

Pre Final Examination - 2024

H. S. 2nd Year

Sub. : Chemistry

Full Marks : 70

Time : 3 hours

Answer the following questions :

তলৰ প্রশ্নবোৰৰ উত্তৰ দিয়া :

1. Define Molality.

ম'লালিটিৰ সংজ্ঞা দিয়া।

2. Write the Nernst Equation for the given cell -

নিম্নোক্ত কোষৰ বাবে নার্নষ্ট সমীকৰণ লিখা :



3. Calculate the overall order of the reaction which has the rate expression -

সামগ্রিক ক্রম গণনা কৰা —

$$\text{Rate} = R [\text{A}]^{3/2} [\text{B}]^{-1}$$

$$\text{গতিবেগ} = R [\text{A}]^{3/2} [\text{B}]^{-1}$$

$$\text{order} = \frac{3}{2} - 1 = \frac{3-2}{2} = \frac{1}{2} = 0.5$$

4. What is the unit of rate constant for a first order reaction?

প্রথম ক্রমৰ বিক্রিয়াৰ গতিধ্রুবকৰ একক কি? $(\text{conc})^{-1} \text{s}^{-1}$

5. Which element of 3d transition metal series donot show variable oxidation state?

3d সংক্রমণশীল শ্রেণীৰ কোনটো ধাতুৰে পৰিৱৰ্তনশীল জাৰণ অৱস্থা

নেদেখুৱায়?

Sc

6. Write the oxidation state of the Central metal atom :

তলৰ কেন্দ্ৰীয় পৰমাণুটোৰ জাৰণ অৱস্থা উলিওৱা :



Solved
paper
Jorhat
District

21
@PC

@ pattern class

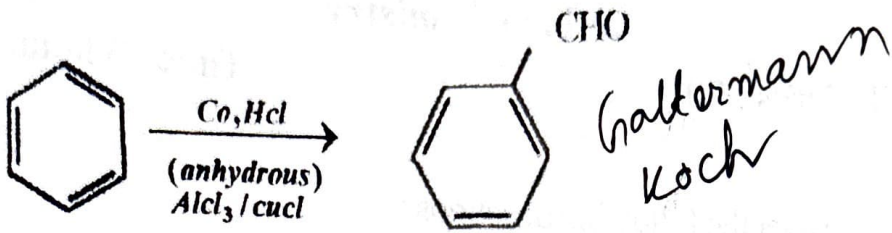
7. Why Grignard reagent should be kept in anhydrous condition?

গ্রিগনার্ড বিকারক কিয় অনার্দ্র পরিবেশত রাখা হয়?

1

8. Write the name of the following chemical reaction -

নিম্নলিখিত রাসায়নিক বিক্রিয়াটোর নাম উল্লেখ করা -



Or/বা

Give an example of globular protein.

বতুলাকার প্রোটিনের এটা উদাহরণ দিয়া।

Hemoglobin, insulin

1

9. Aniline does not undergo Friedel Craft reaction, why?

এনিলিনে কিয় ফিডেল ক্রাফ্টের বিক্রিয়া নেদেখায়?

2

10. Calculate the e.m.f. of the following cell at 298 K.

তলত দিয়া কোষটোর e.m.f. ব মান 298 K উষ্ণতাত নির্ণয় করা :-

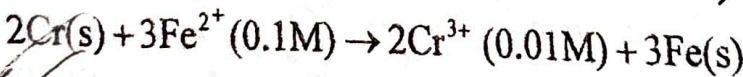
Given, দিয়া আছে — $E^\circ \text{Cr}^{3+}/\text{Cr} = -0.74\text{V}$

$E^\circ \text{Fe}^{2+}/\text{Fe} = -0.44\text{V}$

$$E_{\text{cell}} = E^\circ_{\text{cell}} - \frac{0.0591}{n} \log \frac{[\text{Cr}^{3+}]}{[\text{Fe}^{2+}]}$$

$$= 0.30 + 0.00985$$

$$= 0.30985\text{V}$$



11. What is Lanthanoid Contraction? Write one consequence of this.

ল্যান্থানয়ড সংকোচন কি? ইয়ার এটা ফলাফল লিখা।

2

12. 45 gm ethylene glycol is mixed with 600 gm water. Find the Freezing point of the solution.

45 gm ইথিলিন গ্লাইকল 600 gm পানীত মিহলি করা হ'ল। দ্রবটোর হিমাংক বিন্দু গণনা করা।

2

$$\Delta T_f = K_f \times m$$

$$= 1.86 \times \frac{45/62}{600/100}$$

$$= 2.2475$$

$$T_{\text{soln}} = 273.15 - 2.2475$$

$$= 270.902$$

$$T_{1/2} = \frac{0.693}{K} = 12.6 \times 10^{12}$$

13. The rate constant of a first order reaction is $5.5 \times 10^{-14} \text{ s}^{-1}$.

Calculate the half-life period.

$5.5 \times 10^{-14} \text{ s}^{-1}$ এটা প্রথম ক্রমৰ বিক্ৰিয়াৰ গতিধৰ্মকৰ মান হ'লে বিক্ৰিয়াটোৰ অৰ্ধজীৱনকাল গণনা কৰা।

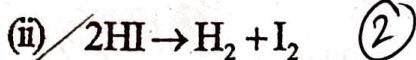
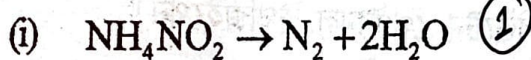
Or

What is molecularity of a reaction? Calculate the molecularity.

of following reactions -

$$1 + \frac{1}{2} + \frac{1}{2} = 2$$

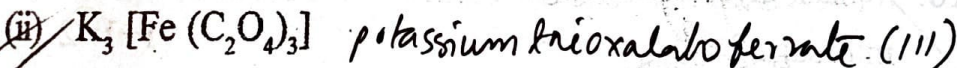
বিক্ৰিয়াৰ আণৱিকতা কি? নিম্নোক্ত বিক্ৰিয়াৰ আণৱিকতা কিমান?



14. Write IUPAC name -

$$1 + 1 = 2$$

IUPAC নাম লিখা -

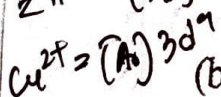


15. (a) Zn^{2+} salts are colourless, while Cu^{2+} salts are coloured.

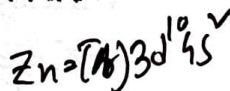
$\text{Zn}^{2+} = (\text{Ar}) 3d^{10}$ Why?

$$1 + 1 = 2$$

Zn^{2+} ৰ লৱণসমূহ বৰণহীন কিন্তু Cu^{2+} লৱণসমূহ বৰণীয়া কিয়?



(b) Why Zn is not regarded as transition element?



Zn ক কিয় সংক্ৰমণশীল মৌল বুলি বিবেচনা কৰা নহয়?

16. $[\text{Ni}(\text{CN})_4]^{2-}$ is diamagnetic and $[\text{NiCl}_4]^{2-}$ is paramagnetic.

Explain on the basis of valence Bond theory.

$[\text{Ni}(\text{CN})_4]^{2-}$ অপচুম্বকীয় আৰু $[\text{NiCl}_4]^{2-}$ অনুচুম্বকীয়। যোজ্যতা বান্ধনি তত্ত্বৰ আধাৰত ব্যাখ্যা কৰা।

Or

Find out the oxidation state of the following compound :-

তলৰ সমন্বয়ী যৌগবোৰৰ জাৰণ সংখ্যা নিৰ্ণয় কৰা :-

$$1 + 1 = 2$$



17. Arrange the following sets of compounds in order of increasing boiling points -

- (a) Pentane-1-ol, butane-1-ol, butane-2-ol, ethanol, propan-1-ol, methanal.
- (b) Pentane-1-ol, n-butane, pentanal, ethoxyethane.

তলত দিয়া যৌগবোৰক উতলাংক উৰ্ধ্বক্রমত সজোৱা :-

- (a) পেন্টেন-১-অল, বিউটেন-১-অল, বিউটেন-২ অল, ইথানল, প্রপেন-১-অল, মিথানল

- (b) পেন্টেন-১-অল, n-বিউটেন, পেন্টানল, ইথক্সিইথেন।

Why is phenol more acidic than alcohol?

ফিনল এলকইলতকৈ বেছি এছিডীয় কিয়?

18. What is glycosidic linkage? Which disaccharide is known as milk sugar?

গ্লাইক'ছাইডিক বান্ধনি কি? দুগ্ধ শৰ্কৰা বুলি কাক কোৱা হয়?

Or/বা

What is peptide linkage? Give one example.

পেপটাইড বান্ধনি কি? এটা উদাহৰণ দিয়া।

19. What is Osmotic Pressure?

Determine the osmotic pressure of a solution prepared by dissolving 25 mg of K_2SO_4 in 2L of water at $25^\circ C$ assuming that K_2SO_4 is completely dissociated?

বসাকৰী চাপ কি? $25^\circ C$ উষ্ণতাত 2L পানীত 25 mg of K_2SO_4 দ্ৰৱীভূত কৰিলে দ্ৰৱটোৰ বসাকৰী চাপ কিমান হ'ব, ধৰি লোৱা হৈছে যে K_2SO_4 সম্পূৰ্ণকৈ বিয়োজিত হৈছে।

$$\pi = i \times C \times R \times T$$

$$= 3 \times \frac{1.43 \times 10^{-4}}{2} \times 0.0821 \times 298$$

$$= 3 \times 7.15 \times 10^{-5} \times 0.0821 \times 298 = 5.246 \times 10^{-3}$$

$$\begin{aligned} \text{mol} &= \frac{25 \times 10^{-3}}{174} \\ &= 1.43 \times 10^{-4} \end{aligned}$$

20/ Show that integrated rate equation for first order reaction

$R \rightarrow P$ is -

দেখুওবা যে, প্রথম ক্রমের বিক্রিয়া $R \rightarrow P$ এর বাবে অনুকলন সমীকরণটো হচ্ছে -

$$R = \frac{2.303}{t} \log \frac{[R_0]}{[R]}$$

Or/বা

Show that for first order reaction half life of reaction is independent of initial concentration of reactants. 3

প্রথম ক্রমের অর্ধজীবনকাল বিক্রিয়কের প্রাথমিক গাঢ়তার ওপর নির্ভর না করে।

21. What are alloys? Name an important alloy which contains some of the lanthanoid metals. Mention its uses. 1+1+1=3

সংকর ধাতু কি? লেহানায়ড ধাতুর এটা উল্লেখযোগ্য সংকর ধাতুর নাম দিয়া। ইয়ার ব্যবহার উল্লেখ করা।

Or/বা

mischmetal

*Bullet's shell
lighter flint*

Explain the following -

1+1+1=3

ব্যাখ্যা করা $3d^4 4s^2$

$3d^5$

(a) Cr^{2+} is strongly reducing while Mn^{3+} is strongly oxidising.

(a) Cr^{2+} বিজারক আর Mn^{3+} তীব্র জারক।

(b) The d^1 configuration is very unstable in ions.

$d^0 \rightarrow$ noble gas

(b) আয়নীয় অবস্থাতে d^1 বিন্যাস দুঃস্থিত।

(c) In the series Sc to Zn, the enthalpy of atomisation of Zinc is the lowest.

(c) Sc থেকে Zn লৈ এই মৌলকেইটার ভিতরত Zn এর পরমাণুকরণ এনথালপি সর্বনিম্ন।

fully filled d^{10}

strength of metallic & covalent bond is less.

Carbylamine test

23

(a) Give a chemical test for primary amine.

প্রাইমেৰী এমাইনৰ এটা ৰাসায়নিক পৰীক্ষা লিখা।

(b) What happens when aniline react with bromine water at room temperature.

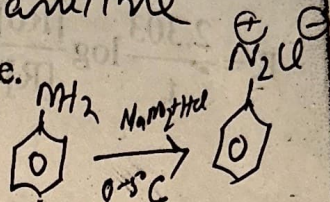
1+1+1=3

সাধাৰণ উষ্ণতাত এনিলিনে ব্ৰ'মি পানীৰ লগত বিক্ৰিয়া কৰিলে কি ঘটিব? 2, 4, 6 - tribromoaniline

(c) Write the diazotisation reaction of aniline.

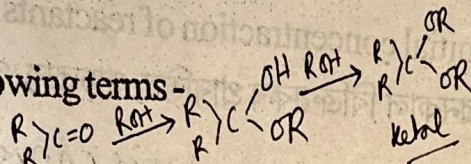
এনিলিনৰ ডায়েজ'কৰণ বিক্ৰিয়াটো লিখা।

Or/বা



Define the following terms -

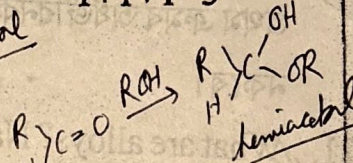
সংজ্ঞা লিখা :



1+1+1=3

(i) Aldol, (ii) Ketal, (iii) Hemiacetal

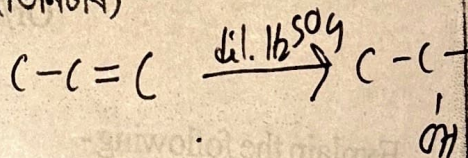
(i) এলডল (ii) কিটেল (iii) হেমিএছিটেল।



23. How will you convert the following (any three) :- 1+1+1=3

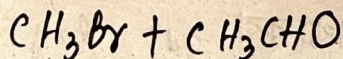
তলৰ পৰিৱৰ্তনবোৰ কেনেদৰে কৰিবা : (তিনিটাৰ)

(i) Propene to propan - 2 - ol



প্রপিনক প্রপেন - 2- অললৈ

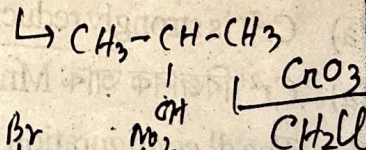
(ii) Bromomethane to propanone.



ব্ৰ'ম'মিথেনক প্রপাননলৈ

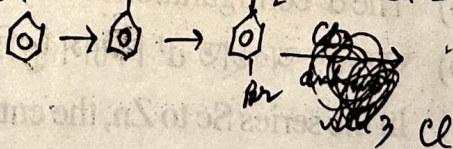
(iii) Benzene to 4 - bromonitrobenzene

বেনজিনক 4 ব্ৰ'ম'নাইট্ৰ'বেনজিনলৈ



(iv) Aniline to Chlorobenzene

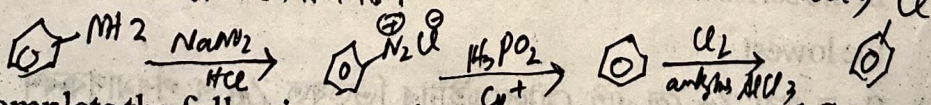
এনিলিনক ক্ল'ৰ'বেনজিনলৈ

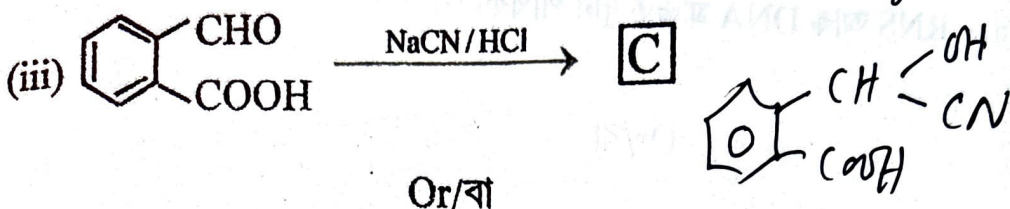
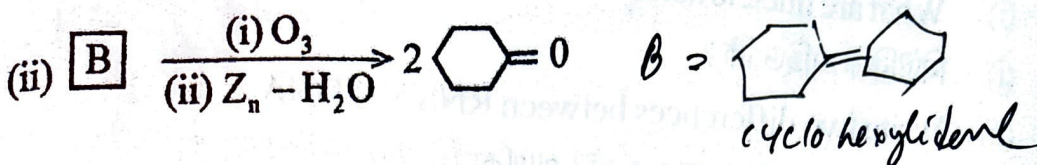
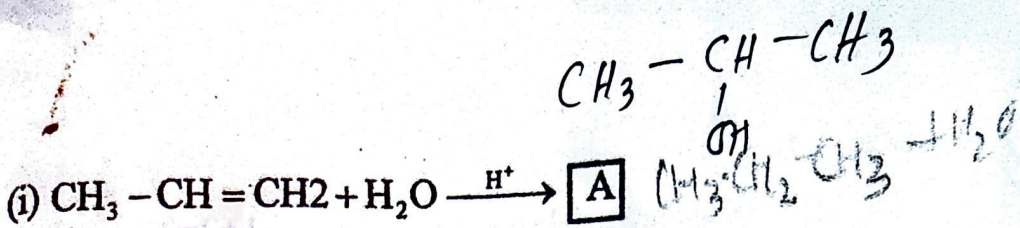


24. Complete the following reactions and identify A, B and C :-

বিক্ৰিয়াবোৰ সম্পূৰ্ণ কৰি A, B, C চিনাক্ত কৰা :

1+1+1=3





Or/বা

Explain why (ব্যাখ্যা কৰা) :

$$1\frac{1}{2} + 1\frac{1}{2} = 3$$

(a) The boiling point of ethanol is higher than methoxy methane.

মিথক্সি মিথেনতকৈ ইথানলৰ উতলাংক বেছি। intermolecular H bonding

(b) Ortho nitro phenol is steam volatile

অর্থ নাইট্রো ফিনল ভাপ উদ্বায়ী। intramolecular H bonding

Give simple chemical test to distinguish between- $1+1+1=3$

তলৰ প্ৰতিযোৰৰ পাৰ্থক্য দেখুৱাবলৈ এটা ৰাসায়নিক পৰীক্ষা লিখা :-

(a) Pentane - 2 - one and pentane - 3 - one

পেণ্টেন - 2 - অন আৰু পেণ্টেন - 3 - অন

Iodoform test (CH_3CO)

(b) Benzaldehyde and benzophenone

বেনজেলডিহাইড আৰু বেনজফিনন।

Tollens test

(c) Phenol and benzoic acid.

ফিনল আৰু বেনজয়িক এছিড।

Neutral FeCl_3 test

Or/বা

Write the chemical reactions of the following :- $1+1+1=3$

তলত দিয়াবোৰৰ কেৱল ৰাসায়নিক সমীকৰণ লিখা :-

(a) Rosenmund reduction

(a) ৰ'জেনমণ্ড বিজাৰণ

(b) Aldol condensation

(b) এলডল ঘনীভৱন

(c) Finkelstein Reaction

(c) ফিংকেলষ্টাইন বিক্ৰিয়া

Recall $\xrightarrow{\text{H}_2} \text{Pd-BaSO}_4$

26.

1+2=3

(i) What are nucleic acids?

(i) নিউক্লিক এছিড কি?

(ii) Write two differences between RNS and DNA.

(ii) RNS আৰু DNA মাজত দুটা পাৰ্থক্য লিখা।

Or/বা

How are Vitamins classified? Name the Vitamin deficiency of which cause Scurvy.

2+1=3

ভিটামিনক কেনেদৰে শ্ৰেণীবিভাজন কৰা হয়? কি ভিটামিনৰ অভাৱত স্কাৰ্ভি ৰোগ হয়?

27.

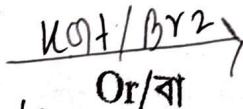
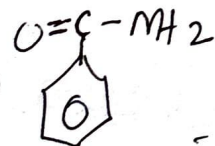
B must be amide

An aromatic compound A on treatment with aqueous ammonia and heating, forms compound B which on heating with Br_2 and KOH forms a compound C of molecular formula $\text{C}_6\text{H}_7\text{N}$.

Write the structure and IUPAC names of the compound A, B and C.

A must

এটা এৰ'মেটিক যৌগ A ৰ জলীয় এম'নিয়াৰ সৈতে বিক্ৰিয়া কৰি গৰম কৰিলে B যৌগটো গঠন হয়, B-ক KOH ৰ সৈতে গৰম কৰিলে C যৌগ গঠন হয় যাৰ আণৱিক সূত্ৰ হৈছে $\text{C}_6\text{H}_7\text{N}$ । A, B আৰু C যৌগ তিনিটাৰ গঠন আৰু IUPAC নাম লিখা।



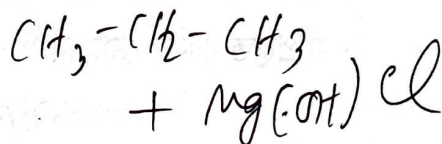
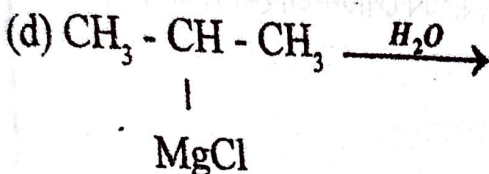
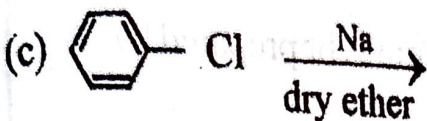
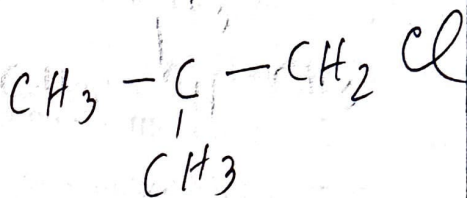
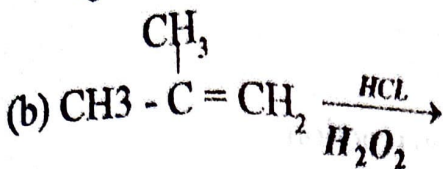
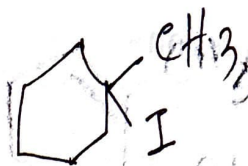
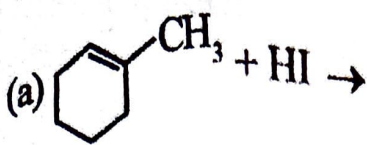
Write the product of the following reactions (any three)

(A)

(B)

1+1+1=3

তলৰ বিক্ৰিয়াবিলাকৰ উৎপাদিত দ্ৰব্য লিখা : (তিনিটাৰ)



28. (i) What is molar conductance?

ম'লাৰ পৰিবাহিতা কি?

(ii) How does molar conductance varies with concentration for strong and weak electrolyte?

গাঢ়তাৰ পৰিৱৰ্তনৰ সৈতে মৃদু আৰু তীব্ৰ বিদ্যুৎবিশ্লেষ্যৰ ম'লাৰ পৰিবাহিতা কেনেদৰে পৰিৱৰ্তন হয়?

(iii) Draw a graph to show variation of λ_m with concentration for strong electrolyte like KCl.

তীব্ৰ বিদ্যুৎ বিশ্লেষ্য যেনে KCl ৰ ম'লাৰ পৰিবাহিতাৰ বিপৰীতে গাঢ়তাৰ লেখ অংকন কৰা।

Or/বা

How many types of Battery are there and what are they?

A solution of CuSO4 is electrolysed for 10 minutes with a current of 1.5 amperes. What is the mass of copper deposited at the cathode?

2+3=5

বেটেৰী কেইপ্ৰকাৰ আৰু কি কি? CuSO4 ৰ দ্ৰৱ এটা 10 minute বাবে 1.5 amperes বিদ্যুৎবিশ্লেষণ কৰিলে কেথ'ডত কিমান গ্ৰাম কপাৰ জমা হ'ব?

29. (a) Write short notes on -

2+2+1=5

চমু টোকা লিখা :

(i) Sandmeyer reaction.

ছেণ্ডমেয়াৰ বিক্ৰিয়া

(ii) Hoffmann bromamide degradation reaction.

হফমেন ব্ৰমেমাইড অৱনমন বিক্ৰিয়া।

(b) Why cannot aromatic primary amines be prepared by Gabriel phthalimide synthesis?

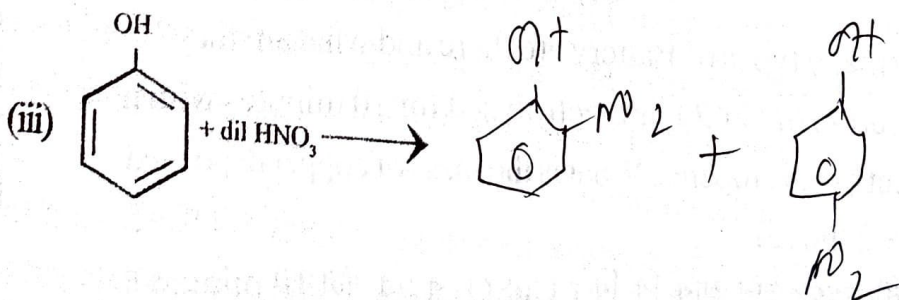
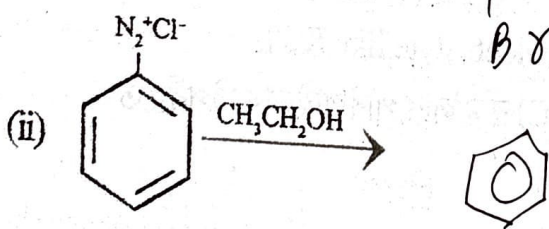
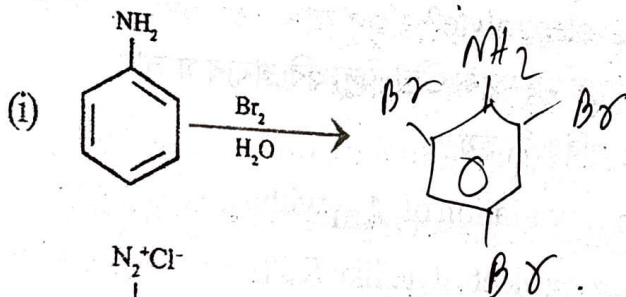
গেব্ৰিয়েল থেলিমাইড সংশ্লেষণৰ দ্বাৰা এৰ'মেটিক প্ৰাইমাৰী এমাইন কিয় প্ৰস্তুত কৰিব নোৱাৰি?

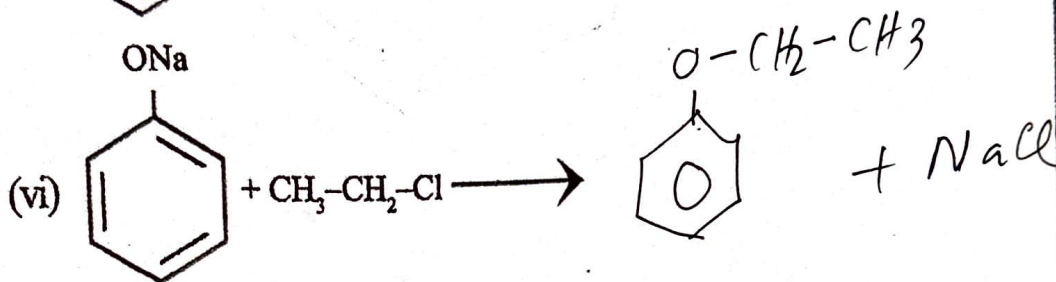
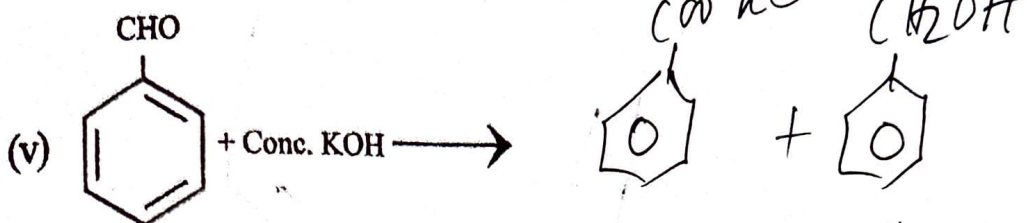
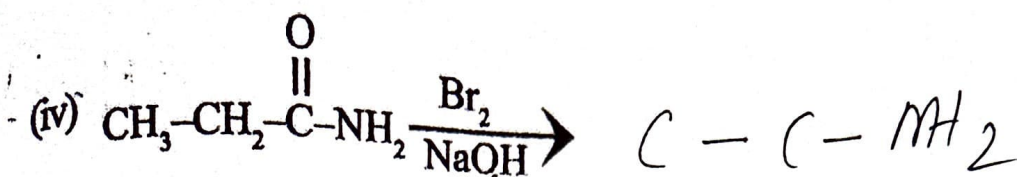
Or/বা

Complete the following reactions - (any five)

1x5=5

ক্ৰিয়াৰ বিক্ৰিয়াকেইটা সম্পূৰ্ণ কৰা : (যিকোনো পাঁচটা)





30. (i) Using crystal Field theory

(a) Draw a figure to show the splitting of d orbitals in an Octahedral crystal field.

অষ্টফলকীয় ক্রিস্টেল তত্ত্বৰ সহায়ত d - অৰবিটেলৰ বিভাজনৰ চিত্ৰ আঁকা।

(b) Define weak field ligand and strong field ligand. Give examples.

মৃদু ক্ষেত্ৰ লিগাণ্ড আৰু তীব্ৰ ক্ষেত্ৰ লিগাণ্ডৰ সংজ্ঞা দিয়া আৰু উদাহৰণ লিখা।

Or/বা

Explain with examples -

Co-ordination entity, ligand, co-ordination number, homoleptic and heteroleptic, chelate. (any five)

উদাহৰণসহ ব্যাখ্যা কৰা :

সমন্বয়ী সত্তা, লিগাণ্ড, সমন্বয়ী সংখ্যা, হ'ম'লেপ্টিক আৰু হেটাৰ'লেপ্টিক যৌগ, কিলেট। (পাঁচটাৰ)।

1) Solⁿ: It is a concentration term, it's the ratio of number of moles of ^{Solute} ~~solvent~~ to the mass of solvent in kilograms.

$$\text{Molality} = \frac{\text{Moles of } \cancel{\text{solvent}} \text{ Solute (mol)}}{\text{mass of solvent (kg)}}$$

2) Solⁿ: $\text{Mg (s)} | \text{Mg}^{2+} (\text{aq}) (0.001 \text{ M}) || \text{Cu}^{2+} (0.001 \text{ M}) | \text{Cu (s)}$

Nernst equation

$$E_{\text{cell}}^{\circ} = (E_{\text{Cu}^{2+} | \text{Cu}}^{\circ} - E_{\text{Mg}^{2+} | \text{Mg}}^{\circ}) - \frac{0.0591}{2} \log \frac{0.001}{0.001}$$

$$E_{\text{cell}} = (E_{\text{Cu}^{2+} | \text{Cu}}^{\circ} - E_{\text{Mg}^{2+} | \text{Mg}}^{\circ}) = E_{\text{cell}}^{\circ}$$

3) Solⁿ: $R = K [A]^{3/2} [B]^{-1}$

overall order :- $\frac{3}{2} - 1$

$$= \frac{3-2}{2} = 0.5$$

4) Solⁿ: $K \text{ unit} = \frac{1}{(\text{conc.})^{n-1} \text{ s.}}$

$$n=1$$

$$K = \frac{1}{\text{s}} = \text{s}^{-1}$$

Q5. Scandium

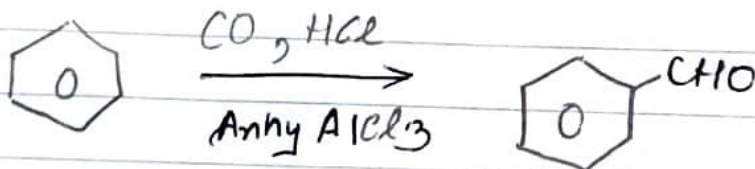
Q6. $[Ni(CO)_4]$

$$x + 4(0) = 0$$

$$x = 0$$

Q7. Grignard reagent will ~~not~~ react with any proton source & will form a corresponding alk.

Q8.



It is called Gattermann-Koch.

OR

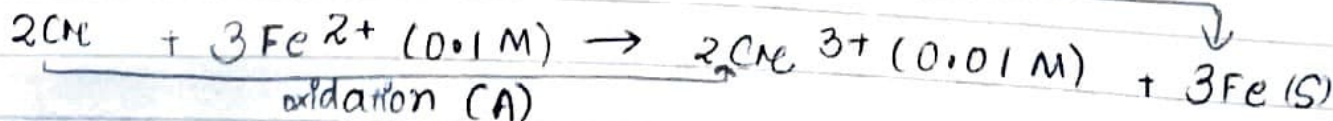
insulin, albumin

Given,

$$E^\circ_{\text{Cr}^{3+}/\text{Cr}} = -0.74 \text{ V}$$

$$E^\circ_{\text{Fe}^{2+}/\text{Fe}} = -0.44 \text{ V}$$

Reduction (C) Fe



$$E^\circ_{\text{cell}} = E^\circ_{\text{RP, cathode}} - E^\circ_{\text{RP, anode}}$$

Important

$$= E^\circ_{\text{Fe}^{2+}/\text{Fe}} - E^\circ_{\text{Cr}^{3+}/\text{Cr}}$$

$$= -0.44 \text{ V} + 0.74 \text{ V}$$

$$= 0.30 \text{ V}$$

$$E_{mf} = E^{\circ}_{cell} - \frac{0.0591}{n} \log \frac{[Cr^{3+}]^2}{[Fe^{2+}]^3}$$

$$E_{mf} = 0.30 - 0.00985 \log \frac{10^{-4}}{10^{-3}}$$

$$= 0.30 - 0.00985 \log 10^{-1}$$

$$= (0.30 + 0.00985) \text{ V}$$

$$= 0.30985 \text{ V}$$

Q11. The reduction of atomic/ionic radii of elements of the lanthanoid series on moving from left to right is called lanthanoid contraction.

Consequence:-

Separation of Lanthanoids:- Due to Lanthanoid contraction the lanthanoids have similar properties, which makes its separation hard.

Q13. We have,

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

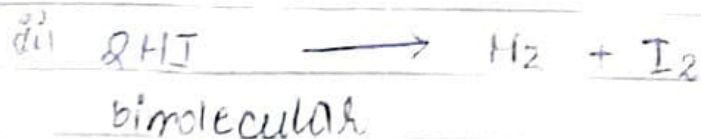
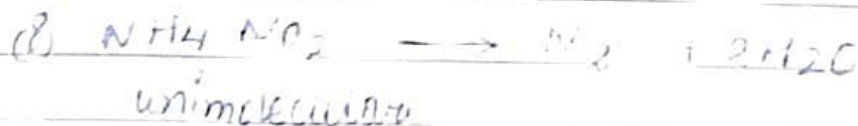
$$t_{1/2} = \frac{0.693}{5.5 \times 10^{-14} \text{ s}^{-1}}$$

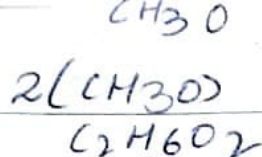
$$= \frac{693 \times 10^4}{100 \times 55}$$

$$= 12.6 \times 10^{12} \text{ s.}$$

OR

Molecularity :- the number of reacting species that must collide simultaneously to bring about a chemical reaction. (elementary).





$\frac{\text{K kg}}{\text{mol}}$

12 13 14 15 16 17 18 19 20 21
26 27 28 29 30 31

Q12. Given, mass of solute = 45 gm
mass of water given = 600 gm
= 0.6 Kg

We know, molar mass of ethylene glycol ($\text{C}_2\text{H}_6\text{O}_2$)
= 24 + 6 + 32
= 38 + 24
= 62 g

$K_f(\text{water}) = 1.86 \frac{\text{K kg}}{\text{mol}}$

no. of moles of ethylene glycol = $\frac{45}{62} \times \frac{1}{10}$
= 0.725 mol

$\Delta T_f = K_f m$

$(273 - T) = \frac{1.86 \times 0.725}{0.6} = \frac{1.3485}{0.6}$

Sunda

= $\frac{13485}{1000} \times \frac{10}{6}$
= 2.2475

$273.15 - T = 2.2475$
= 2.2475

Important

$270.9025 \text{ K} = T$

$$\begin{array}{r} 14 \\ 12 \\ \hline 28 \\ 24 \\ \hline 45 \\ 42 \end{array}$$

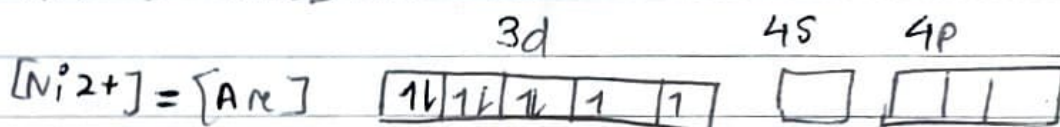
Zn has the electronic configuration of $[Ar] 3d^{10} 4s^2$, & $[Ar] 3d^{10} 4s^2$ in Zn^{2+} , which is its most common O.S. $\therefore$ it has completely filled 3d orbitals, it is not regarded as a transition element.

(Cd, Hg, ~~Cmn~~) too

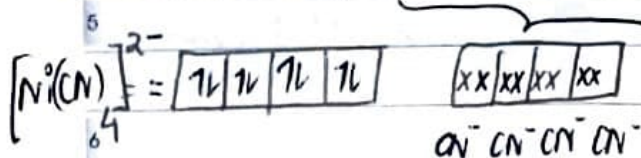
Q16. In both the compounds $[Ni(CN)_4]^{2-}$ & $[NiCl_4]^{2-}$ Nickel is present as Ni^{2+} .

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

$$[Ni^{2+}] = [Ar] 3d^8 4s^0$$



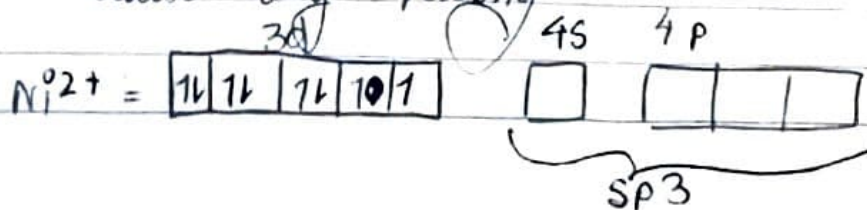
In, $[Ni(CN)_4]^{2-}$, $CN^\ominus$ is a strong field ligand, it causes the last two $e^\ominus$ s to pair up.

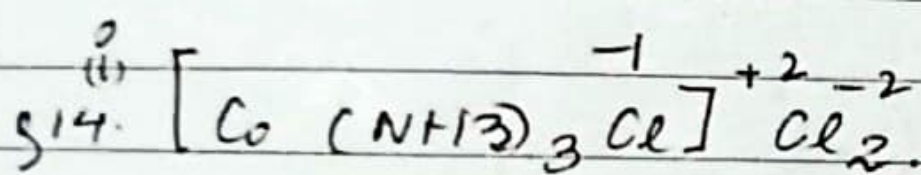


no. of unpaired, $e^\ominus$ s, $n = 0$

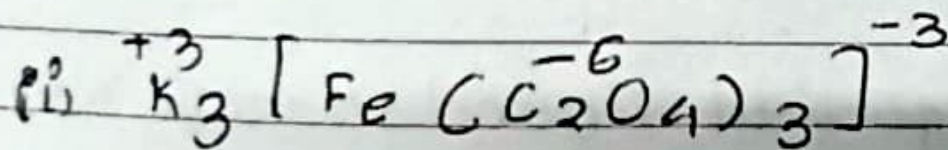
$$M = \sqrt{n(n+2)} = 0 \quad \therefore \text{Diamagnetic}$$

Important In $[NiCl_4]^{2-}$, $Cl^\ominus$ is a weak field ligand, it doesn't cause any pairing.



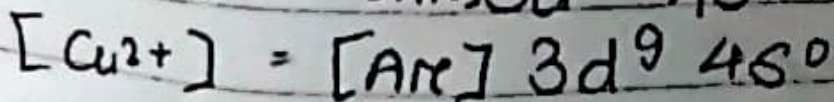
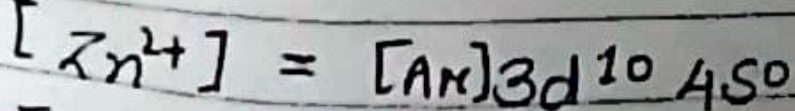


~~trichloro~~ diammine chloridocobalt(III) chloride



potassium trioxalato ferate (III)

Q15. The electronic configurations of Zn^{2+} & Cu^{2+} are.



due to 1 unpaired e^- in Cu^{2+} salts, & d-d transition, Cu^{2+} salts are colored but no d-d transition of e^- is taking place in Zn^{2+} , Zn^{2+} salts are not colored.

11

JAN'25 • Saturday

Week 02/011-354

2025

JANUARY

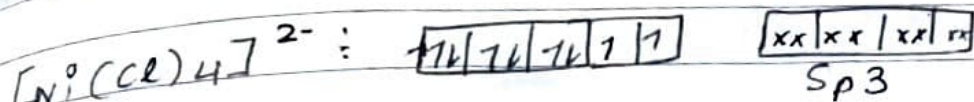
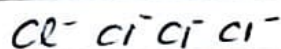
S	M	T	W	T	F	S	S	M	T	W	T	F	S
			1	2	3	4	5	6	7	8	9	10	11
12	13	14	15	16	17	18	19	20	21	22	23	24	25
26	27	28	29	30	31								

OR

8 L-a.a's are connected together by peptide bonds.
Chemically, peptide linkage is an amide formed
9 b/w $-COOH$ & $-NH_2$ group.

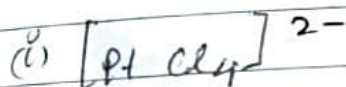
10 Ex- when carboxyl group of glycine combines w/ amino
group of alanine, a dipeptide is formed: glycylalanine.
11

12 Q19. Osmotic pressure is that pressure that stops the
flow of solvent through spm during osmosis.

sp³here, $n=2$

$$\mu = \sqrt{2(2+2)} = \sqrt{2(4)} = 2\sqrt{2} \text{ BM}, \therefore \text{Paramagnetic}$$

OR



$$x(-1)4 = -2$$

$$x - 4 = -2$$

$$x = +2$$

$$3x (+1)3 + x + (-1)6 = 0$$

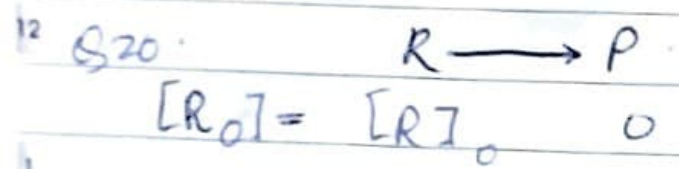
$$+3 + x - 6 = 0$$

$$x - 3 = 0$$

$$x = +3$$

Q18. Two monosaccharides are joined together by an oxide linkage formed by the loss of a water molecule. Such a linkage is glycosidic linkage.

Lactose is known as milk sugar (D-galactose & D-glucose)



$$[R_0] = [R]_0 \quad 0$$

$$[R_t] = [R] \quad [R]_0 - [R]$$

~~$$R = -k \frac{d[R]}{dt}$$~~

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

~~$$kdt = -k d[R]$$~~

$$kdt = -\frac{d[R]}{[R]}$$

Integrating both sides,

$$\int_0^t kdt = - \int_{[R]_0}^{[R]} \frac{d[R]}{[R]}$$

$$kt = - \left[\log_e [R] \right]_{[R]_0}^{[R]}$$

$$kt = - \left\{ \log_e [R] - \log_e [R]_0 \right\}$$

Important

$$\text{mass of } K_2SO_4 = 25 \times 10^{-3} \text{ g.}$$

$$\text{Molar mass of } K_2SO_4 = 39 \times 2 + 32 + 64$$

$$= 78 + 32 + 64$$

$$= 174 \text{ g/mol}$$

$$\text{no. of moles} = \frac{25 \times 10^{-3}}{174}$$

$$= \frac{250}{174} \times 10^{-4}$$

$$= 1.43 \times 10^{-4}$$

$$\text{volume of water} = 2 \text{ L}$$

$$C = \frac{1.43 \times 10^{-4}}{2}$$

$$= 0.715 \times 10^{-4}$$

$$= 7.15 \times 10^{-5} \text{ mol/L}$$

$$\alpha = 1, \quad i = n = 3$$

$$\pi = iCRT$$

$$= 3 \times 7.15 \times 10^{-5} \times 0.0821 \frac{\text{atm} \cdot \text{L}}{\text{K} \cdot \text{mol}} \times 298 \text{ K}$$

$$= 21.45 \times 0.0821 \times 298 \times 10^{-5}$$

$$= 21.45 \times 24.48 \times 10^{-5}$$

$$= 524.667 \times 10^{-5}$$

$$= 5.24667 \times 10^{-3}$$

$$\begin{array}{r} 24.48 \\ \times 21.45 \\ \hline 12230 \\ 24480 \\ 48960 \\ 48960 \\ \hline 524.667 \end{array}$$

16

JAN'25 • Thursday

Week 03 / 016-349

2025

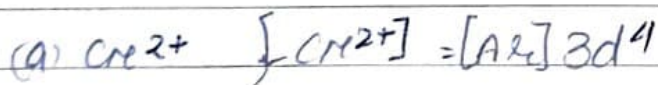
JANUARY													
S	M	T	W	T	F	S	S	M	T	W	T	F	S
			1	2	3	4	5	6	7	8	9	10	11
12	13	14	15	16	17	18	19	20	21	22	23	24	25
26	27	28	29	30	31								

8 $d^{21} \text{Sol}^n$, they are homogeneous ~~at~~ mixtures of two
 9 & more elements, at least one of which is
 10 a metal.

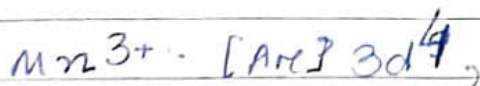
11 mischmetal is a type of alloy which contains
 12 lanthanoids.

13 uses:- 1) used to make bullets, shells etc
 14 2) they are used to make lighter flints.

15 OR



17 on losing $1e^-$ Cr^{2+} will attain stable t_{2g}^3
 18 state. So, it's reducing.



20 on gaining $1e^-$, $3d^4$ will become $3d^5$ & gains
 21 extra stability due to half filled 3d subshell,
 22 so, it is oxidising in nature

Important

$$k_t = \log_e \frac{[R]_0}{[R]}$$

$$k_t = 2.303 \log_{10} \frac{[R]_0}{[R]}$$

$$K = R = \frac{2.303}{t} \log_{10} \frac{[R]_0}{[R]}$$

OR

$$K = \frac{2.303}{t} \log_{10} \frac{a}{a-x}$$

for half life, $a = 100$

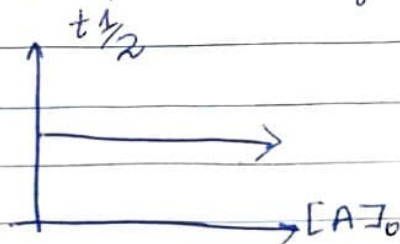
$$x = 50$$

$$a-x = 50$$

$$K = \frac{2.303}{t_{1/2}} \log_{10} 2$$

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

$\therefore t_{1/2}$ is independent of initial concentration $[A]_0$.



Important

(b) the d^2 is unstable & the elements will want to attain d^0 configuration to attain noble gas configuration

(c) Due to fully filled d orbital, the strength of metallic & covalent bonding inside the lattice of Zn is very weak, so enthalpy of atomisation is low.

Q26. (i) They are polymers of nucleotides, which is crucial in all cells & viruses.

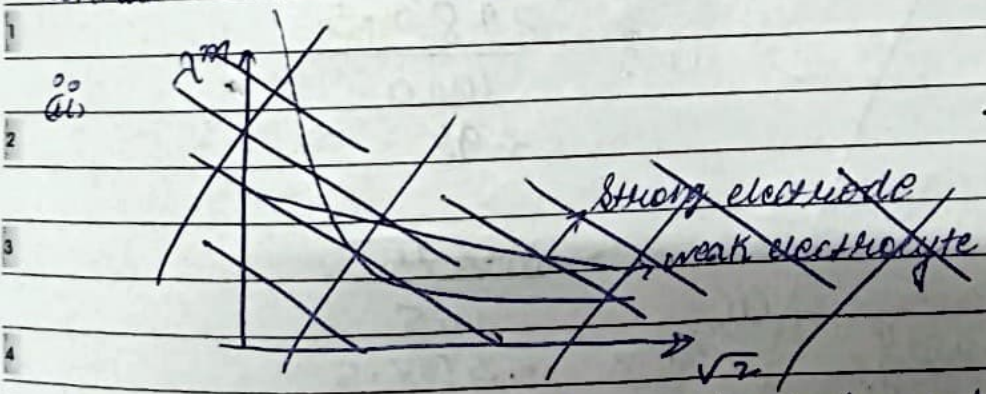
RNA	DNA
RNA is more reactive	DNA is less reactive,
Simple ribose sugar is present	Deoxyribose is present
RNA is single stranded.	DNA is double stranded
hydrogen bonds are ^{ab} present	hydrogen bonds are present.

Molar conductance

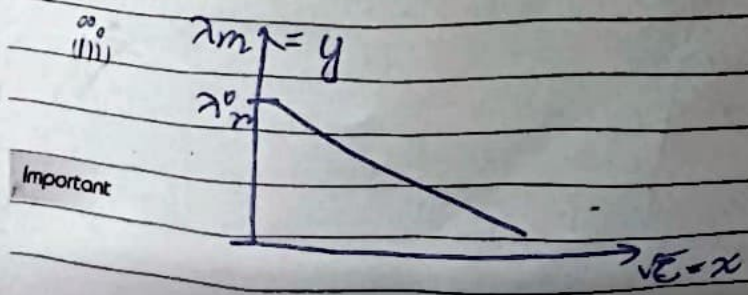
molar conductance is the conductance of all the ions produced by ionisation of 1 mole which is present in V_{sol} of solution.

The molar conductivity of 1 ml solⁿ is called molar conductivity.

When the two electrodes are 1cm apart & the area of the electrodes is large enough to contain the whole solution b/w them.



(ii) For both strong & weak electrolytes, dilution increases the molar conductance due to increase in mobility. So, concentration has the opposite effect. Decreases molar conductivity for both.



$$\lambda_m = -K\sqrt{c} + \lambda_m^\infty$$

Important

OR

8

vitamins are classified in two categories based on their solubility in water or fat. ~~water~~

9

Water soluble: vitamins B & C are water soluble & cannot be stored inside body (except B₁₂). They pass out of the body through urine.

10

Fat soluble: vitamins A, D ~~&~~, E & K are soluble in fats & stored in liver cells & adipose tissue.

11

1

Vitamin C deficiency causes scurvy.

2

28

JAN'25 • Tuesday

Week 05 / 028-337

2025

JANUARY

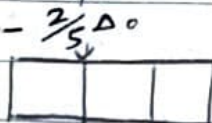
S	M	T	W	T	F	S	S	M	T	W	T	F	S
				1	2	3	4	5	6	7	8	9	10
12	13	14	15	16	17	18	19	20	21	22	23	24	25
26	27	28	29	30	31								

homoleptic: If the coordination sphere has ^{only one} ~~one~~ ~~than 1~~ type of ligand, it is called a homoleptic complex.

heteroleptic: If the coordination sphere has more than 1 type of ligands, the complex is heteroleptic.

Chelate: When the central metal atom or ion makes coordination bonds with ligands having more than 1 denticity, a ring is formed, known as chelate.

830, (i)

~~d-orbitals~~
d-orbitalsd orbitals in
spherical crystal
field $+ \frac{3}{5} \Delta_o$ d orbitals in
octahedral crystal
field.

Barycentre.

Weak field ligands create high spin complexes, & keep the Δ_o value lesser than pairing energy.

Strong field ligand, creates low spin complexes, they increase the Δ_o value more than P.E.

OR

Coordination entity/sphere :- a neutral molecule or ion, consisting of a central metal atom or ion surrounded by ligands.

Ligand :- ligands are Lewis bases, which can form coordination bonds w/ central metal atom/ion.

Coordination number :- The no. of bonds that the central metal

atom or ion forms w/ various ligands.

10 battery

20 battery

Lead acid battery

Lithium-Cadmium battery

Nickel Cadmium battery

Sealed maintenance-free battery



2F deposits 63.5g of Cu.

2 x 96500 coulomb $\rightarrow$ 63.5g.

1.5 x 10 x 60 $\rightarrow$ $\frac{63.5g}{96500 \times 2}$ 1.5 x ~~600~~

$$\Rightarrow \frac{63.5 \times 405}{965} \text{ g.}$$

$$\Rightarrow \frac{25717.5}{965} = 285.75$$

$$= \frac{2857.5}{965} \times 10^{-1}$$

$$= 0.296g$$

Important

17 JUNE

Jorhat

TUESDAY

87. Solⁿ, Grignard reagent should be kept in anhydrous condition to prevent their reaction with water, which would lead to the production of the corresponding alkane & hydroxymagnesium halides.

88. Solⁿ, Gattermann-Koch.

89. Solⁿ, (i) Aniline has -I effect due to $-NH_2$ group, making it deactivating in nature & thus reducing the e^- density on the ring, making it less susceptible to electrophilic attack.

18 JUNE

WEDNESDAY

(ii) Aniline reacts with Lewis acids like $AlCl_3$, $FeCl_3$ used in Friedel-Crafts acylation & alkylation leading to the development of +ve charge on 'N' ~~max~~, turning it into an e^- withdrawing group, & not susceptible for further reaction.

917. (a) $C-C-C-C-C-OH$ (1) max

$C-C-C-C-OH$ (2)

$\begin{array}{c} OH \\ | \\ C-C-C-C \end{array}$ (3)

$C-C-OH$ (5)

$C-C-C-OH$ (4)

$C-OH$ (6) min

19 JUNE

THURSDAY

(b) ~~Pentan-1-ol~~(1) ^{max} C-C-C-C-C-OH H-bonding(4) ^{least} C-C-C-C van der Waals

(2) C-C-C-C-CHO dipole-dipole

(3) C-C-O-C-C dipole-dipole

OR

phenol is more acidic than alcohol, because their conjugate bases phenoxide ion & alkoxide ions have very high differences in stability. In phenoxide ion, stability is brought by -M' effect of phenyl ring. In alkoxide ion, the -ve charge on oxygen is further intensified by +I effect of -R group

20 JUNE

FRIDAY

21 JUNE

Q. 23.

SATURDAY

(a) isocyanide test

Aliphatic & aromatic primary amines when warmed w/ chloroform & an alcoholic soln of KOH, forms isocyanide or carbamine which has a very unpleasant smell. 2° & 3° amines do not give this test

(b) When Bromine water is added to aniline, a white ppt. of 2,4,6-tribromoaniline is formed.

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

22 JUNE

SUNDAY

OR.

(i) Aldol

Def, An aldol is a product of the reaction "Aldol reaction" which is a part of the "Aldol condensation reaction". Aldol consists both a aldehyde & a hydroxyl group. A aldol is better known as a β -hydroxy aldehyde. The carbon next to the α -carbon has a hydroxy group.

23 JUNE

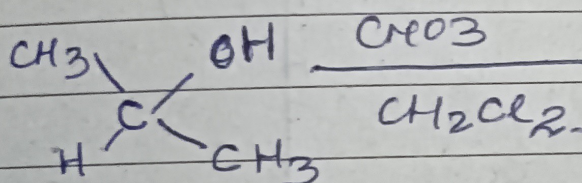
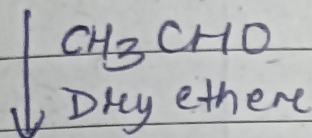
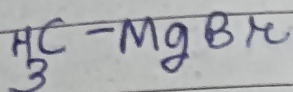
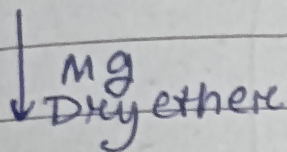
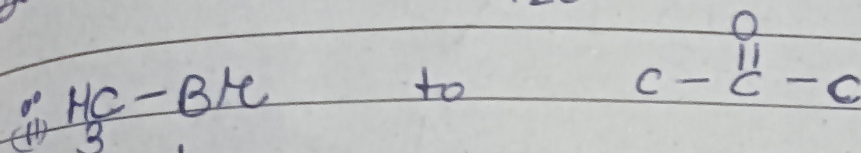
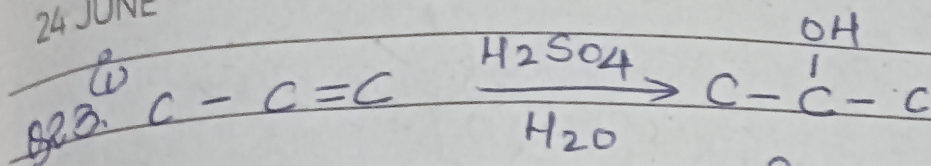
nucleophilic addition MONDAY

(ii) Ketal: They are the product formed when ketone molecules react w/ vicinal dihydric alcohols like ethylene glycol in presence of HCl gas & dilute HCl.

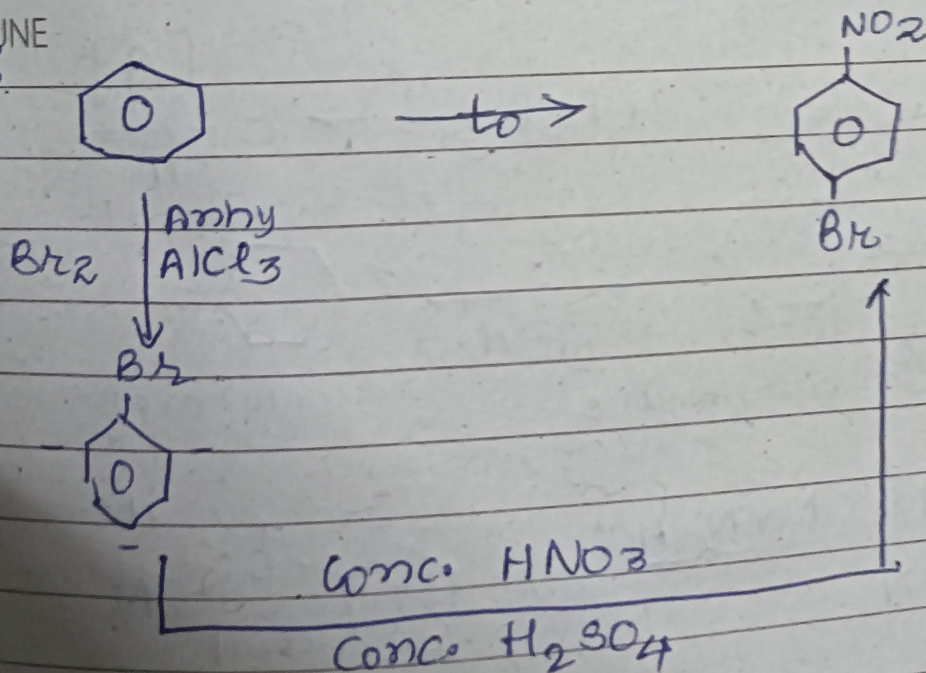
(iii) Hemiacetal: Aldehydes react with 1 equivalent of monohydric alcohol in presence of HCl gas to yield alkoxyalcohol intermediate, known as hemiacetal.

24 JUNE

TUESDAY

25 JUNE
(LID)

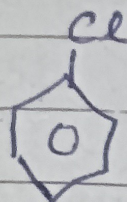
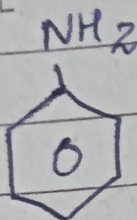
WEDNESDAY



26 JUNE

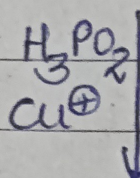
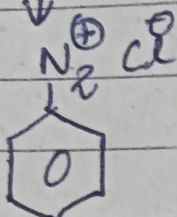
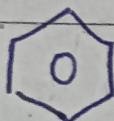
THURSDAY

Lin

NaNO₂

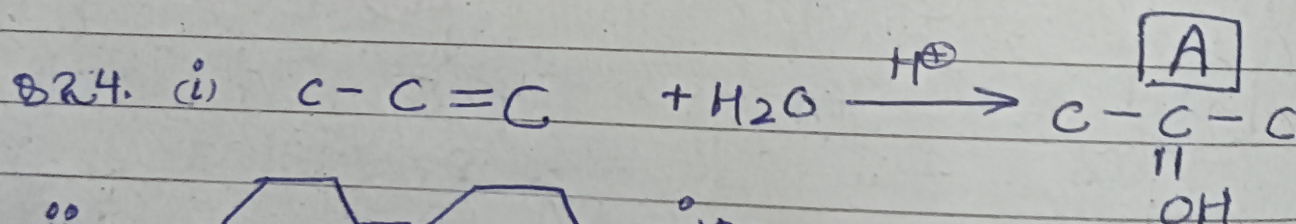
HCl

(0-5°C)

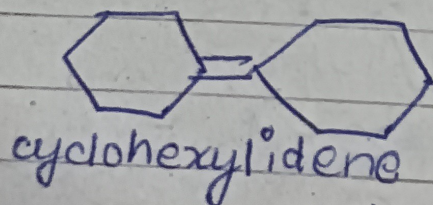
anhy
Cl₂, AlCl₃

27 JUNE

FRIDAY

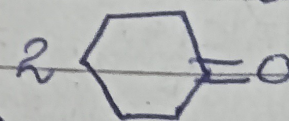


(ii)



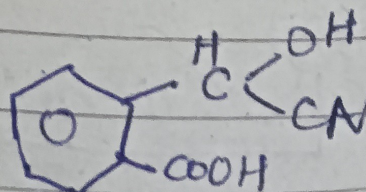
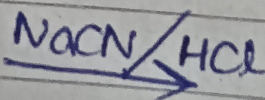
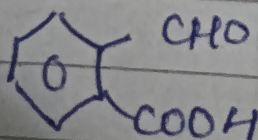
cyclohexylidene

cyclohexane

(i) O₃(ii) Zn-H₂O

cyclohexanone

(iii)



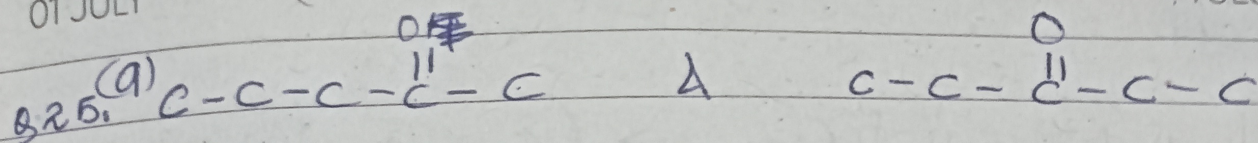
cyanohydrin

(a) The boiling point of ethanol is higher because of presence of intermolecular H-bonding. While, methoxy methane has dipole-dipole interaction between its molecules. And H-bonding is very much stronger than dipole-dipole interaction. Thus, B.P. of ethanol is higher.

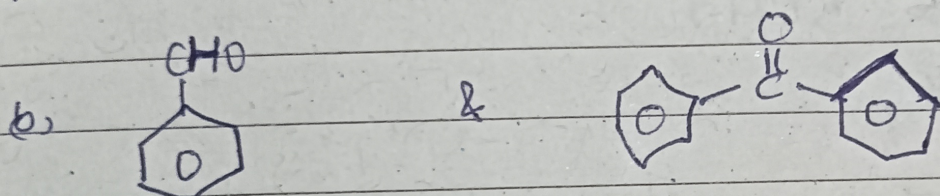
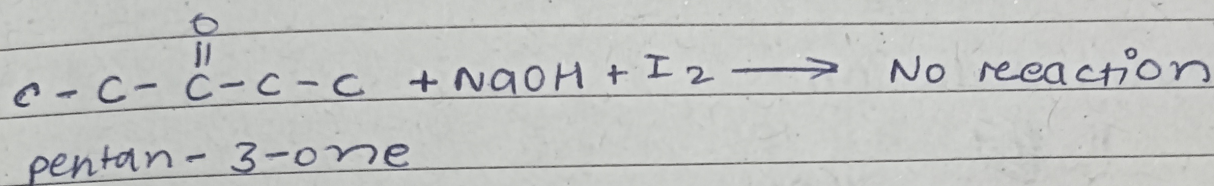
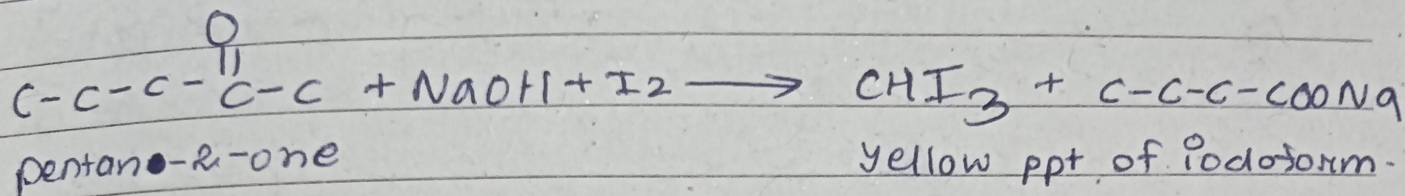
(b) ortho nitrophenol has intramolecular hydrogen bonding instead of intermolecular ~~hydrogen~~ H-bonding. Making it more volatile than para-nitrophenol (possessing ~~intermolecular~~ intermolecular H-bonding). Thus it can be separated from paranitrophenol by steam distillation.

01 JULY

TUESDAY



i) Iodoform test

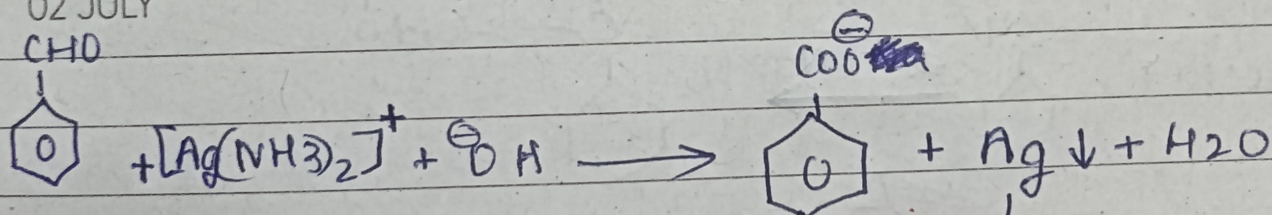


i) Tollen's test

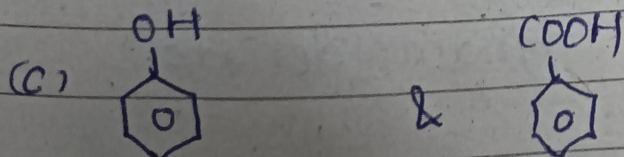
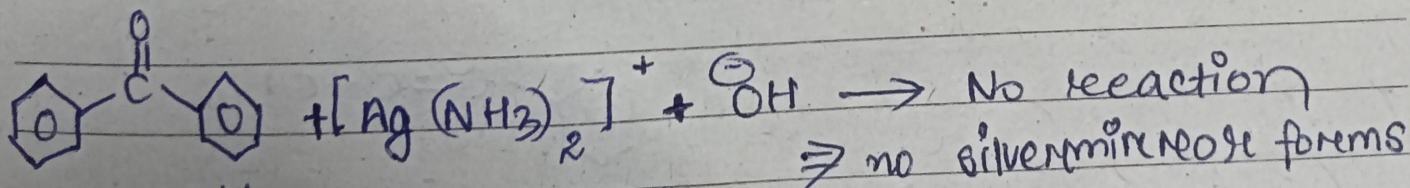
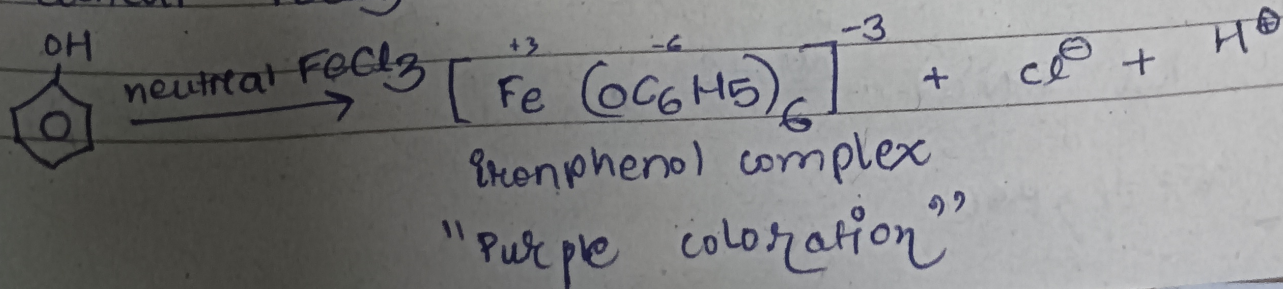
WEDNESDAY

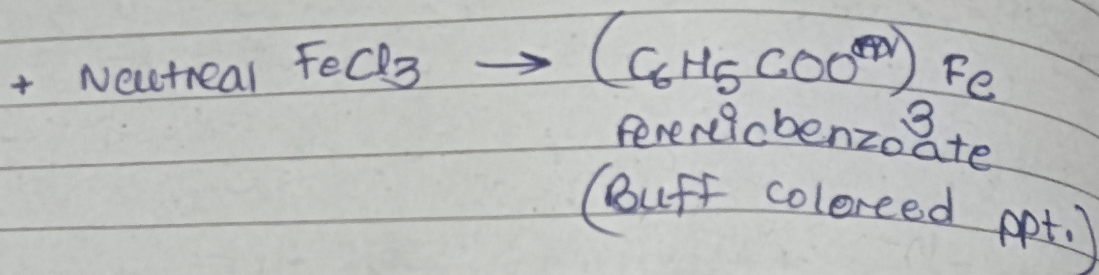
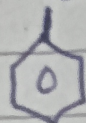
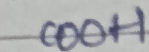
02 JULY

CHO



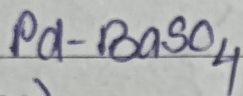
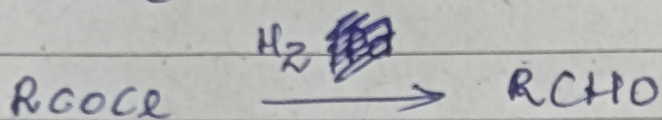
"silver mirror"

i) Neutral FeCl_3 test



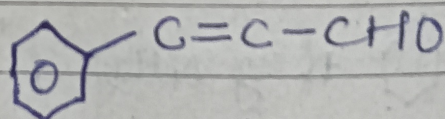
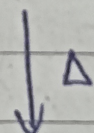
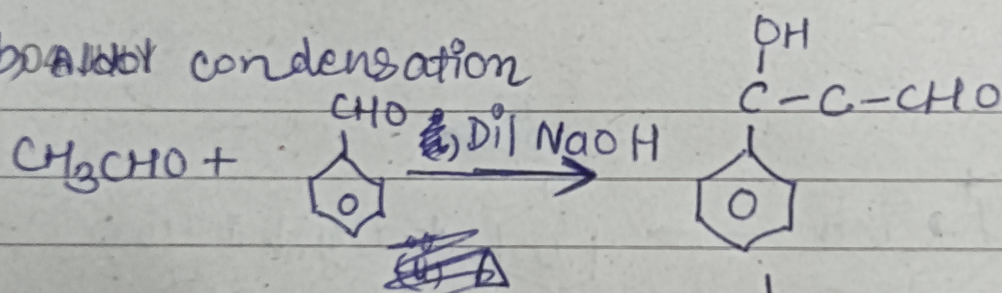
OR

(a) Rosenmund reaction



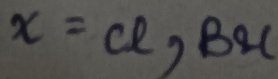
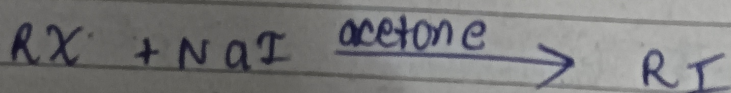
(not HCOCl)

(b) Aldol condensation



cinnamaldehyde

(c) Finkelstein



FRIDAY

06

A)

fo

⑥

sl

⑥

f

RS DAY

05 JULY

SATURDAY

~~Q27.~~
Q27.

pt.)

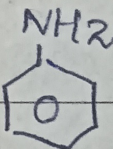
1) Compound B undergoes reaction w/ Br_2 & KOH i.e. Hoffmann bromamide reaction so, it must be amide

2) To form an amide, compound A must be carboxylic acid, which is also aromatic.

3) Also, aromaticity will be present in all 3 compounds A, B & C.

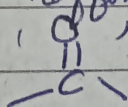
RIDAY

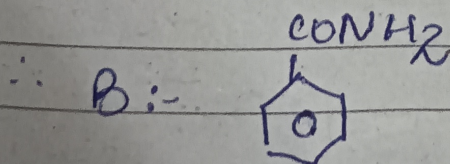
06 JULY

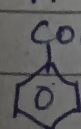
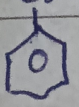
4) compound 'C' can be identified as  the

SUNDAY

formula, $\text{C}_6\text{H}_5\text{NH}_2$ matches with $\text{C}_6\text{H}_7\text{N}$.

5) Compound B, before hoffmann bromamide reaction, should have a  group.



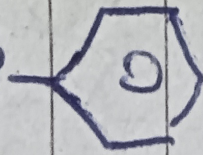
6) & the A, which is a carboxylic acid must be
 $\text{A} =$  . on reaction w/ NH_3 it will
 form B i.e. 

07 JULY

COOH

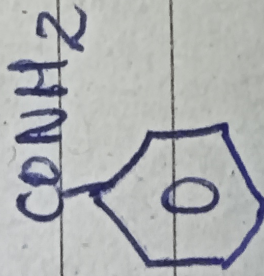
MC

A:-



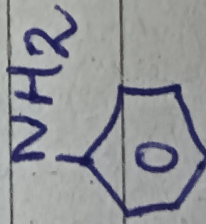
benzenecarboxylic acid

B:-



benzene carboxamide

C:-

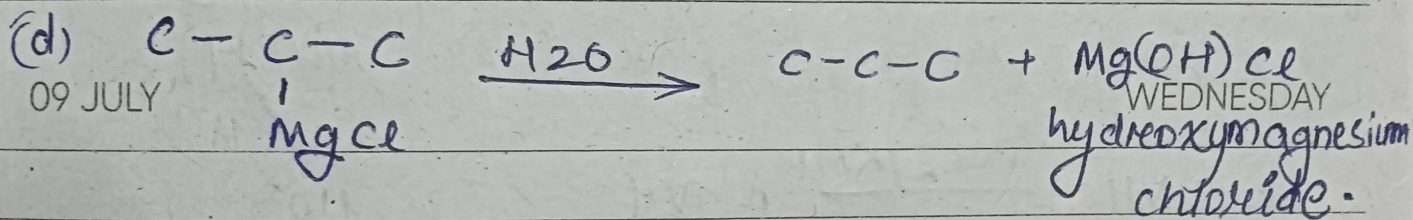
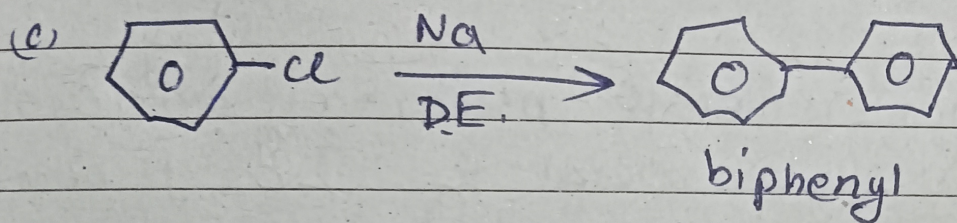
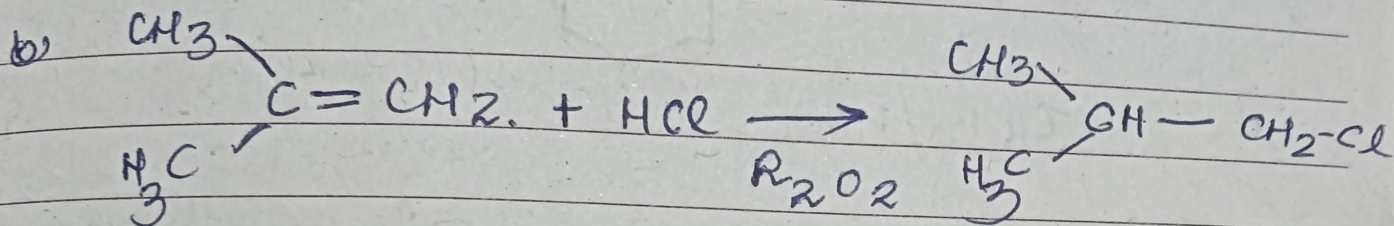
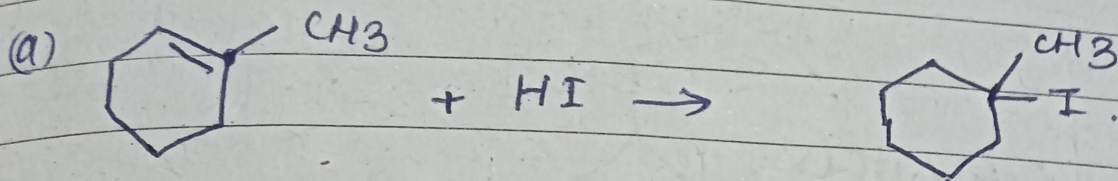


benzenamine

08 JULY

OR

TUESDAY



09 JULY

WEDNESDAY

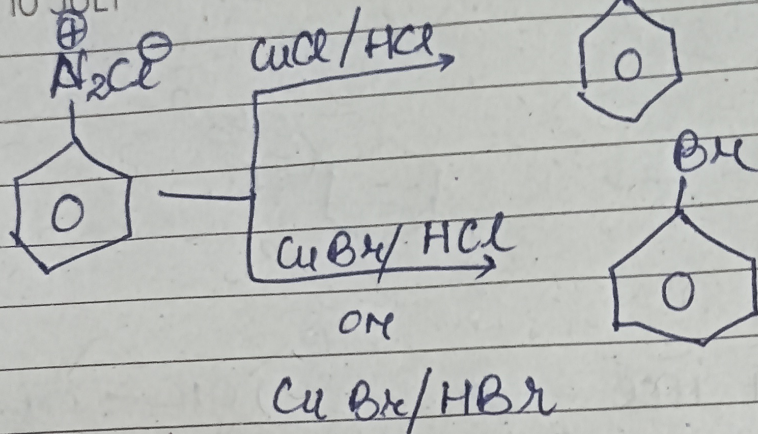
Q29. (a) (i) Sandmeyer reaction.

Sandmeyer reaction involves ~~aromatic~~ ^{aromatic} aryl diazonium salt, turned into halobenzenes by the use of $CuCl$ in presence of HCl or $CuBr$ in presence of HCl or HBr .

It is an example of nucleophilic aromatic substitution reactions.

THURSDAY

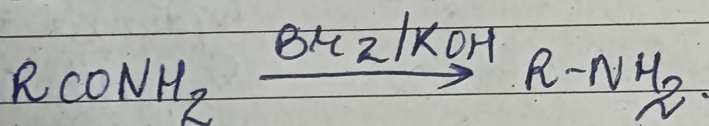
10 JULY



ii) Hoffman bromamide degradation reaction

It is a reaction that converts primary amide into primary amine by removal of -C=O group from amide. The reagent it uses is Br_2 gas in presence of KOH or NaOH .

FRIDAY



It reduces ~~an~~ carbon atom in the process

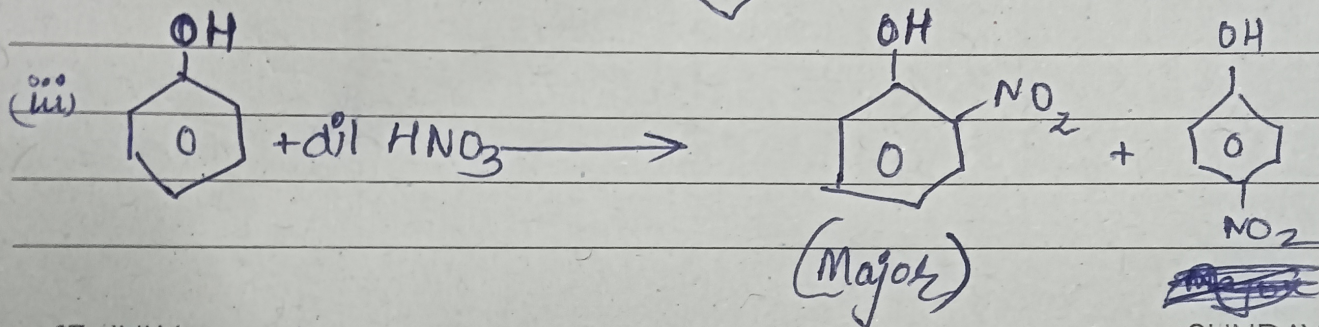
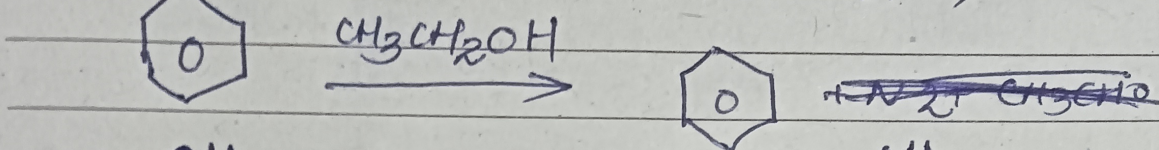
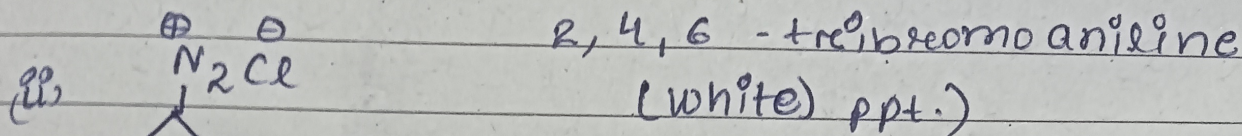
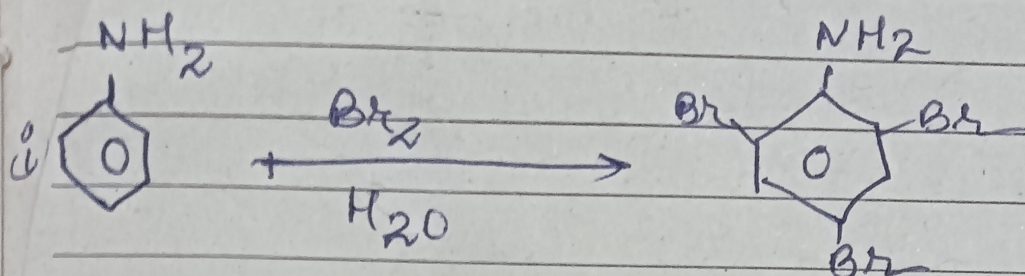
b) Gabriel phthalimide synthesis involves a nucleophilic substitution ~~of the~~ between the potassium salt of phthalimide & the ~~alkyl~~ halide salt.

But $\because$ aryl halides are not susceptible to nucleophilic substitution reactions, aromatic amines cannot be formed via this process.

12 JULY

O.R.

SATURDAY



13 JULY

SUNDAY

