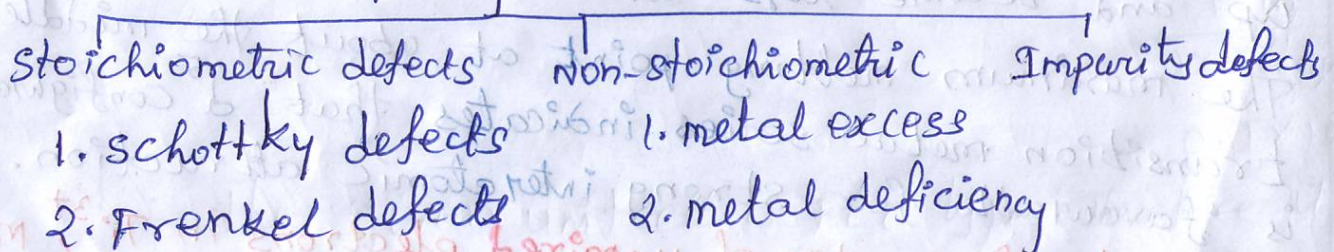
Y is present at the centre of the cube

$$\text{No. of atoms of 'Y' in one unit cell} = \frac{N_b}{1} = 1$$

The formula of the compound = XY

③ Calculate the percentage efficiency of packing in BCC system.
refer page no: 188

④ Outline the classification of point defects.
p.no: 193



⑤ What is Bragg's equation?

$$n\lambda = 2d \sin\theta$$

The above equation is known as Bragg's equation
where λ - wavelength of X-ray

n - order of reflection

θ - angle of diffraction

d - interplanar distance

⑥ What is radius ratio in Ionic solids?

Tabulate the relation between radius ratio and structural arrangement in ionic solids.

refer page no: 192

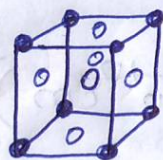
⑦ Explain Frenkel defects.

refer page no: 194

⑧ Write the characteristics of Ionic solids.

refer page no: 179

⑨ Sketch FCC unit cell and calculate the number of atoms present in it.



No. of atoms per unit cell in

$$\begin{aligned} \text{FCC} &= \frac{N_c}{8} + \frac{N_f}{2} \\ &= \frac{8}{8} + \frac{6}{2} \\ &= 4 \end{aligned}$$

⑩ What is packing efficiency? ⁼⁴

$$\text{Packing efficiency} = \frac{\text{Total volume occupied by spheres in a unit cell}}{\text{Volume of the unit cell}} \times 100$$

The percentage of total volume occupied by these constituent spheres gives the packing efficiency of an arrangement.

⑪ Define the term crystal lattice and unit cell.

1) The regular arrangement of atoms (or) ions (or) molecules throughout the crystal is called a crystal lattice.

2) A basic repeating structural unit of a crystalline solid is called a unit cell.

- ⑫ An atom crystallizes in FCC crystal lattice and has a density of 10 g cm^{-3} with unit cell edge length of 100 pm . Calculate the number of atoms present in 1 g of crystal.

Given Density = 10 g cm^{-3}

mass = 1 g

Edge length of unit cell = $100 \text{ pm} \Rightarrow 100 \times 10^{-10} \text{ cm}$
(a)

$$\text{Volume} = \frac{\text{mass}}{\text{Density}} = \frac{1 \text{ g}}{10 \text{ g cm}^{-3}} = 0.1 \text{ cm}^3$$

$$\begin{aligned} \text{Volume of unit cell} &= a^3 \\ &= (100 \times 10^{-10} \text{ cm})^3 \\ &= 10^6 \times 10^{-30} \text{ cm}^3 \\ &= 1 \times 10^{-24} \text{ cm}^3 \end{aligned}$$

$$\begin{aligned} \text{Number of unit cell in } 1 \text{ g of crystal} &= \frac{\text{Total volume}}{\text{Volume of unit cell}} \\ &= \frac{0.1 \text{ cm}^3}{1 \times 10^{-24} \text{ cm}^3} \\ &= 0.1 \times 10^{24} \end{aligned}$$

The given unit cell is FCC type. Therefore it contains 4 atoms. 0.1×10^{24} unit cell will contain

$$= 4 \times 0.1 \times 10^{24}$$

$$= 4 \times 10^{23} \text{ atoms}$$

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Additional Sheet

chapter - 5

① what is crystal field stabilisation energy? ref. P.no: 157

The energy difference of electronic configuration in the ligand field $[E_{LF}]$ and the isotropic field / bary centre

$$CFSE(\Delta E_0) = \{E_{LF}\} - \{E_{iso}\}$$

$$= \{[n_{t_{2g}}(0.4) + n_{e_g}(0.6)] \Delta_0 + n_p P\} -$$

② Mention the main assumption of $\{n_p P\}$ valence bond theory of Coordination Compounds. ref. P.no: 147

③ Explain the bonding nature in metal carbonyl. (Book back) ref. p.no: 162

④ Write the IUPAC Name for the Compound $Na_2[Ni(EDTA)]$

$Na_2[Ni(EDTA)]$ — Sodium 2, 2', 2'', 2''' (ethane-1,2-diyldinitrilo) tetra acetato nickelate (II)

⑤ what is linkage isomerism? Explain with example. ref. P.no: 142 (B.B)

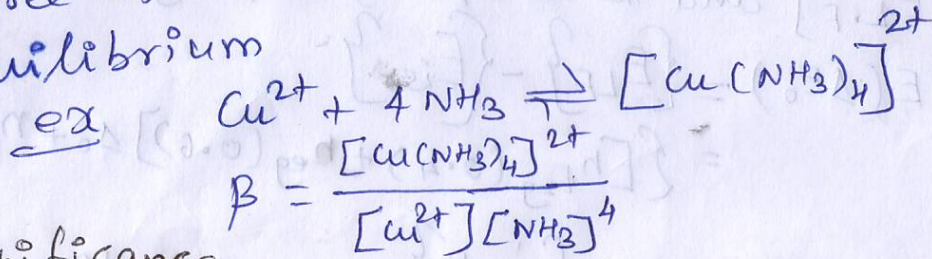
⑥ Give one test to differentiate $[Co(NH_3)_5Cl]SO_4$ and $[Co(NH_3)_5SO_4]Cl$. This two isomers gives different ions in solution. $[Co(NH_3)_5Cl]SO_4$ gives SO_4^{2-} ion and $[Co(NH_3)_5SO_4]Cl$ gives Cl^- ion in solution. This two isomers are called ionisation isomers.

⑦ what are inert and labile complexes? ref. P.no: 163

kinetic stability of a coordination complex refers to the ligand substitution. In some cases, complex can undergo rapid ligand substitution, such complexes are called labile complexes. However, some complexes undergo ligand substitution very slowly (sometimes no substitution) such complexes are called inert complex.

What is stability constant? Mention its significance.

The stability of a coordination compound is a measure of its resistance to the replacement of one ligand by another. The stability of a complex refers to the degree of association between two species involved in an equilibrium.



significance

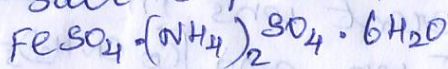
The stability of coordination complex is measured in terms of its stability constant (β). Higher the value of stability constant for a complex ion, greater is the stability of complex ion.

How double salt differs from Co-ordination compounds.

Co-ordination compounds

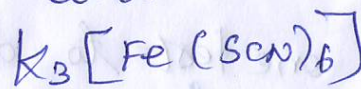
Double Salts

* When an equimolar solution of ferrous sulphate and ammonium sulphate are mixed and allowed to crystallise, a double salt namely Mohr's salt is formed.



* Mohr's salt answers the presence of Fe^{2+} ion.

* The reaction between ferric chloride and potassium thiocyanate solution gives a blood red coloured Co-ordination compound,



* $\text{K}_3[\text{Fe}(\text{SCN})_6]$ ^{do not} gives answer the presence of Fe^{3+} ion.

* Double salt loose their identity

* It dissociates into their constituent simple ions in solutions.

* Does not loose its identity

* It never dissociate to give simple ions.

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Additional Sheet

- (10) Write any two uses of co-ordination compounds in medicines. ref. p.no: 166. (B-B)
- (1) Ca-EDTA chelate, is used in the treatment of lead and radioactive poisoning. That is for removing lead and radioactive metal ions from the body.
- (2) Cis-platin is used as an antitumor drug in cancer treatment.
- (11) What are hydrate isomers? Explain with an example.
ref. p. no: 143 (B-B)



Chapters - 7

① write any three differences between order and molecularity
ref. P.no: 210

② Derive Arrhenius equation to calculate activation energy from the rate constant k_1 and k_2 at temperature T_1 and T_2 respectively. ref. P.no: 220

$$k = A \cdot e^{-E_a/RT}$$

At temperature $T = T_1$, the rate constant $k = k_1$

$$\ln k_1 = \ln A - \left(\frac{E_a}{RT_1} \right) \quad \text{--- ①}$$

At temperature $T = T_2$, the rate constant $k = k_2$

$$\ln k_2 = \ln A - \left(\frac{E_a}{RT_2} \right) \quad \text{--- ②}$$

② - ①

$$\ln k_2 - \ln k_1 = -\frac{E_a}{RT_2} + \frac{E_a}{RT_1}$$

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

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

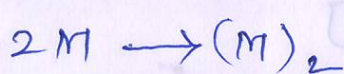
$$\boxed{\log \frac{k_2}{k_1} = \frac{E_a}{2.303R} \left(\frac{T_2 - T_1}{T_1 T_2} \right)} \quad \text{--- ③}$$

③ Derive integrated rate law for a 1st order reaction.

ref. P.no: 212

④ The rate of formation of dimer in a second order reaction is $7.5 \times 10^{-3} \text{ mol L}^{-1} \text{ s}^{-1}$ at 0.05 mol L^{-1} monomer concentration. calculate the rate constant.

Dimerisation of a monomer M



$$[M] = 0.05 \text{ mol L}^{-1} \Rightarrow 5 \times 10^{-2} \text{ mol L}^{-1}$$

$$\text{Rate} = k[M]^2$$

$$\text{Rate} = 7.5 \times 10^{-3} \text{ mol L}^{-1} \text{ s}^{-1}$$

$$k = \frac{\text{Rate}}{[M]^2} = \frac{7.5 \times 10^{-3} \text{ mol L}^{-1} \text{ s}^{-1}}{(5 \times 10^{-2} \text{ mol L}^{-1})^2}$$

$$k = \frac{3.75 \times 10^{-4} \text{ mol l}^{-1} \text{ s}^{-1}}{25 \times 10^{-4} \text{ mol}^2 \text{ L}^{-2} \text{ s}^{-1}}$$

$$k = 3 \text{ mol}^{-1} \text{ L s}^{-1}$$

⑤ mention the factors that affect the rate of the reaction. ref. p.no: 222

1. Nature and state of the reactant
2. Concentration of the reactant
3. Surface area of the reactant
4. Temperature of the reaction
5. presence of catalyst.

⑥ Differentiate rate of reaction and rate Constant of the reaction. ref. p.no: 209

⑦ calculate the half-life period of ~~zero~~ ^{first} order reaction.

The rate constant for a first order reaction is

$$k = \frac{2.303}{t} \log \frac{[A_0]}{[A]}$$

$$t = t_{1/2} \quad [A] = \frac{[A_0]}{2}$$

$$k = \frac{2.303}{t_{1/2}} \log \frac{[A_0]}{\frac{[A_0]}{2}}$$

$$k = \frac{2.303}{t_{1/2}} \log 2$$

$$= 0.693$$

$$k = \frac{0.693}{t_{1/2}}$$

$$t_{1/2} = \frac{0.693}{k}$$

⑧ calculate half life period of zero order reaction.

$$\text{Rate Constant } k = \frac{[A_0] - [A]}{t}$$

$$t = t_{1/2}, [A] = \frac{[A_0]}{2}$$

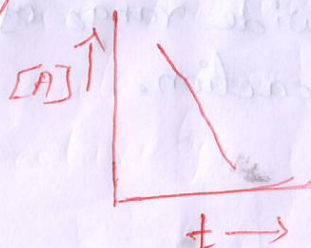
$$k = \frac{[A_0] - \frac{[A_0]}{2}}{t_{1/2}}$$

$$k = \frac{[A_0]}{2 t_{1/2}} \Rightarrow$$

$$t_{1/2} = \frac{[A_0]}{2k}$$

(a) Explain rate determining step with an example.
refer p.no: 210.

(10)



(i) what is the order of the reaction?

zero

(ii) what is the slope of the curve?

negative slope.

(iii) what is the unit of rate constant?

$\text{mol l}^{-1} \text{s}^{-1}$

(11) Define half life period of reaction. show that for a first order reaction half life period is independent of initial concentration.

The half life of a reaction is defined as the time required for the reactant concentration to reach one half its initial value.

$$k = \frac{2.303}{t} \log \frac{[A_0]}{[A]}$$

$$k = \frac{2.303}{t_{1/2}} \log \frac{[A_0]}{\frac{[A_0]}{2}}$$

$$k = \frac{0.693}{t_{1/2}}$$

$$t_{1/2} = \frac{0.693}{k}$$

(12) The rate constant for a 1st order reaction is $1.54 \times 10^{-3} \text{ s}^{-1}$. calculate its half life time.

$$k = 1.54 \times 10^{-3} \text{ s}^{-1}$$

$$t_{1/2} = ?$$

$$t_{1/2} = \frac{0.693}{k}$$

$$= \frac{0.693}{1.54 \times 10^{-3} \text{ s}^{-1}}$$

$$= 450 \text{ Secs}$$

(13) what is zero order reaction? Derive rate law for a zero order reaction. ref. P.no: 214

A reaction in which the rate is independent of the concentration of the reactant over a wide range of concentration is called as zero order reaction.

$A \rightarrow \text{products}$
Rate law can be written as

$$\text{Rate} = k[A]^0 \quad \text{--- (1)}$$

$$\text{Rate} = -\frac{d[A]}{dt} \quad \text{--- (2) from (1) \& (2)}$$

$$-\frac{d[A]}{dt} = k[A]^0$$

Integrate above equation b/w the limits of $[A_0]$ at $t=0$, $[A]$ at $t=t$

$$\int_{A_0}^A d[A] = k \int_0^t dt$$

$$-\left[[A] \right]_{A_0}^A = k(t)_0^t$$

$$-[A] + [A_0] = kt$$

$$[A_0] - [A] = kt$$

$$\frac{[A_0] - [A]}{t} = k$$

$$\boxed{k = \frac{[A_0] - [A]}{t}}$$

Chapter - 8

① Derive the relationship b/w pH and pOH

A relation between pH and pOH can be established using their following definition

$$pH = -\log_{10} [H_3O^+] \quad \text{--- ①}$$

$$pOH = -\log_{10} [OH^-] \quad \text{--- ②}$$

adding equation ① & ②

$$\begin{aligned} pH + pOH &= -\log_{10} [H_3O^+] + (-\log_{10} [OH^-]) \\ &= -\log_{10} [H_3O^+] \times [OH^-] \end{aligned}$$

$$pH + pOH = -\log_{10} K_w$$

$$pH + pOH = pK_w \quad \left(\because -\log_{10} K_w = pK_w \right)$$

at 25°C the ionic product of water $K_w = 1 \times 10^{-14}$

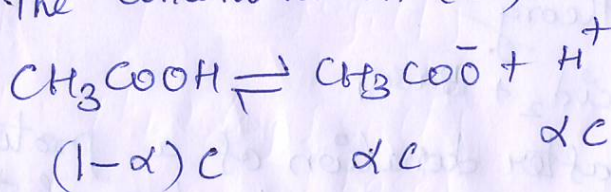
$$\begin{aligned} pK_w &= -\log_{10} (1 \times 10^{-14}) \\ &= 14 \log_{10} 10 \end{aligned}$$

$$\boxed{pH + pOH = 14}$$

$$\boxed{pK_w = 14}$$

② state & derive Ostwald dilution law.

Ostwald's dilution law relates the dissociation constant of the weak acid (K_a) with its degree of dissociation (α) and the concentration (c).



$$K_a = \frac{[CH_3COO^-][H^+]}{[CH_3COOH]}$$

$$K_a = \frac{\alpha c \times \alpha c}{(1-\alpha)c}$$

$$K_a = \frac{\alpha^2 c}{1-\alpha}$$

$$K_a = \alpha^2 c \quad ((1-\alpha) \approx 1)$$

$$\alpha^2 c = K_a$$

$$\alpha^2 = \frac{K_a}{c}$$

$$\boxed{\alpha = \sqrt{\frac{K_a}{c}}}$$

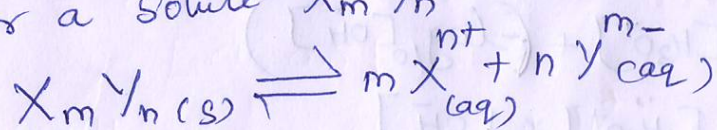
③ what are the two types of Buffer solution? Give example for each?

- (weak acid and its salt)
- (i) Acidic buffer solution - ex. Acetic acid and Sodium acetate
- (ii) Basic buffer solution - ex: NH_4OH and NH_4Cl .
- (weak base and its salt)

④ How is solubility product determined from molar solubility?

The maximum number of moles of solute that can be dissolved in one litre of the solution

For a solute X_mY_n



$$K_{sp} = [\text{X}^{n+}]^m [\text{Y}^{m-}]^n$$

$$[\text{X}^{n+}] = ms \quad [\text{Y}^{m-}] = ns$$

$$K_{sp} = (ms)^m (ns)^n$$

$$= (m)^m (n)^n s^{m+n}$$

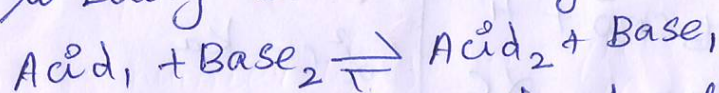
⑤ what are conjugate acid - base pairs? Give example.



Proton donor (acid) proton acceptor (Base) proton donor (acid) proton acceptor (Base)

H_3O^+ donates a proton to Cl^- to form HCl . i.e. the product also behave as acid and base.

According to Lowry - Bronsted theory



The species that remains after donation of a proton is a base (Base_1) and is called the conjugate base of the Bronsted acid (Acid_1). In other words, chemical species that differ only by a proton are called conjugate acid-base pairs.

⑥ what is common ion effect? Give an example.
ref. P.no: 15

⑦ write a note on Lewis concepts of Acids and Bases.

* A Lewis acid is a positive ion (or) an electron deficient molecule and a Lewis base is a anion (or) neutral molecule with at least one lone pair of electrons

* Lewis acid is a species that accepts an electron pair while base is a species that donates an electron pair.

ex BF_3 - Lewis acid

NH_3 - Lewis base

⑧ Define Ionic product of water.

Ionic product of water is equal to the product of molar concentration of hydronium ion and hydroxide ion.

$$K_w = [\text{H}_3\text{O}^+][\text{OH}^-]$$

K_w - represents the ionic product (ionic product constant) of water.

⑨ what do you mean salt hydrolysis.

ref. P.no: 21

⑩ The K_a value of HCN is 10^{-9} . what is the pH of 0.4M HCN solution? B.B. ref. P.no: 301

$$K_a = 10^{-9}, \quad C = 0.4\text{M} \Rightarrow 4 \times 10^{-1}\text{M}$$

$$\text{pH} = -\log[\text{H}^+]$$

$$[\text{H}^+] = \sqrt{K_a \times C}$$

$$= \sqrt{10^{-9} \times 4 \times 10^{-1}}$$

$$= \sqrt{4 \times 10^{-10}}$$

$$[\text{H}^+] = 2 \times 10^{-5}$$

$$\text{pH} = -\log_{10}(2 \times 10^{-5})$$

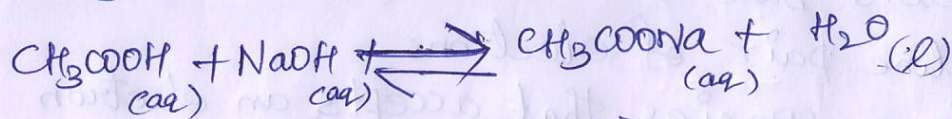
$$= -\log 2 - \log 10^{-5}$$

$$= -0.3010 + 5$$

$$\boxed{\text{pH} = 4.699}$$

(11) Derive expression for hydrolysis constant and pH of salt of weak acid and strong base.

Consider the reaction b/w NaOH and CH_3COOH to give CH_3COONa and H_2O



$$K_h = \frac{[\text{CH}_3\text{COOH}][\text{OH}^-]}{[\text{CH}_3\text{COO}^-][\text{H}_2\text{O}]}$$

$$K_h = \frac{[\text{CH}_3\text{COOH}][\text{OH}^-]}{[\text{CH}_3\text{COO}^-]} \quad \text{--- (1)}$$



$$K_a = \frac{[\text{CH}_3\text{COO}^-][\text{H}^+]}{[\text{CH}_3\text{COOH}]} \quad \text{--- (2)}$$

① x ② we get $K_h \times K_a = \frac{[\text{CH}_3\text{COOH}][\text{OH}^-]}{[\text{CH}_3\text{COO}^-]} \times \frac{[\text{CH}_3\text{COO}^-][\text{H}^+]}{[\text{CH}_3\text{COOH}]}$

$$K_h \times K_a = [\text{OH}^-][\text{H}^+]$$

$$\boxed{K_h \times K_a = K_w}$$

(12) what is Buffer index (β)? ref. p-no: 18

Buffer index is defined as the number of gram equivalents of acid (or) base added to 1 litre of the buffer solution to change its pH by unity

$$\beta = \frac{dB}{d(\text{pH})}$$

Here dB = number of gram equivalent of acid/base added to one litre of buffer solution.

$d(\text{pH})$ = The change in the pH after the addition of acid/base.

(13) what are buffer solution? 16
 Buffer is a solution which consist of a mixture of a weak acid and its conjugate base (or) a weak base and its conjugate acid.

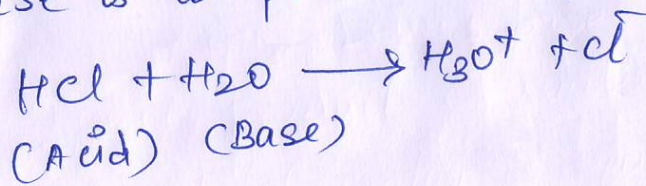
(14) what is solubility product? B.B

P.no 25

(15) Discuss the Lowry - Bronsted concept of acids and bases. B.B (3)

Acid is a proton donor

Base is a proton acceptor



(16) Define pH B.B (10)

$$\text{pH} = -\log_{10} [\text{H}_3\text{O}^+]$$

(17) Derive the Henderson - Hasselbalch equation. P.no: 18

$$[\text{H}_3\text{O}^+] = K_a \frac{[\text{acid}]_{\text{eq}}}{[\text{base}]_{\text{eq}}}$$

$$[\text{H}_3\text{O}^+] = K_a \frac{[\text{acid}]}{[\text{base}] [\text{salt}]}$$

$$\log [\text{H}_3\text{O}^+] = \log K_a + \log \frac{[\text{acid}]}{[\text{salt}]}$$

$$-\log [\text{H}_3\text{O}^+] = -\log K_a - \log \frac{[\text{acid}]}{[\text{salt}]}$$

$$\text{pH} = \text{p}K_a - \log \frac{[\text{acid}]}{[\text{salt}]}$$

$$\text{pH} = \text{p}K_a + \log \frac{[\text{salt}]}{[\text{acid}]}$$

$$\text{pOH} = \text{p}K_b + \log \frac{[\text{salt}]}{[\text{base}]}$$

Chapter - 9

① A conductivity cell has two platinum electrodes separated by a distance 1.5 cm and the cross sectional area of each electrode is 4.5 sq. cm. Using this cell, the resistance of 0.5N electrolytic solution was measured 15 Ω . Find the specific conductance of the solution. ref. P.no: 35 x 36. (V-II)

Given $l = 1.5 \text{ cm} \Rightarrow 1.5 \times 10^{-2} \text{ m}$

$A = 4.5 \text{ cm}^2 \Rightarrow 4.5 \times 10^{-4} \text{ m}^2$

$R = 15 \Omega$

$K = \frac{l}{R \times A}$

$= \frac{1.5 \times 10^{-2} \text{ m}}{15 \Omega \times 4.5 \times 10^{-4} \text{ m}^2}$

$= \frac{15 \times 10^{-3}}{15 \Omega \times 4.5 \times 10^{-4} \text{ m}^2}$

$= \frac{1}{45 \times 10^{-2}}$

$= \frac{1}{45} \times 10^2 \text{ S m}^{-1}$

$= \frac{100}{45} \text{ S m}^{-1}$

$= 2.22 \text{ S m}^{-1}$

$K = 2.22 \text{ S m}^{-1}$

② what is intercalation? ref. P.no: 59

In Lithium ion Battery, during discharge, the Li^+ ions produced at the anode move towards cathode through the non-aqueous electrolyte. when a potential greater than emf produced by the cell is applied across the electrode, the cell reaction is reversed and now the Li^+ ions move from cathode to anode where they become embedded on the porous graphite electrode. This is known as intercalation.

③ what are the Conventions used in Galvanic cell notation? ref. P.no: 46

④ write Debye-Huckel and Onsager equation for a uni-univalent electrolyte. ref. P.no: 41

$$\Lambda_m = \Lambda_m^\circ - (A + B\Lambda_m^\circ)\sqrt{C}$$

Where A and B are the constant which depends only on the nature of solvent and Temperature.

The expression for A and B are

$$A = \frac{82.4}{\sqrt{DT} \eta}, \quad B = \frac{8.20 \times 10^5}{\sqrt[3]{DT}}$$

Here D is the dielectric constant of the medium, η - viscosity of the medium and T - temperature in kelvin.

⑤ What is Buffer index (B)?

⑤ The reaction $\text{Zn(s)} + \text{Co}^{2+} \rightleftharpoons \text{Co(s)} + \text{Zn}^{2+}$ occurs in a cell. Complete the standard emf of the cell. Given that $E^\circ_{\text{Zn/Zn}^{2+}} = +0.76\text{V}$ and $E^\circ_{\text{Co/Co}^{2+}} = +0.28\text{V} \Rightarrow E^\circ_{\text{Co}^{2+}/\text{Co}} = -0.28\text{V}$

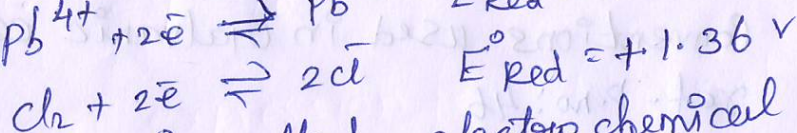
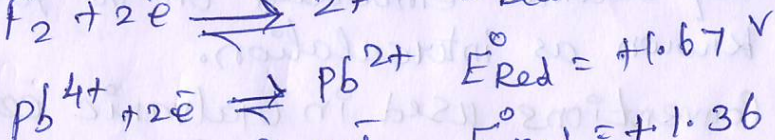
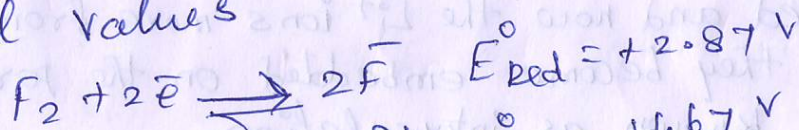
$$E^\circ_{\text{cell}} = (E^\circ_{\text{ox}})_{\text{Zn/Zn}^{2+}} + (E^\circ_{\text{red}})_{\text{Co}^{2+}/\text{Co}}$$

$$= +0.76\text{V} - 0.28\text{V}$$

$$\boxed{E^\circ_{\text{cell}} = +0.48\text{V}}$$

⑥ What are electrochemical series? How is it useful to predict corrosion?

* The standard aqueous electrode potential at 298K for various metal-metal ion electrodes are arranged in the decreasing order of their standard reduction potential values



This series is called electrochemical series.

The standard reduction potential (E°) is a measure of the oxidising tendency of the species.

The greater E° value, greater is the tendency shown by the species to accept electrons and undergo reduction. So higher the (E°) value, lesser is the tendency to undergo corrosion.

⑦ write a note on standard hydrogen electrode (SHE).

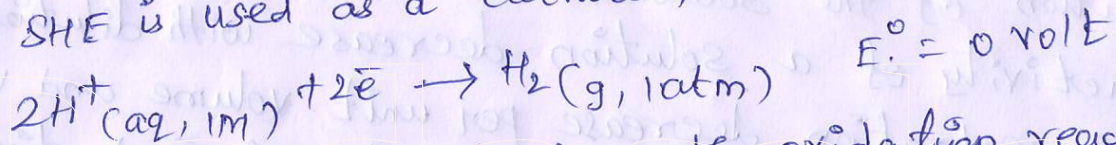
i) standard hydrogen electrode is used as the reference electrode. It has been assigned an arbitrary emf of exactly zero volt.

ii) It consists of a platinum electrode in contact with 1M HCl solution and 1 atm hydrogen gas.

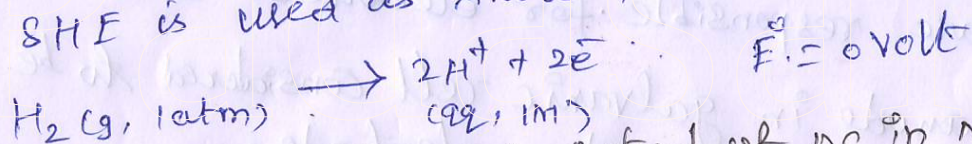
iii) The hydrogen gas is bubbled through the solution at 25°C .

iv) SHE can act as a cathode as well as anode.

If SHE is used as a cathode, the reduction reaction is



If SHE is used as Anode, the oxidation reaction is



⑧ why is AC current used instead of DC in measuring the electrolytic conductance? B.B

In the measurement of specific resistance of a metallic wire a DC power supply is used. Here if we apply DC current through conductivity cell, it will lead to the electrolysis of the solution taken in the cell. So AC current is used for this measurement to prevent electrolysis.

⑨ How cathodic protection helps to protect the metal from corrosion. Ref. p.no: 61

In this technique, unlike galvanising the entire surface of the metal to be protected need not be covered with a protecting metal. Instead, metals such as Mg (or) zinc which is corroded more easily than iron can be used as a sacrificial anode and the iron material act as a cathode. So iron is protected, but Mg (or) Zn is corroded.

(10) State Faraday's 1st law of electrolysis. (54)

The mass of the substance (m) liberated at an electrode during electrolysis is directly proportional to the quantity of charge (Q) passed through the cell.
 $m \propto Q$.

(11) State Kohlrausch law

At infinite dilution, the limiting molar conductivity of an electrolyte is equal to the sum of the limiting molar conductivities of its constituent ions.

For a uni-univalent electrolyte such as NaCl,

$$(\lambda_m^0)_{NaCl} = (\lambda_m^0)_{Na^+} + (\lambda_m^0)_{Cl^-}$$

(12) Why is AC current does conductivity of a solution decrease on dilution of the solution.

Conductivity of a solution decrease with dilution because ions concentration decrease per unit volume and we know that ions are responsible for electrical conductivity.

(13) Why is anode in galvanic cell considered to be negative and cathode to be positive electrode.

* The electrode at which the oxidation occurs is called the anode. Electrons are liberated at anode hence it is negative (-ve)

* The electrons flow through the circuit from anode to cathode. Here the electrons are consumed hence it is positive.

(14) Describe the construction of Daniel cell. Write the cell reaction. (46) P.no:

(15) Derive an expression for Nernst equation

P.No: (51)

chapter - 10

① peptising agent is added to convert precipitate into colloidal solution. Illustrate with an example.

By addition of suitable electrolytes, precipitated particles can be brought into colloidal state. The process is termed as peptisation and the electrolyte added is called peptising (or) dispersing agent. ex $\text{AgCl} \xrightarrow{\text{HCl}}$ AgCl (colloid)
(precipitate) electrolyte

② what is the role of adsorption in the heterogeneous catalysis?

* Langmuir explained the action of catalyst in heterogeneous catalysed reaction based on adsorption. The reactant molecules are adsorbed on the catalyst surface, so this can also be called as contact catalysis.

* According to this theory, the reactants are adsorbed on the catalyst surface to form activated complex which ~~se~~ subsequently decomposes and gives the product.

③ Define the term Emulsification and Deemulsification

* The process of preparation of emulsion by the dispersal of one liquid in another liquid is called Emulsification.

* Emulsion can be separated into two separate layers. The process is called Deemulsification

④ what are characteristics of adsorption?

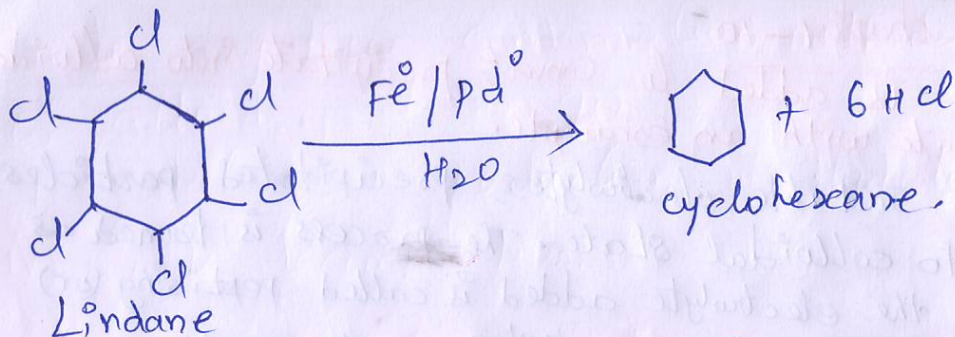
1) Adsorption can occur in all interfacial surface.
i.e. Adsorption can occur in between gas-solid, liquid-solid.

2) Adsorption is a spontaneous process and it is always accompanied by decrease in free energy. $\Delta G < 0$ equilibrium
 $\Delta G = \Delta H - T\Delta S$

3) when molecules are adsorbed, there is always a decrease in randomness of the molecules.
 $\Delta S < 0$ and $T\Delta S$ is negative. Hence adsorption is exothermic.

⑤ what is Nano catalysis? Give example. ref. P.no: 86

Nano materials such as metallic nano particles, metal oxides etc are used as catalyst in many chemical transformation.
ex: "Lindane" converted into cyclohexane.



⑥ what are active centre? P.no: 82

The surface area of a catalyst is not smooth. It bears steps, cracks and corners. Hence the atoms on such locations of the surface are co-ordinatively unsaturated. So, they have much residual force of attraction. Such sites are called active centre.

⑦ what are the general characteristics of catalyst? P.no: 78

(i) For a chemical reaction, catalyst is needed in very small quantity.

(ii) They may be some physical changes, but catalyst remains unchanged in mass.

(iii) A catalyst itself cannot initiate a reaction.

(iv) A catalyst are said to be specific in nature

(v) A catalyst is highly effective at particular Temperature is called optimum temperature.

⑧ what is the significance of Brownian movement? ref. p: 94

(i) Used to calculate Avogadro number.

(ii) used to confirm kinetic theory which considers the ceaseless rapid movement of molecules that increase with increase in temperature

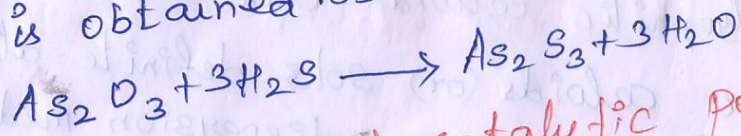
(iii) To understand the stability of colloids.

⑨ what is meant by Helmholtz double layer. ref P.no: 94

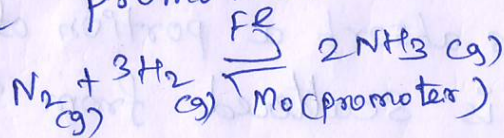
⑩ Differentiate physisorption and chemisorption ref. p. 71. (B.B)

(11) what happens when hydrogen sulphide gas is passed through a solution of arsenic oxide? Name the chemical method.

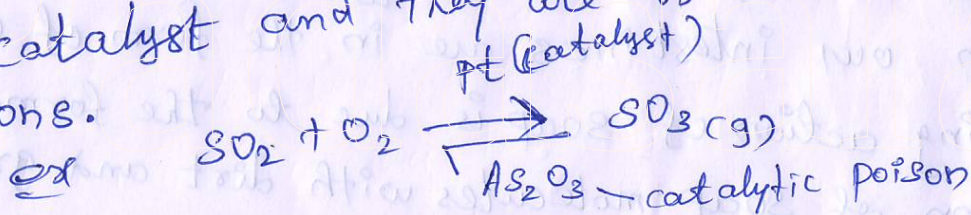
when hydrogen sulphide gas is passed through a solution of arsenic oxide, a yellow coloured arsenic sulphide is obtained as a colloidal solution



(12) what are promoters? and catalytic poison (B.B) ref. P.no: 79
In a catalyst reaction, the presence of a certain substance increases the activity of a catalyst. Such a substance is called a promoter.



* certain substances when added to a catalysed reaction decreases (or) completely destroys the activity of catalyst and they are often known as catalytic poisons.



(13) write a note on electrophoresis.
when electric potential is applied across two platinum electrodes dipped in a hydrophilic sol, the dispersed particle move toward one (or) other electrode.
The migration of sol particles under the influence of electric field is called electrophoresis (or) cataphoresis.

(14) mention the medicinal uses of colloids. P.no: 98
(i) colloidal gold and colloidal calcium are used as tonics
(ii) milk of magnesia is used for stomach troubles.
(iii) Silver sol, protected by gelatin known as Argyrol is used as eye lotion.

(15) write any three Condensation methods of preparation of colloids. ref P.no: 90

- (i) oxidation (ii) Reduction (iii) Hydrolysis
(iv) Double decomposition.

H.E

(16) write about lyophilic colloids. Give any one example. 87
In lyophilic colloids (or) sols definite attractive force (or) affinity exists between dispersion medium and dispersed phase. ex sols of protein and starch.

(17) what is Tyndall effect? 93

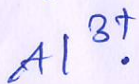
The colloidal particles absorb a portion of light and the remaining portion is scattered from the surface of the colloid. is called Tyndall effect.

(18) Give three uses of emulsions. 98

- (i) Fats in our intestines are in the form of emulsion.
(ii) cleansing action of soap is due to the formation of emulsion of soap molecules with dirt and grease.
(iii) It is used in making of medicines.

(19) Addition of Alum purifies water. why? 98

purification of drinking water is activated by coagulation of suspended impurities in water using alum containing



(20) write a note on catalytic poison (B.B) P.no: 79.

(20) Describe the adsorption theory of catalysis. (B.B). P.no: 81
5 points.

(21) Explain the electrical property of colloids. 94
Helmoltz double layer.

(22) Define Gold number. 96

(23) How will you identify the type of emulsions.

(24) what is the difference b/w a sol and a gel. B.B

A sol - A sol is a type of colloid in which solid is the dispersed phase and liquid is the dispersion medium. ex: Ink, paints.

A gel: A gel is a type of colloid in which liquid is the dispersed phase and solid is the dispersion medium.
ex: cheese, Butter.

(25) why does bleeding stop by rubbing moist alum? B.B

Blood is a colloidal solution of an albuminoid substance. The styptic action of Alum is due to coagulation of blood forming a clot which stops further bleeding.

(26) what happens when a colloidal sol of $\text{Fe}(\text{OH})_3$ and As_2O_3 are mixed?

$\text{Fe}(\text{OH})_3$ sol has positive charge due to preferential adsorption of Fe^{3+} ion while As_2O_3 sol has negative charge due to preferential adsorption of O^{2-} ions. When these two sols get mixed with each other, then neutralisation of charge will happen and precipitate will be formed.

(27) Explain any one method for coagulation.

(i) Addition of electrolyte

(ii) Electrophoresis

(iii) By mixing two oppositely charged sols.

(iv) By boiling - when boiled due to increased collisions, the sol particles combine and settle down.

(28) write a note on

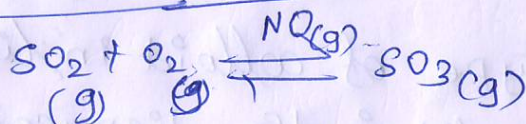
(i) Dialysis - 91

(ii) Electrodialysis - 91

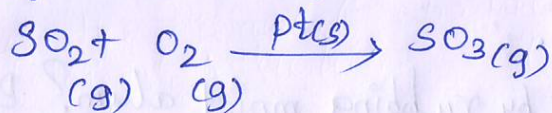
(iii) Ultrafiltration - 91

(29) what are the differences between Homogeneous and Heterogeneous catalysis? B.B (77)

Homogeneous catalysis



Heterogeneous catalysis



(30) what are the factors (or) condition for the colour of the sol?

(i) Size and shape of colloidal particle.

(ii) Wavelength of source of light.

(iii) method of preparation.

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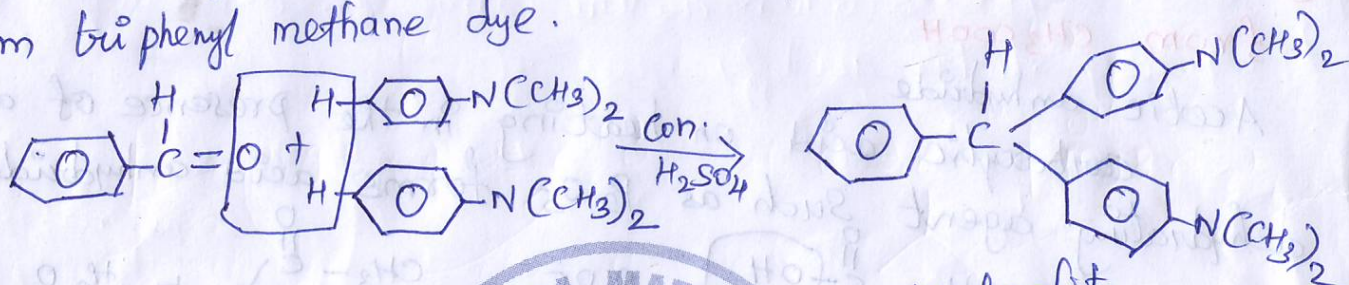
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Additional Sheet

Chapter - 12

① How will you prepare Malachite green dye from benzaldehyde? ref. P.no: 165

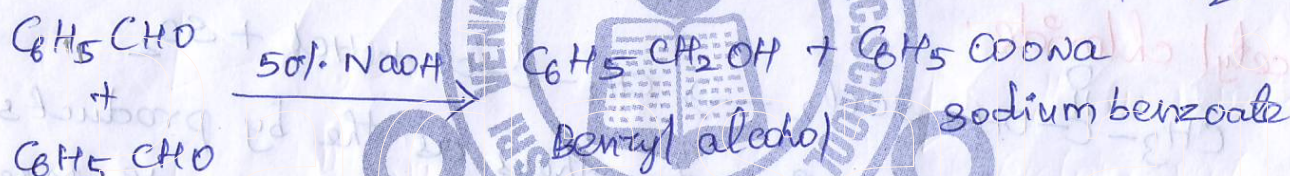
Benzaldehyde Condenses with tertiary aromatic amines like N, N-dimethyl aniline in the presence of strong acids to form triphenyl methane dye.



Malachite green dye.

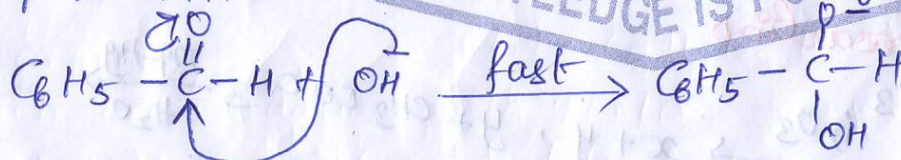
+ H₂O.

② Explain the mechanism of Cannizzaro reaction.

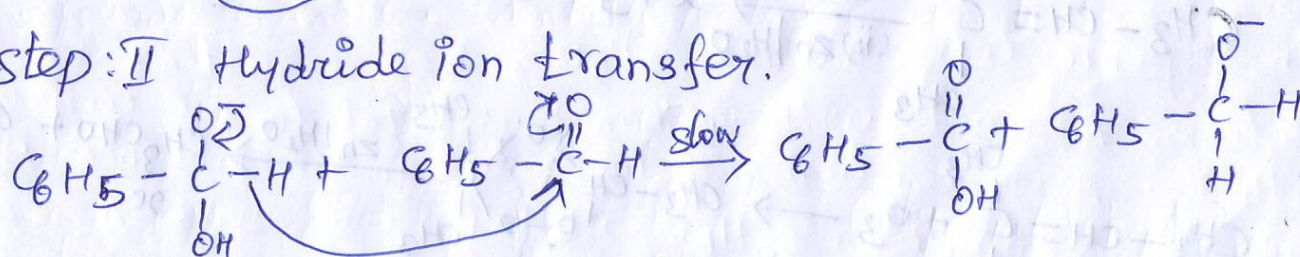


Cannizzaro reaction involves three steps.

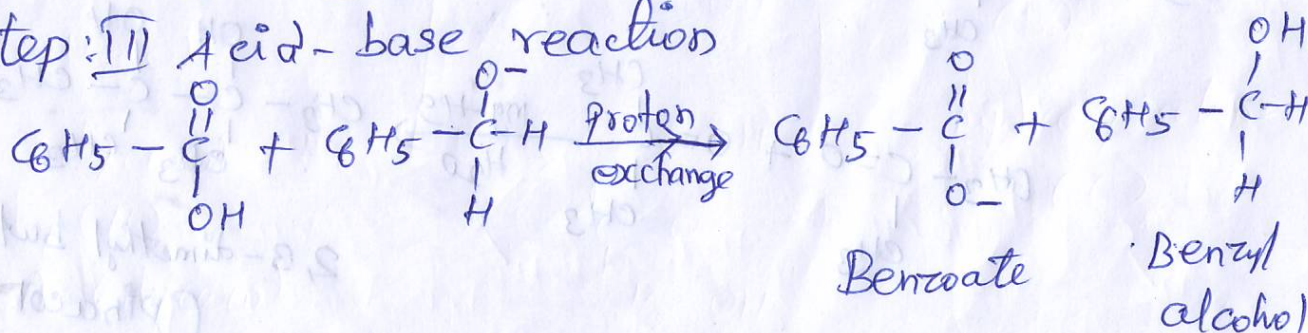
Step: I Attack of OH⁻ on the carbonyl carbon.



Step: II Hydride ion transfer.

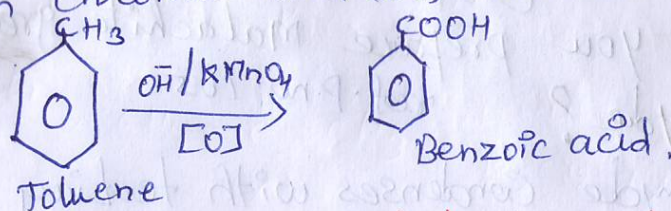


Step: III Acid-base reaction



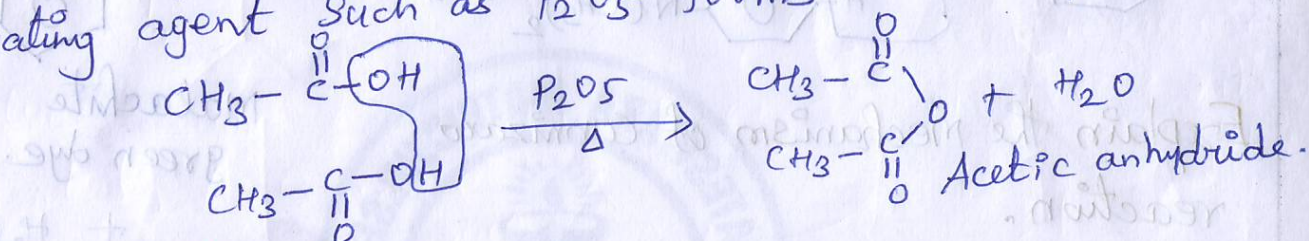
③ How will you prepare Benzoic acid from Toluene?

Benzoic acid can be prepared by vigorous oxidation of Toluene with chromic acid (or) alkaline potassium permanganate.

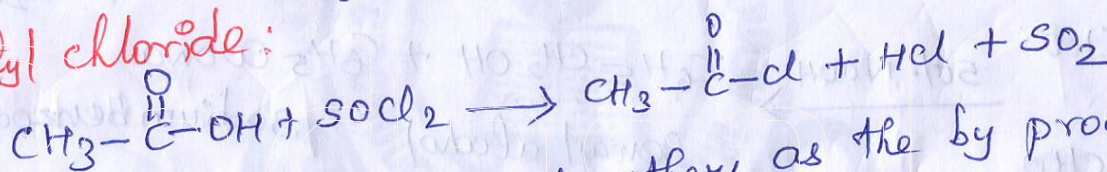


④ How will you prepare acetic anhydride and acetyl chloride from CH_3COOH

Acetic anhydride carboxylic acid on heating in the presence of a strong dehydrating agent such as P_2O_5 forms acid anhydride.

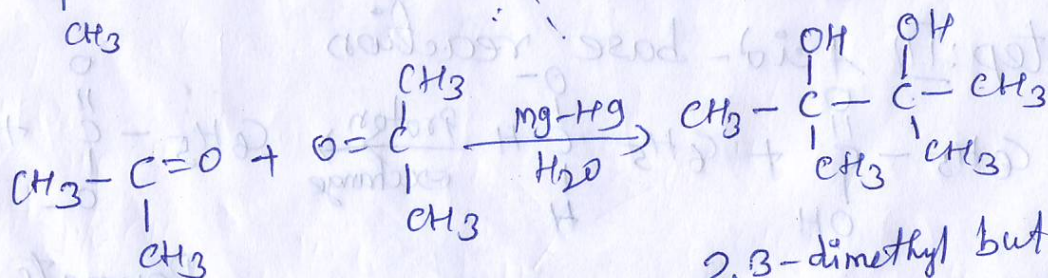
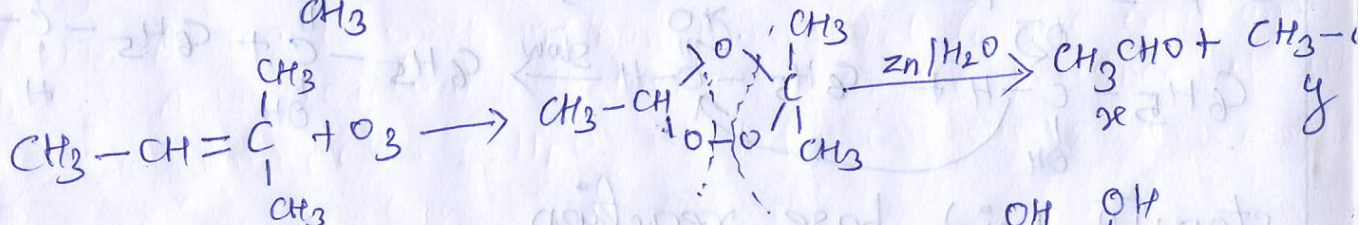
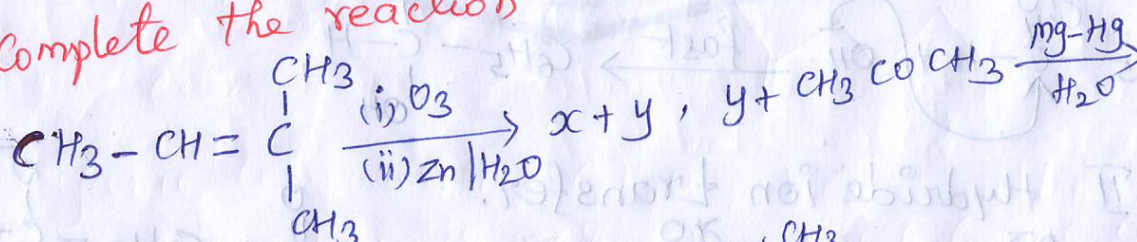


Acetyl chloride:



This method is superior to others as the by products being gases escape leaving the acid chloride in the pure state.

⑤ Complete the reaction



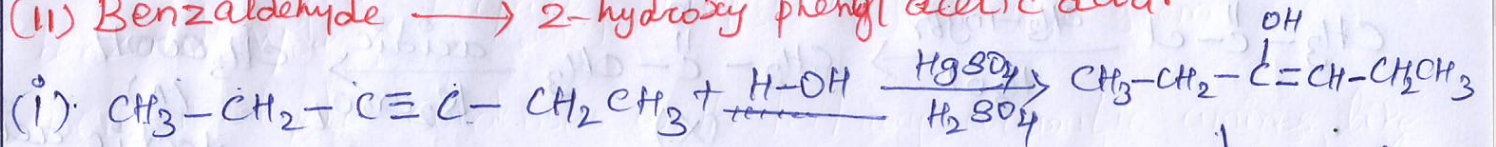
2,3-dimethyl butan-2-ol (pinacol)

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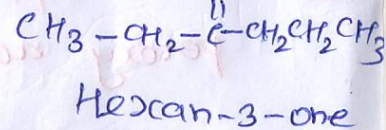
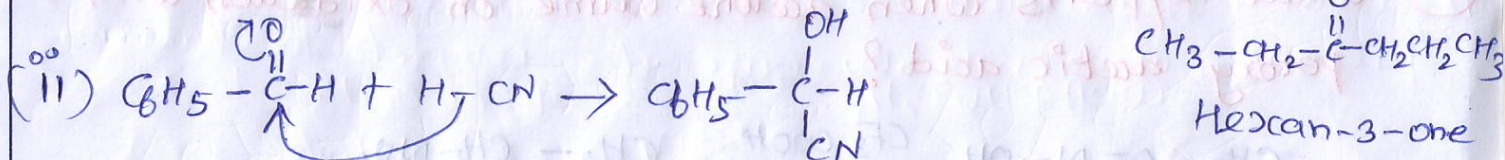
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Additional Sheet

⑥ How are the following conversions effected?

(i) Hex-3-yne $\rightarrow$ hexan-3-one(ii) Benzaldehyde $\rightarrow$ 2-hydroxy phenyl acetic acid.

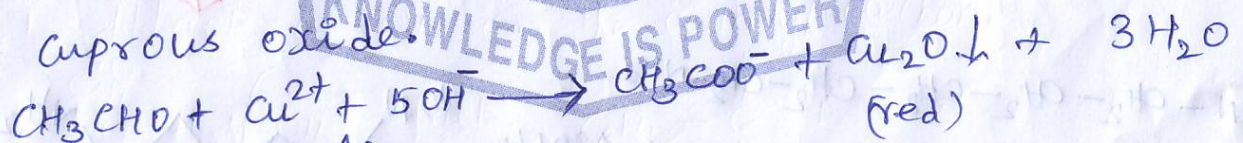
Isomerises



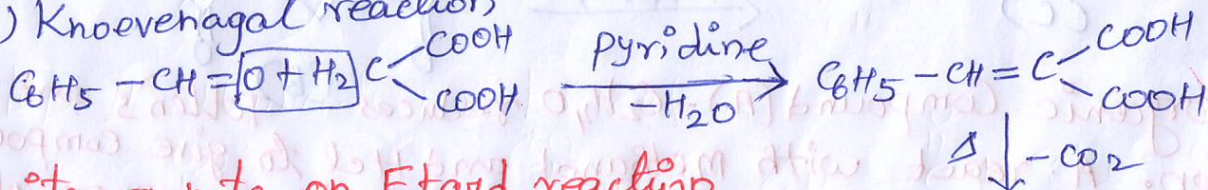
⑦ Write a note on (i) Benedict's solution test (ii) Knoevenagel reaction

(i) Benedict's solution test (ref. p.no: 167)

Benedict's solution is a mixture of CuSO_4 + Sodium citrate + NaOH . Cu^{2+} is reduced by aldehyde to give red precipitate of cuprous oxide.

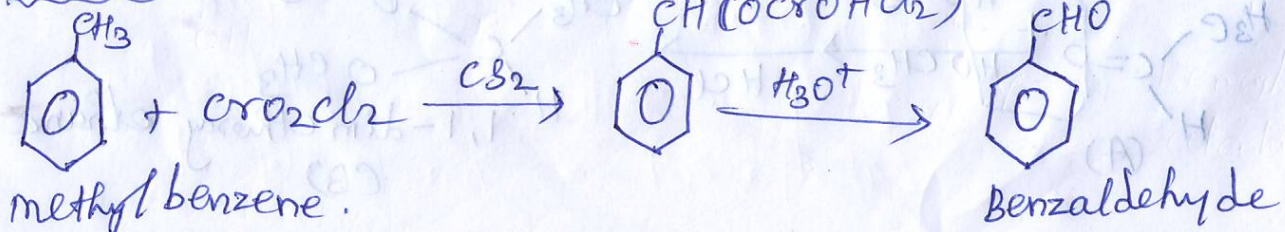


(ii) Knoevenagel reaction

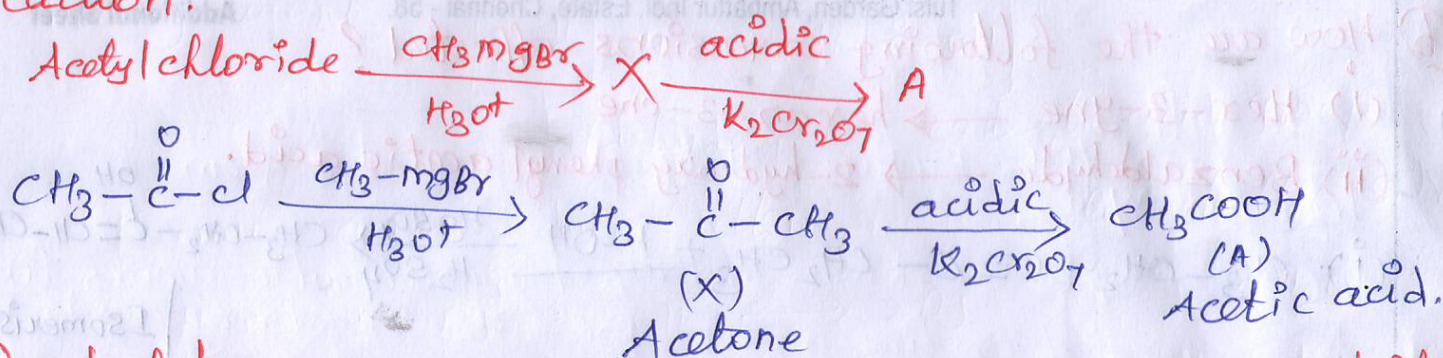


⑧ Write a note on Etard reaction

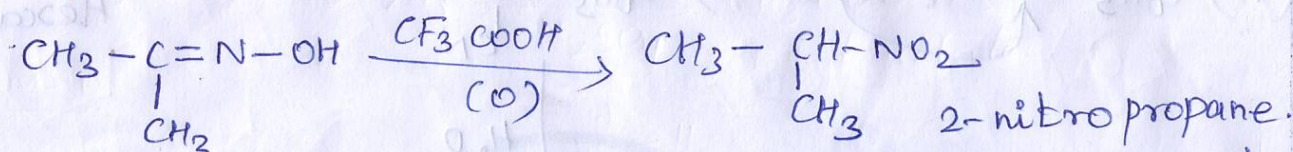
When chromyl chloride is used as an oxidising agent, toluene gives benzaldehyde. This reaction is called

Etard reaction

7) what will be the product (X and A) for the following reaction?

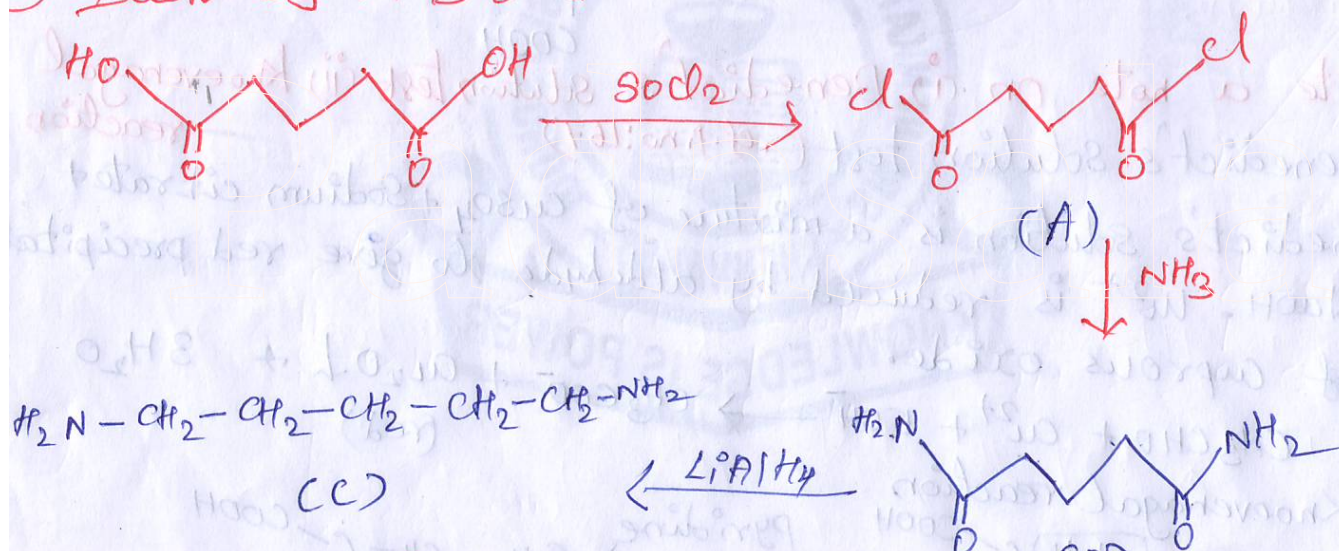


8) what happens when acetone oxime on oxidation with trifluoro peroxy acetic acid?

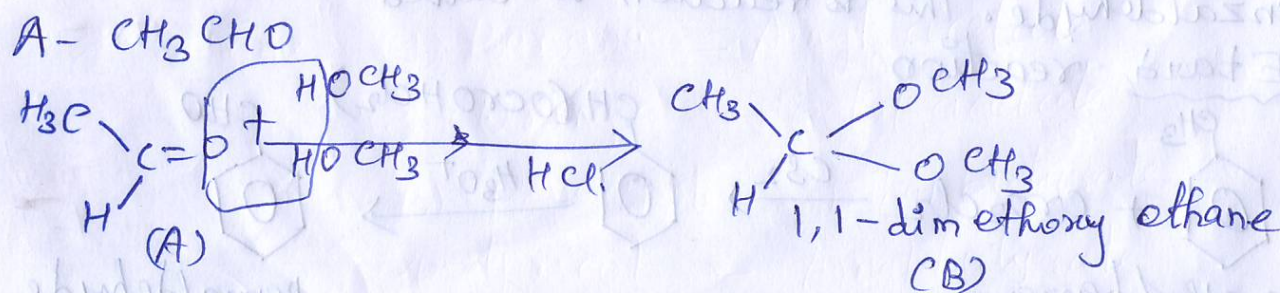


Acetone oxime oxidised with CF_3COOOH gives 2-nitropropane.

1) Identify A, B and C



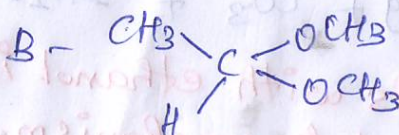
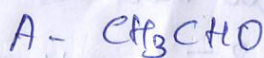
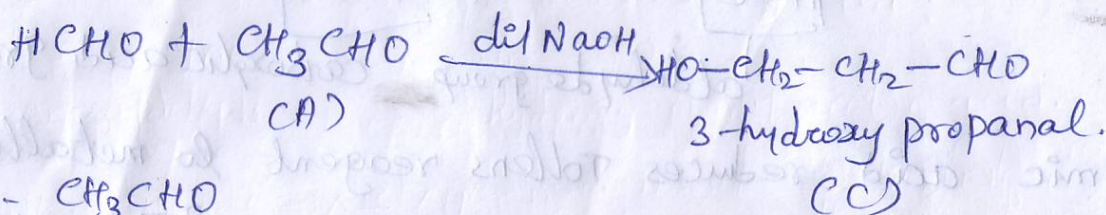
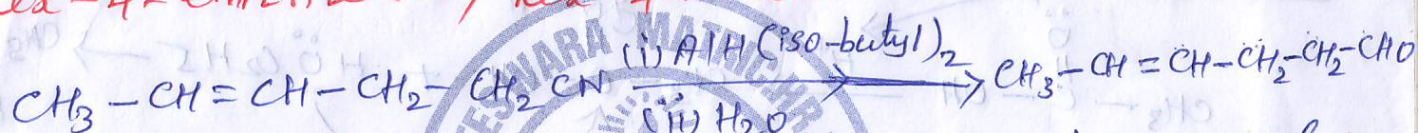
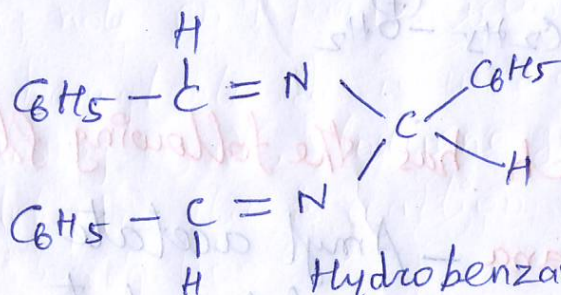
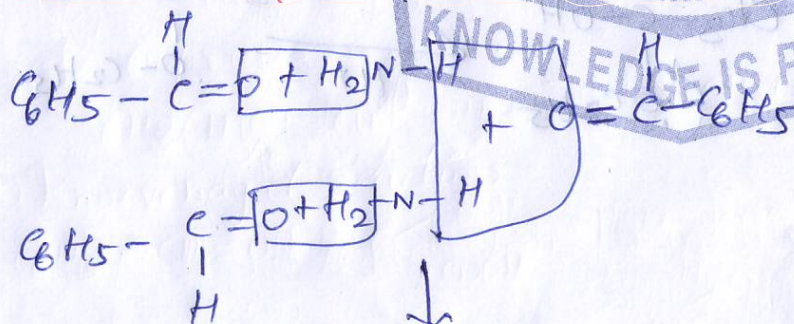
2) An organic Compound (A) - $\text{C}_2\text{H}_4\text{O}$ reduces (B) Tollen's and Fehling's solution. A reacts with methanol and HCl to give compound (B) $\text{C}_4\text{H}_{10}\text{O}_2$. A on reaction with methanol in the presence of dil. NaOH to give compound (C) - $\text{C}_3\text{H}_6\text{O}_2$. Identify compounds A, B and C with necessary reactions.



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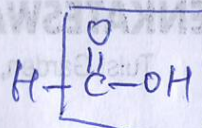
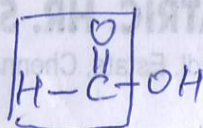
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Additional Sheet

**13** How is the following conversion effected? ref. p. no: 151hex-4-enitrile $\rightarrow$ hex-4-enal**14** How are the following conversion effected? hex-4-enal.(i) Benzene $\rightarrow$ acetophenone ref. p. no: 153(ii) Benzaldehyde $\rightarrow$ hydrobenzamide. (ref. p. no: 159)**15** why formic acid act as strong reducing agent? Give one equation to show its reducing property. R no: 177

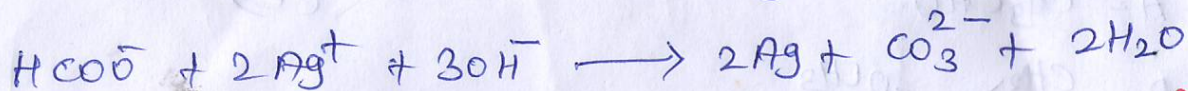
Formic acid contains both an aldehyde as well as an acid group. like other aldehyde formic acid can

easily be oxidised and therefore act as a strong reducing agent

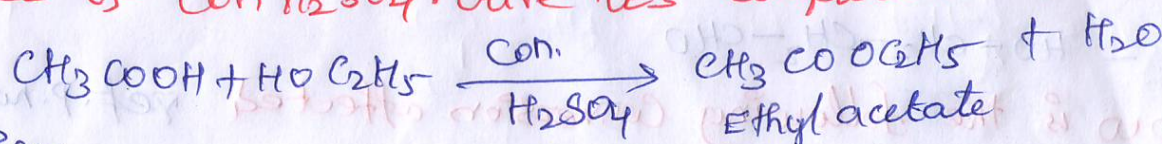


aldehyde group carboxylic acid group

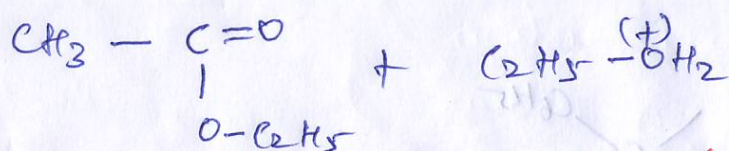
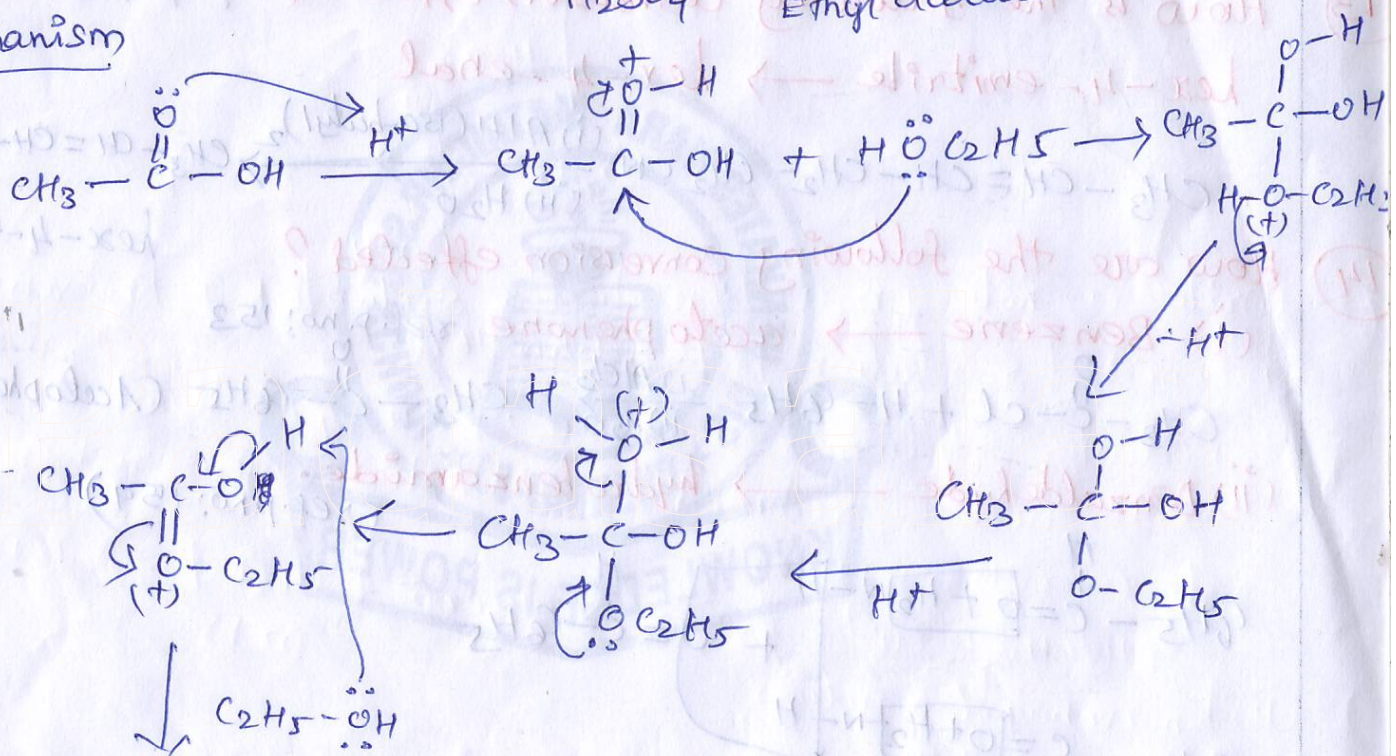
or Formic acid reduces Tollens reagent to metallic silver



(16) what happens when ethanoic acid reacts with ethanol in the presence of $\text{con H}_2\text{SO}_4$. Give its complete mechanism.



Mechanism



(17) Name the ester which has the following flavour?

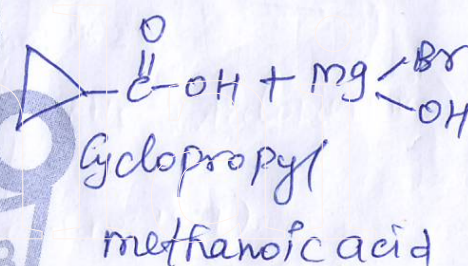
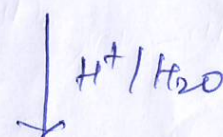
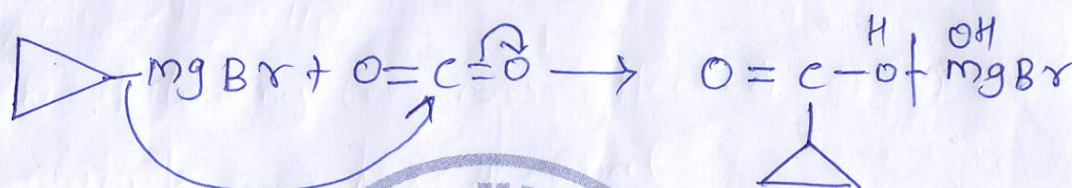
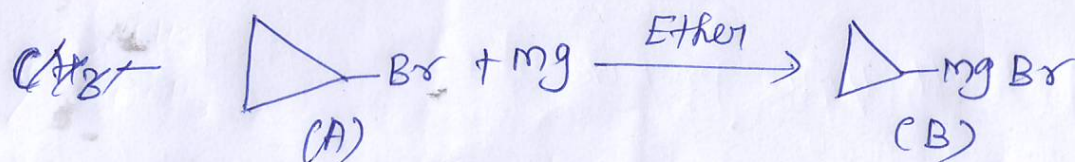
- ~~(1) Banana~~ (1) Banana — Amyl acetate
 (2) Orange — Octyl acetate
 (3) pineapple — Ethyl butyrate
 (4) Apricot — Amyl butyrate

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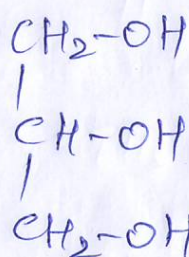
Additional Sheet

18) An organic compound C_3H_5Br (A) on treatment with Mg in dry ether gives which on treatment with CO_2 followed by acidification gives (C). Identify A, B & C and write possible equations.



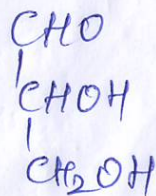
(C)

19) An organic compound (A) - $C_3H_8O_3$ used as a sweetening agent, which on oxidation with Fenton's reagent gives a mixture of compounds B and C. Identify A, B & C. Write possible reactions.

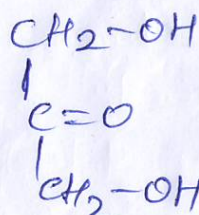


Glycerol
(A)

(O)



Glyceraldehyde
(B)



Dihydroxy acetone
(C)

A - Glycerol

B - Glyceraldehyde, C - Dihydroxy acetone.

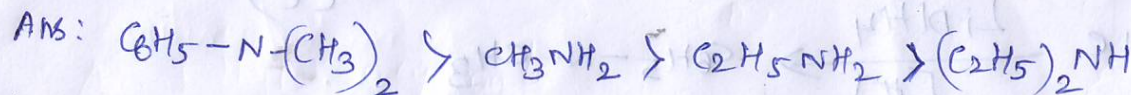
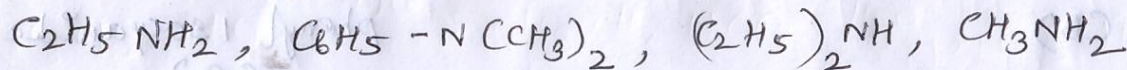
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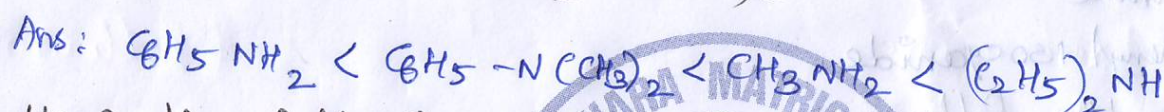
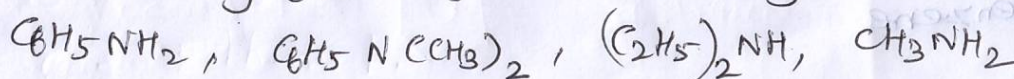
Additional Sheet

Chapter - 13

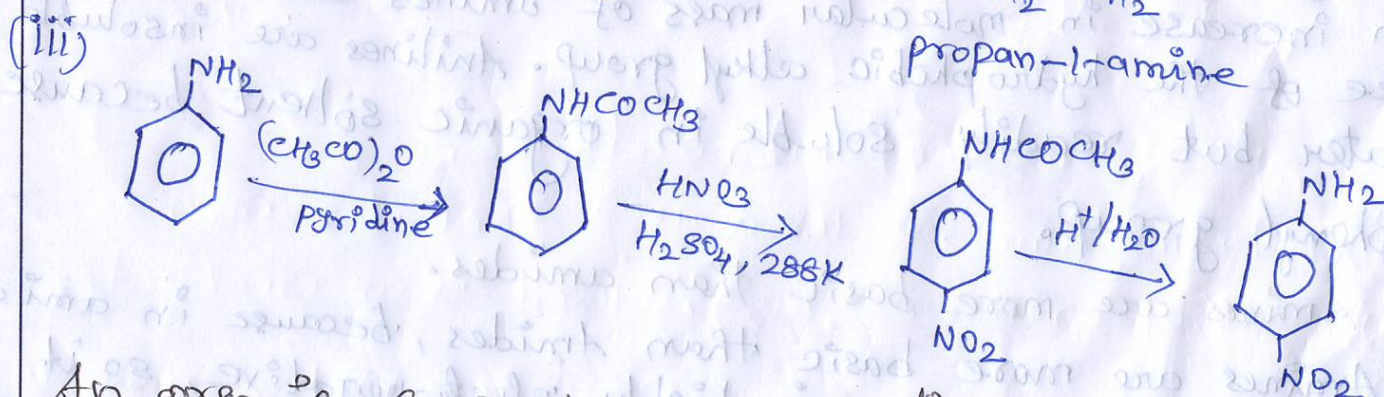
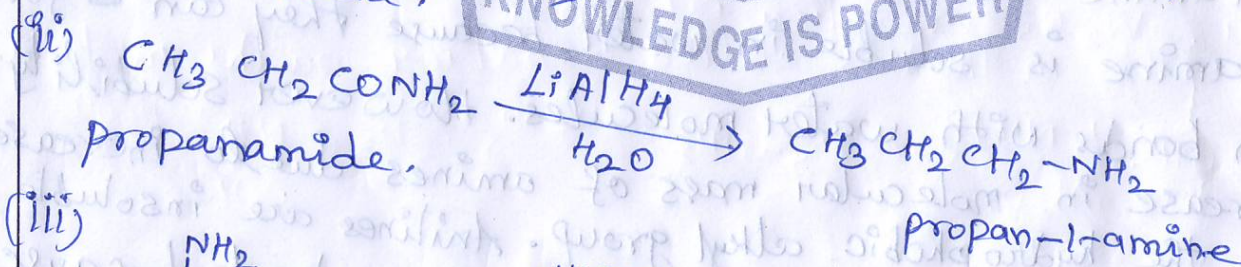
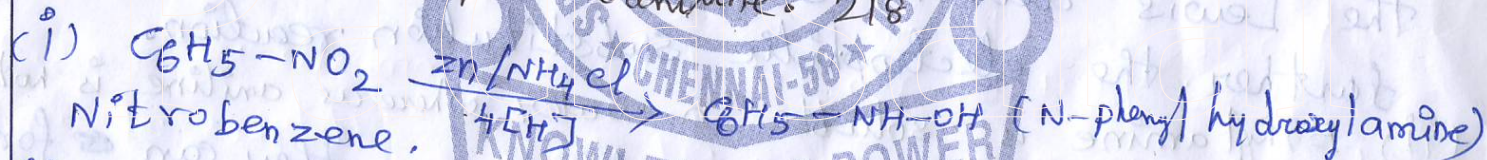
① Arrange the following

(i) In decreasing order of the pK_b values:

(ii) increasing order of basic strength

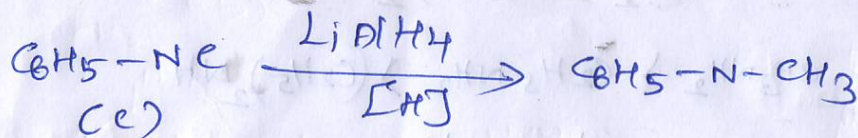
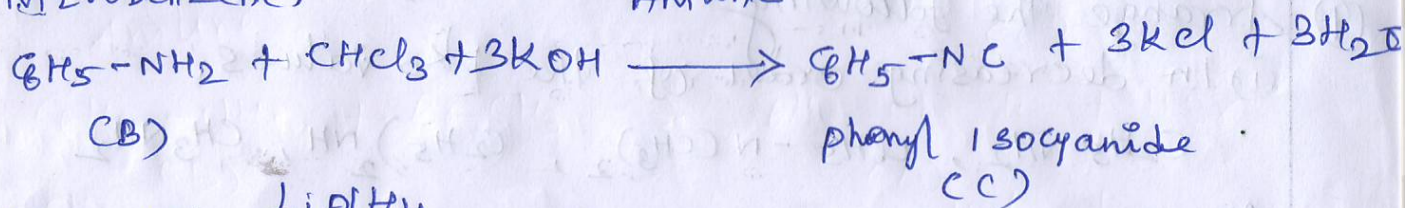
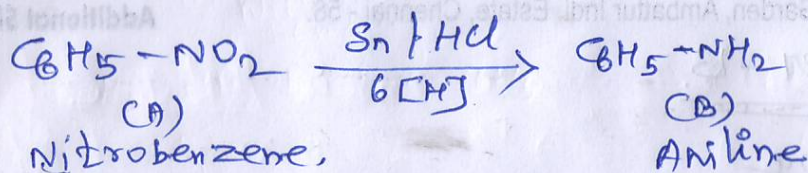


How the following conversions are affected?

(i) Nitro benzene $\rightarrow$ N-phenyl hydroxyl amine. 203(ii) Propanamide $\rightarrow$ propan-1-amine(iii) Aniline $\rightarrow$ p-nitroaniline. 218

③ An organic compound (A) on reduction gives p-nitro aniline. Compound (B). B on treatment with $CHCl_3$ and KOH gives compound (C). C on catalytic reduction gives N-methyl aniline. Identify A, B and C write its reaction.

Compound (A) - Nitrobenzene.



A - Nitrobenzene

B - Aniline

C - phenyl isocyanide.

④ Account the following

(i) Aniline does not undergo Friedel-Craft reaction. 218

Aniline does not undergo Friedel-Craft reaction. We know aniline is basic in nature and it donates its lone pair to the Lewis acid AlCl_3 to form an adduct which inhibits further the electrophilic substitution reaction.

(ii) Ethylamine is soluble in water whereas aniline is not. 211
Ethylamine is soluble in water, because they can form hydrogen bonds with water molecules. However solubility decreases with increase in molecular mass of amines due to increase in size of the hydrophobic alkyl group. Anilines are insoluble in water but readily soluble in organic solvent because of phenyl group.

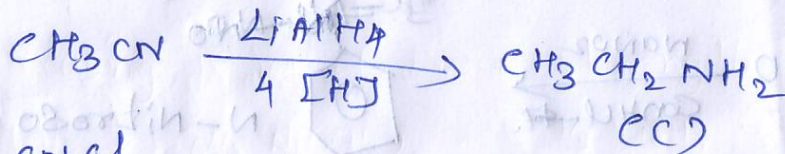
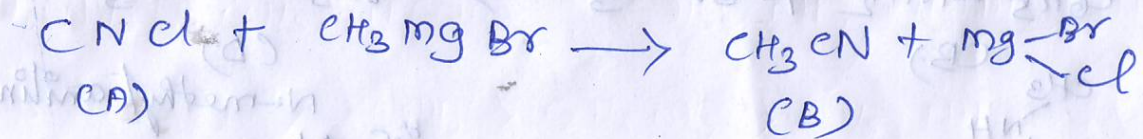
(iii) Amines are more basic than amides.
Amines are more basic than amides, because in amides, the carbonyl group is highly electronegative, so it has greater power to draw electrons towards it, making the lone pair of amide nitrogen less available to accept a proton.

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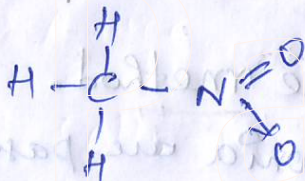
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Additional Sheet

- 5) An organic compound (A) - CNCl react with methyl magnesium bromide to give compound (B) - $\text{C}_2\text{H}_5\text{N}$. B upon catalytic reduction to give compound (C) - $\text{C}_2\text{H}_7\text{N}$. C gives carbylamine test. Identify compound A, B & C.

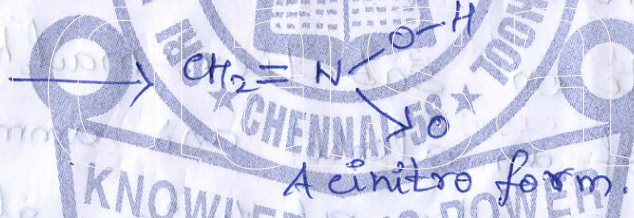
A - CNCl B - CH_3CN C - $\text{CH}_3\text{CH}_2\text{NH}_2$

- 6) There are two isomers with the formula CH_3NO_2 . How will you distinguish between them.



Nitro form

Nitro form



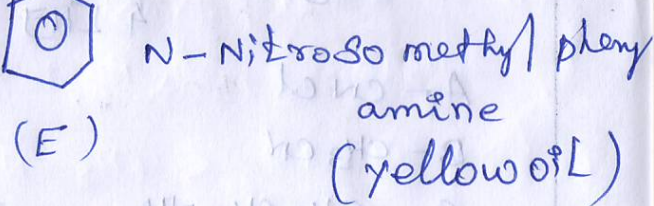
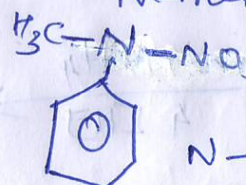
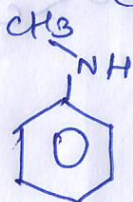
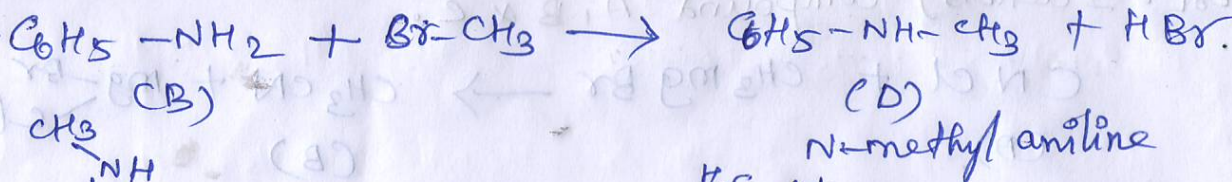
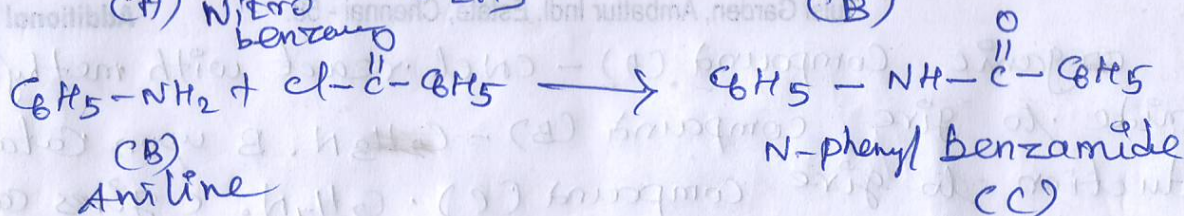
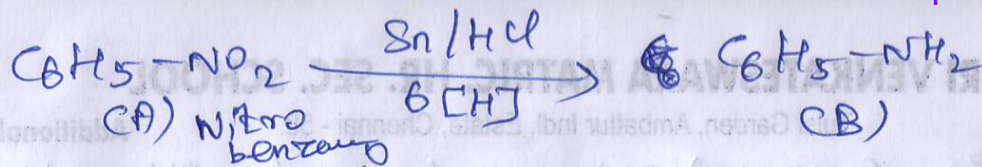
Acinitro form.

Ac-initro form

more acidic

1. Less acidic
2. Dissolves in NaOH slowly
3. Decolourises FeCl_3 solution with FeCl_3 , gives reddish brown colour.

- 7) An aromatic nitro compound (A) on reduction with Sn/HCl gives compound (B) $\text{C}_6\text{H}_7\text{N}$, which on treatment with Benzoyl chloride in the presence of pyridine to give compound (C). Compound (C) on treatment with CH_3Br to give compound (D) which further react with NaNO_2/HCl to give compound (E) with yellow oil liquid. Identify A to E and write the reactions.



A - Nitrobenzene

B - Aniline

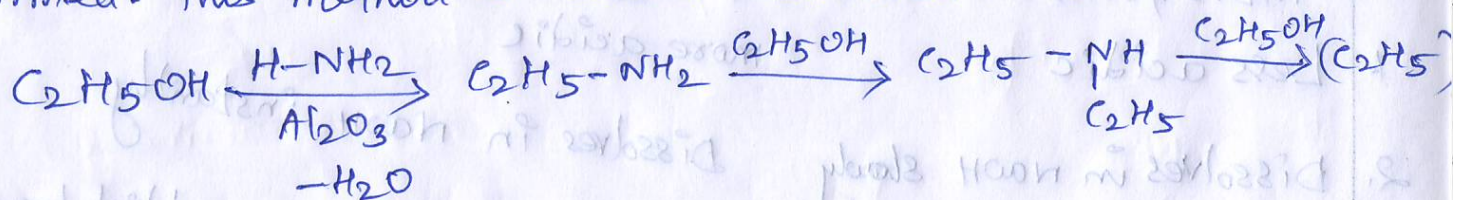
C - N-phenyl benzamide

D - N-methyl aniline

E - N-Nitroso methyl phenyl amine.

⑧ write a note on sabatier - mailhe method.

When vapour of an alcohol and ammonia are passed over alumina, W_2O_5 (or) silica at 400°C , all types of amines are formed. This method is called Sabatier - mailhe method.



⑨ write the uses of nitro alkane. 228.

(i) Nitromethane, is used as a fuel for cars.

(ii) chloropicrin (CCl_3NO_2) is used as an insecticide.

(iii) Nitro ethane is used as a fuel additive and precursor to explosive.

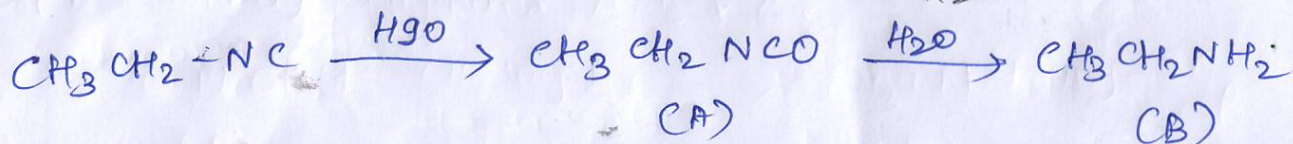
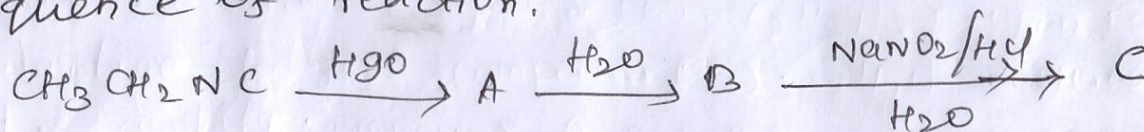
(iv) 4% solution of ethyl nitrite in alcohol is known as sweet spirit of nitre and is used as diuretic.

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Additional Sheet

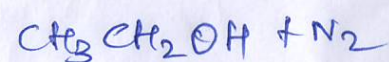
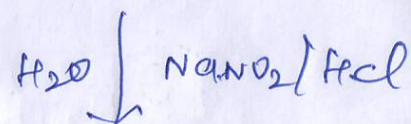
(10) Identify Compounds A, B and C in the following sequence of reaction.



A - Ethyl Iso cyanate

B - Ethyl amine

C - Ethanol.



Ethanol

(C)



chapter - 14

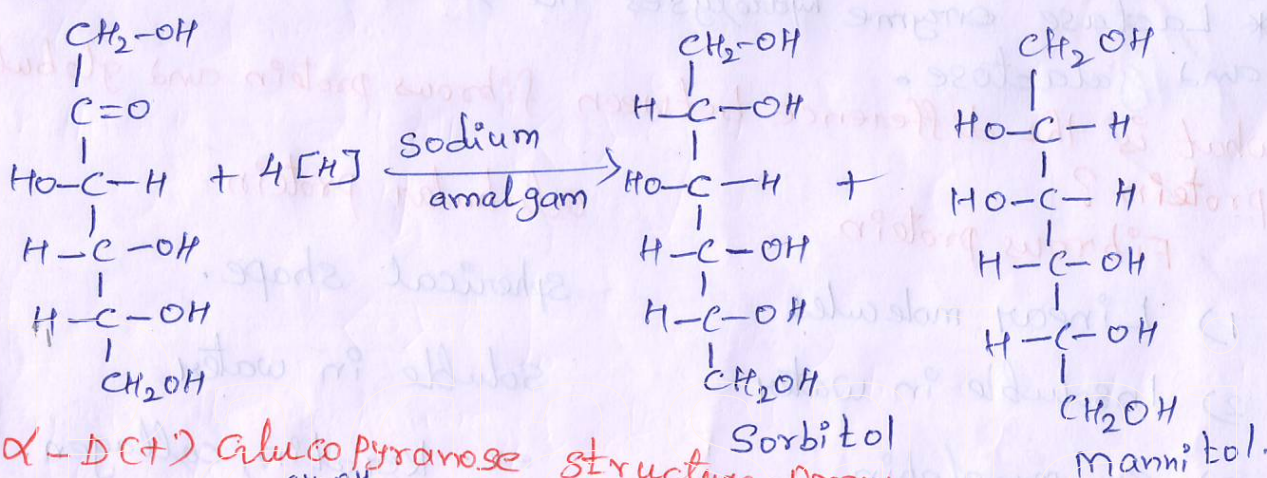
① Name the vitamins whose deficiency cause.

(i) pellagra - Vitamin B₃ (ii) Beri - Beri - Vit B₁ (iii) Night blindness - Vit A

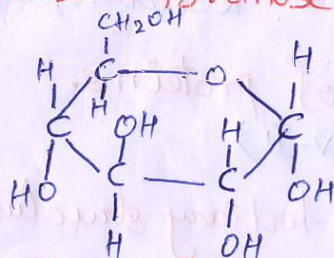
② What are enzymes? Explain the mechanism of enzyme action.
refer p.no: 257

③ What happens when fructose is partially reduced with sodium amalgam and water? P.no: 245

Partial reduction of fructose with sodium amalgam and water produces mixtures of Sorbitol and mannitol which are epimers at the second carbon.



④ α -D(+) Glucopyranose structure. Draw.



⑤ Mention the biological importance of Lipids. refer P.no: 258 (V-II)

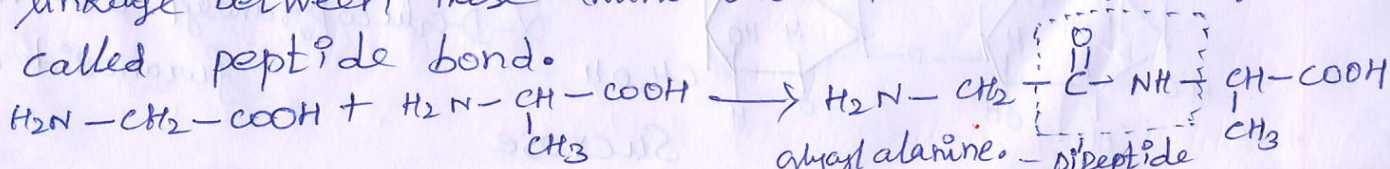
⑥ What are hormones? Give example. P.no: 266.

Hormone is an organic substance that is secreted by one tissue. It limits the blood stream and induces a physiological response (eg. growth and metabolism) in other tissue.

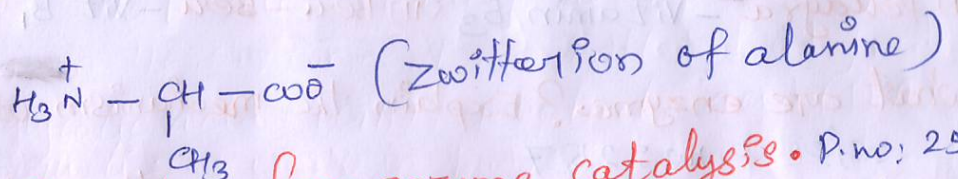
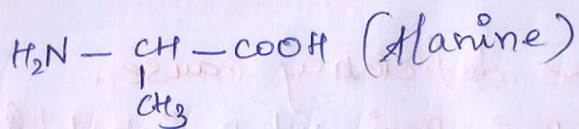
ex: Endocrine, Paracrine, etc.

⑦ Write a short note on peptide bond.

The carboxyl group of the first amino acid react with amino group of the second amino acid to give an amide linkage between these amino acids. This amide linkage is called peptide bond.



⑧ Write the zwitter ion structure of Alanine.



⑨ Give two examples for enzyme catalysis. P.no: 257

* Carbonic anhydrase enzyme catalyses the interconversion of carbonic acid to water and carbon dioxide.

* Sucrase enzyme catalyses the hydrolysis of sucrose into glucose and fructose.

* Lactase enzyme hydrolyses the lactose into glucose and galactose.

⑩ What is the difference between fibrous protein and globular protein?

Fibrous protein

- 1) Linear molecules
- 2) Insoluble in water
- 3) ex: myoglobin

Globular protein

spherical shape.

soluble in water

ex: Keratin, collagen.

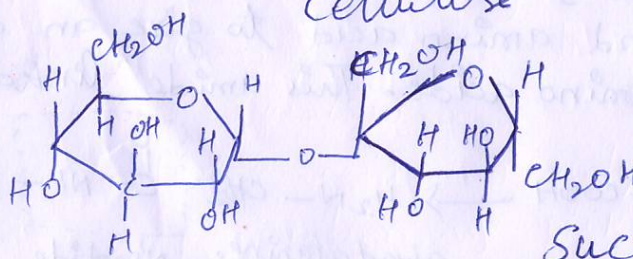
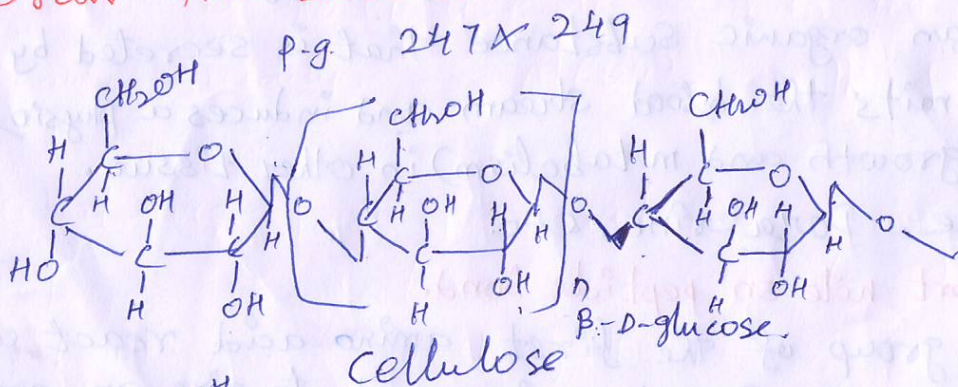
⑪ Write a note on denaturation of proteins.

refer p.no: 256 (V-II)

⑫ Explain primary, secondary and tertiary structure of proteins.

refer page no: 254 and 255.

⑬ Draw the structure of cellulose and Sucrose.



α -D-glucopyranosyl- β -D-fructofuranoside.

④ write a note on formation of α -helix.
refer P.no: 254

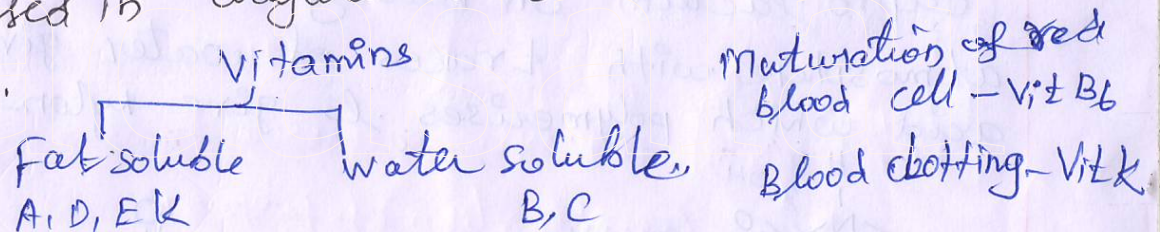
- ⑮ what are the differences between Hormones and Vitamins.
- (1) Vitamins have catalytic action. Hormones have no catalytic action.
- (2) Vitamins are small organic compounds that cannot be secreted by ~~the~~ body. Hormones are secreted by one tissue to the blood. ex: Vit A, B, C, etc. ex: Insulin.

⑯ write the differences between DNA & RNA (B.B) P. 264

⑰ write the cyclic structure of Fructose

α -D-Fructose

⑱ How vitamins are classified? Name the Vitamins that are used in coagulation of blood, and maturation of red blood cell.



⑲ Name the base & present in DNA. which one of these are not present in DNA.

Adenine, Thymidine
Guanine, cytosine,
~~Thiamine~~

Ch-15

- ① What are bio degradable polymers? Give two examples.

The materials that are readily decomposed by micro organism in the environment are called biodegradable
ex poly glycolic acid (PGA), poly lactic acid (PLA)

- ② How the tranquilizers work in body?

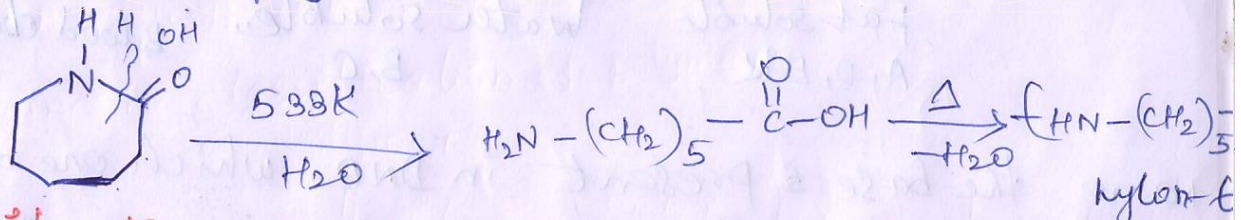
Tranquilizers act on the central nervous system by blocking the neurotransmitter dopamine in the brain. It is used in treatment of stress, depression etc.

- ③ Write a note on TFM value?

TFM value is defined as the total amount of fatty matter that can be separated from a sample after splitting with mineral acids. Higher the TFM quantity in the soap, better is its quality.

- ④ How nylon-6 is prepared?

Capro lactam on heating at 533K in an inert atmosphere with traces of water gives amino cap acid which polymerises to give nylon-6



- ⑤ Write the mode of action and uses of antacids. Give example.

Antacids neutralize the acid in the stomach that causes acidity. ex $\text{Al}(\text{OH})_3$, milk of magnesia, Ranitidine.

- ⑥ What are food preservatives?

Food preservatives are capable of inhibiting, retarding (or) arresting the process of fermentation, acidification (or) other decomposition of food by growth of micro organism.

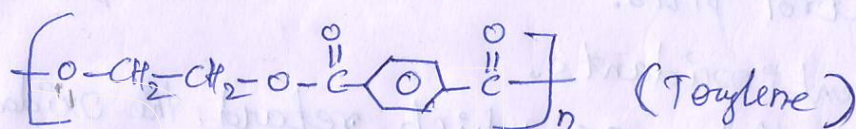
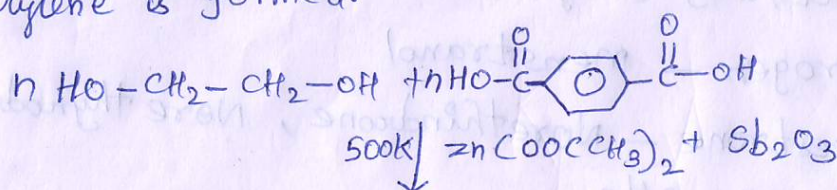
ex Acetic acid is mainly preservatives for the preparation of pickles and vegetables.

⑦ Define the term therapeutic index. How is it related to the safety of the drug?

Therapeutic index, which is defined as the ratio between the maximum tolerated dose of a drug (above which it become toxic) and the minimum curative dose (below which the drug is ineffective). Higher the value of therapeutic index, safer is the drug.

⑧ How is terylene prepared?

When ethylene glycol and terephthalic acid heated at 500K in the presence of zinc acetate and antimony trioxide catalyst terylene is formed.



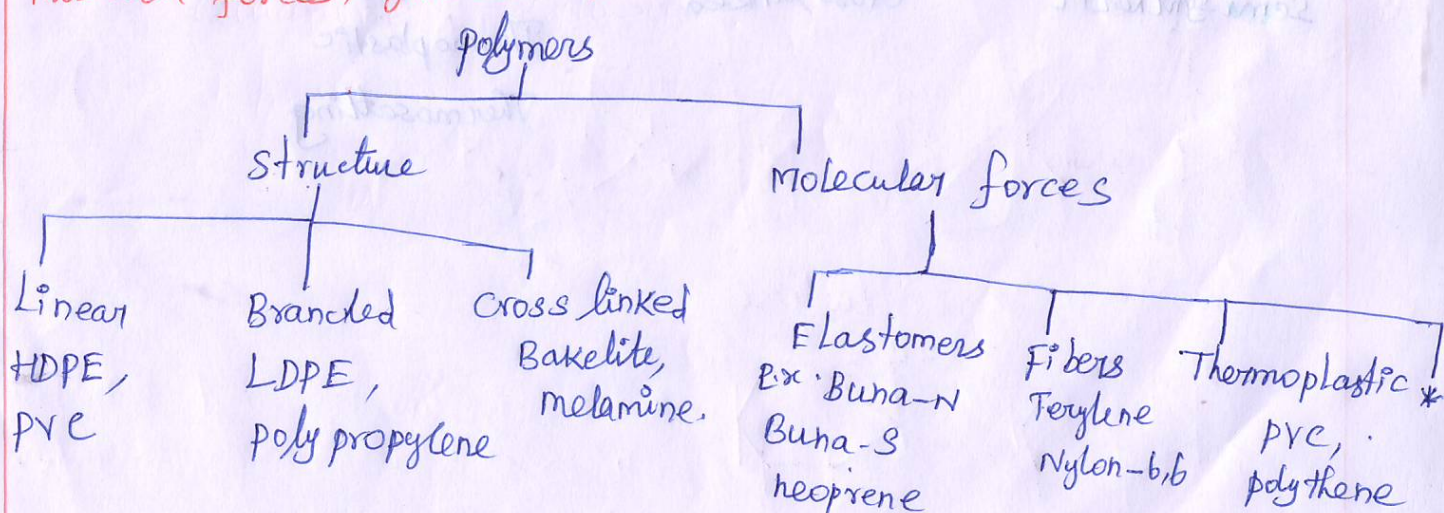
⑨ Explain the mechanism of cleansing action of soaps and detergents? P.no: 284 & 285

⑩ What are Antiseptics? Give an example.

* Antiseptic stop (or) slow down the growth of micro organism and applied to living tissue. It used to reduce risk of infection during surgery and other procedures.

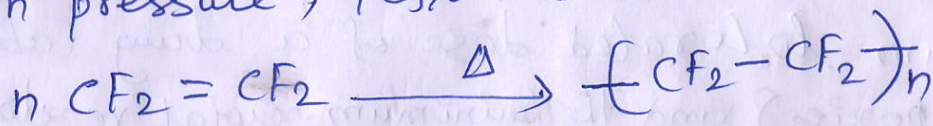
ex Hydrogen peroxide, benzalkonium chloride.

⑪ How polymers are classified on the basis of structure and molecular forces, give examples of each one.



* Thermosetting → ex. Bakelite, melamine

- (12) what is Teflon? How is it prepared?
 when tetrafluoro ethene is heated with oxygen under high pressure, Teflon is obtained.



It is used in preparing Non-stick utensils.

- (13) Give an example and uses of Antihistamine.

chlorizine, lerochlorizine

It is used to provide relief from the allergic effect.

- (14) what are antifertility drugs? Give examples. (B.B)

ex Synthetic oestrogen - mestranol

Synthetic progesterone - Norethindrone, Norethynodrel
 used in birth control pills.

- (15) write a note on antioxidants.

Antioxidants are substances which retard the oxidative deteriorations of food. ex BHT (Butylhydroxy toluene)

BHA (Butylated hydroxy anisole)

- (16) Explain^{about} the classification of polymer.

Polymer			
Sources	Structure	Molecular force	Mode of Synthesis
Natural	Linear		Addition
Synthetic	Branched	Elastomer	condensation
Semi synthetic	Cross linked	Fibers-polymer	
		Thermoplastic	
		Thermosetting	