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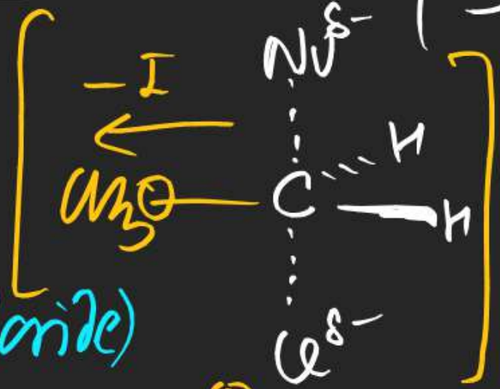
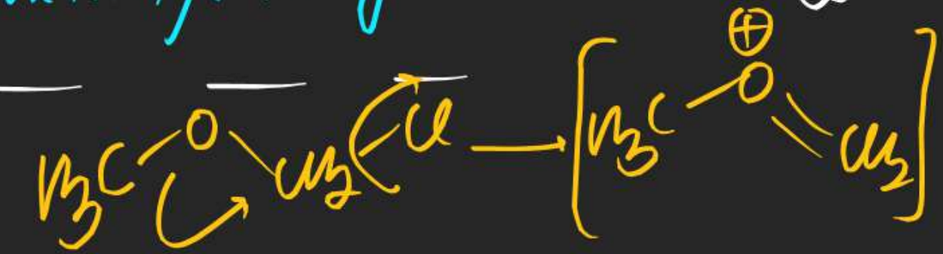
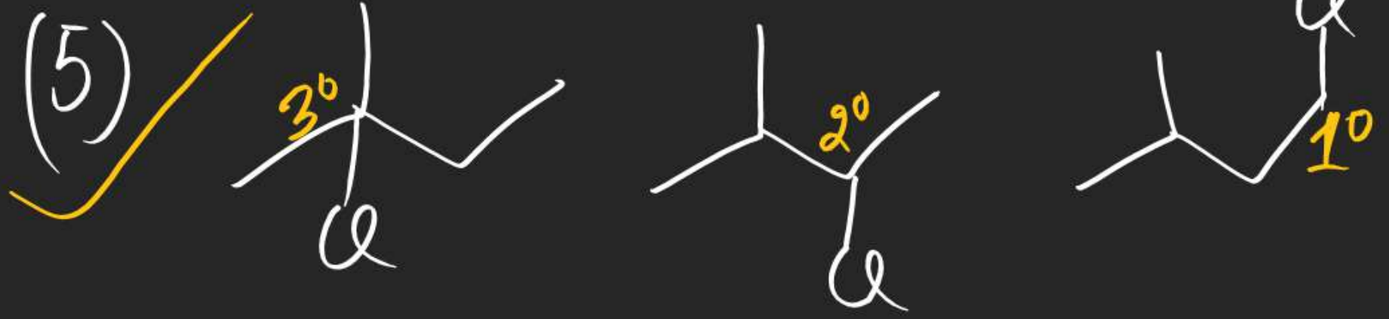
(2) ——— 4>3>2>1 ——— (S_N1)

(3) mom-chloride (methoxymethyl chloride) (2>1)

 (S_N2)

(4) ——— (2>1)  (S_N1)

(5)  (S_N2) (III > II > I)

(6) ——— (S_N1) (I > II > III)

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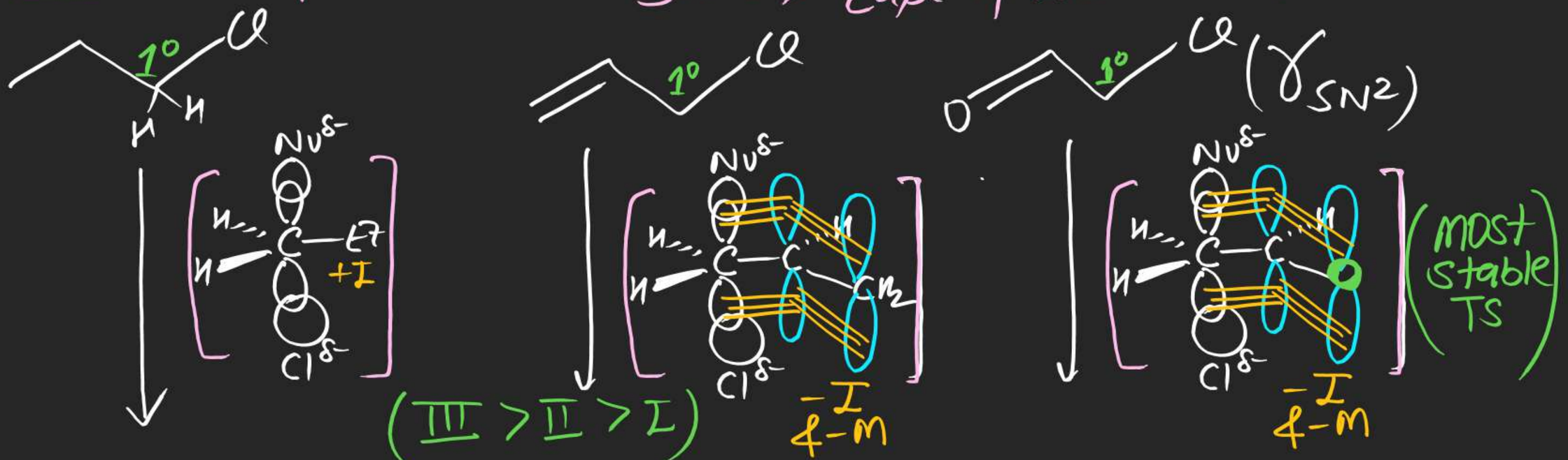
If Substrate degree is same

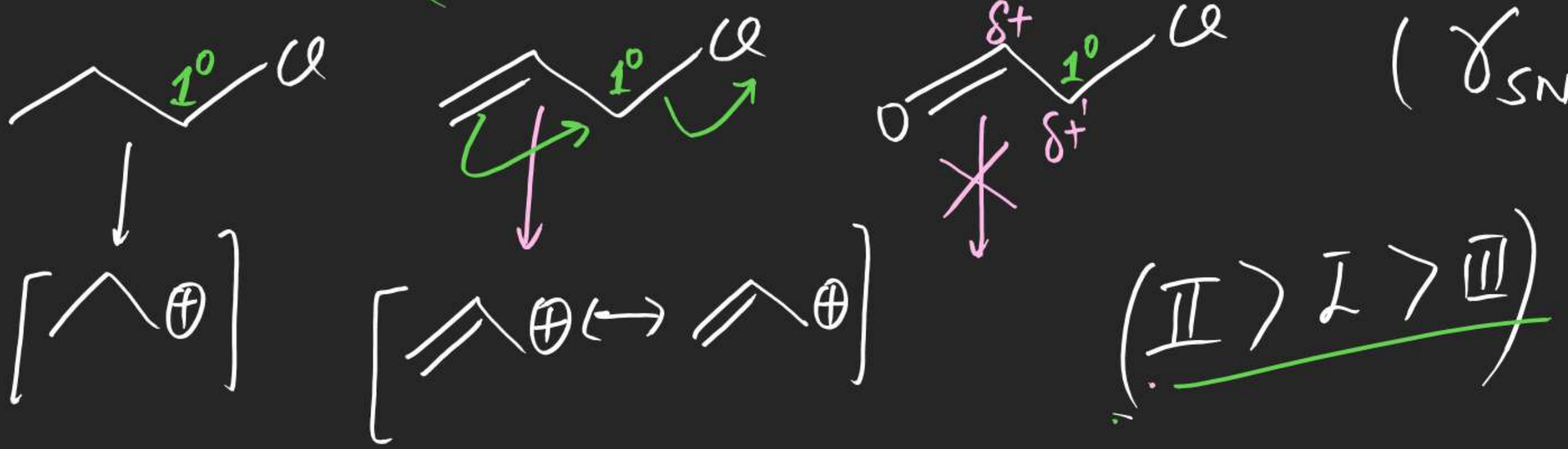
$SN^2 \Rightarrow$ T.S stability (EWG)

$SN^1 \Rightarrow$ Ease of dissociation

(7)



(8)



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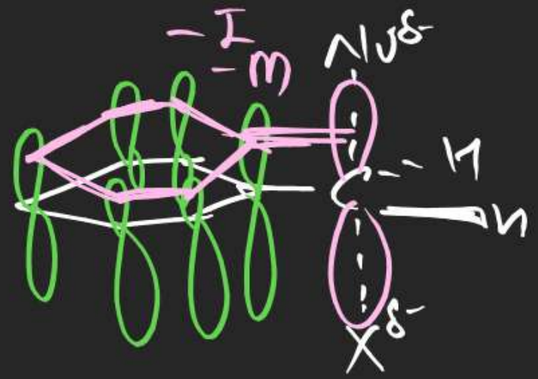
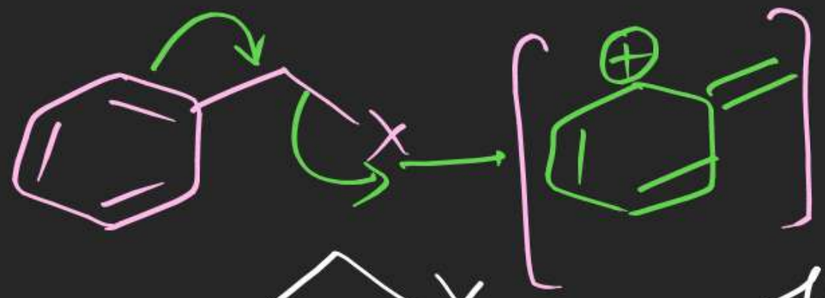
(9) (SN^2) (1>2)



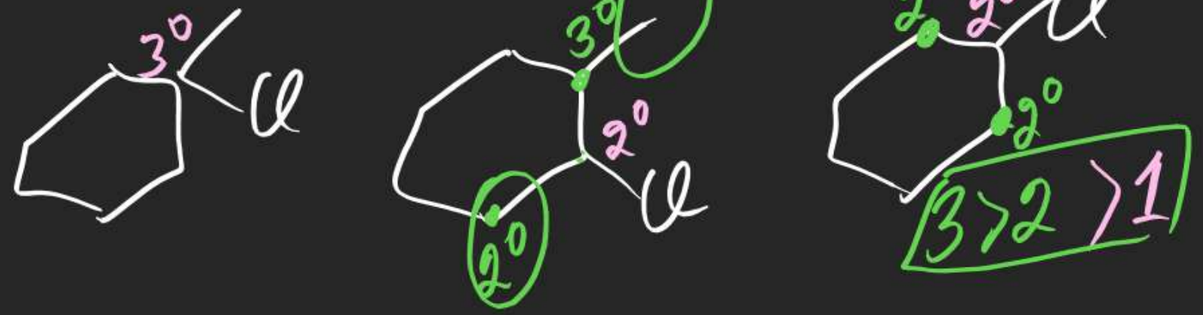
(10)  (SN^1) (1>2)

(11)

(SN^2)

1>2>3

(12) ——————— (3>2>1) ——— (SN^1)

(13) 

(SN^2)

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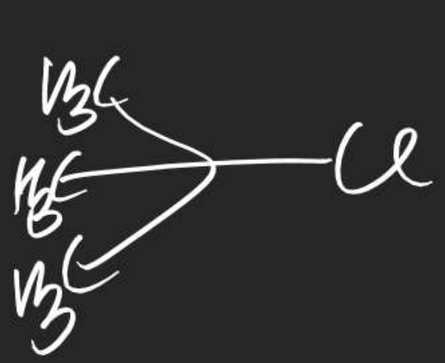
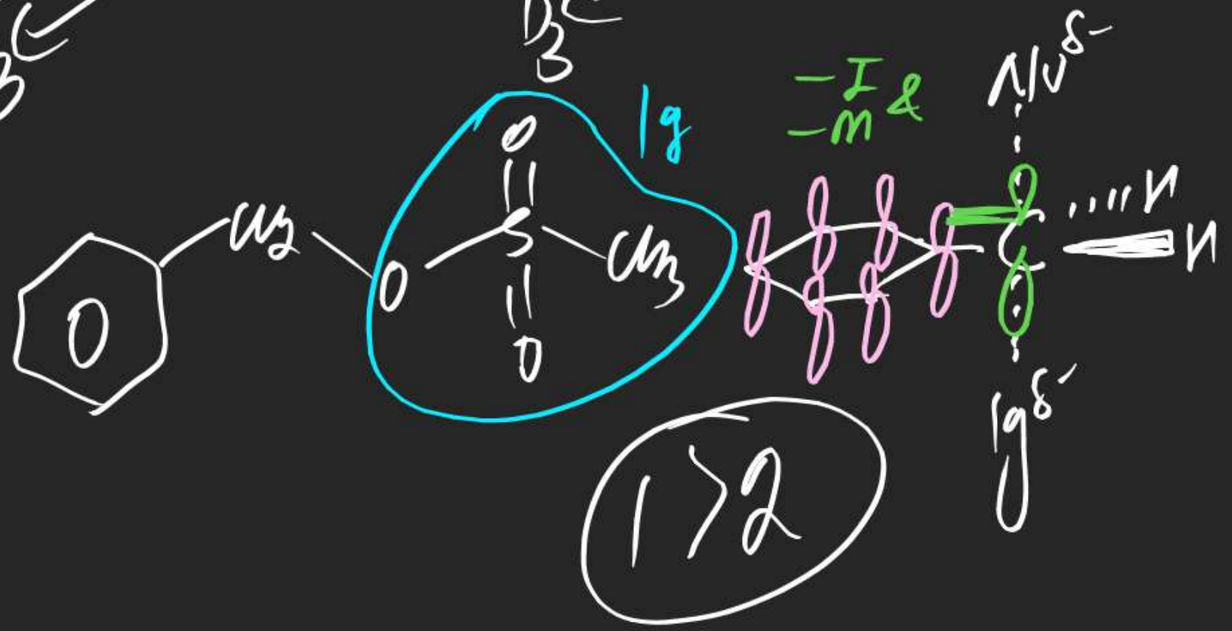
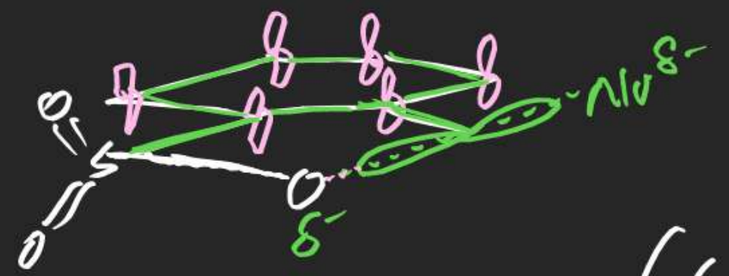
(14) — — — (1 > 2 > 3) — — — (S_N1)

(15) H_3C-Cl D_3C-Cl (S_N2) $1 \simeq 2$

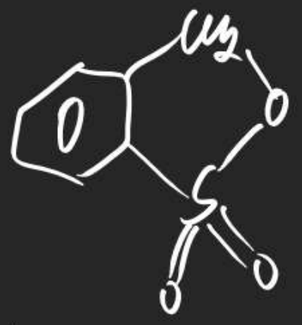
(16)  (S_N1) $1 \simeq 2$

(17) 

1 > 2



(S_N2)



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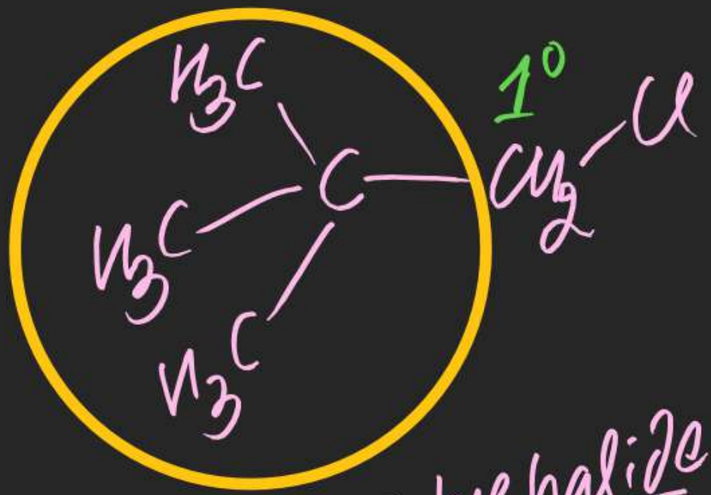
Note: (i) Following halides neither show S_N1 nor S_N2

	S_N1	S_N2
Aryl halide	✗	✗
Vinyl halide	✗	✗
Bridge head halide	✗	✗

(ii)



S_N1	S_N2
✓ (slow)	✗

neopentyl halide

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(18) (SN2)

(19) (SN1)

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Note (i) $I^{\ominus}$ is good leaving Group & as well as good Nucleophile. hence can be used as a Nucleophilic Catalyst in S_N1 Rx^{n}s.

(1) $R-X \xrightarrow{NaOH} HO-R + NaX$

(2) $R-X \xrightarrow[\text{in NaI}]{NaOH} R-OH + NaX$

$\boxed{\gamma_2 > \gamma_1}$ Explain why?

Soln: $I^{\ominus} + R-X \longrightarrow I-R \xrightarrow{NaOH} R-OH + NaI$

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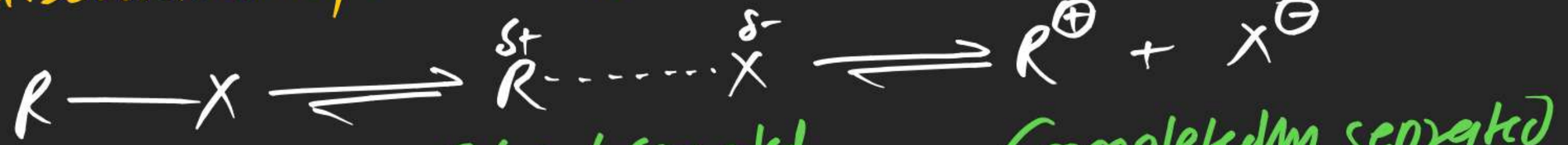
(ii) Use of $Ag^{\oplus}$, Hg^{+2} favours SN^1 Rxn due to fast Rate of dissociation due to ppt formation.

(iii) Bond dissociation of a Bond is



Solvent separated ion pair ($SN^2 + SN^1$)

Completely separated ion pair (SN^1)

(SN^2)

(iv) In Case of Misciable Solvents

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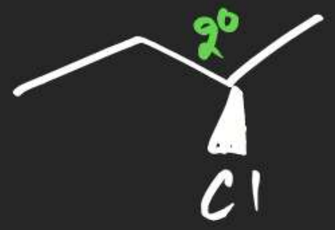
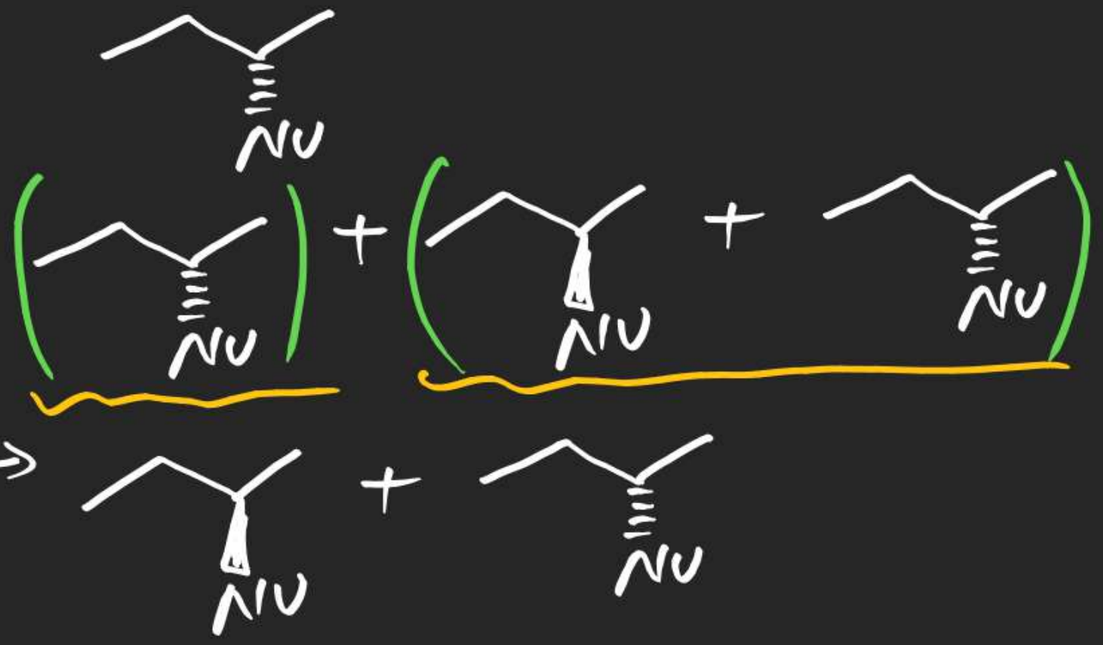
(Ex)



NU^- (SN^2) in DMSO

$NU^\ominus$ (DMSO + H_2O)

NU^- in H_2O (SN^1)



(*) $\gamma_{SN^2} = K_{SN^2}[R-X][NU^\ominus]$

(*) $\gamma_{SN^1} = K_{SN^1}[R-X]$

(*) $\gamma = \gamma_{SN^1} + \gamma_{SN^2} = [R-X]\{K_{SN^1} + K_{SN^2}[NU^\ominus]\}$

$$\%[Product]_{SN^2} = \frac{\gamma_{SN^2}}{\gamma} \times 100 = \frac{K_{SN^2}[R-X][NU^-]}{[R-X]\{K_{SN^1} + K_{SN^2}[NU^-]\}} \times 100 = \frac{K_{SN^2}[NU^-]}{K_{SN^1} + K_{SN^2}[NU^-]} \times 100$$

∴

$$\Rightarrow \%[\text{Product}]_{SN1} = \frac{\gamma_{SN1}}{\gamma} \times 100$$

$$= \frac{K_{SN1}}{K_{SN1} + K_{SN2}[Nu]} \times 100$$

(#) In Case of Imiscible Solvents:

A alkyl halide (Soluble in NPS) in taken with Aq. NaOH, Explain about the process.

$$R-X + NaOH \longrightarrow$$

(CCl_4) (H_2O)

Imiscible

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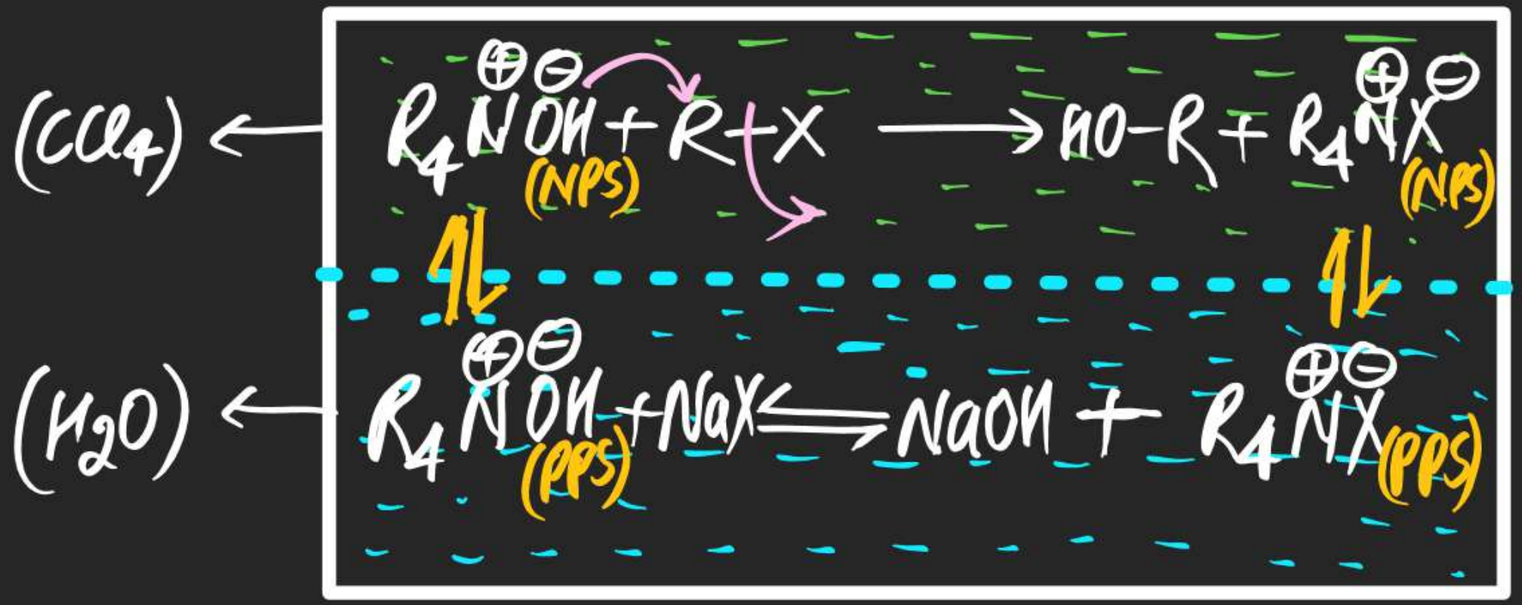
In such Type of Cases we use phase Transfer Catalyst (PTC)



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(#) Finkelstein Rxn :-

⟹ In this Reaction Substrate is Treated with NaI in Acetone So that alkyl Iodide is obtained as a Product.

(1) $R-Cl + \underset{\text{Covalent}}{NaI} \xrightarrow[\text{weakly polar Covalent}]{\text{Acetone}} I-R + \underset{\text{Ionic}}{NaCl}$

Note : (1) Driving force of Reaction is ppt formation of NaCl (Ionic) in Acetone (Covalent).

(2) SN^2 mechⁿ

(3) Inversion takes place

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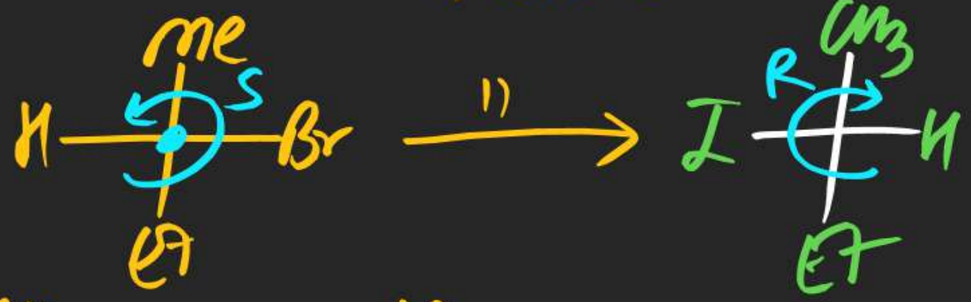
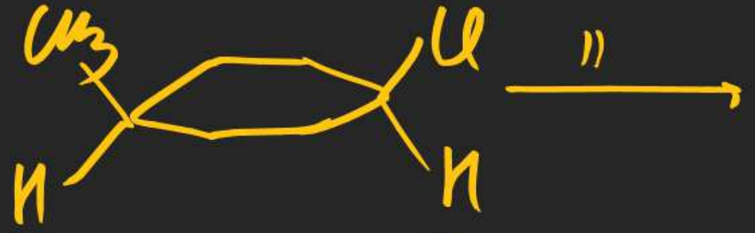
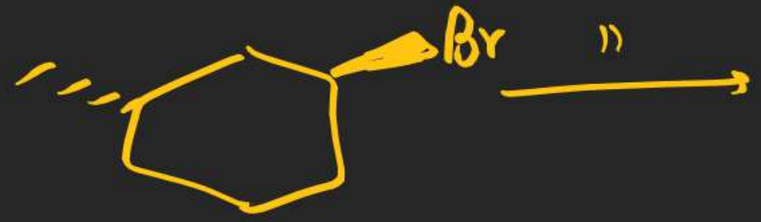
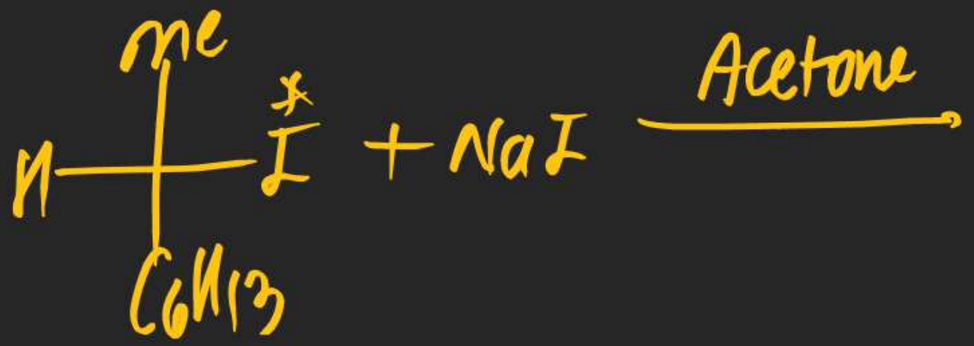
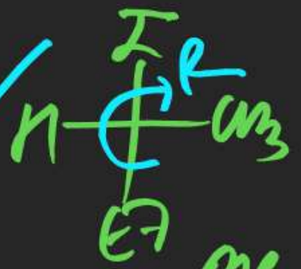
(2) $CH_3-CH_2-Cl \xrightarrow[\text{Acetone}]{NaI}$

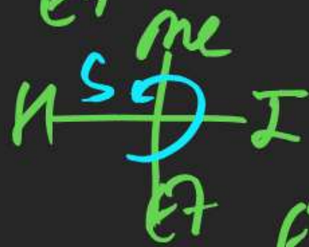
(3) 

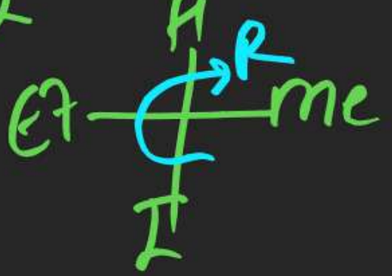
(4) 

(5) 

(6) 

(A) 

(B) 

(C) 

(D) NOT

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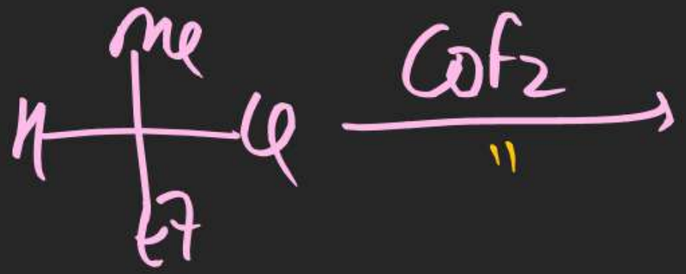
(2) Swarts Rxn :

⇒ In this Reaction Alkyl halide is Treated with

AgF, Hg_2F_2, COF_2 ---So that alkyl Fluoride is obtained as a Product.

(1) $R-X + AgF \xrightarrow{PAS} F-R + AgX$

(2) $CH_3-CH_2-Br \xrightarrow[\text{''}]{Hg_2F_2}$

(3) 

$\xrightarrow[\text{''}]{COF_2}$

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(4) + AgF ⟶

(#) Wiliamson Ether Synthesis :-

⇒ In this Reaction alkyl halide is treated with Sodium or Potassium alkoxide so that Ether is obtained as a Product.

(1) $R-OH \xrightarrow[-H_2\uparrow]{Na} R-O^{\ominus}\overset{\oplus}{Na} + R'-X \longrightarrow R-O-R' + NaX$

(2) $R'-OH \xrightarrow[-H_2\uparrow]{Na} R'-O^{\ominus}\overset{\oplus}{Na} + R-X \longrightarrow R'-O-R + NaX$

Note (i) SN^2 mechanism.

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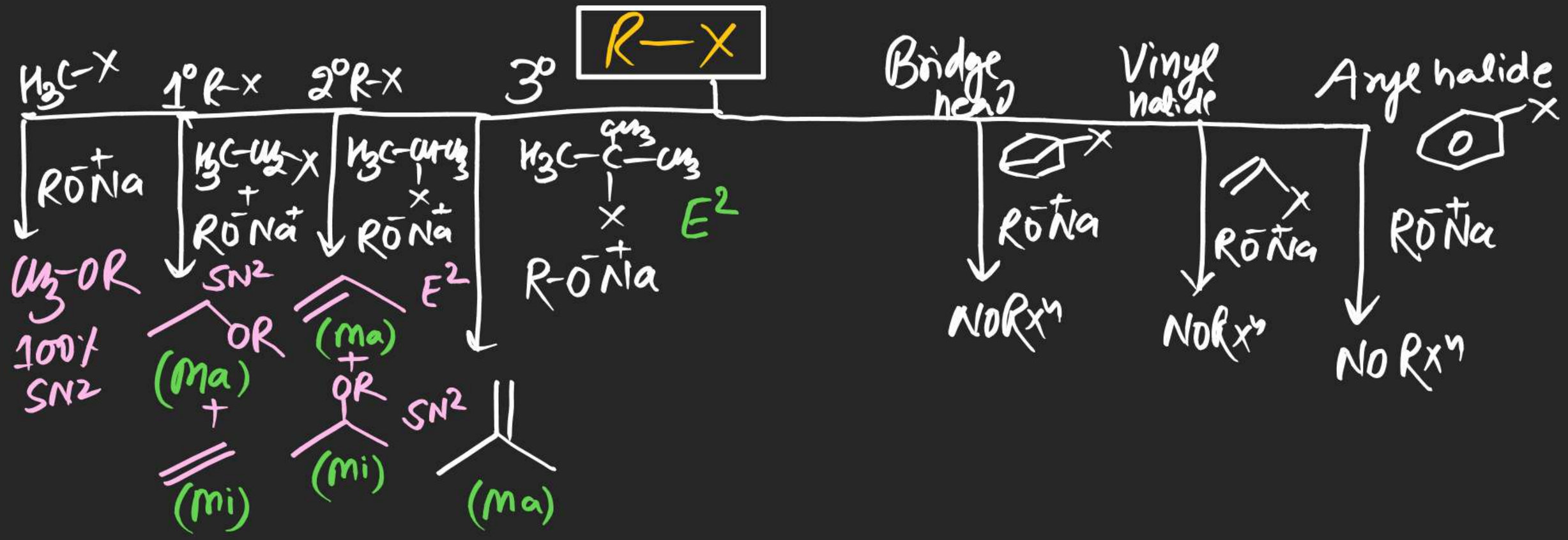

(2) $CH_3-O^-\overset{\oplus}{Na} + CH_3-Cl \longrightarrow$

(3) " + $\longrightarrow$

(4) " + $\longrightarrow$

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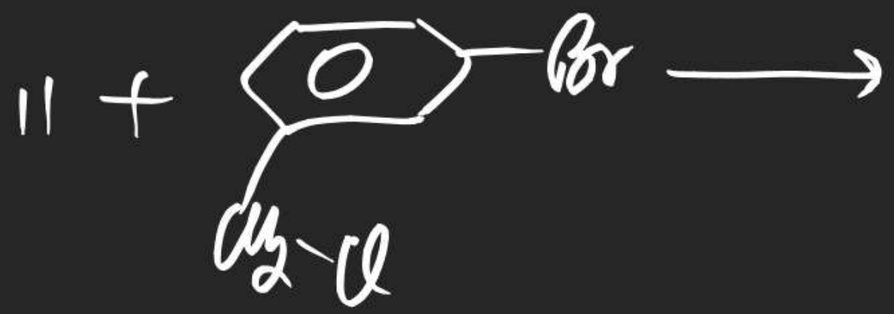
(5)

(6)

(7)

(8)

(9)

(10)