LIVE

ALKYL HALIDE

for JEE-MAIN

One Shot

By SKM Sir

4:00 PM Tuesday

Nishant Jindal

Alkyl halide

Rxn shown By alkyl halide

$Nu^{\ominus} + R-X \longrightarrow R-Nu + X^{\ominus}$

Nucleophilic Substitution

SN^2

(1°)

Nu^- (Strong)

R-X | NaI, NaCN, NaSR, NaN_3, KI ...

SN^1

(weak Nu⁻)

R-X | H_2O, ROH, RCOOH

Elimination

E^1

Weak Base

R-X $\xrightarrow{\Delta}$ (H_2O, ROH, RCOOH)

E^2

$B^{\ominus}$ (Strong)

R-X | Alc. NaOH, Alc. KOH, NaOR, $NaNH_2$, t-BuOK

(DBN, Et_3N, DBU)

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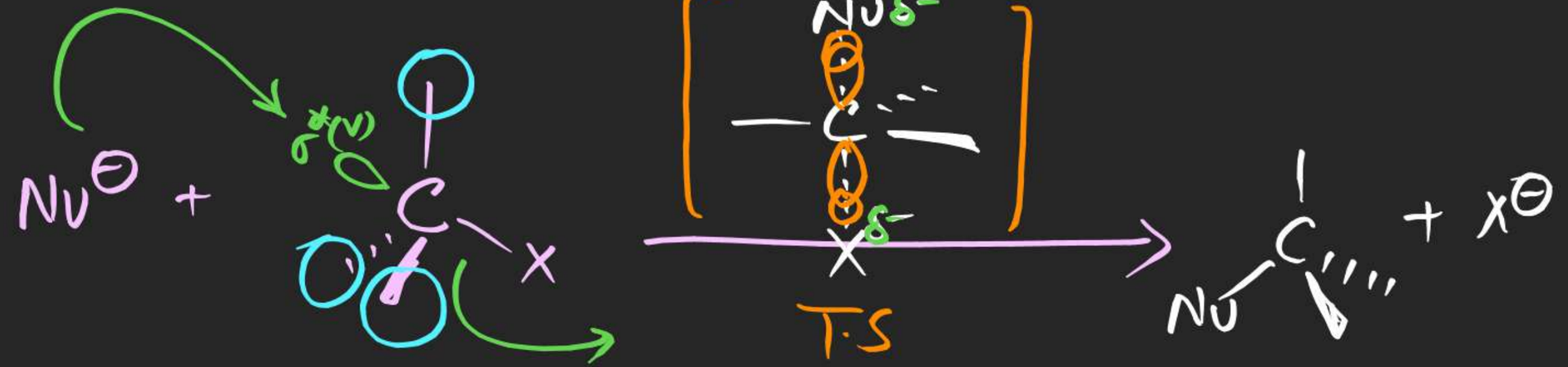
(#) S_N2:



(*) Presence of EWG ↑ Rate of Rxn

(*) Order of γ_{SN2} for R-X: $CH_3-X > 1^\circ > 2^\circ > 3^\circ$ (S_N1)

(CH_3-X to 2°: S_N2; 2° to 3°: S_N2)

(*) Strong Nu⊖ (*) One step Rxn

(*) Inverted Product

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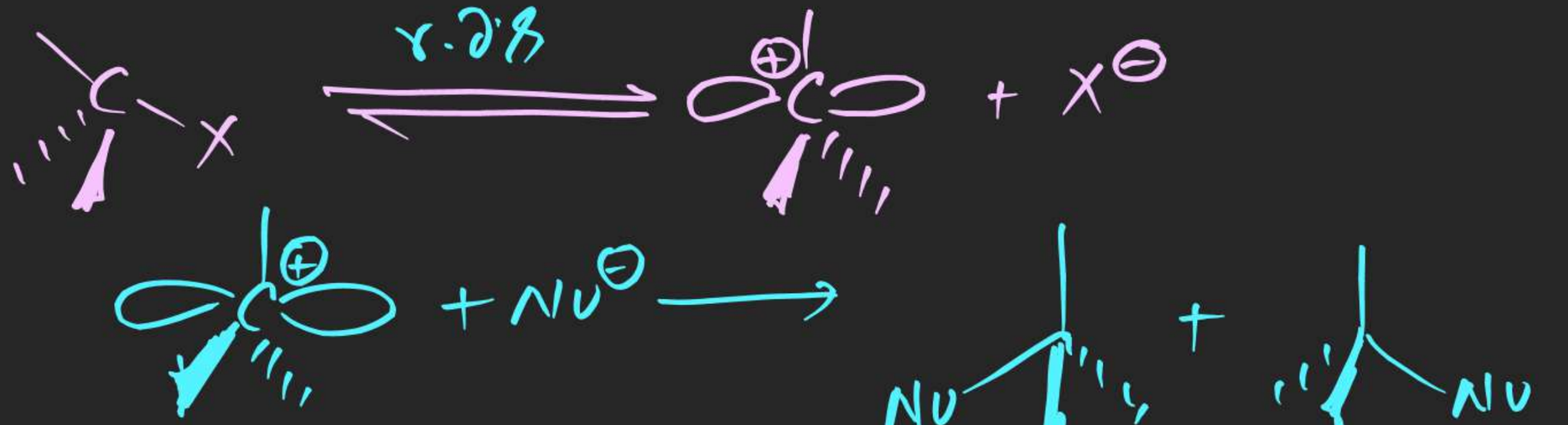
SN^1:



(*) EDG ↑ γ_{SN^1}

(*) Order of γ_{SN^1} for R-X $3^{\circ} > 2^{\circ} > 1^{\circ} > Me-X$

(*) Weak Nu⁻

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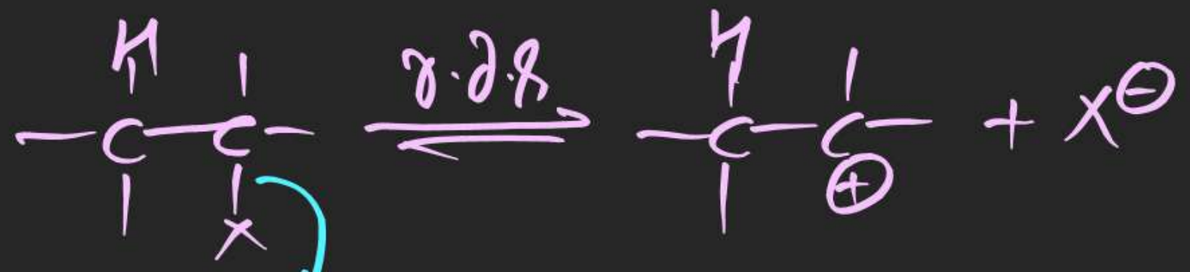
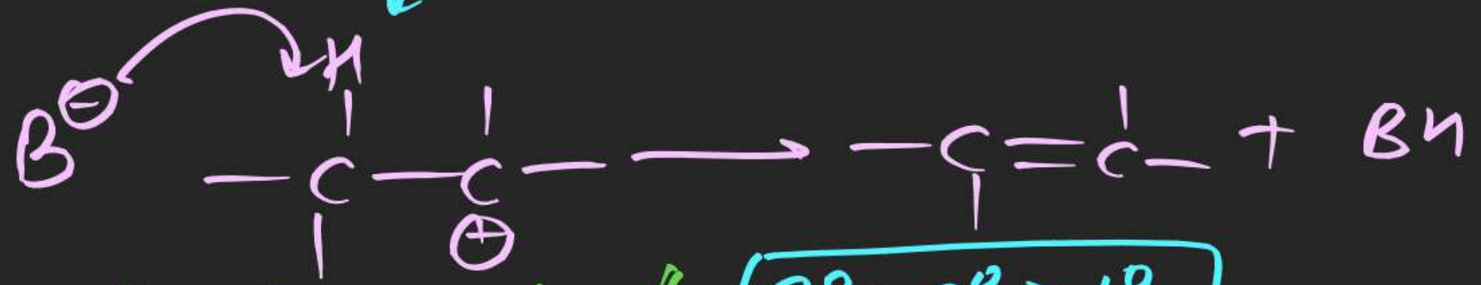
E^1 :



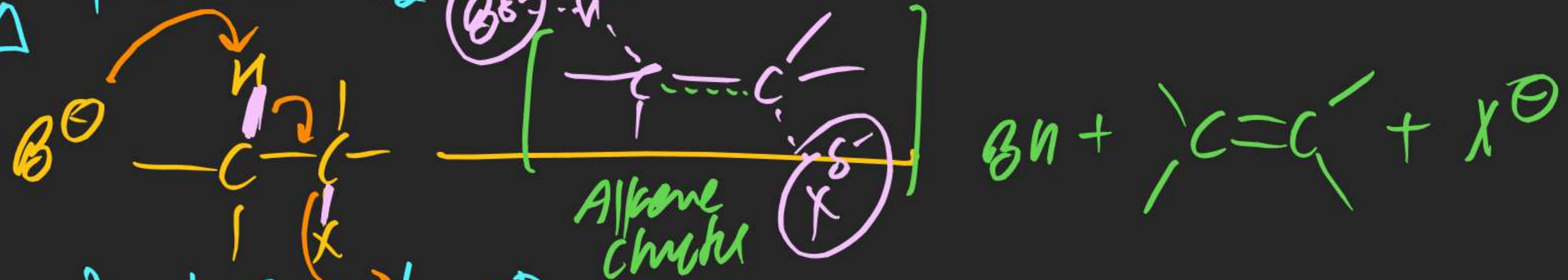


$\Rightarrow$ Order of rate of E^1 $3^\circ > 2^\circ > 1^\circ$

$\Rightarrow$ weak Base H_2O, ROH, RCOOH - - - -

$\Rightarrow \Delta$

E^2 :



$\Rightarrow$ Order of γ_{E2} $3^\circ > 2^\circ > 1^\circ$

$\Rightarrow$ Strong Base $\Rightarrow$ Anti elimination.

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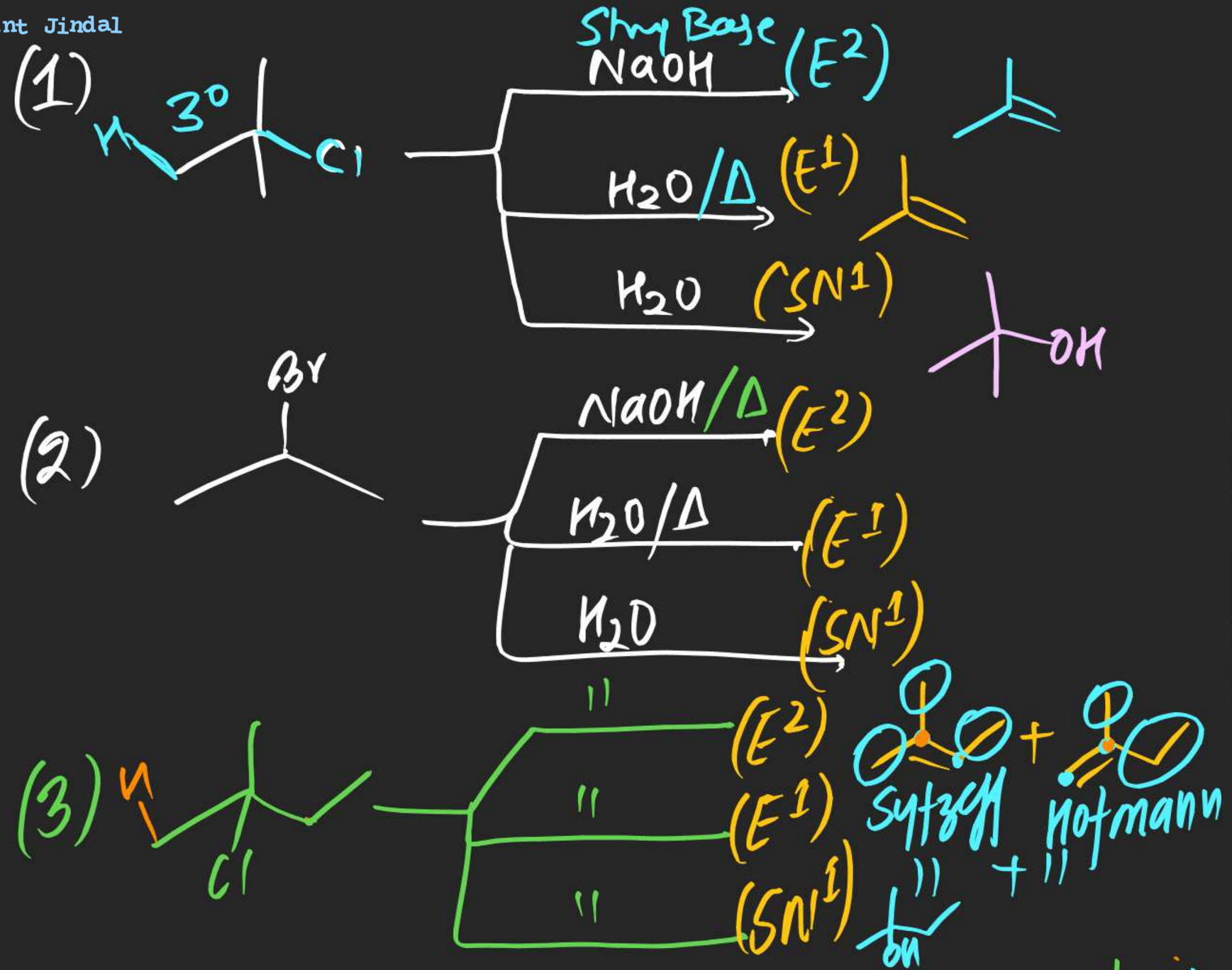

AlC·KOH, AlC·NaOH } E^2

Aq·NaOH, Aq·KOH } SN^2

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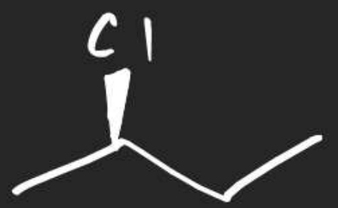
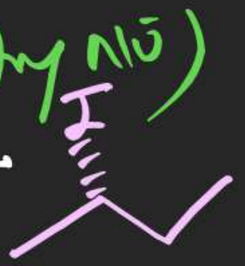
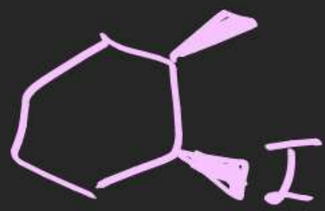
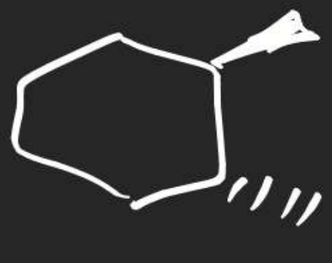
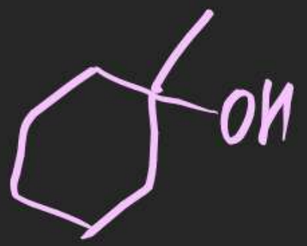
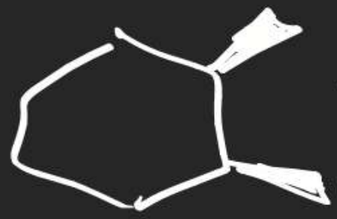
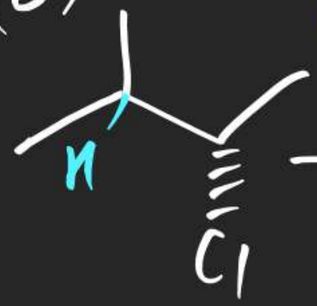
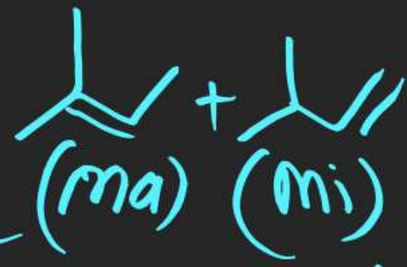
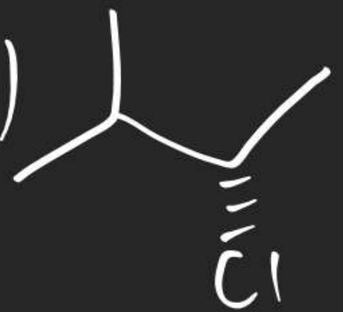
(4)  NaI / Acetone (SN2) (Strong Nu⁻) 

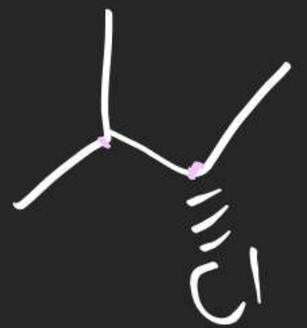
(5)  // (SN2) 

(6)  H2O (SN1) 

(7)  H2O (SN1) //

(8)  (Strong) E2, RO^-Na^+, ROH, Alcoholic →  (ma) + (mi)

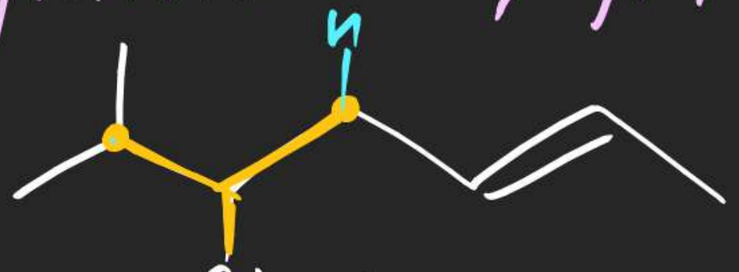
(9)  (SN1) / ROH → 

(10)  (E1) ROH, Δ →  (ma) + 

(#) Hofmann Product dominates over Sytzeff Product iff

Stability order
Hofmann Product > Syt. product

(1)



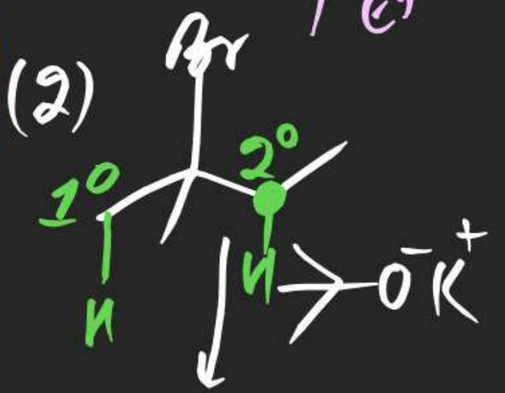
↓ Alc. KOH

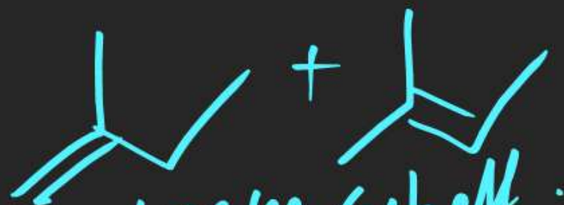
(Sytzeff) + (Hofmann) major

Bulkier Base

$> O^-K^+$ / $> O^-NR_4^+$

(2)



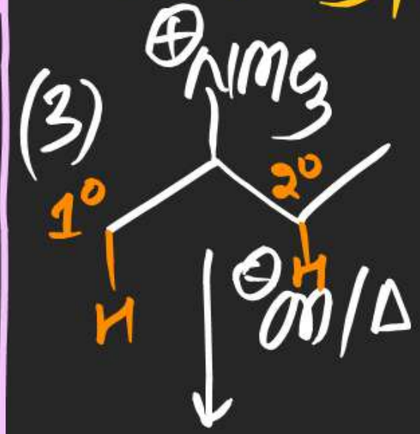


Hofman (maja) + Sytzeff ...

In case of Bad lg

$\oplus$ $\oplus$
$-F, -\overset{\oplus}{A}lR_3, -\overset{\oplus}{S}R_2$

(3)



(Maja) + (Hofmann)

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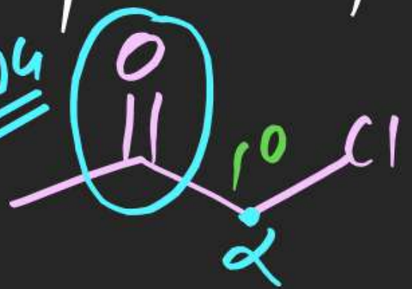
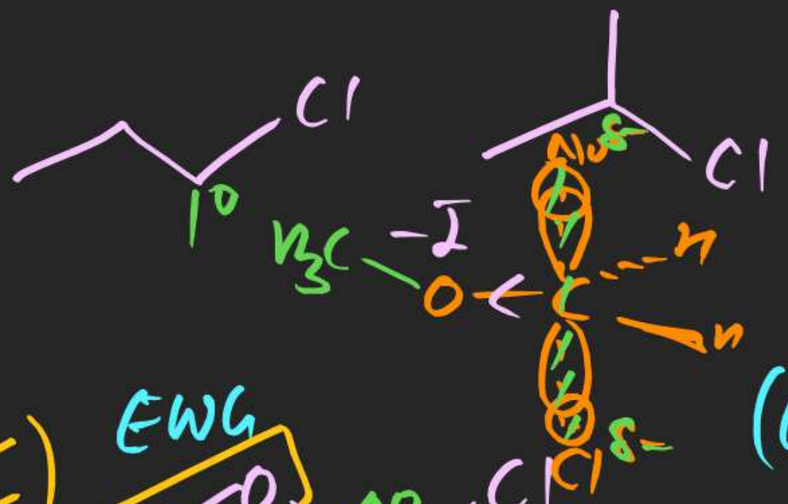
(#) order of rate of SN^2 Rxn.

(i) EWG



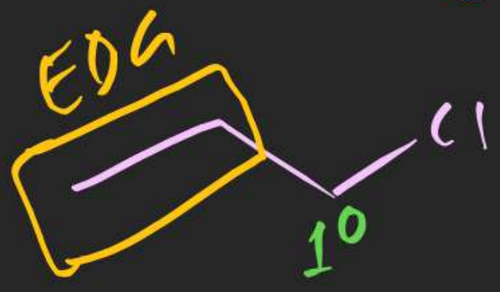
(α-Halo Carbonyl)



EWG

(1 > 2 > 3)

(ii)



(-I)

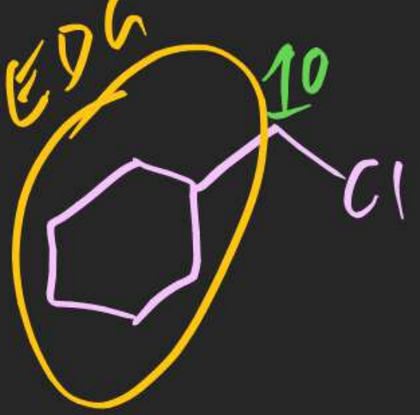
(EWG)

2 > 1

mom-chloride

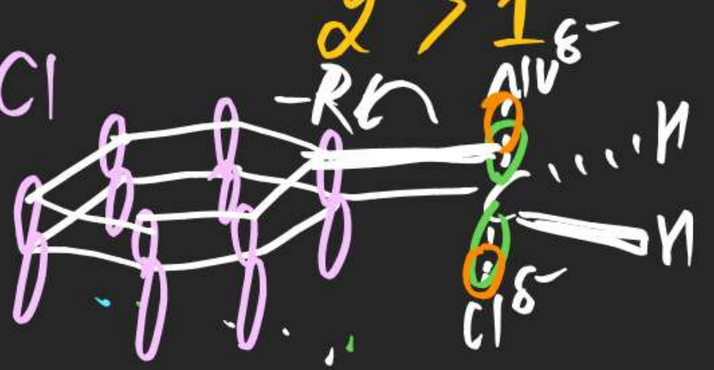
methoxy-methyl chloride

(iii)



(EWG)

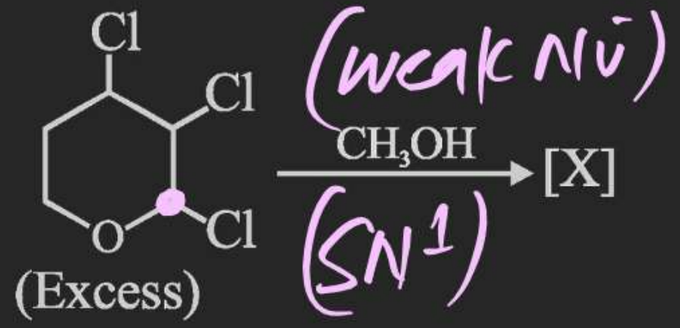
2 > 1

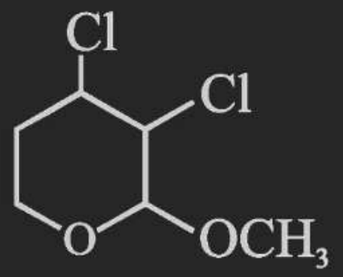


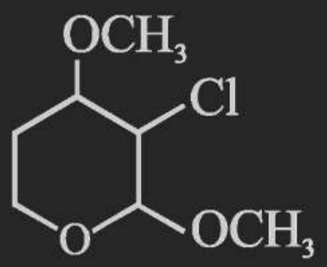
SUBSTITUTION ELIMINATION

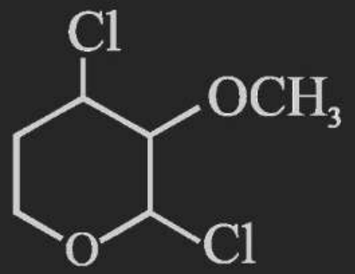
EXERCISE - I (MAINS ORIENTED) PPT-1

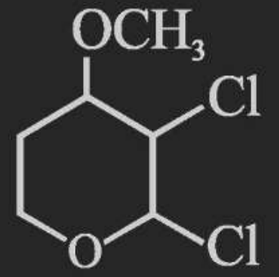
1. Major product of following reaction is:



(A) 

(B) 

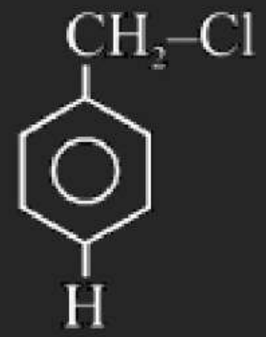
(C) 

(D) 

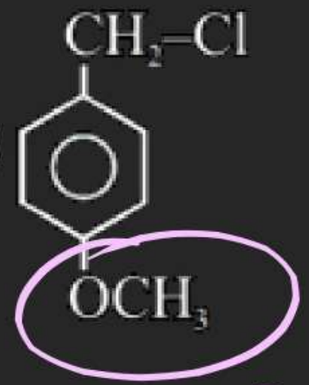
SUBSTITUTION ELIMINATION

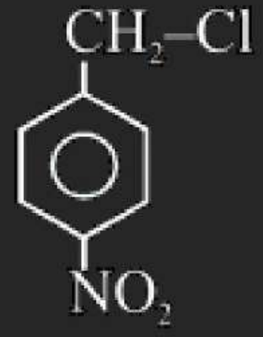
4. Arrange the following compounds in order of decreasing rate of hydrolysis for S_N1 reaction:

EDG

(A) 

(B) 

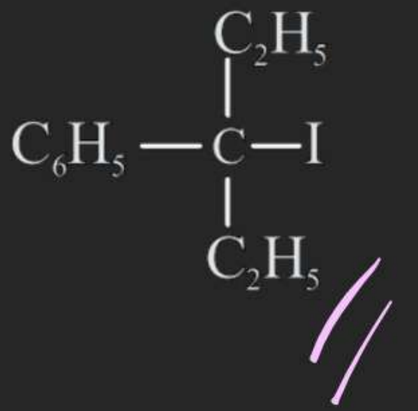
(C) 

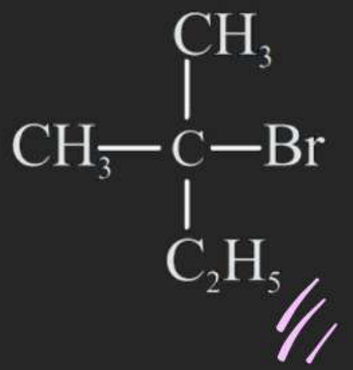
(D) 

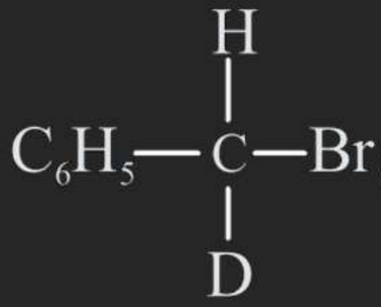
C > B > A > D

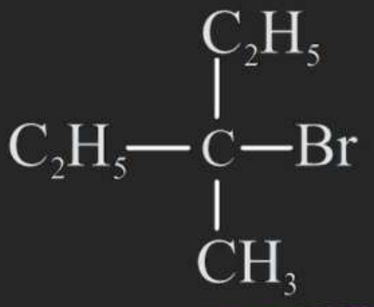
SUBSTITUTION ELIMINATION

6. Arrange the following compounds in order of decreasing rate of hydrolysis for S_N1 reaction:

(A) 

(B) 

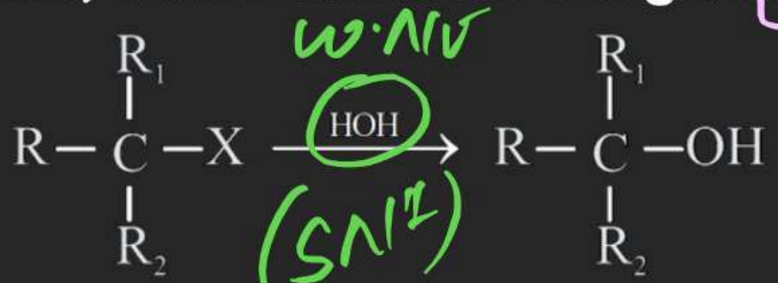
(C) 

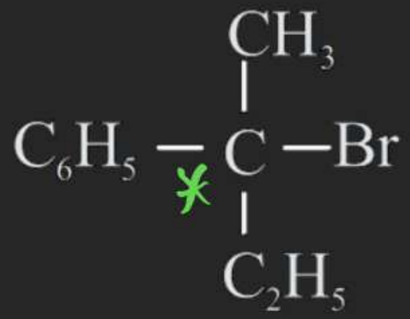
(D) 

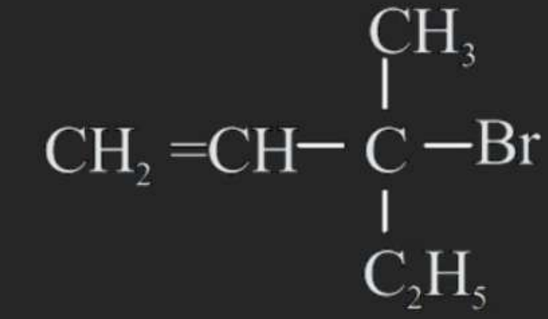
A > B > D > C

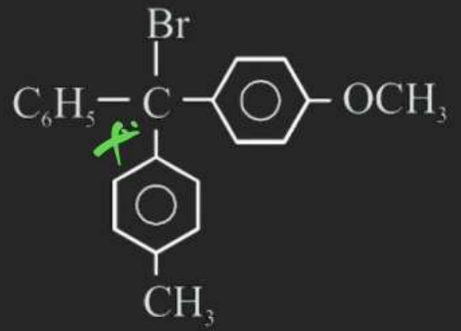
SUBSTITUTION ELIMINATION

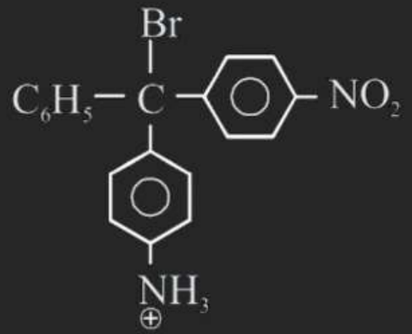
8. For the given reaction, which substrate will give maximum racemisation?



(A) 

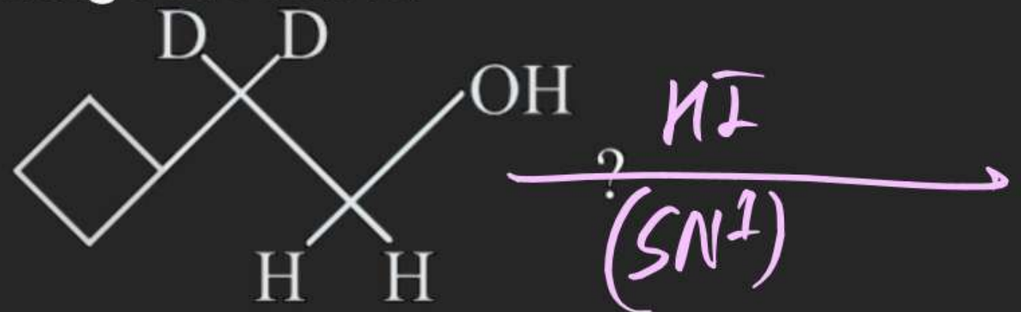
(B) 

(C) 

(D) 

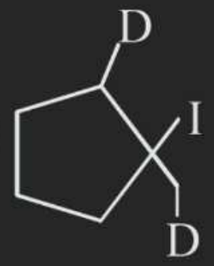
SUBSTITUTION ELIMINATION

9. Major product of following reaction is:

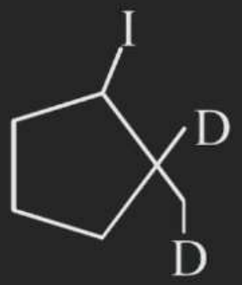


(A)

(B)



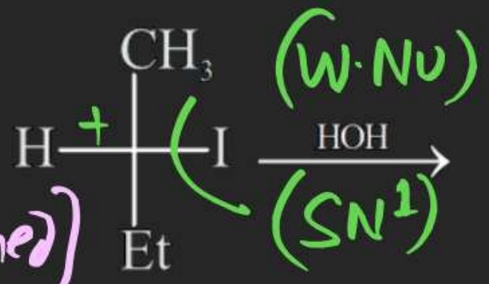
(C)

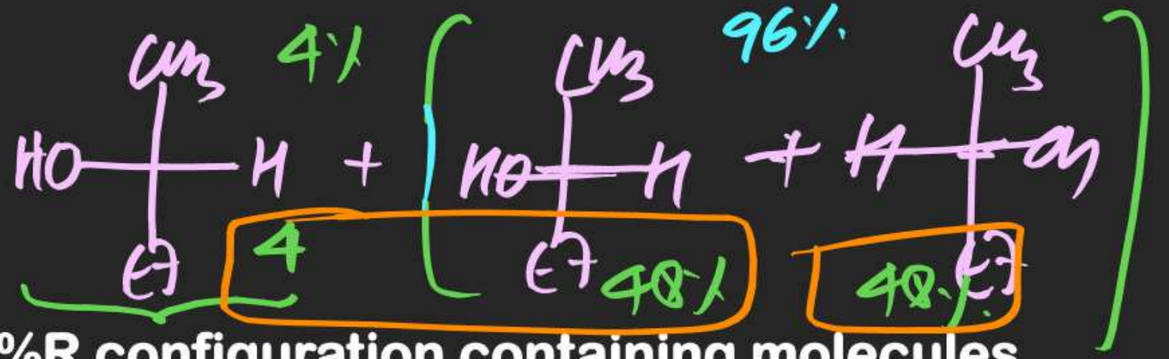


(D) None of these

SUBSTITUTION ELIMINATION

10. If 96% racemisation takes place in given reaction then find out the correct statement:





* Partial Racemisation
[Inverted] > [Retained]

(A) Among the products 48% S and 48%R configuration containing molecules are present

(B) Among the products 50% S and 50%R configuration containing molecules are present

(C) Among the products 48% S and 52%R configuration containing molecules are present

(D) Among the products 52% S and 48%R configuration containing molecules are present

SUBSTITUTION ELIMINATION

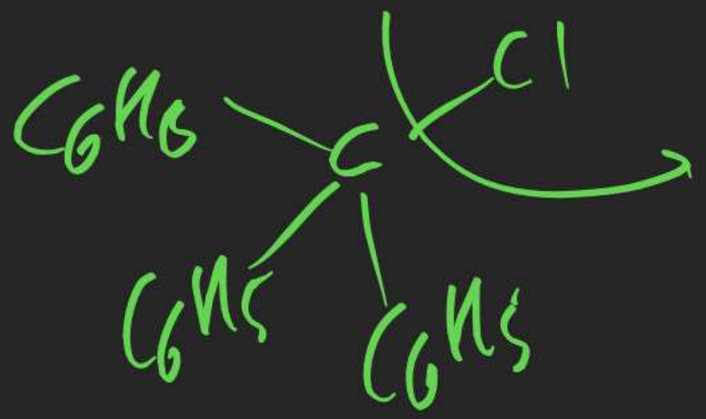
13. Which of the following compounds is most rapidly hydrolysed by S_N1 mechanism?

(A) C_6H_5Cl

(B) $Cl - CH_2 - CH = CH_2$

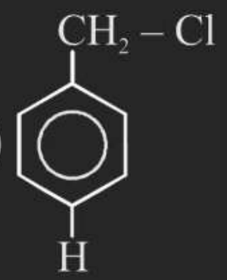
(C) $(C_6H_5)_3CCl$

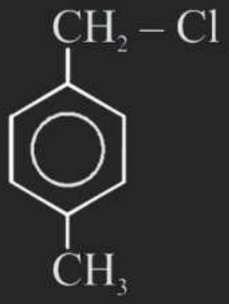
(D) $C_6H_5CH_2Cl$

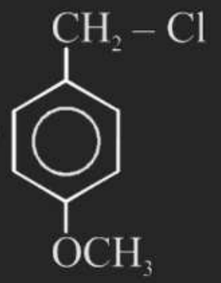


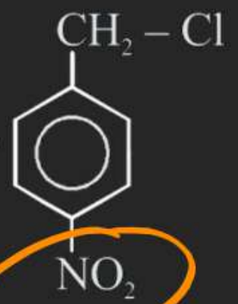
SUBSTITUTION ELIMINATION

15. Which of the following is most reactive toward S_N2.

(A) 

(B) 

(C) 

(D) 

SUBSTITUTION ELIMINATION

16. Which of the following is most reactive toward S_N2.

1° SNu

$CH_3Br + OH^- \longrightarrow CH_3OH + Br^-$

(A) Rate $= k[CH_3Br]$

(B) Rate $= k[OH^-]$

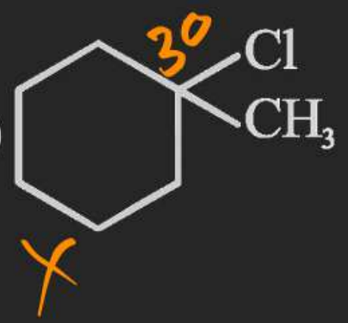
(C) Rate $= k[CH_3Br][OH^-]$

(D) Rate $= k[CH_3Br]^0[OH^-]^0$

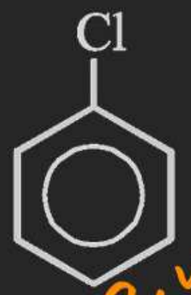
$r = K[R{-}X]^1[Nu^-]^1$

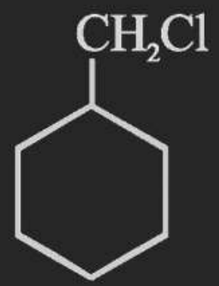
SUBSTITUTION ELIMINATION

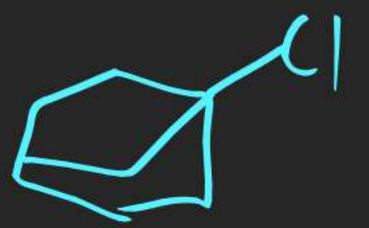
23. Which reaction proceeds faster with NaI in DMSO?

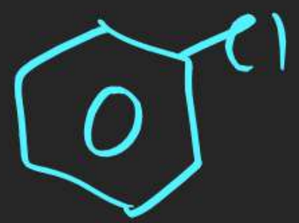
(A) 

(B) 

(C) 

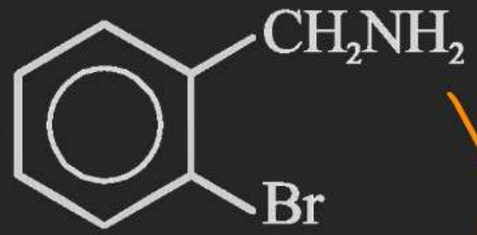
(D) 

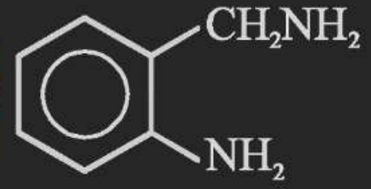


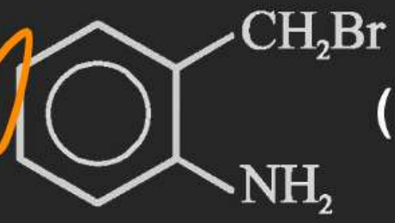


SUBSTITUTION ELIMINATION

24. The major product in the given reaction is:

(A) 

(B) 

(C) 

(D) All of these

SUBSTITUTION ELIMINATION

25. The compound $CH_3 - O - CH_2 - Br$ gives faster rate of nucleophilic substitution reaction than :

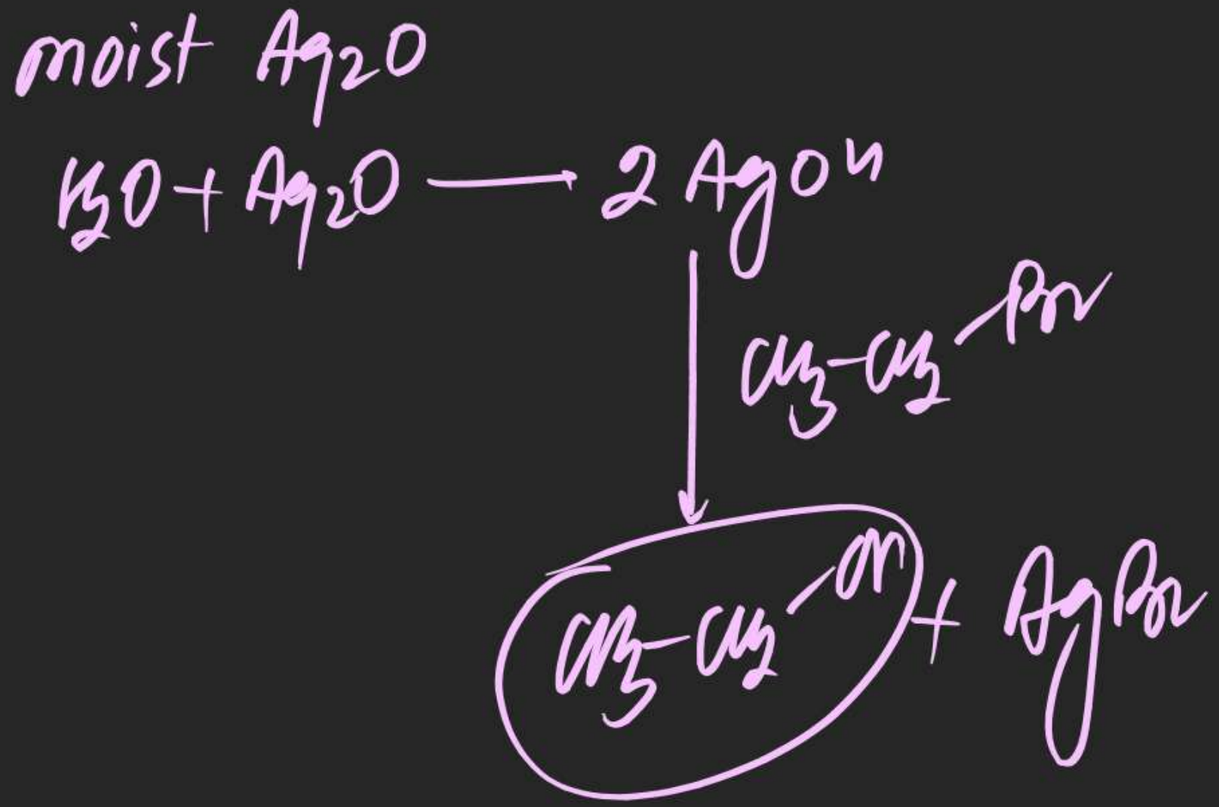
(A) CH_3Br (B) CH_3CH_2Br (C) $PhCH_2Br$ (D) CH_3OCH_2Cl

(E) CH_3-O-CH_2-I

SUBSTITUTION ELIMINATION

27. When ethyl bromide is treated with moist Ag_2O, the main product is:

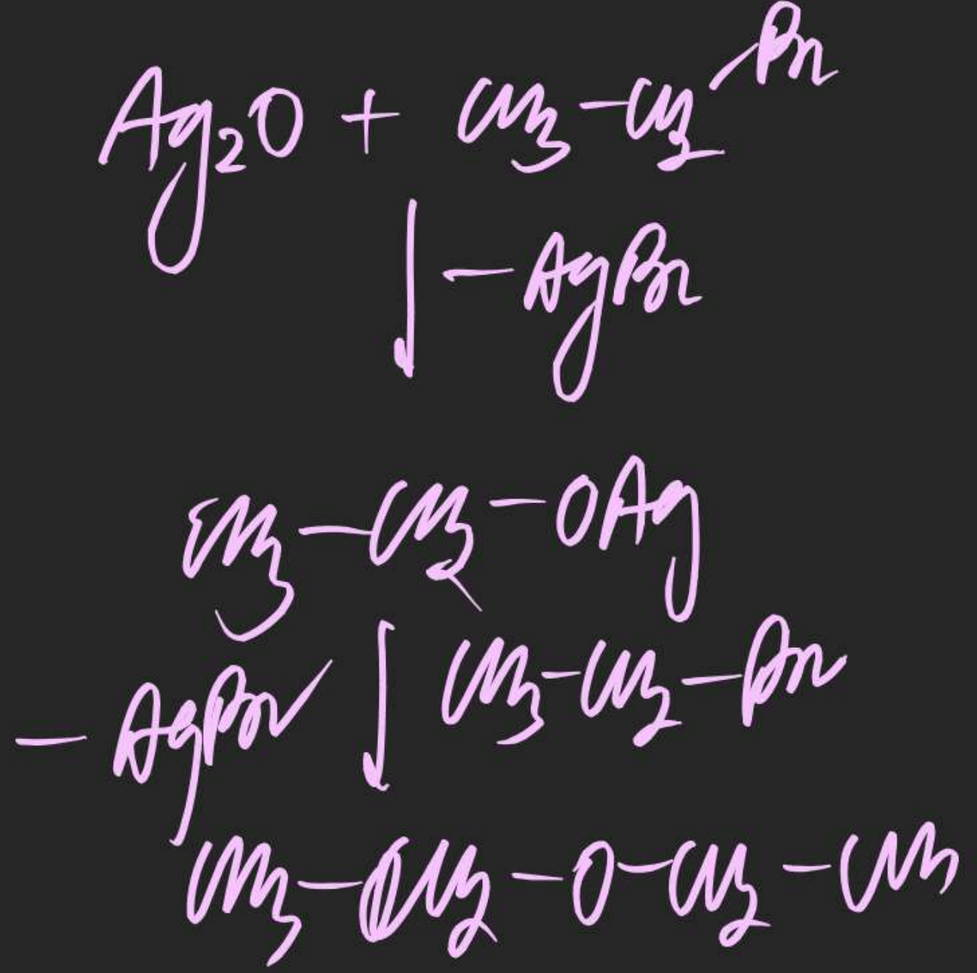
(A) Ethyl ether (B) Ethanol (C) Ethoxy ethane (D) All of these



SUBSTITUTION ELIMINATION

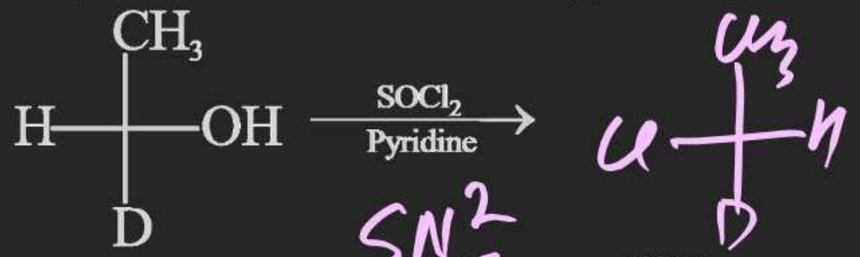
28. When ethyl bromide is treated with dry Ag_2O, the main product is:

(A) Ethyl ether (B) Ethanol (C) Ethoxy ethane (D) All of these

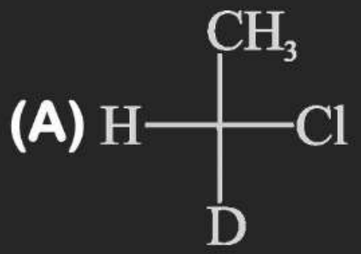


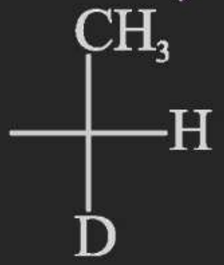
SUBSTITUTION ELIMINATION

29. Major product of following reaction is:



SN2

(A) 

(B) 

(C) $H_2C = CH_2$

(D) 

SUBSTITUTION ELIMINATION

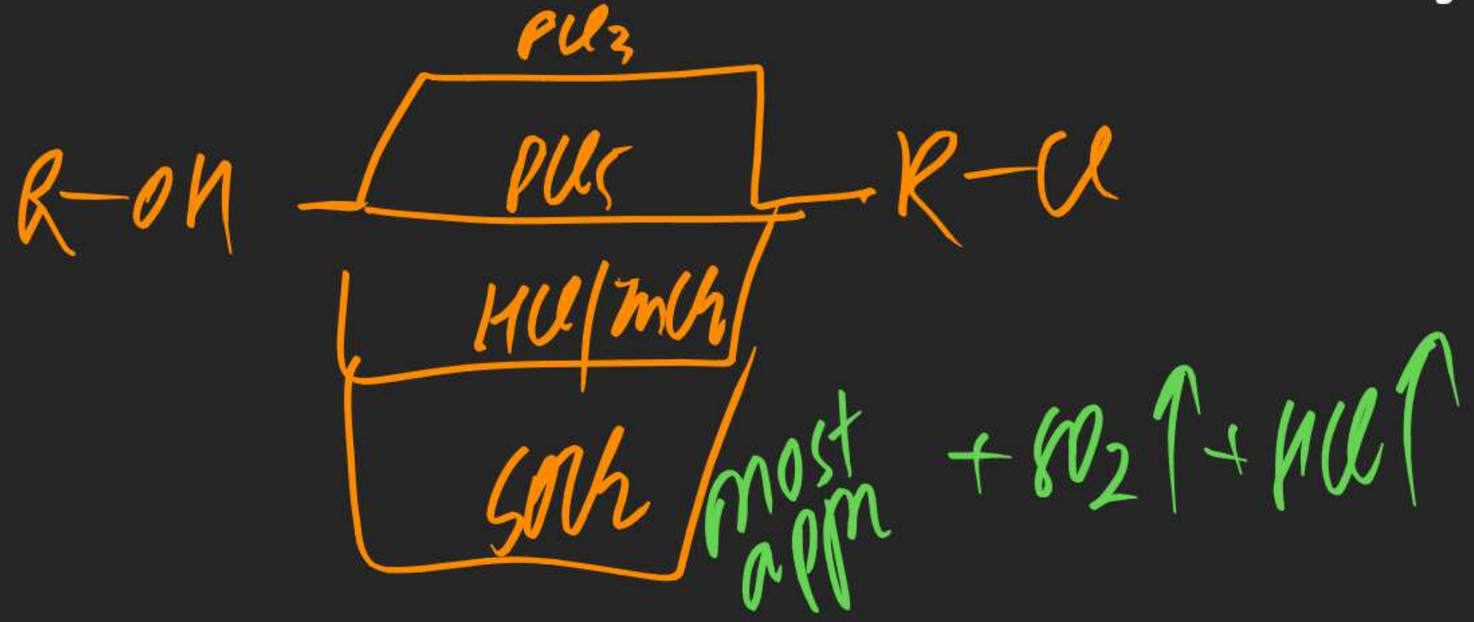
33. The reaction of $SOCl_2$ on alkanols to form alkyl chlorides gives good yields because

(A) Alkyl chlorides are immiscible with $SOCl_2$

Ans (B) The other products of the reaction are gaseous and escape out

(C) Alcohol and $SOCl_2$ are soluble in water

(D) The reaction does not occur via intermediate formation of an alkyl chloro sulphite



SUBSTITUTION ELIMINATION

38. CORRECT order of rate of reaction for following compounds with Conc. HBr is:

(P) CH_3OH S_N2

(Q) CH_3CH_2OH S_N2

(R) $(CH_3)_2CHOH$ 2^0

(S) $(CH_3)_3COH$ 3^0

R-OH S_N1

(A) S > R > Q > P

(B) P > Q > R > S

(C) S > R > P > Q

(D) P > S > Q > R

SUBSTITUTION ELIMINATION

40. On heating glycerol with excess amount to HI, the product formed is

(A) Allyl iodide

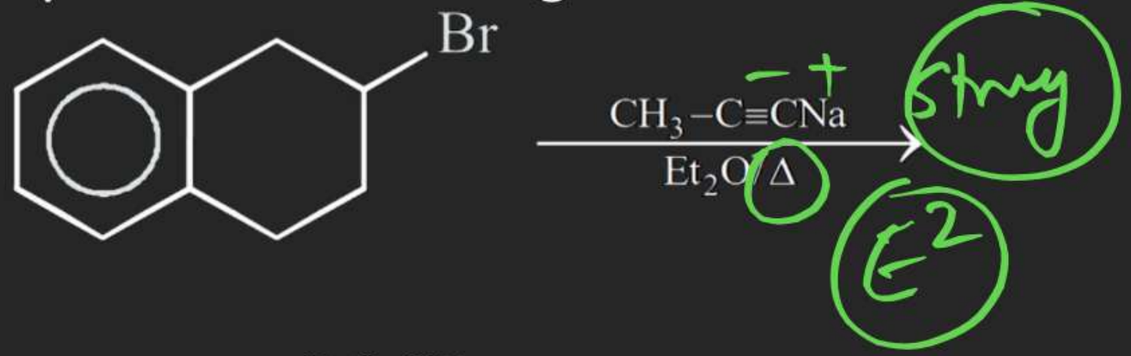
(B) Isopropyl iodide

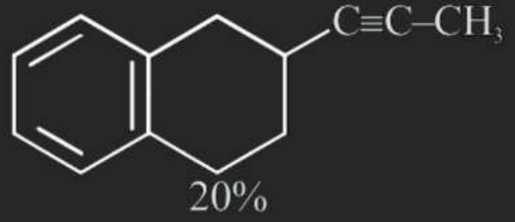
(C) Propylene

(D) 1,2,3-tri-iodopropane

SUBSTITUTION ELIMINATION

41. Major product of following reaction is:



(A) 

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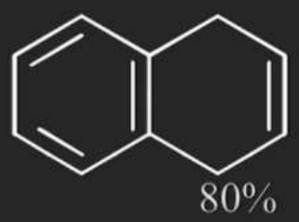
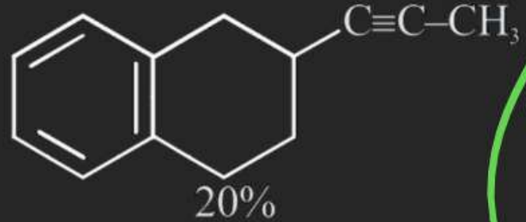


(B) 

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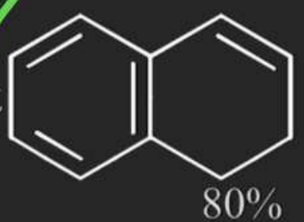
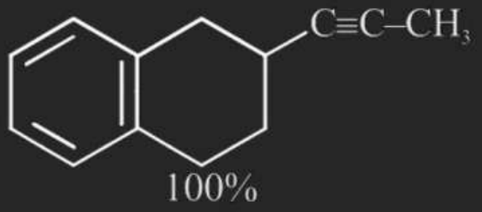
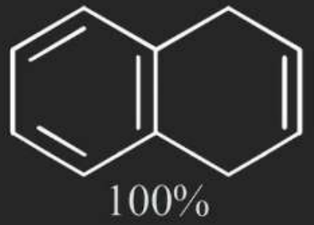


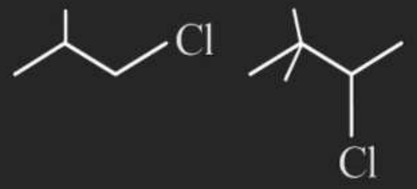
(C) 

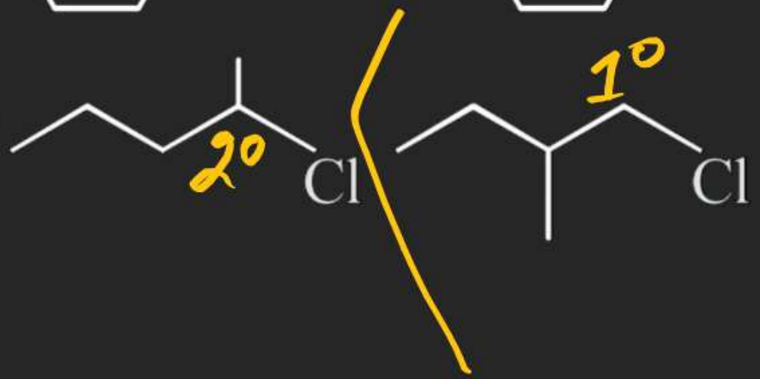
(D) 

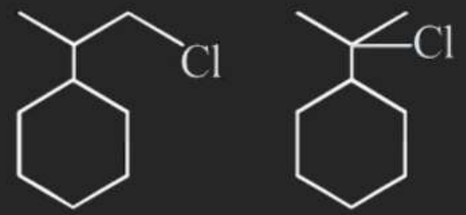
SUBSTITUTION ELIMINATION

2. In the given pair in which pair the first compound is more reactive than second towards S_N2 reaction. ($1^\circ > 2^\circ > 3^\circ$)

(A) 

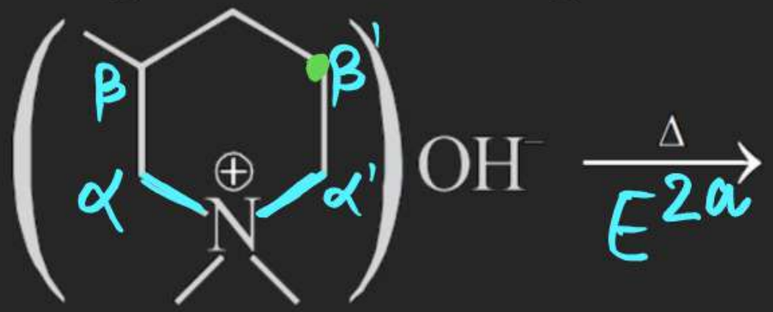
(B) 

(C) 

(D) 

SUBSTITUTION ELIMINATION

12. Which of following are correct for given reaction



(A) Major product of reaction is 

(B) Major product is

(C) Major product formation involve substitution

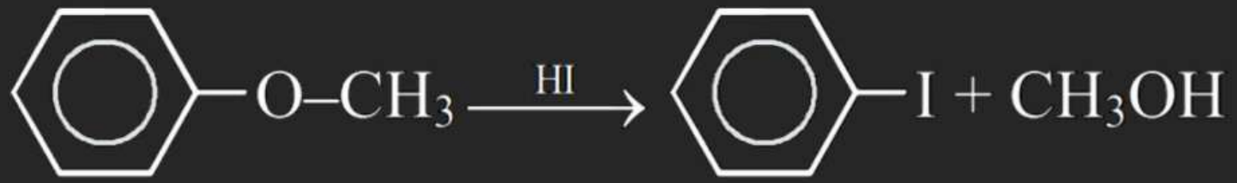
(D) The reaction is E_2 reaction

SUBSTITUTION ELIMINATION

13. Which of the following reactions is (are) incorrectly matched with their major product:

(A) $Me_3C-O-CH_3 \xrightarrow{HI} Me_3C-OH + CH_3I$

(B) $H_3C-O-CH_2-CH_3 \xrightarrow{HI} CH_3OH + ICH_2CH_3$

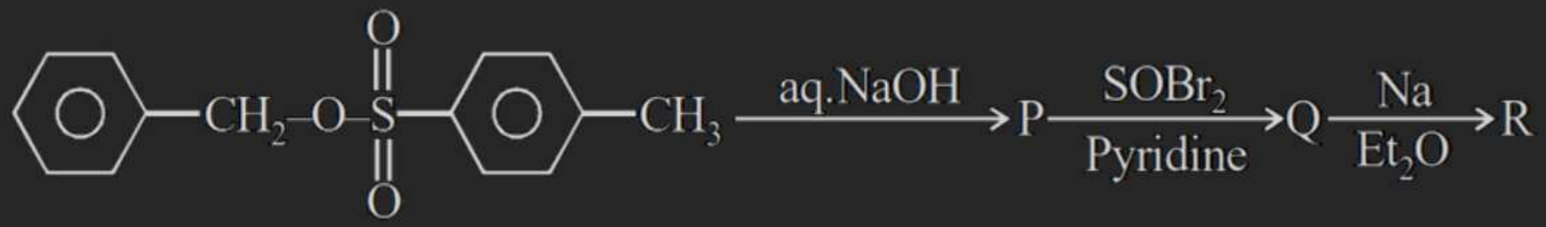
(C) 

(D) $CH_3-\overset{10}{O}-CH_2CH_3 \xrightarrow{H_3O^+} CH_3OH + CH_3CH_2\overset{18}{O}H$

(SN2) H^+ $CH_3-\overset{10}{O}(H)-CH_2-CH_3 \xrightarrow[-H^+]{OH_2}$ $\overset{10}{H}O-CH_2-CH_3$ + $HO-CH_3$

SUBSTITUTION ELIMINATION

17. How many monobromo derivatives are possible for Hydrocarbon (R)?



(A) 2 (B) 3 (C) 5 (D) 1

Alkyl halide [Free Radical / Electrophilic addⁿ (one shot)] Carbocation sheet Ex-1 & ex-2.