How to get 80+ in Assam State School Education Board (ASSEB)
2024-25 II PATTERN CLASSES II 9864089106

1. Why does the molality of a solution remain unchanged with temperature?

Molality = $\frac{\text{mole of solute}}{\text{solvent in kg}}$; mass is unchanged with Temp

2. How much H_2 in grams will be liberated if 1F electricity is passed through acidified water?

$2H^+ + 2e^- \rightarrow H_2$

$2 \text{ mol } e^- = 2F \rightarrow 1 \text{ mol } H_2$

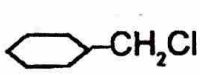
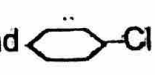
$\rightarrow 1F \rightarrow \frac{1}{2} \text{ mol } H_2 \rightarrow \frac{1}{2} \times 2 = 1g$

3. What are Ambidentate Liagands? Give one suitable example of Ambidentate ligand.

Two site of attachement to the central atom, NO_2, SCN

4. In the following paird of halogen compounds, which would undergo S_N2 reaction faster?

1>2>3

a)  and 

b)  I and  Cl

5. Arrange the following in increasing order of P^{Ka} values.

① ② ③ ④

CH_3COOH, $ClCH_2COOH$, $Cl_2CHCOOH$, Cl_3CCOOH

6. What is the basic structural difference between starch and cellulose?

Starch → branched polymer

Cellulose → linear polymer

7. P^{kb} of Aniline is more than that of methylamine. Why?

CH_3NH_2 is more basic than aniline $\quad pk_b \propto \frac{1}{k_b}$

8. Give reason for the higher boiling point at ethanol in comparison to methoxymethane.

intermolecular (H) bonding

9. State Faraday's first law of electrolysis. How much charge in terms at Faraday is required for the reduction at 1 mole of Cu^{2+} to Cu? 2

$Cu^{2+} + 2e^- \rightarrow Cu$

$2 \text{ mol } e^- = 2F \text{ charge.}$

What is meant by positive deviations from Rault's law? How is the sign of $\Delta_{mix}H$ related to positive deviations from Rault's law? 2

$(V.P.)_{soln} > (V.P.)_{Raoult's\ Law}$ $\quad \Delta H_{mix} = +ve$

11./A first order reaction takes 40 minutes for 20% decomposition. Calculate its half life period.

$K = \frac{2.303}{40} \log \frac{100}{80} = 0.055847$ / $T_{1/2} = \frac{0.693}{K} = 12.38$ min

Establish the relation for a first order reaction.

$K = \frac{2.303}{t} \log \frac{[R]_0}{[R]}$ $\quad -\frac{d[R]}{dt} = K[R]$

1st order kinetics derivation

12. Explain why $[Ti(H_2O)_6]^{3+}$ is violet in colour.

(H_2O) is a WFL, High spin Complex / $Ti(22) = [Ar]\,3d^2 4s^2$ / $Ti^{3+} = [Ar]\,3d^1$ / e⁻s absorbs photons from yellow light & emits its contemporary colour violet

Out of Cu^+ and Cu^{2+}, which ion is more stable in aqueous solution and why?

Cu^{2+} is more stable in aqueous medium due to high value of hydration enthalpy which compensates for high 2nd I.E. of Cu.

13. Write the IUPAC name of the following complexes (any two)
তলৰ জটিল যৌগবোৰৰ IUPAC নাম লিখা (যিকোনো দুটা)

i) $[Pt(NH_3)_2Cl(NO_2)]$ diammine chloride nitrito-N platinum (II)

ii) $K_3[Fe(C_2O_4)_3]$ potassium trioxalatoferrate (III)

iii) $[Pt(NH_3)_2Cl(NH_2CH_3)]Cl$ diammine chloride methylamine platinum (II) chloride

14. Draw the facial and meridional isomer of the following complex compound. $[Co(NO_2)_3(NH_3)_3]$

please check the solved PDF @ paltan classes 9864089106

14. Out of the following two coordination entities which is chiral (optically active)? Explain.

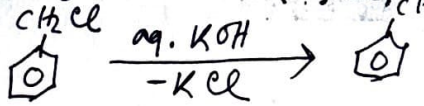
a) Cis – $[CrCl_2(ox)_2]^{3-}$ and → @ is non superimposable mirror images

b) Trans– $[CrCl_2(ox)_2]^{3-}$

optically active

15. Write the chemical reactions for the following transformations (any two)

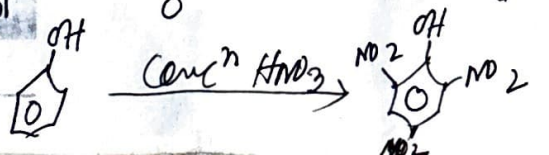
i) Benzyl chloride to benzyl alcohol



ii) Methyl magnesium bromide to 2- methyl - propan-2-ol

$CH_3MgBr + CH_3-\underset{\underset{O}{\|}}{C}-CH_3 \xrightarrow{dry\ ether} H_3C-\underset{\underset{OH}{|}}{\overset{\overset{CH_3}{|}}{C}}-CH_3$

iii) Phenol to 2, 4, 6– trinitrophenol



16. Answer any two of the following :-

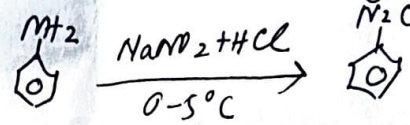
i) Arrange the following in decreasing order of the pK_b values.

$C_2H_5NH_2$, $C_6H_5NHCH_3$, $(C_2H_5)_2NH$ and $C_6H_5NH_2$

$(C_2H_5)_2NH > C_2H_5NH_2 > C_6H_5NHCH_3 > C_6H_5NH_2$ (K_b)

$C_6H_5NH_2 > C_6H_5NHCH_3 > C_2H_5NH_2 > (C_2H_5)_2NH$ (pK_b)

ii) Write the diazatisation reaction of aniline.



iii) Give a chemical test for Primary amines.

Carbylamine test:

$R-NH_2$ or $Ar-NH_2$ $\xrightarrow[\Delta]{alc.\ KOH,\ CHCl_3}$ $R-NC$. Not for 2°, 3° amines

highly offensive smell

17. Discuss the mechanism of S_N2 reaction with proper chemical reactions. 2

$Y^- + C-Br \xrightarrow{NaOH} [OH^- \cdots C \cdots Br] \rightarrow OH-C + Br^-$ (inversion) check video

18. How are vitamins classified? Name the vitamin responsible for the coagulatioon at blood. 2

FAT SOLUBLE (DEKA) & WATER SOLUBLE (B, C)

vit (K)

19. Urea (NH_2CONH_2) forms an ideal solution in water. Determine the vapour pressure of an aqueous solution containing 10% by mass of urea at 40°C. (Vapour pressure of water at 40°C is 55.3 mmHg)

$$\frac{P_0 - P}{P_0} = \chi_A$$

$$\frac{55.3 - P}{55.3} = \frac{10/60}{10/60 + 90/18} \Rightarrow P = 53.52 \text{ mm of Hg}$$

20. Write the Nernst equation and emf of the following cells at 298k (any two)

i) Mg(s) | Mg^{2+} (0.001 M) || Cu^{2+} (0.0001 M) / Cu (s) → $E_{cell} = E^\circ_{cell} - \frac{0.0591}{2} \log \frac{[Mg^{2+}]}{[Cu^{2+}]}$

ii) Sn (s) | Sn^{2+} (0.050M) || H^+ (0.020M) | H_2(g) | (1 bar) | Pt(s) → $E_{cell} = E^\circ_{cell} - \frac{0.0591}{2} \log \frac{[Sn^{2+}]}{[H^+]^2}$

iii) Fe(s) | Fe^{2+} (0.001M) || H^+ (1M) | H_2 (g) (1bar) | Pt(s) → $E_{cell} = E^\circ_{cell} - \frac{0.0591}{2} \log \frac{[Fe^{2+}]}{[H^+]}$

21. The time required for 10% completion of a first order reation at 298 k is equal to that required for 25% completion at 308 k. Calculate Ea. 3

$$\frac{2.303}{k_1} \log \frac{100}{90} = \frac{2.303}{k_2} \log \frac{100}{75}$$

$$\Rightarrow \frac{k_2}{k_1} = 2.717 \Rightarrow \log \frac{k_2}{k_1} = 0.427$$

$$\log \frac{k_2}{k_1} = \frac{Ea}{19.15}\left(\frac{1}{298} - \frac{1}{308}\right)$$

$$\Rightarrow Ea = 85.5 \text{ J}$$

22. Answer the following questions : (Either (a) and (b) or only (c)]

a) What is the general electronic configuration of transition elements. Write two characteristics of transition elements. $(n-1)d^{1-10}\,ns^{1-2}$

① variable oxidation state

② Coloured compounds

b) After having completely filled d orbitals ($4d^{10}$) in Silver atom in its ground state, how can you say that Silver is a transition element. 1

Compounds like AgO, AgF_2

Ag shows (+2) oxidation state

Ag in (+2) O.S. its configuration will be $3d^9$, due to this ① unpaired electron, Ag is a Transition element

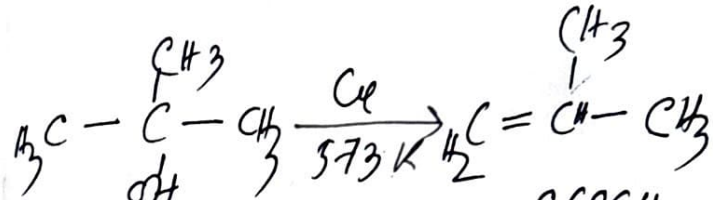
What is Lanthanoid contraction? What are the consequences of lanthanoid contraction?

Decrease in ionic/atomic radii of the elements of lanthanoid series in left to right.

Difficult to separate lanthanoid due to similar size

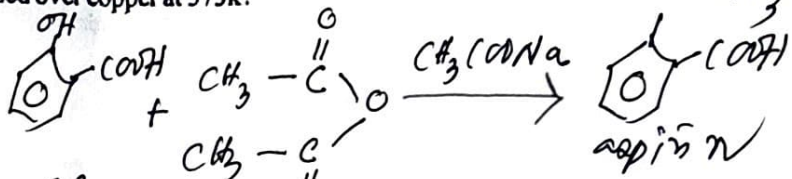
23. Why a solution of $[Ni(H_2O)_6]^{2+}$ is green while a solution of $[Ni(CN)_4]^{2-}$ is coloureless? What is the primary valency at Ni in $[Ni(CO)_4]$. 2+1=3

24. Answer the following questions : [Either (a) and (b) or only (c)]



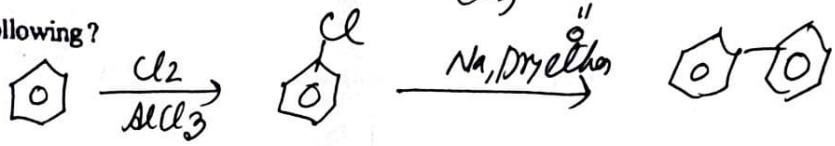
a) What will happen when vapour of 3° alcohol passed over copper at 573k?

b) How to get synthesize aspirin from salicylic acid?



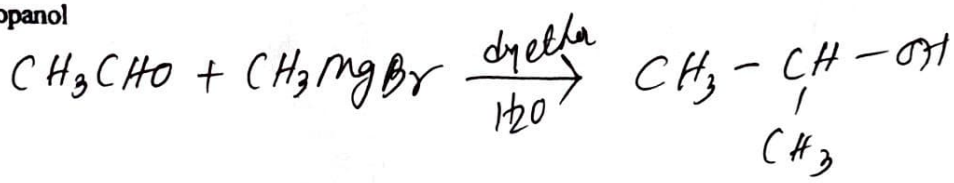
c) How will you convert the following?

i) Benzene to biphenyl



ii) Nitrobenzene to aniline.

iii) Acetaldehyde to isopropanol



25. Explain why (any two)

a) Orthonitrophenols are more acidic than Phenol.

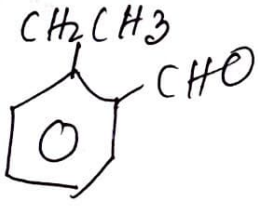
b) Aniline does not undergo Friedel Craft reaction.

c) Diazonium salts of aromatic amines are more stable than those of aliphatic amines.

Due to resonance.

must have $-\overset{\overset{O}{\|}}{C}-$

26. An organic compound with the molecular formula $C_9H_{10}O$ forms 2,4–DNP derivative, reduces Tollens' reagent and underogoes cannizzaro reaction. On vigorous oxidation, it gives 1, 2 - benzenedicarboxylic acid. Identify the compound.



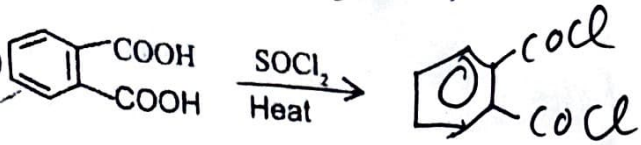
Give simple chemical tests to distinguish between the following pairs of compound.

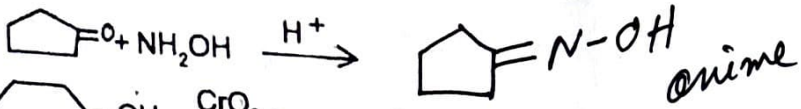
a) Ethanal and Propanal

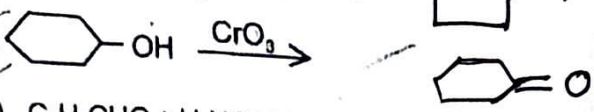
b) Propanal and propanone

c) Acetophenone and Benzophenone

27. Complete the following reactions (any three)

a) 

b) 

c) 

d) $C_nH_nCHO + H_2NCONHNH_2 \longrightarrow$ 

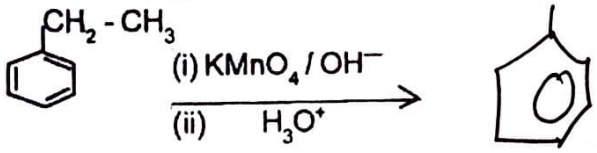
28. a) What are essential and non-essential amino acids? Give one exmples of each type.

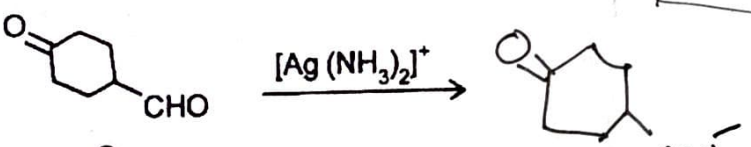
b) Write two difference between DNA and RNA.

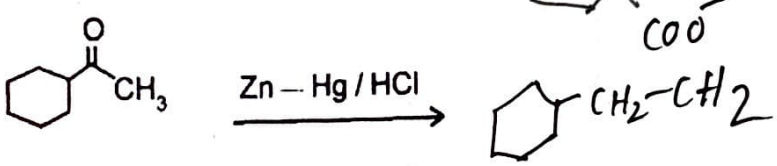
c) Which sugar is called invert sugar? Why is it called so?

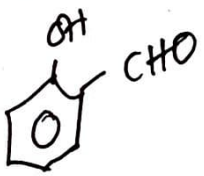
29. An organic compound (A) reacts with PCl_5 to produce another compound (B). (B) reacts the magnesium metal in presence of ether to produce Grignard reagent (C). (C) reacts with ethanal and the product is hydrolysed to produce propan –2–ol. Identify (A), (B) and (c) and explain the reaction. 5

Complete the following reactions :(any five)
তলৰ বিক্রিয়াবোৰ সম্পূর্ণ কৰা— (যি কোনো পাঁচটা)

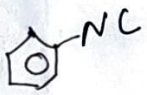
(i) 

(ii) 

(iii) 

(iv) $C_6H_5OH \xrightarrow[(ii)\ H^+]{(i)\ CHCl_3 + aq\ NaOH}$ 

v) $C_6H_5N_2Cl \xrightarrow[Warm]{H_2O}$ 

vi) $C_6H_5NH_2 + CHCl_3 + \text{alc. KOH} \longrightarrow$ 

30. a) Write the Finkelstein reaction.

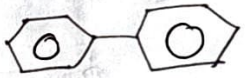
$$R-X \quad + NaI \xrightarrow{\text{acetone}} R-I$$

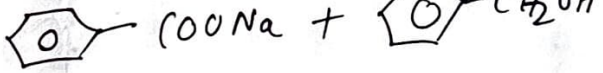
$X = Br, Cl$

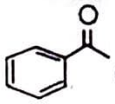
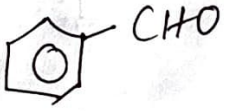
b) Both carboxylic acid and alcohol can form intermoecular hydrogen bonding. But the boiling point of carboxylic acid is more than that of corresponding alcohols. why? 2

C.A. forms a cyclic dimer. Intermolecular H-bonding in C.A. is higher than alcahol due to this.

c) Complete the following reaction. (any two)
নিম্নলিখিত বিক্রিয়াসমূহ সম্পূর্ণকে লিখা (যিকোনো দুটা)

i)  $+ 2Na \xrightarrow{\text{dry ether}}$ 

ii)  $\xrightarrow[\Delta]{\text{Conc. NaOH}}$ 

iii)  $\xrightarrow[Pd-BaSO_4]{H_2}$ 

19 AUGUST Sivsagan TUESDAY

Q10- Positive deviation from Raoult's law is when the observed vapor pressure of a mixture is greater than whats predicted by Raoults law. when molecules with weaker intermolecular forces are mixed w/ those w/ stronger intermolecular forces, they give rise to +ve deviation (water + Alcohol

$\Delta mix H$ is positive for +ve deviation from Raoult's law because absorption of heat takes place.

8

20 AUGUST WEDNESDAY

Q11.

Let the initial amount be, $a = 100\%$

Let the amount decomposed be $x = 20\%$

Remaining amount, $a - x = 80\%$

Given, time required, $t = 40$ minutes

The integrated rate equation for first order reaction is,

$$K = \frac{2.303}{t} \log \frac{a}{a-x}$$

plugging the values to get K

$$K = \frac{2.303}{40} \log \frac{100}{80}$$

$$= 0.005584$$

21 AUGUST THURSDAY

Half life period for a 1st ordere reaction is given by,

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

$$= \frac{0.693}{0.056}$$

$$= 12.38 \text{ minutes}$$

(11) Or

Q. Establish the relation for a 1st ordere reaction, $K = \frac{2.303}{t} \log \frac{[R]_0}{[R]}$

22 AUGUST FRIDAY

Sol^n, Let the reaction of order 1 be

$$R \longrightarrow P$$

Let at $T = 0$, $[R] = [R]_0$

& at $T = t$ s, $[R] = [R]$

The differential rate equation for this reaction will be,

$$R = -\frac{d[R]}{dt} = K \cdot [R]$$

Rearranging & integrating both sides,

23 AUGUST SATURDAY

$$-\frac{d[R]}{[R]} = K\,dt$$

$$-\ln[R] = Kt + C \quad \text{--- (i)}$$

here, have, at $t=0$, $[R] = [R]_0$

eqn (i) $\Rightarrow$ $-\ln[R]_0 = K(0) + C$

$$C = -\ln[R]_0$$

Putting back value of C.

$\therefore$ eqn (i) $\Rightarrow$ $-\ln[R] = Kt - \ln[R]_0$

24 AUGUST $\Rightarrow$ $\ln\frac{[R]_0}{[R]} = Kt$ } $\log a - \log b = \log\frac{a}{b}$ SUNDAY

$\Rightarrow$ $2.303\log\frac{[R]_0}{[R]} = Kt$ } $\ln_e a = 2.303\log_{10} a$

$\Rightarrow$ $\frac{2.303}{t}\log\frac{[R]_0}{[R]} = K$

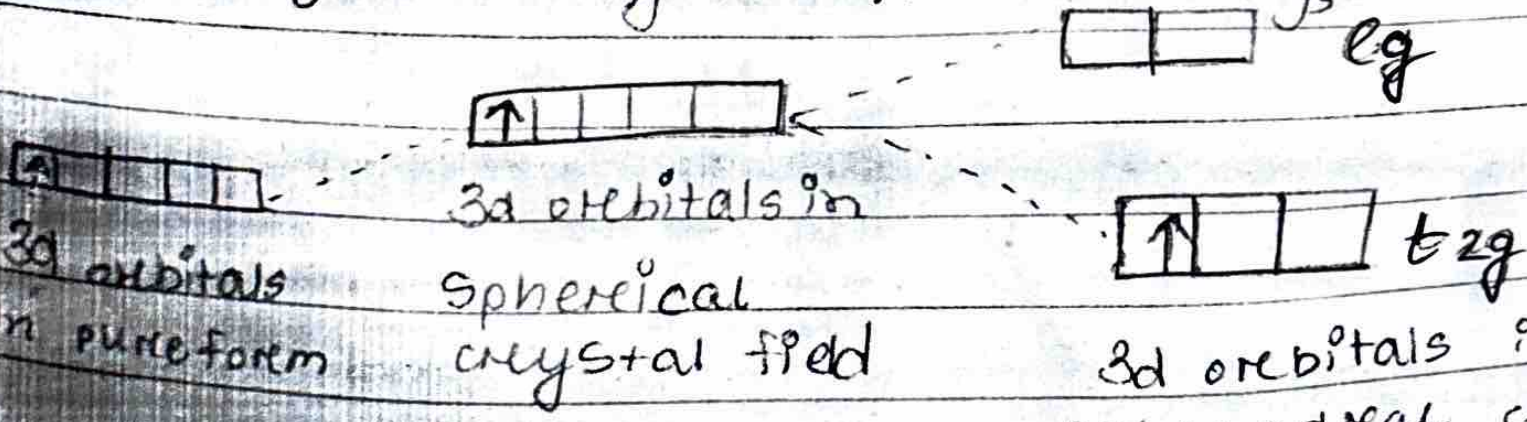
Q12. $[Ti(H_2O)_6]^{3+}$ is violet in color,

In this complex, Ti is present as Ti^{3+}.

$[Ti^{\circ}] = [Ar]\ 3d^2 4s^2$

$[Ti^{\circ}]^{3+} = [Ar]\ 3d^1$

According to crystal field theory,



H_2O is a weak field ligand, a high spin complex is formed.

26 AUGUST TUESDAY

During transition of this $e^{\ominus}$, it absorbs photons from yellow light & emits it's complementary color violet, which is observed by naked eyes

Q. Out of Cu^{+} & Cu^{2+}, which ion is more stable in aqueous solution & why?

Sol^{n}. Out of Cu^{+} & Cu^{2+}, Cu^{2+} is more stable in aqueous medium because of high value of hydration enthalpy which compensates for the high 2nd ionization enthalpy of coppere.

27 AUGUST ∴ Cu^{+} disproportinates into Cu^{2+} & Cu WEDNESDAY in aqueous medium

Q13. (i) $[Pt(NH_3)_2Cl(NO_2)]$

diamminechloridonitrito-N-platinum (II)

(ii) $K_3[Fe(C_2O_4)_3]$ (-5, -3)

potassiumtrioxalatoferrate (III)

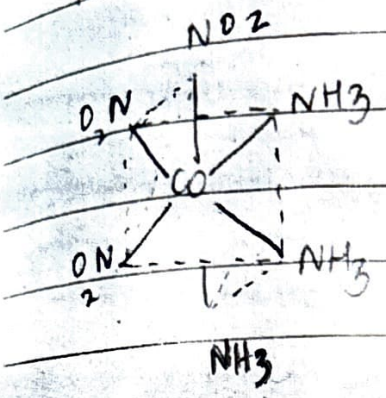
(iii) $[Pt(NH_3)_2Cl(NH_2CH_3)]Cl$ (+1, Cl^{-1})

diamminechloridomethylamine platinum (II) chloride

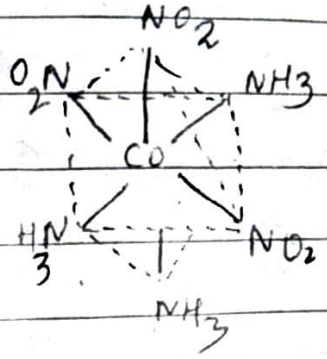
28 AUGUST THURSDAY

Q14. Soln $[Co(NO_2)_3(NH_3)_3]$

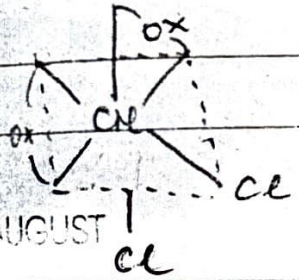
facial isomer



meridional isomer



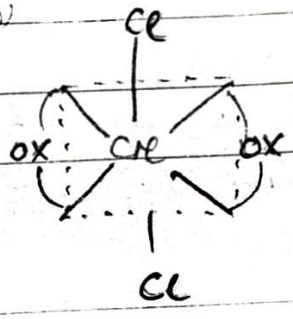
(a)



29 AUGUST

cis-

(b)

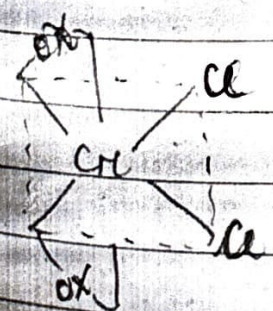


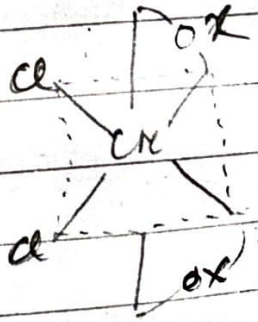
FRIDAY

trans-

(b) Is optically active

(a) has non-superimposable mirror images

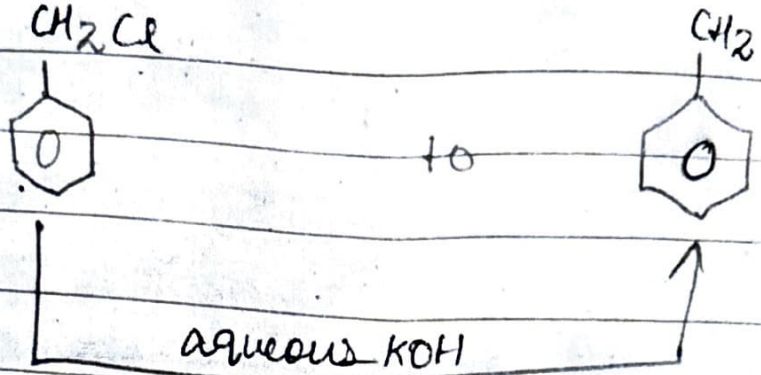




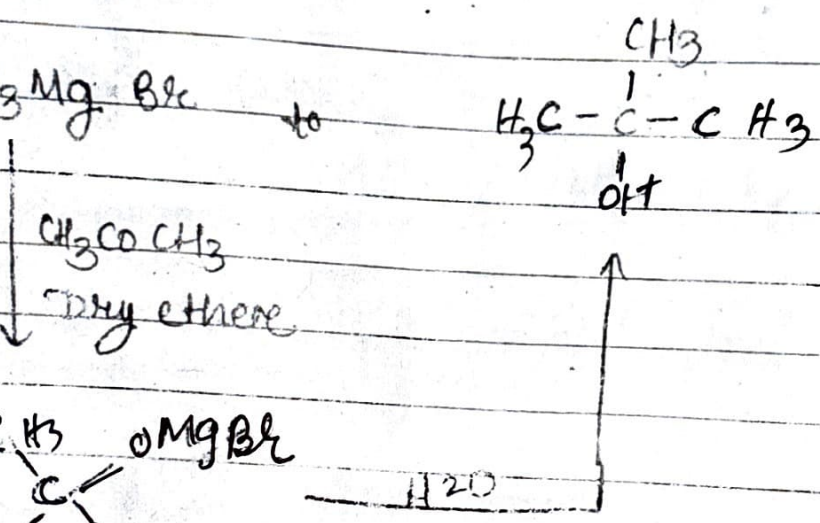
30 AUGUST

SATURDAY

Q5. (i)



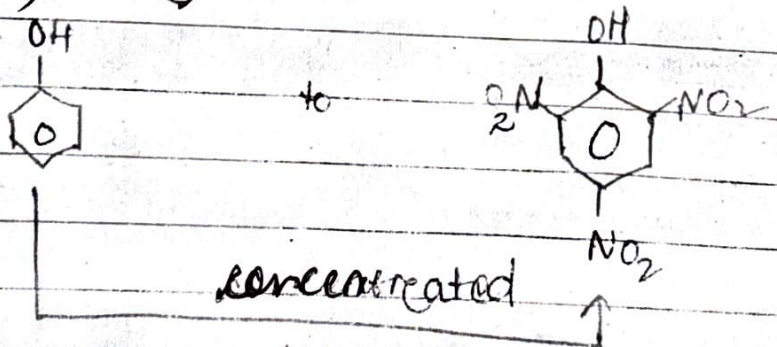
(ii) CH_3MgBr to



31 AUGUST

SUNDAY

(i)



27 SEPTEMBER SAT

916. (i)

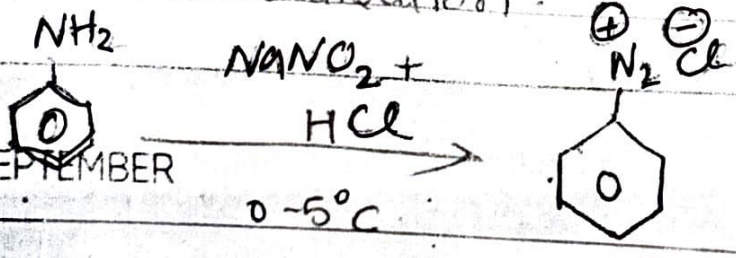
Basic strength (K_b)

$C_6H_5NH_2 < C_6H_5NHCH_3 < C_2H_5NH_2 < (C_2H_5)_2NH$

(pK_b) order

$C_6H_5NH_2 > C_6H_5NHCH_3 > C_2H_5NH_2 > (C_2H_5)_2NH$

(ii) The conversion of 1° amines into diazonium salts is called diazotisation.



28 SEPTEMBER SUND

(iii) Carbylamine test

Both aromatic & aliphatic 1° amines undergo reaction w/ alcoholic KOH/NaOH & $CHCl_3$ to form carbylamines distinguished by an unpleasant smell. 2° & 3° amines donot give this test.

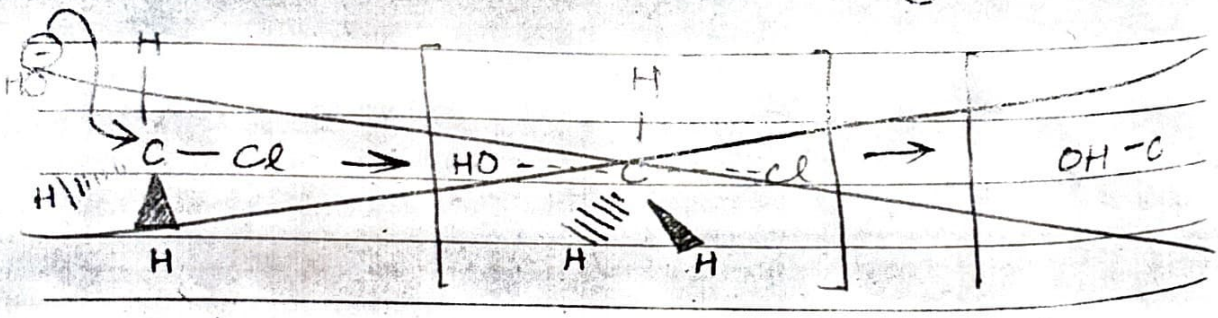
30 SEPTEMBER TUESDAY

Q17. Generally, S_N2 reaction is followed by 1° alkyl halide.

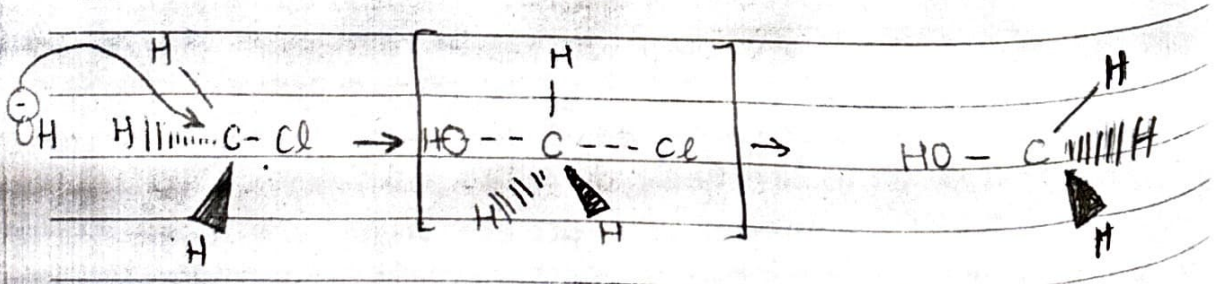
This reaction takes place in only one step thus bond breaking & making takes place at the same time giving rise to a transition state

The nucleophile always attacks the α-carbon from the back side of the halogen atom. Therefore, inversion of configuration takes place called walden inversion.

Ex:- $CH_3Cl + KOH(aq) \longrightarrow CH_3OH + KCl$



mechanism



walden inversion

Q19.

Given; $P_0 = 55.3$ mmHg.

$$\frac{P_0 - P}{P_0} = \chi_A$$

$$\frac{55.3 - P}{55.3} = \frac{\frac{10}{60}}{\frac{10}{60} + \frac{90}{18}}$$

$$= \frac{\frac{1}{6}}{\frac{1}{6} + 5}$$

$$55.3 - P = \frac{1}{31} \times 55.3$$

$$55.3 - P = 1.78$$

$$53.52 \text{ mmHg} = P$$

04 OCTOBER

05 OCTOBER SUNDAY

Q20. (i)

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

$$= E^\circ_{cell} - 0.0295 \log \frac{10^{-3}}{10^{-4}}$$

$$= E^\circ_{cell} - 0.0295$$

$$E^\circ_{cell} = E^\circ_{Cu^{2+}/Cu} - E^\circ_{Mg^{2+}/Mg}$$

(ii) $$E_{cell} = E^\circ_{cell} - \frac{0.0591}{2} \log \frac{[Sn^{2+}]}{[H^+]^2}$$

$$= E^\circ_{cell} - 0.0295 \log \frac{5 \times 10^{-2}}{4 \times 10^{-4}}$$

$$= E^\circ_{cell} - 0.00286$$

$$E^\circ_{cell} = E^\circ_{2H^+/H_2} - E^\circ_{Sn^{2+}/Sn}$$

(iii) $$E_{cell} = E^\circ_{cell} - 0.0295 \log \frac{[Fe^{2+}]}{[H^+]^2}$$

$$= E^\circ_{cell} - 0.0295 \log \frac{10^{-3}}{1}$$

$$= E^\circ_{cell} + 29.5$$

$$E^\circ_{cell} = E^\circ_{2H^+/H_2} - E^\circ_{Fe^{2+}/Fe}$$

07 OCTOBER TUESDAY

82. $T_1 = 298\ K$ $T_2 = 308\ K$

$K = K_1$ $K = K_2$

$t = TS$ $t = TS$

$K_1 = \frac{2.303}{T} \log \frac{100}{96}$ $K_2 = \frac{2.303}{T} \log \frac{100}{75}$

$K_1 = \frac{2.303}{T}(1 - 0.954)$ $K_2 = \frac{2.303}{T}(0.602 - 0.477)$

$= \frac{2.303}{T}(0.046)$ $= \frac{2.303}{T}(0.125)$

08 OCTOBER WEDNESDAY

$\frac{K_1}{K_2} = \frac{0.046}{0.125}$

$= \frac{46}{125}$

$\frac{K_2}{K_1} = \frac{125}{46} = 2.717$

$\log \frac{K_2}{K_1} = 0.301 + 0.717 \times 0.176$

$= 0.301 + 0.1262$

$= 0.427$

$0.427 = \frac{E_a}{19.15}\left(\frac{1}{298} - \frac{1}{308}\right)$

$7 = 785.5 = E_a$

02 SEPTEMBER (22) C// TUESDAY

Lanthanoid contraction & consequences

The decrease in ionic/atomic radii of the elements of lanthanoid series in moving left to right is known as lanthanoid contraction.

Concequences,

- Separation of Lanthanoids :- The chemical properties of lanthanides are similars because their ionic radii are only slightly different. This makes it difficult to separate lanthanides in pure state.

- Effect on basic characters of hydroxide :- Due to lanthanoid contraction the size of M^{3+} ion decreases increasing the covalent characters in M-OH bond. Thus basic strength decreases from $La(OH)_3$ to $Lu(OH)_3$

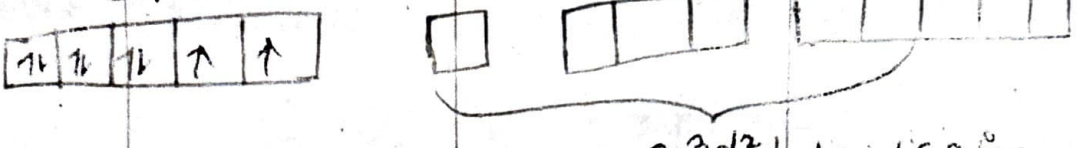
Q.3 In both the compounds $[Ni(H_2O)_6]^{2+}$ & $[Ni(CN)_4]^{2-}$ Ni is present as Ni^{2+},

$[Ni] = [Ar] 3d^8 4s^2$

$[Ni]^{2+} = [Ar] 3d^8$

FRI SAT SUN NOTES

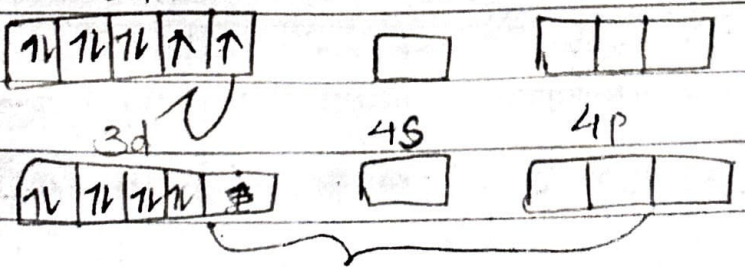
Applying VBT to both the compounds.

(i) $[Ni^{2+}]$ = 

sp^3d^2 hybridisation

∵ H_2O is a WFL so, no pairing of unpaired es take place. So, 2 unpaired es show d-d transition

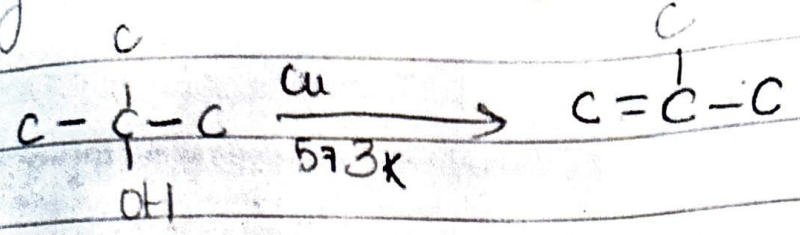
on absorbing radiation equivalent to Red light & emitting it's complementary color green.

(ii) $[Ni^{2+}]$ = 

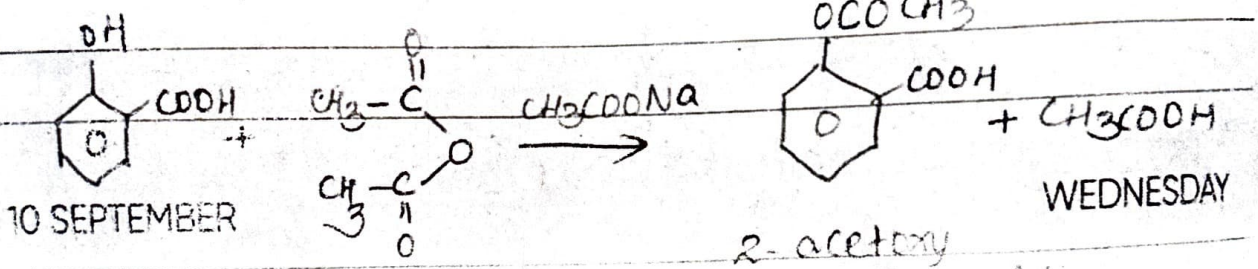
dsp^2,

CN being a SFL, pairs the unpaired es, so no d-d transition takes place.

24. (a) When vapors of 3° alcohols are passed over copper at 573K, instead of dehydrogenation, dehydration occurs & alkene is formed.



(b) From salicylic acid, to synthesize Aspirin i.e. 2-acetoxybenzoic acid, acetic anhydride in presence of Sodium acetate is used.

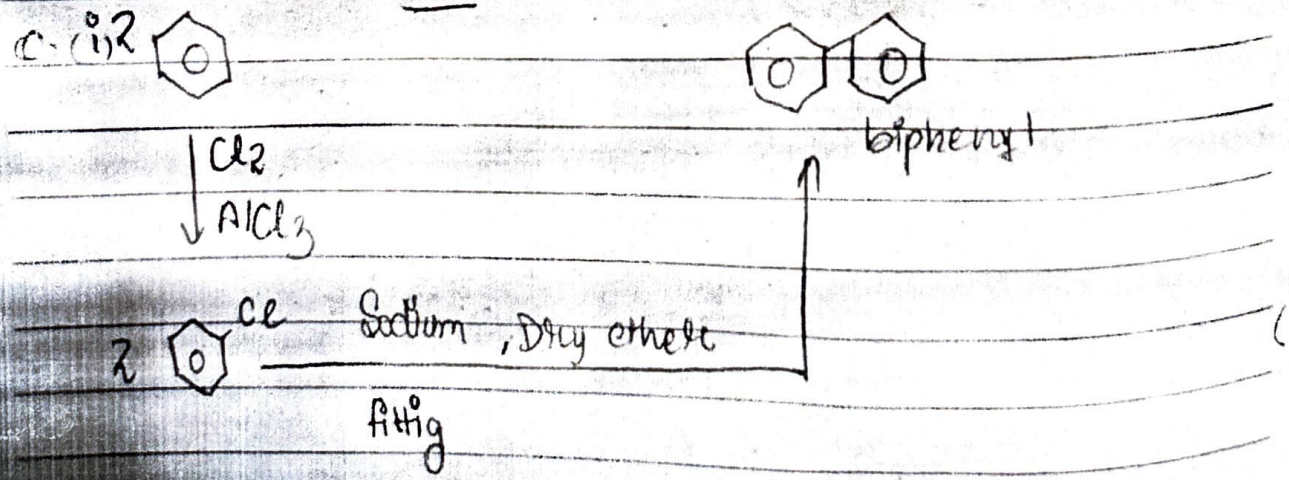


10 SEPTEMBER

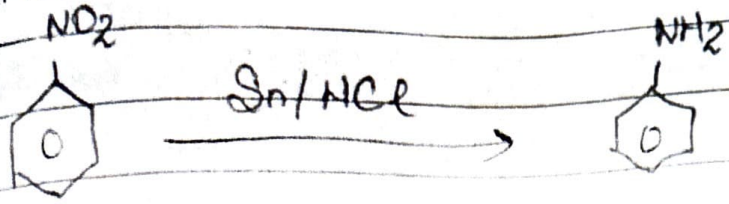
WEDNESDAY

2-acetoxy benzoic acid or Aspirin

OR

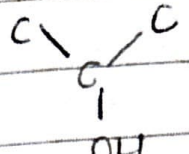


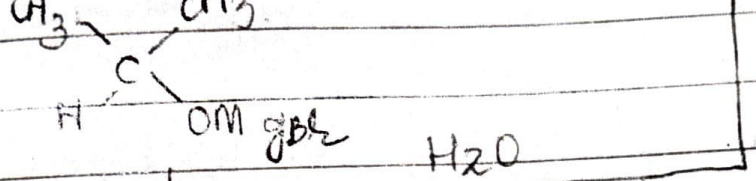
11 SEPTEMBER THURSDAY

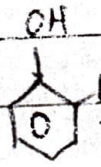
(ii) 

(iii) CH_3CHO

CH_3MgBr
DE





(a) 

is more acidic due to ortho effect. Due to the steric hindrance b/w $-NO_2$ & $-OH$, $-NO_2$ group rotates the plane of the $-OH$ group, making the 'H' on $-OH$ more available.

12 SEPTEMBER FRIDAY

(b) Aniline is an deactivating group due to $-I$ effect, so this reaction is not favorable.

(c) Aniline reacts w/ the lewis acids used in friedal craft alkylation & acylation, leading to the formation of +ve charge on 'N', so instead of '+R' effect, it generates '-R' effect, making is very deactivating for further reaction

13 SEPTEMBER SATURDAY

(c) Diazonium salts of aromatic amines have resonance which disperses the positive charge on the $N_2^{(+)}$ group all over the benzene ring.

Aliphatic diazonium salts don't exhibit resonance making them less stable than aromatic diazonium salts.

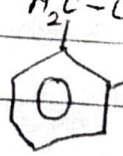
Q26. 1) The compound forms a 2,4-D NP derivative
∴ The compound must contain a $-\overset{O}{\overset{\|}{C}}-$ group.

2) It reduces Tollen's reagent, then it must be an aromatic or aliphatic aldehyde.

14 SEPTEMBER SUNDAY

3) It undergoes cannizaro reaction, it proves that there is no α-hydrogen on the compound.

4) On oxidation it gives 1,2-benzenedicarboxylic acid, so the compound must be aromatic. 6-carbons will be used in the benzene ring, 1-carbon will form the aldehydic group, then 2-carbons will have to form an ethyl group on benzene.
∴ The compound will be



15 SEPTEMBER

(a) Ethanal & Propanal

C - CHO C - C - CHO

(i) Iodoform test

$C-CHO \xrightarrow[I_2]{NaOH} CHI_3 + CO_2 + H_2O$

yellow colored ppt

$C-C-CHO \xrightarrow[I_2]{NaOH}$ No reaction

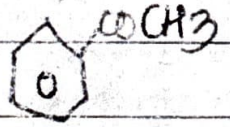
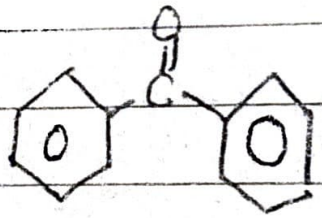
b) Propanal & propanone

i) Tollen's reagent test

$$C-C-CHO \xrightarrow[OH^{\ominus}]{[Ag(NH_3)_2]^{\oplus}} C-C-COO^{\ominus} + Ag\downarrow + H_2O$$

Silver mirror forms

$$C-C(=O)-C \xrightarrow[OH^{\ominus}]{[Ag(NH_3)_2]^{\oplus}} \text{No reaction}$$

c)  & 

ii) Iodoform test