(ix) This Reaction of R-OH & LR is Used in POC for distinguishion b/w 1°, 2° & 3° Alcohols By noticing time taken to appear turbidity.

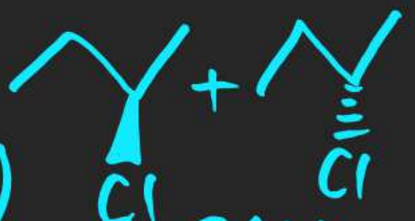
Allylic 1°/2° ⇒ 3° ⟶ Immidiate turbidity
Benzylic

2° ⟶ 5 to 7 min

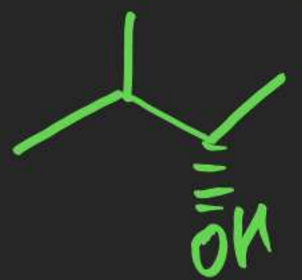
1° ⟶ No Turbidity
(gives turbidity on heating)

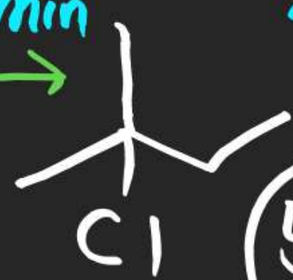
Ex: Complete following & also predict time taken to appear turbidity.

(1) 

$\xrightarrow[ZnCl_2]{HCl}$ (5 to 7 min)


2(±)

(2) 

$\xrightarrow{\text{''min}}$


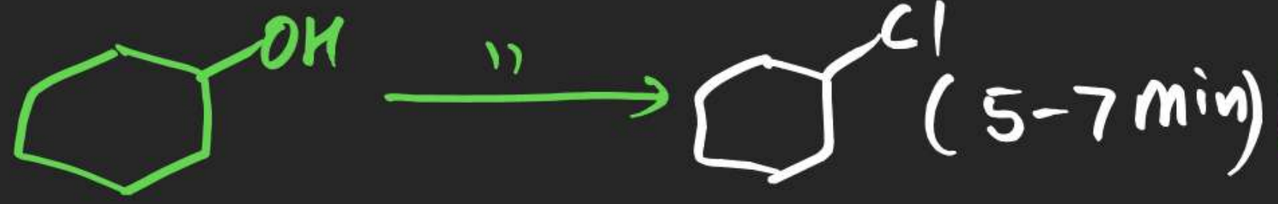
5 to 7 min

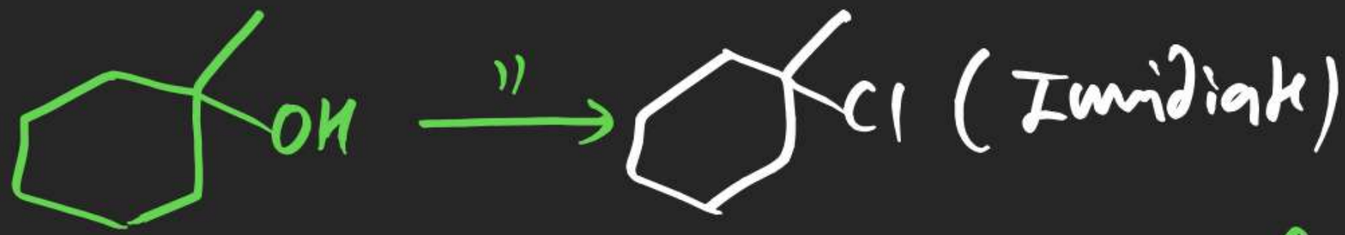
(3) 

$\xrightarrow{\text{''}}$


(Immidiate)

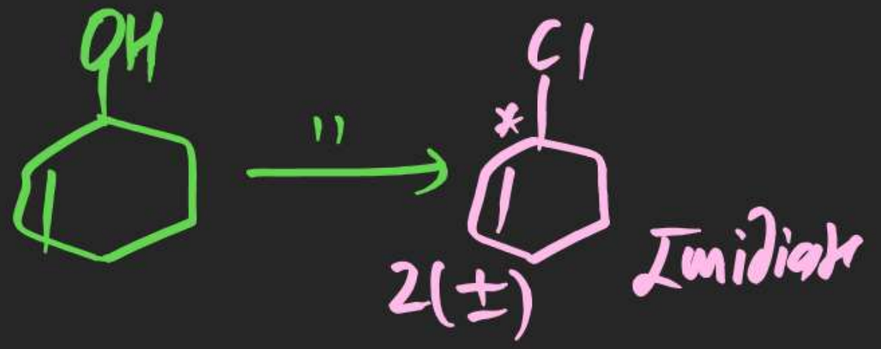
Nishant Jindal

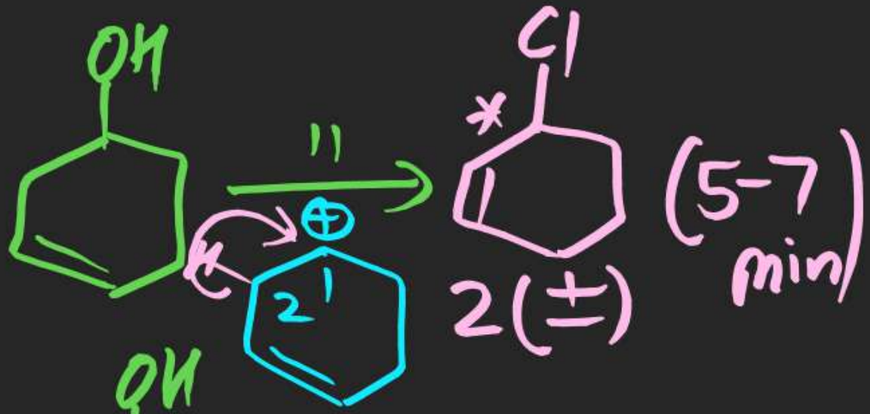
(4)  (5-7 min)

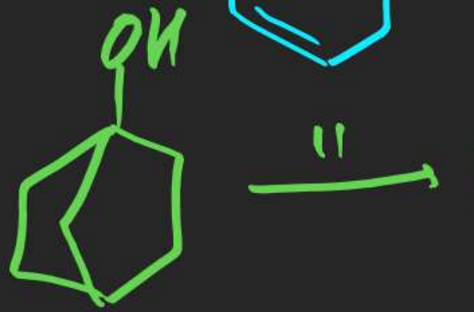
(5)  (Immediate)

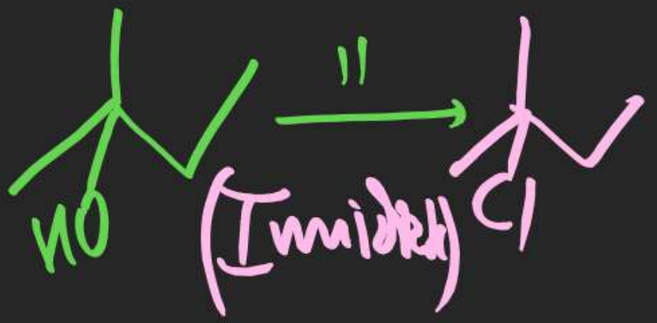
(6)  (5-7 min)

(7) 

(8) 

(9) 

(10) 

(11) 

Complete following :-

(12) $CH_3-CH_2-\ddot{O}H + NaCl \longrightarrow$ No Rxn

(Nu) (Nu)

(13) $CH_3-CH_2-OH + NaI \longrightarrow$ No Rxn

(Nu) (Nu)

mIup

(14) $CH_3-CH_2-OH + NaI + H_2SO_4 \longrightarrow$ ~~CH_3-CH_2-I~~

Nu Nu (E)

mIup

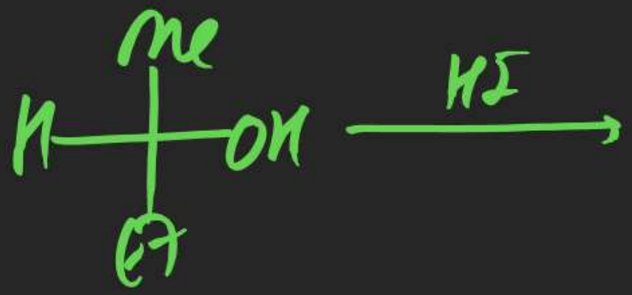
$NaI + H_2SO_4 \longrightarrow I_2$

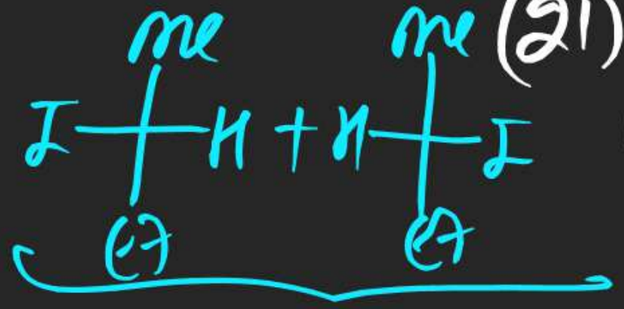
oxidising agent

(15) $CH_3-CH_2-OH + NaI + H_3PO_4 \longrightarrow CH_3-CH_2-I$

(Nu) (Nu) (E)

Nishant Jindal

(16) 

(21) 

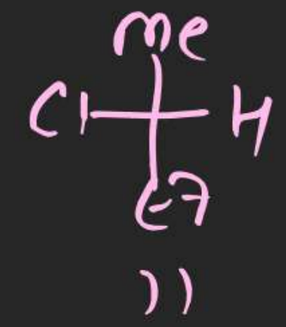
PCl_3 (SN^2)

PCl_5 (SN^2)

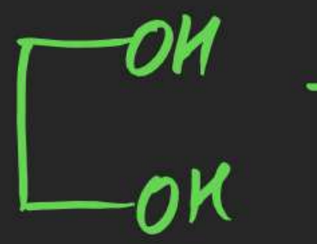
$SOCl_2/Py$ (SN^2)

$SOCl_2$ (SN^i)

$HCl/ZnCl_2$ (SN^1)



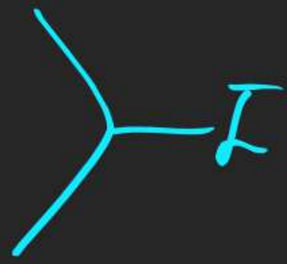
))

(17) 

HI (Excess), Δ

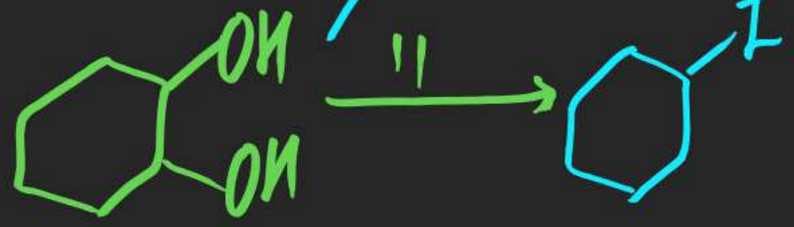
(18) 

))



(19) 

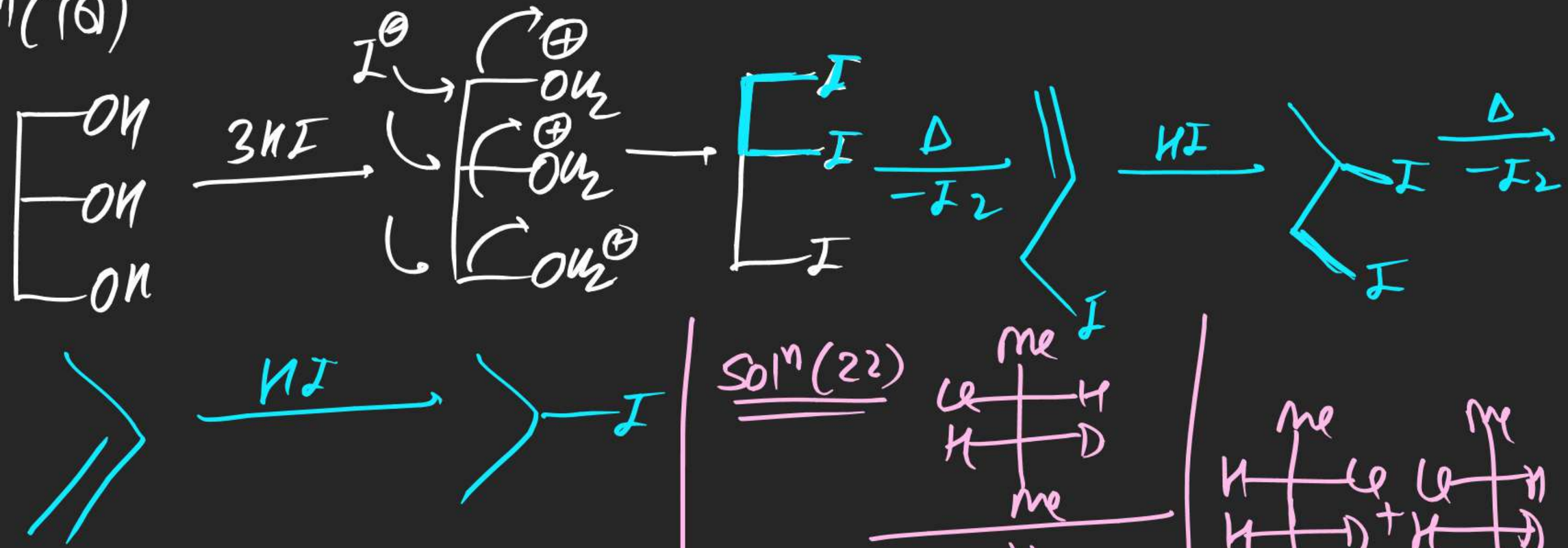
))

(20) 

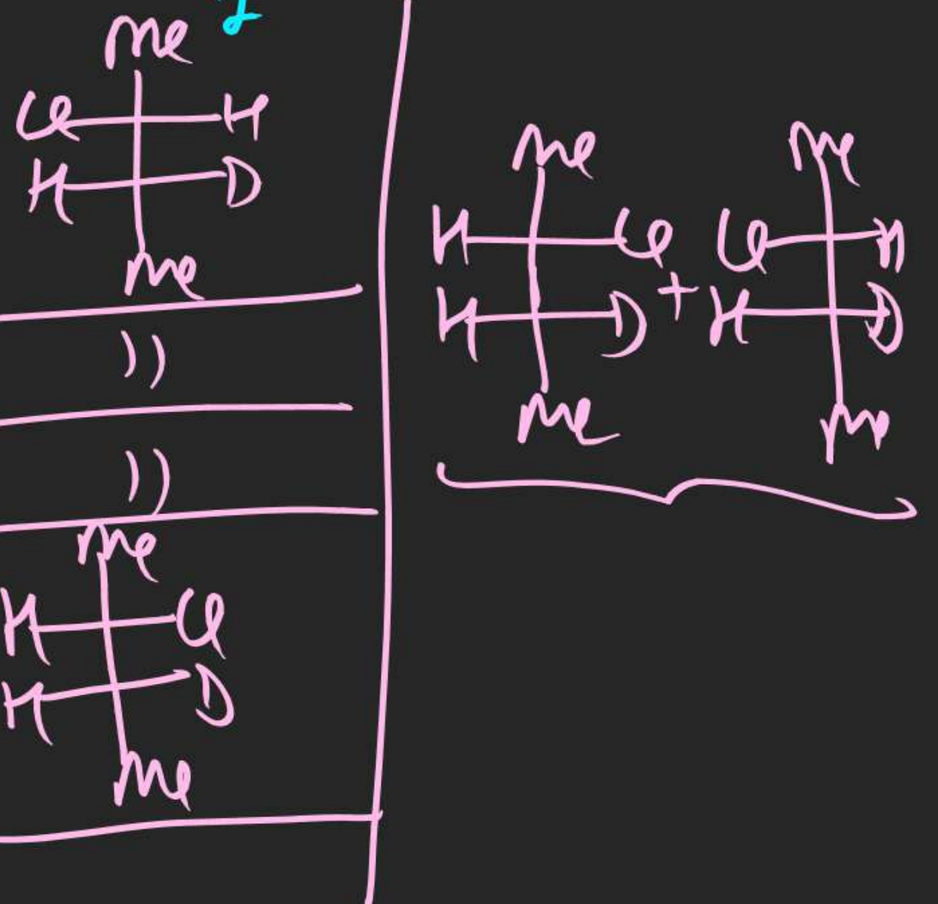
(22) 

(

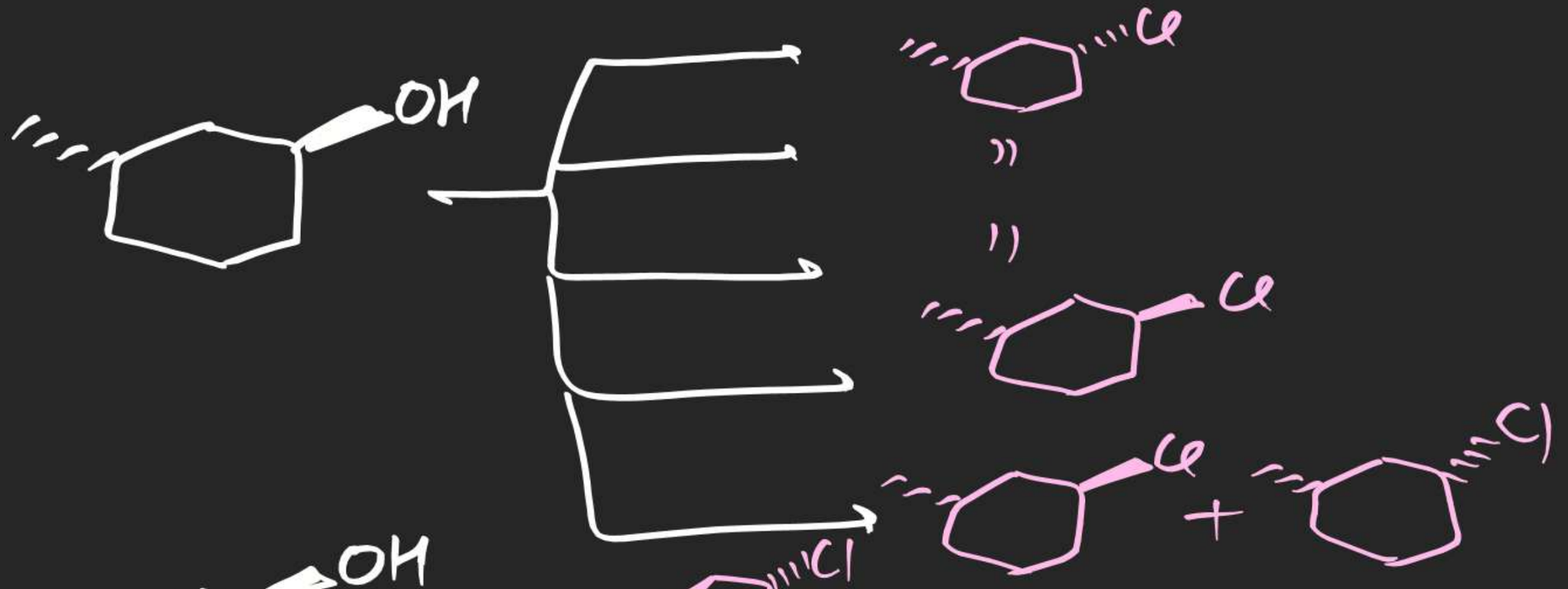
Soln (21)



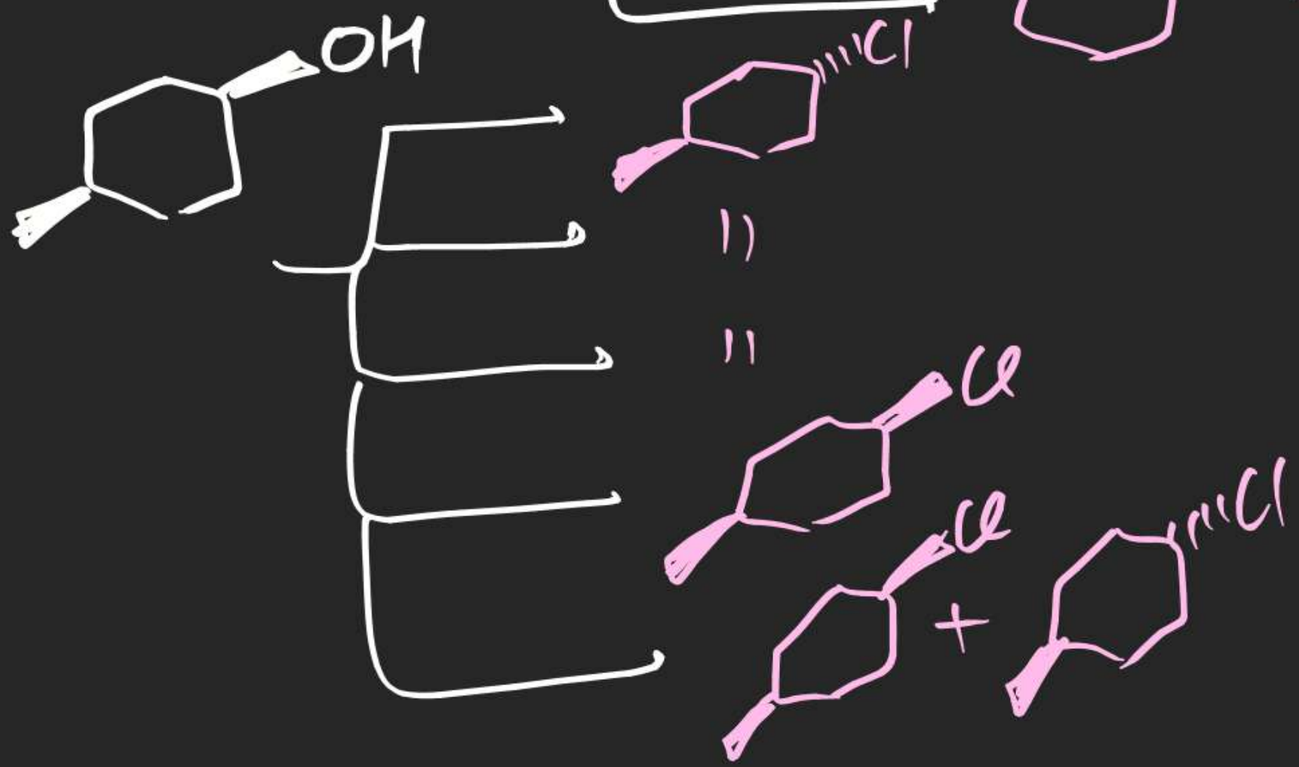
Soln (22)



(23)

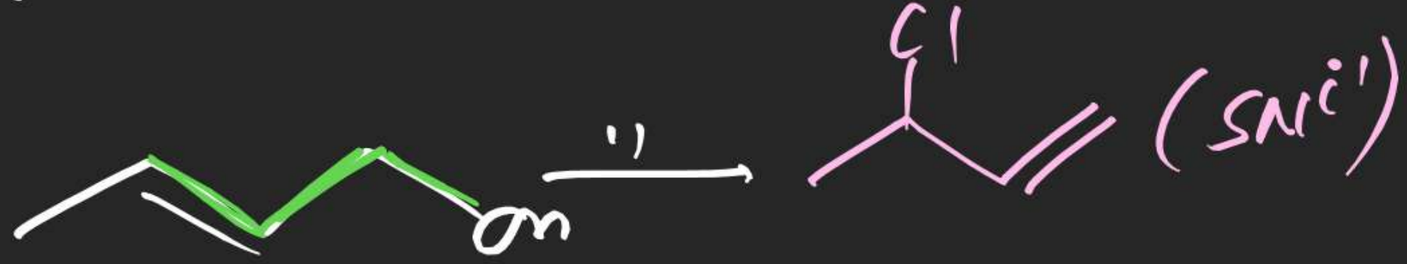


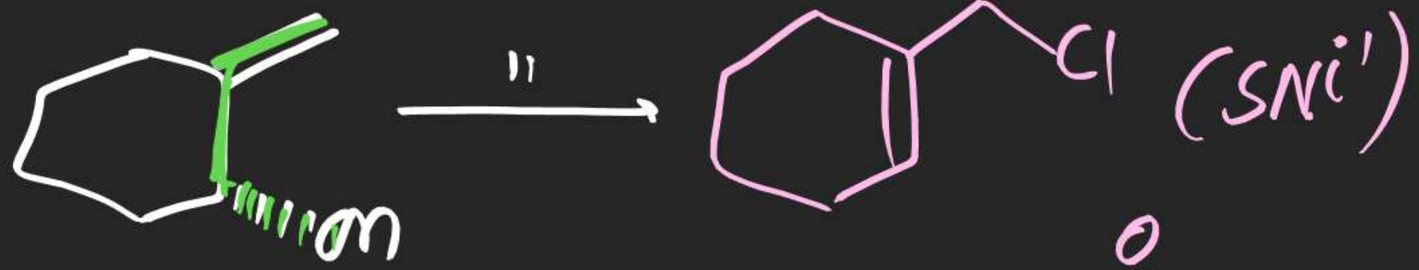
(24)



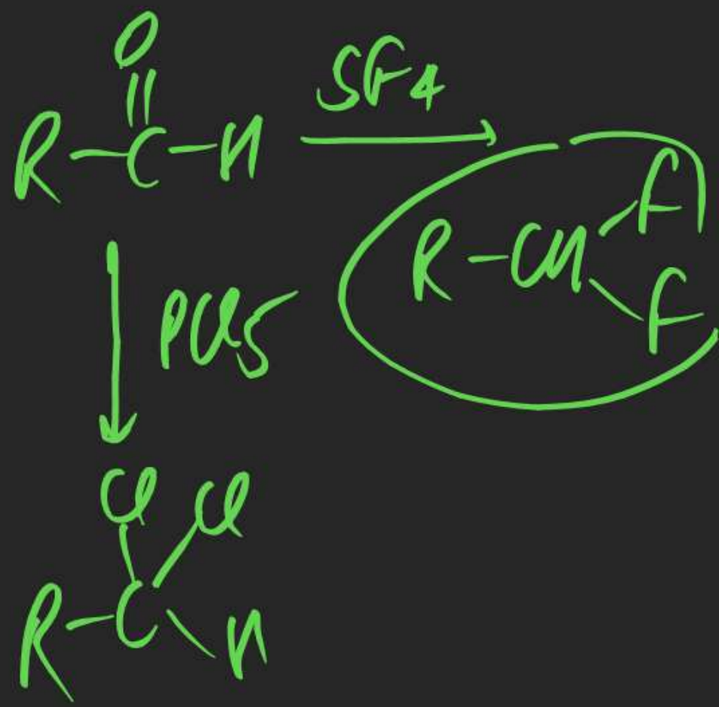
Nishant Jindal

(25) 

(26) 

(27) 

(28) 

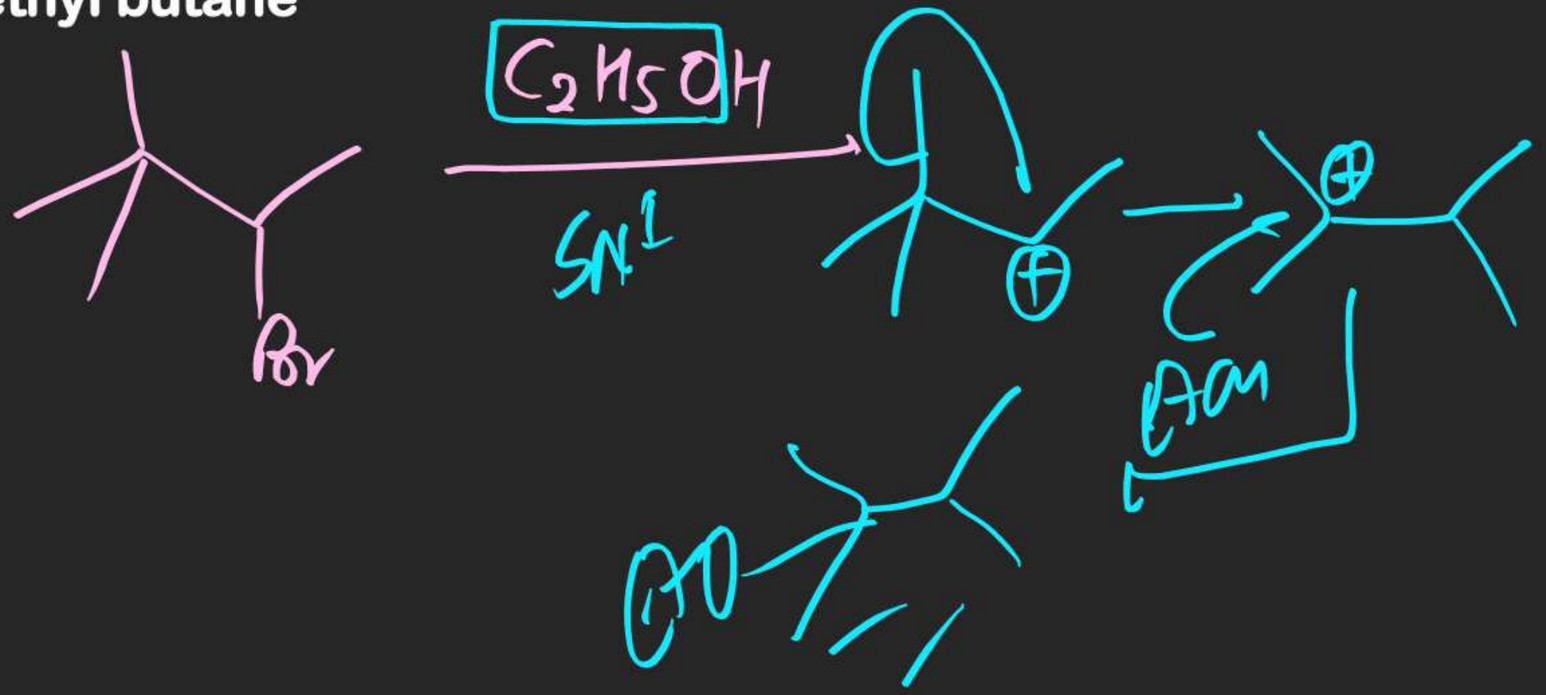


EXERCISE – III (JEE-MAIN)

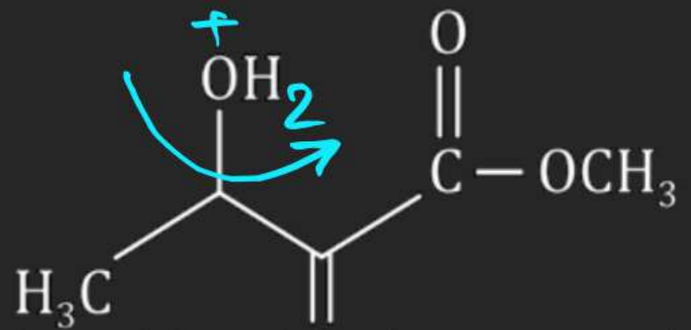
13. In the given reaction 3 -Bromo-2, 2 -dimethyl butane $\xrightarrow{C_2H_5OH}$ $\underset{\text{(Major Product)}}{'A'}$ Product A is:

[JEE MAIN-2021]

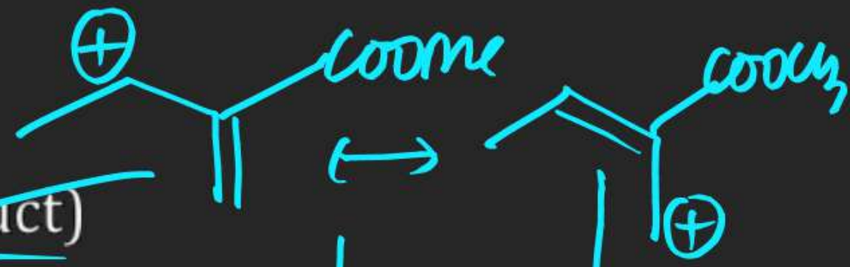
(A) 2-Ethoxy-3, 3-dimethyl butane
(B) 1-Ethoxy-3, 3-dimethyl butane
(C) 2 -Ethoxy-2, 3 -dimethyl butane
(D) 2-Hydroxy-3, 3-dimethyl butane



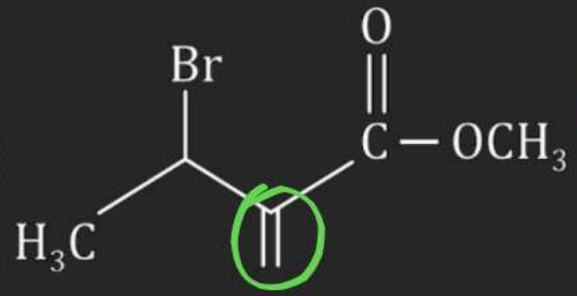
EXERCISE – III (JEE-MAIN)

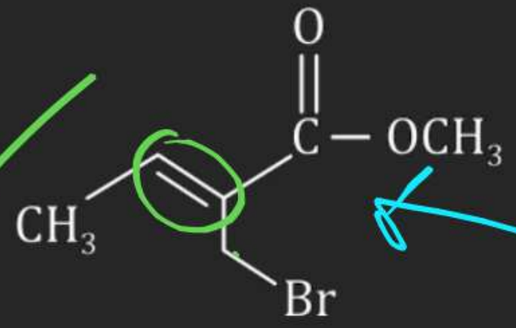
15. 

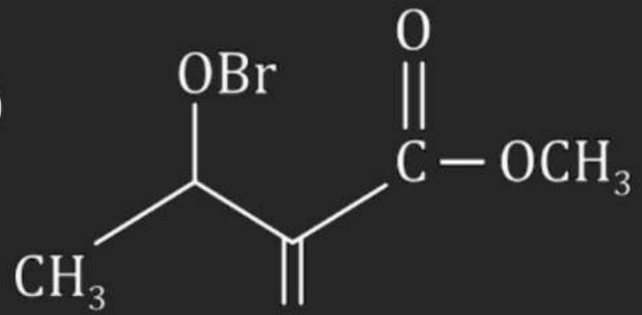
Conc. HBr → "P" (Major Product)

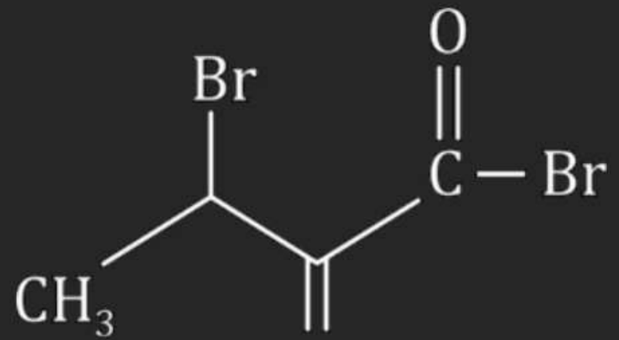


Consider the above reaction, the major product " P " formed is :- [JEE MAIN-2021]

(A) 

(B) 

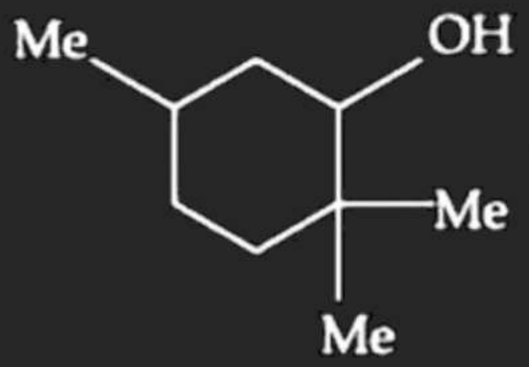
(C) 

(D) 

EXERCISE – III (JEE-MAIN)

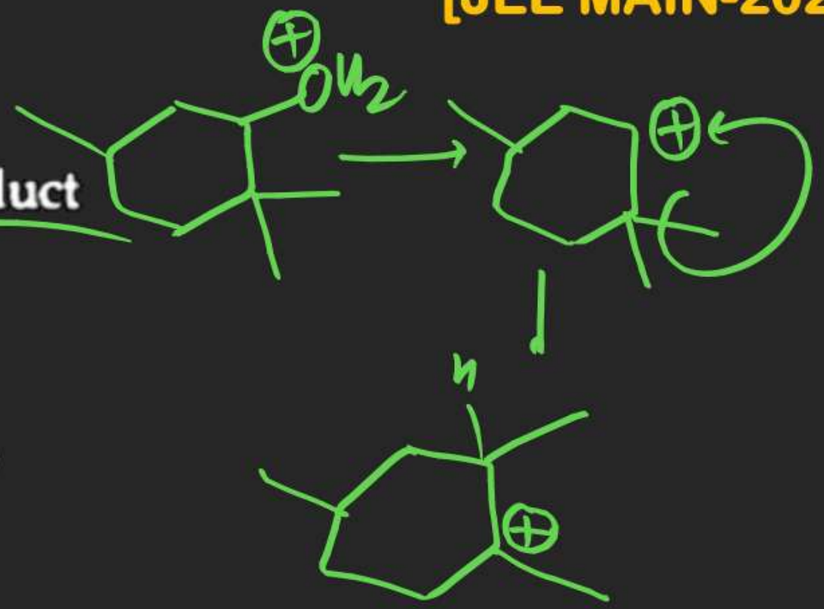
18.The major product (P) of the given reaction is (where, Me is $-CH_3$)

[JEE MAIN-2022]

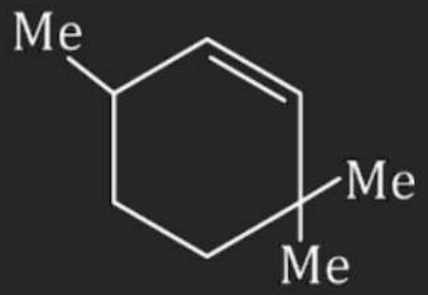


$\xrightarrow{H^+}$ P

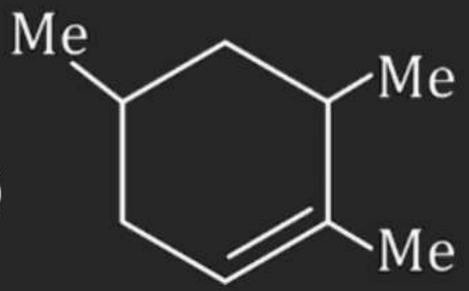
Major Product



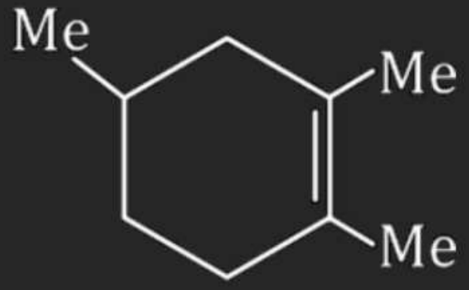
(A)



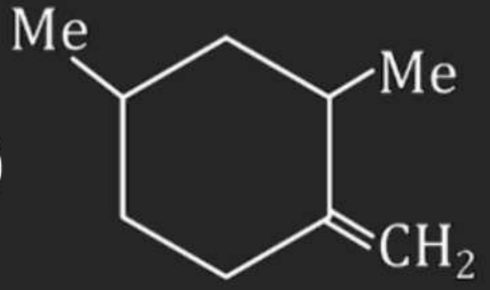
(B)

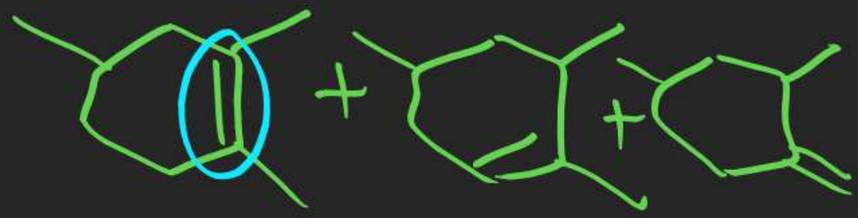


(C)



(D)





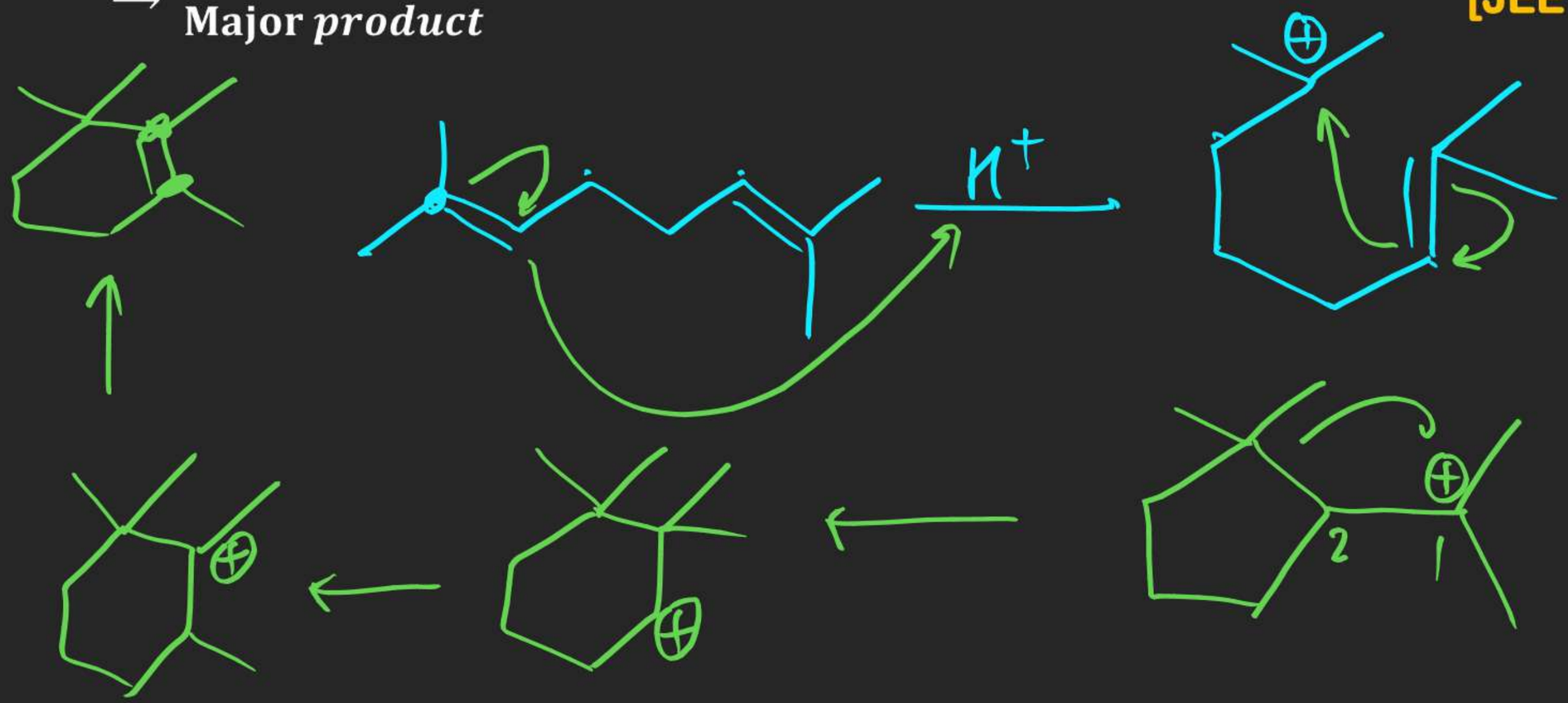
EXERCISE – III (JEE-MAIN)

19. The major product 'A' of the following given reaction has _____ sp^2 hybridized carbon atoms. 2,7 - Dimethyl1 - 2,6-octadiene

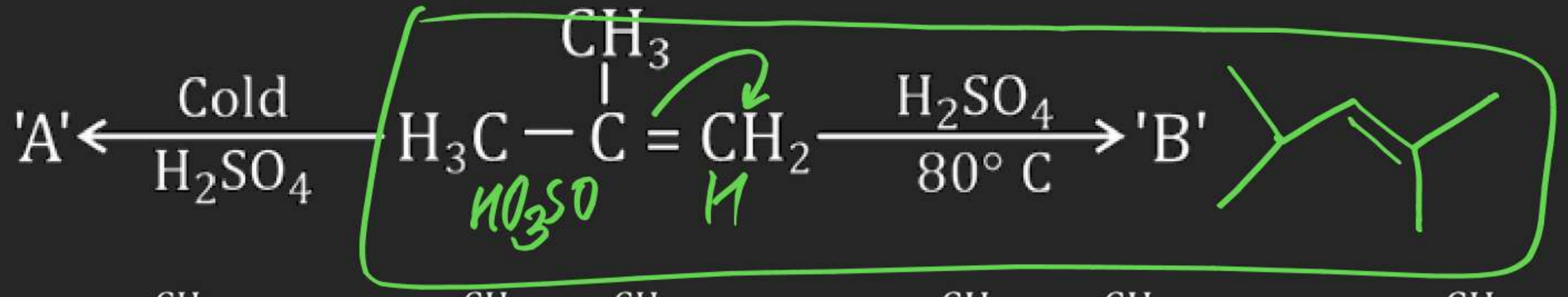
$\xrightarrow{H^+}$ A

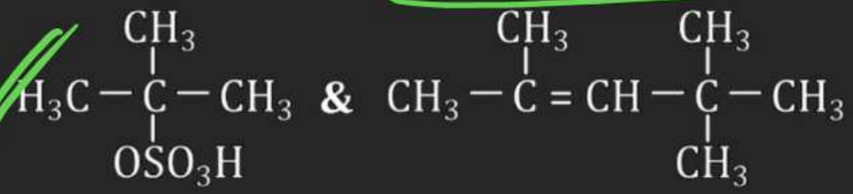
Major *product*

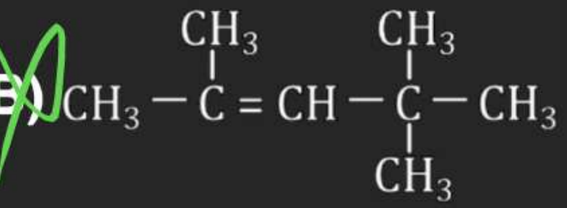
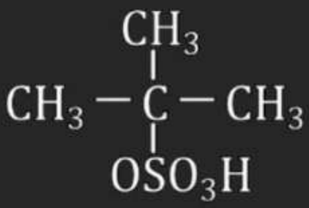
[JEE MAIN-2022]

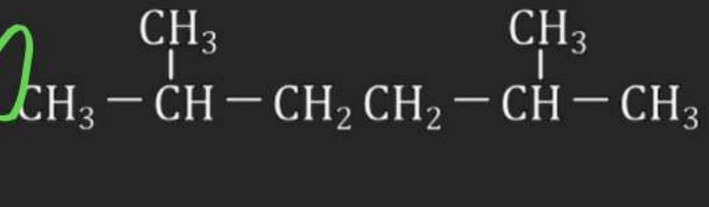
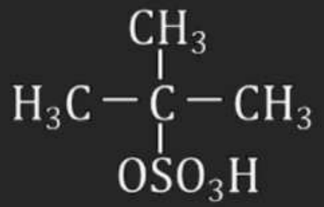


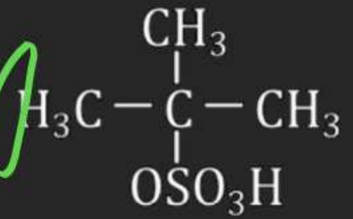
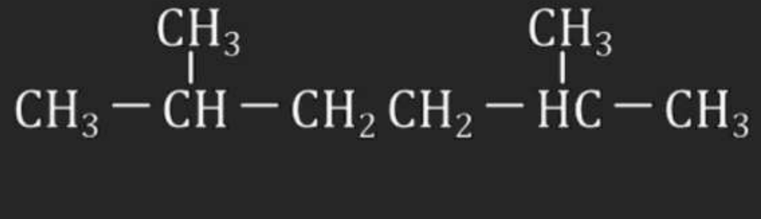
26. The major products ' A ' and ' B ', respectively, are **[JEE MAIN-2023]**



(A)  **&**

(B)  **&** 

(C)  **&** 

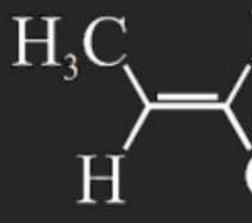
(D)  **&** 

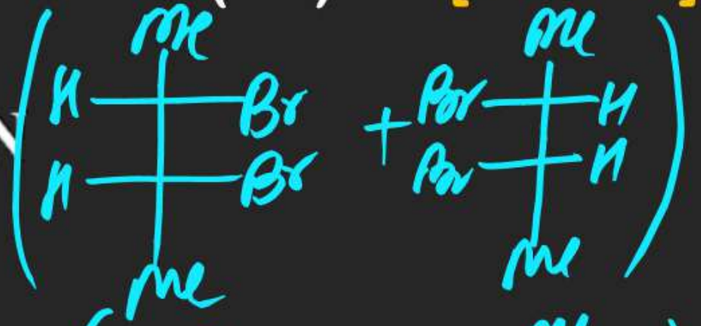
2. Which of the following has the highest nucleophilicity? [IIT 2000]

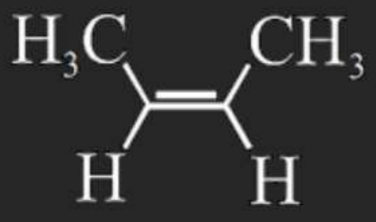
(A) F^- (B) OH^- (C) CH_3^- (D) NH_2^-

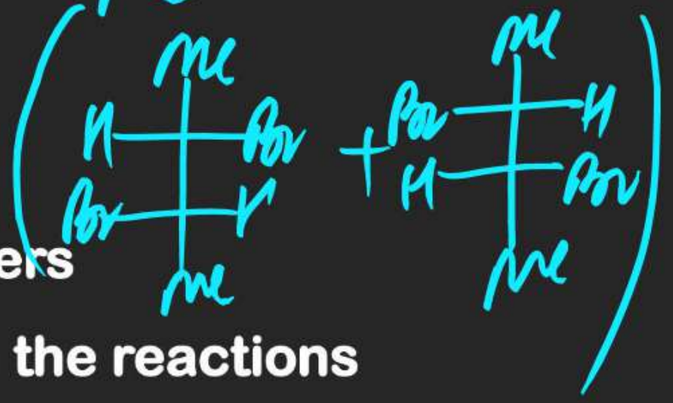
$CH_3^- > NH_2^- > OH^- > F^-$

4. The correct statement(s) for the following addition reactions is (are) [IIT 2017]

(i)  Trans $\xrightarrow[\text{Anti}]{Br_2/CHCl_3}$ M and N



(ii)  Cis $\xrightarrow[\text{Anti}]{Br_2/CHCl_3}$ O and P



(A) (M and O) and (N and P) are two pairs of diastereomers

(B) Bromination proceeds through trans-addition in both the reactions

(C) O and P are identical molecules

(D) (M and O) and (N and P) are two pairs of enantiomers

7. **Match the reactions in List-I with the features of their products in List-II and choose the correct option.** [IIT 2023]

List-I

(P) (-)-1-Bromo-2-ethylepentane (single enantiomer) $\xrightarrow[S_N2 \text{ reaction}]{\text{aq. NaOH}}$

(Q) (-)-2-Bromopentane (single enantiomer) $\xrightarrow[S_N2 \text{ reaction}]{\text{aq. NaOH}}$

(R) (-)-3-Bromo-3-methylhexane (single enantiomer) $\xrightarrow[S_N1 \text{ reaction}]{\text{aq. NaOH}}$

(S) 

(single enantiomer) $\xrightarrow[S_N1 \text{ reaction}]{\text{aq. NaOH}}$

List-II

(1) Inversion of configuration

(2) Retention of configuration

(3) Mixture of enantiomers

(4) Mixture of structuralisomers

(5) Mixture of diastereomers

(A) $P \rightarrow 1; Q \rightarrow 2; R \rightarrow 5; S \rightarrow 3$

(B) $P \rightarrow 2; Q \rightarrow 1; R \rightarrow 3; S \rightarrow 5$

(C) $P \rightarrow 1; Q \rightarrow 2; R \rightarrow 5; S \rightarrow 4$

(D) $P \rightarrow 2; Q \rightarrow 4; R \rightarrow 3; S \rightarrow 5$

Nishant Jindal

(#) Cleavage of Ether : (Reaction of Ether with HI)

⇒ On Reaction of Ether with HI mixture of alcohol & alkyl iodide or mixture of alkyl Iodides are obtained.

(1) $R-\underset{(Nu)}{O}-R + \underset{(Nu)}{NaOH} \longrightarrow$ No Rxn

(2) $R-O-R + NaI \longrightarrow$ No Rxn

(3) $R-O-R + H-I \xrightarrow{Cold} R-OH + R-I$

(4) $R-O-R + H-I \xrightarrow{Hot} R-I + R-I + H_2O$

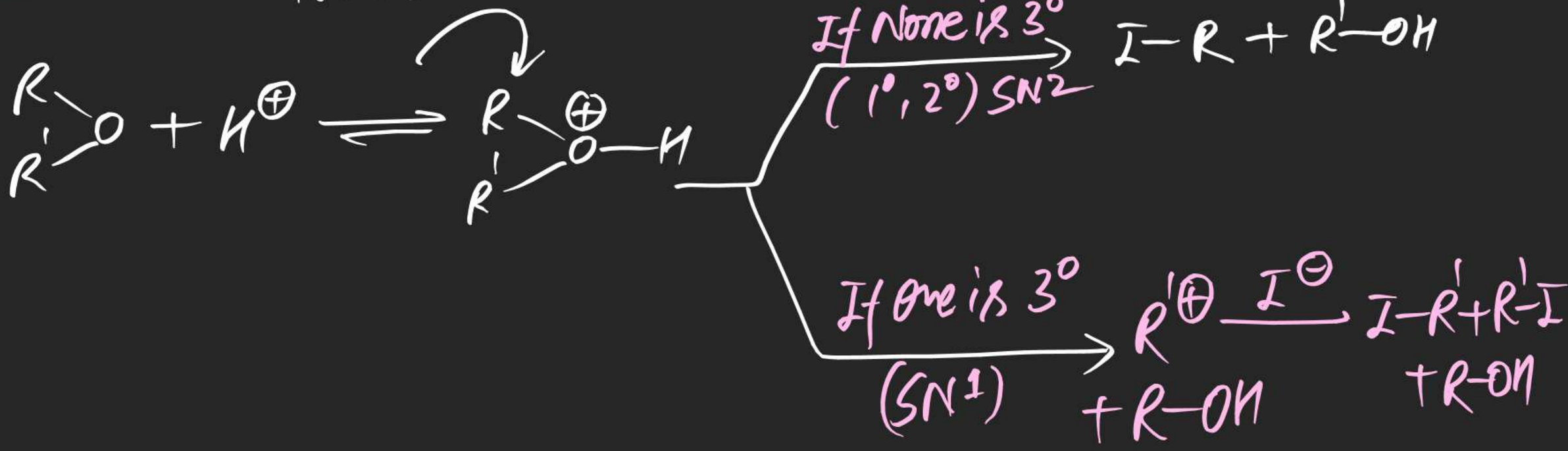
(5) $R-O-R' + H-I \xrightarrow[(Excess)]{Hot} R-I + R'-I + H_2O$

(6) $R-O-R' + H-I \xrightarrow[(Excess)]{Cold} R-OH + R'-I \,/\, R'-OH + R-I$

Nishant Jindal

Mechanism

Let us Consider $R' > R$ in size



(7) $H_3C-\overset{18}{O}-CH_3 + H-I \xrightarrow{\text{Cold}}$

(8) $H_3C-\overset{18}{O}-CH_2-CH_3 + H-I \xrightarrow{\text{cold}}$

(9) $CH_3-{}^{18}O-CH(CH_3)_2 \xrightarrow[HI]{\text{Cold}}$

(10) $CH_3-{}^{18}O-C(CH_3)_3 \xrightarrow{''}$

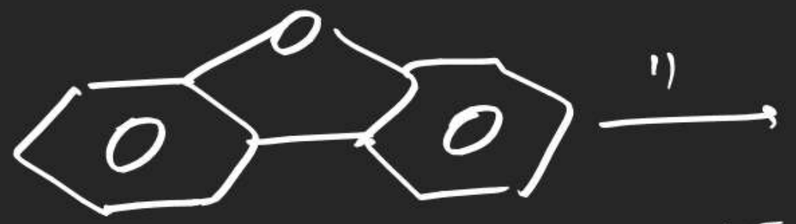
(11) $Ph-{}^{18}O-CH_3 \xrightarrow{\text{Cold HI}}$ / $\xrightarrow{\text{Hot HI}}$

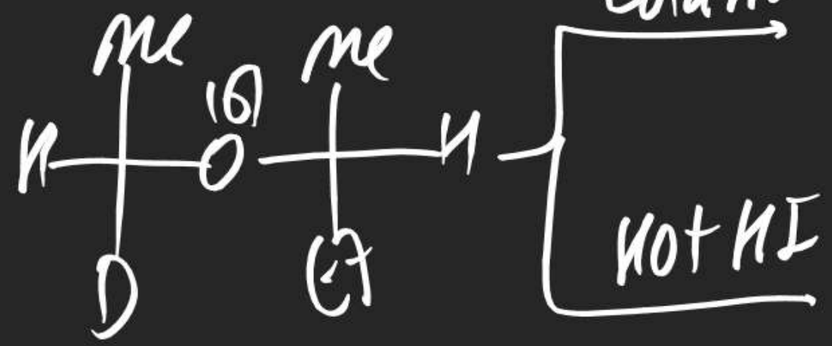
(12) $Ph-O-Ph \xrightarrow{\text{Cold HI}}$ / $\xrightarrow{\text{Hot HI}}$

(13)  $\xrightarrow{''}$

(14)  $\xrightarrow{''}$

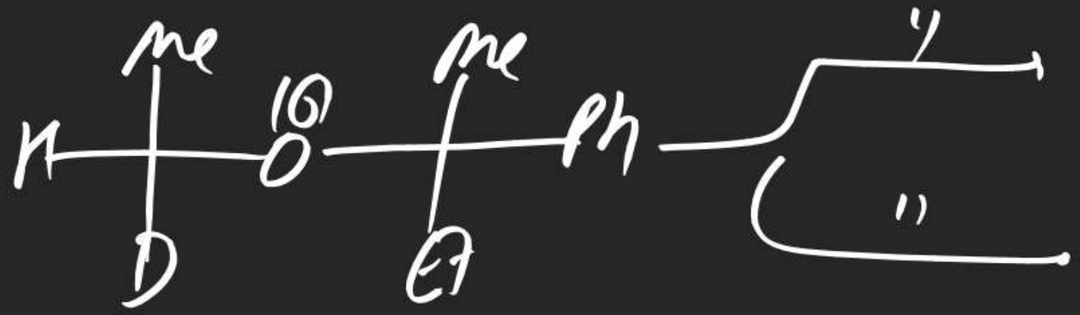
(15)  $\xrightarrow{''}$

(16)  $\xrightarrow{''}$

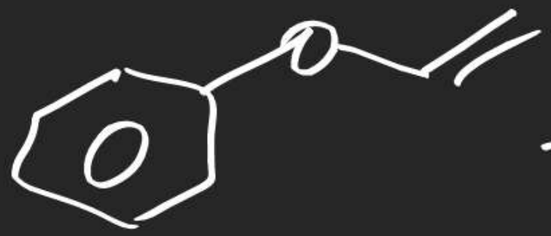
(17) 

Nishant Jindal

(18)

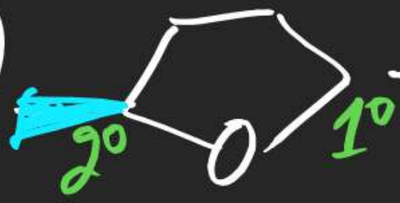


(19)



$\xrightarrow[\text{Excess}]{HI}$

(20)



Cold HI →

Hot HI →

Nishant Jindal

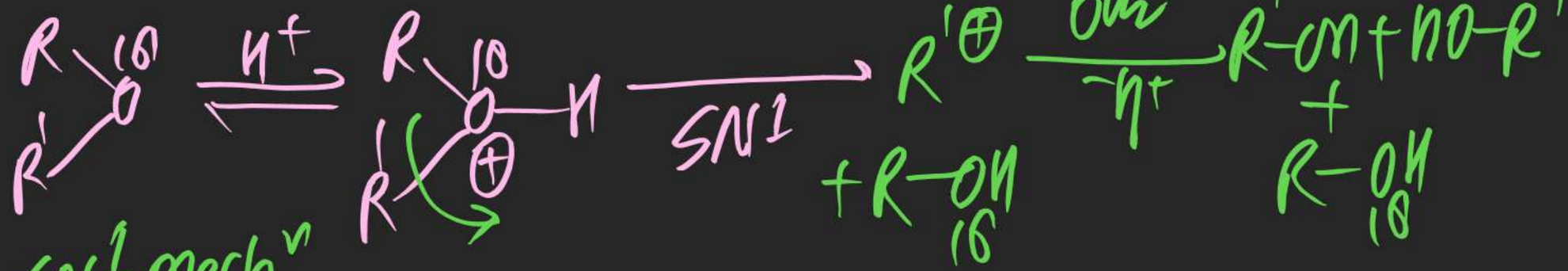
(#) Hydrolysis of Ether :-

⟹ Hydrolysis of Ether gives mixture of alcohol as a Product

(1) $R-O-R + H_2O \xrightarrow{H^{\oplus}} R-OH + R-OH$

(2) $R-\overset{*}{O}-R' + H_2O \xrightarrow[(R'>R)]{H^+} R-\overset{*}{O}H + R'-OH + H_2O$

Mechⁿ:



Note (i) S_N1 mechⁿ

Nishant Jindal

(3) $CH_3-\overset{\oplus}{O}(D)-CH_3 \xrightarrow{H_3O^+}$

(4) 

(5) 

(6) 

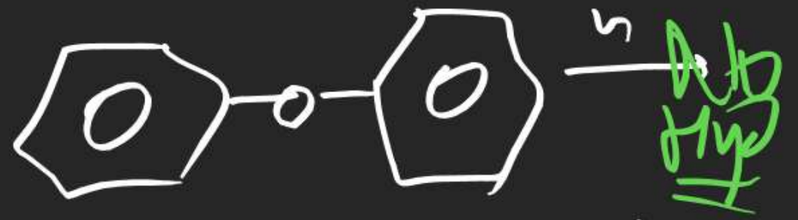
(7) 

(8) 

(9) 

(10) 

(11) 

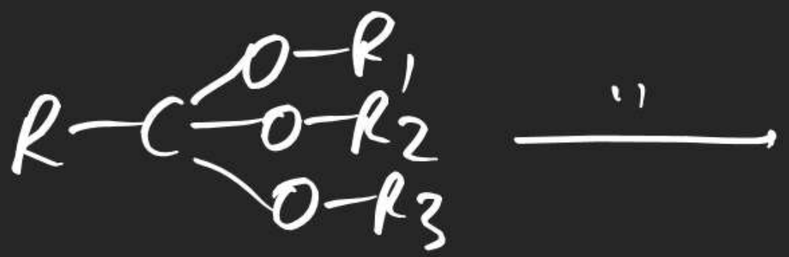
(12) 

(13) 

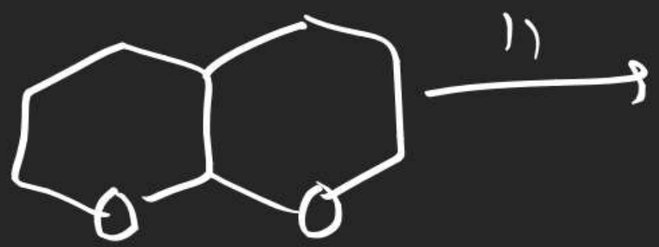
(14) 

Nishant Jindal

(15) 

(16) 

(17) 

(18) 

(19)  $\xrightarrow{H_3O^+}$

(20)  $\xrightarrow{H_3O^+}$

(21)  $\xrightarrow{H_3O^+}$

(22)  $\xrightarrow{H_3O^+}$

(23)  $\xrightarrow{H_3O^+}$

Nishant Jindal

(24) 

(25) 

HW Substitution Sheet First QO