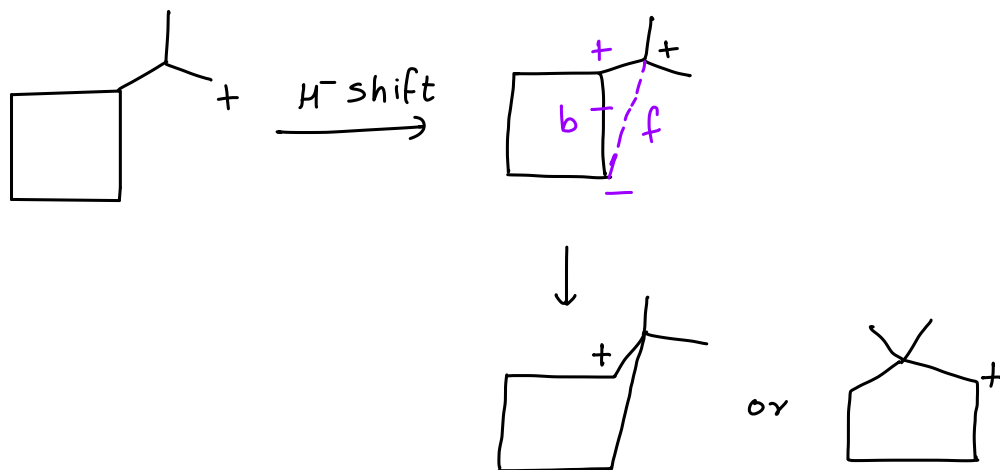
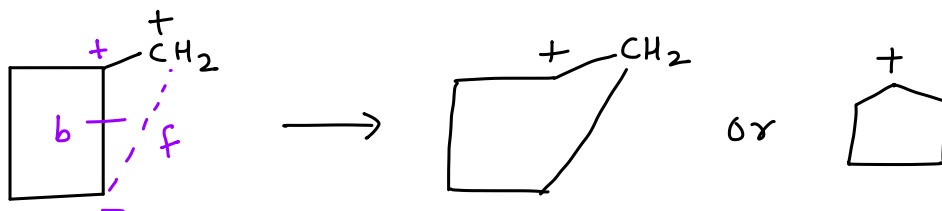


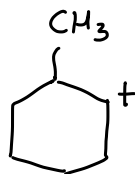
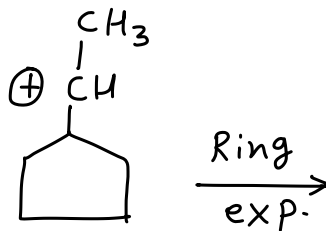
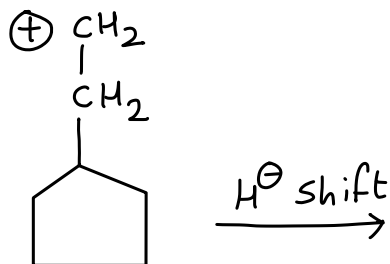
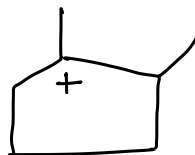
Hydrocarbons

Ring expansion \rightarrow

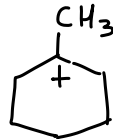
$4 \rightarrow 5, 5 \rightarrow 6$



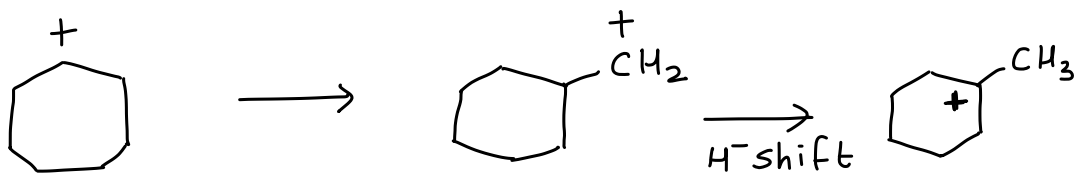
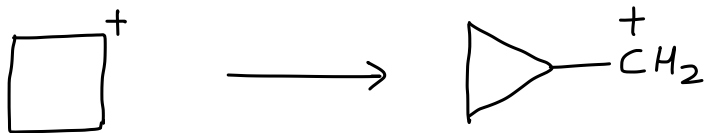
\downarrow CH_3^- shift



\downarrow H^- shift



Ring contraction \rightarrow 4 \rightarrow 3 , 7 \rightarrow 6



Alkenes

Alkenes = olefins (oil forming)

* General formula = C_nH_{2n}

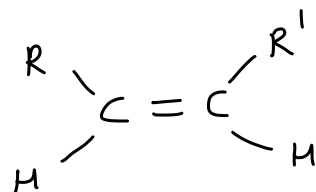
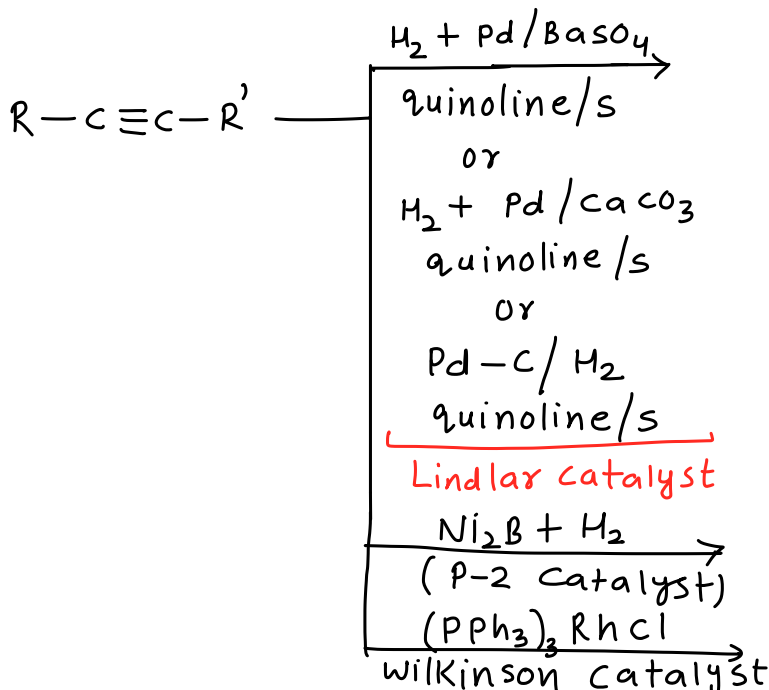
* Bond length $\rightarrow C=C = 1.34 \text{ \AA}$
 $C-H = 1.1 \text{ \AA}$

* Bond energy $\rightarrow C=C = 143.1 \text{ kcal/mol}$
 $C-H = 98.7 \text{ kcal/mol}$

Methods of Preparation \rightarrow

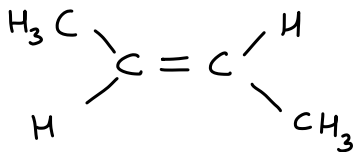
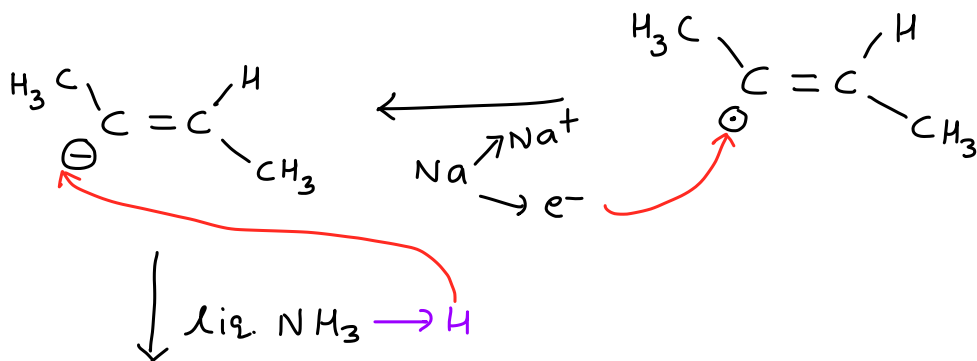
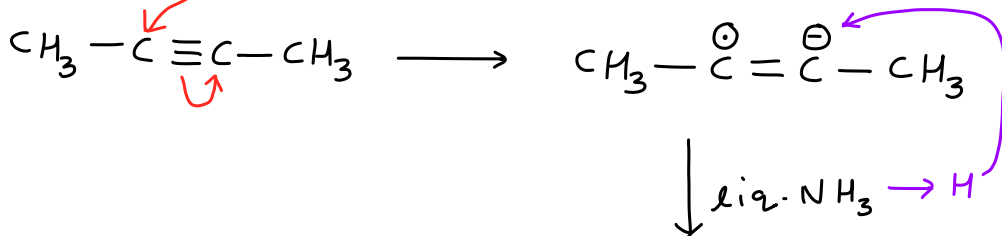
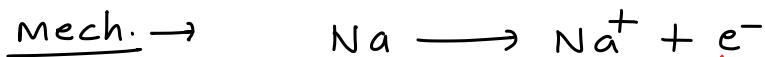
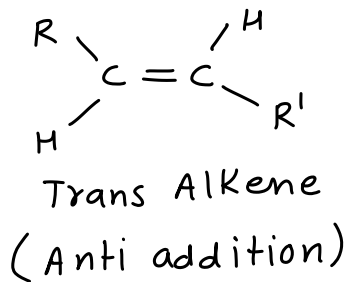
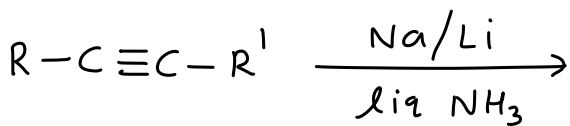
(1) By Alkanes \rightarrow Pyrolysis

(2) By Alkynes \rightarrow Partial hydrogenation

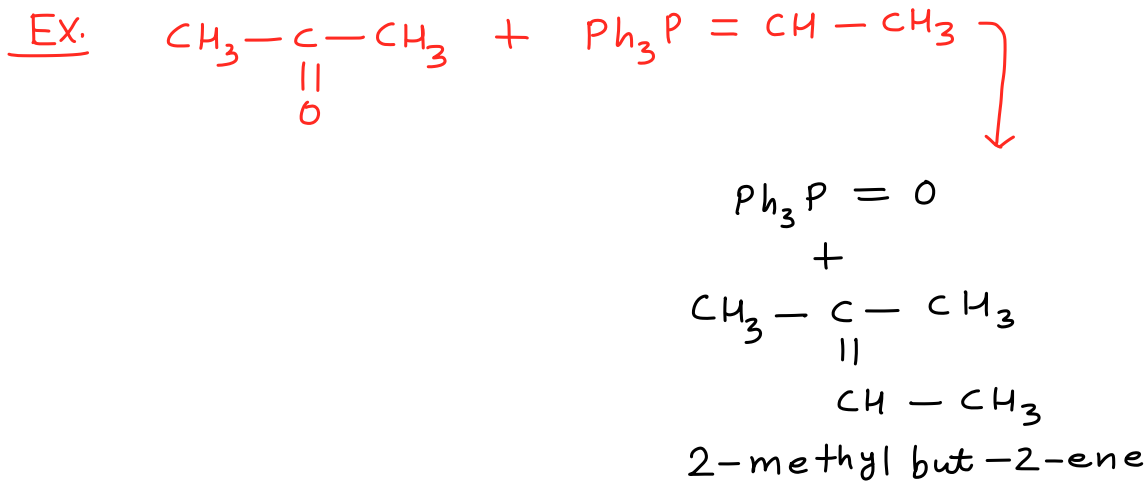
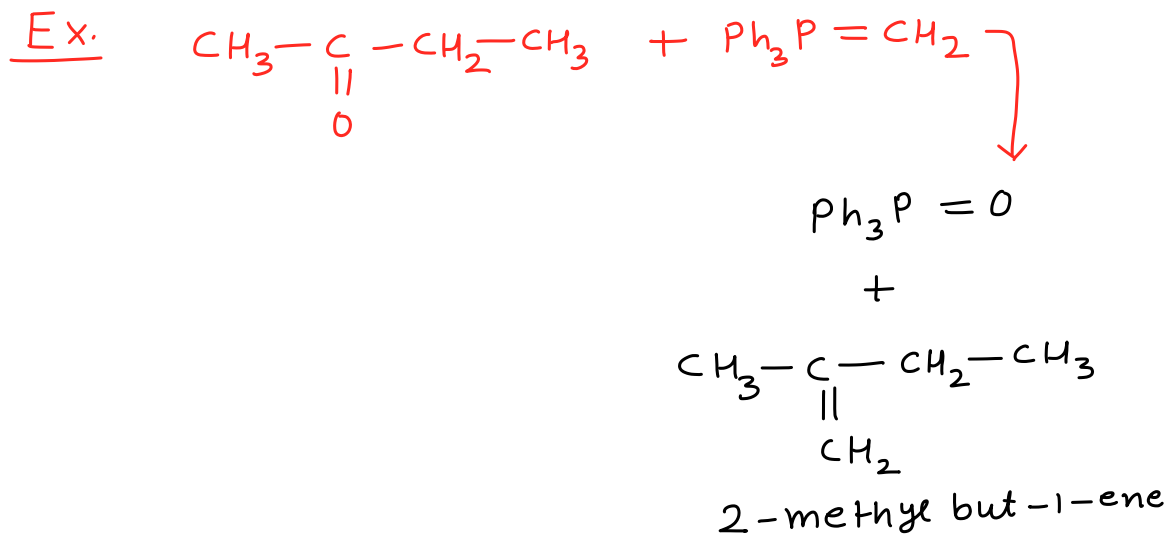
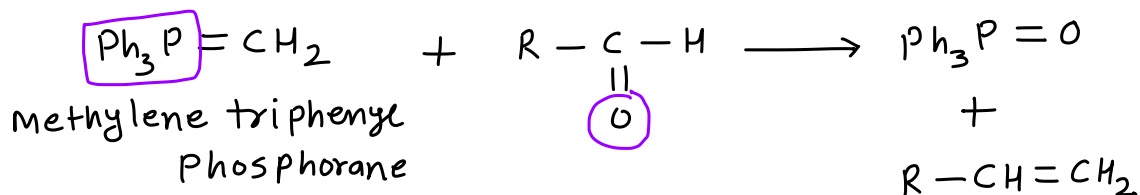


Cis alkene

(Syn Addition)

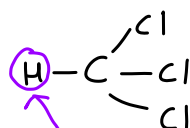


(3) The wittig Rxⁿ (wittig olefination) →

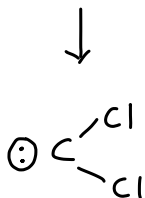
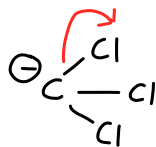


(4) Elimination Rxⁿ →

α-elimination
(1,1 eli.)

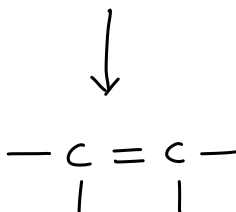
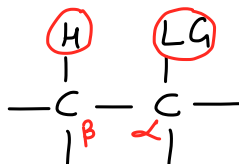


Alic. KOH
or
 $\text{C}_2\text{H}_5\text{OH} / \text{KOH}$
 $\text{C}_2\text{H}_5\text{O}^- \text{K}^+$

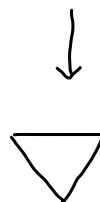
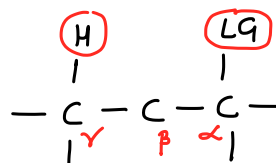


Dichloro Carbene

β-elimination
(1,2 eli.)



γ-elimination
(1,3 eli.)



Types of β-elimination Rxⁿ →

(a) E_1

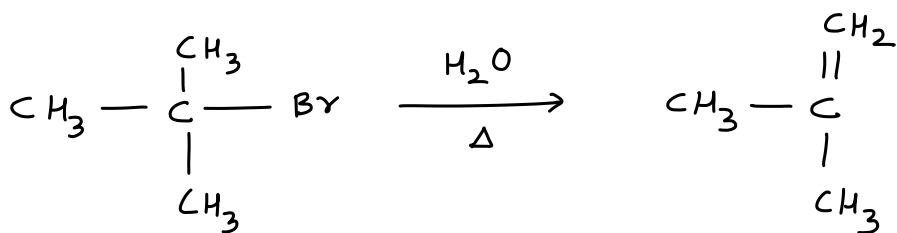
(b) E_2

(c) $\text{E}_{1\text{cB}}$

(d) E_i

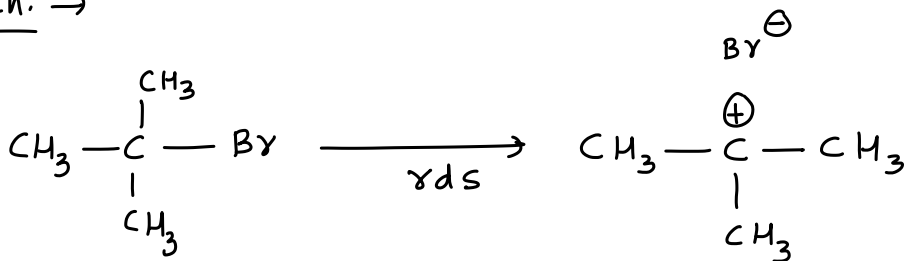
Elimination Unimolecular RX^n (E_1 RX^n) \rightarrow

* Dehydrohalogenation of 3° halide with H_2O/Δ



Mech. \rightarrow

Step-1



$$r = k [R-X]^1 [H_2O]^0$$

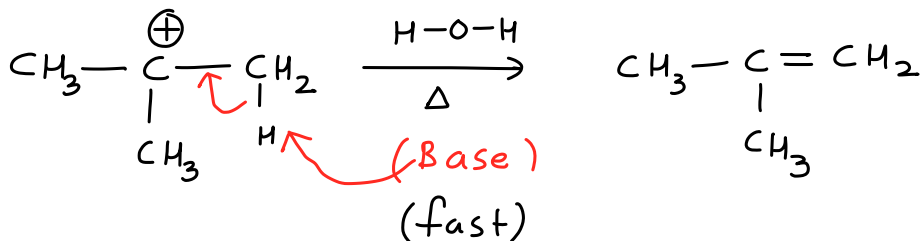
$$\text{order} = 1$$

$$\text{molecularity} = 1$$

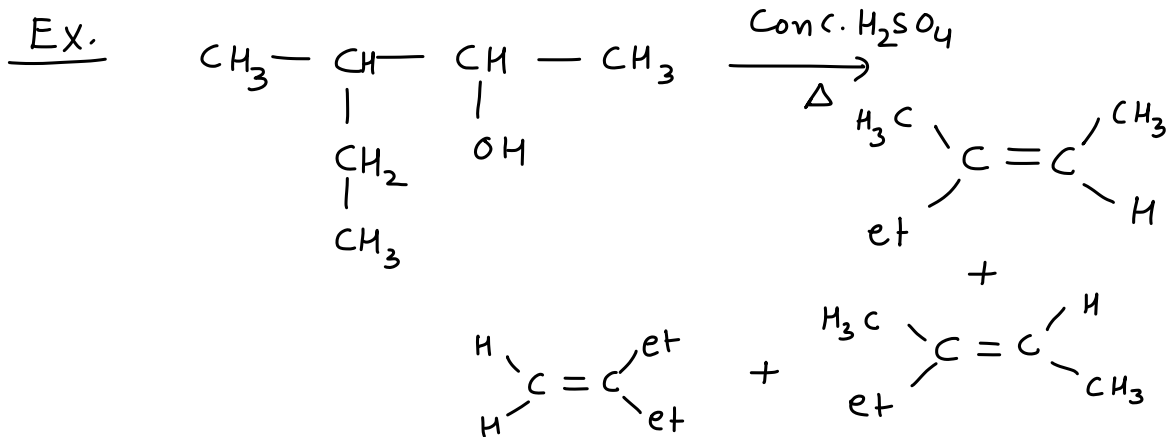
H_2O (Polar Protic solvent)

\hookrightarrow high dielectric constant

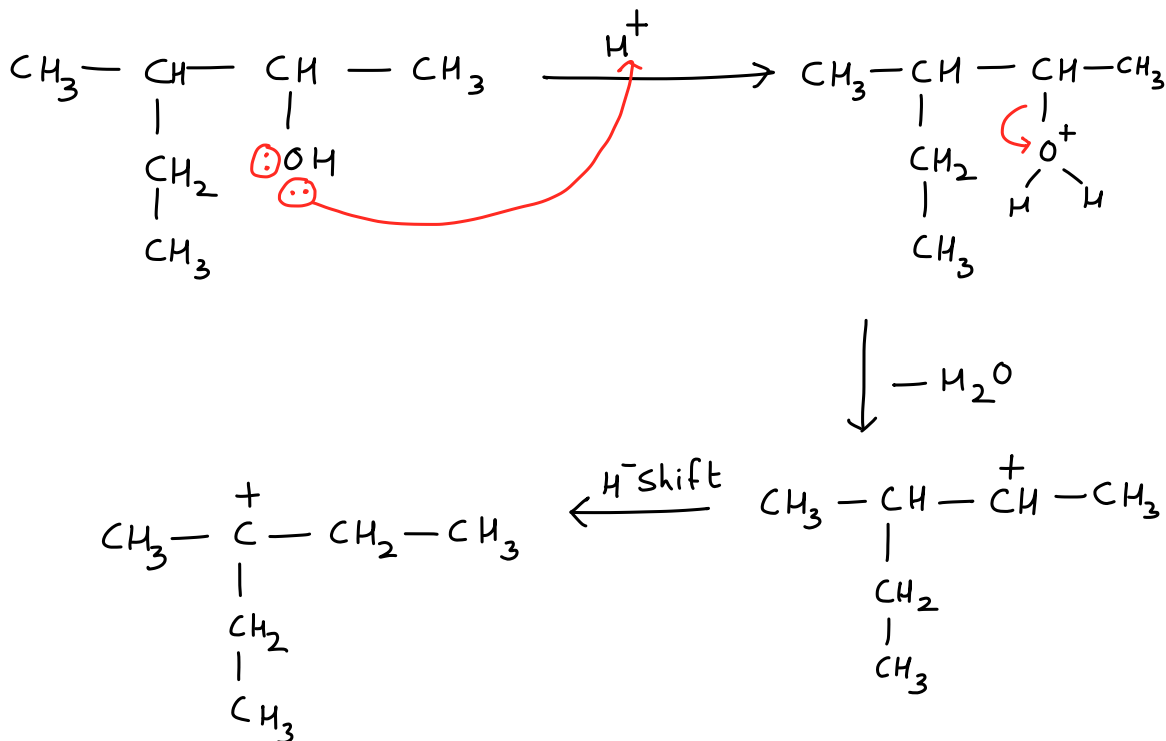
Step-2

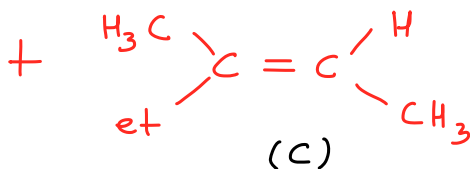
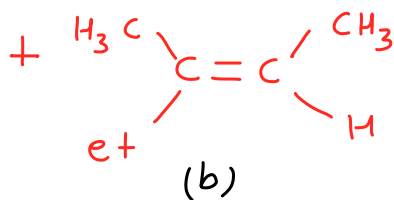
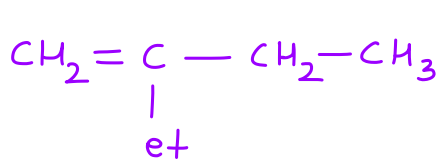
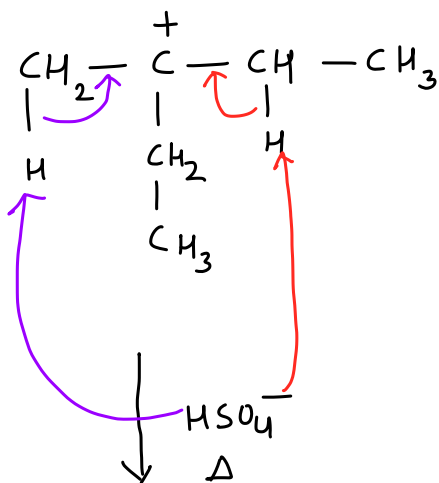


* Dehydration of alcohols by conc $\text{H}_2\text{SO}_4/\Delta$,
 conc. $\text{H}_3\text{PO}_4/\Delta$, conc. KHSO_4/Δ , H^+/Δ



Mech. \rightarrow





stab. \Rightarrow (c) > (b) > (a)

Saytzeff alkene Hoffmann alkene

- * stereoselective R_x^n
- * Non stereospecific R_x^n
- * Regio selective R_x^n
- * Non Regio specific R_x^n

Key Points →

- (1) $\text{order} = 1 = \text{molecularity}$
- (2) C^{\oplus} is intermediate so it can rearrange if possible.
- (3) $\left. \begin{array}{l} 2 \text{ } \sigma\text{-bond break} \\ 1 \text{ } \pi \text{ bond form} \end{array} \right\} \Rightarrow \text{endothermic } \text{Rxn}$

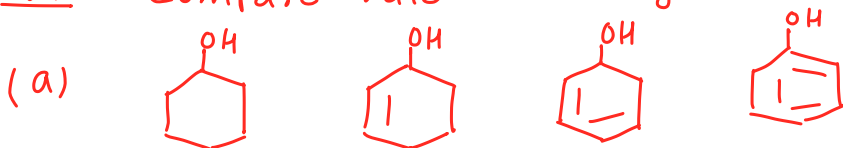
$$\Delta H > 0$$

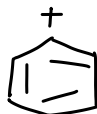
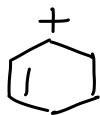
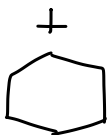
$$\Delta S > 0$$

Higher temp. makes $\Delta G < 0$
 \Rightarrow Temp. is driving force.

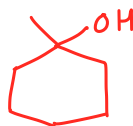
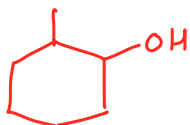
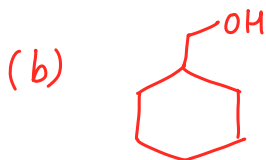
- (4) Polar protic solvent, weak base, low conc. of base favours $\text{E}_1 \text{ Rxn}$.
- (5) rate of $\text{Rxn} \propto \text{stab. of carbocation}$
- (6) saytzeff alkene will be major product
↓
most stable alkene

Q. Compare rate of dehydration ?



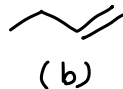
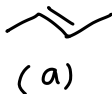
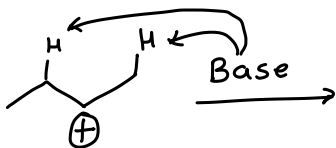
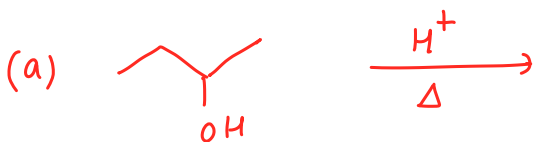


$c > b > a > d$

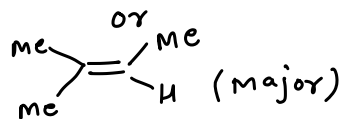
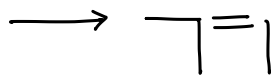
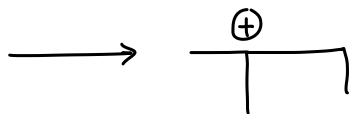


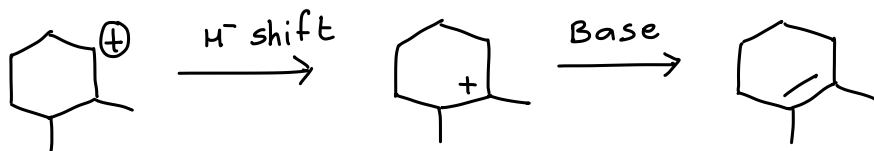
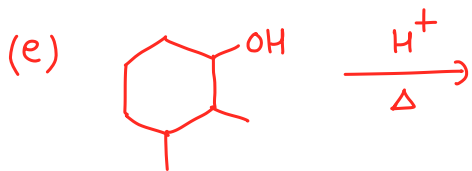
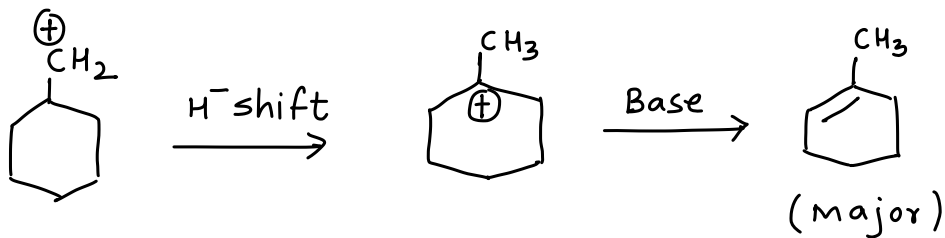
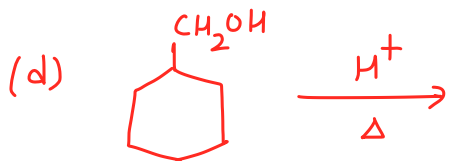
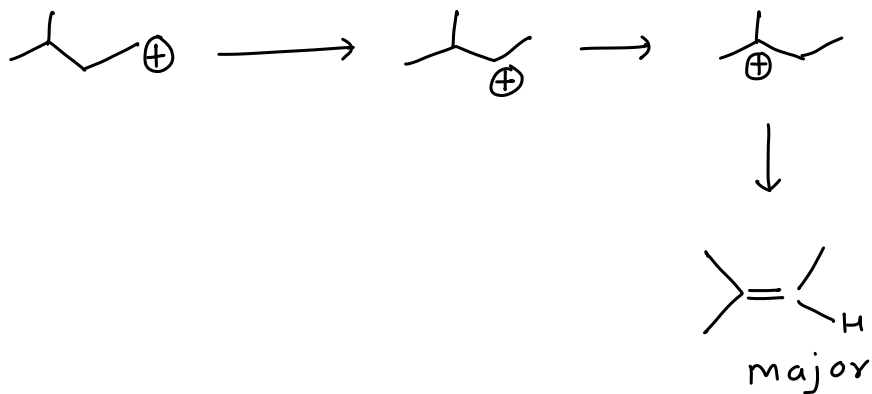
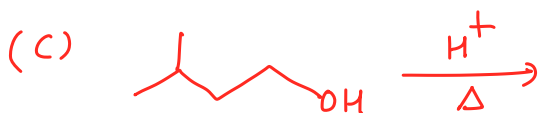
$d > c > b > a$

Q. Identify the products ?



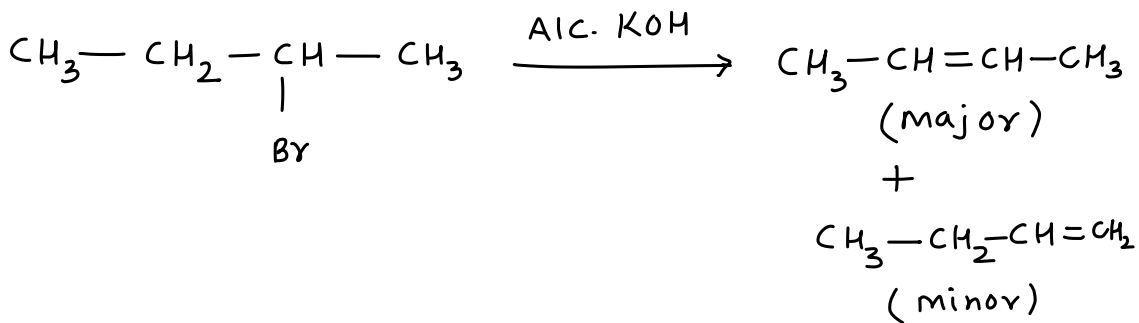
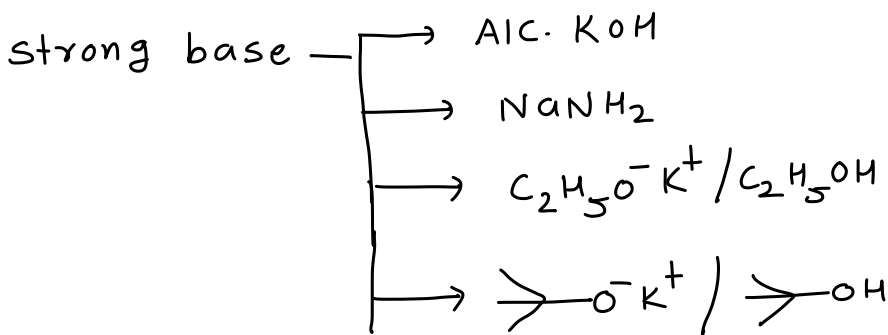
$(a) > (c) > (b)$



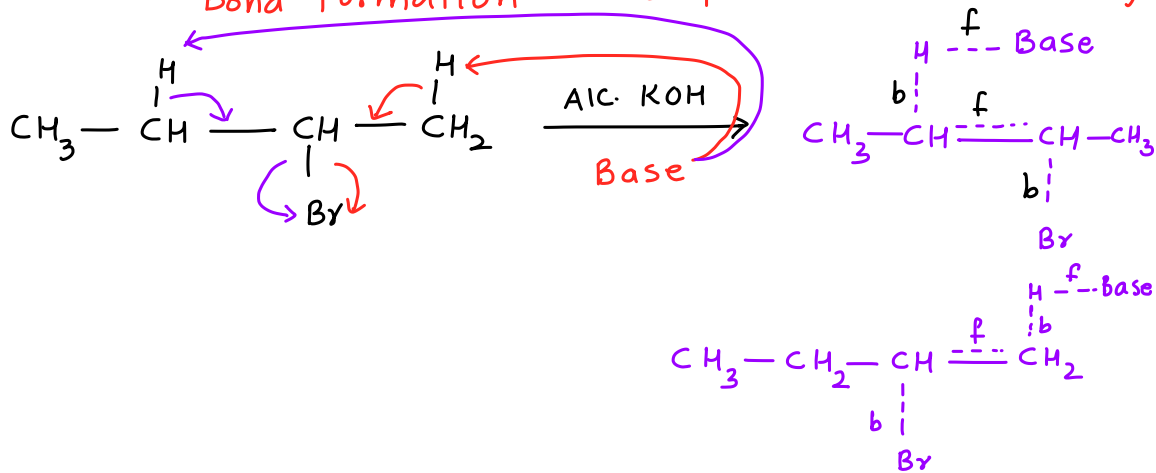


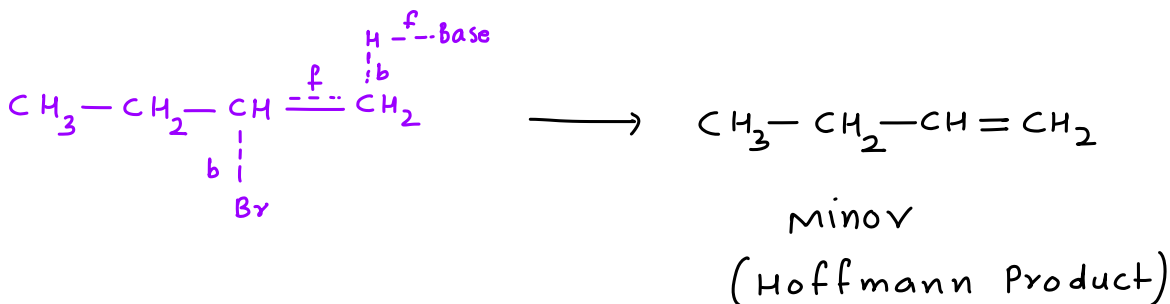
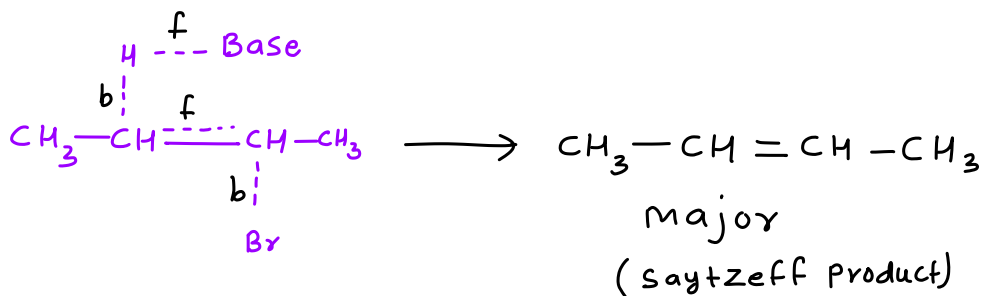
Elimination bimolecular RX^n (E_2 RX^n) \rightarrow

* Dehydrohalogenation of $1^\circ/2^\circ$ halide with strong base \rightarrow



Mech. \rightarrow Concerted mech. (Bond breaking and Bond formation takes place in one step only)





Key Points \longrightarrow

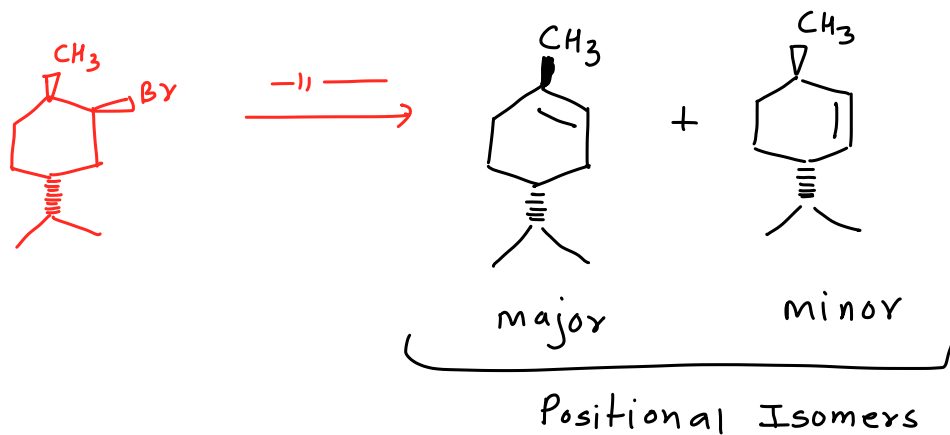
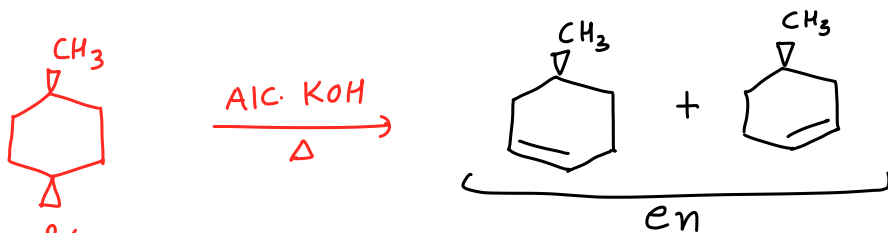
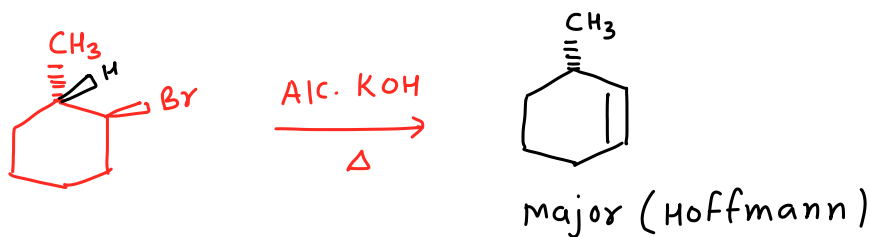
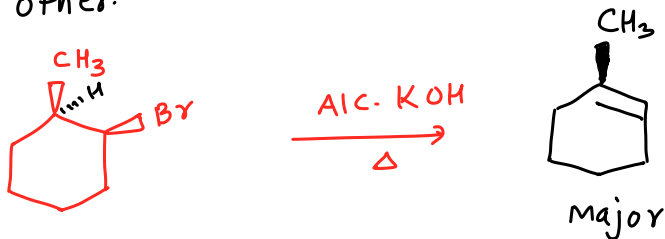
- (1) rate law $\longrightarrow r = k [\text{R-X}]^1 [\text{Base}]^1$
 $0 = m = 2$
- (2) NO Carbocation, NO rearrangement
- (3) Rate of $\text{E}_2 \text{ Rx}^n \propto$ stab. of Transition state
 \propto stab. of Alkene
- (4) $\Delta H > 0$, $\Delta S > 0$
 Higher temp. favours this Rx^n .
- (5) Saytzeff alkene (Zaitsev alkene) will be

major product.

Imp.
(6)

It is exa. of Anti elimination. It means that β -hydrogen and leaving group must be at Anti position to each other.

Ex





DTS-1-11

Q.13,14,22,42,83

JEE MAIN : Q.5-8,14,18,27

JEE ADVANCED: Q.7,23,39,47,54,57,65,66,73,75,78,93,95,97,100,103,104,114

Organic concepts workbook

DTS-1-11

Q.1-16,57,62-64,69,70,73-77,95,103,111,113,116,122,127,137