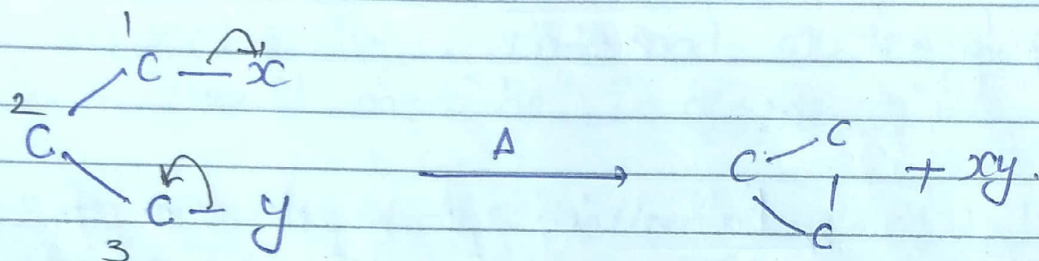
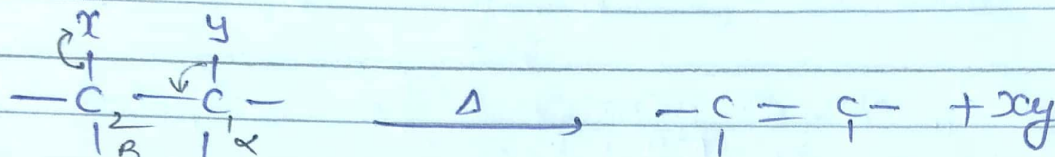
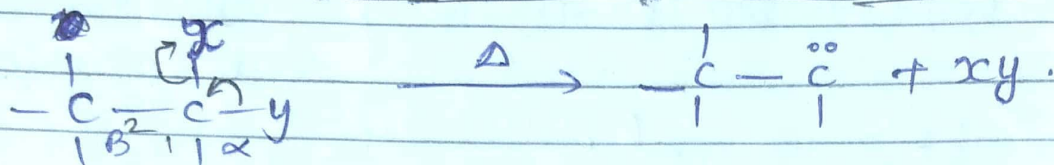


16/08/17

SBG STUDY

Elimination Reaction



- It is endothermic process occurs only on Heating

* Types of Elimination:

(1) 1,1 - / α, α - / 1 - / α - Elimination $\Rightarrow$ Carbenium Ion

(2) 1,2 - / α, β - / 2 - / β - Elimination $\Rightarrow$ Alkene/Alkyne

(3) 1,3 - Elimination Rxn

(4) 1,4 - " "

(5) 1,5 - " "

(6) 1,6 - " "

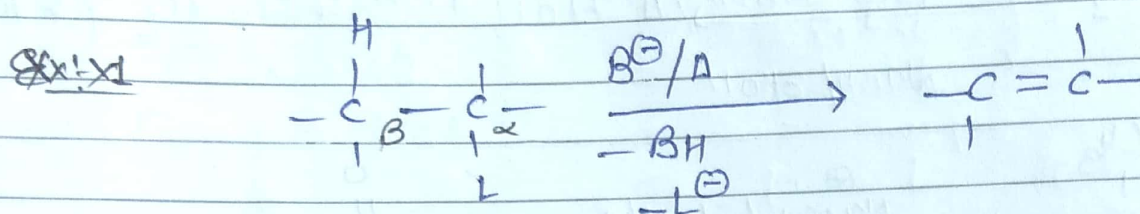
Cyclic Elimination $\Rightarrow$ Cyclic form

19/08/17

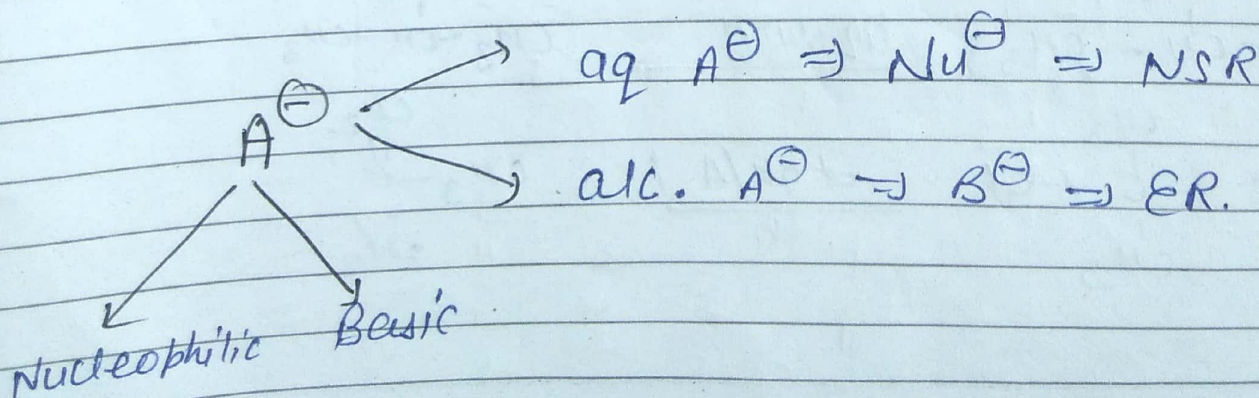
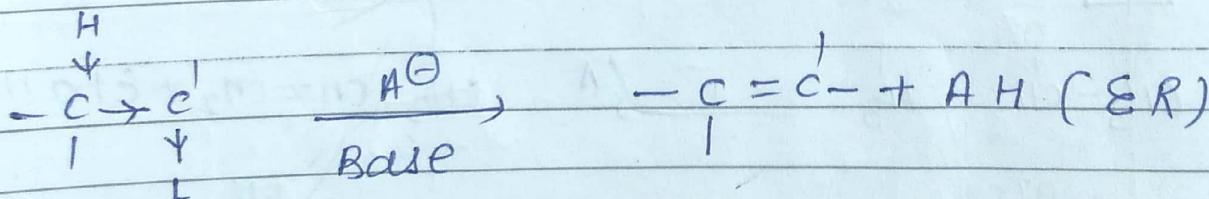
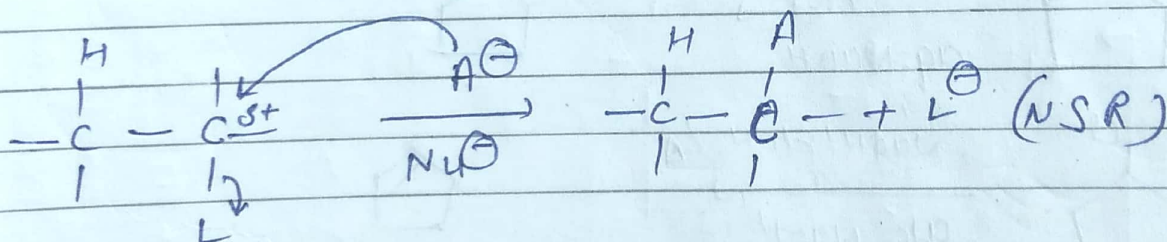
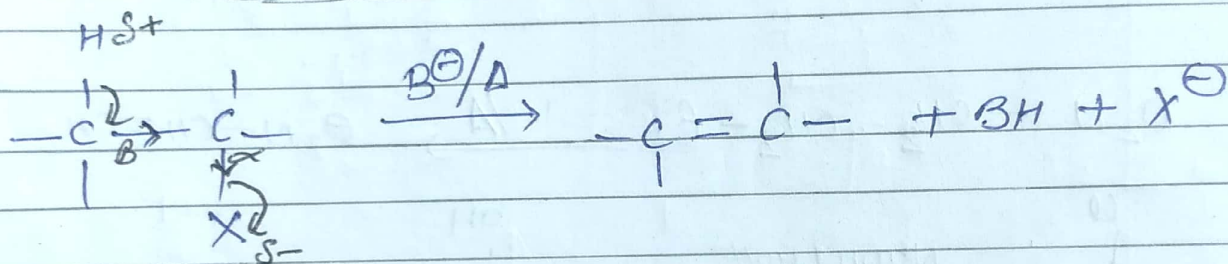
Elimination Rxn

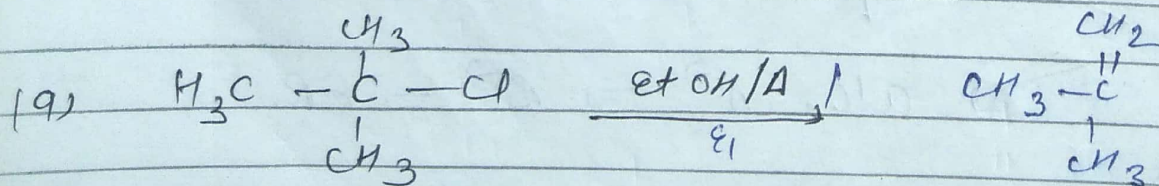
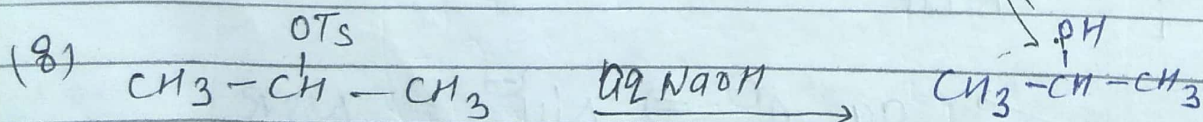
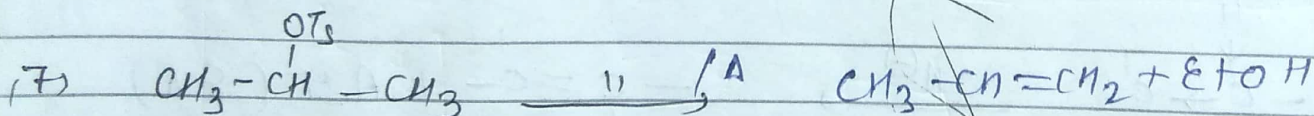
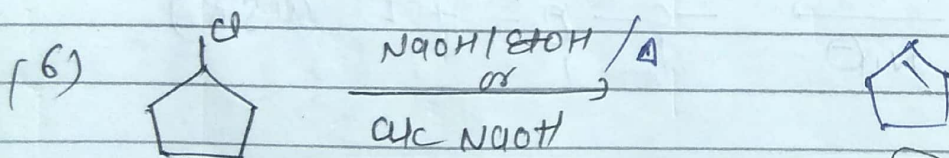
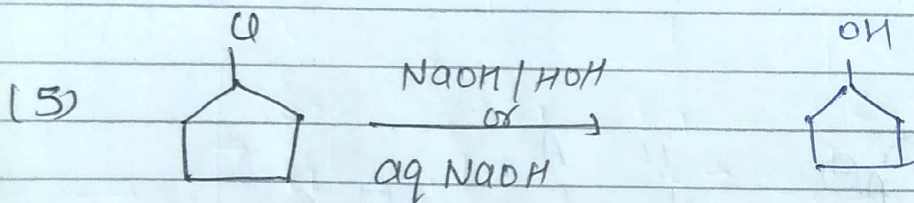
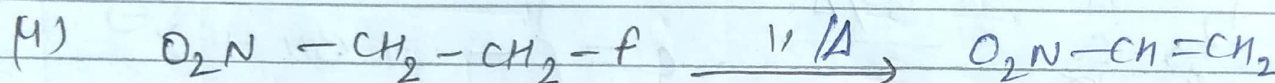
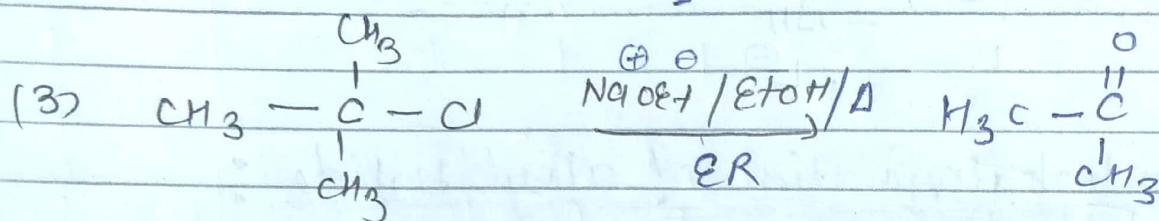
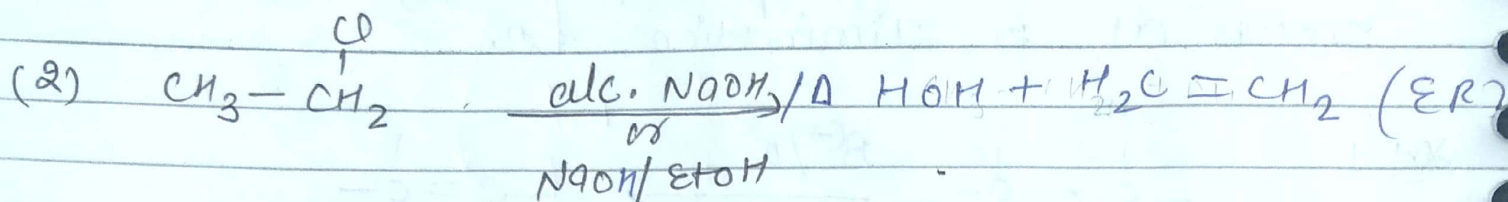
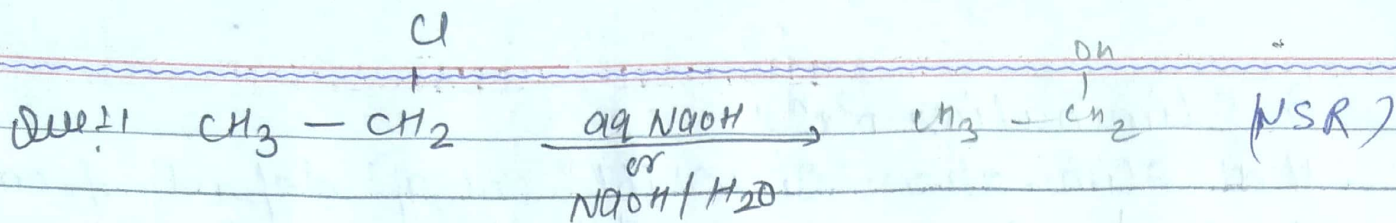
* β Elimination Rxn:

that elimination in which one gp depart from α and other group depart from β are known as β elimination Rxn.



Ex: 1 Dehydrohalogenation of alkyl Halide:





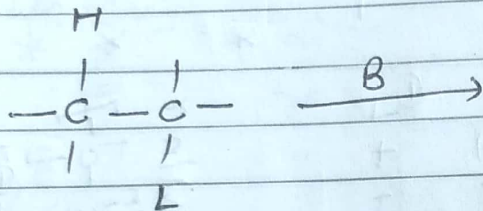
* Mechⁿ of β elimination:

It occurs by following three Mechⁿ.
Depending upon

(1) E_1 -Mechⁿ:

(2) E_2 -Mechⁿ

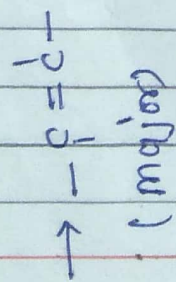
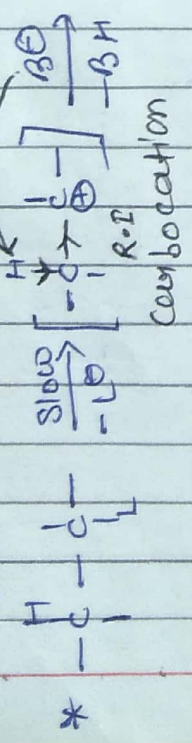
(3) E_{1cB} - Mechⁿ



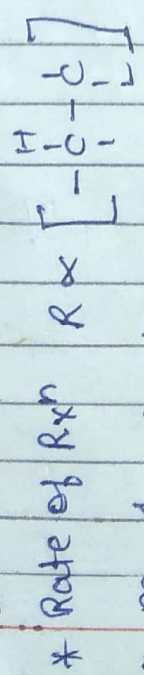
Et₂ → make + form

E₁ - Mechⁿ

* Unimolecular Elimination Mechⁿ

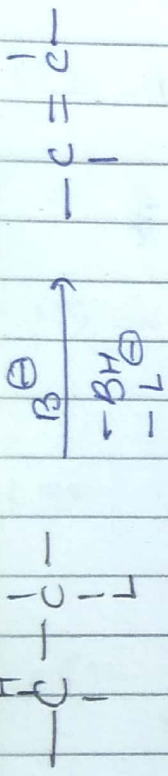
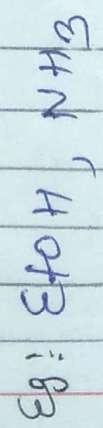


Product



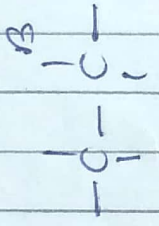
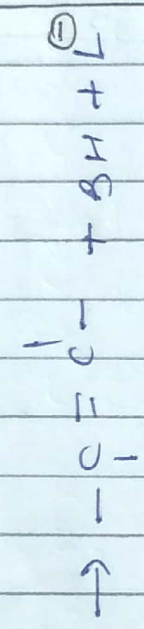
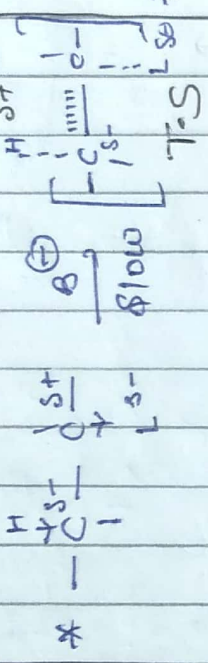
* $m = 1, o = 1$

* Favoured by weak base

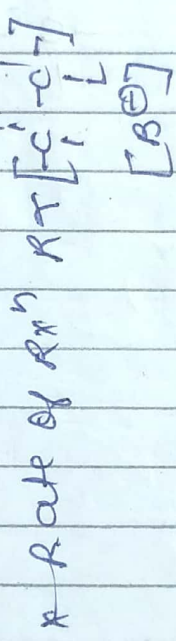


E₂ - mechⁿ

* Bimolecular Elimination Mechⁿ

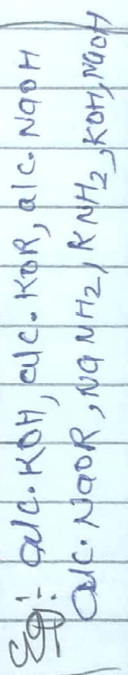


S_N2-Product Minor



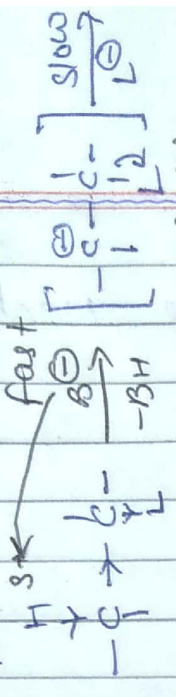
* $m = 2, o = 2$

* Favoured by strong / moderate base

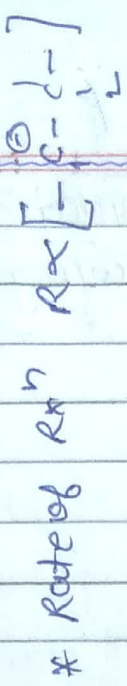


E1cB - Mechⁿ

* Unimolecular Elimination by formation of conjugate base

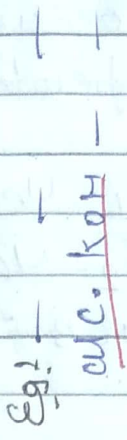


c.b. (R.I) or carbanion.



* Favoured by strong base

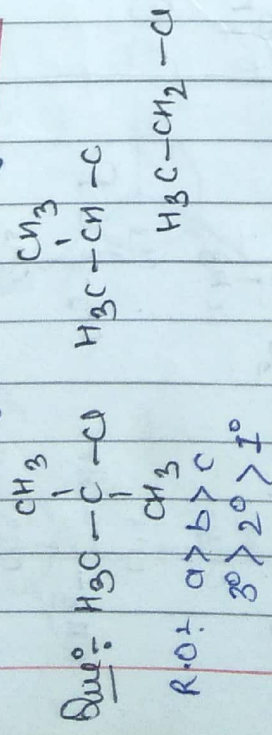
Base



E_1

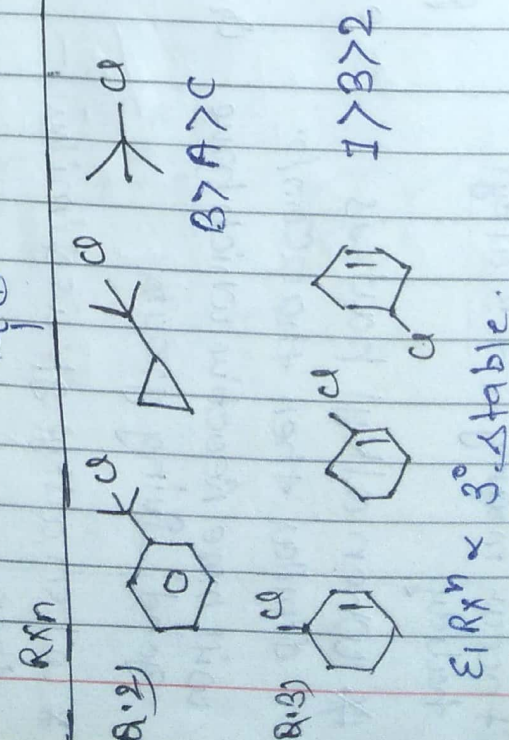
* Favoured By Polar Protic Solvent
PPS (Et-OH), NH_3 etc)

* Favoured by good living group



* Those comp. are more reactive towards $E_1 R^n$ of which carbonation is more stable.

* Reactivity towards E_1 $\propto$ stability $\propto$ effect $+m/+H/+I$



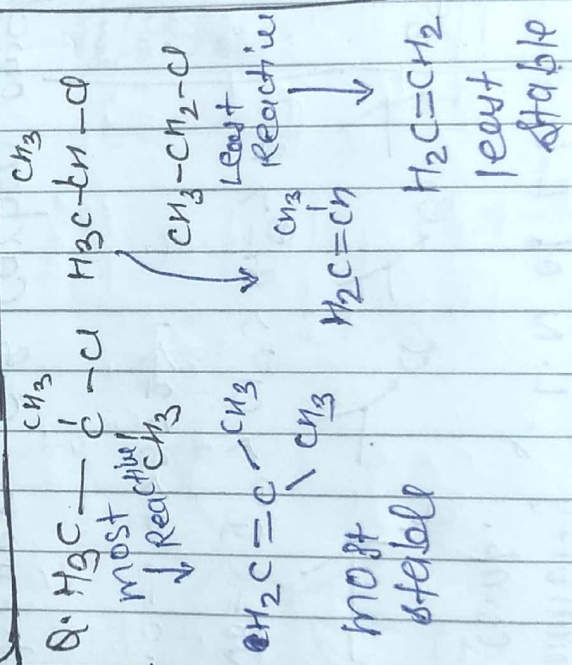
E_2

* Favoured by Polar aprotic solvent PPS ($\rightarrow$ DMF, DMSO, Acetone, ether)

* Favoured by $LiAlH_4$ or moderate living group

* Reactivity towards of Comp.

$E_2 R^n \div$
 $\propto$ stability of Alkene
 $\propto$ Acidic nature of $C_\beta-H$



E_{cb}

* Favoured by PPS.

Favoured by poor living gp
 $PLH(-f, -O-\ddot{O}-R)$

* Condition for E_{cb}

① Living group should be poor living gp/very poor living gp.

$\Rightarrow -f, -O-\ddot{O}-CH_3(-OAc)$

② $-m|-H|-I$ gp at C_β (conj. ben).
 $(H) of C_\beta$ should be highly acidic

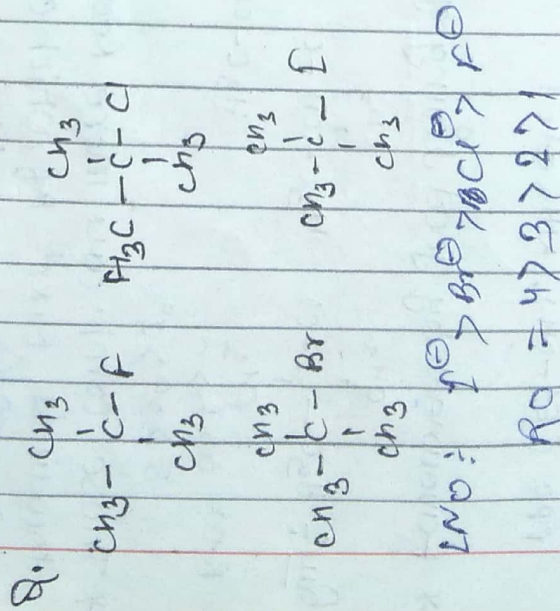
$H.W \div 10-11$

It occurs mainly in 3 alkyl
-halides

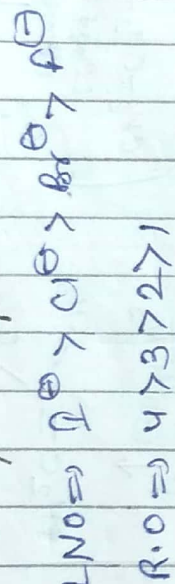
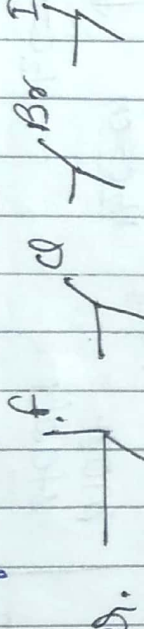
* When alkyl part is
similar then that comp.
will more reactive which have
good living group.

* When alkyl part is similar
then

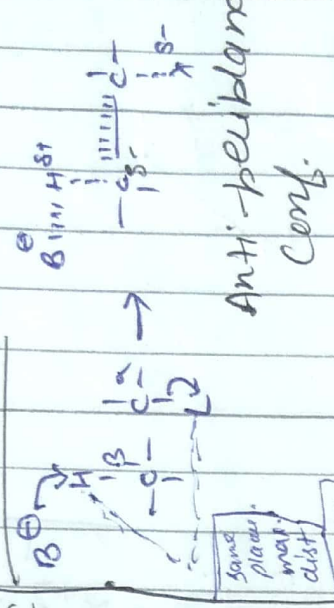
Reactivity of $\propto$ L.N. of
comp $\propto$ L.N.



Reactivity
of comp.



$\propto$ L.N. of L.N.



* Hydrogen α carbon and living gp of
 β should be anti to each other. ~~these~~
Conf. Should be anti to each other and
in same plane this Conf. necessary to ~~to~~ E_2
Conf. reaction is known as anti-periplanar Conf.

Test syllabus E.P.S.T. 2
Carbocation
Relationship. SN¹ and SN²
Nu⁺ & R.
Titrimetry

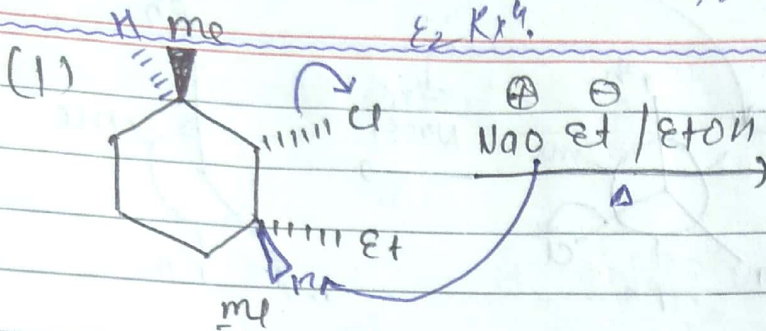
Favourable condition for

E_2 Rxn.

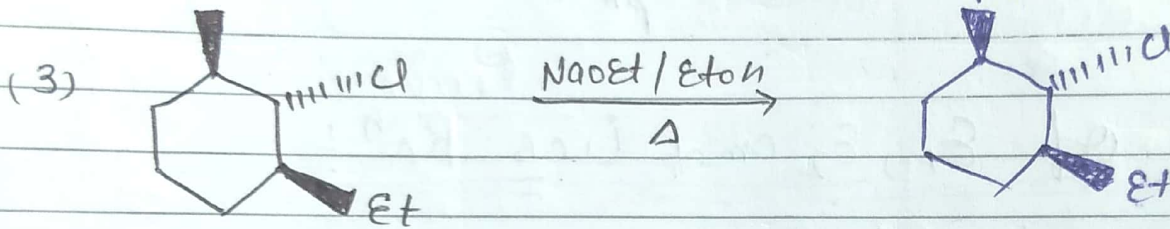
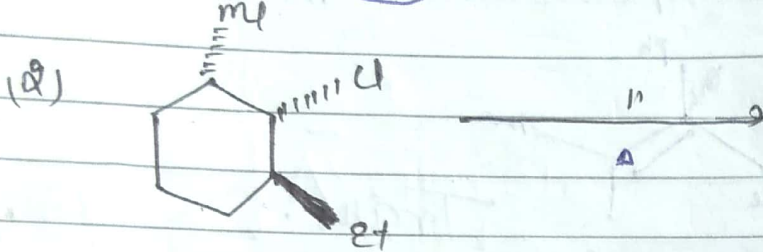
Weak Neutral Base $\rightarrow$ Cation, Stable $\rightarrow$ E1
 in strong base - E2, E2c
 P.L.H.
 β -H acidic
 -m, -l

Weak ethanolic ammonia base.

Cyclohexo $\rightarrow$ cis like

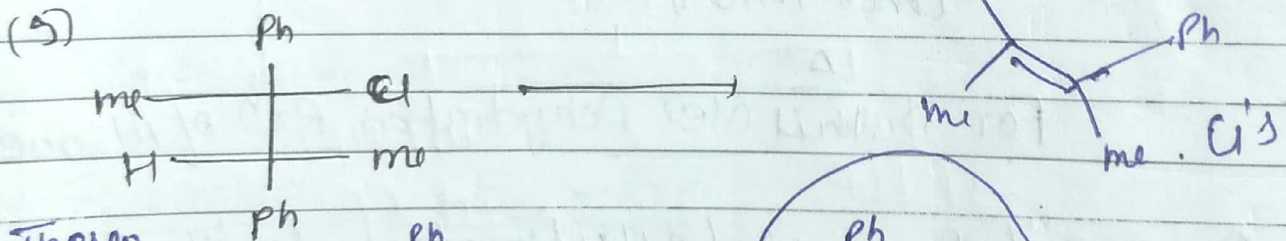
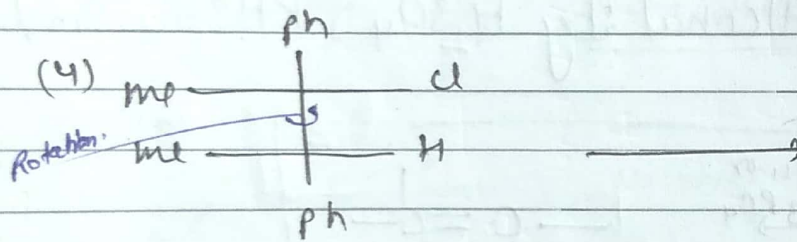


fixed
no
Rotation

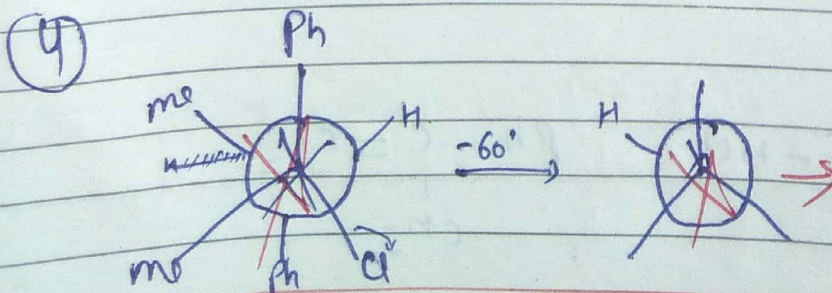
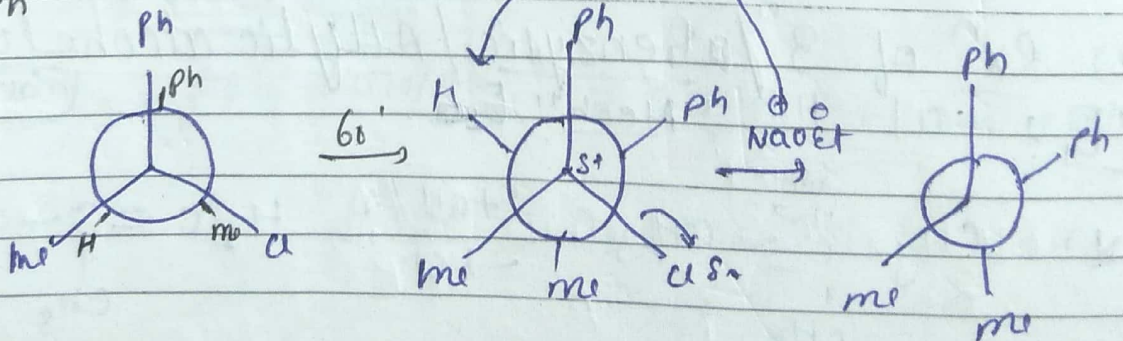


No Rxn

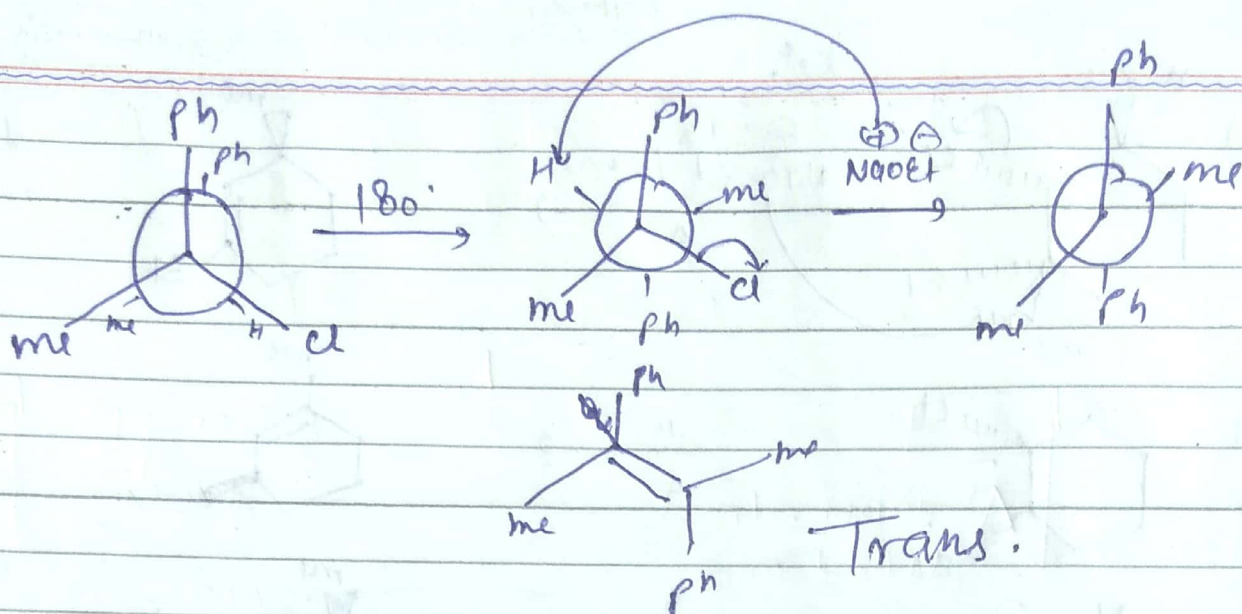
Rotation



Threo
Isomer



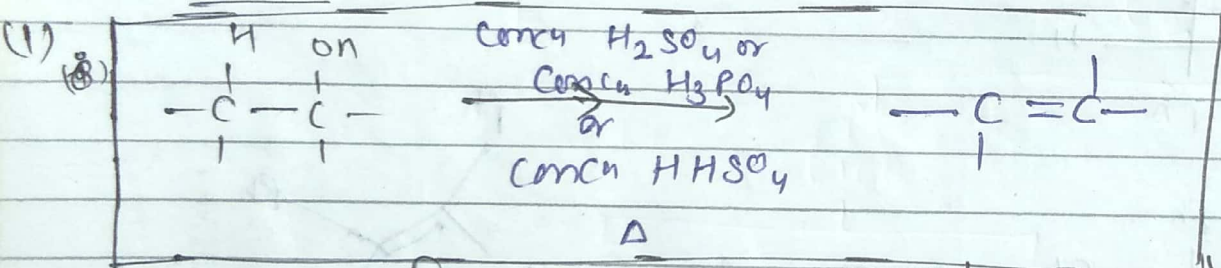
(4)



* Examples of E_1 , E_2 and E_{1cB} Rxn:

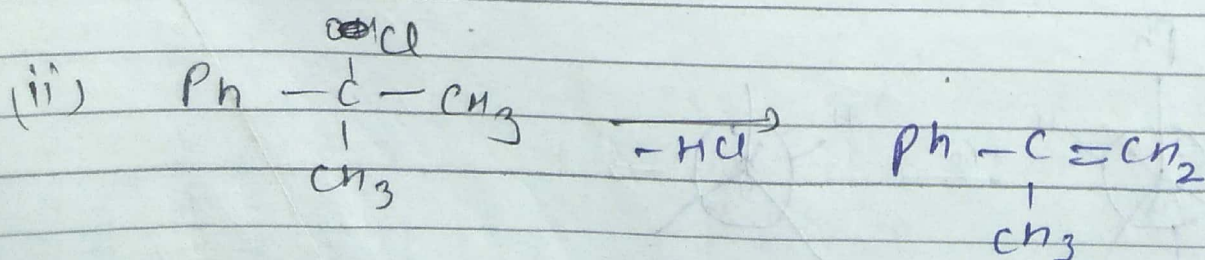
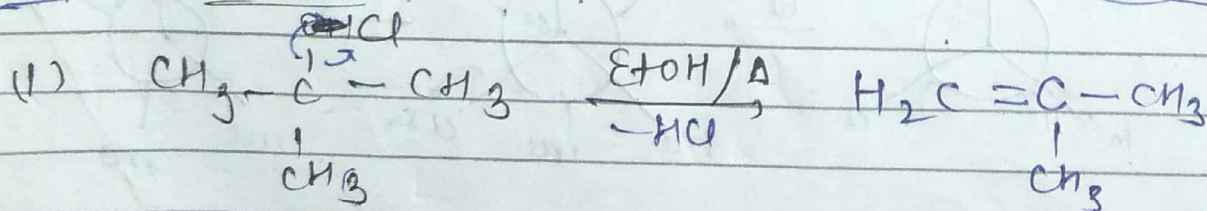
(E₁)

(1) Dehydration of Alcohol by H_2SO_4 , $KHSO_4$ and H_3PO_4 :



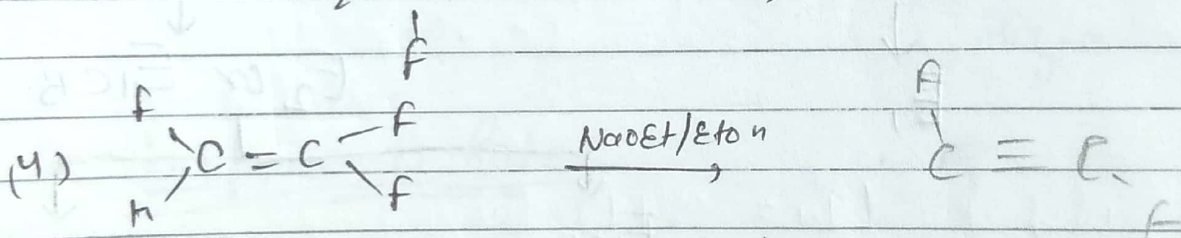
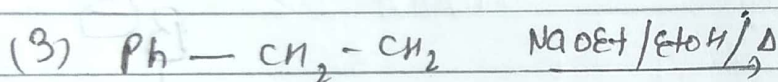
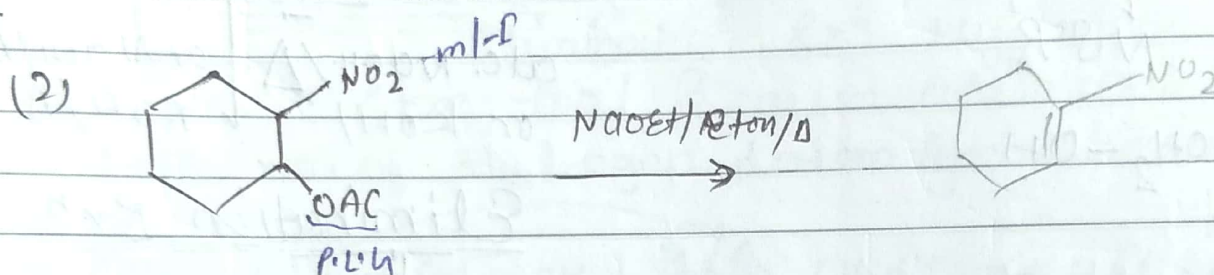
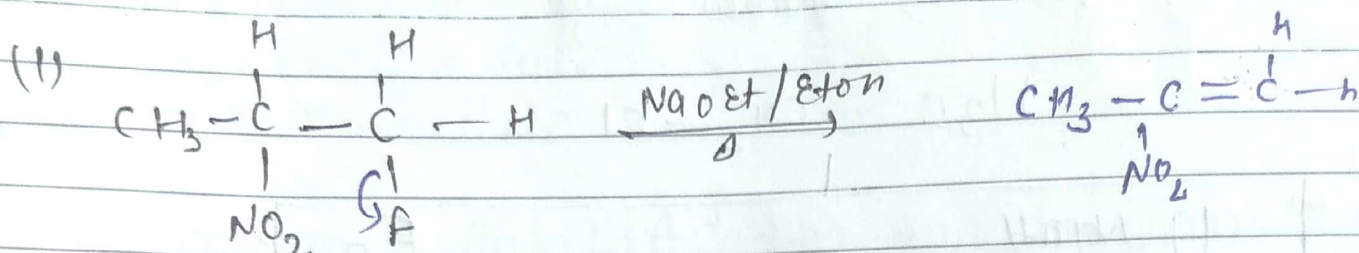
for Detail see Dehydration Rxn of Alcohol

(2) Rxn of 3° / Benzylic / Allylic alcohol with EtOH
 Mech: E_1 at HI: Mech: E_{1cB} (make alkene)



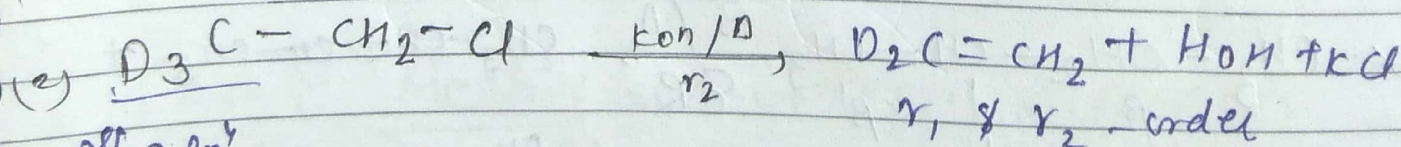
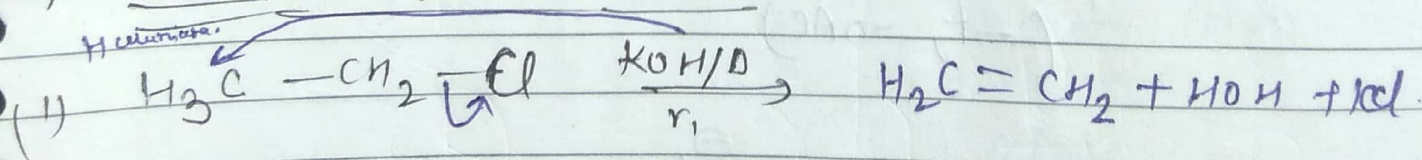
Rest Rxn always E2.

* Examples of E1cB:

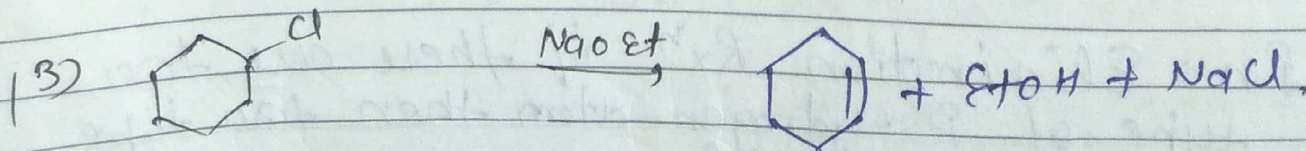


Rest other elimination is E2

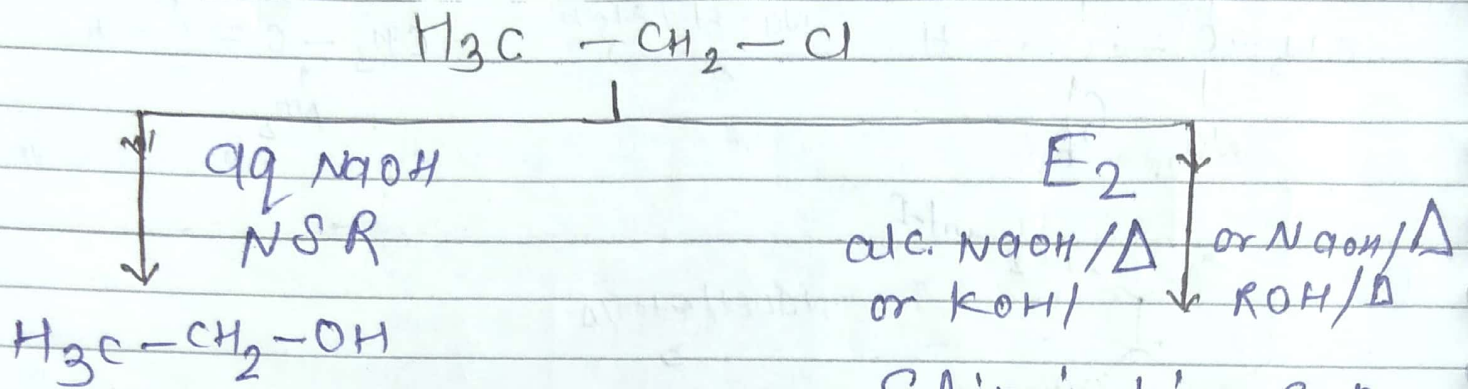
* Examples of E2 - Rxn:



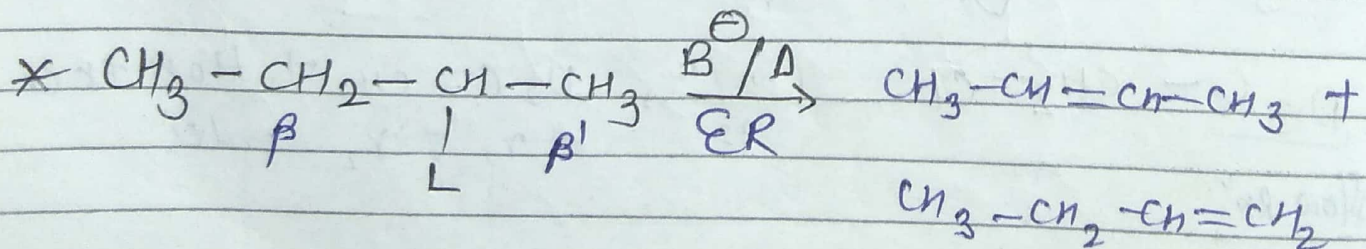
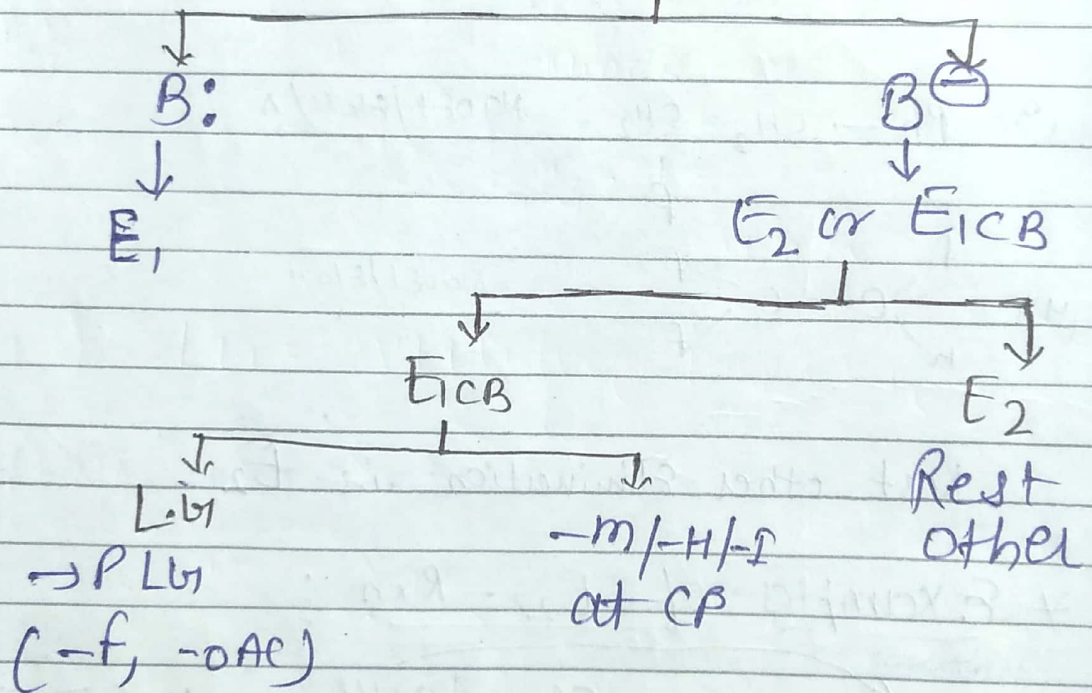
slow Rxn



* Orientation in Elimination Rxn:



Elimination Rxn



In Elimination Rxn if there are two type of β hydrogen atom then two type of alkene are form

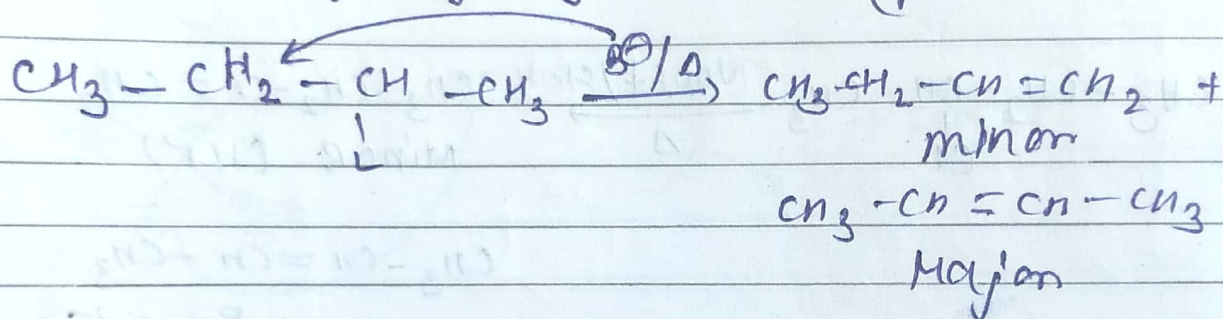
Ques: 11, and 12.

And which alkene are major and minor, it is decided by Two Rule.

(1) Saytzeff's Rule

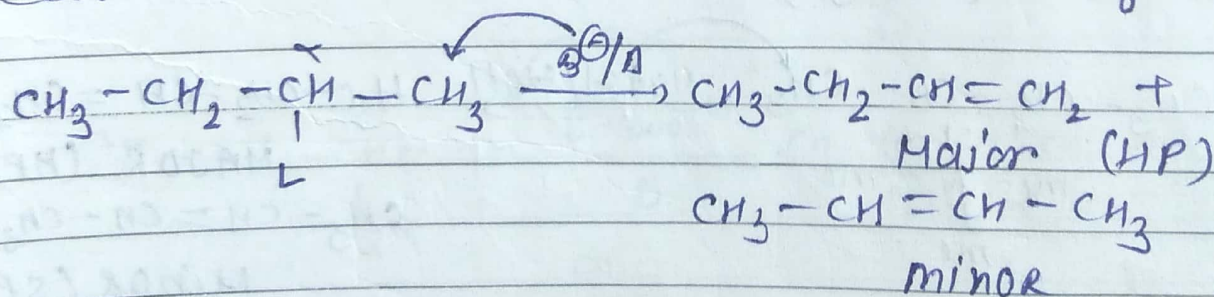
(2) Hoffmann Rule

(1) Saytzeff's Rule: Acc. to this rule during the elimination Rx^h hydrogen eliminate from that β carbon atom which have less no. of Hydrogen atom (poor becomes poorer).



* Hoffmann Rule:

Acc. to this Rule H eliminate from that β carbon atom which have more no. of H atom.



* For E_1 Mechⁿ: $\Rightarrow$ Saytzeff's Rule (SR)

* For E_{1cB} Mechⁿ: $\Rightarrow$ Hoffmann Rule (HR).

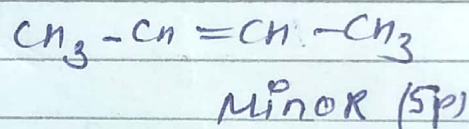
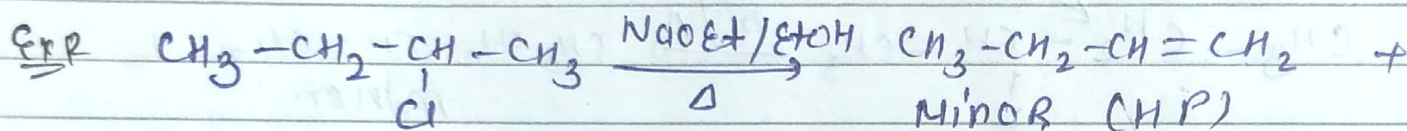
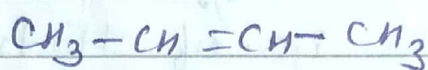
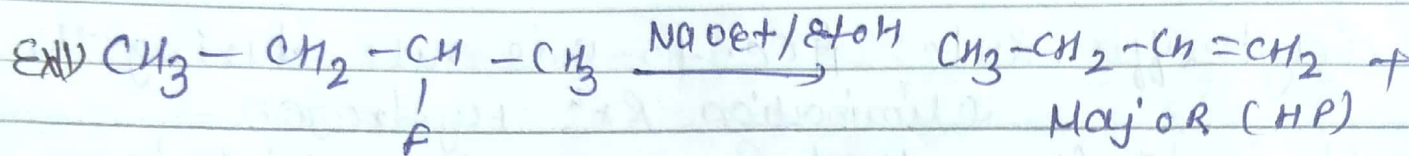
* For E_2 Mechⁿ: Both (SR + HR).

↓
In most
of the case

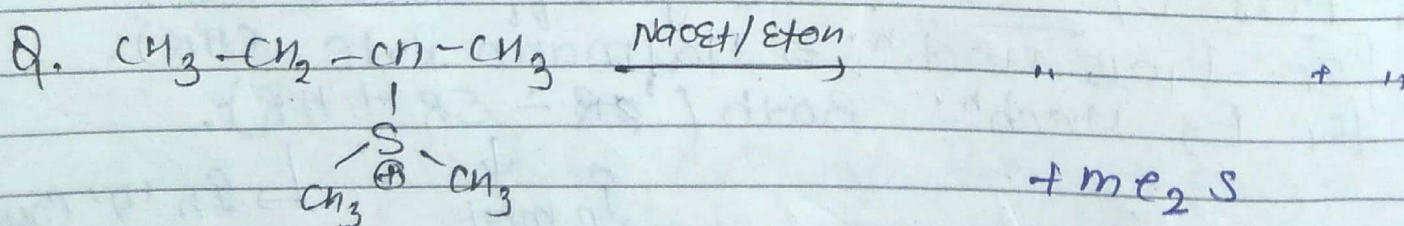
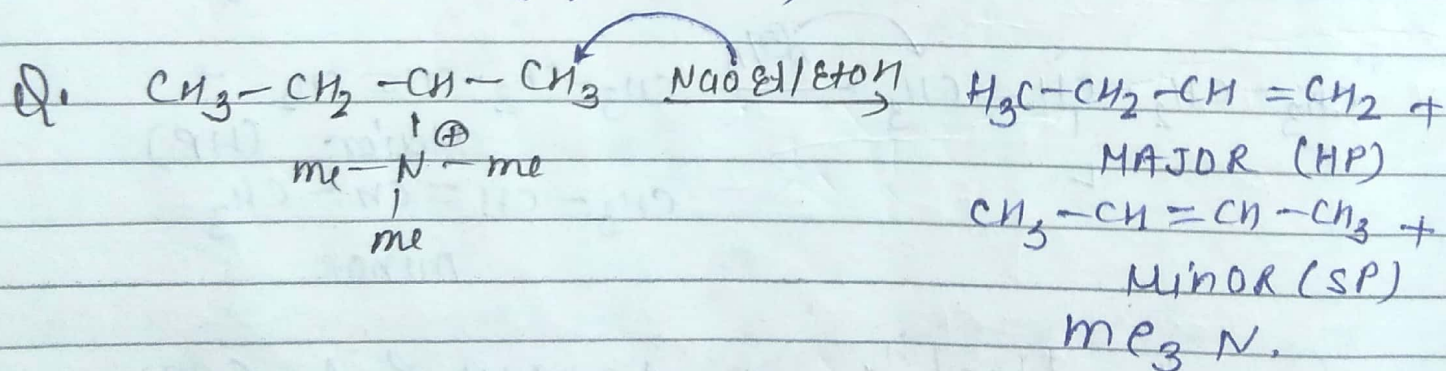
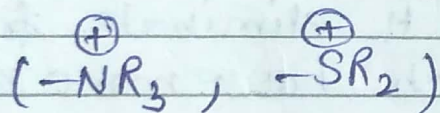
↳ In '4' cases

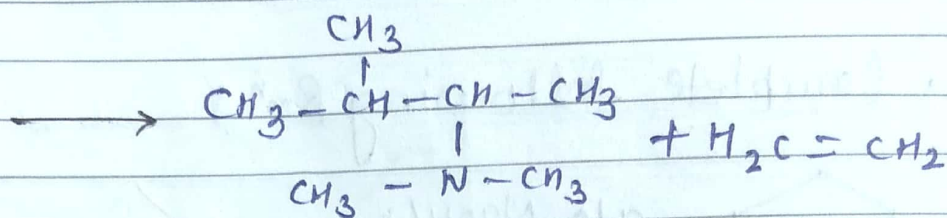
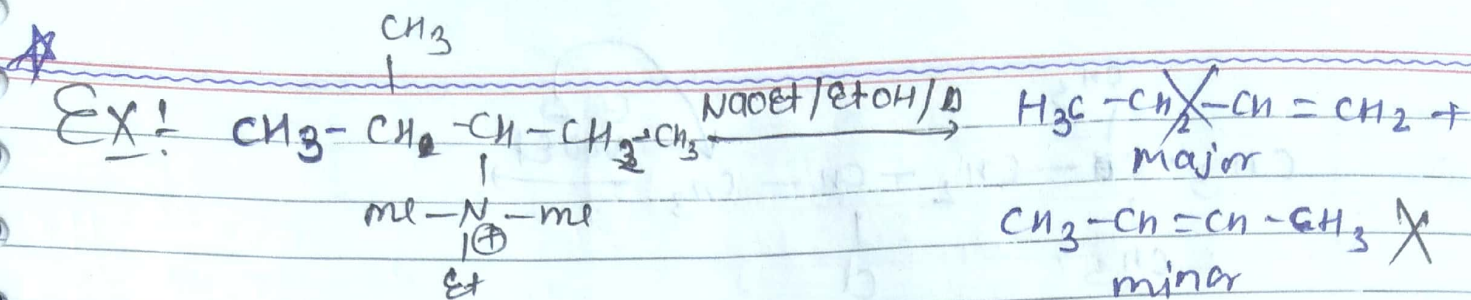
Case 1 Half

(1) When Lb is VPLb (very poor living gr).
 $[-F, -O-\overset{\cdot}{C}-CH_3 (-AC)]$

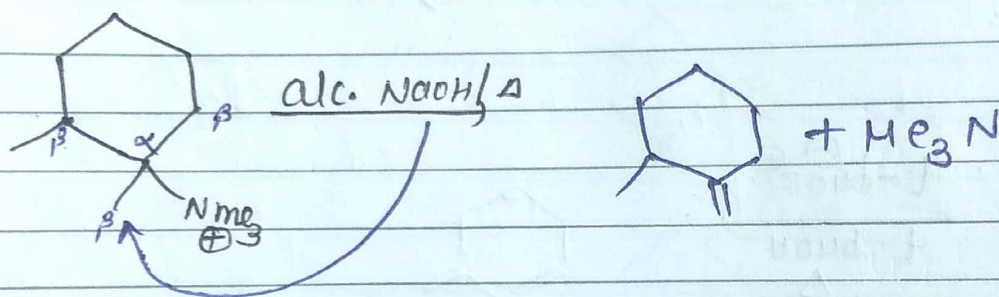


Case 2 When $Lb = VLLb$ (very large living gr).

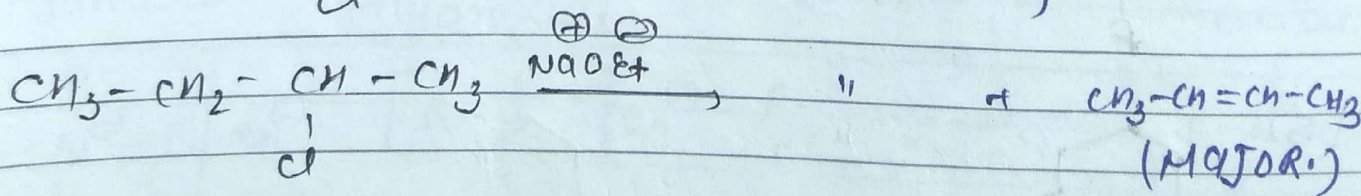
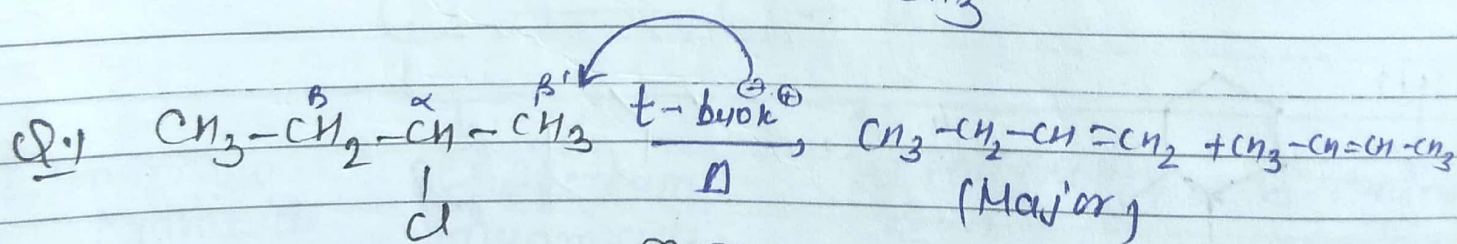
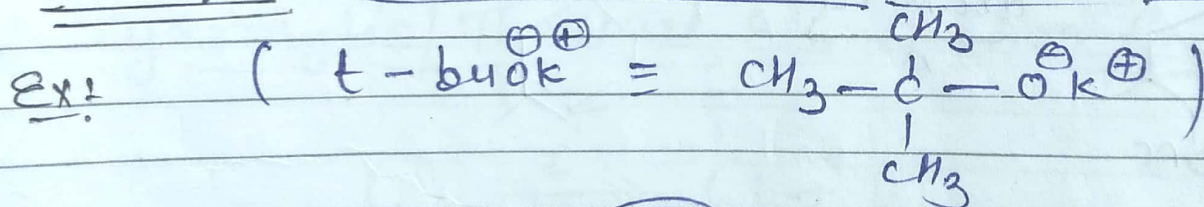




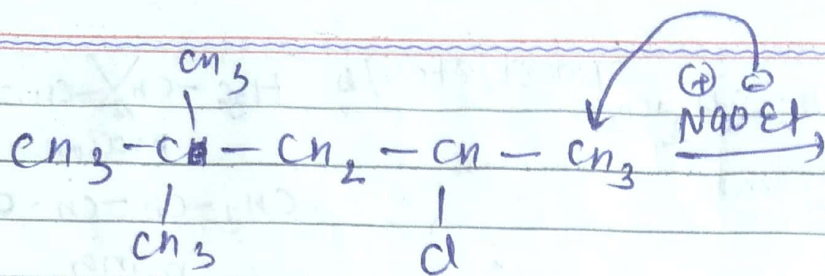
(4)



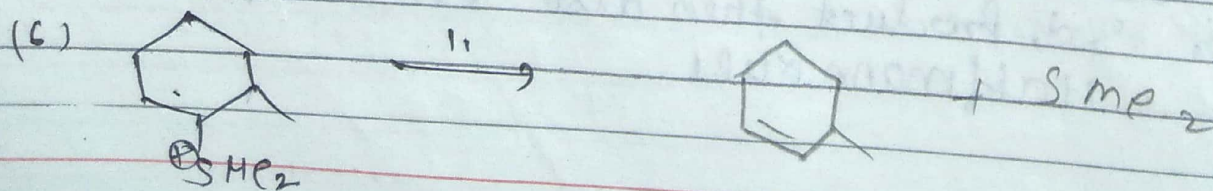
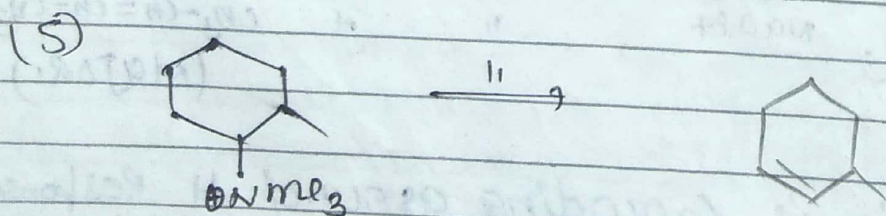
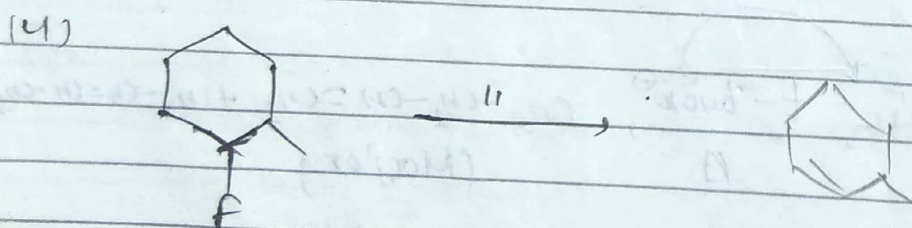
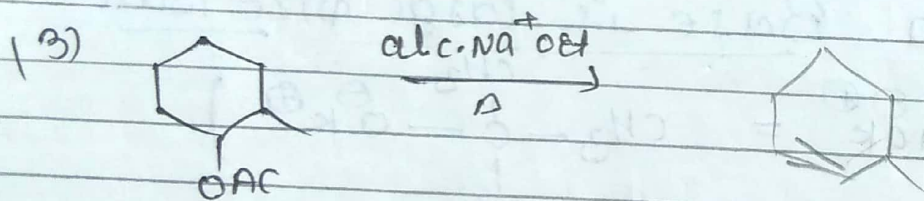
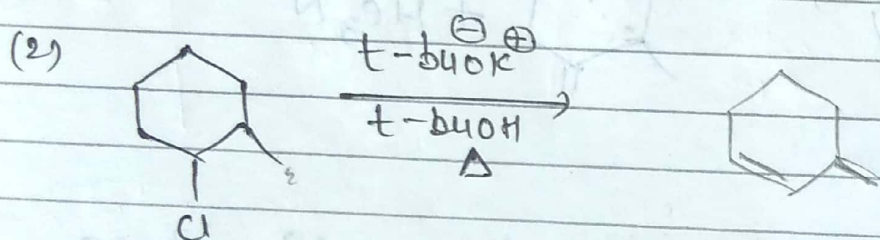
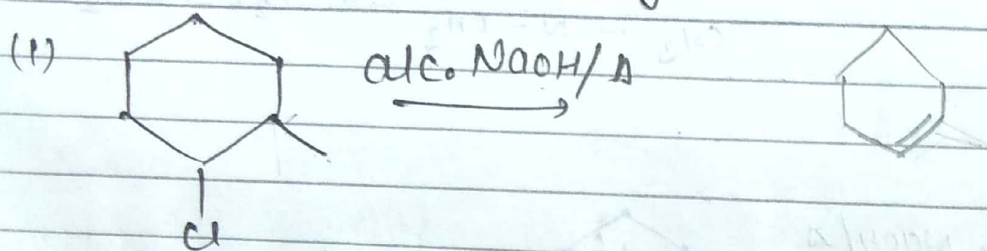
Case-3 When Base is large size Base

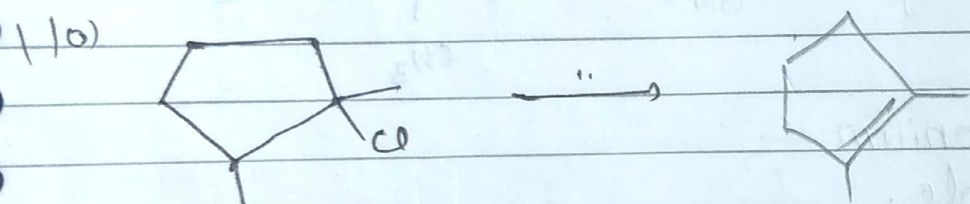
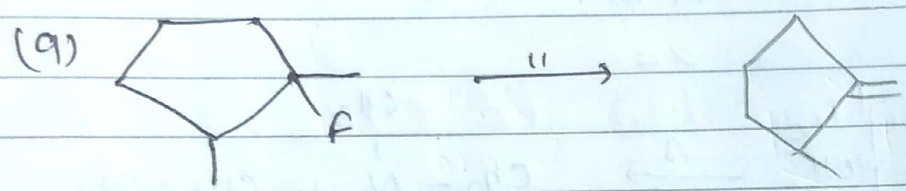
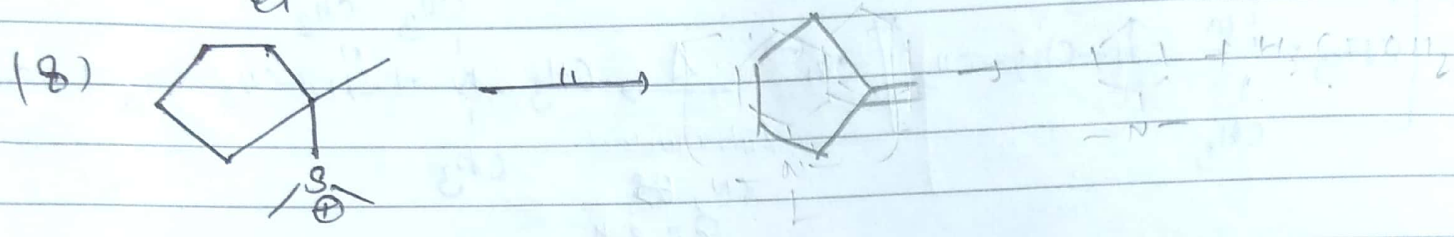
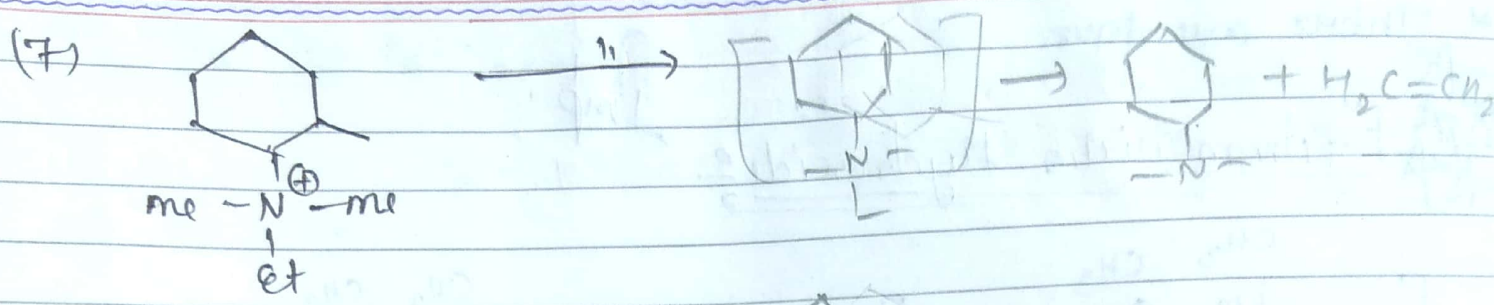


Case-4 When there is crowding around H responsible for 2nd. product then also elimination occur by Hoffmann Rule

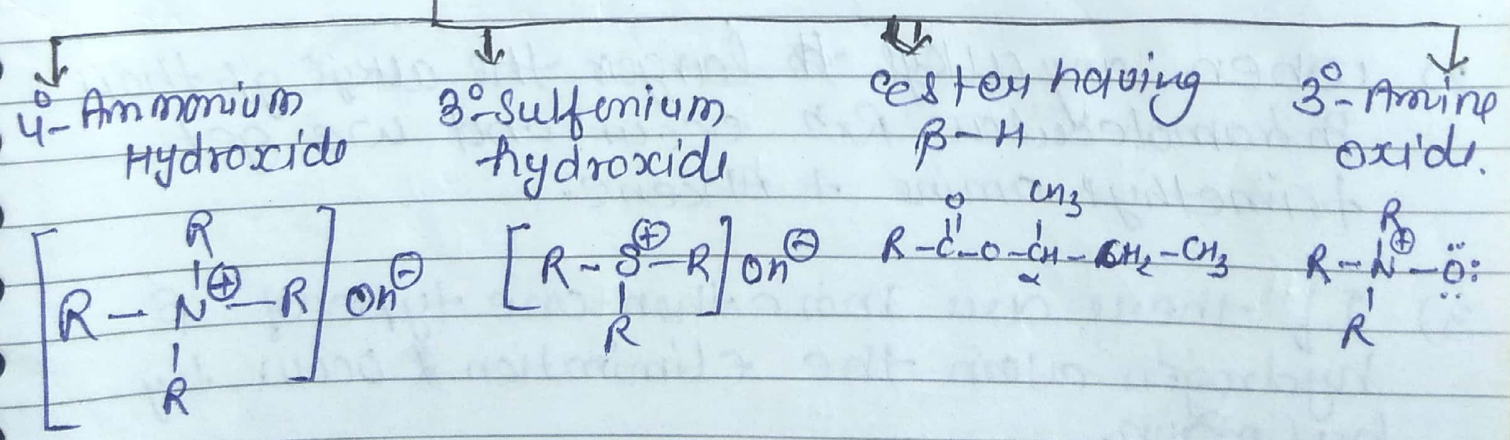
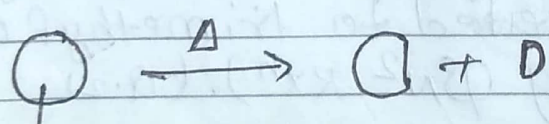


* Q. Complete following Rxn:





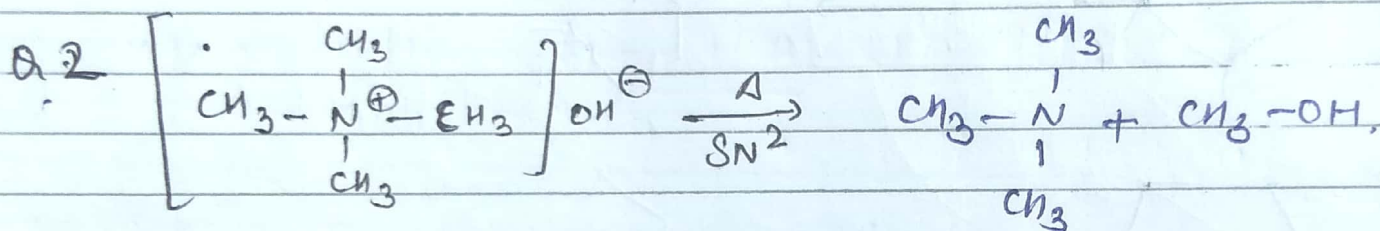
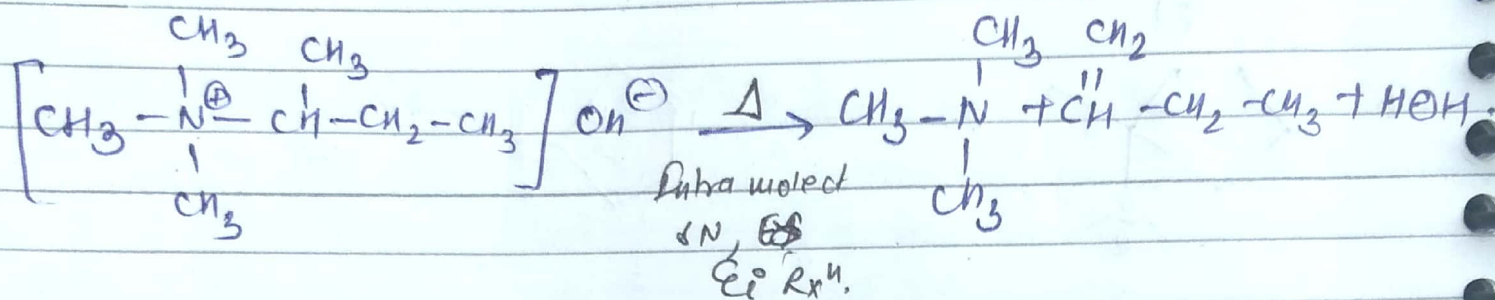
* Pyrolytic/Thermal Elimination Reaction:



* There are four

Imp.

1° - Ammonium hydroxide



Tetramethylammonium hydroxide.

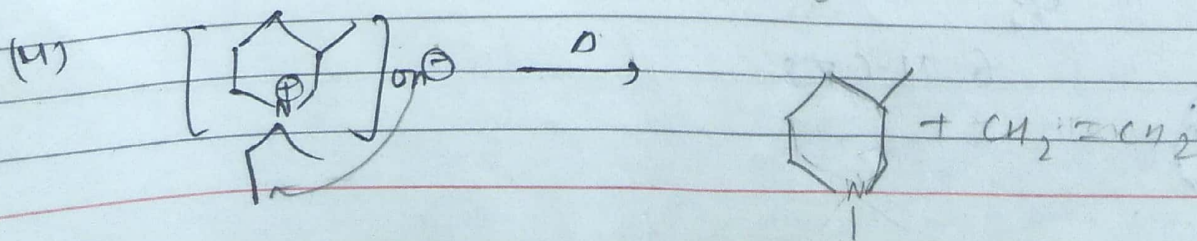
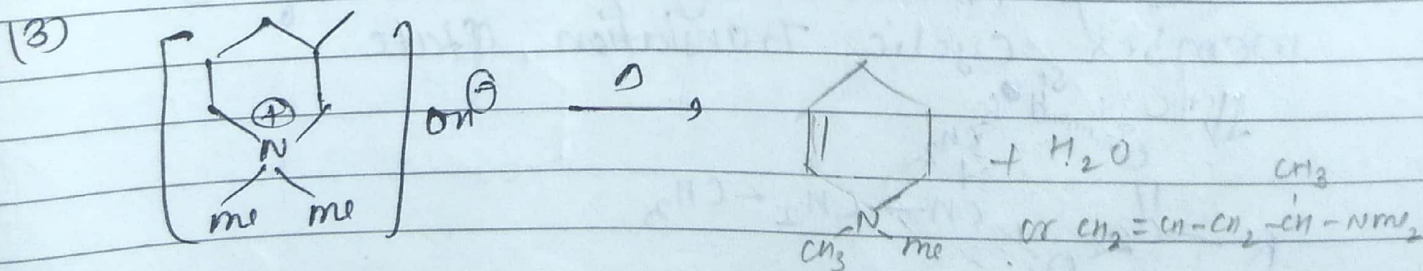
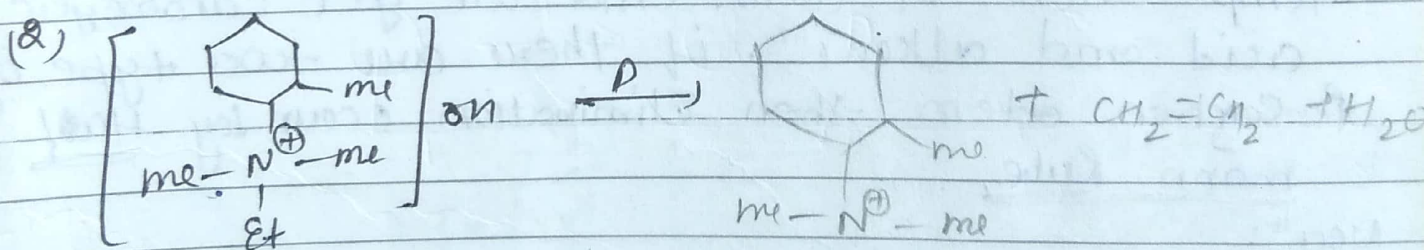
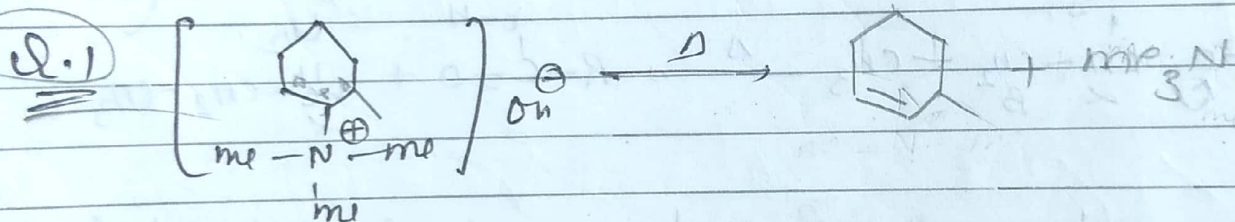
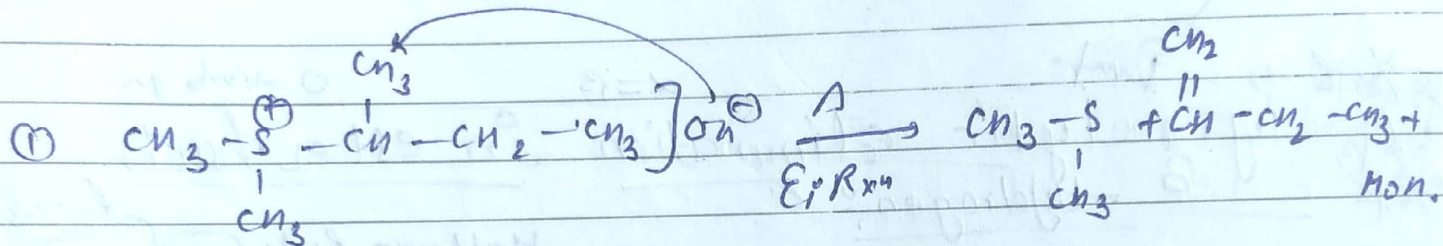
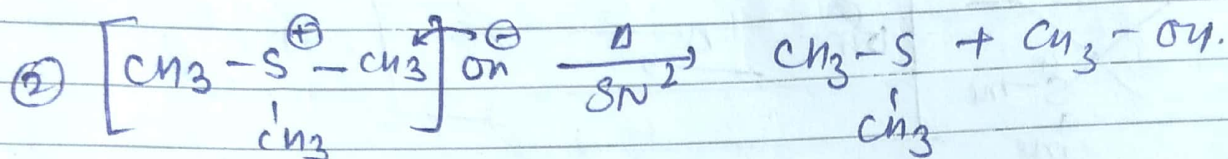
(1) When all alkyl gp are methyl gp. then on heating converted to trimethyl amine and methanol. (by SN² Rxn). (Q.2)

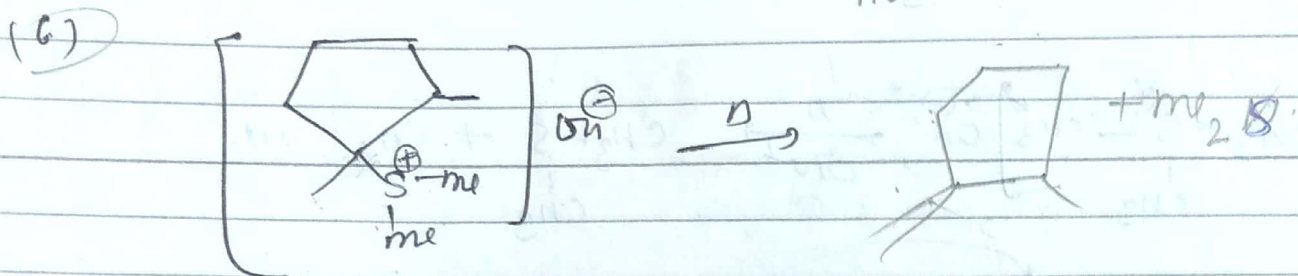
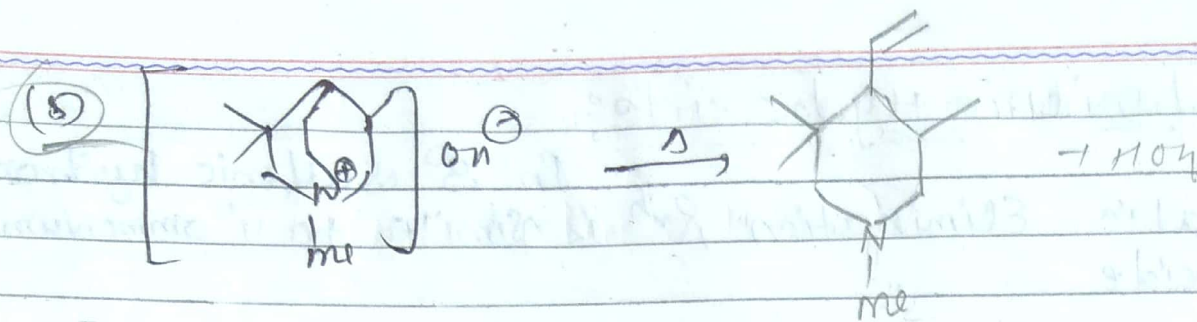
2) When any alkyl ~~th~~ larger the alkyl gp then intramolecular Rxn occur and we get trimethyl amine + Alkene.

3) If there are more than one type of β hydrogen atom the elimination ~~R~~ occur by Hofmann.

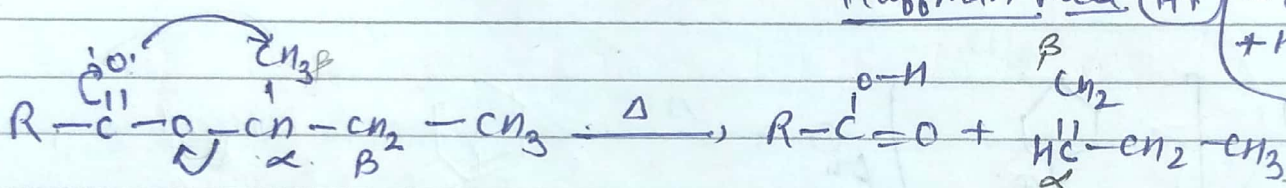
* 3° Sulfonium hydroxide:

Pyrolytic Elimination R^{xH} is similar to 4° ammonium hydroxide





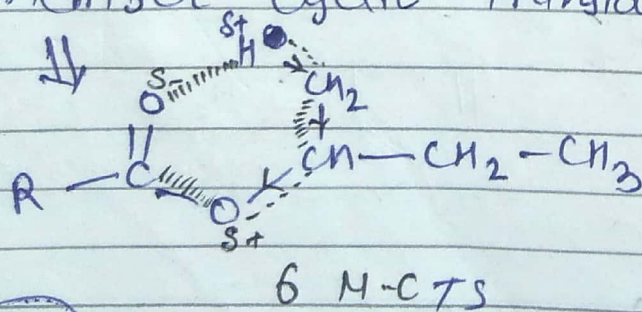
Pyrolytic elimination in ester having $\alpha = \beta$ Hydrogen:



When ester with β Hydrogen is heated at high temp. then E_i occur and we get carboxylic acid and alkene. if there are two type of β carbon atom then Elimination occur by Haffmann Rule

Mechⁿ:

This ~~for~~ R_x^n occur by formation of 6 member cyclic Transition State



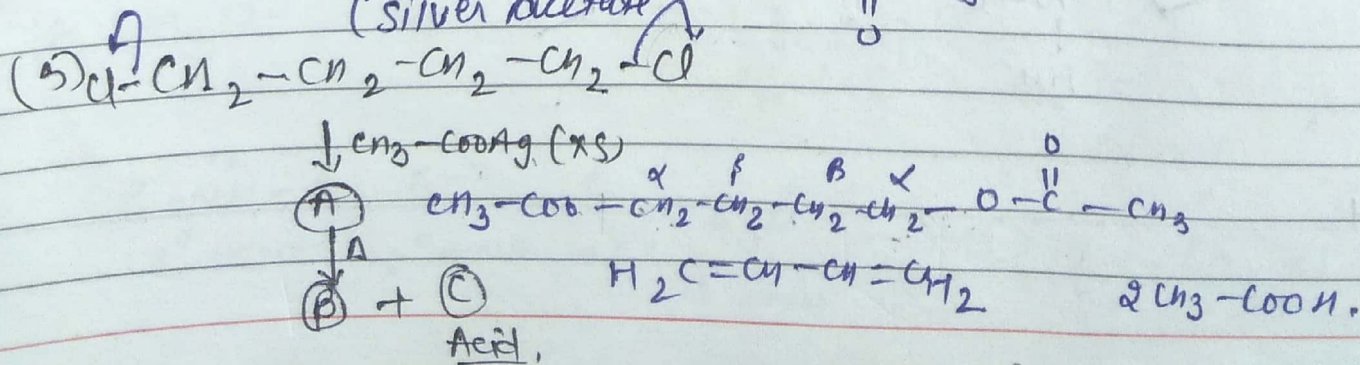
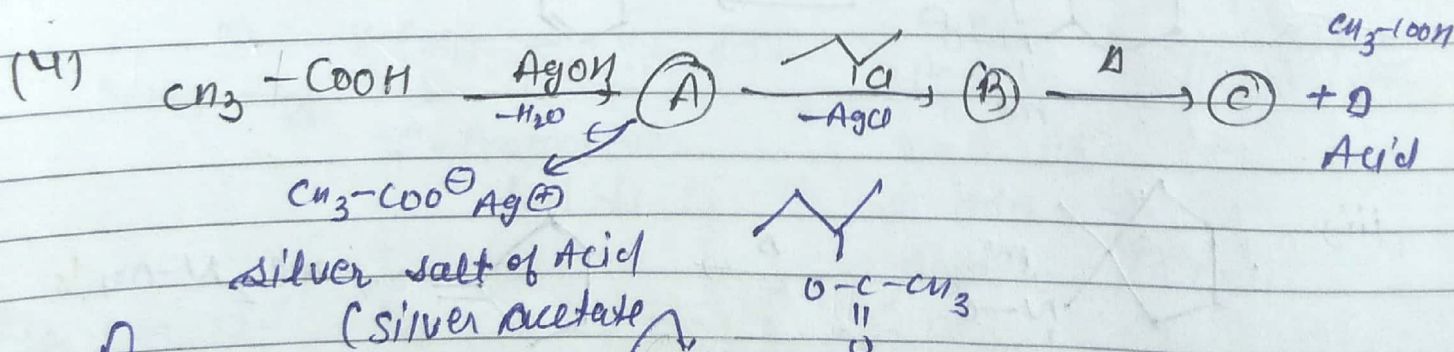
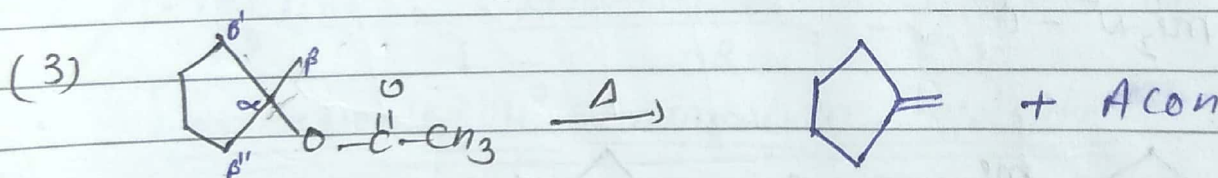
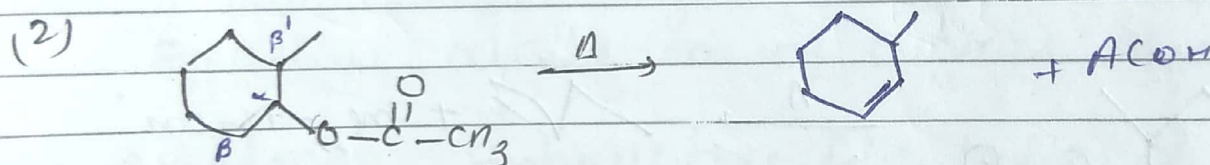
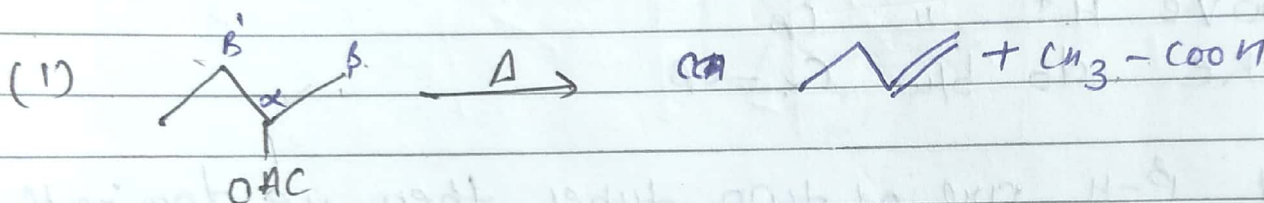
Syn elimination

T T M P (Trials to make product) (formation)

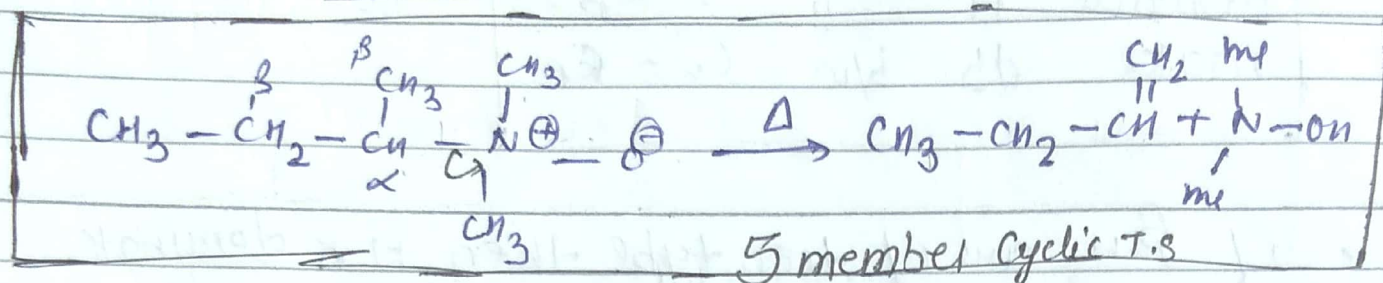
- Remove $R-COO^-$ from C_α .
- Remove H^+ " " C_β .
- make db b/w $C_\alpha - C_\beta$

- If β -H are of two type then H R dominate.

Ques:

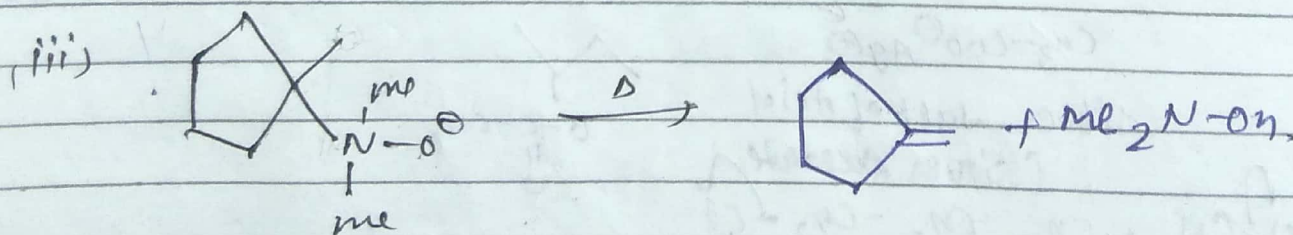
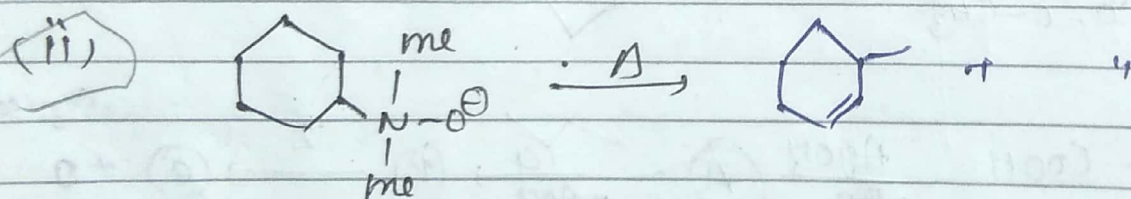
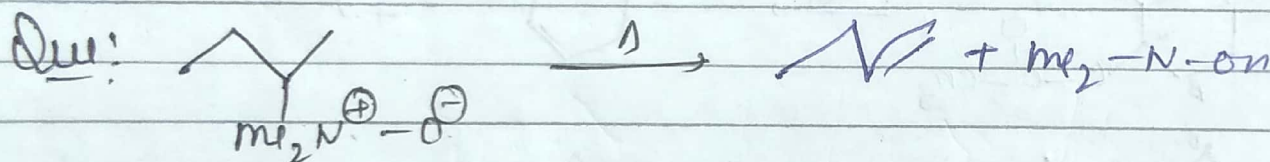


* Pyrolytic Elimination on β -Amine Oxide
 OR
 (Cope - Elimination)



- + T.M.P
Remove N^+ from C_α
Remove H^+ " C_β
make db b/w $\text{C}_\alpha - \text{C}_\beta$

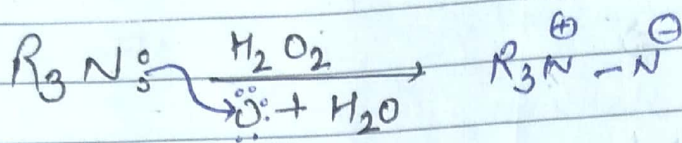
- If β -H are of two types then HR dominate



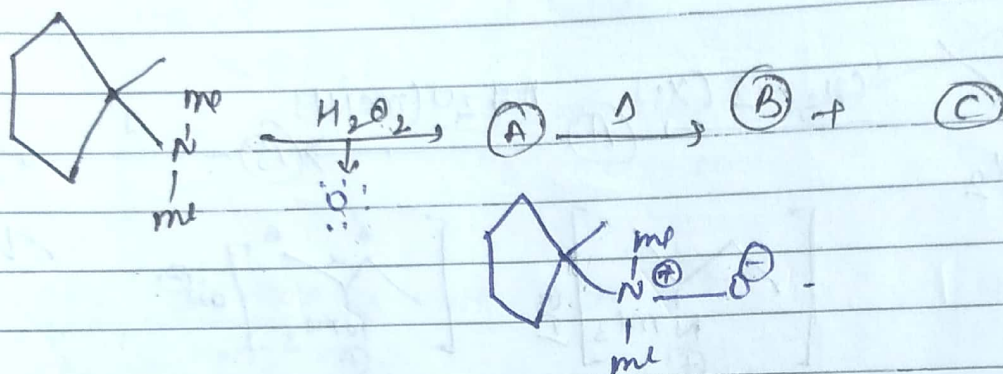
Not

Haffman

Note! 3° Ammine oxide can be prepared by R_3N of 3° Ammine with H_2O_2 or Ag_2O or CH_2I_2/Ag



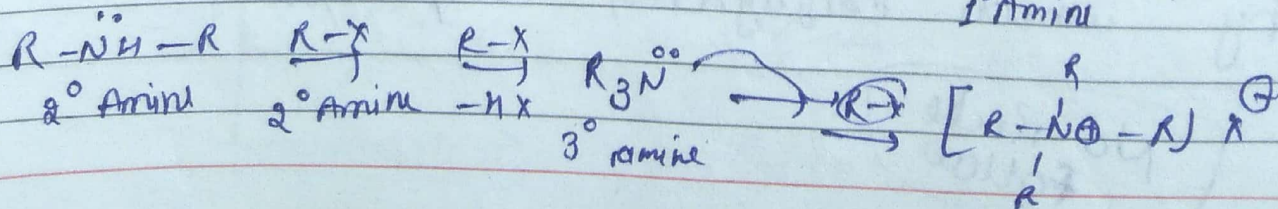
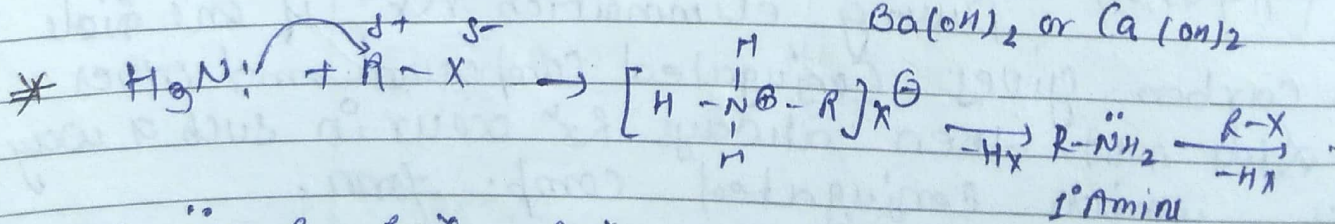
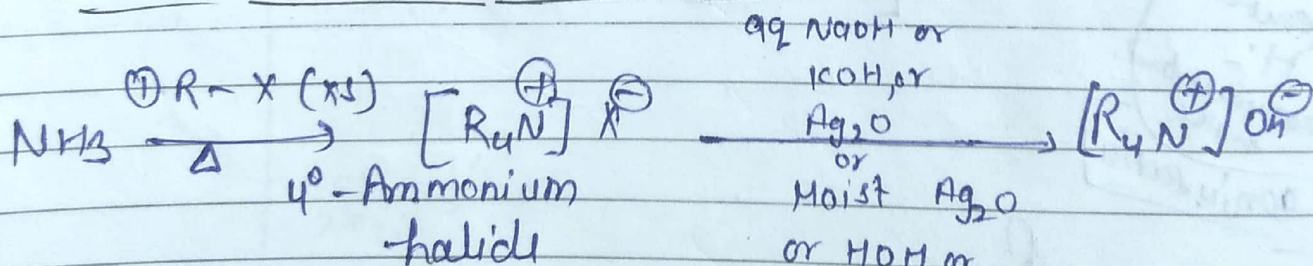
Q.

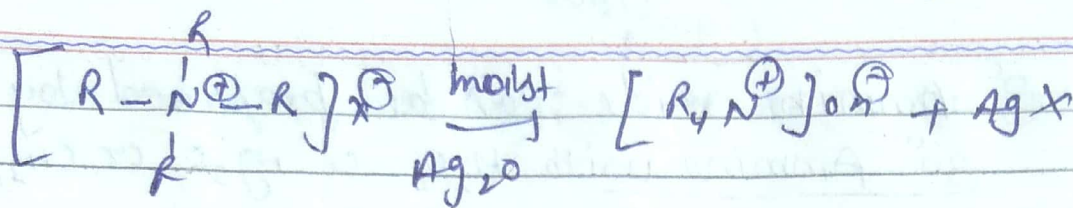
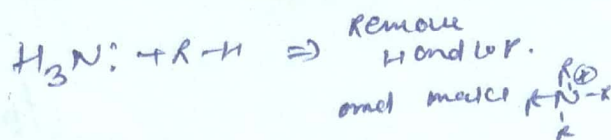


* 4° Ammonium Hydroxide can be prepared by Exhaustive alkylation of amines or Ammonium.

* Haffman Exhaustive Alkylation of NH_3 OR.

Formation of 4° - Ammonium hydride

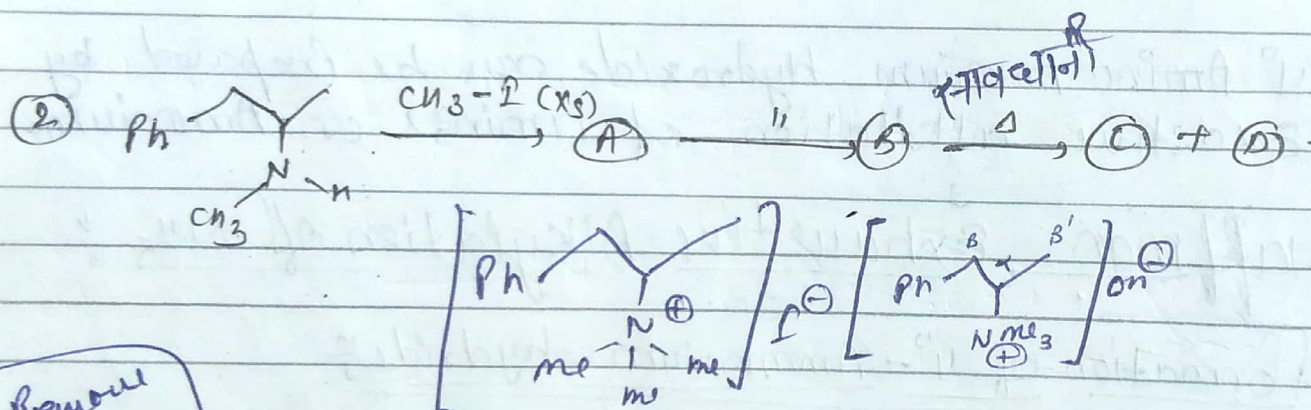
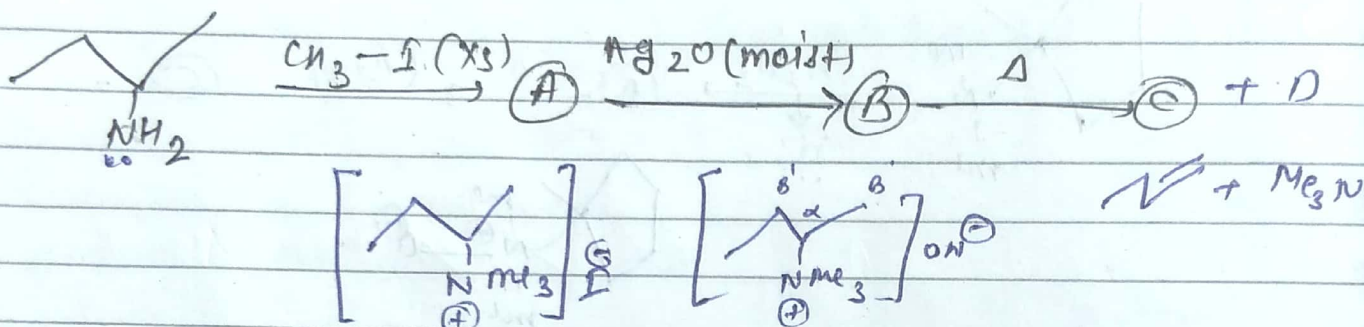




* Key point $\Rightarrow$

By this method 1°, 2°, 3° Amine Can also prepared.

Q.

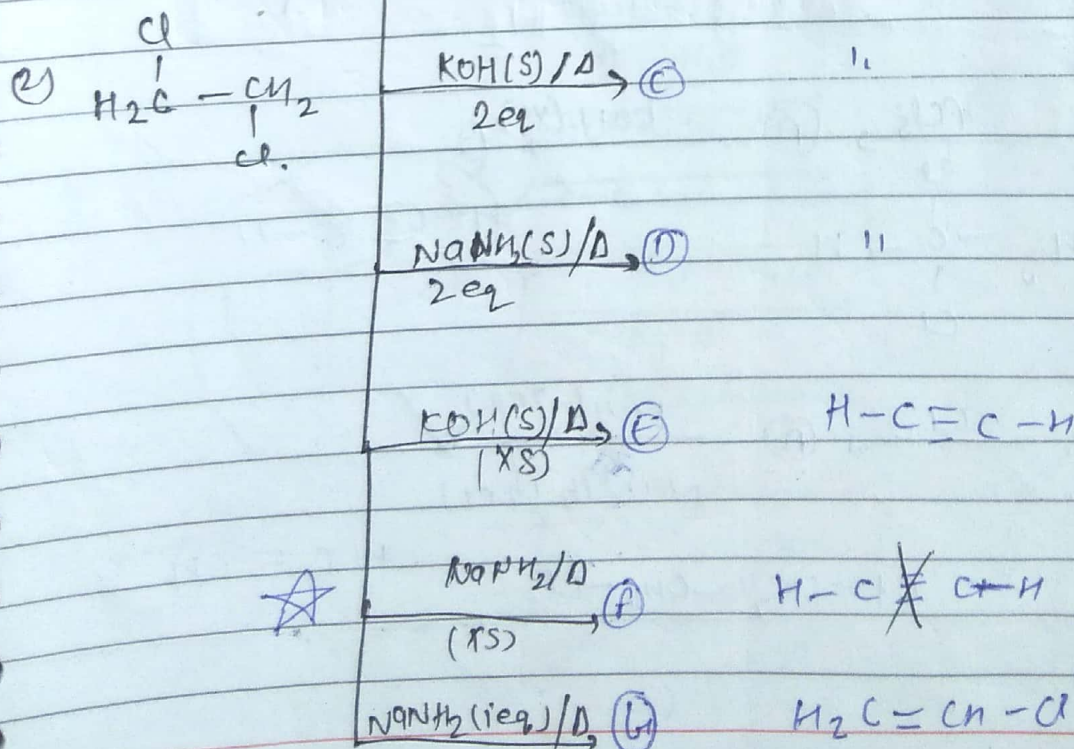
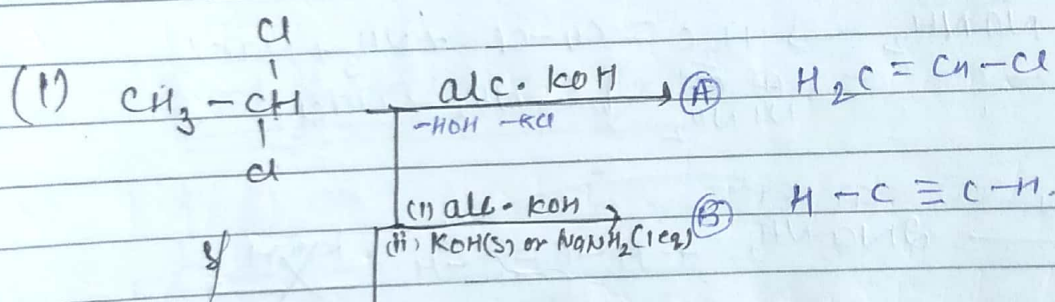
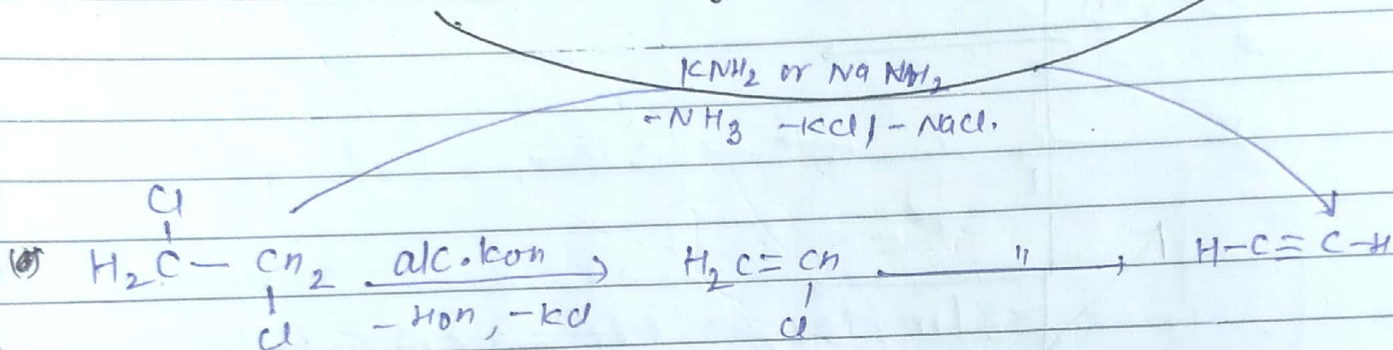
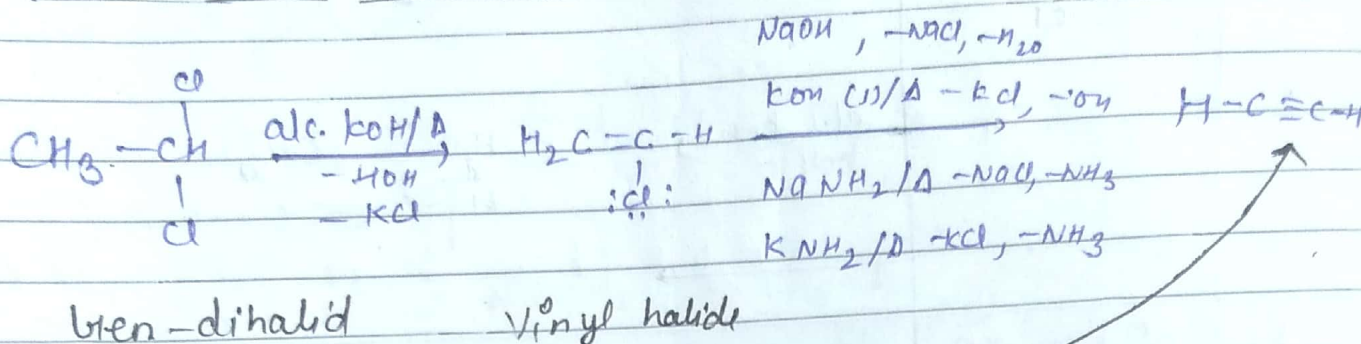


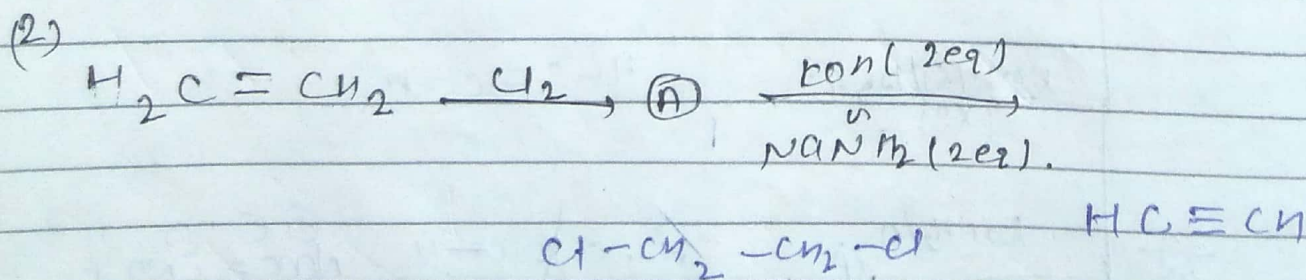
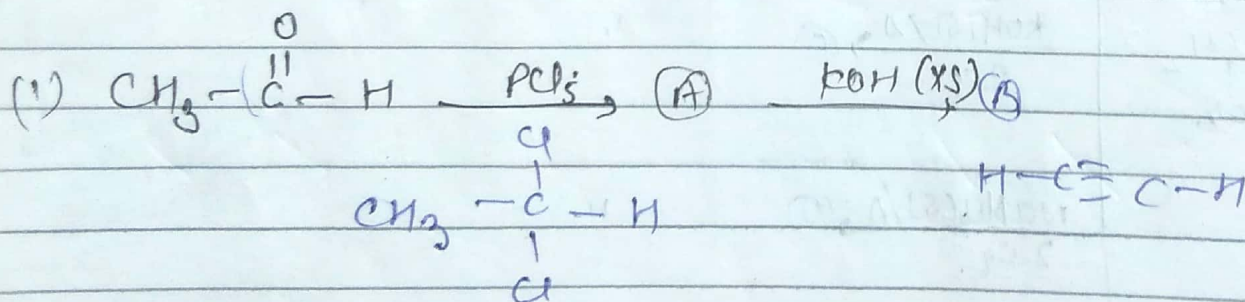
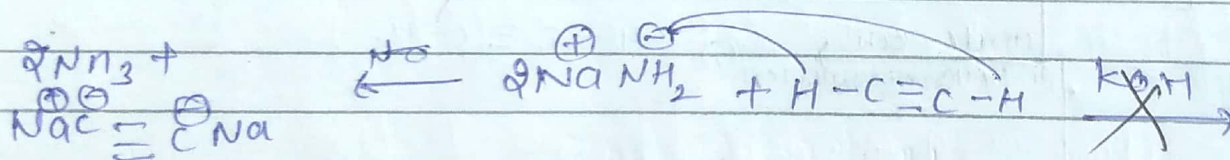
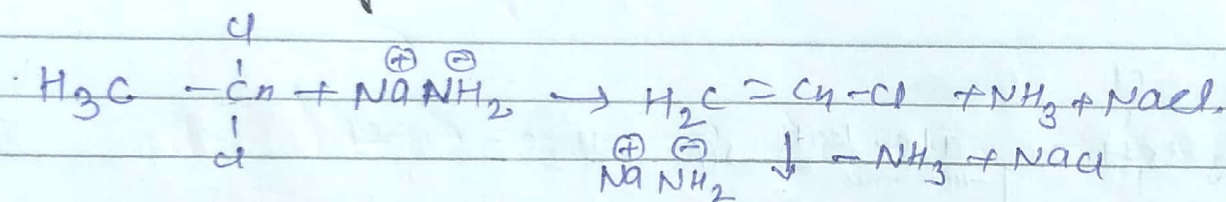
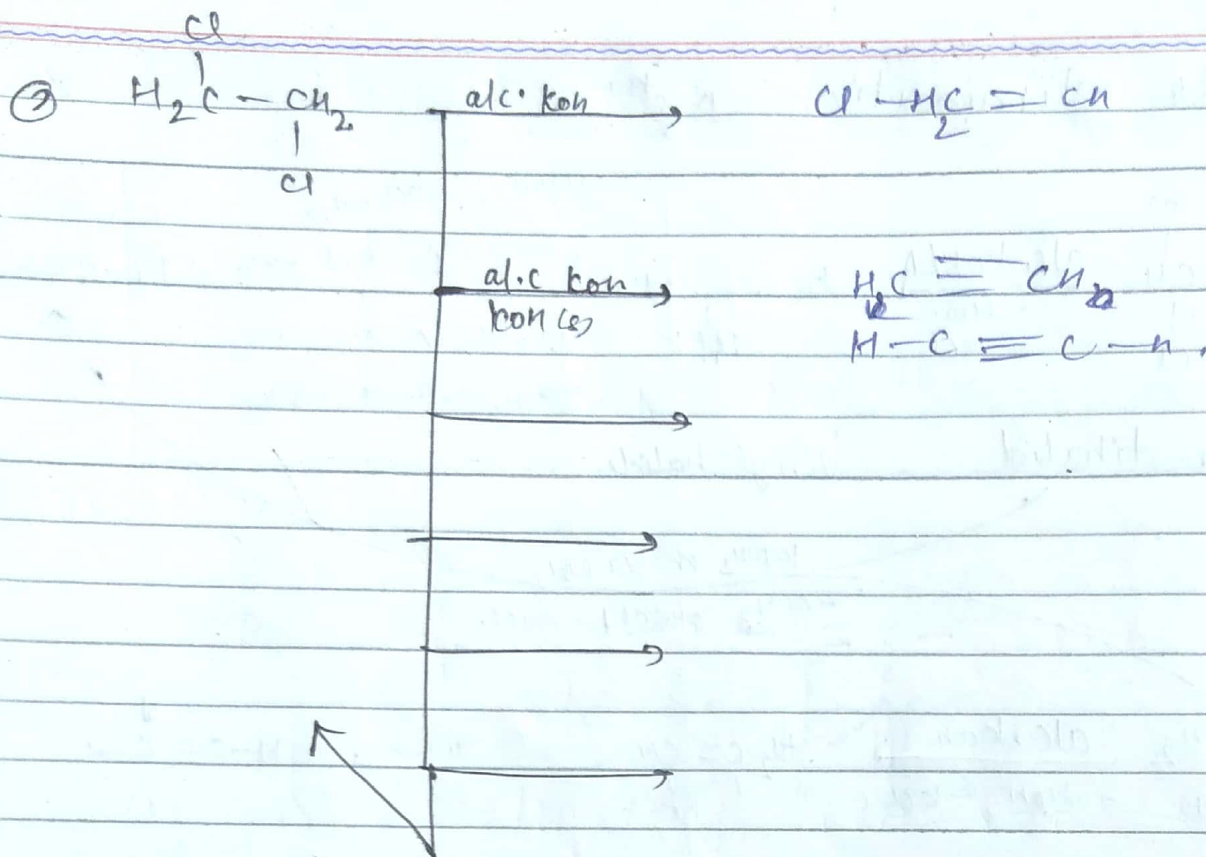
Remove H.
 Resonance bond.
 make conjugation

During elimination rxn if one side β carbon gives conjugated compound and other side not then always rxn occur in such a way by which conjugated comp. form.

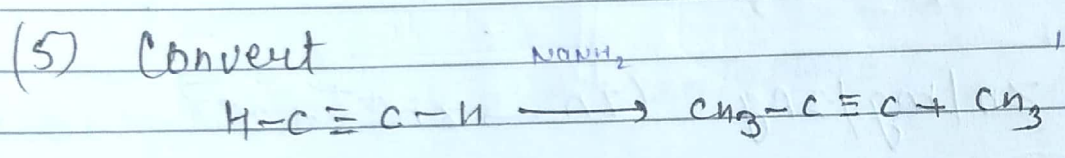
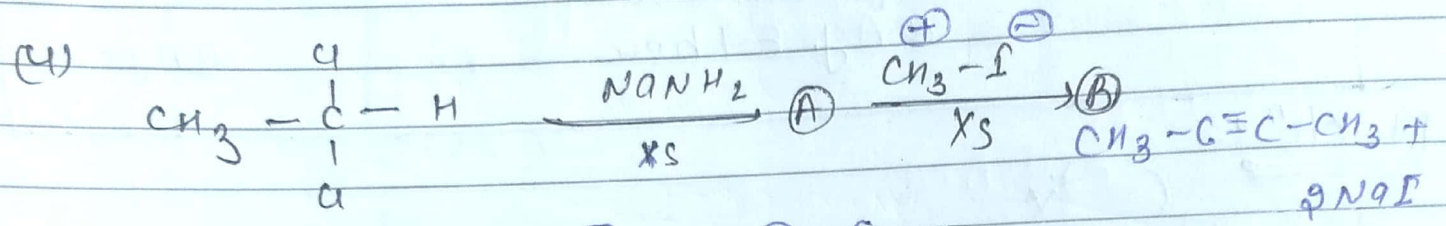
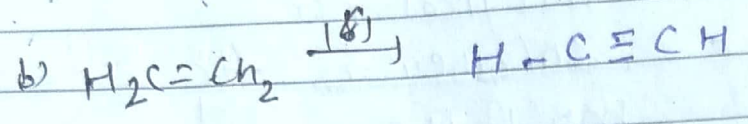
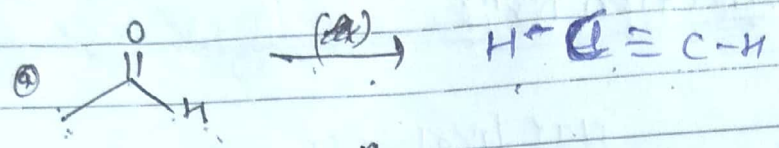
No Rule follow

* Double elimination Rxn:

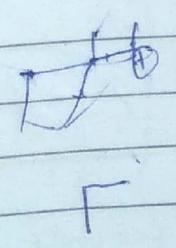
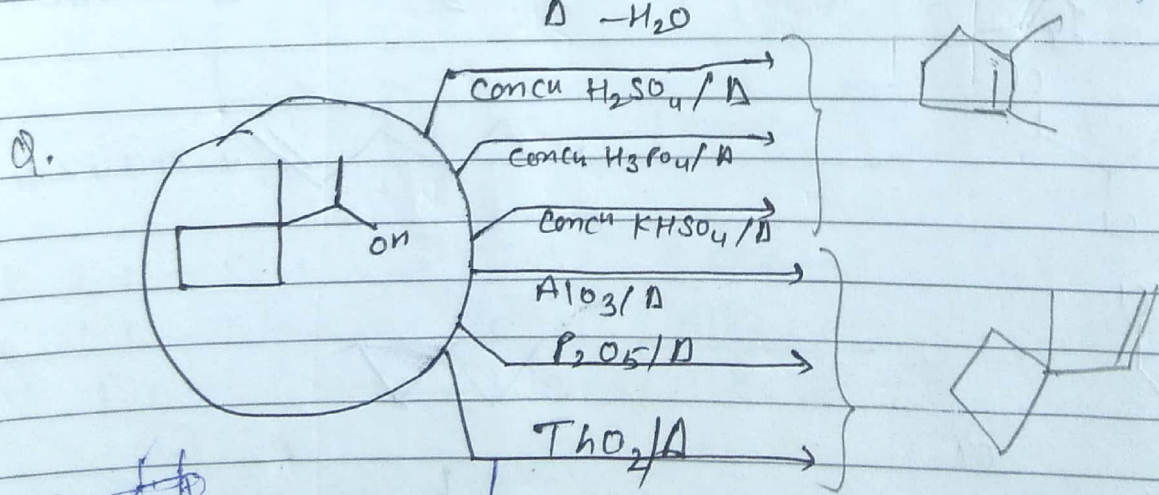
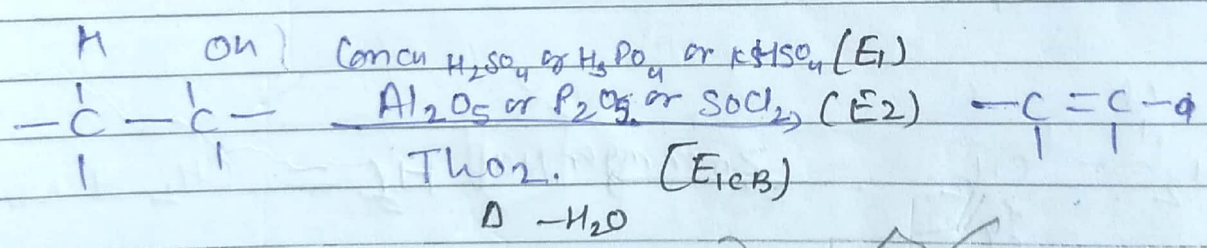




Q3 Convert



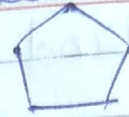
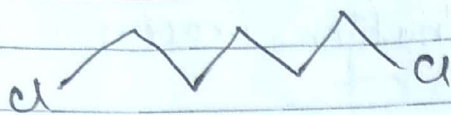
* Dehydration Rxn.



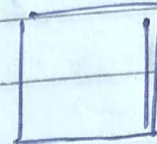
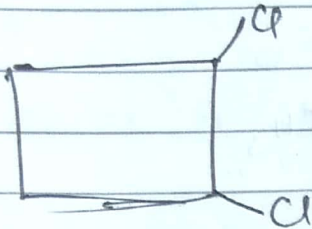
Rearrangement
Not occur

1) $\rightarrow$ Dimer.

(5)

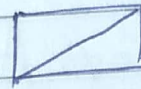
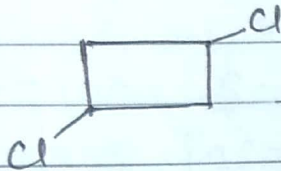


(6)

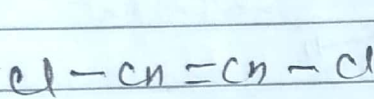


+ $\text{PbCl}_2 + \text{NaCl}$.

(7)



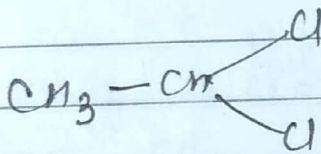
(8)



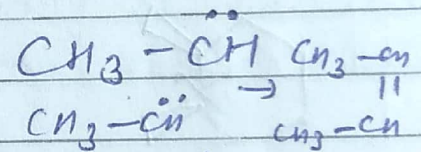
$\xrightarrow{\text{Zn/ether}/\Delta}$

$\text{CH}_2=\text{CH}_2 + 2\text{Zn}$.

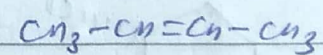
(9)



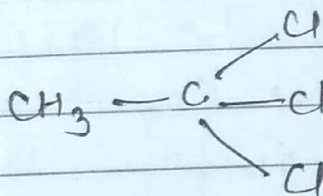
$\xrightarrow{\text{Ag}/\Delta}$



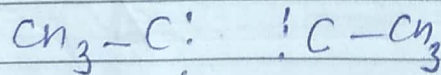
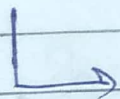
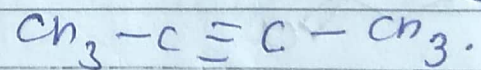
$\downarrow$



(10)



$\xrightarrow{\text{Ag}/\Delta}$



* 1,1-DH $\rightarrow$ Dimer (Alkene)

* 1,1-TH $\rightarrow$ " (Alkyne)

1,2- $\rightarrow$ Alkene/Alkyne

1,3-

14- DH $\rightarrow$ cyclic compound

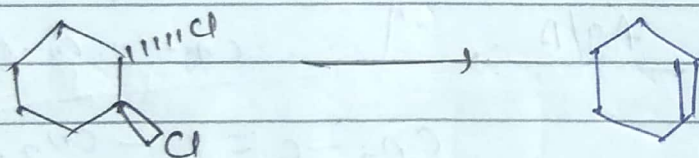
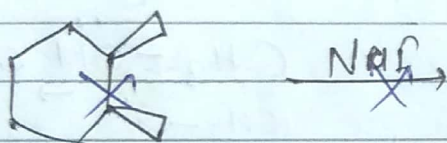
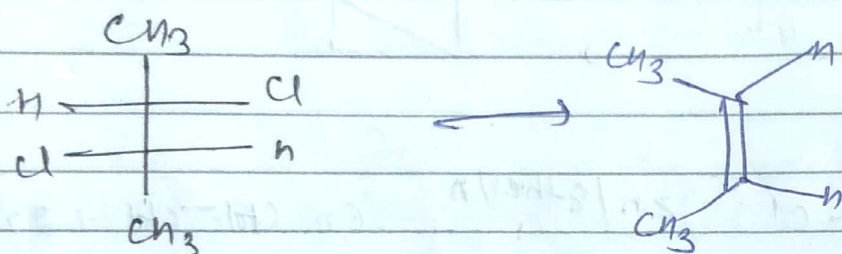
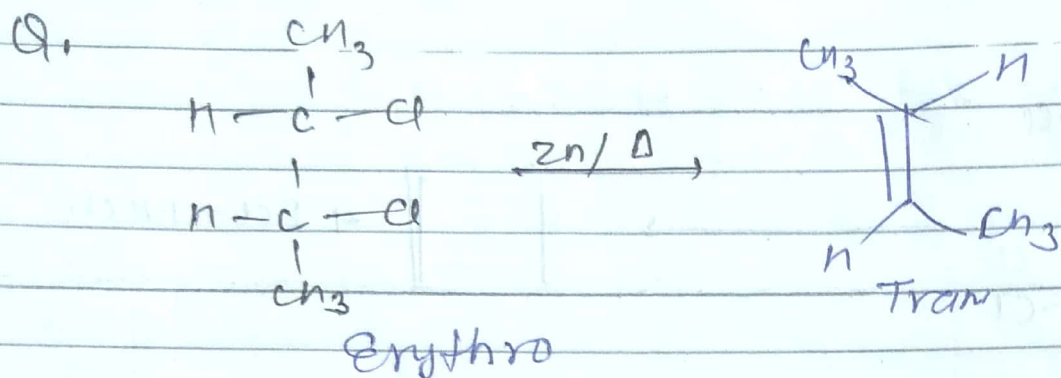
15-

16-

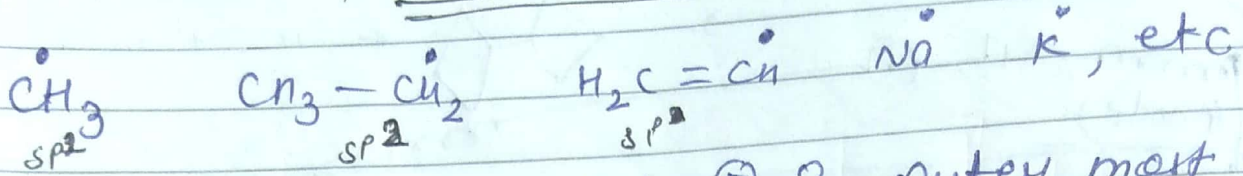
17- Polymer

18-

* It is a kind of anti^o elimination process



* Free - Radical *



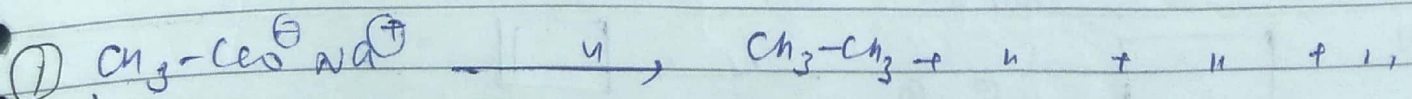
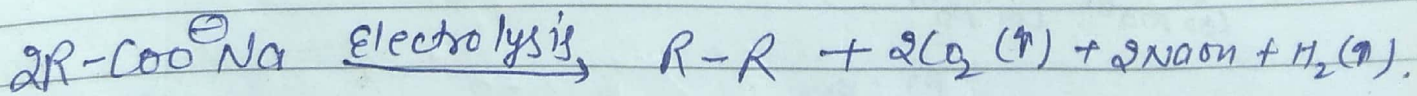
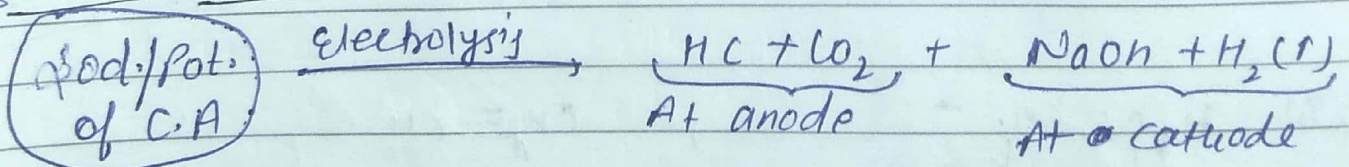
* Species with unpaired e^- in outer most shell.

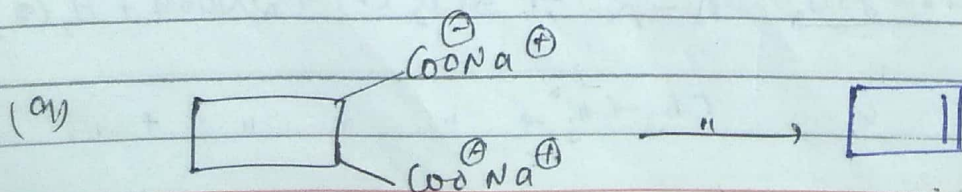
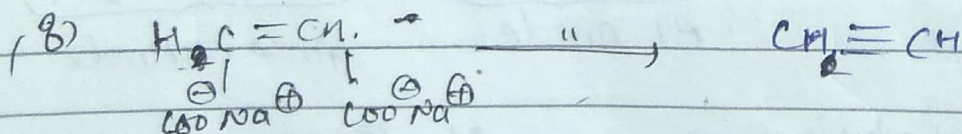
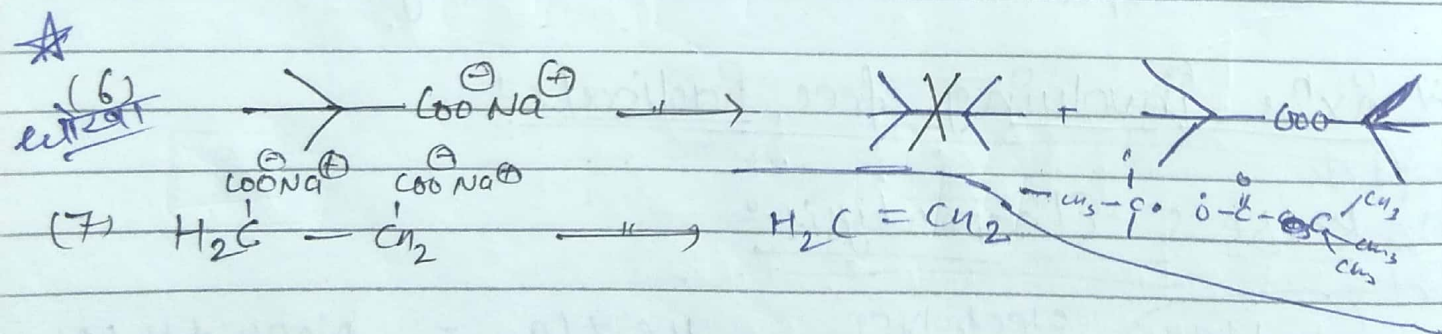
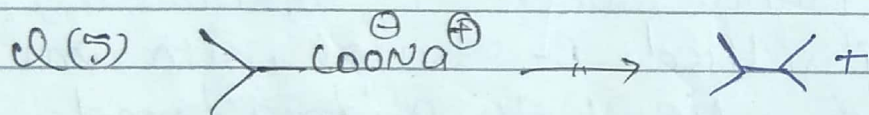
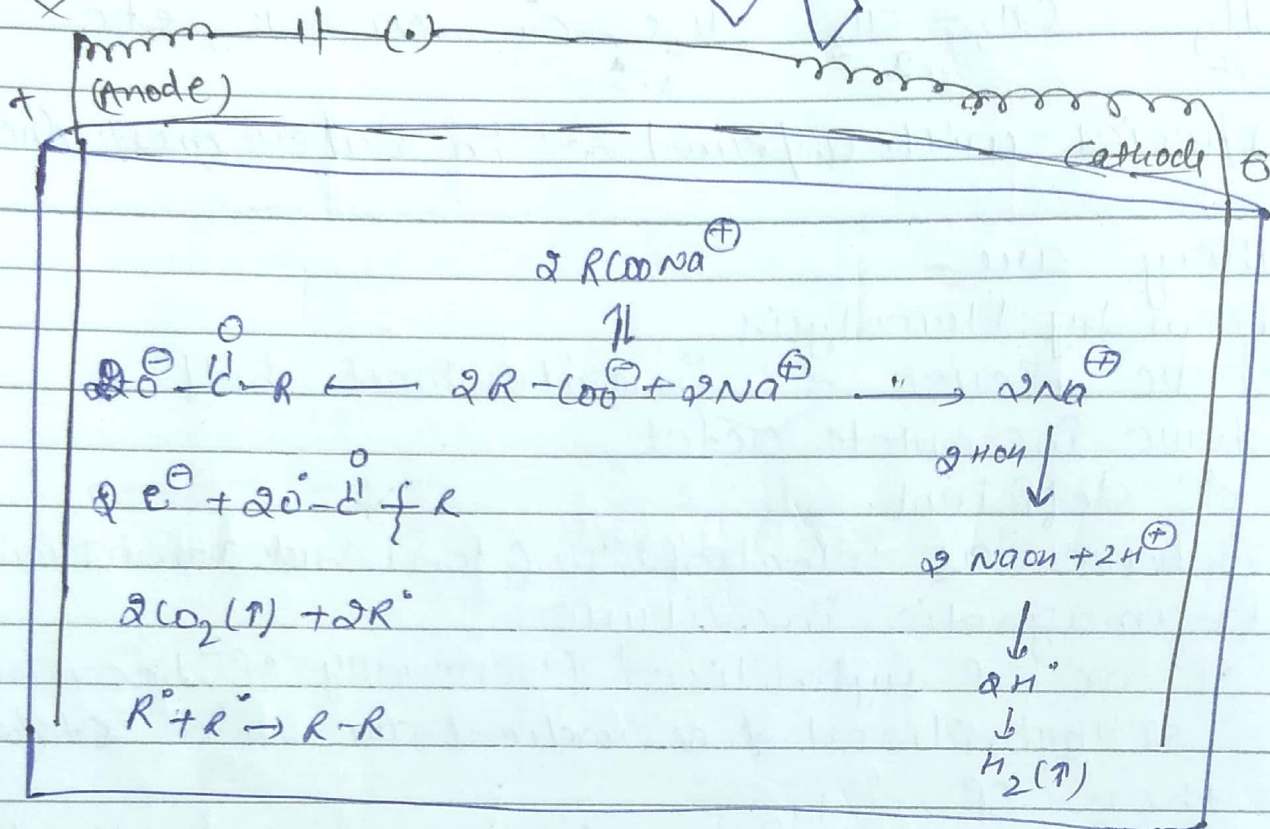
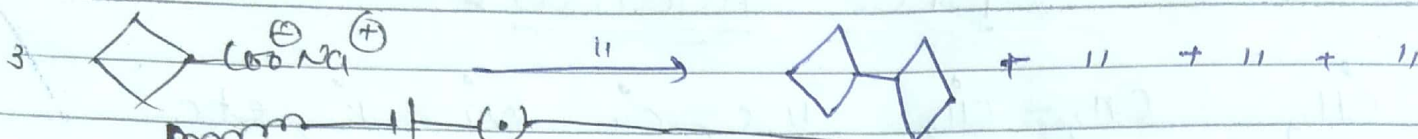
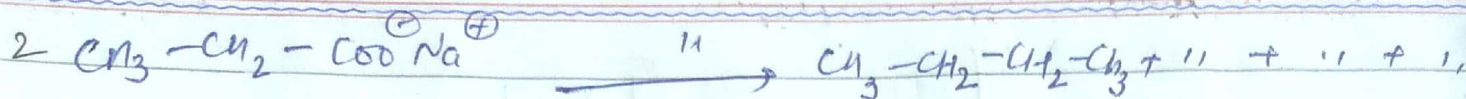
⇒ They are -

- * form by Homolysis
- * have seven e^- in outer most shell
- * have incomplete octet
- * e^- deficient.
- * Behaves as electrophile (but not Lewis acid).
- * Paramagnetic in nature
- * sp^2 or sp hybridised (generally sp^2 because sp^2 hybridised free radical are more stable than sp)
- * TBP (Trigonal Planar (when sp^2 hybridised)).
- * have one unhybridised p-orbital with one unpaired e^- lie $\perp$ to sigma bond.

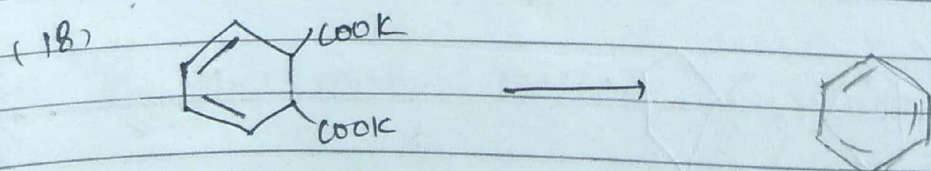
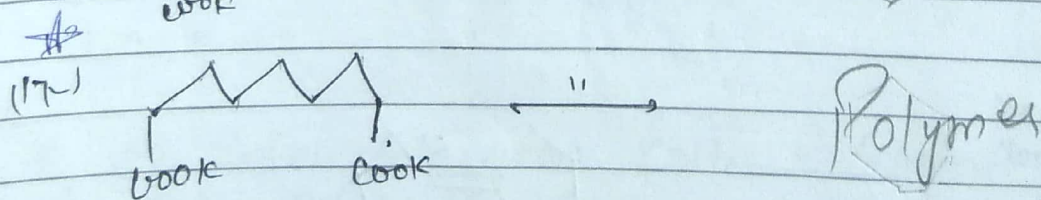
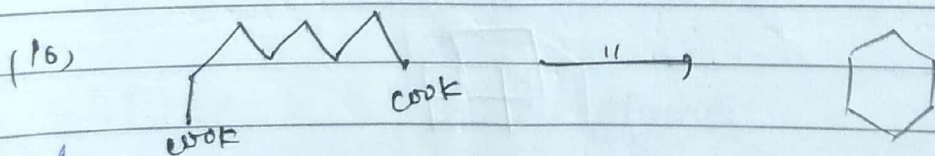
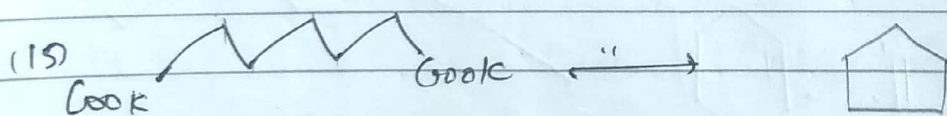
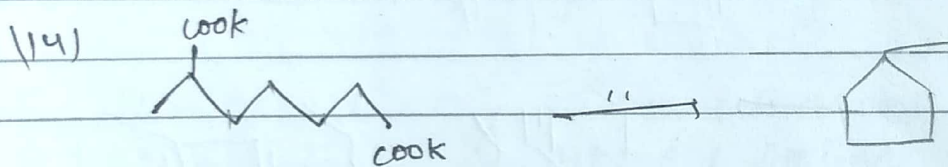
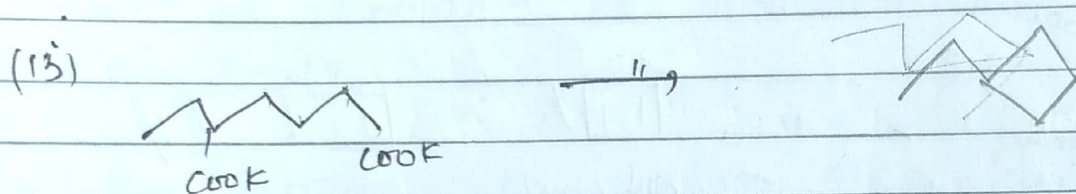
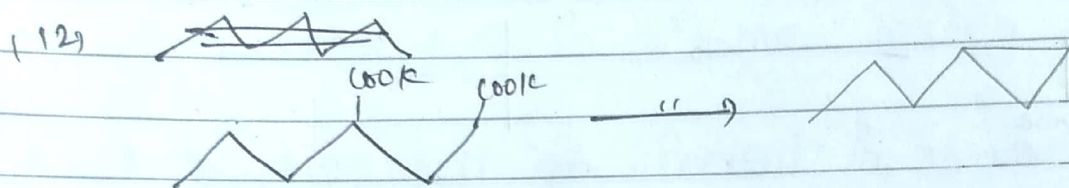
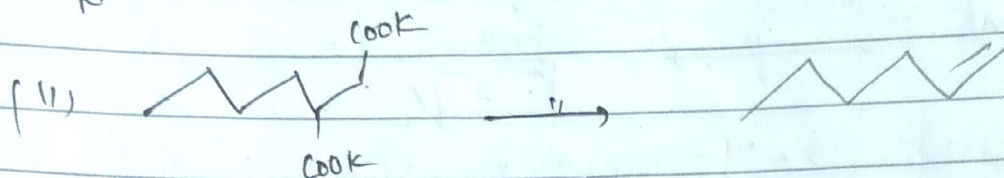
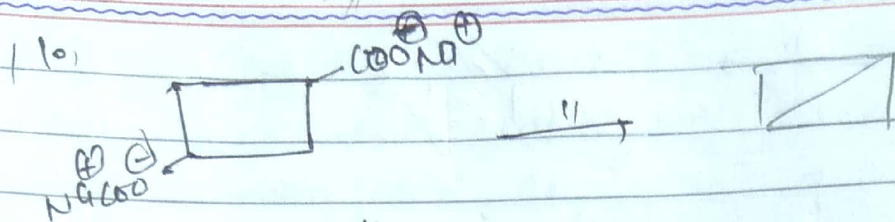
* Rxn's involving free Radicals:

 (1) Kolbe's Electrolysis:

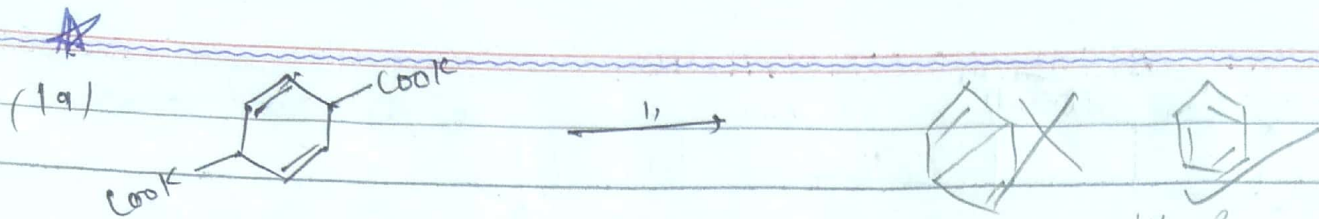




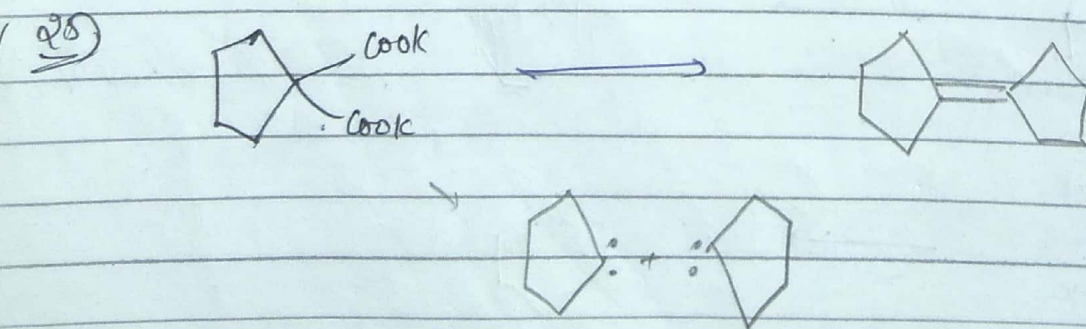
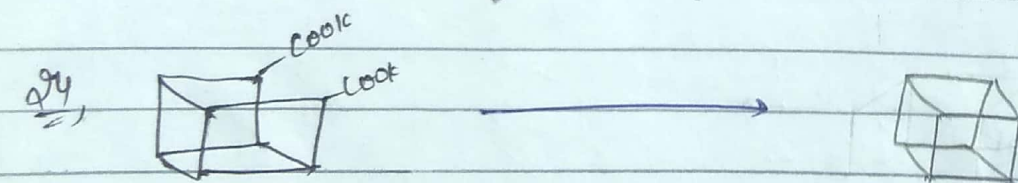
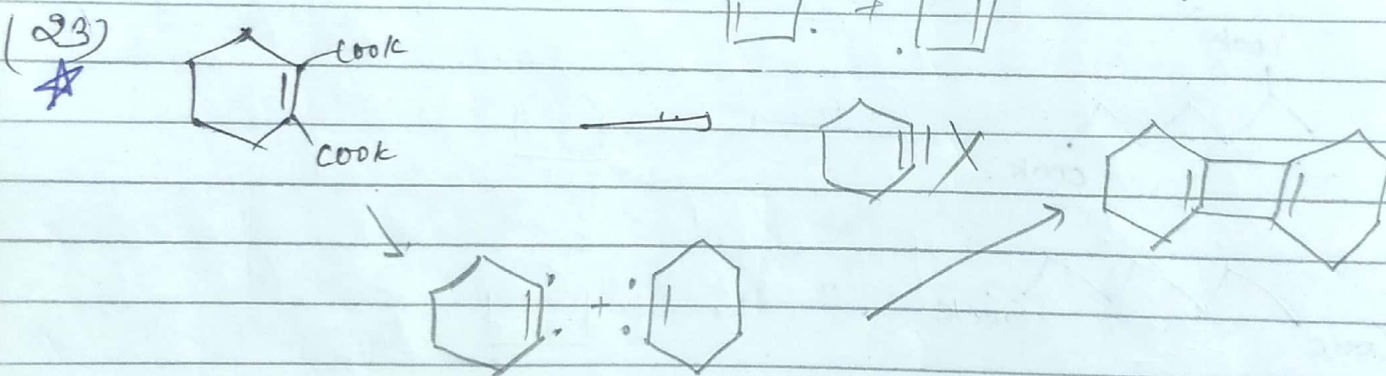
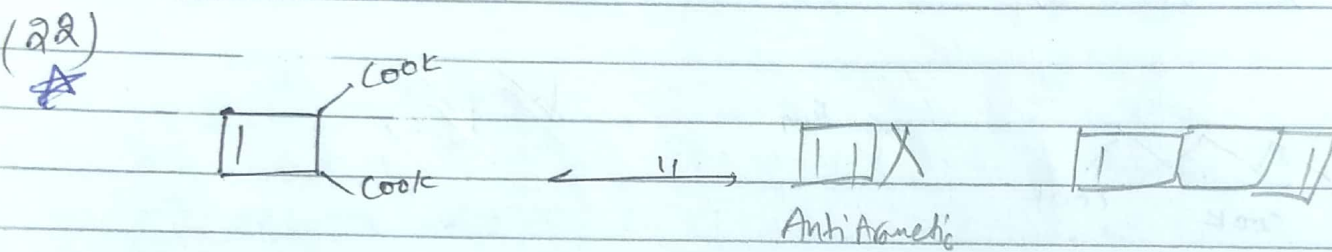
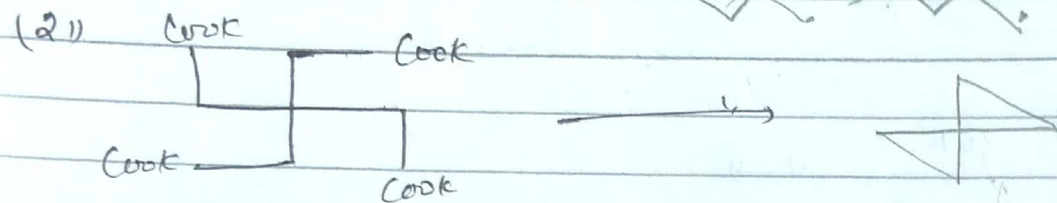
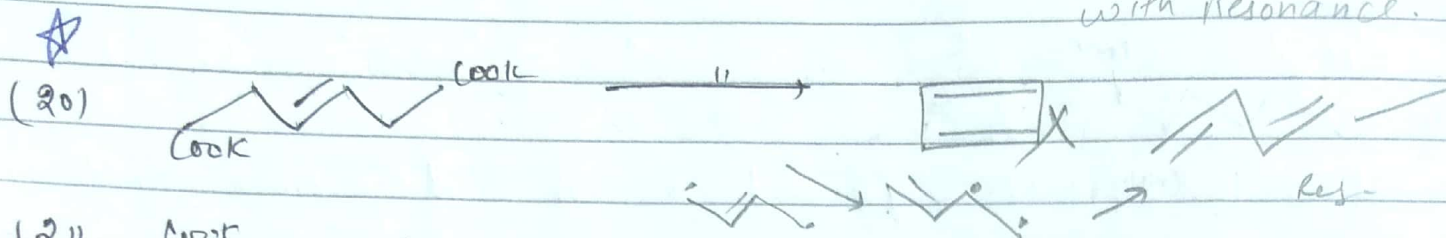
1.7 Polymer



8 member = 3 band.



with Resonance.



- * Key points: When aqueous sodium and Pot. salt of acid is electrolysed then we get alkane (Hydrocarbon) and CO_2 gas anode and $\text{NaOH} + \text{H}_2$ (gas) at Cathode
- * As time increases pH of solution increases
- * When Alkyl gp is 3° then ester form (Exam. 6)
- * When two salt gp Present in same molecules then Rxn is known as intramolecular Kolbe's electrolysis (Ex- 7-24)
- * In Intramolecular Kolbe's electrolysis we get either alkene, Alkyne or cyclic Compound.
- * 1,1 - Disalt $\rightarrow$ Dimer (Alkene)
- * 1,2 - Disalt $\rightarrow$ Alkene / Alkyne.
- * $\left. \begin{array}{l} 1,3 - \\ 1,4 - \\ 1,5 - \\ 1,6 - \end{array} \right\} \rightarrow \text{Cyclic Compound.}$
- * $\left. \begin{array}{l} 1,7 \\ 1, n \end{array} \right\} \rightarrow \text{Polymer.}$
- * By Intermolecular Kolbe's electrolysis symmetrical alkene with even Carbon can be prepared.
- * By this method methane can not form.

Remove H Cathode

± use formic anode and cathode remove H

Q. which of the following alkane can be prepared by Colber's electrolysis effectively

(i) methane CH_4 x

(ii) $C-C$ ✓

(iii) $C-C-C$ x

(iv) $C-C-C-C$ ✓

(v) $C-C-C-C-C$ x

(vi) $C-C-C-C-C-C-C$ x

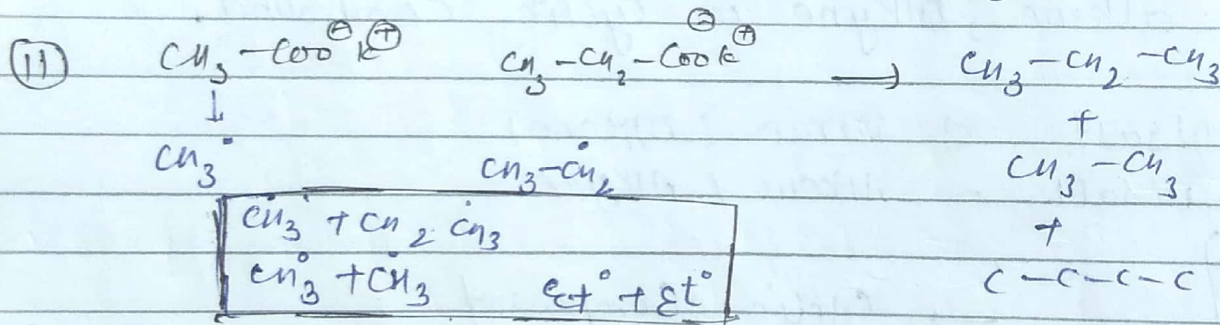
(vii) $C-C-C-C$ x

(viii)  ✓

(ix)  x

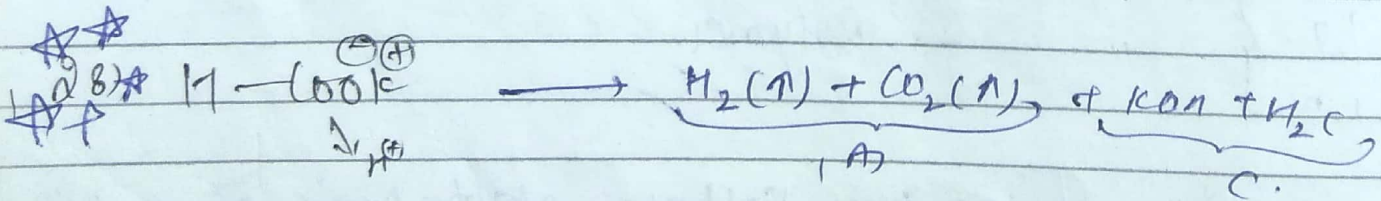
(x) $C-C-C-C-C-C$ ✓

~~Cross KE~~

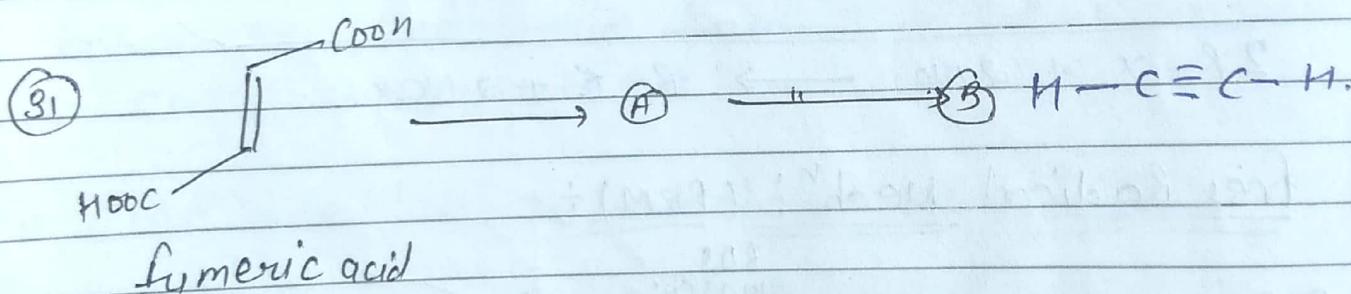
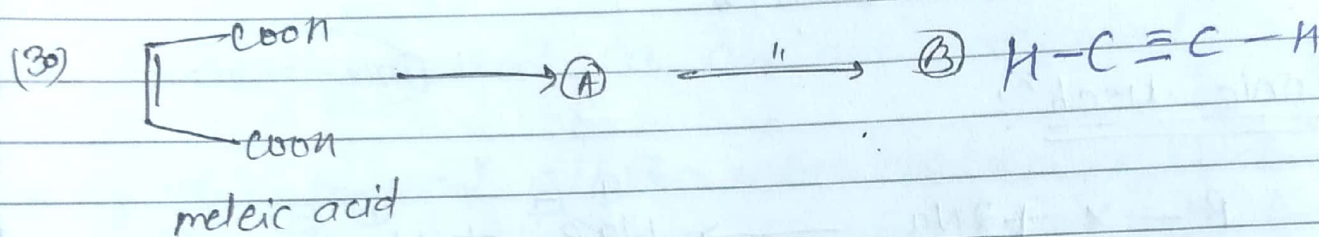
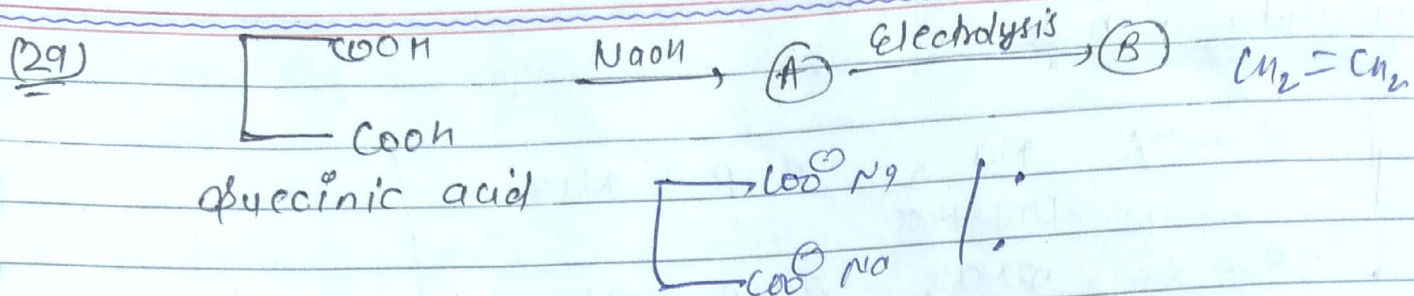


* Cross KE

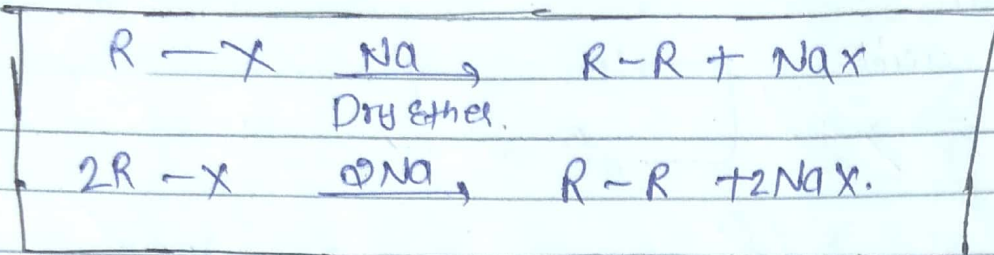
The KE in which both salt are different is known as Cross KE.



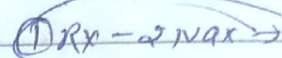
* Salt of formic Acid (sod. or pot. formate) give $H_2(g)$ on both electrode.



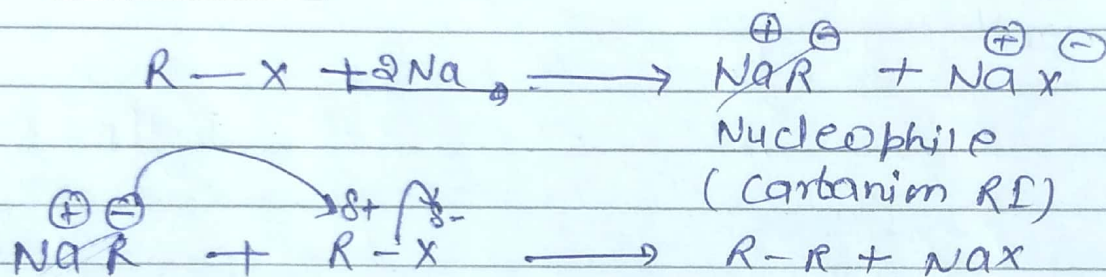
* Wurtz Rxn :



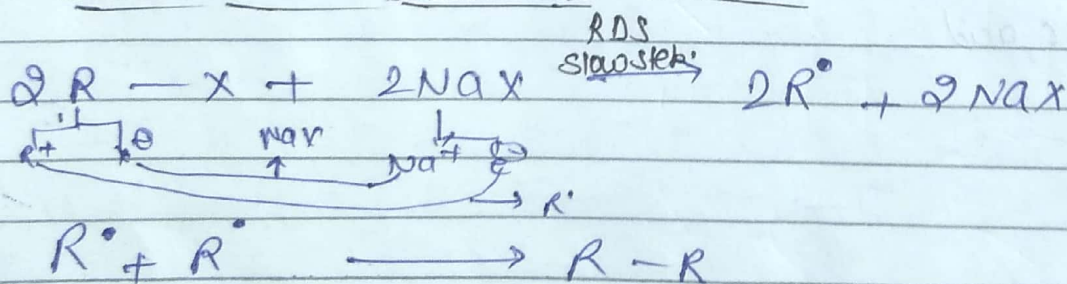
Mech : (1) Ionic Mechⁿ
(2) free Radical Mechⁿ.



(1) Ionic Mechⁿ :



(2) Free Radical Mechⁿ : (FRM) :



* Key points :

This Rxn occur by ionic and free Radical both Mechⁿ.

* By this Rxn alkyl halide converted into hydrocarbon.
* when two halogen present in same molecules

then Rx^h is known as fmwr (Intermolecular wurtz Rx^h)

* In fmwr product is either alkene or alkyne or cyclic compounds. By ~~fmwr~~ Inter molecular wurtz Rx^h Alkane with even carbon and symmetrical structure can be prepared.

* By this method CH_4 can not be prepared

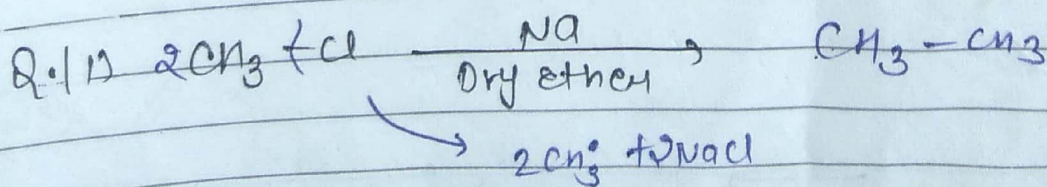
* By this method alkane with odd no. of carbon atom like Propane, Pentane, Heptane can not be prepared effectively.

* When two different alkyl halide react then more than one product form. The Rx^h is known as cwr (cross wurtz Rx^h).

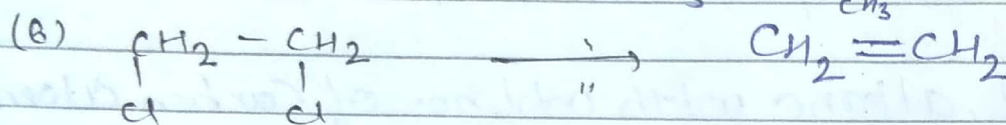
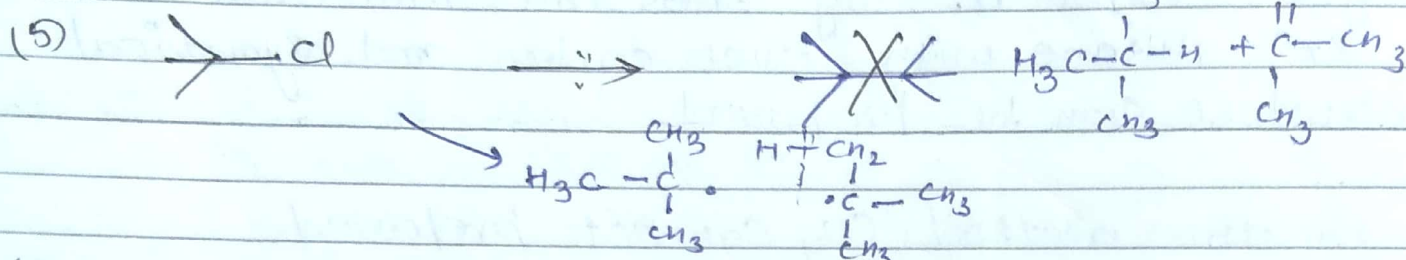
* cwr are less important for us.

* If alkyl halide is 3° alkyl halide then in the place of combination Rx^h disproportionation Rx^h occur and we get alkane + alkene.

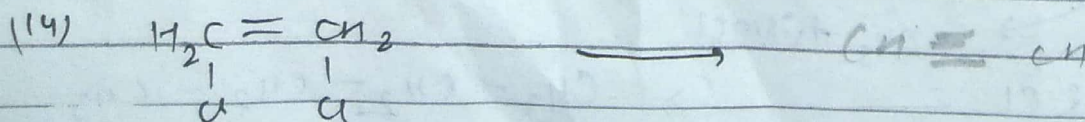
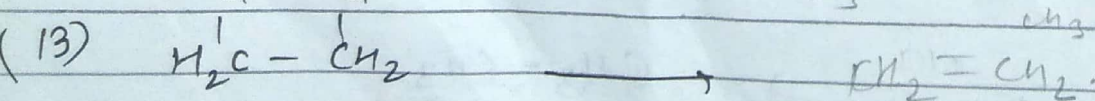
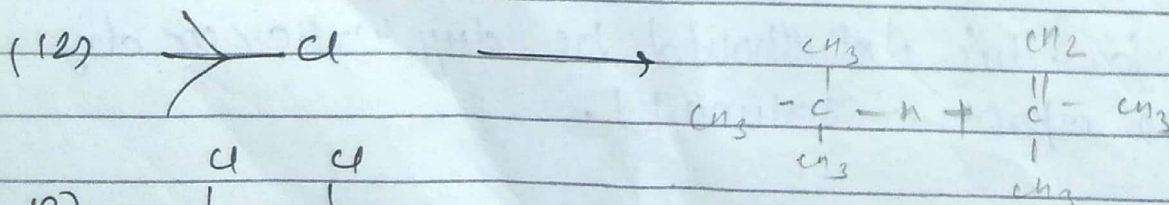
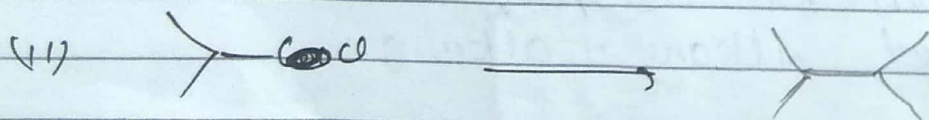
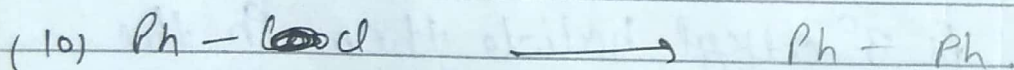
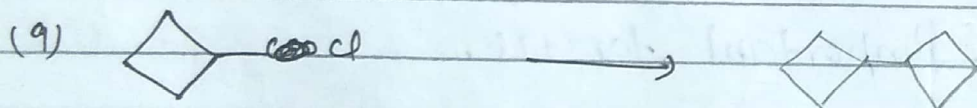
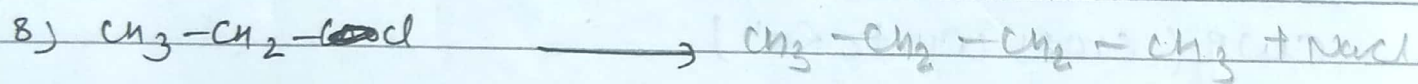
* Solvent for this Rx^h should be dry ether or dry PAS (polar aprotic solvent).

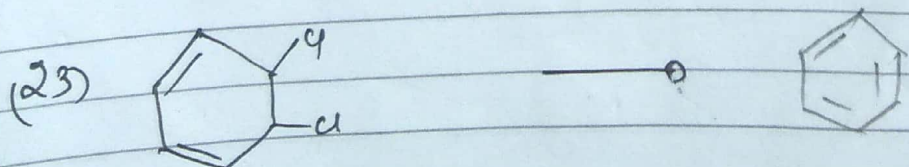
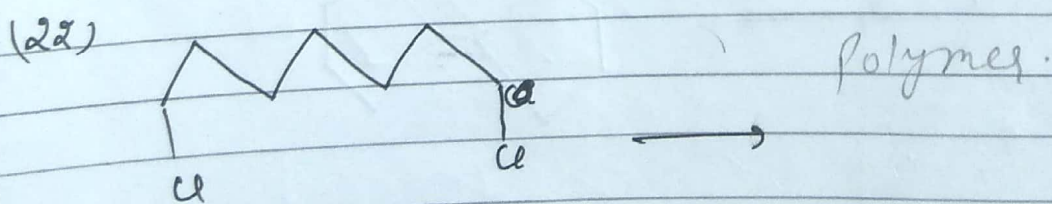
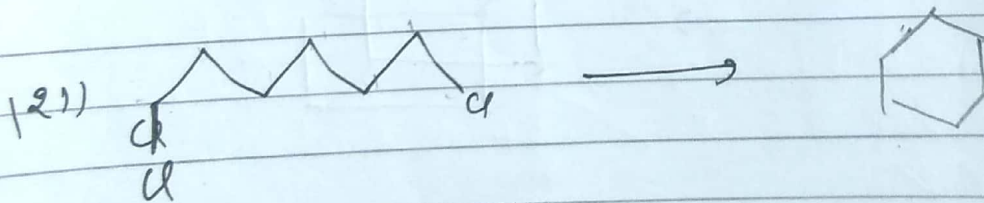
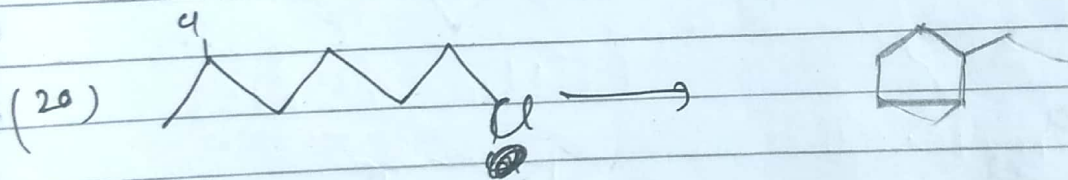
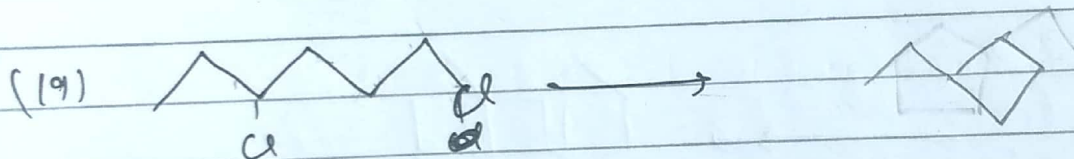
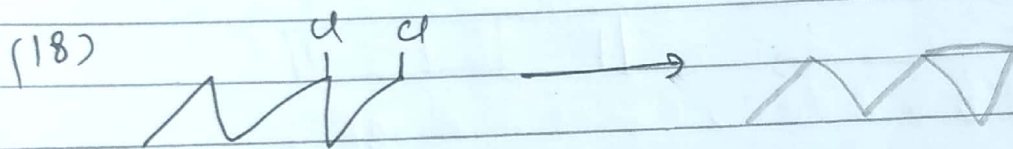
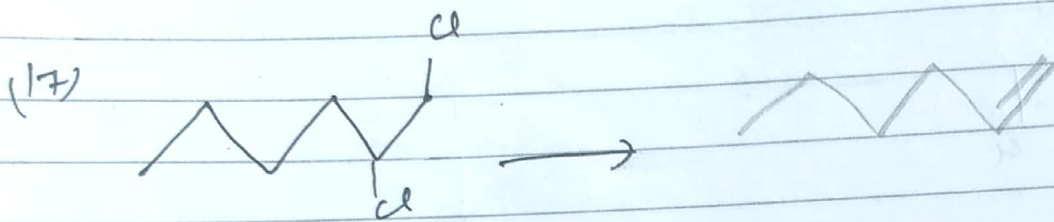
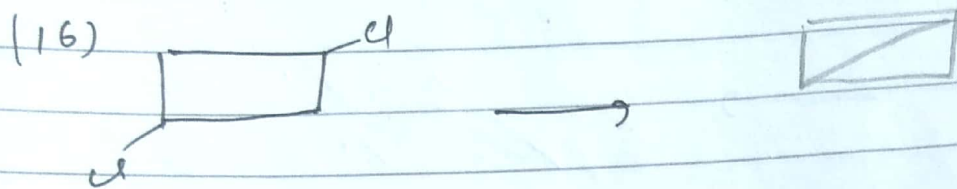
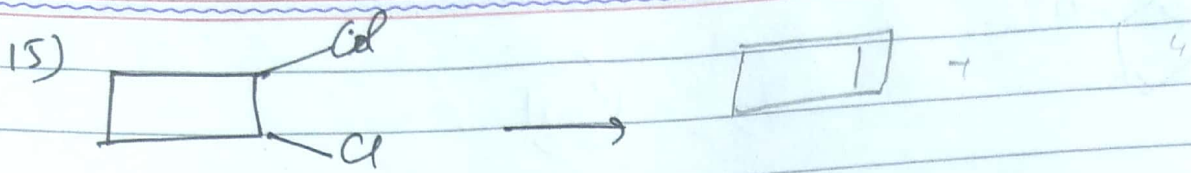


2 same $\rightarrow$ 2 diff. comb.,
called dimerization



* ~~8th Q~~ Q. 7, 8 --- 26.





Resonance

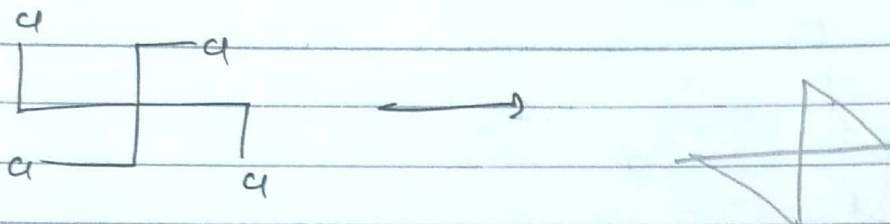
(24)



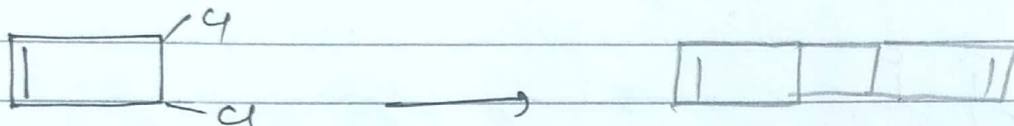
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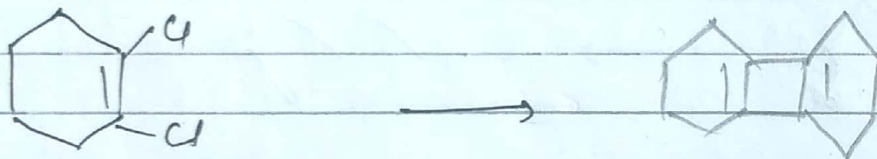
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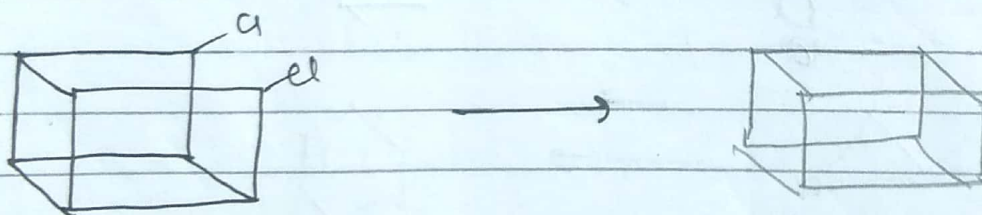
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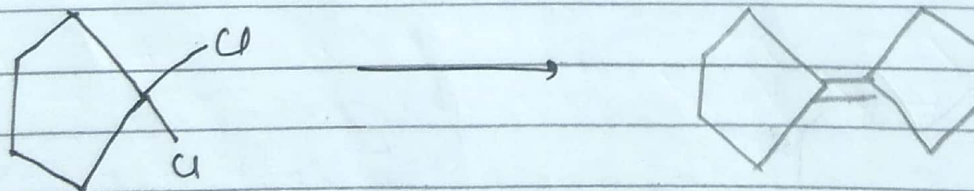
(28)

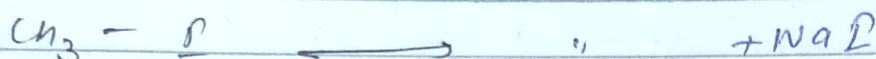
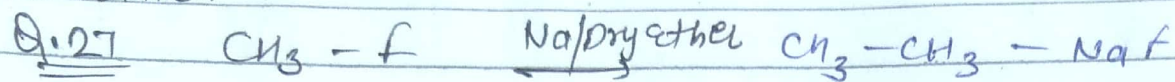


(29)

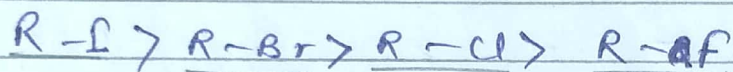


(30)

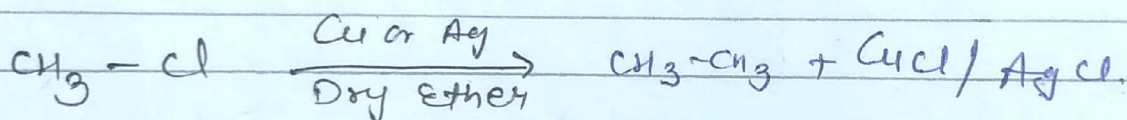




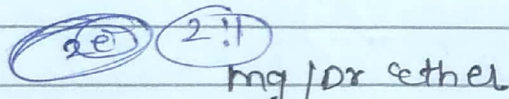
When there are different halogen and same R, then reactivity order



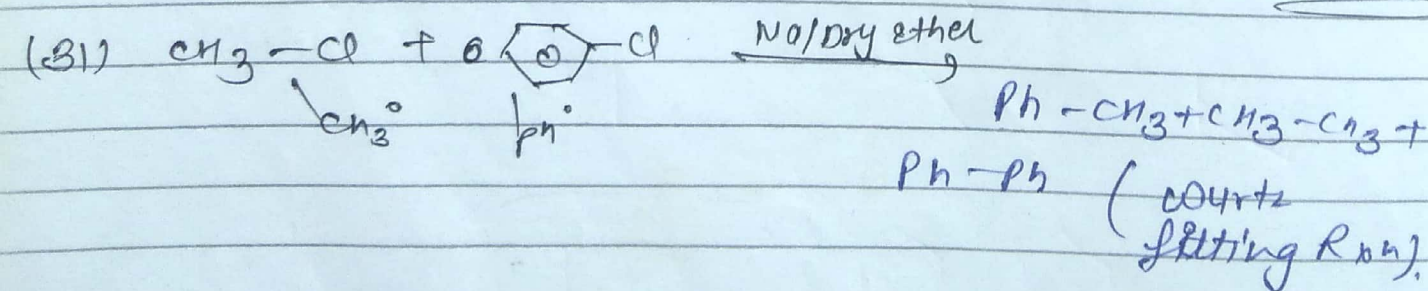
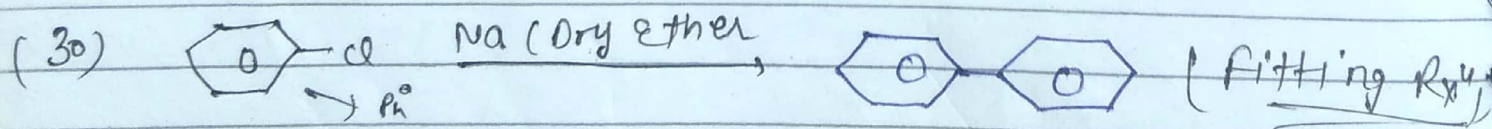
Q.28



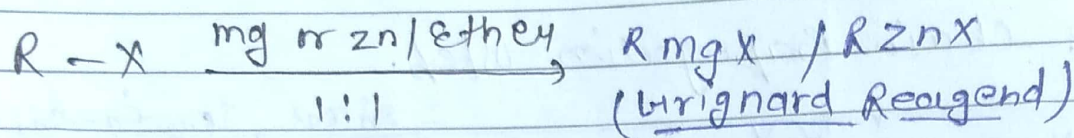
(Ullmann Rxn).



(Frankland Reaction)



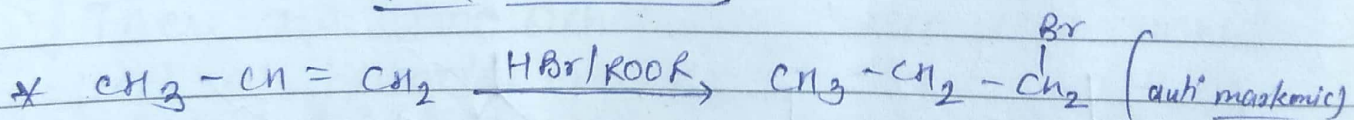
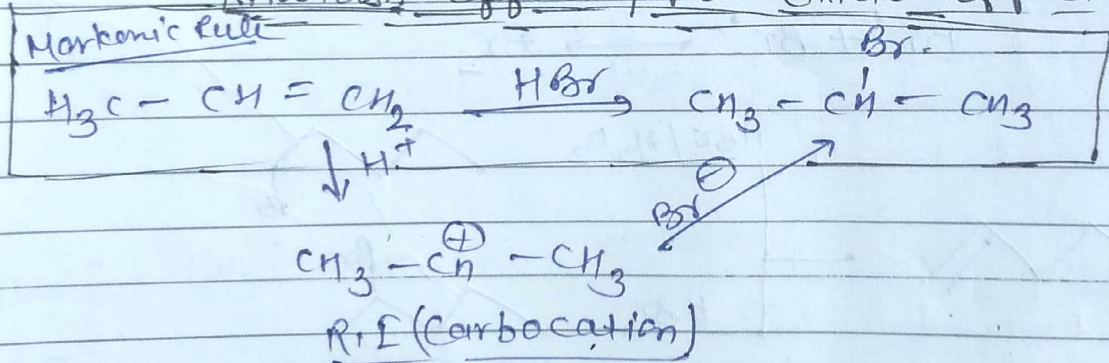
* प्रतिक्रिया : In Frankland Rxn Ratio of R-X and zinc or mg should be 2:1 if they are taking in 1:1 then we get Grignard Reagent (Organometallic compound in the place of alkane).



* Addition of HBr with alkenes and alkynes in the presence of Peroxide :-
OR

Anti-markovnikov addition of HBr :-
OR

Kharasch-effect / Per-oxide effect :-

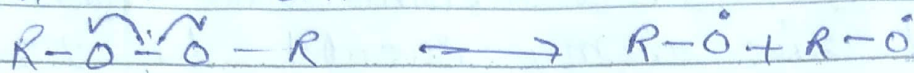


(Anti-markovnik of Method)

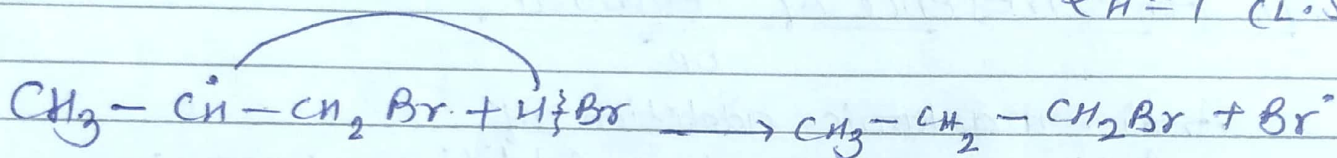
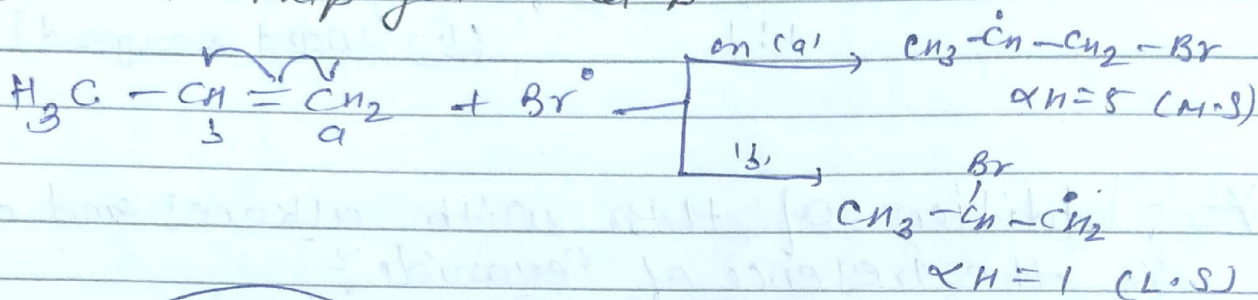
• Mech^m: F.R.M.

* Completed in 3 steps.

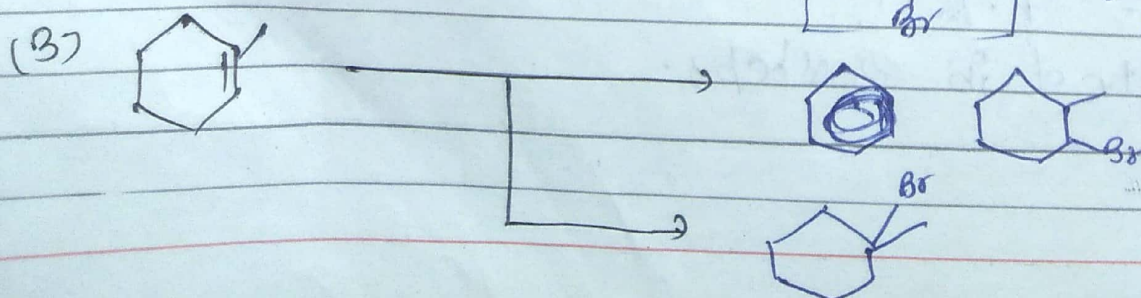
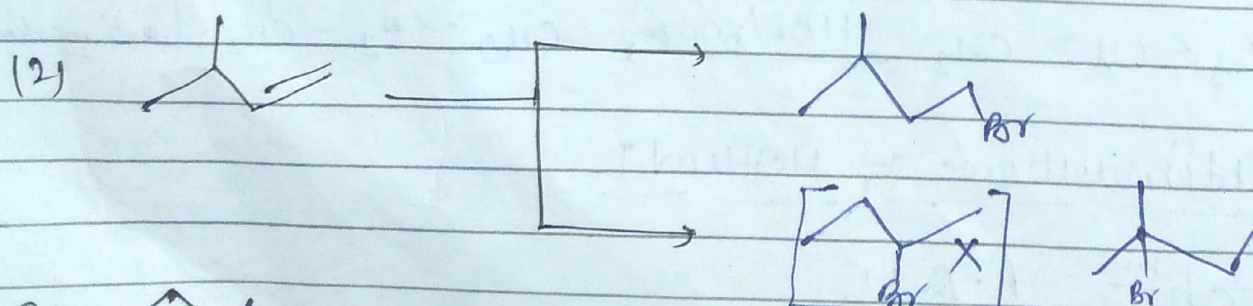
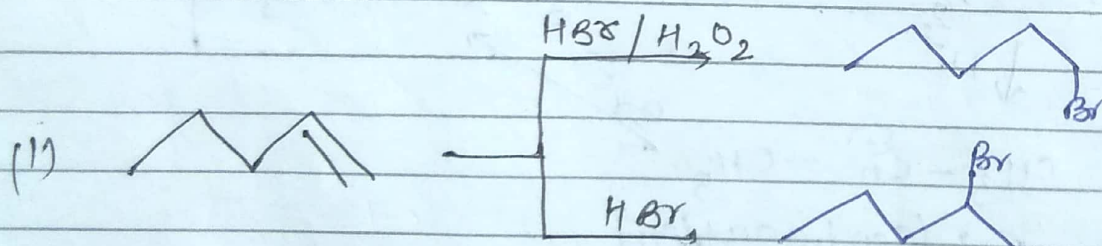
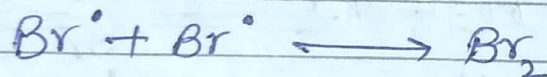
* Step: 1 Chain Initiation (Step)

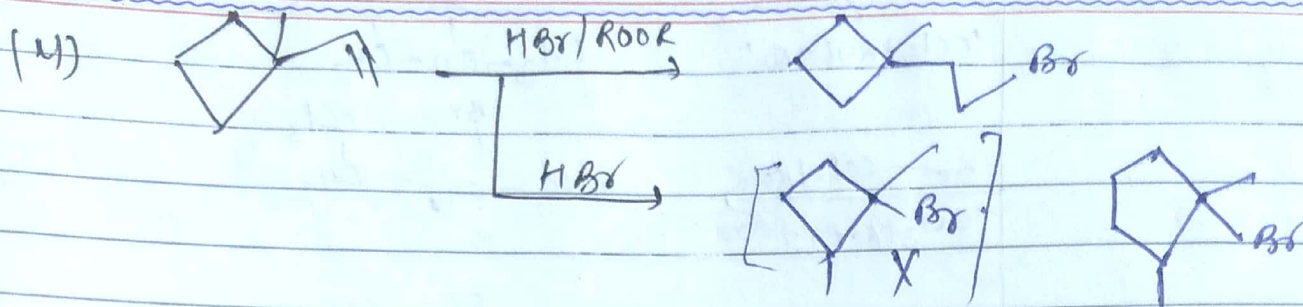


Step: 2 Chain Propagation (Step).



Step III: Chain Termination (Step)



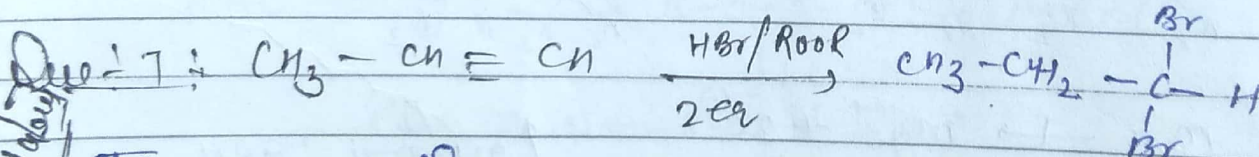
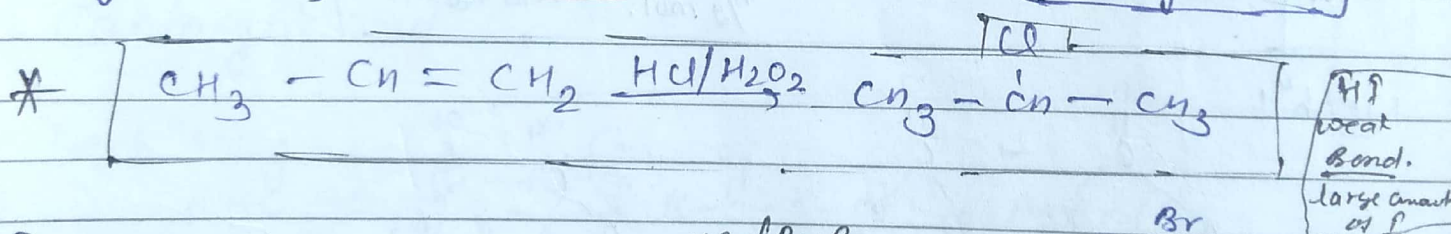


* Important Note :

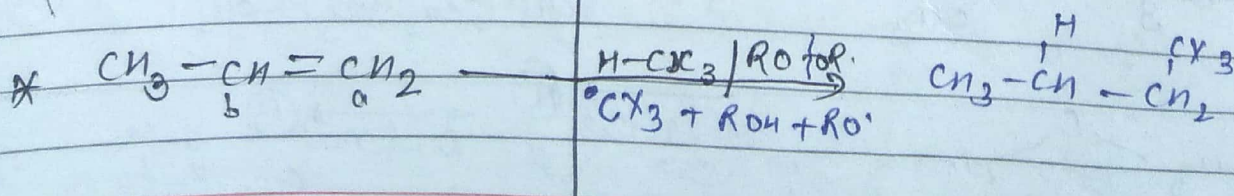
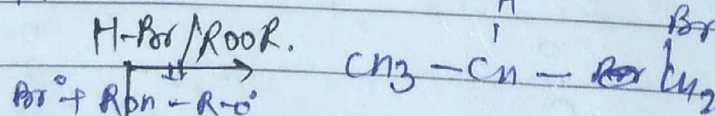
(1) In the presence of Peroxide addition of HBr with alkene becomes by / occur by free Radical Mechⁿ.

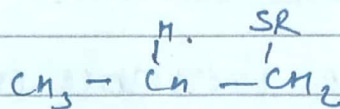
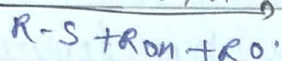
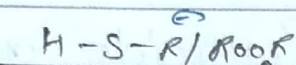
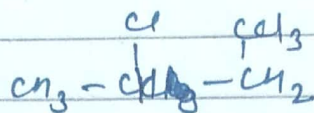
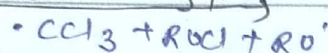
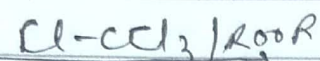
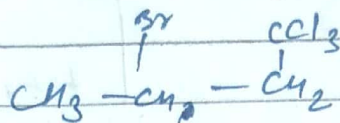
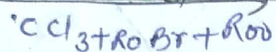
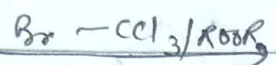
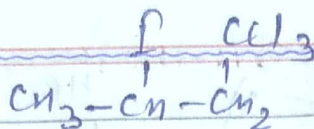
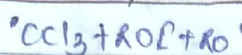
(2) In this Rxⁿ Rearrangement not occur.

(4) There is no effect of Peroxide on addition of Hf, Hcl, HI. (But only on HBr)



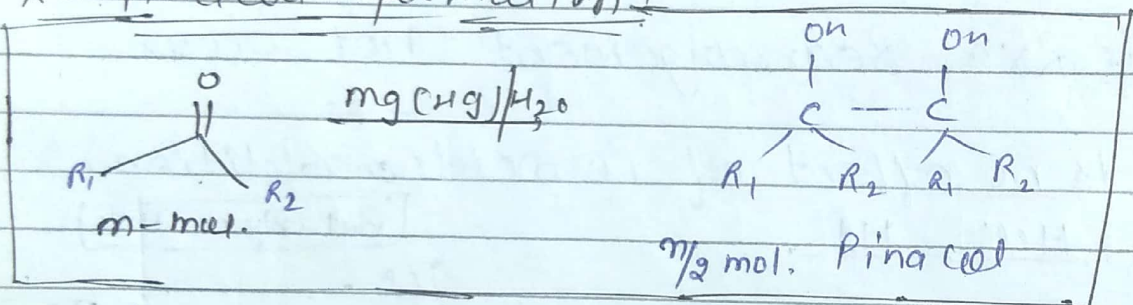
There are some other comp. also upon which effect of peroxide are same these are haloform ($\text{CH}-\text{CX}_3$). $\text{Cl}-\text{CCl}_3$, $\text{Br}-\text{CCl}_3$, $\text{I}-\text{CCl}_3$, $\text{CH}_3 - \text{S} - \text{H}$.



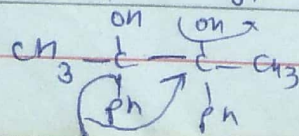
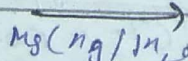
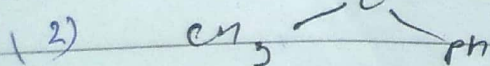
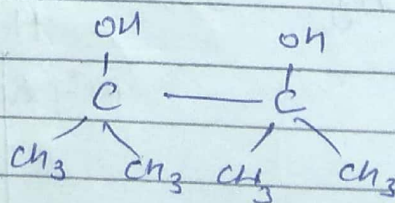
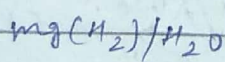
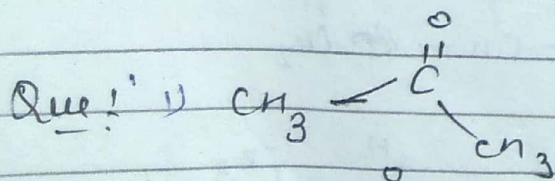
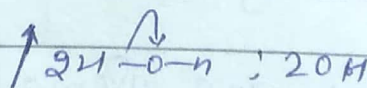
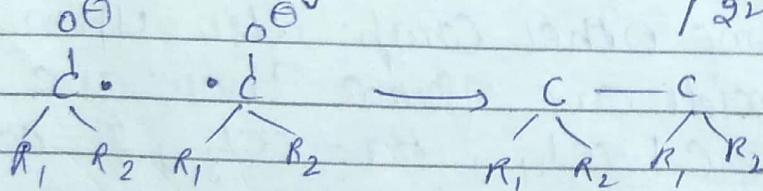
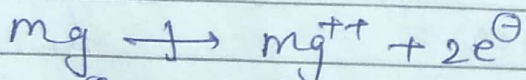
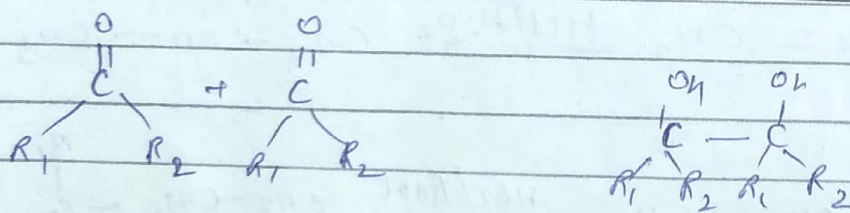


☆☆

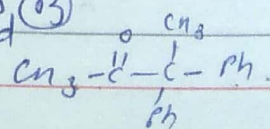
Pinacol formation

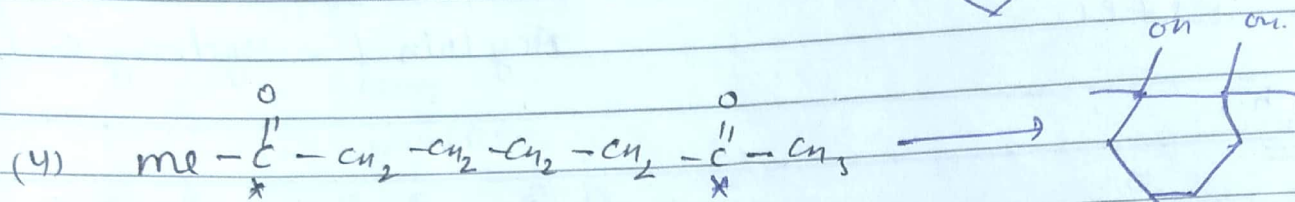
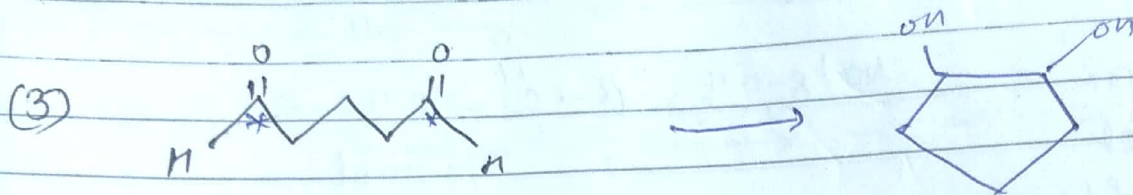


Mechⁿ!



Diol Acid (B)

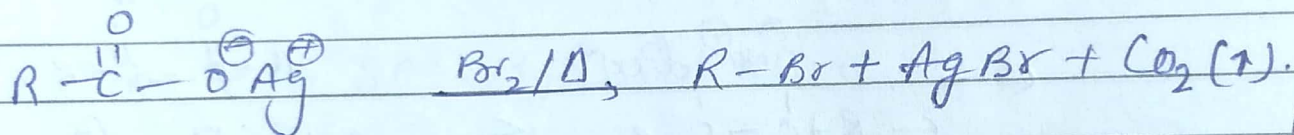




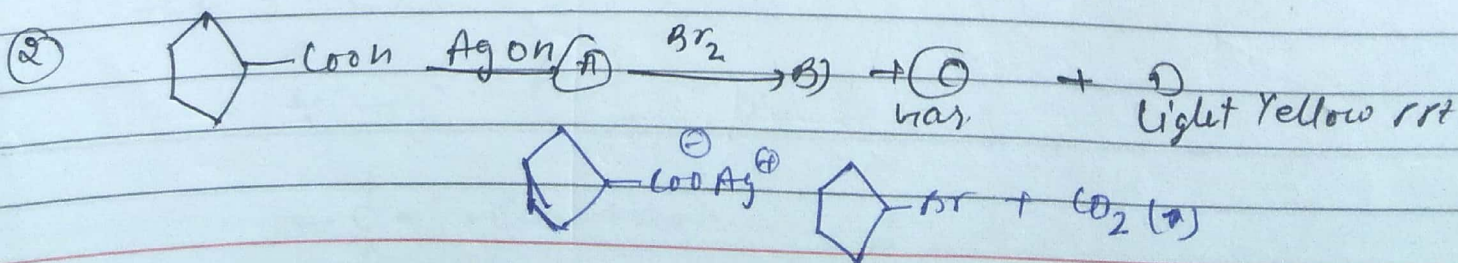
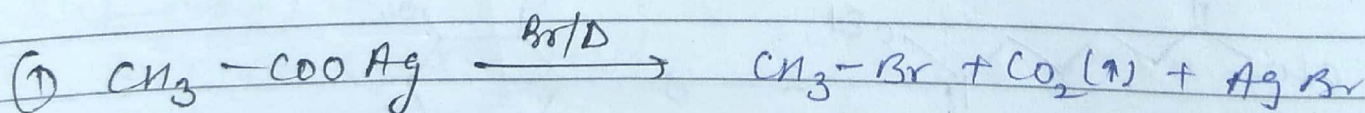
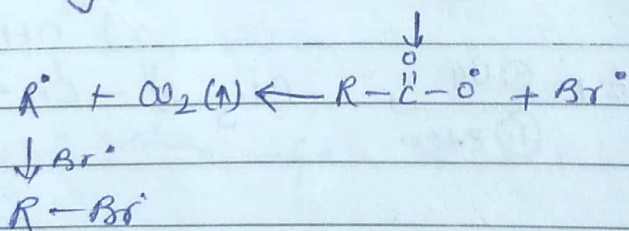
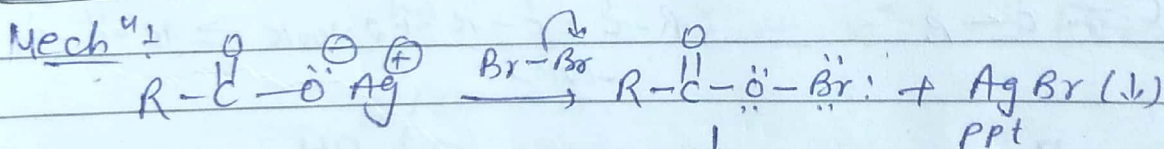
Dil H_2SO_4

Out of Syllabus

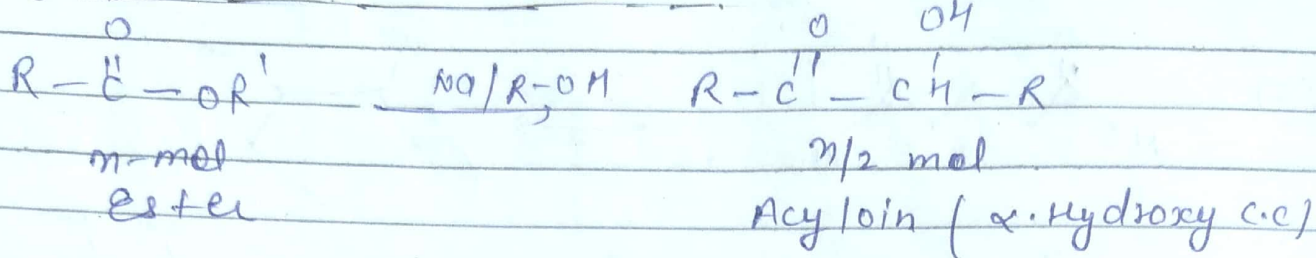
* ~~A Hunsdiecker~~ Hunsdiecker Reaction!



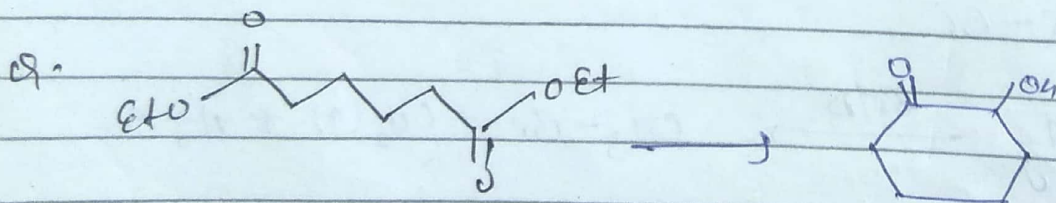
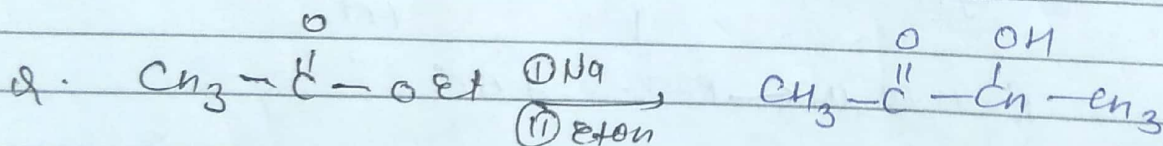
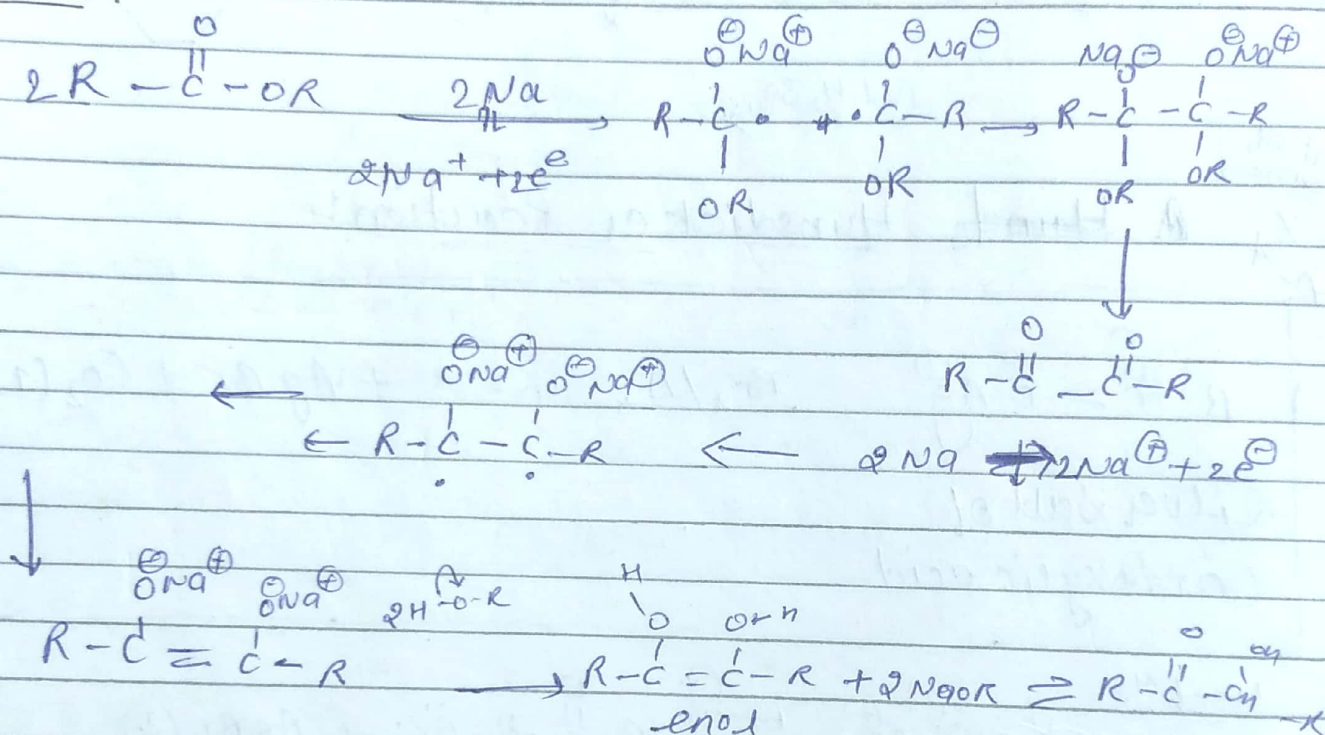
Silver salt of
Carboxylic acid



* Acyloin Condensation Rxn:

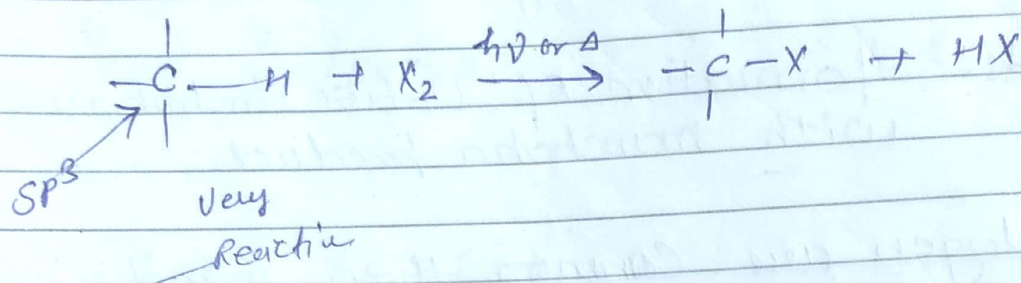


Mech:



Imp
~~***~~

*** Halogenation: ***



* $\text{X}_2 \neq \text{F}_2$ or $\text{I}_2 \rightarrow$ less reactive

* $\text{X}_2 = \text{Cl}_2$ or Br_2 (generally)

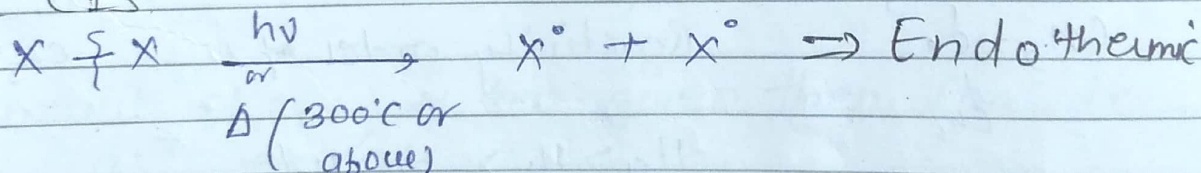
$\text{X}_2 = \text{F}_2 \gg \text{Cl}_2 > \text{Br}_2 \gg \text{I}_2$

* R^{n} occur on SP^3 -Hybridised -C.

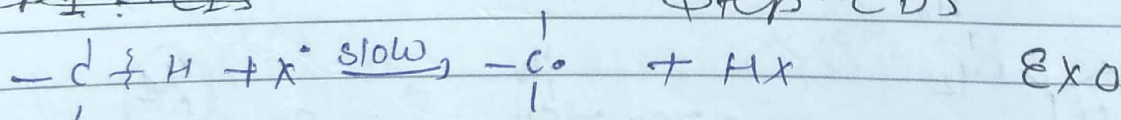
Mechⁿ: FRM $\Rightarrow$ Completed in three steps.

① CUS ② CPS ③ CTS.

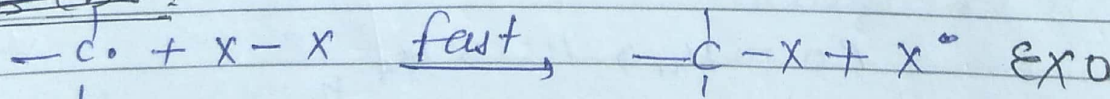
Step 1: CUS



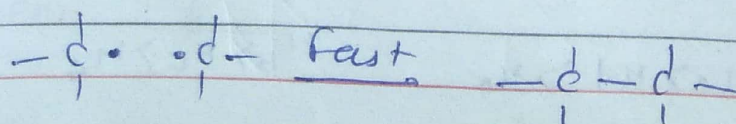
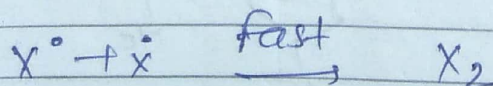
~~Step 2: CPS~~



~~Step 2: CPS~~



Step 3: CTS

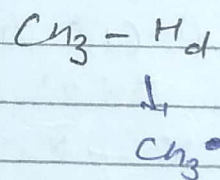
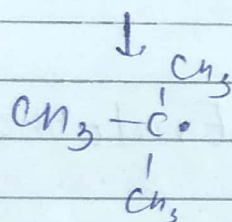
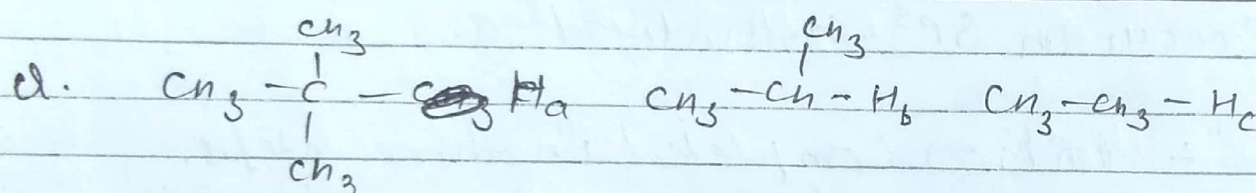


* Merit : $\rightarrow$ Overall Rxn is exothermic.
 $\rightarrow$ Takes very less time.

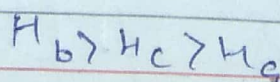
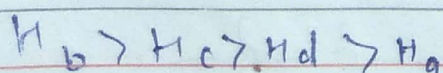
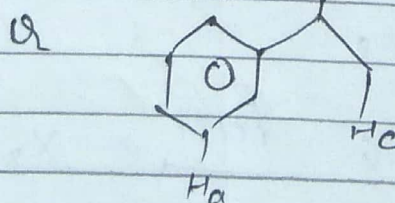
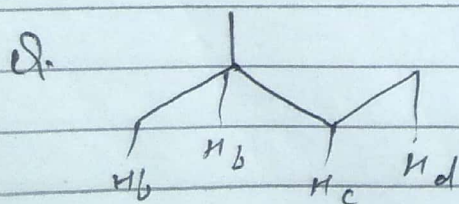
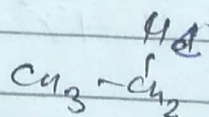
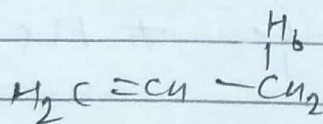
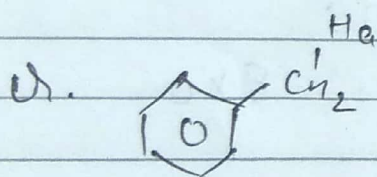
* Demerits : formation of ~~unlike~~ Unchacha product with manchaha product.

If halogen are common then Reactivity of Halogen toward halogenation depends on free radical

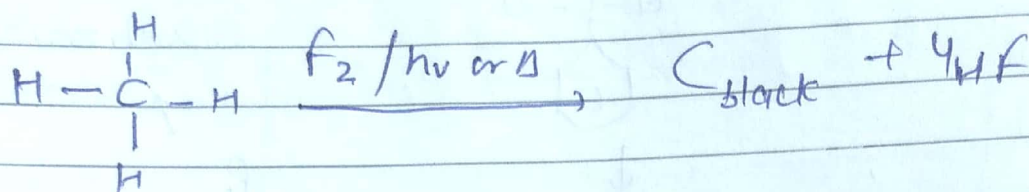
Reactivity of H' towards Halogenation Rxn $\propto$ Stability of f.R (RS) formed



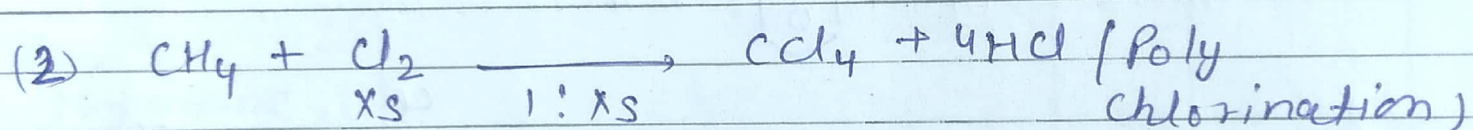
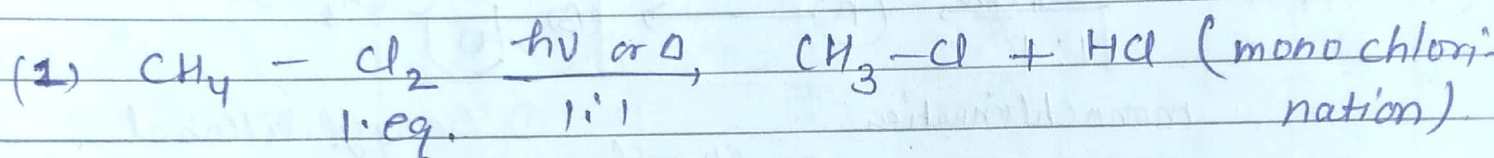
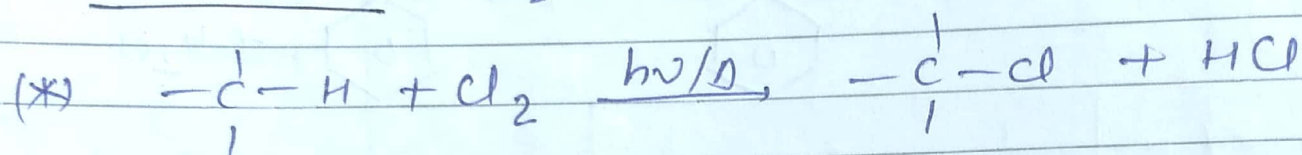
Reactivity order of H



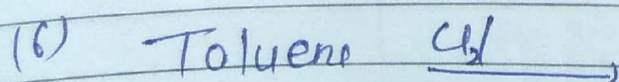
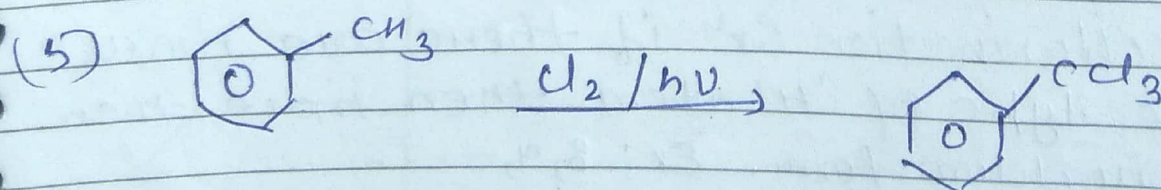
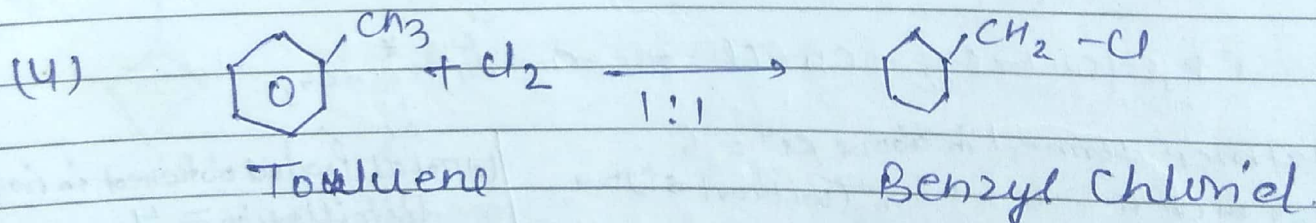
* Fluorination :



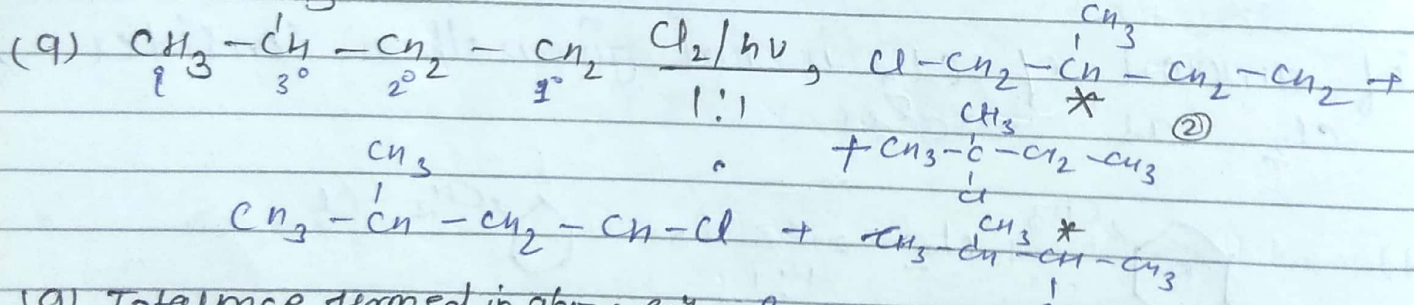
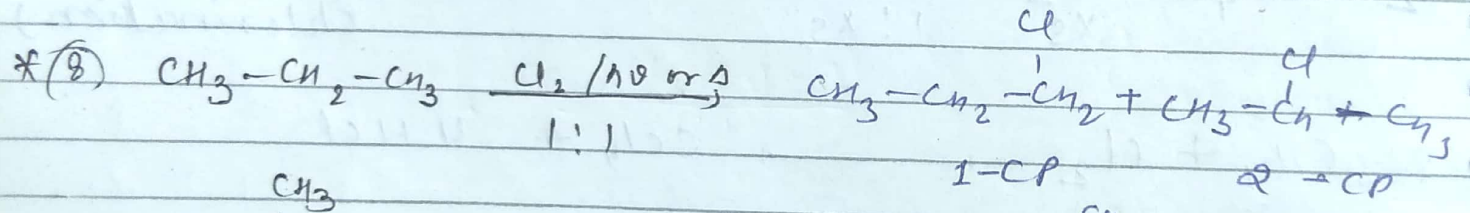
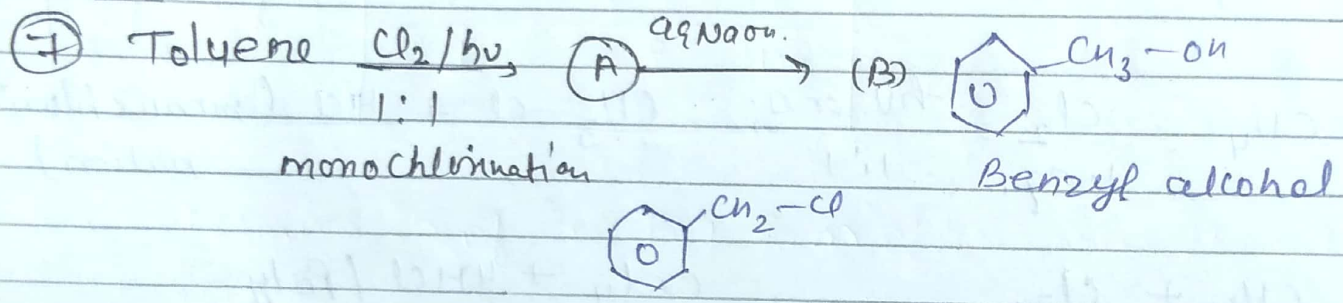
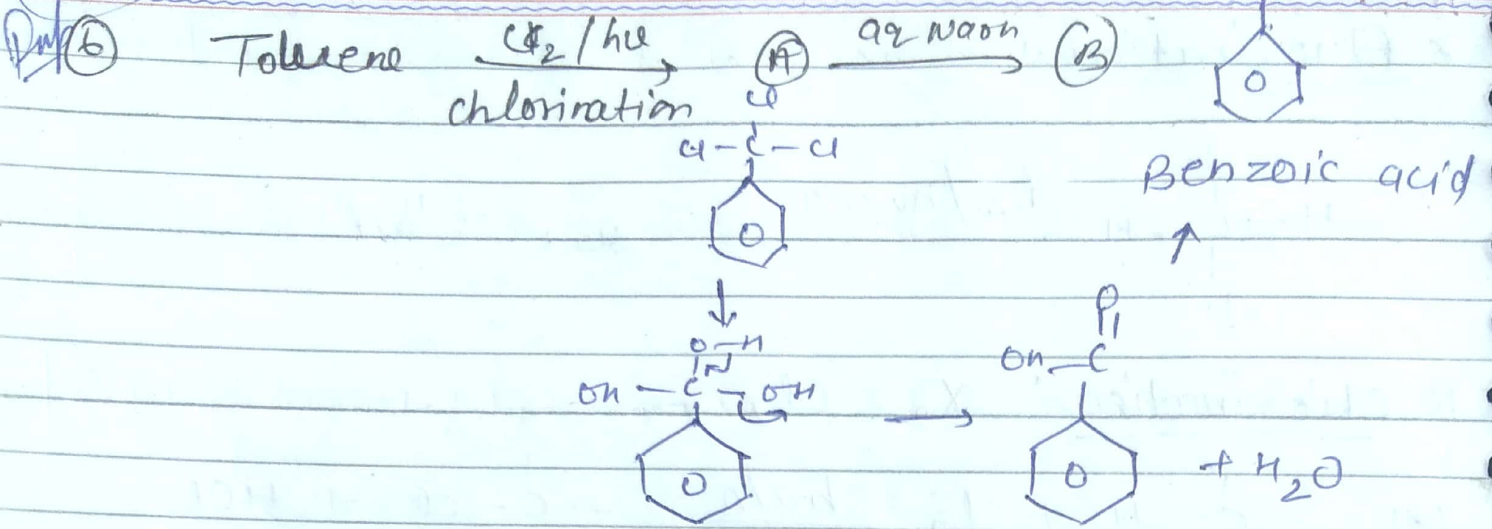
* Chlorination : $\text{X}_2 = \text{Cl}_2$



* If amount of Cl_2 is not given then consider Cl_2 as excess.



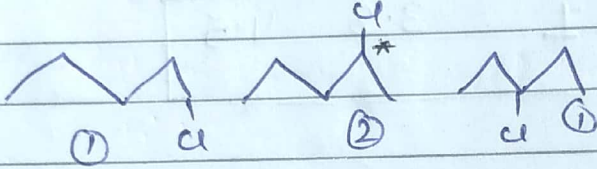
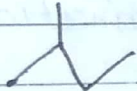
IIT



- (a) Total MCP formed in above Rxn = 6
 (b) Total MCP " " " (without SF) = 4
 (c) " optically active (chiral product) = 4
- (d) Total Product obtained in fractional distillation = 4.

Note! In chlorination Rxn if there are more than one type of 'H' atom then more than one monochloro form. Ex: 8, 9, - - -

Q. Make Monochloro product: and decide a,b,c,d in following molecules

molecules	product	a	b	c	d
(1)  Ethane.					
(2)  n-Butane					
(3)  Iso-Butane.					
(4)  n-Pentane		4	3	2	3
(5)  Isopentane					
(6) 					
(7) 					
(8) 					

* Determination of % of MCP (mono chloro product).

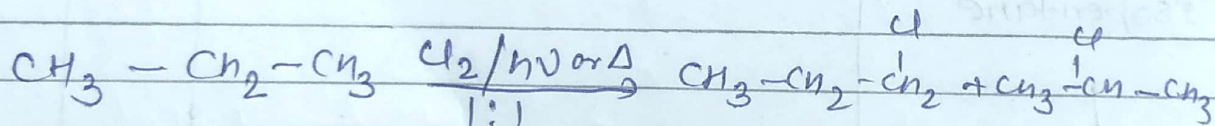
$$\text{Percentage of Any Isomer} = \frac{\text{Relative amount of that Isomer}}{\text{R.A of Total isomer}} \times 100$$

$$\text{Relative amount of Any Isomer} = \text{No. of Responsible-H} \times \text{R. Reactivity}$$

Types of 'H'	1°	2°	3°
R. R	1	3.8	4.5

Q. Determine % of product form of on mono chlorination of Propane:

Solⁿ



1-CP (44%) 2-CP (56%)

MINOR MAJOR

• R.A of 1-CP = $6.0 \times 1.0 = 6.0$

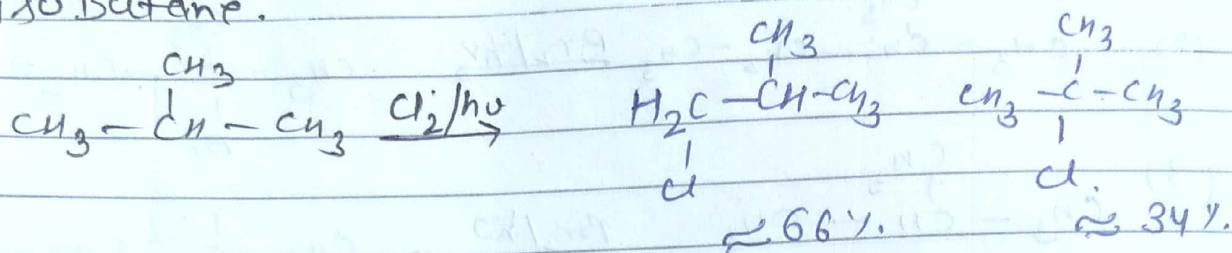
• R.A of 2-CP = $2.0 \times 3.8 = 7.6$

$$\% \text{ of 1-CP} = \frac{6.0}{13.6} \times 100 = \frac{600}{13.6} \approx 44\%$$

$$\% \text{ of 2-CP} = \frac{7.6}{13.6} \times 100 \approx 56\%$$

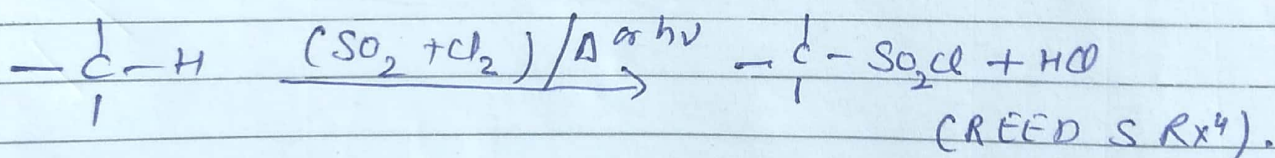
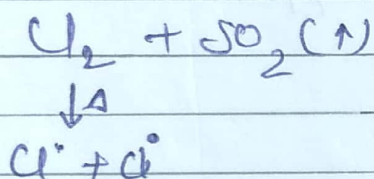
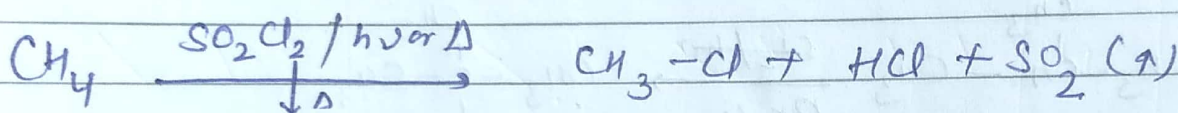
QA
QA

Make MCP and decide % of Product of form in iso Butane.



1 CP =

Note! Chlorination can also be done by $\text{SO}_2 \text{Cl}_2$



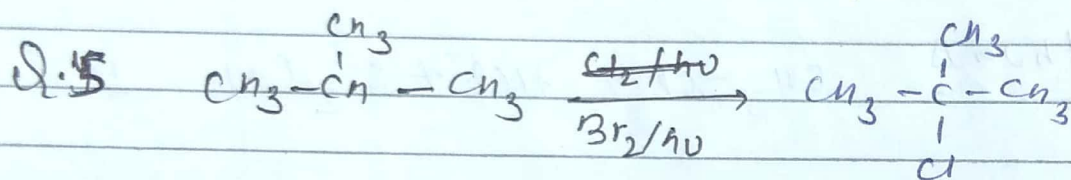
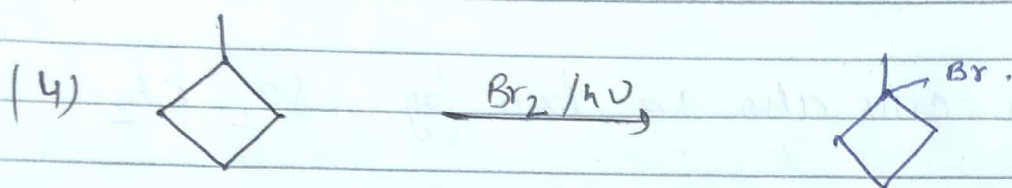
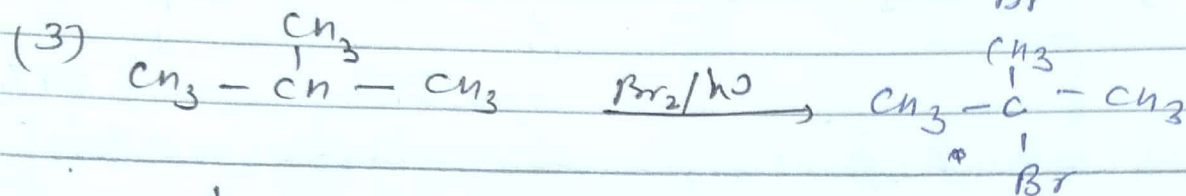
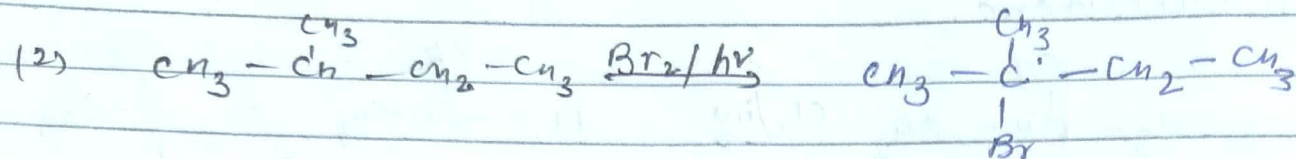
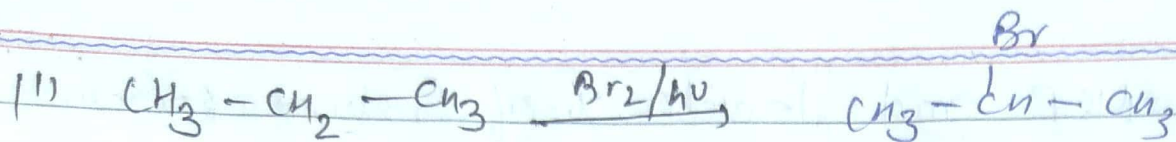
* Bromination: $\text{X}_2 = \text{Br}_2$

Mechⁿ: Similar Chlorination.

Due to less Reactivity than Chlorine

Bromine is a selecting Brominating agent

(i.e. if more than Hydrogen present in comp. then it Brominate most Reactive Hydrogen).



SBG STUDY