

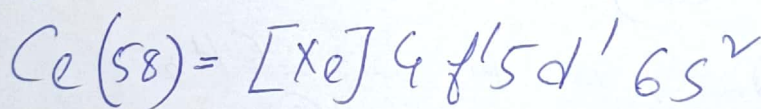
2024 PRE-FINAL EXAMINATION Chemistry

Q1 Chemical name of vitamin C?

Ans : Ascorbic acid; protect cells and keeping them healthy.

Q2 Name a lanthanoid which exhibit (+4) O.S. and write down the electronic configuration (M^{4+})

Ans Cerium exhibit (+4) state because after losing 4 electrons it obtain stable noble gas configuration.



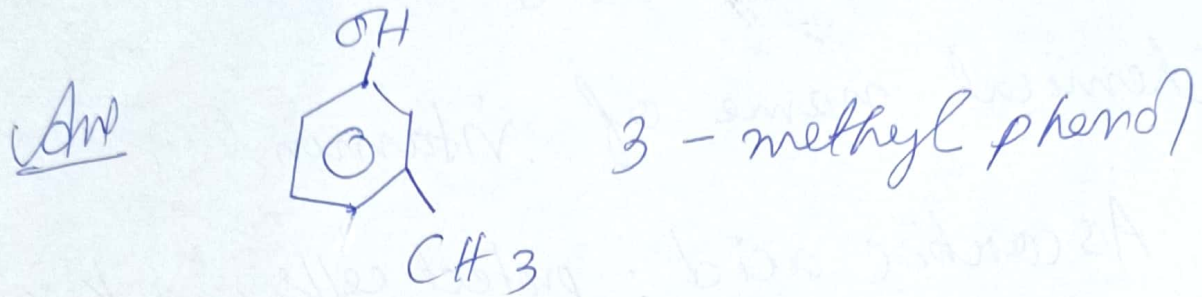
Palder classes

used as a pigment, flat-screen TV's, low energy lights bulbs and flood lights

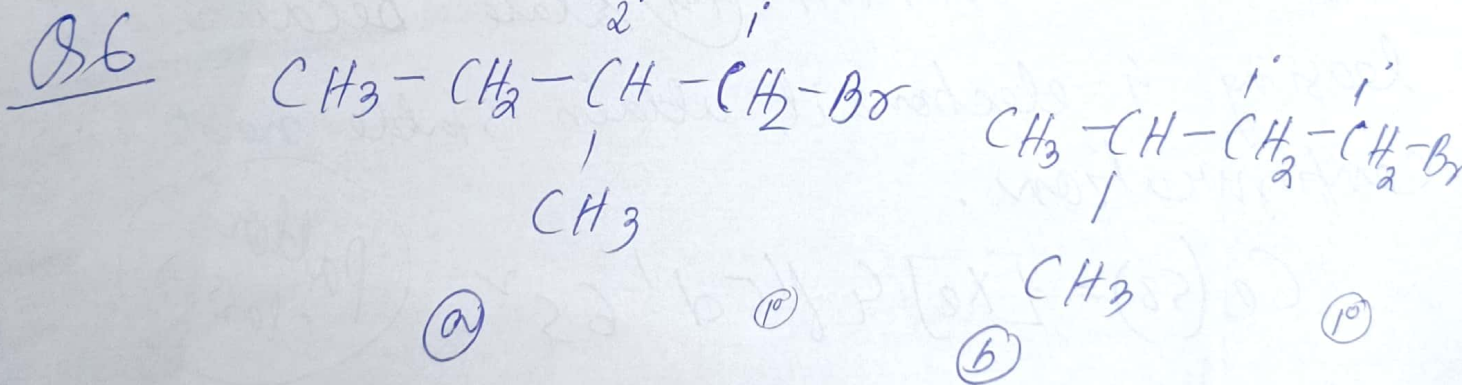
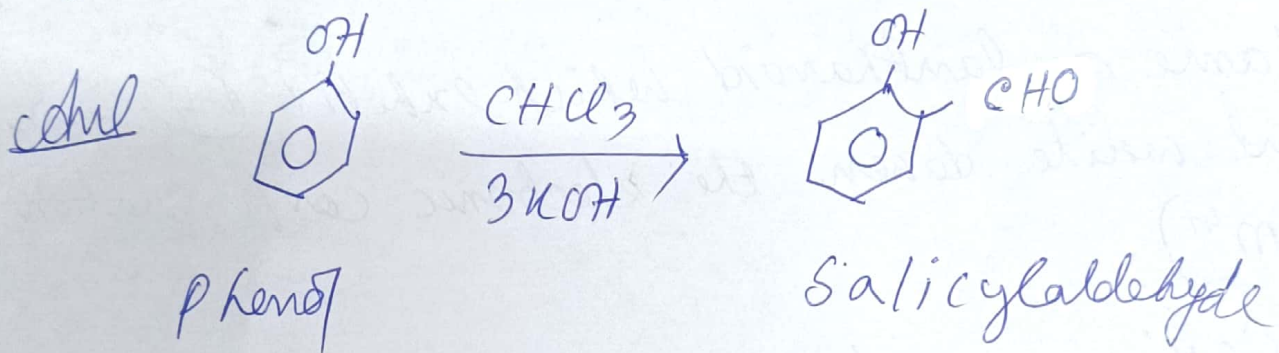
Q3 When does Raoult's law become a special case of Henry's law?

Ans Raoult's law, $p = p^0 \cdot x$ when
Henry's law, $p = k_H \cdot x$ when $p^0 = k_H$ both are same

Q4 What is the IUPAC name of
m-Cresol



Q5 Write Reimer-Tiemann reaction

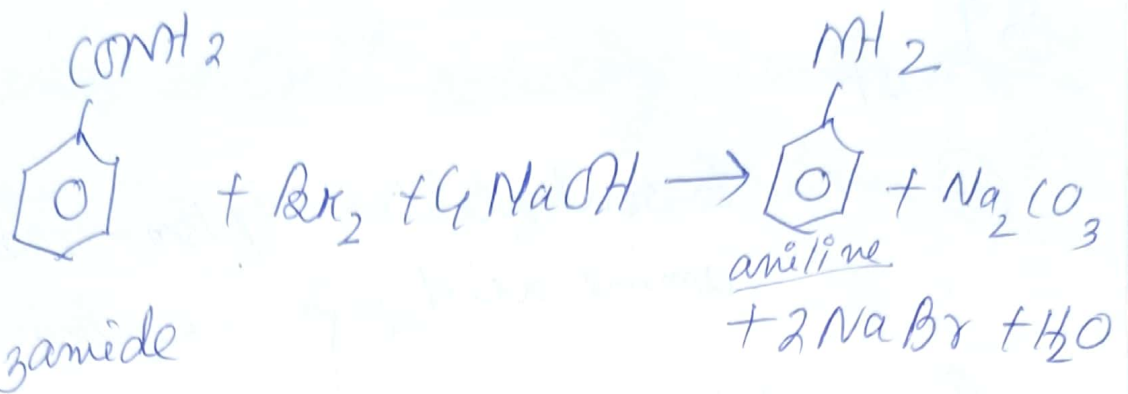


which will undergoes $\text{S}_{\text{N}}2$ faster
b) > a

Q7 What is the structure and IUPAC name of the amine produced by the Hoffmann bromamide degradation of Benzamide

Term
Classes

chem



IUPAC name of Aniline is Phenylamine

Q 8 Find out half life of a first order reaction with rate constant
 $k = 2.31 \times 10^{-14} \text{ s}^{-1}$.

Ans $T_{1/2} = \frac{0.693}{k} = \frac{0.693}{2.31 \times 10^{-14}} = 3 \times 10^{13} \text{ seconds}$

Q 9 Globular

- (i) Main structural units of animal tissues
- (ii) soluble in water
- (iii) Insulin and Albumin
- (iv) α -helix str.

Fibrous

- (i) These are act as enzymes, antibodies
- (ii) insoluble in water
- (iii) Keratin and myosin
- (iv) β -pleated str.

Q9 OR

(ii) Essential amino acid

(i) can't be made by body

(ii) known as indispensable amino acid

(iii) 9 Essential amino acids are known out of 20

(iv) Repair muscle tissues

Non-essential amino acid

(i) Can be made by the body

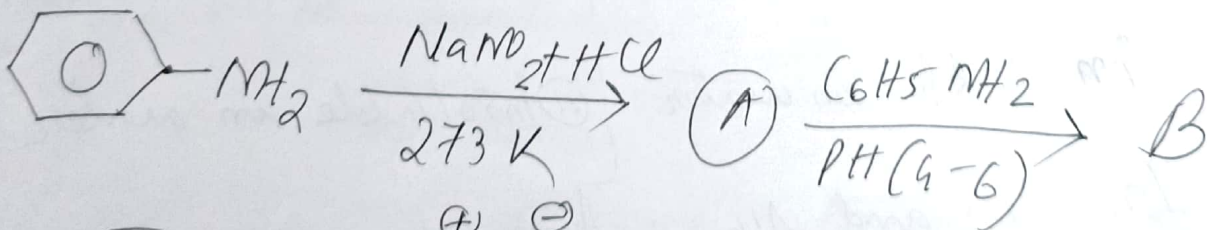
(ii) known as dispensable amino acids

(iii) 11 of the 20 amino acids are non-essential.

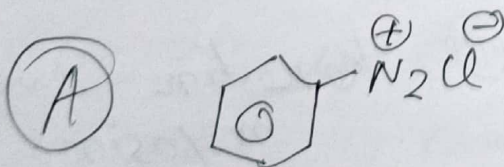
(iv) Removal of toxins

Q10

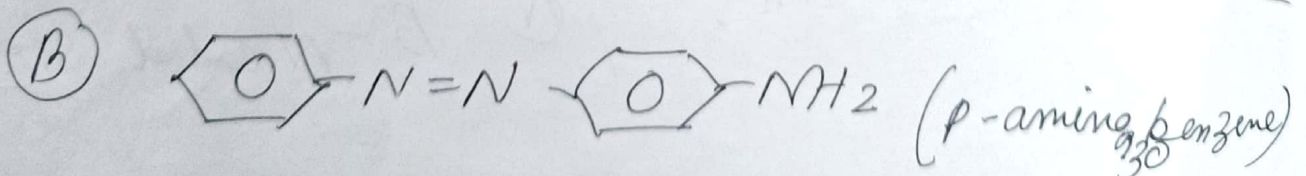
Identify (A), (B) from the following



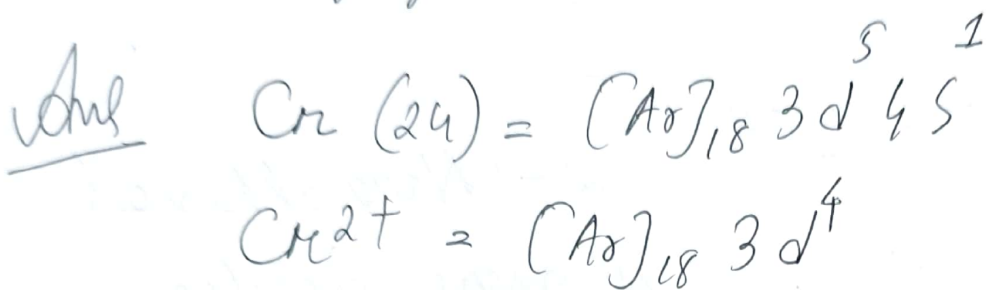
Ans



Benzene diazonium chloride

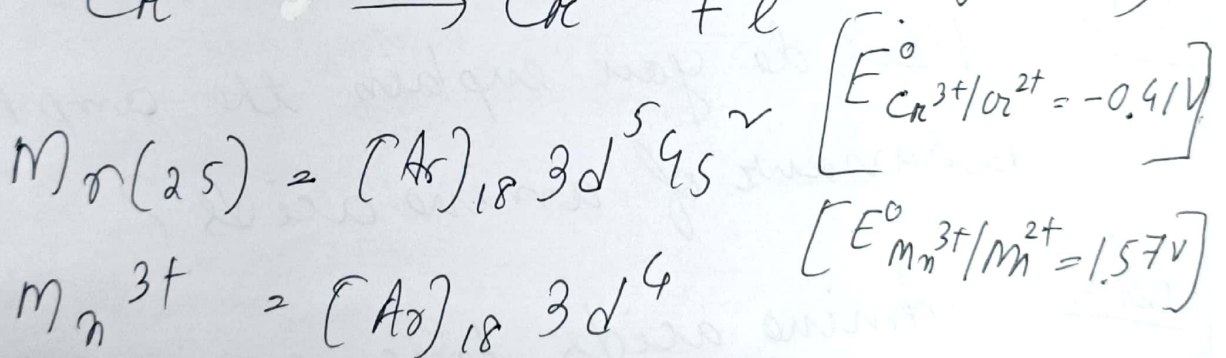


Q11 Why is Cr^{2+} reducing and Mn^{3+} oxidising although both have d^4 configuration

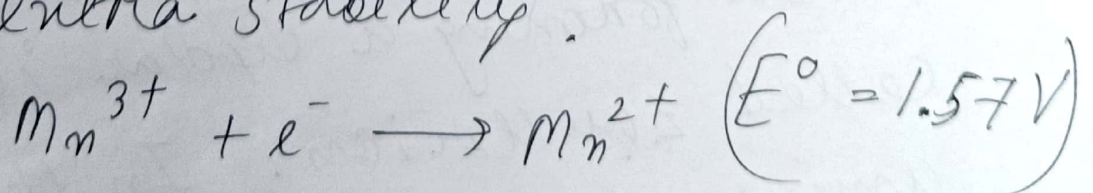


Pattern Classes

Cr^{2+} is reducing as its configuration changes from d^4 to d^3 . (Half filled t_{2g} level)

$$\text{Cr}^{2+} \rightarrow \text{Cr}^{3+} + e^-$$


Changes from Mn^{3+} to Mn^{2+} results half filled (d^5) configuration which has extra stability.



∴ This is why Cr^{2+} is reducing and Mn^{3+} is oxidising agent.

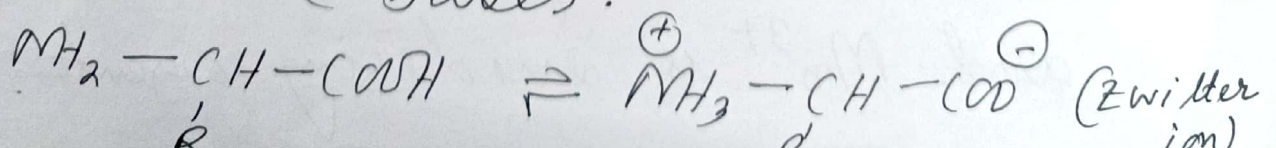
Q12 Out of 2-chloroethanol and ethanol which is more acidic and why?

Ans $\text{H}_2\text{C} - \text{CH}_2\text{OH}$
|
Cl

2-chloroethanol is more acidic because of presence of (-I) group Cl.

Q13 How do you explain the amphoteric behaviour of amino acids?

Ans Amino acids have amino ($-\text{NH}_2$) group, basic in nature and accepts a proton and ($-\text{COOH}$) group loses a proton forming a dipolar ion, called zwitterion. In this form, amino acids behave both as acids and bases.



Q14

A solution of CuSO_4 is electrolysed with a current of 1.5 A, How much time is required to deposit 0.63 g Cu at cathode?

Ans - A/C, Faradays 1st Law of electrolysis,

$$W = \frac{E I t}{96500} \quad \left[\text{Equivalent wt. of Cu is } \frac{63.5}{2} \text{ g} \right]$$

$$\Rightarrow t = \frac{W \times 96500}{E \times I} = \frac{0.63 \times 96500}{\frac{63.5}{2} \times 1.5}$$

$$= 1,276.53 \text{ sec.}$$

Q14 OR

Suggest a way to determine λ_m° value for formic acid.

Ans $\lambda_m^\circ \text{HCOOH} = \lambda_m^\circ \text{H}^+ + \lambda_m^\circ \text{HCOO}^-$

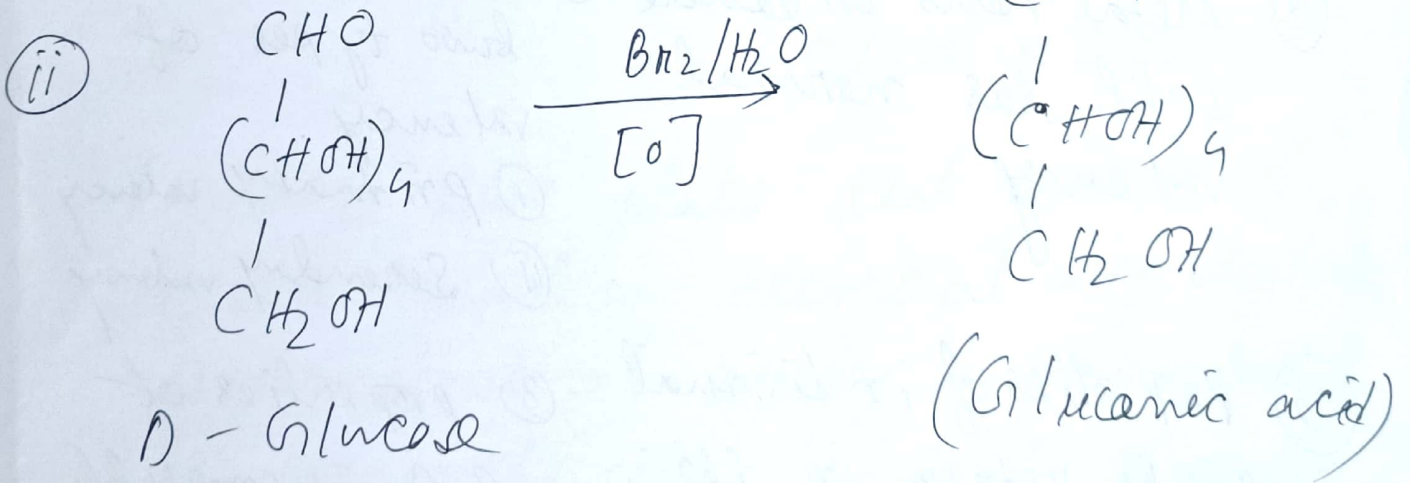
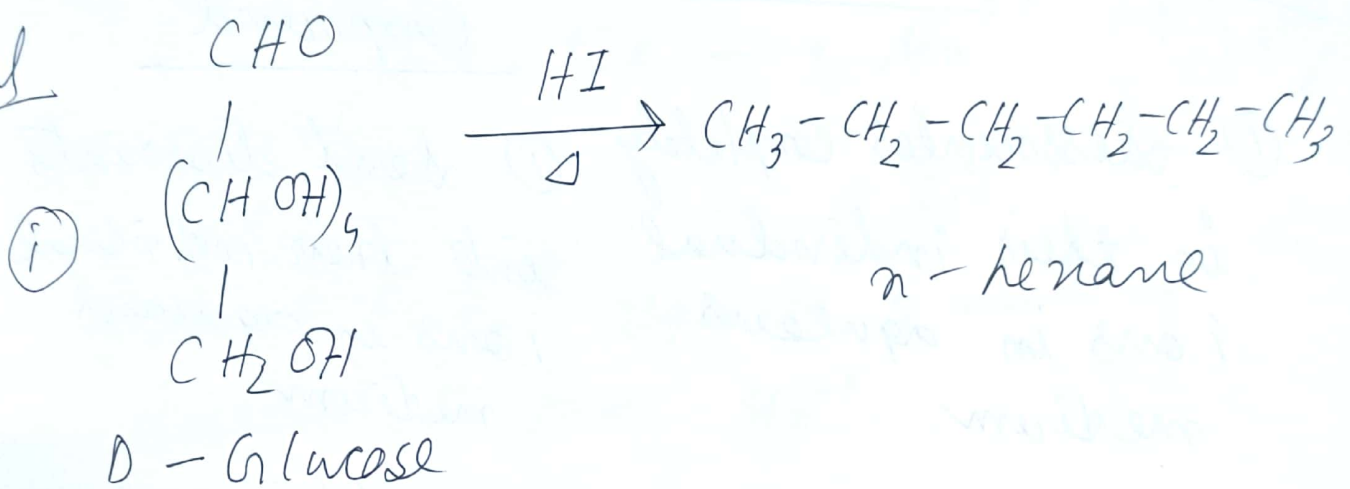
If we know the molar conductivity value of $\lambda_m^\circ \text{HCl}$, $\lambda_m^\circ \text{HCOONa}$, $\lambda_m^\circ \text{NaCl}$, we can easily get the value of $\lambda_m^\circ \text{HCOOH}$.

Q16

What happens when D-Glucose is treated with the following reagents?

- (i) HI (ii) Bromine water

ans



Q17

Write IUPAC name of $[\text{CoCl}_2(\text{en})_2]\text{Cl}$

O.S. = $x - 2 + 0 - 1 = 0$ / Dichlorobis(ethylenediamine)
 $\Rightarrow x = 3$ Cobalt (III) chloride.

Q17

What is the basic difference between double salt and co-ordination compound?

Ans

Double salt

Co-ordination compound

- | | |
|--|--|
| <p>① Dissociates completely into their individual ions in aqueous medium</p> <p>② Metal ions in double salt has normal valency</p> <p>③ Properties of individual salts retain in the double salt</p> <p>④ For exp, Mohr's salt potash alum</p> | <p>① don't dissociates into their individual ions in aqueous medium</p> <p>② Metal ions have two types of valency.</p> <p>① primary valency</p> <p>② Secondary valency</p> <p>③ properties of C.C. is completely different to the individual salt.</p> <p>④ $K_3[Fe(CN)_6]$
$[Ni(CO)_4]$</p> |
|--|--|

Q18

State Faradays Law. How much charge in coulombs is required for 1 mol of MnO_4^- to Mn^{2+} ?

Ans



Pattern
Classes

0.5, (+7)

(+2)

1 mol of MnO_4^- requires 5 moles of electrons to form Mn^{2+} .

$$5 \text{ mol of } e^- = 5 F \\ = 5 \times 96500 = 4.825 \times 10^5 \text{ C}$$

Faradays Law states that amount of chemical reaction occurs at any electrode under electrical energy is proportional to the electricity passed through the electrolyte.

A/c, Faradays 1st Law, $W = \frac{E I t}{96500}$

A/c, Faradays 2nd Law, $\frac{W_1}{E_1} = \frac{W_2}{E_2} = \text{Mod. const.}$

Q19 → 19.5 g of CH_2FCOOH is dissolved in 500 g of water. The depression in Freezing Point of water observed is 1°C . Calculate (i) factor & K_a for Fluoroacetic acid. ($K_f = 1.86$ per kg)

Ans

$$i = \frac{\text{Observed Colligative Property}}{\text{Theoretical Colligative Property}}$$

$$= \frac{(\Delta T_f)_{\text{obs}}}{(\Delta T_f)_{\text{theo}}}$$

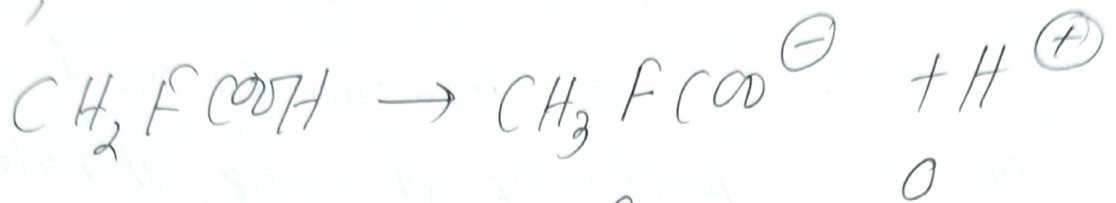
$$= \frac{1}{(K_f \times \text{molality})_{\text{theo}}}$$

$$= \frac{1}{(1.86 \times \frac{19.5/78}{500/1000})} = \frac{1}{1.86 \times 0.50} = \frac{1}{0.93}$$

$$i = 1.0753$$

Palton
Classes

Now,



$t=0$

C

0

0

$t = \text{time}$

$C(1-\alpha)$

$C\alpha$

$C\alpha$

$$i = \frac{C(1-\alpha) + C\alpha + C\alpha}{C} = \frac{C(1+\alpha)}{C}$$

$$i = 1 + \alpha$$

$$\Rightarrow \alpha = i - 1 = 1.0753 - 1 \\ = 0.0753$$

$$K_a = \frac{[\text{CH}_2\text{FCOO}^-][\text{H}^+]}{[\text{CH}_2\text{FCOOH}]}$$

$$= \frac{C\alpha \cdot C\alpha}{C(1-\alpha)} = \frac{C\alpha^2}{1-\alpha}$$

$$= \frac{0.50 \times (0.0753)^2}{1 - 0.0753}$$

$$= 3.07 \times 10^{-3}$$

Pattern
Classes

Q19 OR The V.P. of pure liquid

(A) and (B) are 400 mm Hg and 600 mm Hg respectively at 300K. If molar ratio of two liquids (A) and (B) are 3:2. What is total V.P. of solution.

Ans Total vapour pressure (P_T) = $\chi_A \times P_A^0 + \chi_B \times P_B^0$

$$= (0.60 \times 400) + (0.40 \times 600)$$

$$\chi_A = 0.60$$

$$\chi_B = 0.40$$

as the molar ratio is 3:2

$$= 240 + 240$$

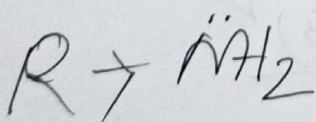
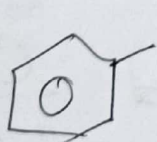
$$= 480 \text{ mm of Hg}$$

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P.C.

Q20

(a) Why areyl amines less basic than alkyl amines.

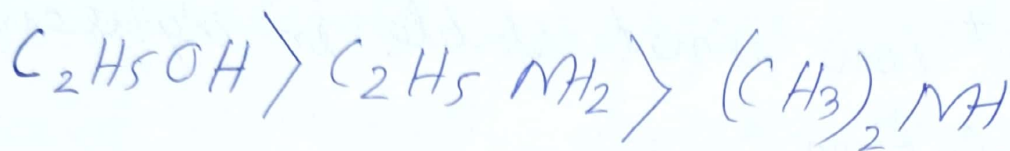
Ans



Aromatic amines can't donate lone pair of electrons of (N) as it is engaged with Resonance within the molecule.

Aliphatic amines can easily donate electrons to others as resonance is not involved.
 \therefore aliphatic amines is more basic than aromatic amines

Q20
(b)



78.37°C

16.6°C

7°C

Q21
a

Explain, transition metals are good catalyst.

Ans Transition metals have partially filled d-orbitals and also have a tendency to show large no. of oxidation states and the ability to form complexes which makes them a good catalyst. Eg, Fe used in Haber process to produce ammonia.

Q21
b) The enthalpies of atomization of the transition metals are high

Ans. Transition metals have high effective nuclear charge, greater number of valence electrons and some unpaired electrons. They thus have strong metal-metal bonding. Hence they have high enthalpy of atomization.

821

© Cu^+ ion is not stable in aqueous solution.

why: Cu^+ (aq) is unstable in solution and undergoes simultaneous oxidation and reduction. $2 Cu^+(aq) \rightleftharpoons Cu^{2+}(aq) + Cu(s)$

High energy is required to remove one electron from Cu^+ to Cu^{2+} high hydration energy of Cu^{2+} compensates for it.

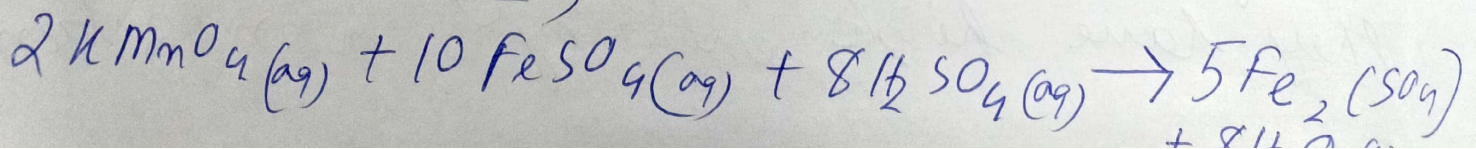
821

① In the titration of $FeSO_4$ with $KMnO_4$ in acidic medium, dilute HCl is not used.

why Dil. H_2SO_4 is an oxidising agent and oxidises $FeSO_4$ to $Fe_2(SO_4)_3$.

Dil HCl is a reducing agent and liberates chlorine on reacting with $KMnO_4$ solution. Hence, the part of the oxygen produced from $KMnO_4$ is used by HCl .

Balanced equation,



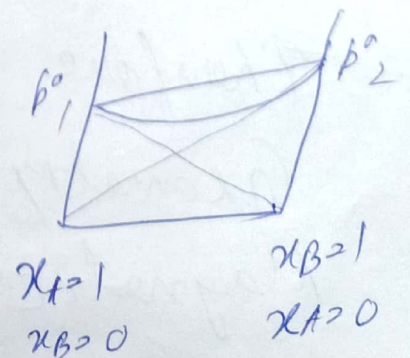
22

what are azeotropes? what is meant by negative deviation from Raoult's law and how is the sign $\Delta_{mix} H$ related to negative deviation from Raoult's law?

Q Azeotropes is a binary mixture of two or more liquids that boils and distil at a constant temperature at a given pressure without changing its concentration or composition.

when the actual vapour pressure of a non-ideal solution is lower than expected vapour pressure show negative deviation. eg. mixture of chloroform and acetone show negative deviation.

$$\Delta_{mix} H = -ve \text{ sign}$$

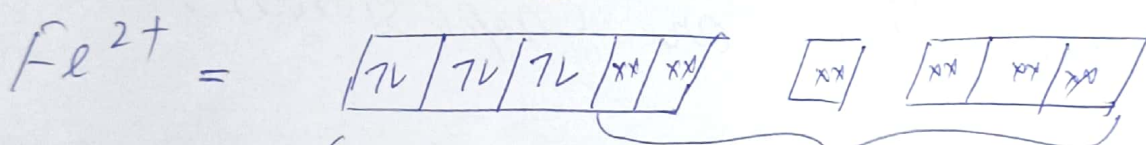
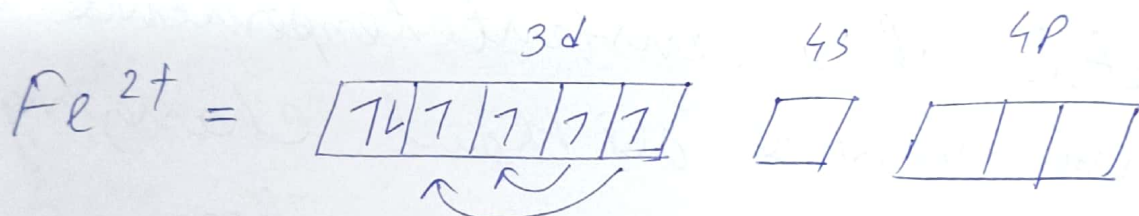


Q23

Explain the geometry and magnetic property of $[\text{Fe}(\text{CN})_6]^{4-}$ using VBT

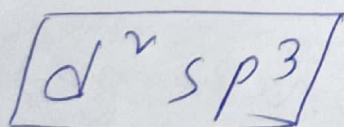
Ans

O.S. of Fe is $x - 6 = -4 \Rightarrow x = 2$



(CN) is a strong field ligand so, pairing takes place.

6 pair of electrons from (CN⁻) will be donated to form hybridisation



Therefore Hybridisation = $d^2 sp^3$

Geometry = octahedral

Magnetic property = Diamagnetic (zero unpaired electron)

Q23 OR

(a) How many geometrical isomers are possible for compound $[\text{Cr}(\text{C}_2\text{O}_4)_3]^{3-}$

Ans $[\text{Cr}(\text{C}_2\text{O}_4)_3]^{3-}$ shows optical

isomerism. Both d-form and l-form as oxalato is a bidentate ligand.

Therefore zero(0) G.I. present.

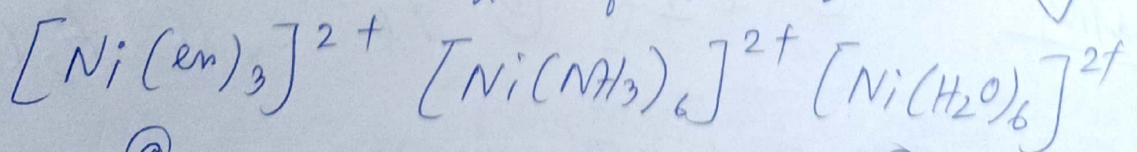
Q23

(b) d-orbital splitting for octahedral crystal field.

Q23

(c)

What will be the correct order for the wavelengths of absorption in the visible region for the following

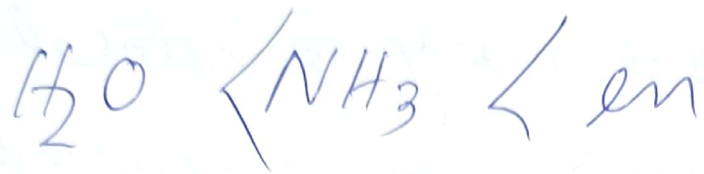


(a)

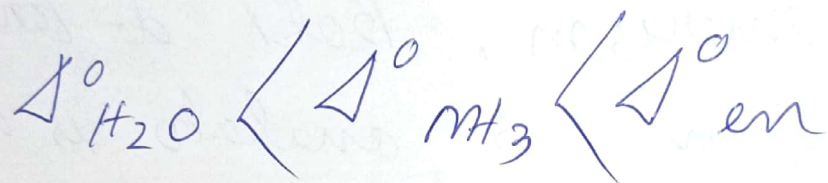
(b)

(c)

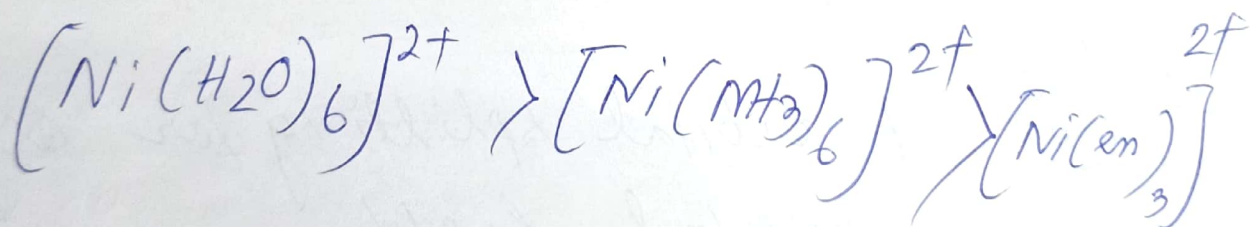
Ans: Spectrochemical series order



Thus CFSE will be in the following order,



Hence wavelength of absorption in the visible region will be



Q24

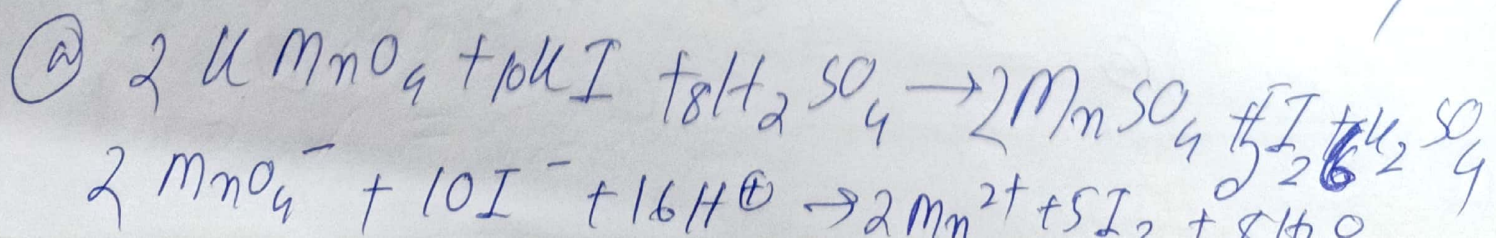
How does the acidified permanganate solⁿ react with the following? Write the ionic equations for the reaction.

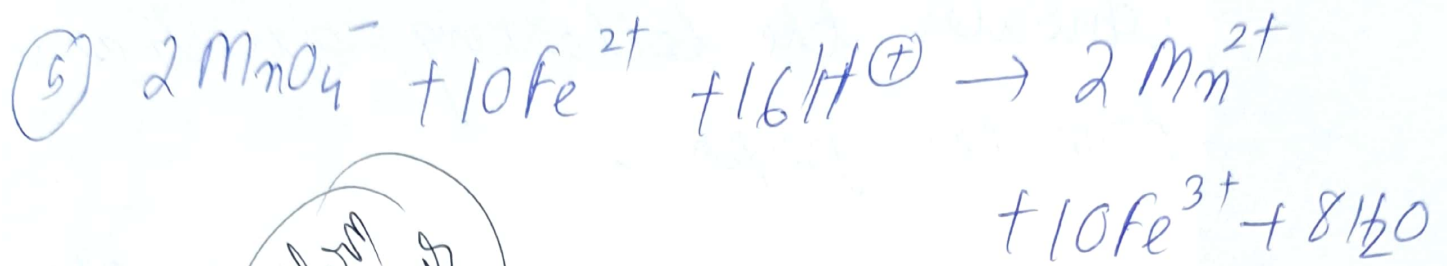
Ans

(a) KI

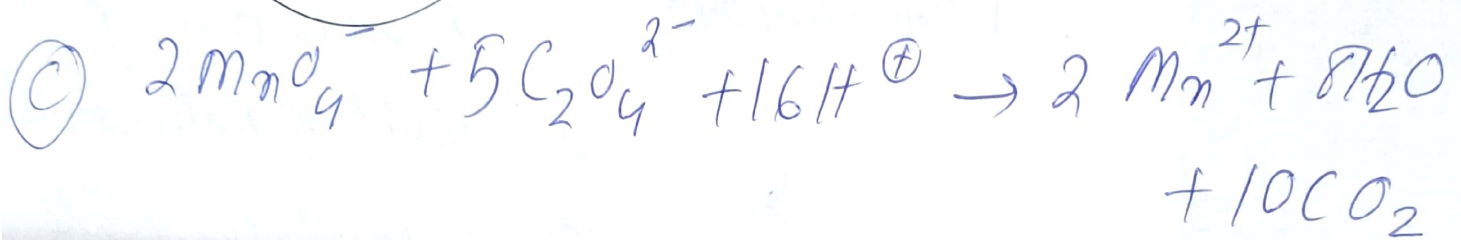
(b) Fe²⁺

(c) H₂C₂O₄





Pattem
Classes



Q 24 OR

What are interstitial compounds?
Name the metals used for formation of bronze. Name the catalyst used in contact process of H_2SO_4 synthesis.

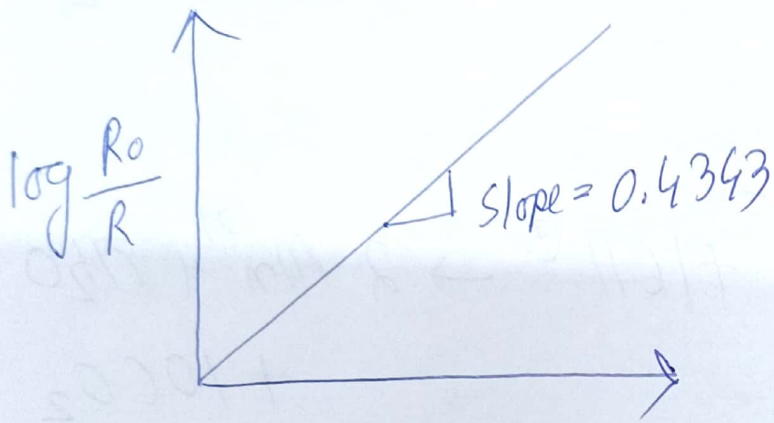
Ans. Interstitial compounds are formed when H, C, N atoms become trapped inside the crystal lattice of metals.

→ Bronze is an alloy of copper & tin.

→ Vanadium Pentoxide, V_2O_5

Q25

Answer the following question from the graph:



- (a) What is the order of the reaction?
- (b) Unit of rate constant
- (c) Calculate rate constant?

Ans For 1st order reaction

$$k = \frac{2.303}{t} \log \frac{R_0}{R_t}$$

$$\Rightarrow \frac{kt}{2.303} = \log \frac{R_0}{R_t}$$

Ans (a) 1st order reaction

(b) unit of rate constant $(k) = (\text{con}^n)^{1-n} t^{-1}$
 $= (\text{mol L}^{-1})^{1-1} t^{-1}$
 $= t^{-1} \text{ or } \text{min}^{-1}$

(c) A/B, $\frac{k}{2.303} = 0.4343$

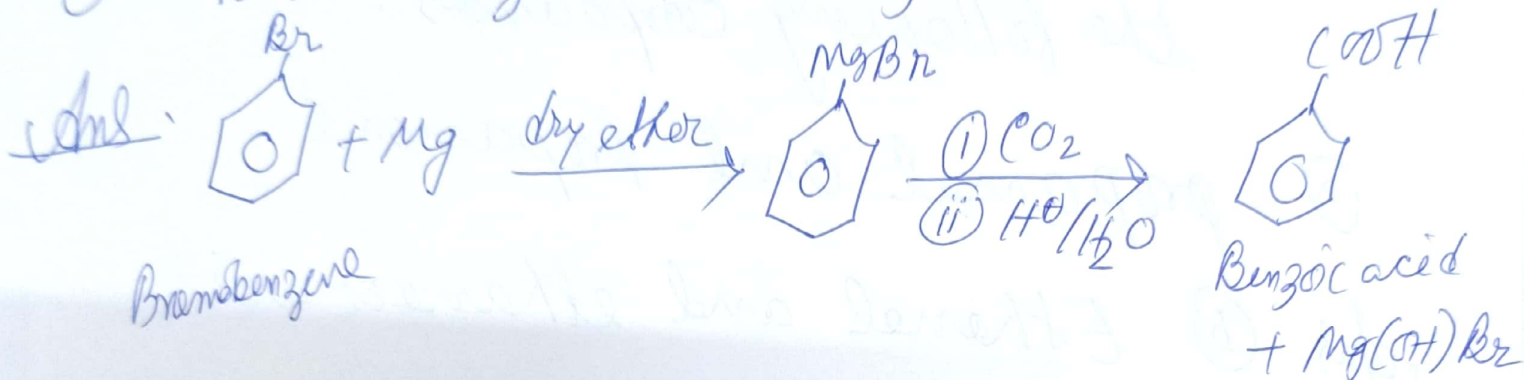
$$\Rightarrow k = 1.0001929 \text{ min}^{-1}$$

Pattern classes

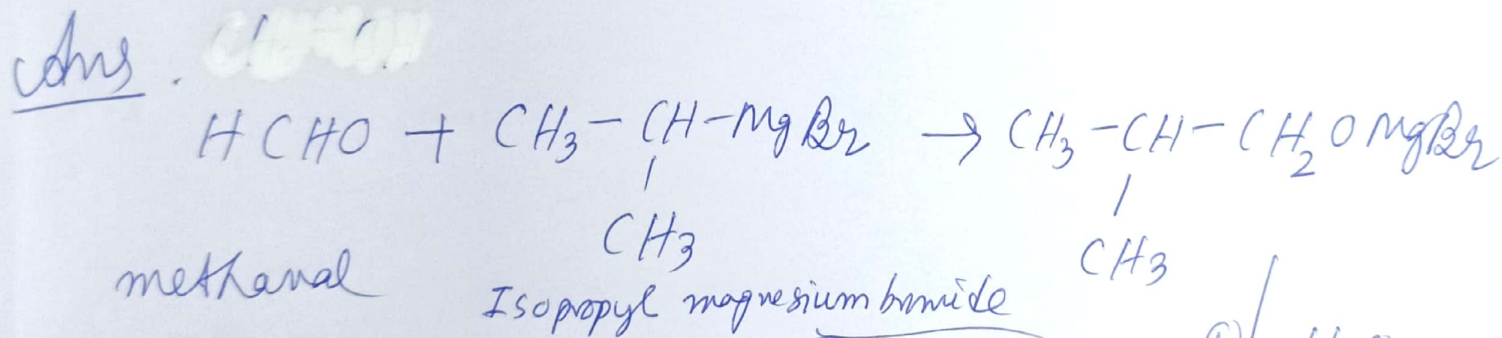
Q26

Convert the following

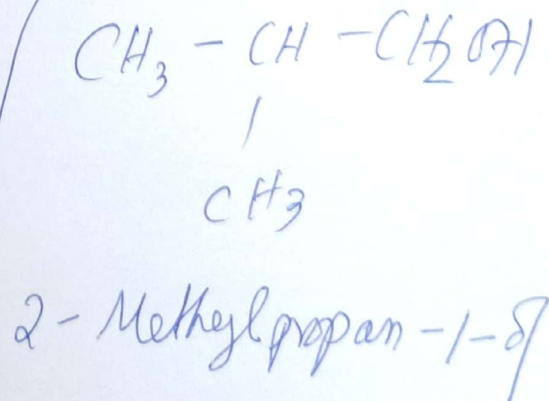
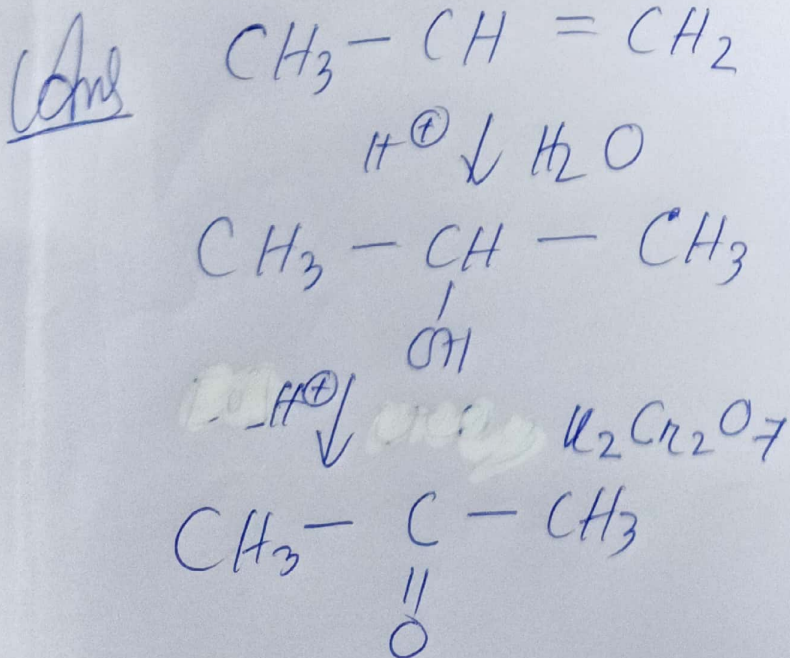
(a) Bromobenzene to benzoic acid



(b) Methanal to 2-methylpropan-1-ol



(c) Propene to acetone



28 (b) A primary cell is a kind of electrochemical battery which cannot be recharged and the chemicals are to be replaced in it regularly.
E.g.- Dry cell

Q. 29 .

X is an alkene

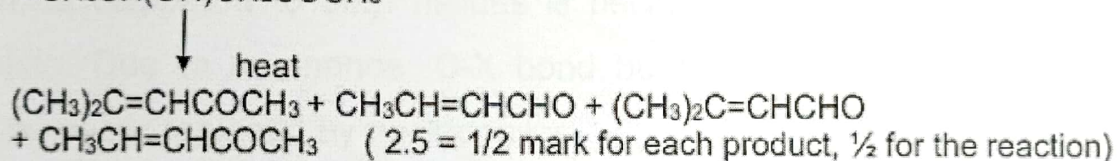
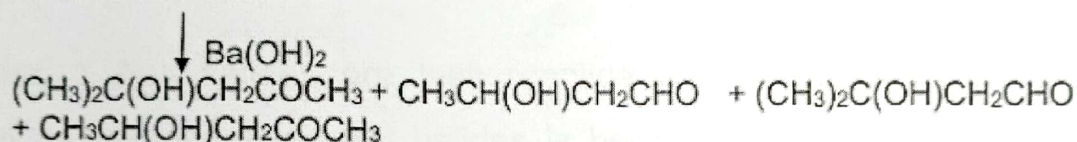
Y is an aldehyde with $-\text{CH}_3$ group

Z is a methyl ketone



X : $\text{CH}(\text{CH}_3)=\text{C}(\text{CH}_3)_2$ **Y** : CH_3CHO **Z** : $\text{O}=\text{C}(\text{CH}_3)_2$ (1.5 = 1/2 each)

$\text{CH}_3\text{COCH}_3 + \text{CH}_3\text{CHO}$



30(a) The dipole moment of chlorobenzene is lower than that of cyclohexyl chloride

Ans.: The dipole moment of chloro-benzene is less than cyclo hexyl chloride as in chloro benzene C-Cl bond is sp^2 hybridised where as in cyclohexyl chloride the C - Cl bond is Sp^3 Hybridised . As sp^2 has more s character and more electronegative than sp^3 .

b) Alkyl halides though polar are immiscible with water.

Ans. : The new force of attraction between the alkyl halides and water molecules is weaker than the alkyl halide-alkyl halide and water-water forces of attraction. Hence, alkyl halides (though polar) are immiscible with water.

c) Grignard reagent should be prepared under anhydrous conditions

Ans. : Grignard reagents ($R - Mg - X$) are readily decomposed by water to produce alkanes. That is why they should be prepared under anhydrous conditions.

(d) $SOCl_2$, is preferred for the preparation of haloalkanes from alcohol ?

Ans. : The thionyl chloride method is preferred over hydrogen chloride or phosphorous chloride method for the preparation of haloalkanes because both the by-products (SO_2 and HCl) in this case are gases and escape leaving behind pure chloroalkane.

(e) Aryl halides are extremely less reactive towards nucleophilic substitution reaction ?

Ans. : Aryl halides are less reactive towards nucleophilic substitution reaction as compared to alkyl halides is because of resonance stabilization in aryl halide. Due to resonance, $C-X$ bond becomes shorter and stronger and cannot be easily replaced by nucleophiles.

(f) A racemic mixture is optically inactive, why ?

Ans : A racemic mixture is optically inactive due to the external compensation of equal percentage of (+) and (-) forms. The cis form exists in three - diastereomers.

For Question No. 29/OR/ answer Please contact

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