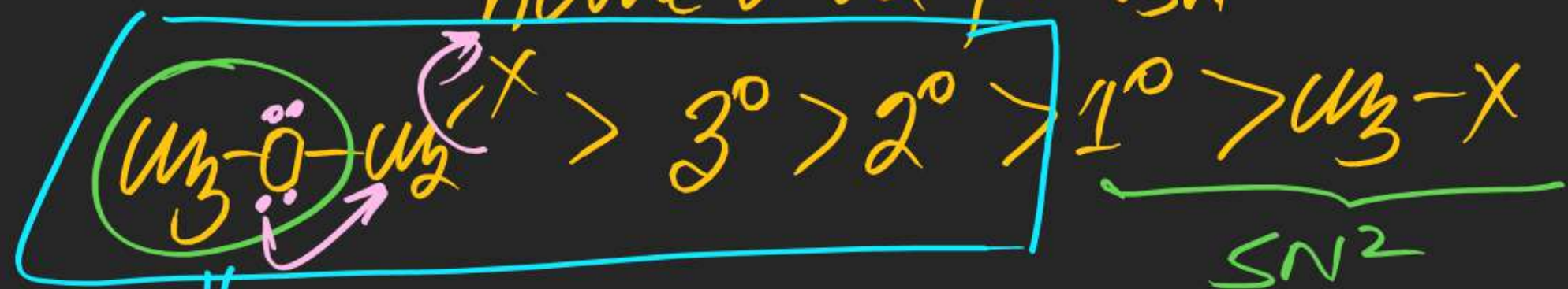
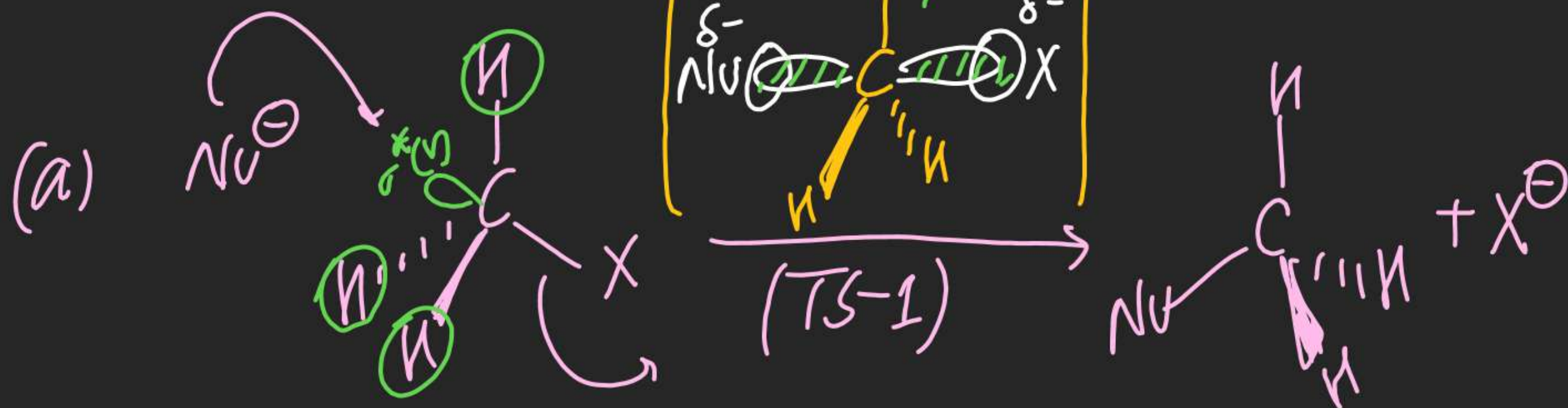


Since higher the Ease of dissociation higher wd be  $k_{SN1}$   
 Since higher the Stability of Carbocation  $\Rightarrow$  higher wd be  $k_{SN1}$   
 hence order for  $k_{SN1}$

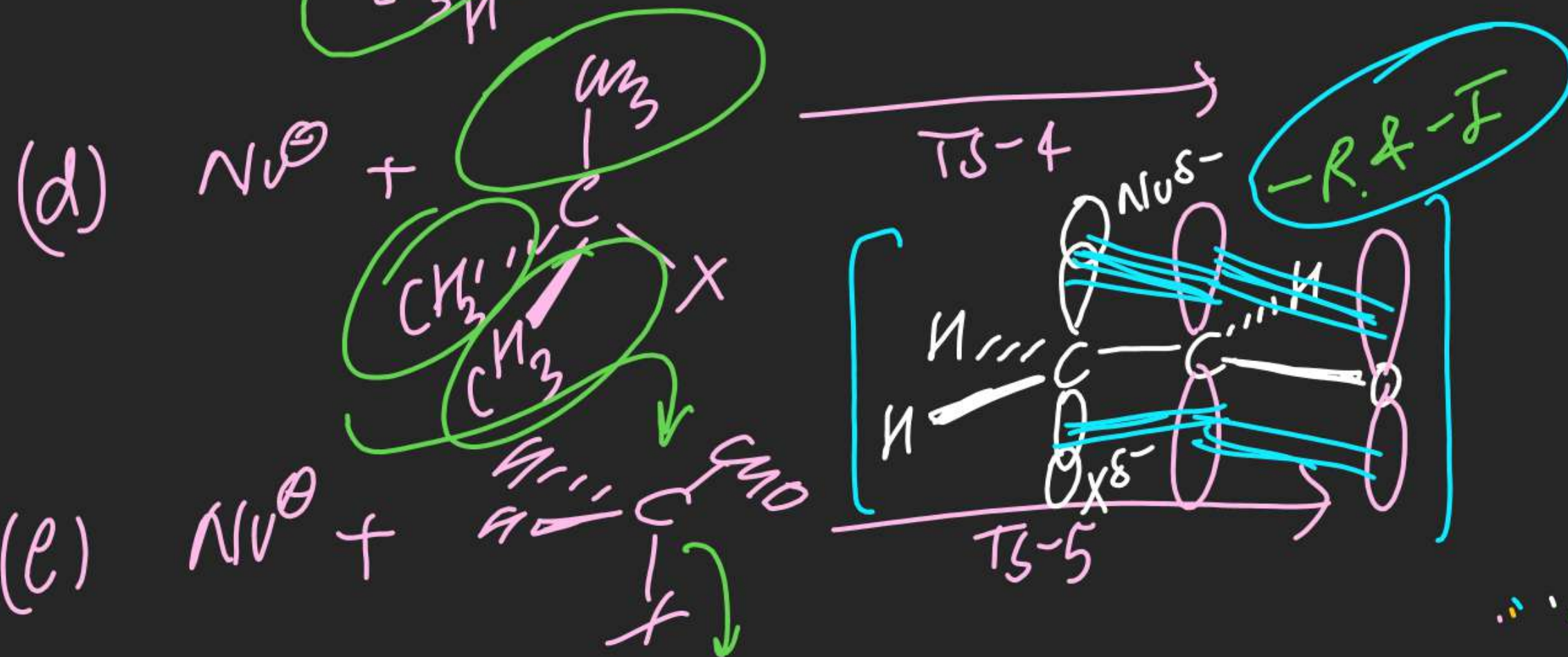
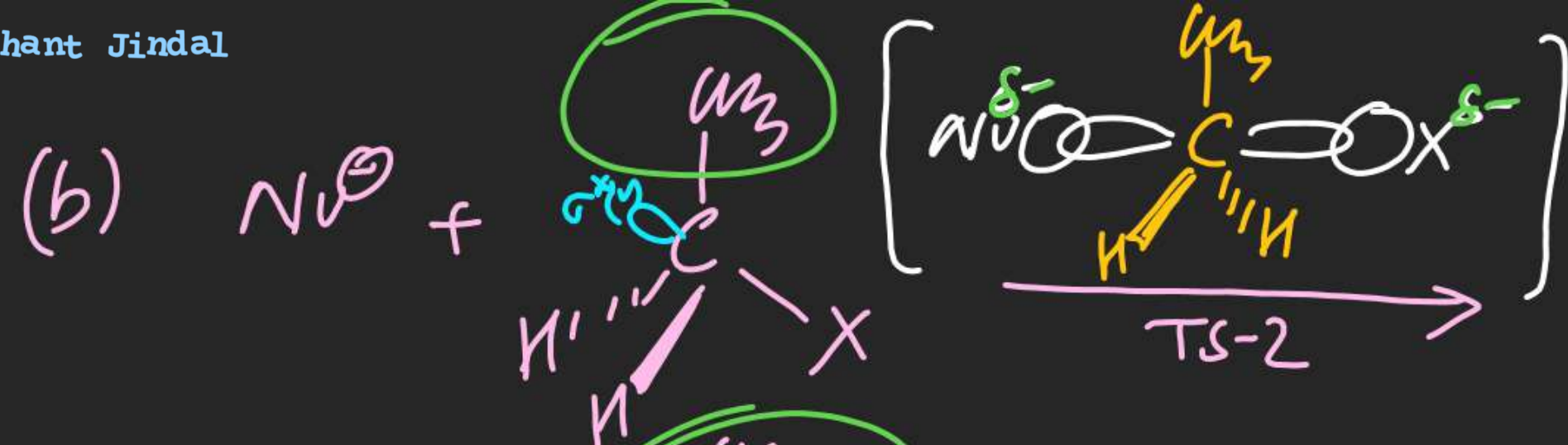


Cation  
stabilising

For  $\text{SN}2$



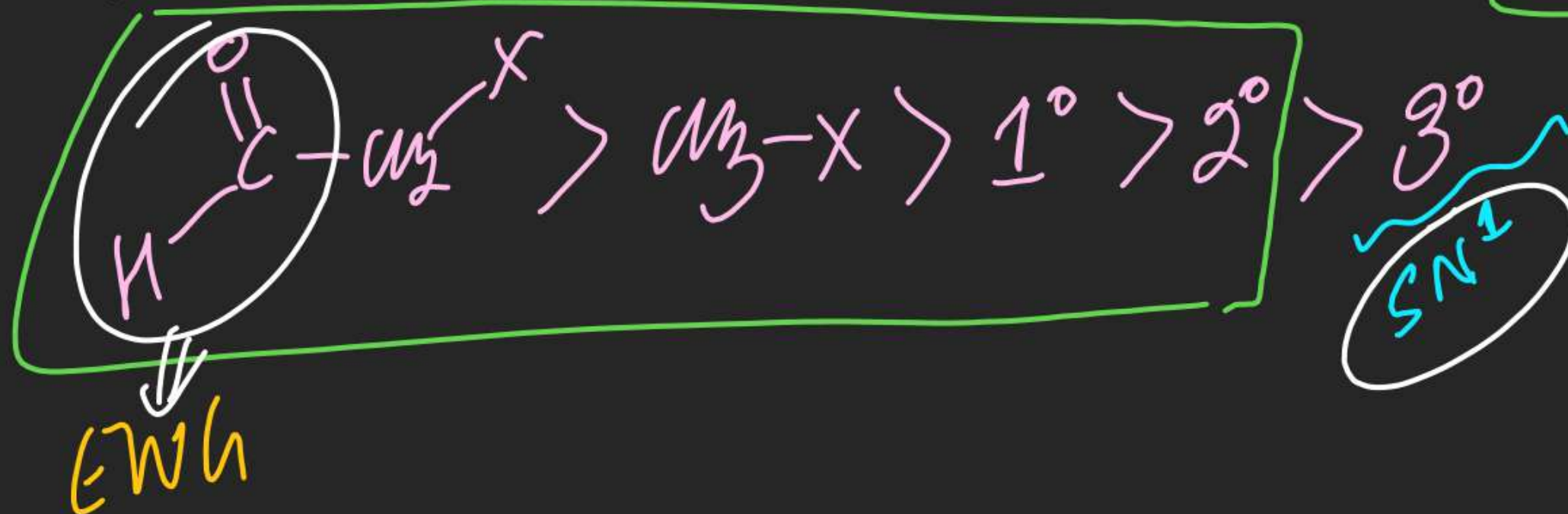




⇒ Since TS containing Anion like character have  
pr. of EWH ↑  $\gamma_{SN^2}$

⇒ higher The stability of TS, higher will be rate of  $SN^2$   
 stability of TS  $TS-5 > TS-1 > TS-2 > TS-3 > TS-4$   
 $CH_3-X \rightarrow SN^2$   
 $1^\circ \rightarrow SN^2$   
 $2^\circ$   
 $3^\circ \rightarrow SN^1$

Order of  $\gamma_{SN^2}$  for R-X ::

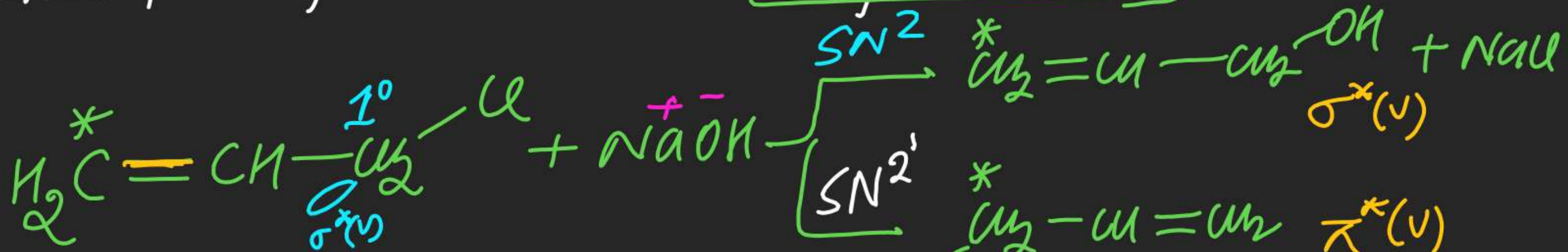




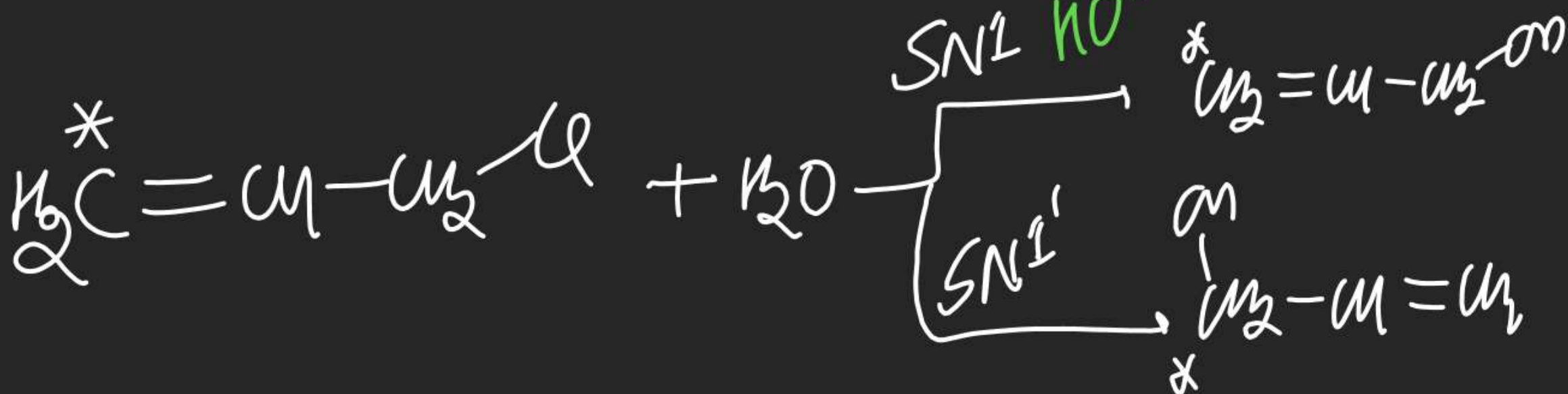
# (#) $SN^1$ & $SN^2$ mech<sup>n</sup>

⇒ For These kind of mechanism allylic substrate must be present

Ex-1:



Ex-2:



## (2) Nature of leaving Group :-

⇒ Since  $\text{>C-X}$  Bond Breaking is involved in r.d.s of Both  $\text{S}_\text{N}1$  &  $\text{S}_\text{N}2$  mechanism hence on ↑ leaving tendency rate of Both  $\text{S}_\text{N}1$  &  $\text{S}_\text{N}2$  increases.

order of  $\delta_{\text{S}_\text{N}1}$  &  $\delta_{\text{S}_\text{N}2}$



## (3) Effect of Nucleophile

(For  $\text{S}_\text{N}1$ )

Since no Nucleophile is involved in r.d.s of  $\text{S}_\text{N}1$  mechanism  
hence no effect on  $\delta_{\text{S}_\text{N}1}$  of  $\left\{ \begin{array}{l} \text{Nucleophilicity} \\ \text{conc.} \\ \text{Size} \end{array} \right.$

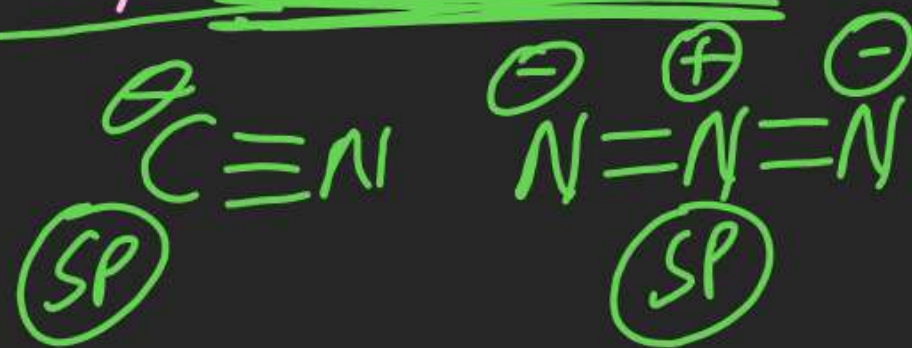


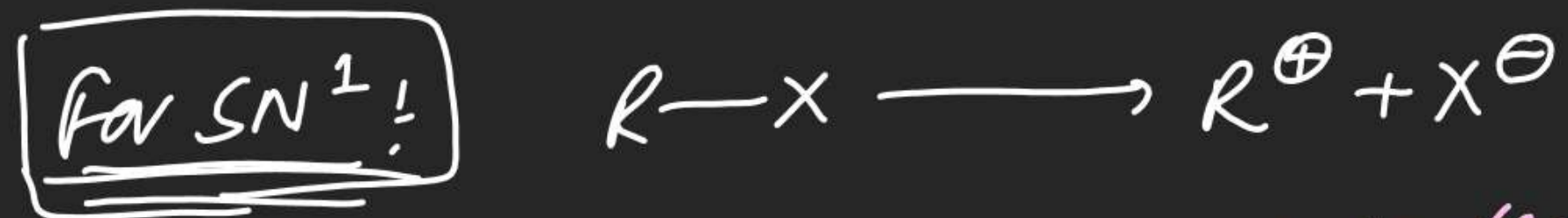
For  $S_N2$ : Since  $NO^-$  is involved in r.d.s of  $S_N2$  mech<sup>n</sup> hence

$\chi_{S_N2}$  increases  $\Rightarrow$  Strong nucleophile  
higher conc.  
Small in size

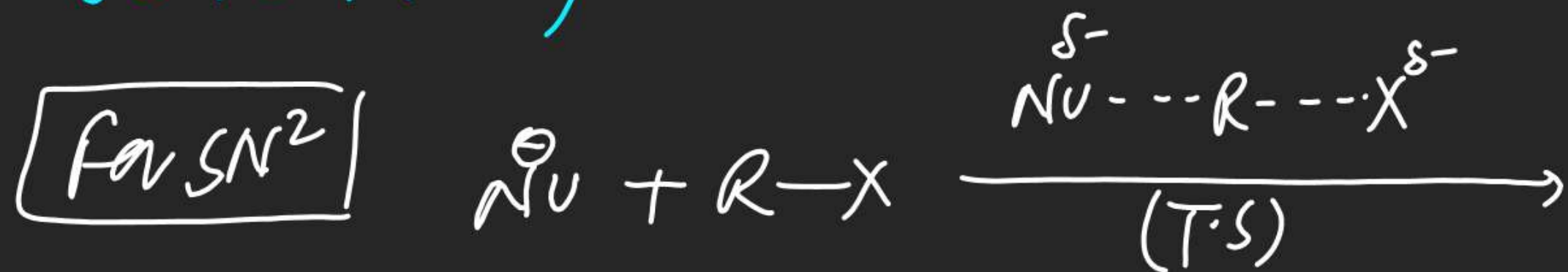
Few Nucleophiles for  $S_N2$

$NaI$ ,  $NaBr$ ,  $NaSR$ ,  $NaSH$ ,  $NaCN$ ,  $NaN_3$ ,  $NaOH$ ,  $NaOR$



(4) Nature of Solvent :-

$\Rightarrow$  PPS is more appropriate for dissociation of a Bond  
( $H_2O$ ,  $ROH$ ,  $RCOOH$ ...)



$\Rightarrow$  more appropriate solvent is P.AS (DMSO, DMF, THF, Acetone...)



$S_N2$	$S_N1$
$CH_3-X > 1^\circ > 2^\circ > 3^\circ$	$3^\circ > 2^\circ > 1^\circ > CH_3-X$
$R-I > R-Br > R-Cl$	$R-I > R-Br > R-Cl$
<b>Strong Nucleophile</b> $NaI, NaBr, NaSH, NaSR$ $NaCN, NaN_3, NaOAc$ ----	<b>Weak Nucleophile</b> $H_2O, ROH, RCOOH$ -----
$PAS (DMF, DMSO, THF \dots)$	$PPS (H_2O, ROH, RCOOH \dots)$



**EXERCISE – II (B)**

1. **Statement-1:** HBr shows antimarkownikoff's addition on propene but not HCl.

**Statement-2:** H – Br is stronger acid than H – Cl. *(Correct) But not correct explain*

**(A)** Statement-1 is true, statement-2 is true and statement-2 is correct explanation for statement 1 .

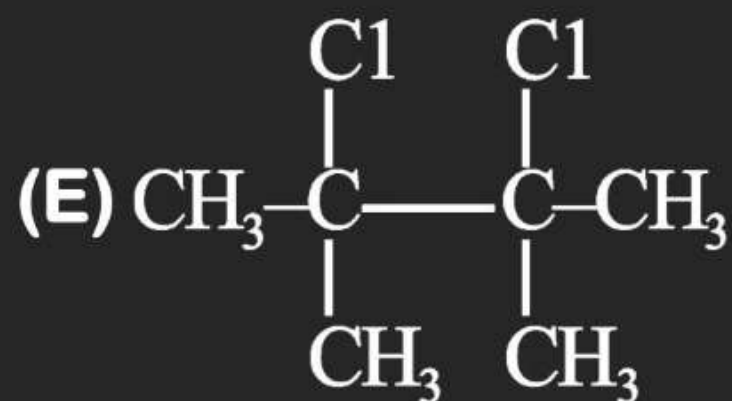
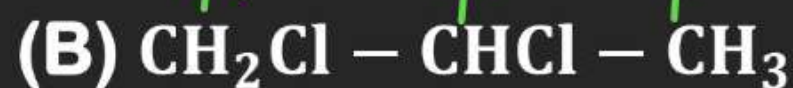
**(B)** Statement-1 is true, statement-2 is true and statement-2 is NOT the correct explanation for statement-1.

**(C)** Statement-1 is true, statement-2 is false.

**(D)** Statement-1 is false, statement-2 is true.

2. Each of the compounds in column A is subjected to further chlorination. Match the following for them:

Column-A



Column-B

(P) Optically active original compound

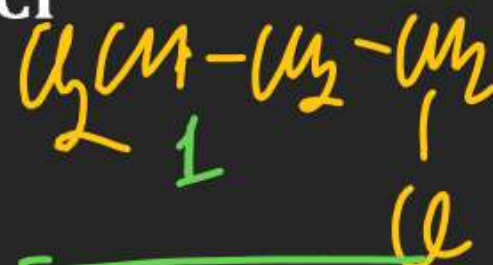
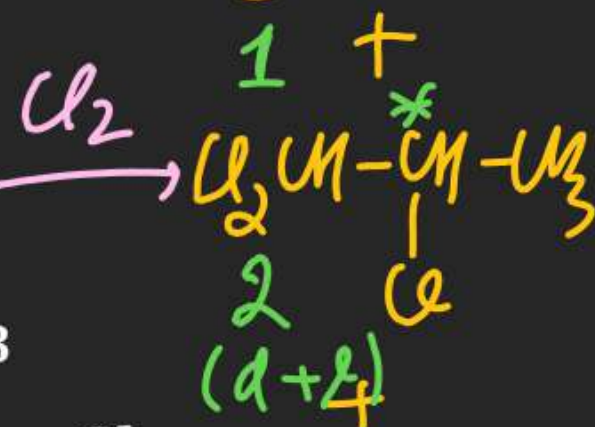
(Q) Only one trichloro product

(R) Three trichloro product.

(S) Four trichloro product

(T) Atleast one of the trichloro product is optically active

(U) Two trichloro products.



4



### 3. Column-I (Intermediate)

(A) Carbocation

(B) Carbanion

(C) Free radical

(D) Octet complete in one of the intermediate ~~intermediate~~

### Column-II

(P) Kolbey Electrolysis Radical

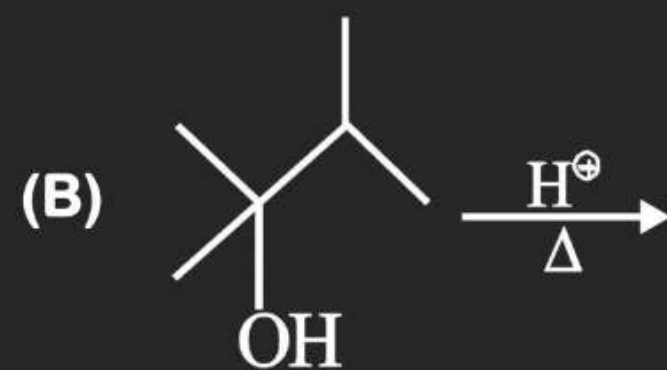
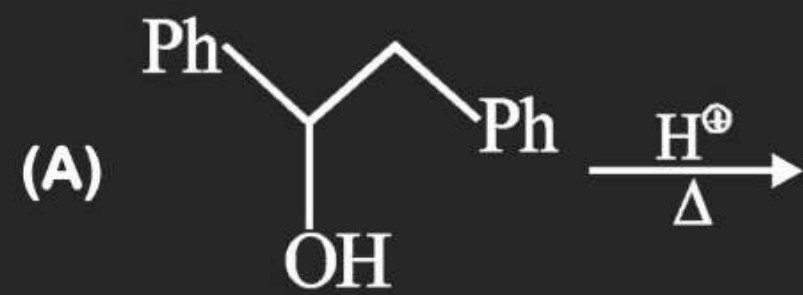
(Q) Wurtz reaction Radical & Carbanion

(R) Dehydration of alcohol Cation

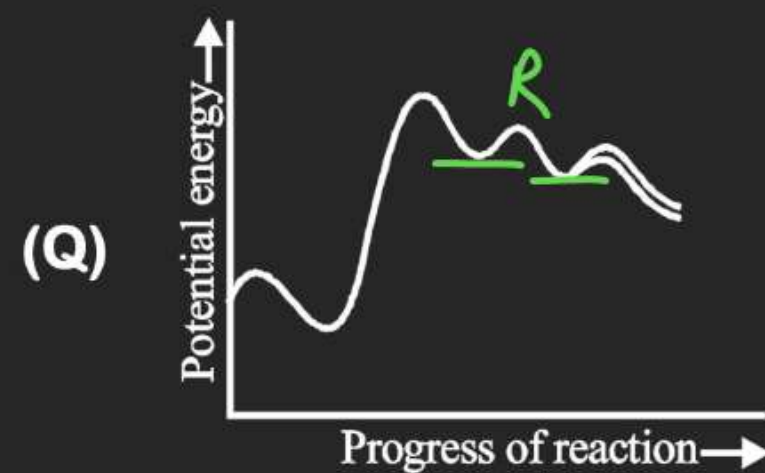
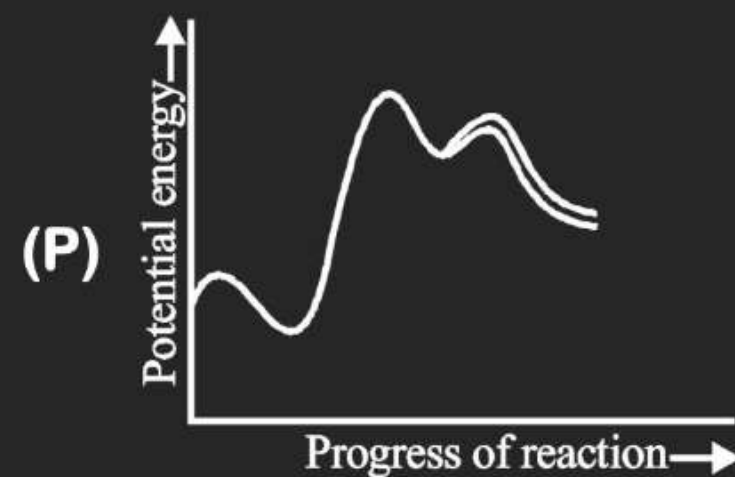
(S) Monocarboxylic acid with Soda lime

4. Match the Column.

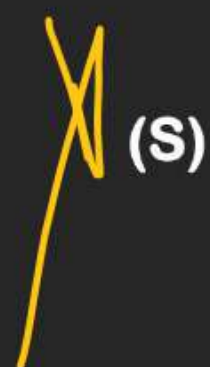
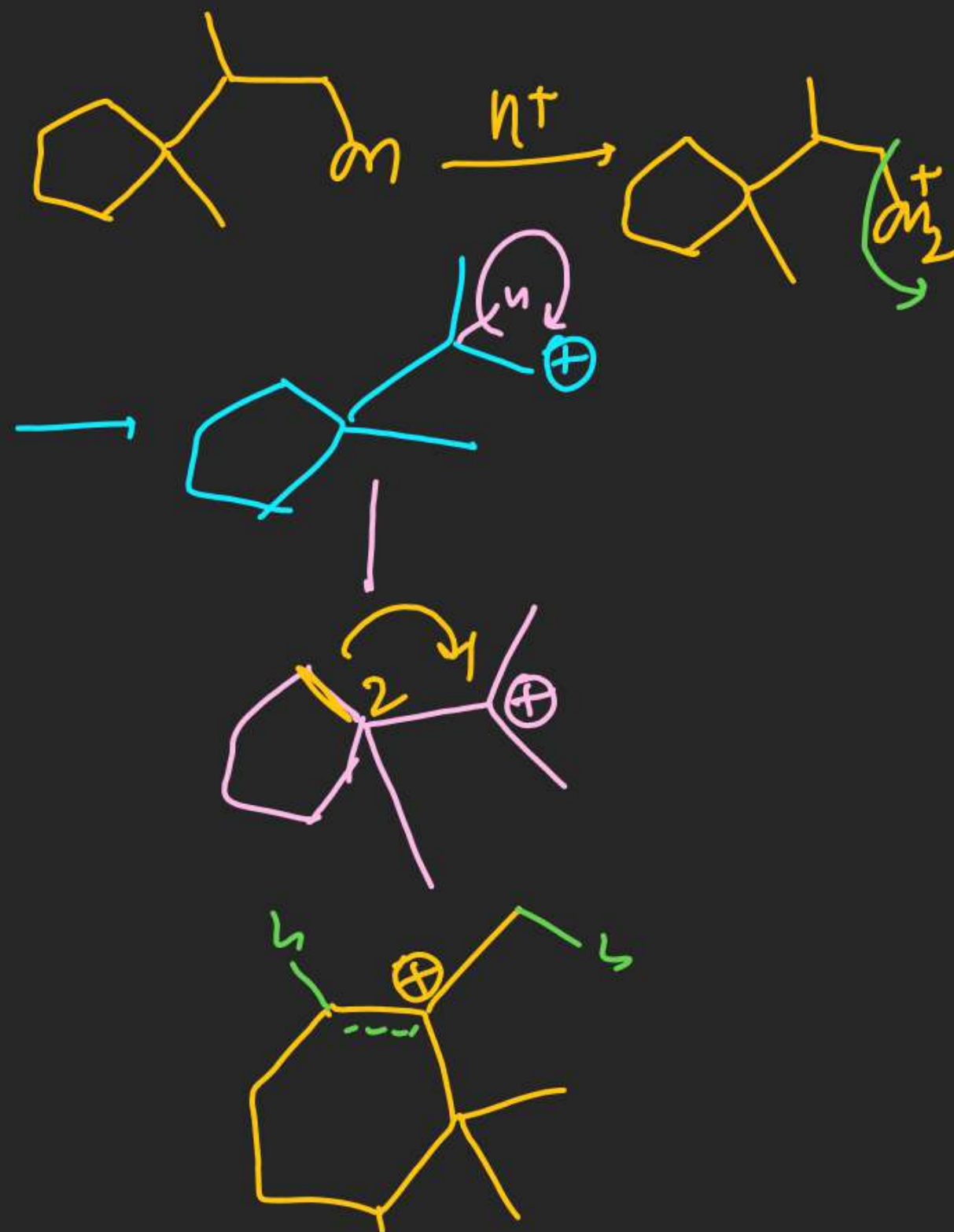
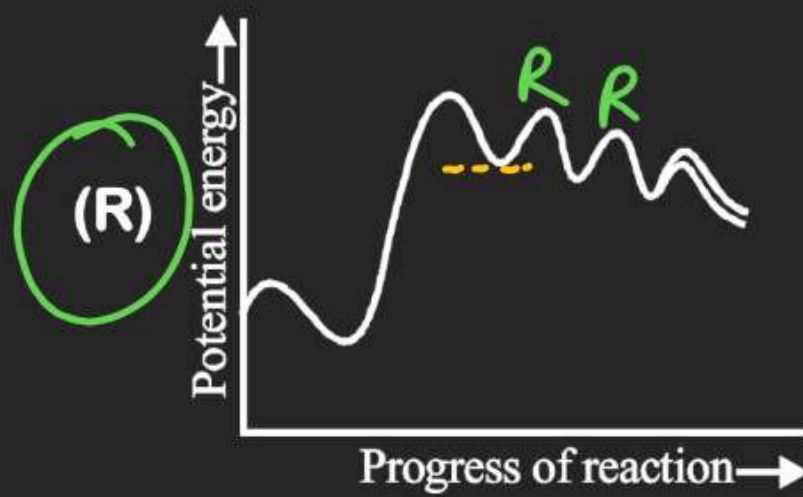
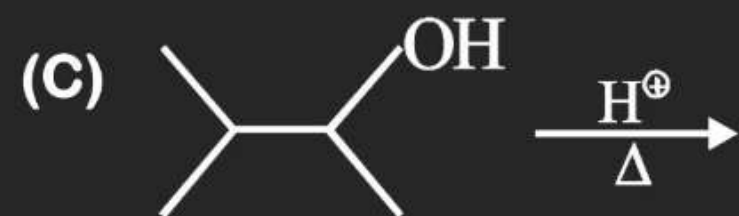
Column-I (Reaction)



Column-II (Potential Energy Curve)

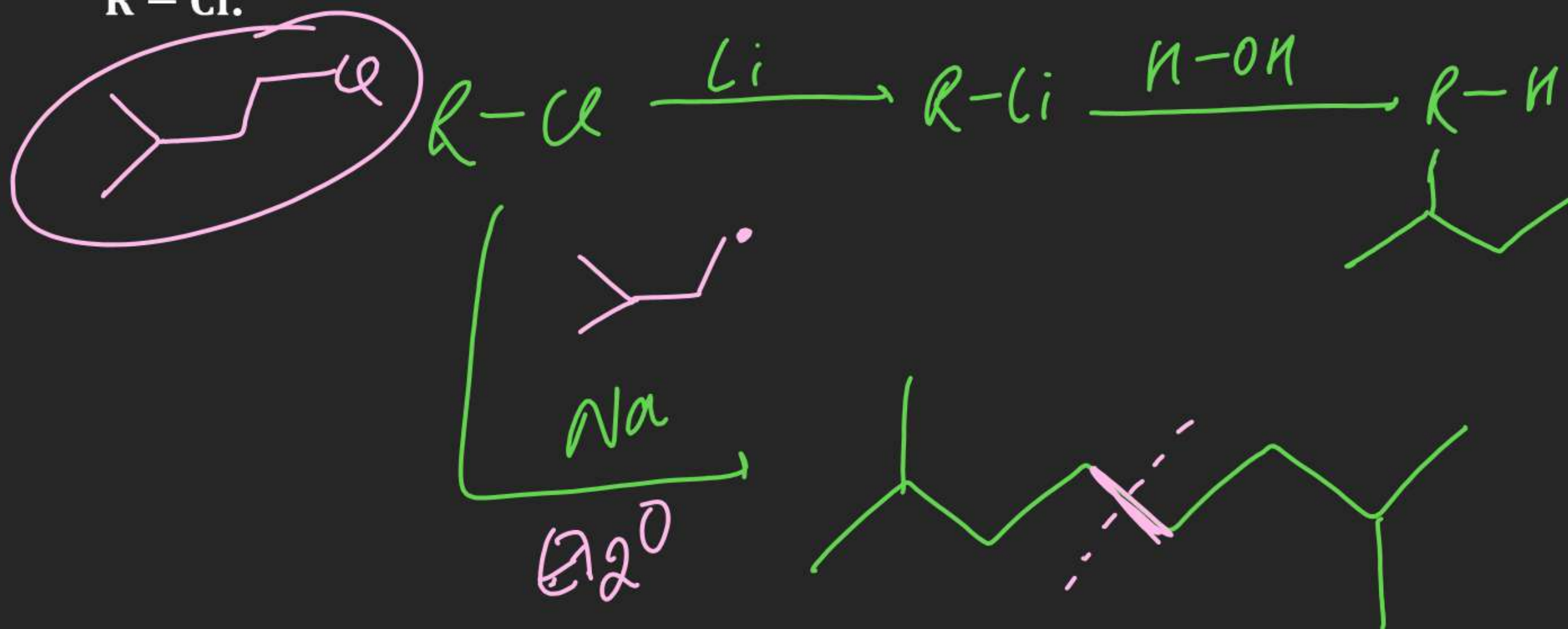






5. RCl is treated with Li in ether to form R – Li, R – Li reacts with water to form isopentane.

R – Cl also reacts with sodium to form 2, 7-dimethyloctane. What is the structure of R – Cl.

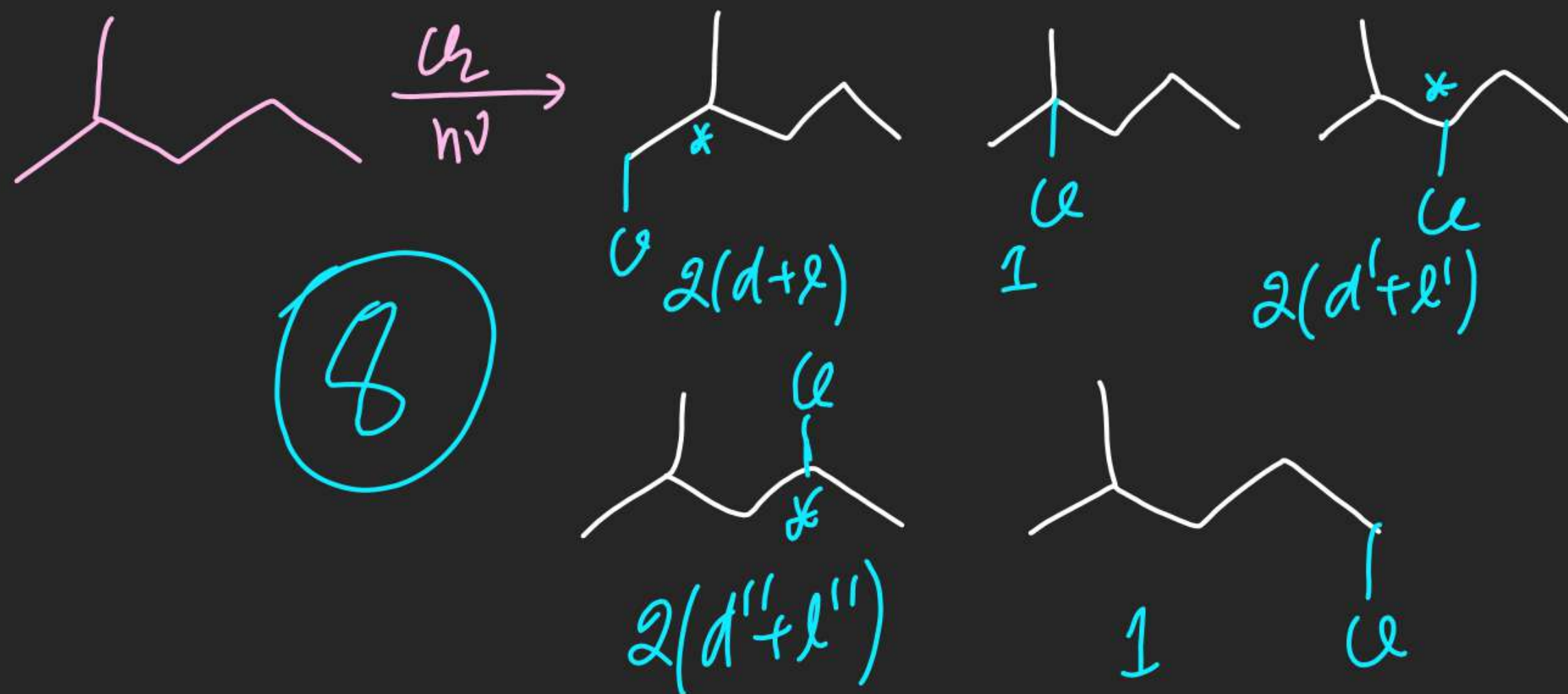




7. With the help of following data show HBr exhibits the peroxide effect.

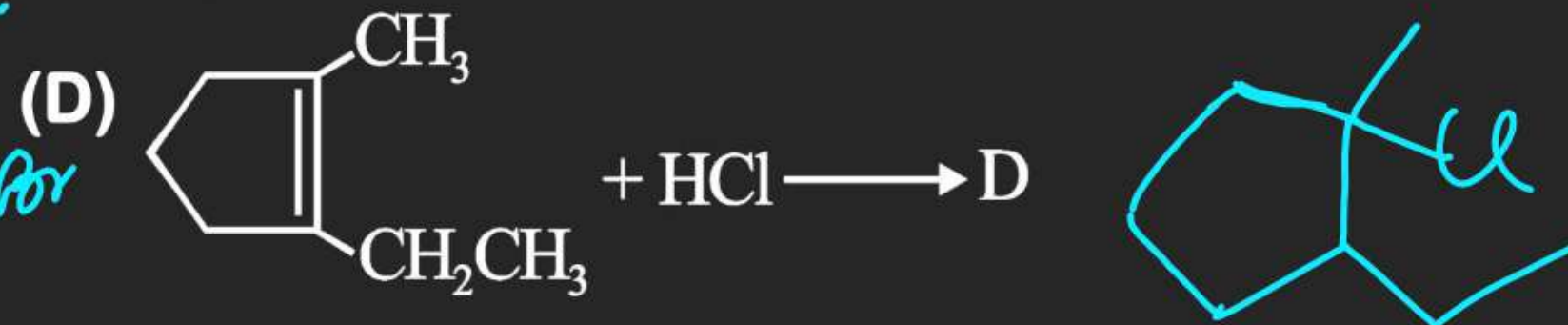
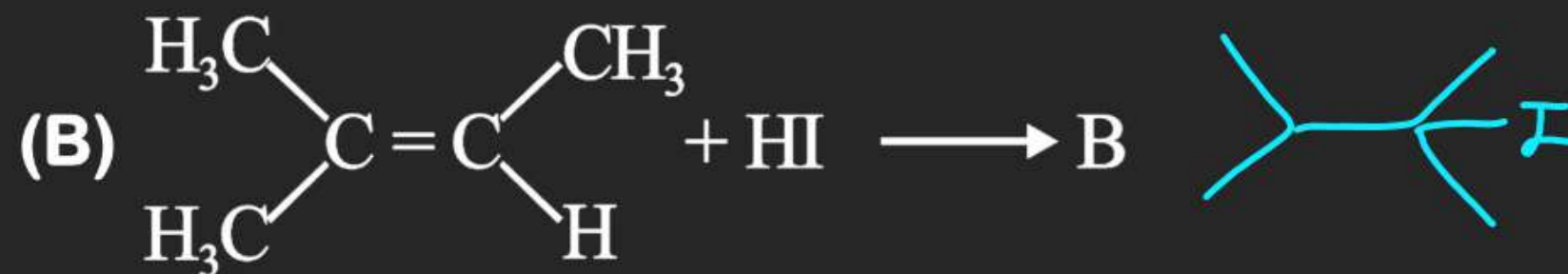
	$\Delta H_1^0/\text{kJmol}^{-1}$	$\Delta H_2^0/\text{kJmol}^{-1}$
H - X	$\dot{X} + \text{CH}_2 = \text{CH}_2 \rightarrow \text{XCH}_2 - \dot{\text{C}}\text{H}_2$	$\text{XCH}_2 - \dot{\text{C}}\text{H}_2 + \text{H} - \text{X} \rightarrow \text{XCH}_2\text{CH}_3 + \dot{X}$
	↓	
HCl	-67	+12.6 $(\Delta H > 0)$
HBr	-25.1 $(\Delta H < 0)$	-50.2 $(\Delta H < 0)$
HI	+46 $(\Delta H > 0)$	-117.1

8. Write all the monochlorinated products (including stereo) of isohexane.



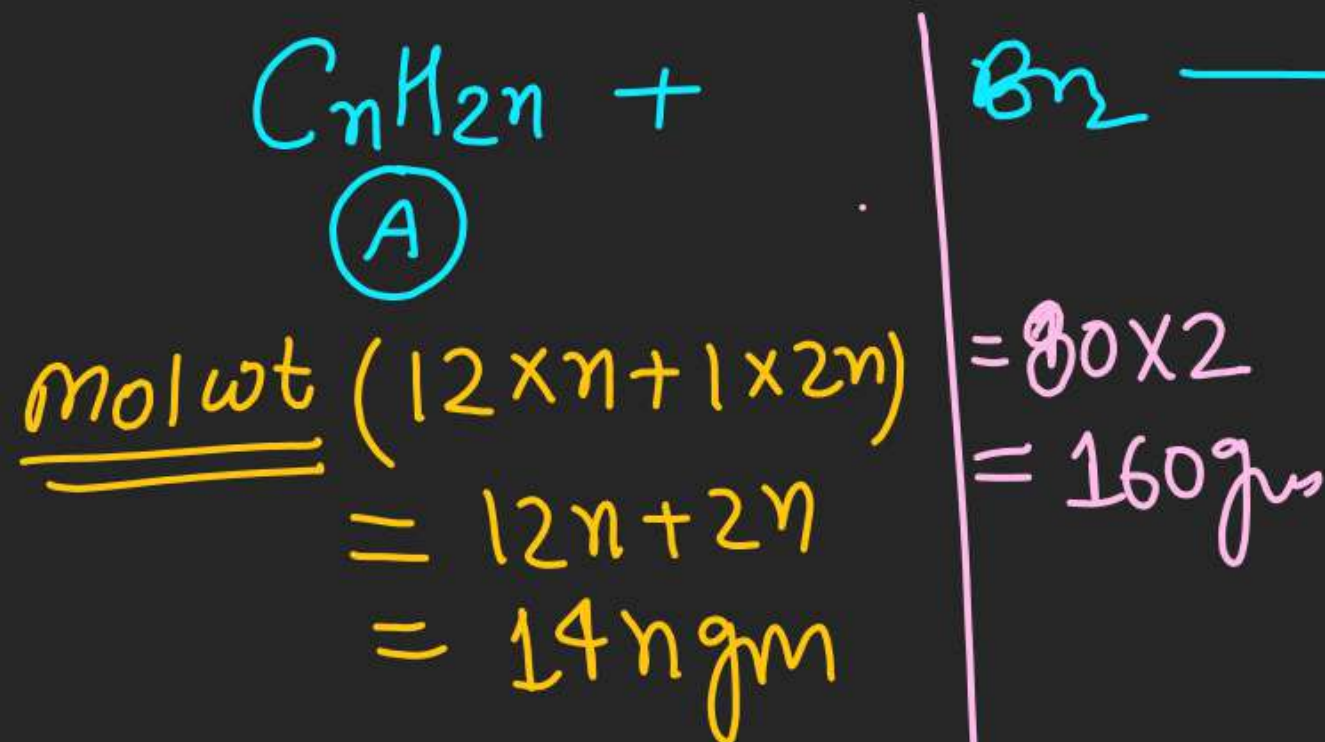


9. What are the products of the following reactions?



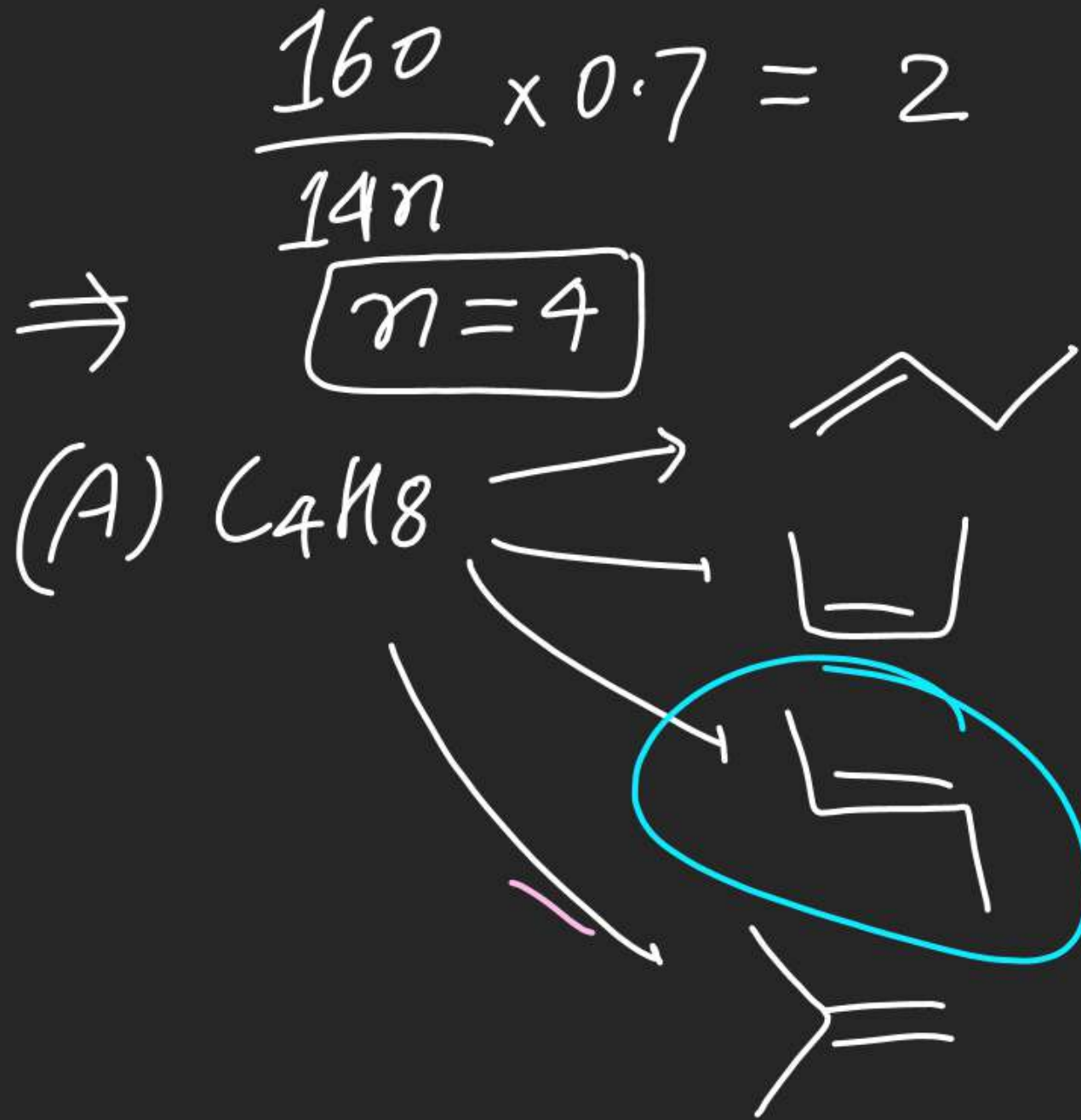
<sup>"1"</sup>  
must have Pi Bond

10. It required 0.7 g of a hydrocarbon (A) to react completely with  $\text{Br}_2$  (2.0 g) and form a non resolvable product. On treatment of (A) with  $\text{HBr}$  it yielded monobromo alkane (B). The same compound (B) was obtained when (A) was treated with  $\text{HBr}$  in presence of peroxide. Write down the structure formula of (A) and (B) and explain the reactions involved.

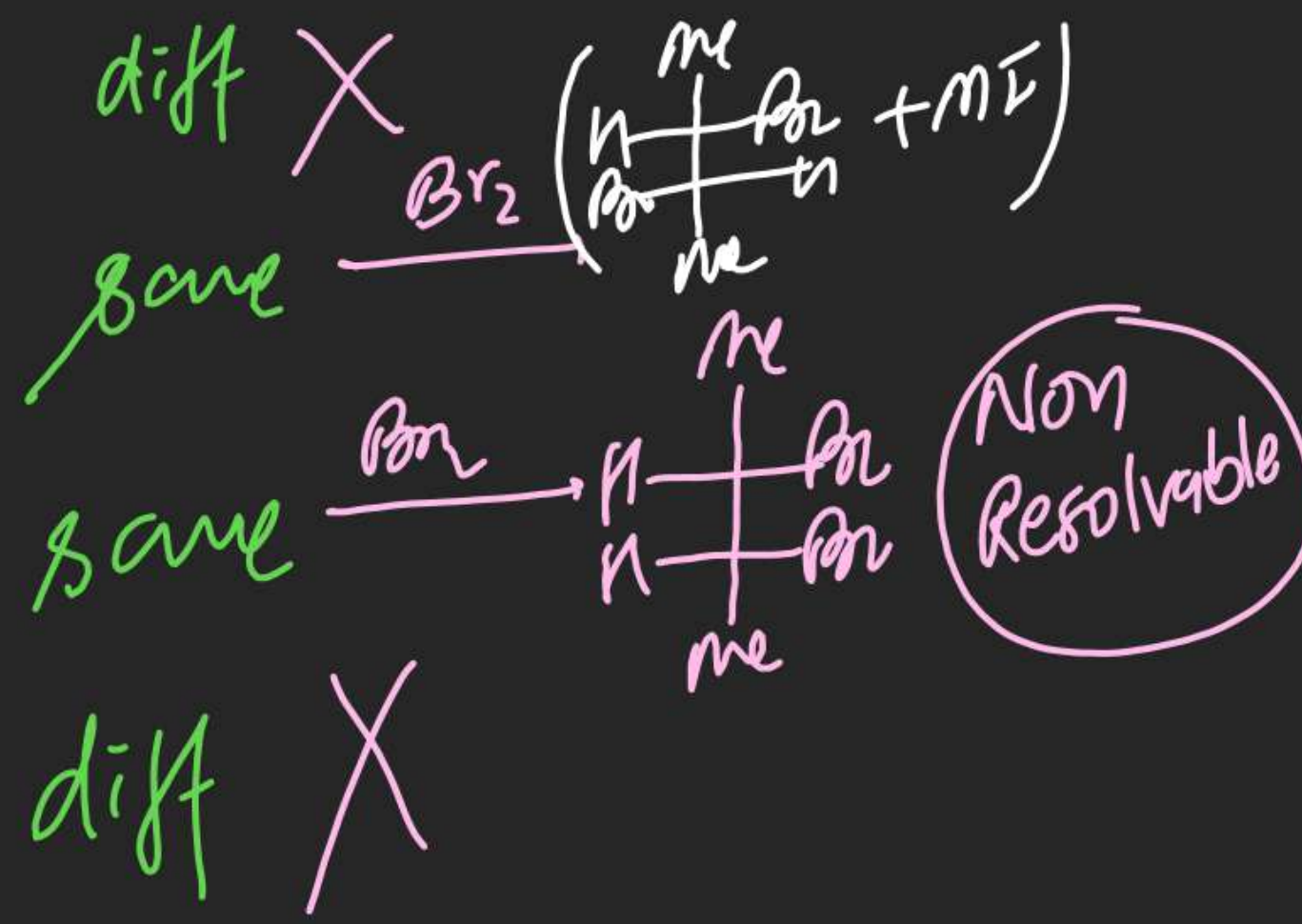


$$\begin{array}{l}
 14n \text{ gm (A)} \times \frac{160}{14n} = 160 \text{ gm} \\
 1 \text{ gm} \longrightarrow \frac{160}{14n} \\
 0.7 \text{ gm} \longrightarrow \left( \frac{160}{14n} \times 0.7 \right)
 \end{array}$$

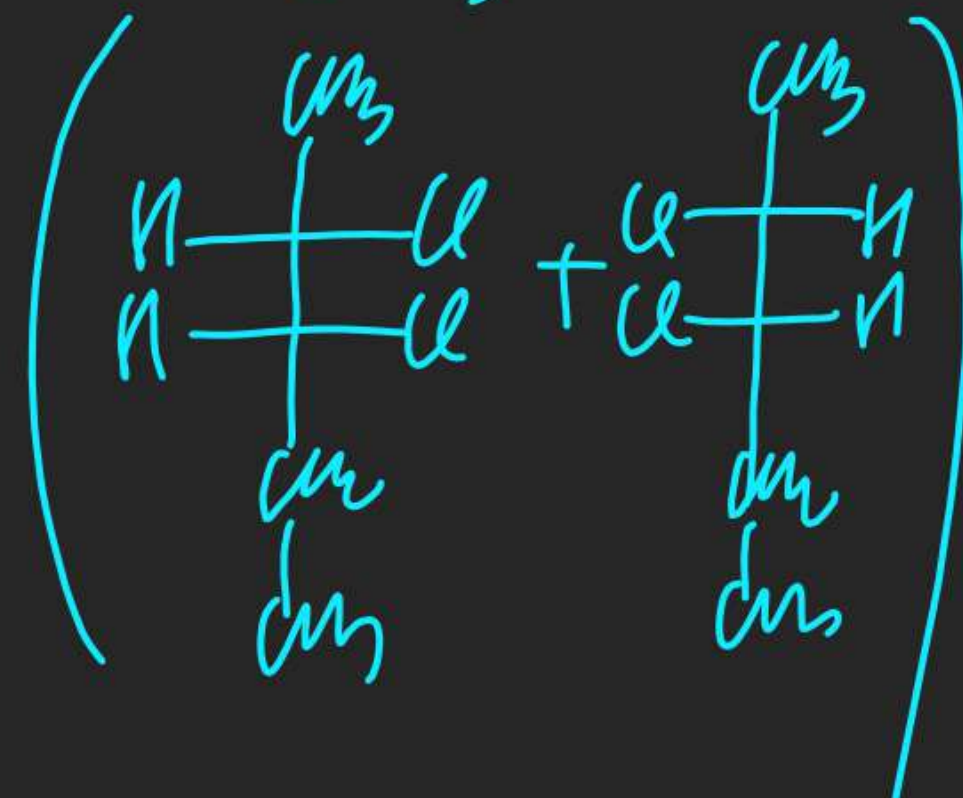
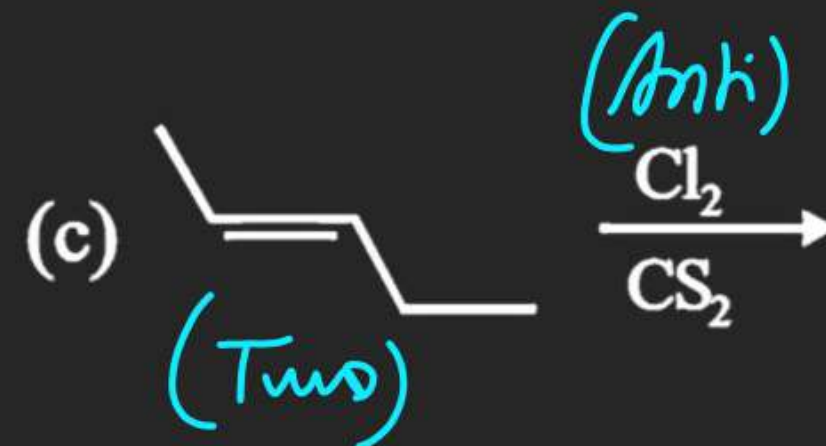
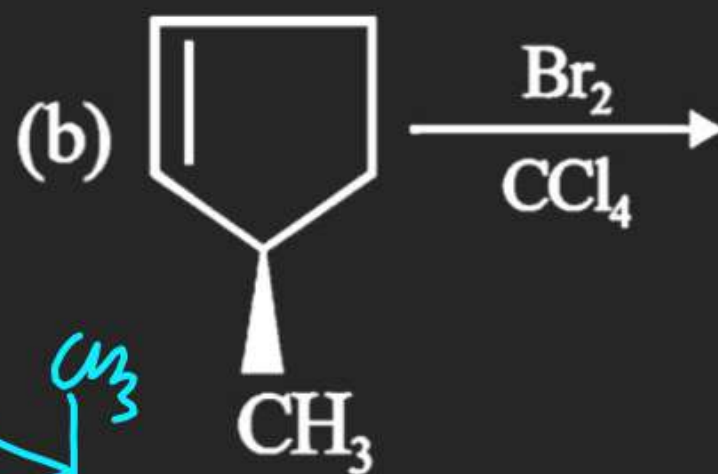
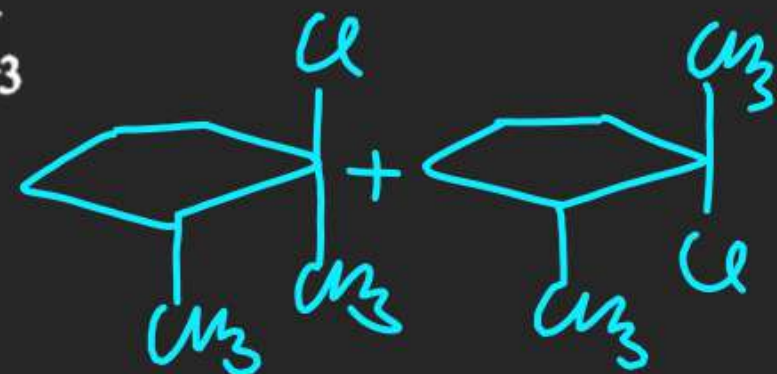
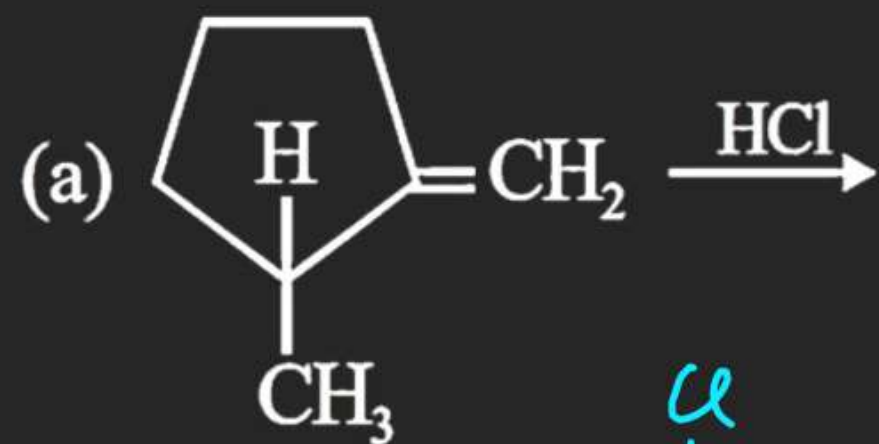




$HB\dot{r}$  &  $HB\dot{r}/R\dot{O}O\dot{r}$

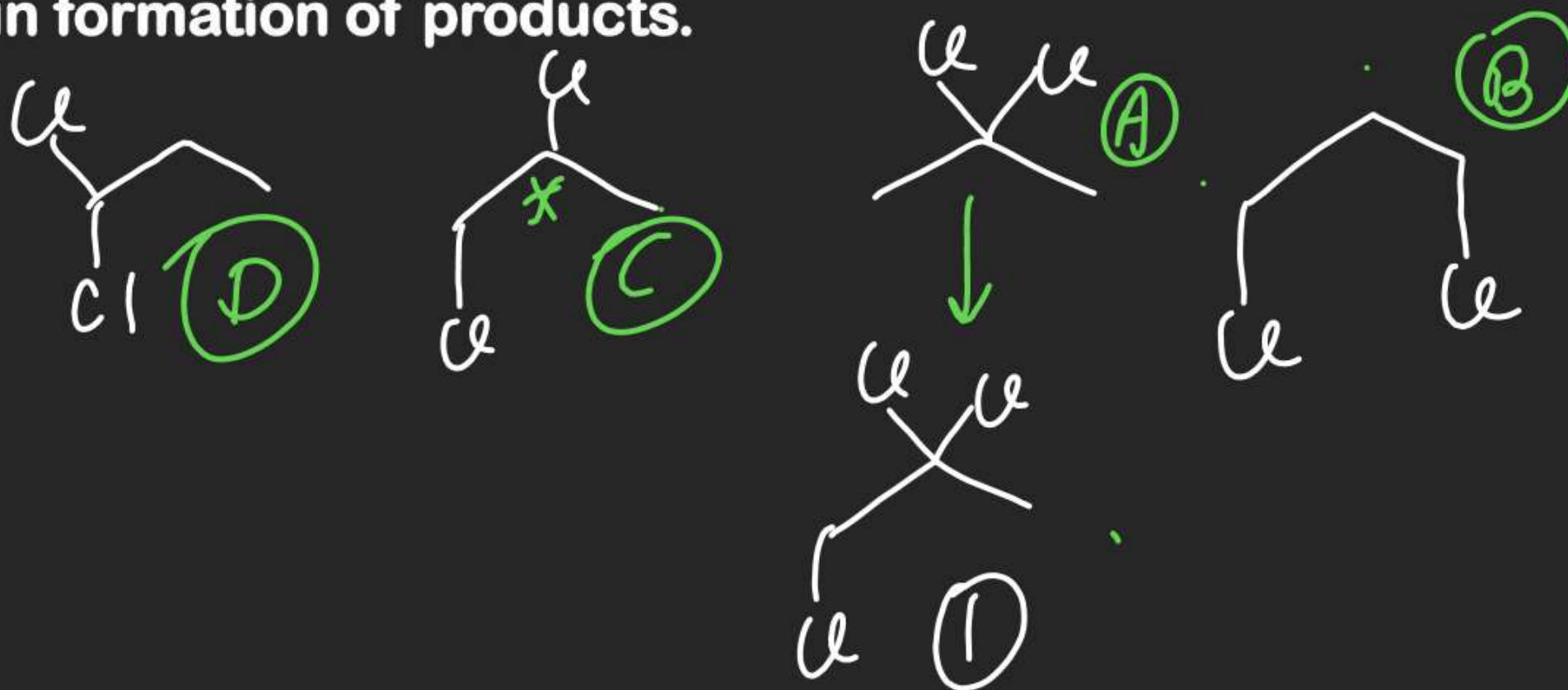


11. Complete following reaction :





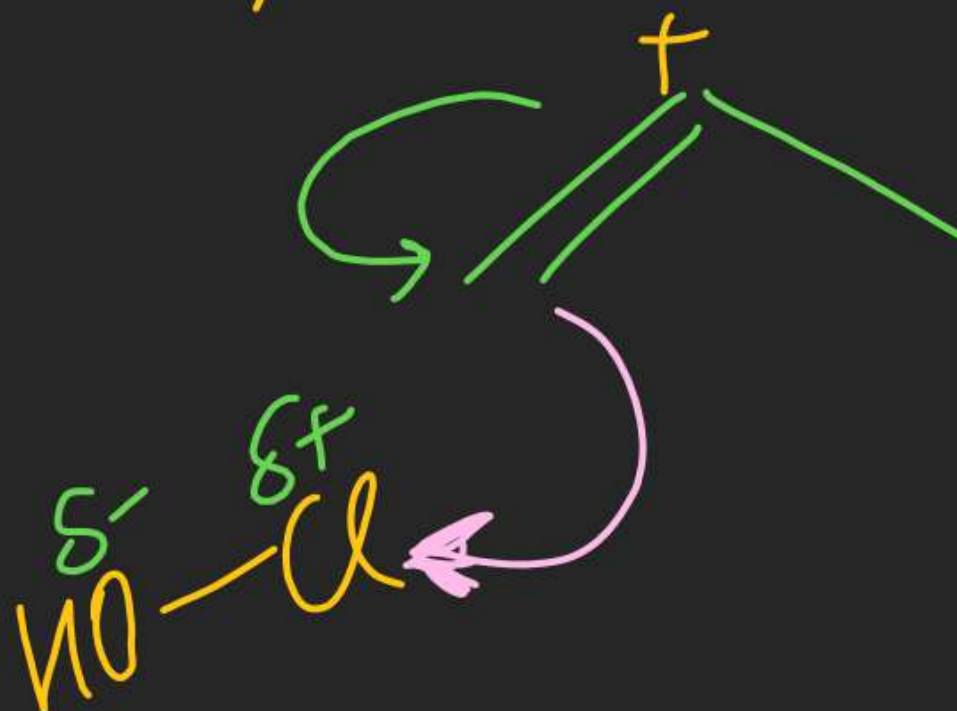
13. In study of chlorination of propane four products (A, B, C, D) of molecular formula  $\text{C}_3\text{H}_6\text{Cl}_2$  were obtained. On further chlorination of the above products A gave one trichloro product, B gave two whereas C and D gave three each. When optically active C was chlorinated one of trichloro propanes was optically active and remaining two were optically inactive. Identify the structures of A, B, C and D, and explain formation of products.



## EXERCISE – III (JEE-MAIN)

1. The reaction of propene with  $\text{HOCl}(\text{Cl}_2 + \text{H}_2\text{O})$  proceeds through the intermediate :

[JEE MAIN 2016]

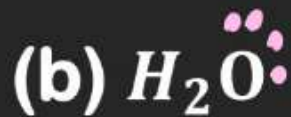




## EXERCISE – III (JEE-MAIN)

3. The increasing order of nucleophilicity of the following nucleophiles is:

[JEE MAIN-2019]



(A) (b) < (c) < (d) < (a)

(C) (a) < (d) < (c) < (b)

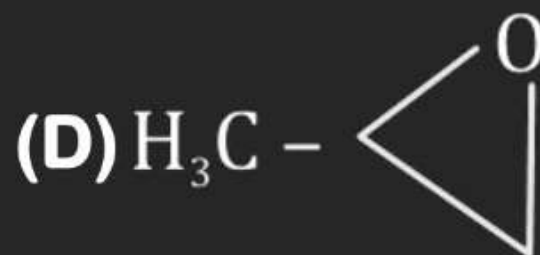
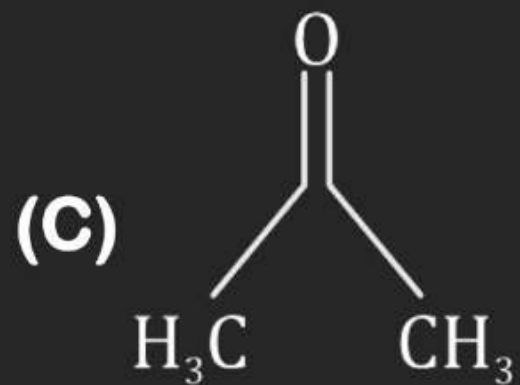
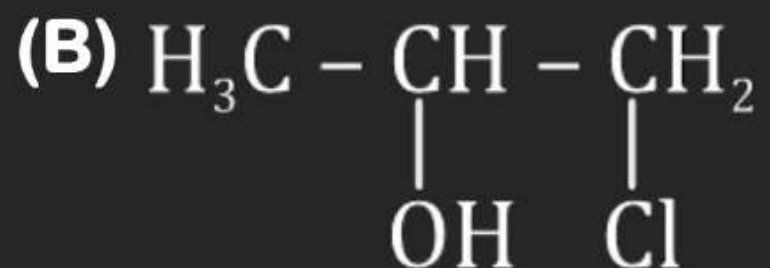
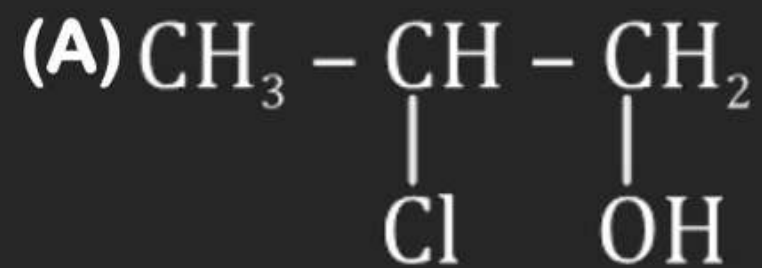
(B) (b) < (c) < (a) < (d)

(C) (d) < (a) < (c) < (b)

## EXERCISE – III (JEE-MAIN)

4. The major product of the following addition reaction is:

[JEE MAIN-2019]





## EXERCISE – III (JEE-MAIN)

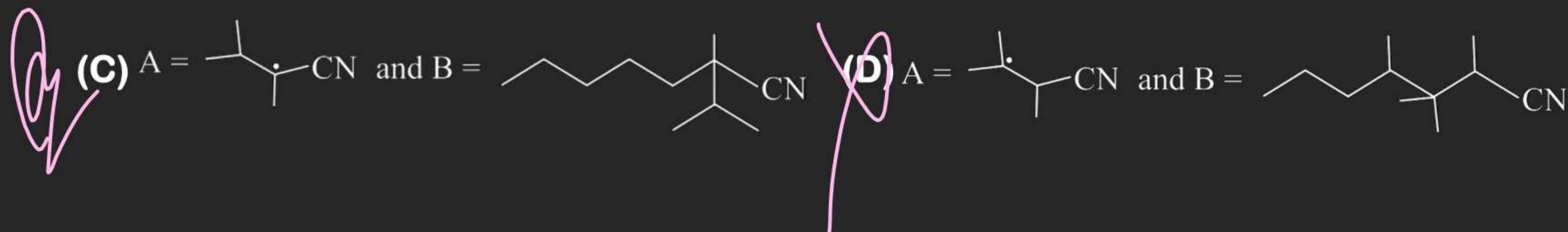
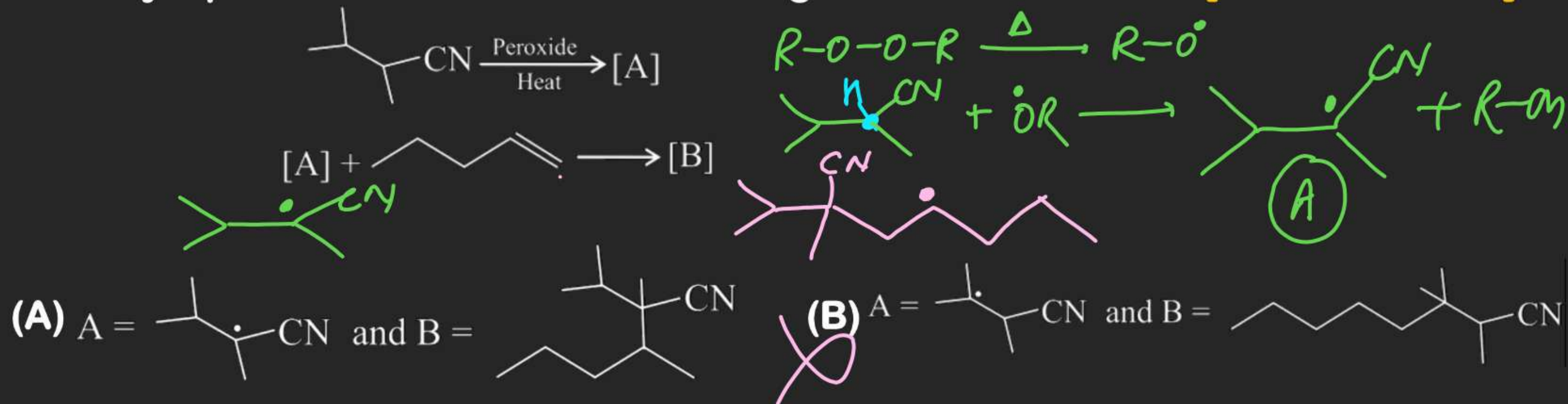
6. Which one of the following alkenes when treated with HCl yields majorly an anti Markovnikov product?  
[JEE MAIN-2019]



## EXERCISE – III (JEE-MAIN)

8. The major products A and B in the following reactions are :

[JEE MAIN-2020]

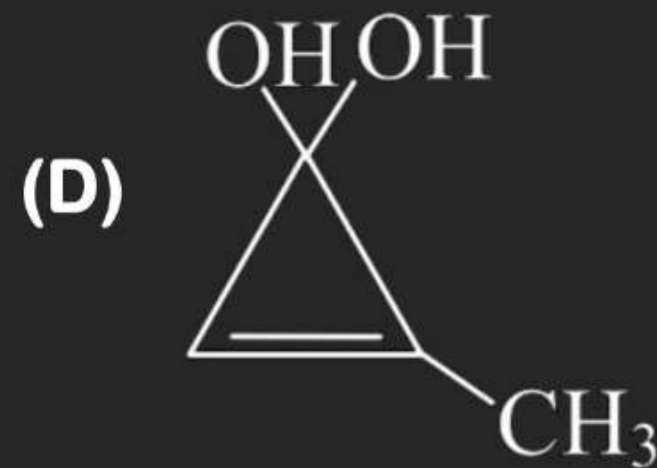
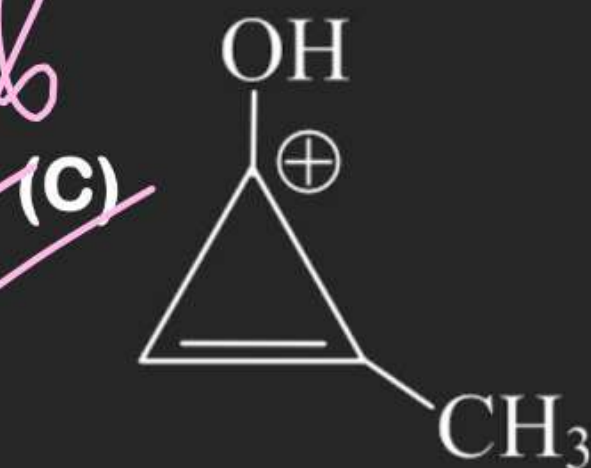
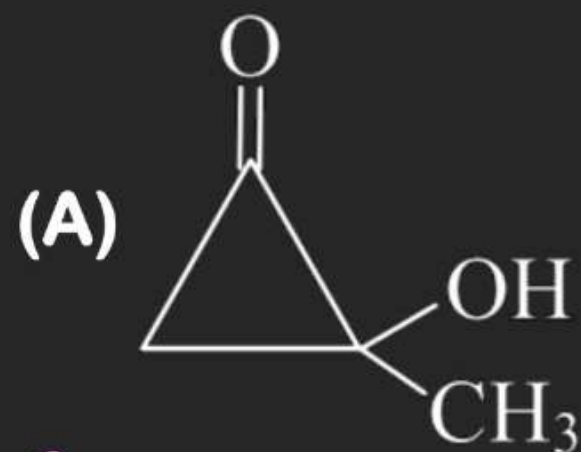
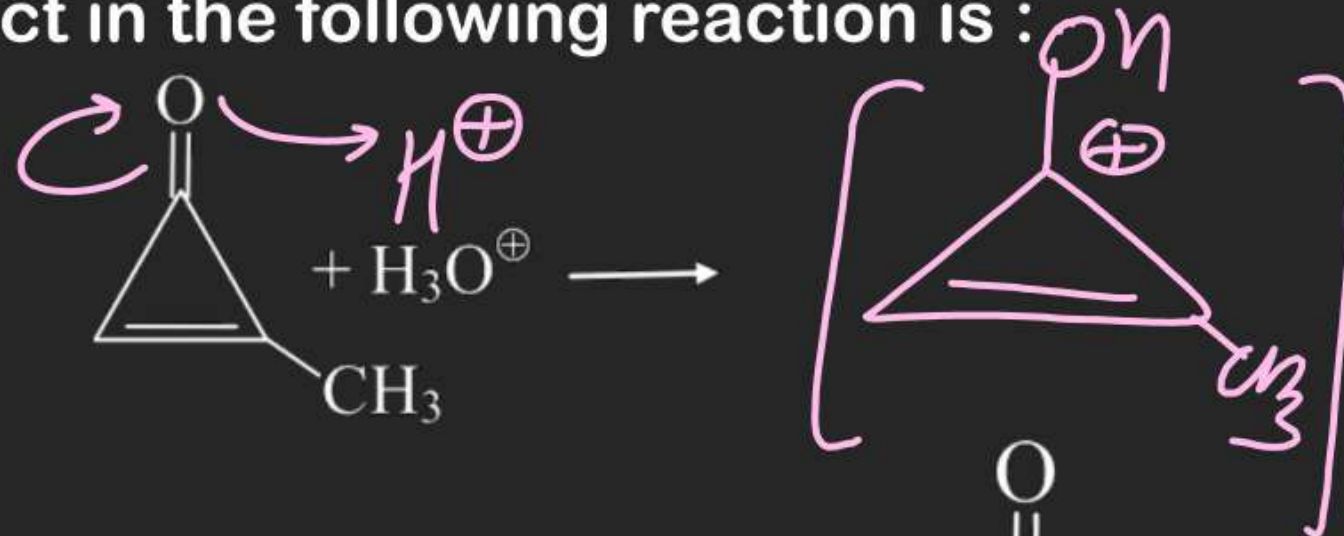




## EXERCISE – III (JEE-MAIN)

10. The major product in the following reaction is :

[JEE MAIN-2020]



## EXERCISE - III (JEE-MAIN)

13. In the given reaction 3-Bromo-2, 2 -dimethyl butane  $\xrightarrow{C_2H_5OH}$  'A' (Major Product) Product

A is:

- (A) 2-Ethoxy-3, 3-dimethyl butane  
(B) 1-Ethoxy-3, 3-dimethyl butane  
(C) 2-Ethoxy-2, 3 -dimethyl butane  
(D) 2-Hydroxy-3, 3-dimethyl butane

[JEE MAIN-2021]

