Group "B"

1)

Why the oxalic acid is known as primary standard ~~solution~~? substance?

→ Oxalic acid is known as a primary standard substance because it is highly pure, stable and doesnot change its concentration with environmental factors.

2) 0.4g divalent metal (eq.wt = 20) is dissolved in 50cc of 0.64 ~~solution~~ N HCl solution. If further 109.2 cc of NaOH is required to neutralize the resultant solution completely. Determine the strength of NaOH is g/l.

Soln,

wt. of metal (w) = 0.4g

Eq.wt (E) = 20

vol. of HCl (V_1) = 50 cc = 0.05 ltr

Normality of HCL (N_1) = 0.64 N

Volume of NaOH (V_2) = 109.2 cc = 0.1092 ltr

Normality of NaOH (N_2) = ?

Then, since the acid left over from reaction of metal & HCl is neutralized by NaOH,

n gm-eq. of metal + n gm eq. of NaOH = n gm eq. of HCl

$$\text{or, } \frac{W}{E} + N_2 \times V_2 = N_1 V_1$$

$$\text{or, } N_1V_1 - \frac{W}{E} = N_2V_2$$

$$\text{or, } N_2 = \left(N_1V_1 - \frac{W}{E} \right) \times \frac{1}{V_2}$$

$$\therefore N_2 = 0.109\,N$$

Now,

$$g/lt = \frac{N_2}{10} \times Eq.wt$$

$$= \frac{0.109}{10} \times 20$$

$$= 0.218 \;//\; ans$$

OR

a) Differentiate between order and molecularity of reaction. [3]

Order of reaction	Molecularity of reaction
i) It is determined experimentally.	i) It is a theoretical concept
ii) It can~~not~~ be zero.	ii) It ~~can be~~ cannot be zero.
iii) It can have fractional values also.	iii) It ~~c~~ has integral values only.
iv) It is defined as sum of powers of concentration terms in a rate equation.	iv) It is defined as the total number of species taking part in chemical reaction
v) It is derived from the rate expression.	v) It is derived from the mechanism of reaction.

b) The rate of first order reaction is 0.6932×10^{-2} mol L^{-1} min^{-1} and the initial concentration of reactant is 0.1 mole. Find its half life period. [2]

Soln,

Rate of first order, rexn (R) $= 0.6923 \times 10^{-2}$ mol L^{-1}min

initial concn of reactant (a) $= 0.1$ mol^{-1}

then,

Half life ($T_{1/2}$) $= \frac{0.693}{K}$

Since,

Rate $= K\,[\text{reactant}]^{a}$

or $0.6923 \times 10^{-2} = K \times 0.1$

$\therefore K = 0.69823 \times 10^{-1}\ \text{min}^{-1}$

So,

$T_{1/2} = \frac{0.693}{0.6923 \times 10^{-1}} \simeq 10$ min //

Date : / /

2. Study the following data for melting of ice at 1 atm and at different temperature.

$H_2O(s) \longrightarrow H_2O(l)$

Condition	Temperature (K)	ΔH (J)	ΔS (JK^{-1})	$T\Delta S$ (J)
1	263	5614	20.5	5392
2	273	6006	22.0	6006
3	283	6391	23.4	6622

Soln

$H_2O(s) \longrightarrow H_2O(l)$

a) Find the ΔG at condn (1)

→ ΔG for condn 1

$$\Delta G = \Delta H - T\Delta S$$
$$= 5614 - 5392$$
$$= 222J$$

b) At condition 3,

$$\Delta G = \Delta H - T\Delta S$$
$$= 6391 - 6622$$
$$= -231J < 0$$

Since ΔG is -ve,

the reaction at condn (3) is spontaneous

c) For equilibrium,

$$\Delta G = 0$$

or $\Delta H - T\Delta S = 0$

or $\Delta H = T\Delta S$

In condn (2)

$$\Delta H = T\Delta S = 6006$$

So, at 273K, the ice and water are in equilibrium state.

d) Effect of temperature for sponteniety

⇒ If ΔH is -ve and ΔS is +ve, ΔG would certainly be -ve and the process will be spontaneous at all temperatures.

If both ΔH and ΔS are -ve, ΔG would be -ve if
$\Delta H > T\Delta S$

If both ΔH and ΔS are +ve, ΔG would be -ve if $T\Delta S > \Delta H$

If ΔH is +ve and ΔS is -ve, ΔG would be certainly be +ve and the process will be non-spontaneous at all temperatures

---

3.a) Write the basic principle for this process with necessary chemical reaction?

→ The above shown figure shows open health process. which is one of the process in manufacturing steel

The basic principle for this process are:

i) Impurities present in cast iron are removed by oxidation ~~of~~ by haematite.

ii) Percentage of carbon is decreased by adding scrap iron.

iii) Percentage of carbon is maintained by adding required amount of spigelesien.

iv) Maintenance of high temperature and saving of fuel is done based on a regenerating system of heat economy.

Date / /

Reactions:

$3C + 2Fe_2O_3 \rightarrow 4Fe + 3CO_2$

$3S + 2Fe_2O_3 \rightarrow 4Fe + 3SO_2$

$3Si + 2Fe_2O_3 \rightarrow 4Fe + 3SiO_2$

$SiO_2 + CaO \rightarrow CaSiO_3$

b) What are the advantages of this process?

→ The advantages of this process are:

i) The quality of steel is uniform.

ii) This process is easily controllable.

iii) The loss of iron from iron ore is less, because ~~of there is~~ no blast of air is passed.

iv) The batch size is very large compared to other processes.

4. Write the preparation, properties and uses of white vitriol? [5]

→ Zinc sulphate is commonly known as white vitriol.

Preparation

i) From Zn, ZnO, $ZnCO_3$, $Zn(OH)_2$ with dil H_2SO_4

$Zn + H_2SO_4 \rightarrow ZnSO_4 + H_2$

$ZnO + H_2SO_4 \rightarrow ZnSO_4 + H_2O$

$ZnCO_3 + H_2SO_4 \rightarrow ZnSO_4 + H_2O + CO_2$

$Zn(OH)_2 + H_2SO_4 \rightarrow ZnSO_4 + 2H_2O$

$ZnSO_4(aq.) \xrightarrow{\text{crystallization}} ZnSO_4 \cdot 7H_2O$

ii) From ZnS

$ZnS + 2O_2 \xrightarrow{\text{below } 800^\circ C} ZnSO_4$

Properties

i) Physical properties

a) It is a white crystalline solid.

b) It is highly soluble in water and is hygroscopic.

c) It is efflorescent and loses water when exposed to air.

ii) Chemical properties

a) when heated to decomposition, it releases harmful sulphur oxides and zinc oxide fumes.

b) The solution of white vitriol is acidic in nature.

c) White vitroil is insoluble in alcohol

d) The powdered and granular form of white vitriol lose water to the atmosphere

Uses

a) It is used for the synthesis of human drugs.
b) It is used in making cosmetic products.
c) It is used in oral care products.
d) It is used in synthesis of the antibacterial drug.
e) It is used as an absorbent
f) It is also used as a general adhesive and binding agent.

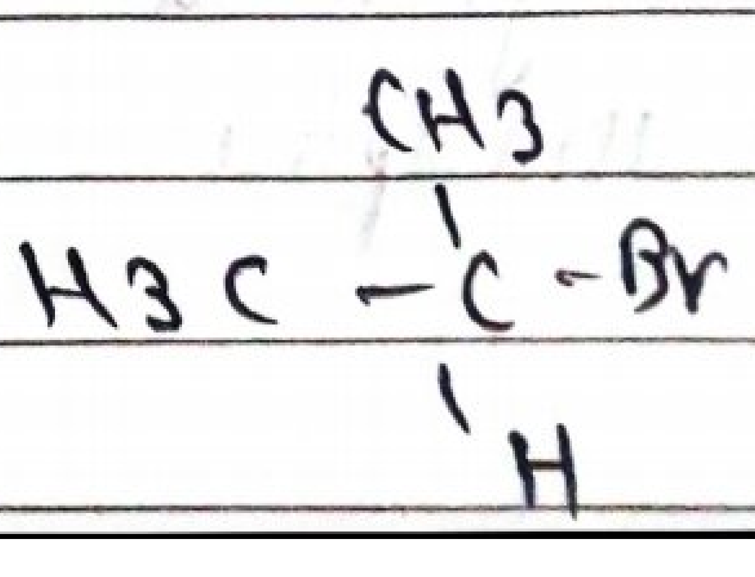
---

5. The given table shows the compounds and their molecular formula. How can you convert P to Q., where Q is the compound in which two methyl groups are substituted at adjacent carbons? How is P is obtain from T where T is a secondary alcohol? Write the reaction involved in the consersion of ~~R~~ to S and R. [5]

Compounds	Molecular formula
P	C_3H_7Br
Q	C_6H_{14}
R	C_3H_6O
S	C_3H_6
T	C_3H_8O

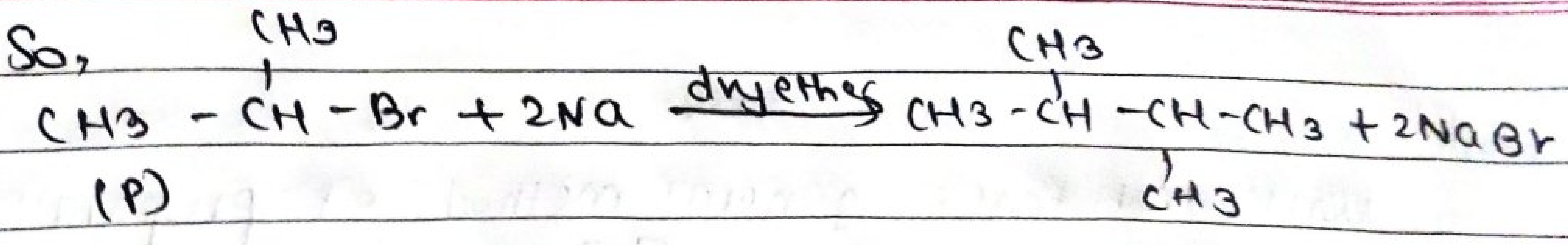
→ Since, Q is the compound in which two methyl groups are substituted at adjacent carbons.

for P to Q,
'P' must be



$H_3C-\overset{\overset{\displaystyle CH_3}{|}}{\underset{\underset{\displaystyle H}{|}}{C}}-Br$

So,

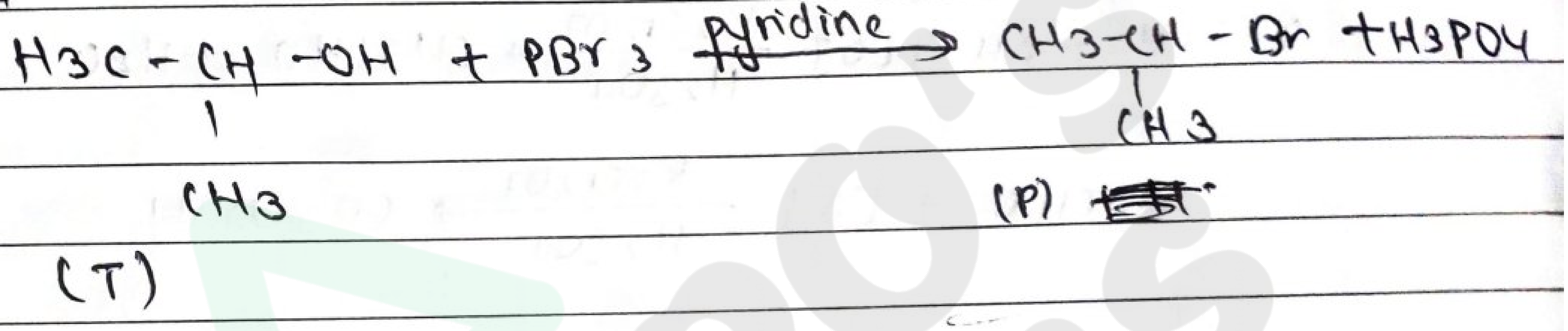


$$CH_3-\overset{CH_3}{CH}-Br + 2Na \xrightarrow{dry\ ether} CH_3-\overset{CH_3}{CH}-\underset{CH_3}{CH}-CH_3 + 2NaBr$$

(P)

Since, T is secondary alcohol, it must be $H_3C-\overset{H}{\underset{CH_3}{C}}-OH$

for 'T' to 'P'

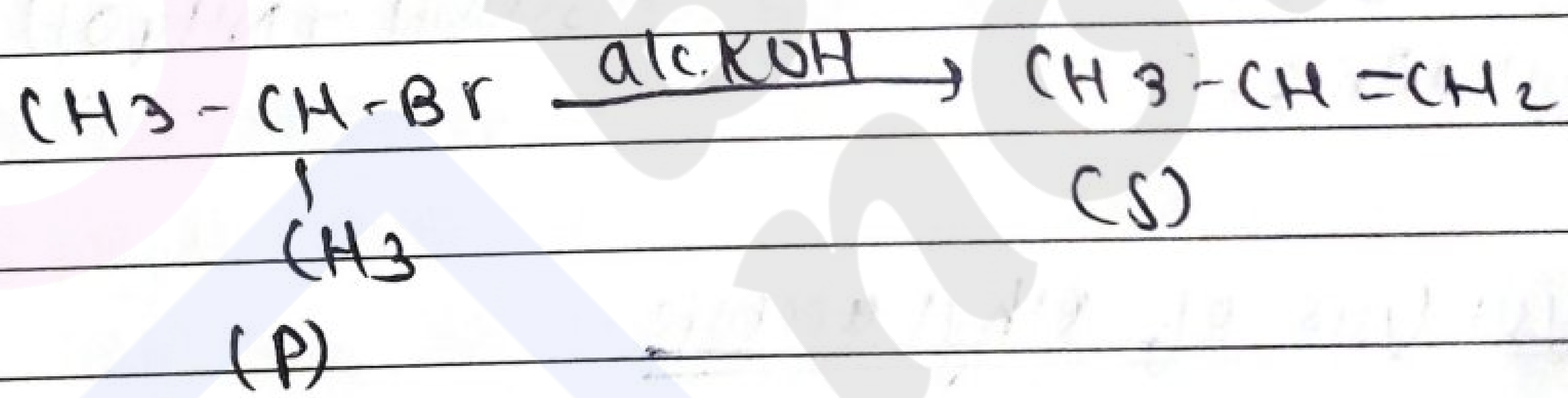


$$H_3C-\underset{CH_3}{CH}-OH + PBr_3 \xrightarrow{pyridine} CH_3-\underset{CH_3}{CH}-Br + H_3PO_4$$

(T) (P)

Now

P to S,

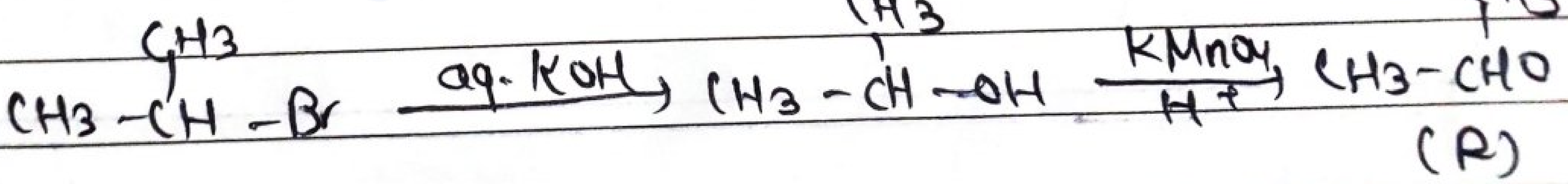


$$CH_3-\underset{CH_3}{CH}-Br \xrightarrow{alc.KOH} CH_3-CH=CH_2$$

(P) (S)

Also,

P to R,



$$CH_3-\overset{CH_3}{CH}-Br \xrightarrow{aq.KOH} CH_3-\overset{CH_3}{CH}-OH \xrightarrow[H^+]{KMnO_4} CH_3-\overset{CH_3}{C}HO$$

(R)

6.

a) Write any three general method of preparation of this compound. [3]

→ The given compound is acetic acid. ($C_2H_4O_2$)

The methods of preparation are:

1) **By oxidation of ethyl alcohol**

$$CH_3CH_2-OH + [O] \xrightarrow[H_2SO_4]{K_2Cr_2O_7} CH_3CHO + H_2O$$

$$CH_3CHO + [O] \xrightarrow[H_2SO_4]{K_2Cr_2O_7} CH_3COOH$$

2) **By hydrolysis of methyl nitrile:**

$$CH_3CN + 3H_2O \xrightarrow{H_2SO_4} CH_3COOH + NH_4OH$$

methyl nitrile

3) **By hydrolysis of ethyl acetate**

$$CH_3COOC_2H_5 + H_2O \xrightarrow{conc.H_2SO_4} CH_3COOH + C_2H_5OH$$

ethyl acetate

b) Why chloroacetic acid is more stronger than acetic acid? [2]

⇒ If,

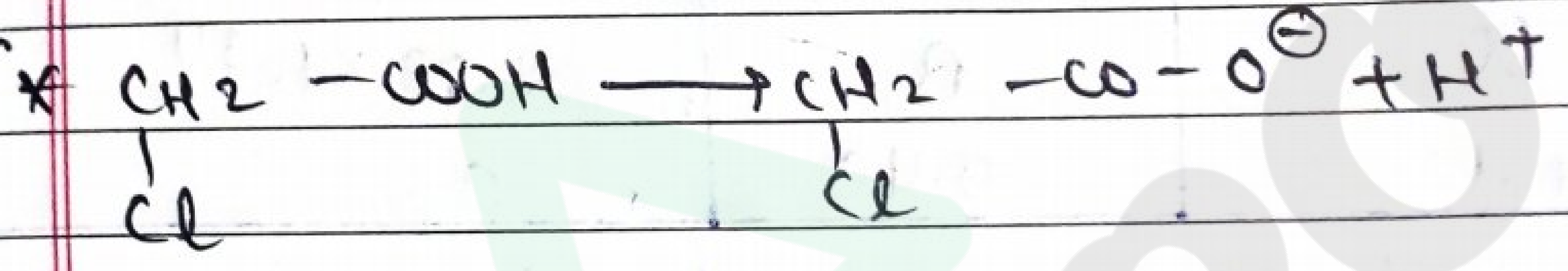
$HA \longrightarrow H^+ + A^-$

↓

If A^- is stable, it is acidic.

So stability of ion ∝ Acidity.

optional



* $\underset{Cl}{CH_2}-COOH \longrightarrow \underset{Cl}{CH_2}-CO-O^\ominus + H^+$

* $CH_3-COOH \longrightarrow CH_3-CO-O^\ominus + H^+$

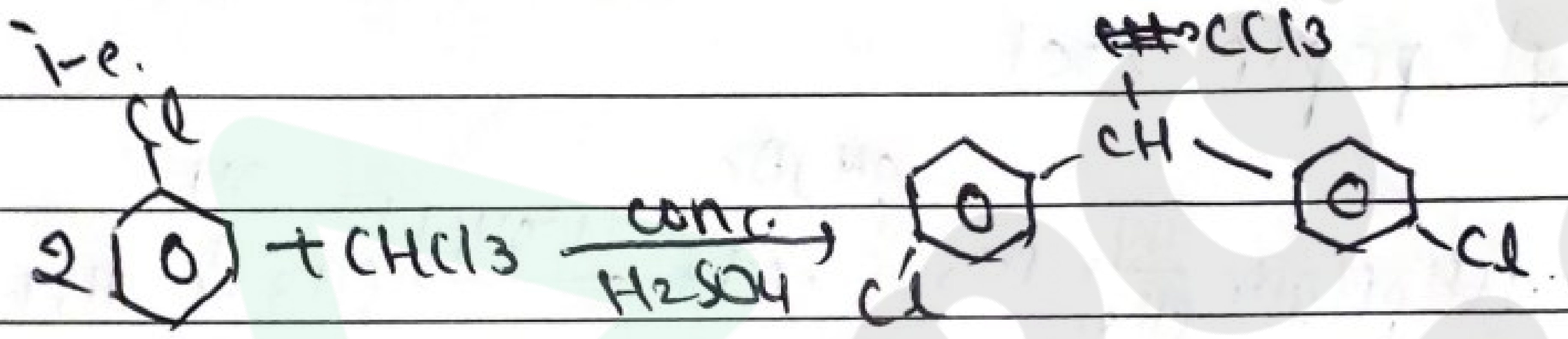
⇒ Due to -I effect (electron withdrawing) of chlorine, negative charge density on the oxygen atom is reduced, hence stabilising the conjugate base of chloroacetic acid. While the negative charge on oxygen atom in acetic acid is localized and the conjugate base is less stable. So, thats why chloroacetic acid is stronger than acetic acid.

7) Write the structure and reagent /conditions for the conversion of A to D. If D is treated with 2,2,2-trichloro ethanal in presence of conc. H_2SO_4 gives DDT and the compound A is obtained by ammonolysis of benzyl chloride. How can you convert D into compound B.

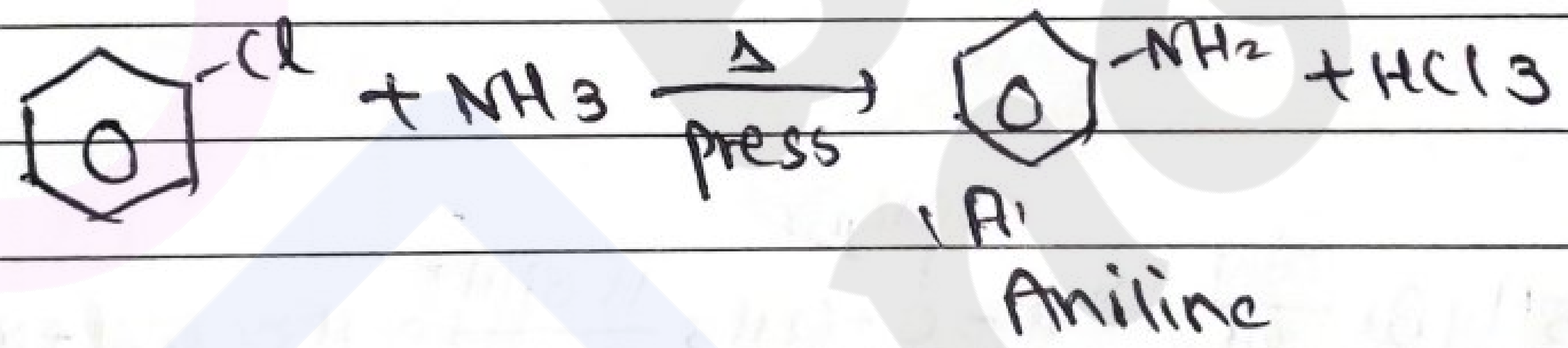
[5]

→ Since 'D' on treatment with 2,2,2, trichloro ethanal in the presence of conc. H_2SO_4 gives DDT. 'D' must be chlorobenzene.

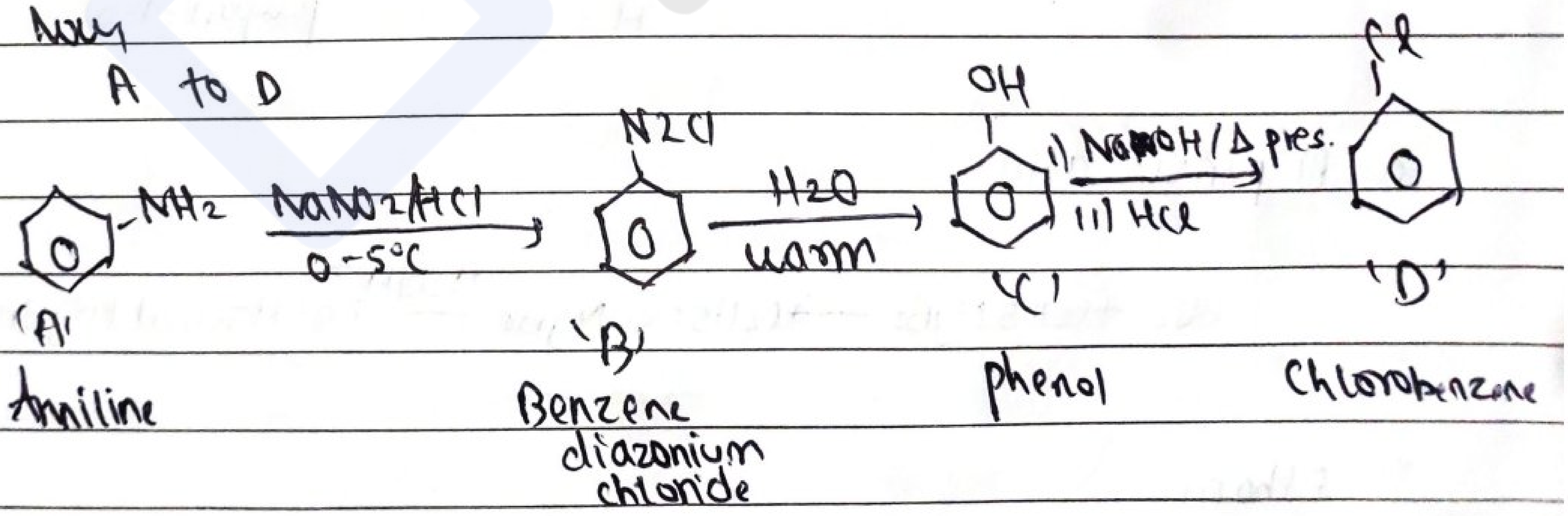
i.e.



Since, compound 'A' is obtained by ammonolysis of benzyl chloride 'A' must be aniline.



Now
A to D



Hence,

A → Aniline

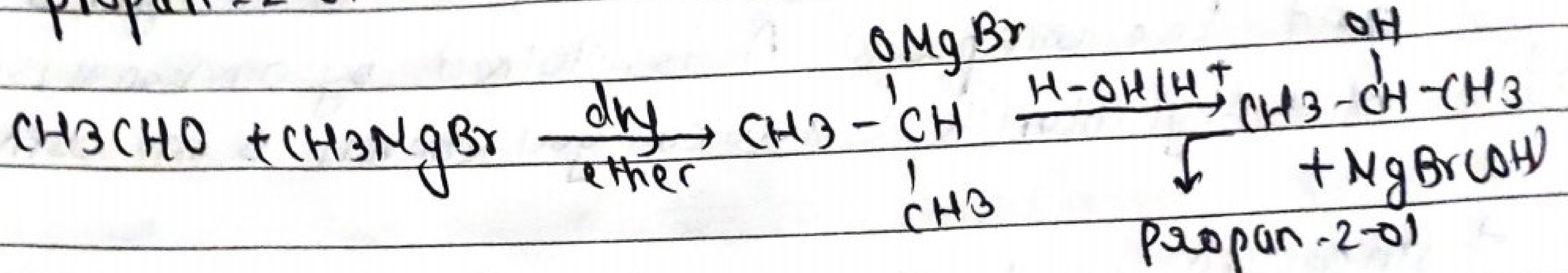
B → Benzene diazonium chloride

C → phenol

D → Chlorobenzene

8. Outline the synthesis for the following compound from Grignard reagent -

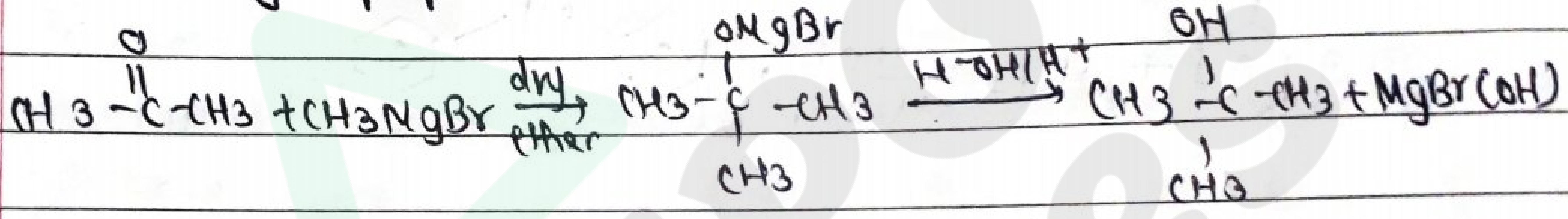
a) propan-2-ol



$$CH_3CHO + CH_3MgBr \xrightarrow[ether]{dry} CH_3-\underset{CH_3}{\overset{OMgBr}{CH}} \xrightarrow{H-OH/H^+} CH_3-\overset{OH}{CH}-CH_3 + MgBr(OH)$$

propan-2-ol

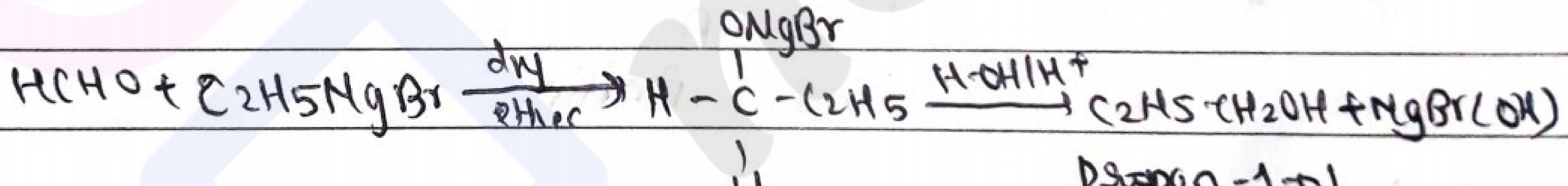
b) 2-methyl propan-2-ol



$$CH_3-\overset{O}{\overset{\|}{C}}-CH_3 + CH_3MgBr \xrightarrow[ether]{dry} CH_3-\underset{CH_3}{\overset{OMgBr}{C}}-CH_3 \xrightarrow{H-OH/H^+} CH_3-\underset{CH_3}{\overset{OH}{C}}-CH_3 + MgBr(OH)$$

2methylpropan2-ol.

c) propan-1-ol



$$HCHO + C_2H_5MgBr \xrightarrow[ether]{dry} H-\underset{H}{\overset{OMgBr}{C}}-C_2H_5 \xrightarrow{H-OH/H^+} C_2H_5-CH_2OH + MgBr(OH)$$

propan-1-ol

d) propanoic acid

$$CO_2 + C_2H_5MgBr \longrightarrow C_2H_5COOMgBr \xrightarrow{H_2O/H^+} C_2H_5COOH + MgBr(OH)$$

e) Ethane

$$C_2H_5Br \xrightarrow{H_2O/H^+} C_2H_6 + MgBr(OH)$$

Group "C"

1. For a hypothetical reaction $2M + N \rightarrow$ product is first order with respect to M and second order with respect to N.

Expt no.	M/ $mol L^{-1}$	N/ $mol L^{-1}$	Initial rate $mol L^{-1} s^{-1}$
I	0.10	0.20	3×10^2
II	A	0.40	3.6×10^3
III	0.60	B	2.88×10^4
IV	0.10	0.40	C

Identify a, b and c from the above information. [4]

Soln

from I,

$Rate = K[M]^1 . [M]^2$

or, $3 \times 10^2 = K \times 0.10 \times 0.20$

$\Rightarrow K = 1.5 \times 10^4 \, mol^{-2} L^2 s^{-1}$

for II,

$Rate = K[M]^1 [N]^2$

or, $3.6 \times 10^3 = K \times A \times (0.4)^2$

or, $3.6 \times 10^3 = 1.5 \times 10^4 \times a \times (0.4)^2$

$\Rightarrow a = 1.5 \, mol L^{-1}$

for III,

$Rate = K[M]^1 [N]^2$

or, $2.88 \times 10^4 = K \times 0.60 \times (B)^2$

or, $2.88 \times 10^4 = 1.5 \times 10^4 \times 0.60 \times B^2$

or, $B^2 = 3.2$

$B = 1.7 \, mol L^{-1}$

For IV,

$Rate = K[M]^1[N^2]$

$c = 1.5\times104 \times 0.10\times(0.40)^2$

$c = 0.024\times10^4$

$c = 240\ mol\ L^{-1}s^{-1}$ //

What is the effect of temperature, catalyst and concentration of reactants in rate of reaction. Write the example of pseudo first order reaction.

⇒ The effect of temperature, catalyst and concn of reactants in rate of reaction are:

i) <u>Effect of temperature</u> → Reaction of rate increases with increase in temperature. Temperature increases Average kinetic energy of the particle increasing the collision frequency of the constituent particles.

ii) <u>Effect of catalyst</u> ⇒ Rate of reaction increases in presence of a catalyst. A catalyst increases the rate of reaction because it reduces the activation energy so more of the collisions have enough energy to react.

iii) <u>Effect of concn of reactants</u> → Increasing the concentration of reactants increases the rate of reaction because there are more collisions between the reactant particles.

⇒ The example of pseudo first order reaction is:

$CH_3COOC_2H_5 + H_2O \longrightarrow CH_3COOH + C_2H_5OH$

Ethyl ethanoate water ethanoic acid ethanol

1 OR

A) Calculate the heat of formation of methane from the given data.

Heat of combustion of methane = −890.3KJ

Heat of formation of water = −285.3KJ

Heat of formation of carbondioxide = −393.5KJ

Soln,

Heat of combustion of ~~water~~ methane,

$CH_4 + 2O_2 \longrightarrow CO_2 + 2H_2O$, $\Delta H = -890.3KJ$ — ①

Heat of combustion of water,

$H_2 + \frac{1}{2}O_2 \longrightarrow H_2O$, $\Delta H = -285.3KJ$ — ⑪

Heat of formation of methane,

$C + 2H_2 \rightarrow CH_4$, $\Delta H = ?$

then

Multiplying eqn(iii) by 2 ~~by~~ and adding to eqn(iii)

$2H_2O + O_2 \longrightarrow 2H_2O$, $\Delta H = -570.6KJ$

$C + O_2 \longrightarrow CO_2$, $\Delta H = -393.5KJ$

$C + 2H_2O + 2O_2 \rightarrow CO_2 + 2H_2O$, $\Delta H = -964.1KJ$

Now

substracting eqn(i) from eqn(i)

$C + 2H_2 + 2O_2 \longrightarrow CO_2 + 2H_2O$, $\Delta H = -964.1KJ$

$\underset{-}{CH_4} + \underset{-}{2O_2} \longrightarrow \underset{-}{CO_2} + \underset{-}{2H_2O}$, $\Delta H = \underset{+}{-890.3KJ}$

$C + 2H_2 \rightarrow CH_4$, $\Delta H = -73.8 KJ$ //ans

B) Given standard potential of $E^\circ_{Cu^{++}/Cu}$ and $E^\circ_{Ag^+/Ag}$ are +0.34 V and 0.80 V respectively.

a) Define standard electrode potential.

→ The potential difference setup between the electrode at its ions present in the solution at 25°C and 1 atm pressure is standard electrode potential.

b) Write rex^n at anode and cathode.

Given,

$E^\circ_{Cu^{++}/Cu} = +0.34V$

$E^\circ_{Ag^+/Ag} = +0.80V$

Then,

Since, $E^\circ_{Ag^+/Ag} > E^\circ_{Cu^{++}/Cu}$,

Ag-electrode undergoes red^n and is cathode and Cu-electrode is anode.

So,

Rexn at anode : $Cu \rightarrow Cu^{++} + 2e^-$

Rexn at cathode : $[Ag^+ + 1e^- \rightarrow Ag] \times 2$

c) ~~cell n~~ Write the cell notation.

→ ⊖ $Cu(s) \mid Cu^{++}(1M) \parallel Ag^+(1M) \mid Ag$ ⊕

d) Calculate the cell potential of 1M solution at 25°C and 1 atm pressure.

Soln

cell potential $= E^\circ_{cathode} - E^\circ_{anode}$

$= 0.80 - 0.34$

$= +0.46V$

2)

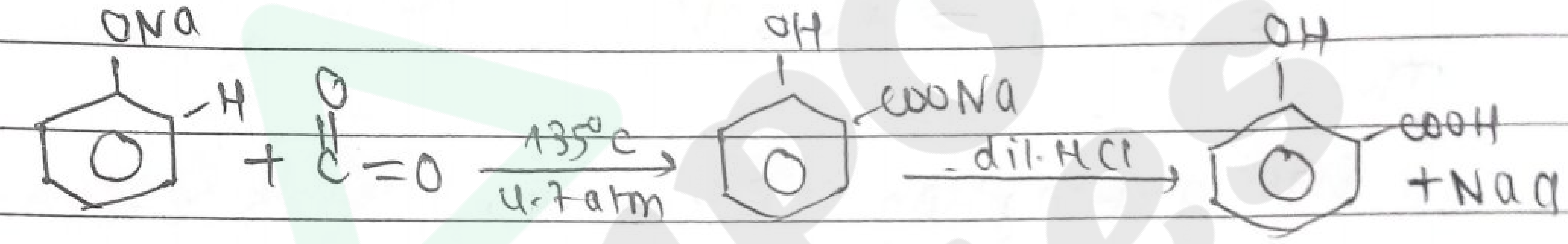
a) Write the example of following name reactions:

i) carbylamine reaction

→ $CH_3-CH_2-NH_2 + CHCl_3 + \xrightarrow[\Delta]{Alc\ 3KOH} CH_3-CH_2-NC + 3KCl + 3H_2O$

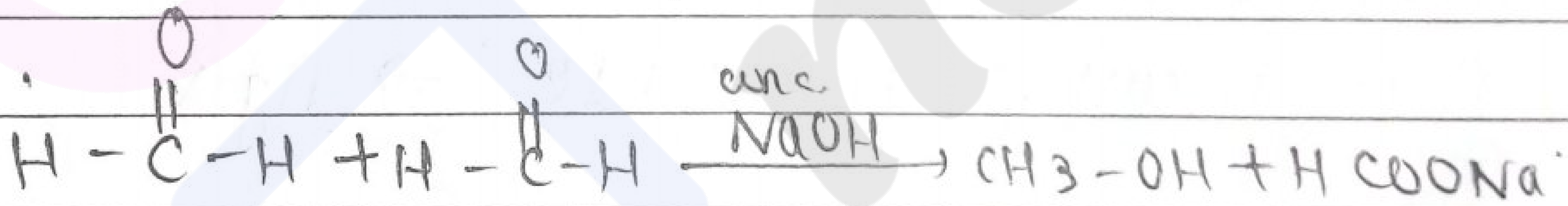
Ethanomine Ethyl isocyanide

ii) Kolbe's reaction

→ 

Sodium phenoxide Sodium salicylate Salicyalic acid

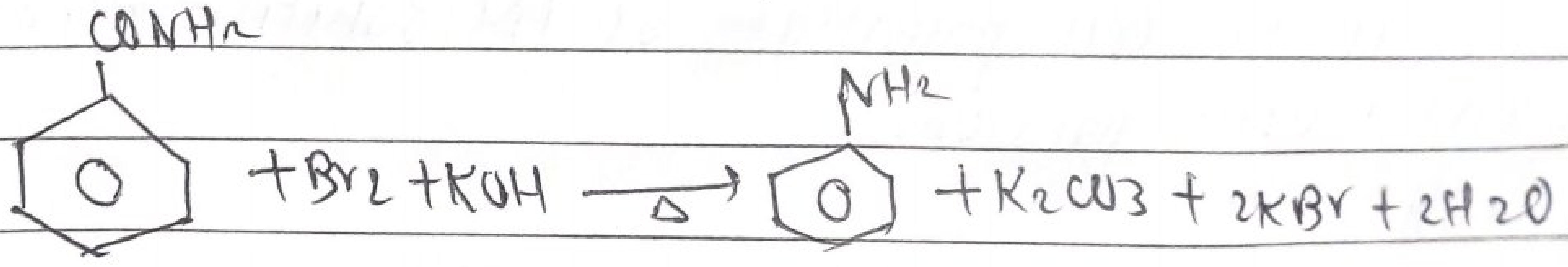
iii) Cannizaro reaction



$H-\overset{O}{\overset{\|}{C}}-H + H-\overset{O}{\overset{\|}{C}}-H \xrightarrow{conc.\ NaOH} CH_3-OH + HCOONa$

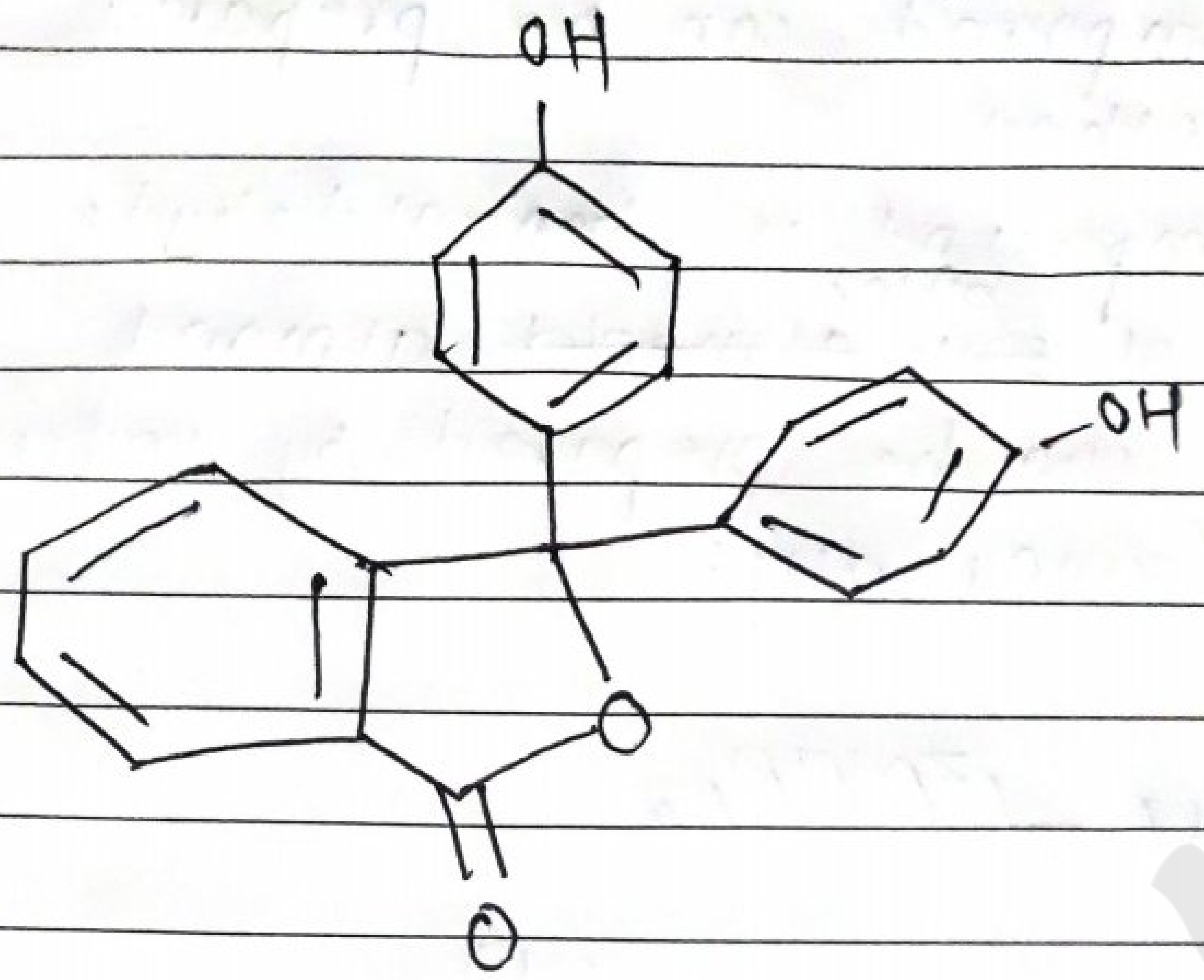
formaldehyde methyl alcohol sod. formate

iv) Hoffman's bromamide degradation reaction



b) Write down the structure of phenolphthalin.

→



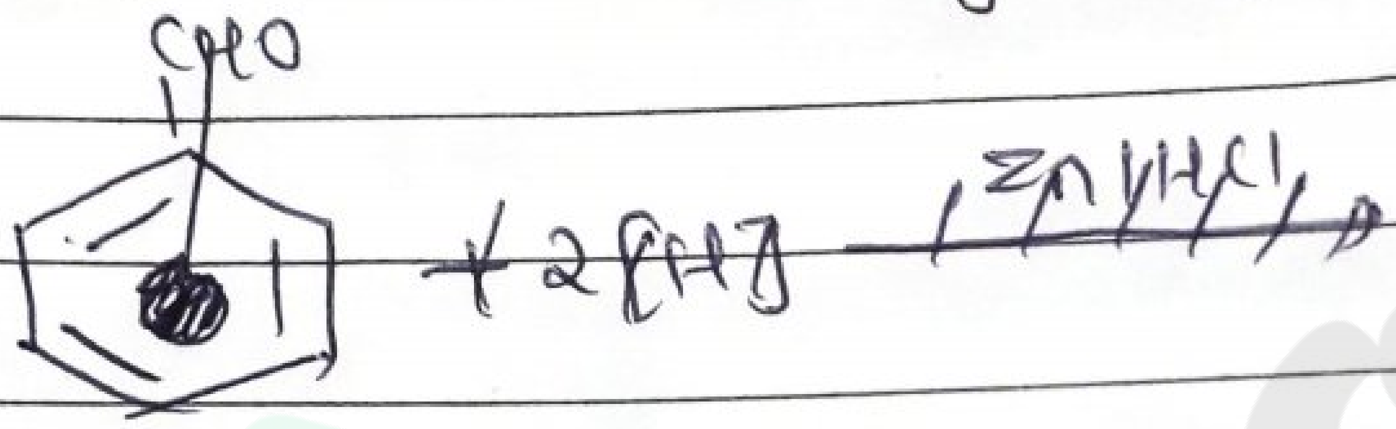
c) a) Write the reaction when compound is treated with phenol.

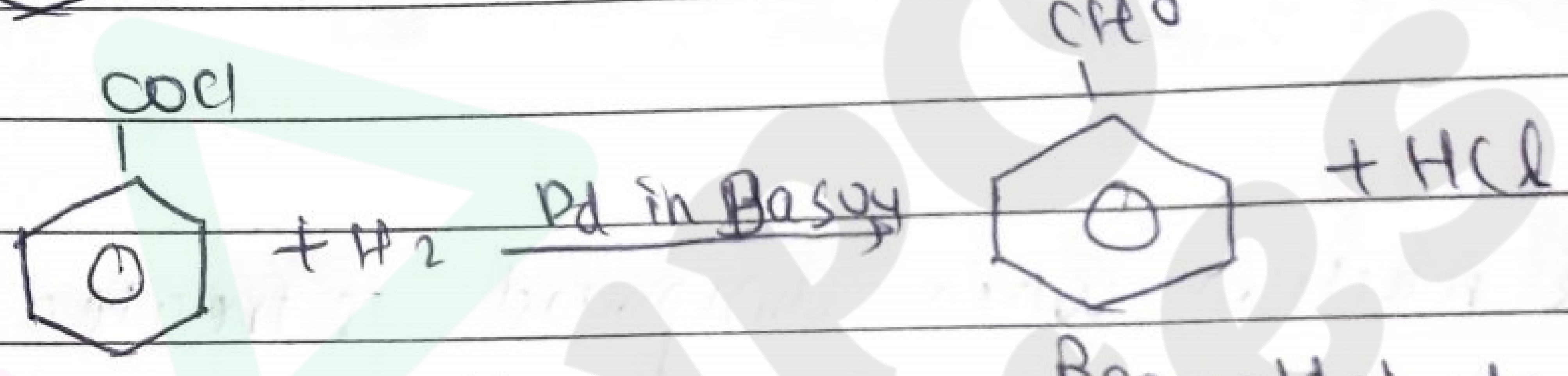
→

3)

a) How this compound can be prepared by reduction method?

→ The given compound is benzaldehyde i.e. having taste of ~~sour almond~~ bitter almond.
This compound can be prepared by reduction method in following way:



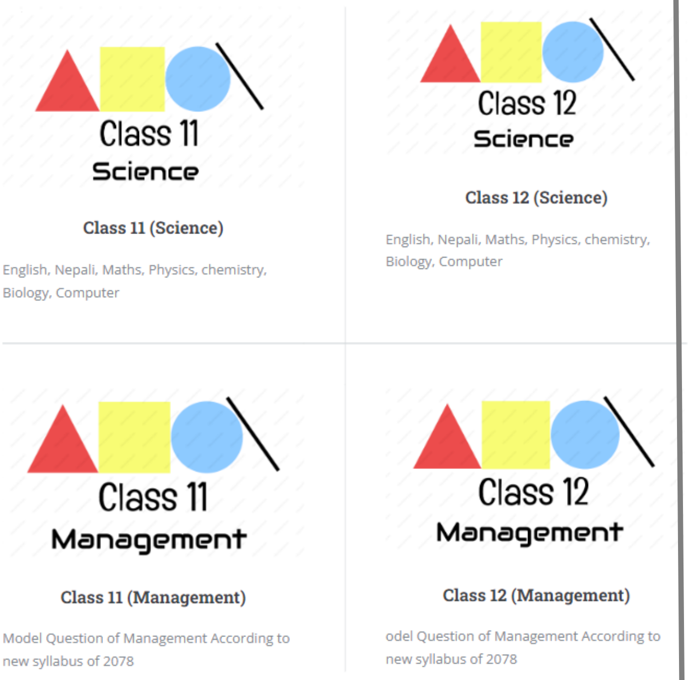


Benzoyl chloride Benzaldehyde

b) How it can be used to prepare Benzene diazonium chloride?

BIPO's notes

Class 12 complete notes and paper collection and solutions.



Class 11 (Science)

English, Nepali, Maths, Physics, chemistry, Biology, Computer

Class 12 (Science)

English, Nepali, Maths, Physics, chemistry, Biology, Computer

Class 11 (Management)

Model Question of Management According to new syllabus of 2078

Class 12 (Management)

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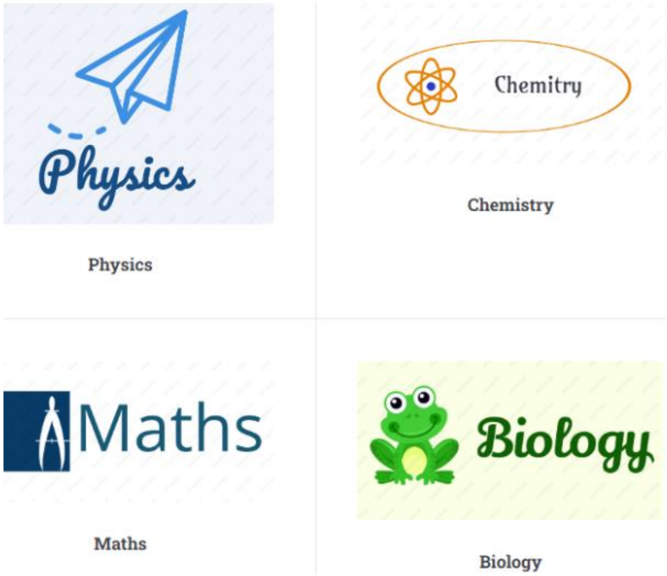

Physics

Chemistry

Maths

Biology

Feedbacks:

admin@bipinkhatri.com.np | bipinkhatri.ram@gmail.com

Contact:

@im.bipo www.bkhatri.com.np @im.bipo