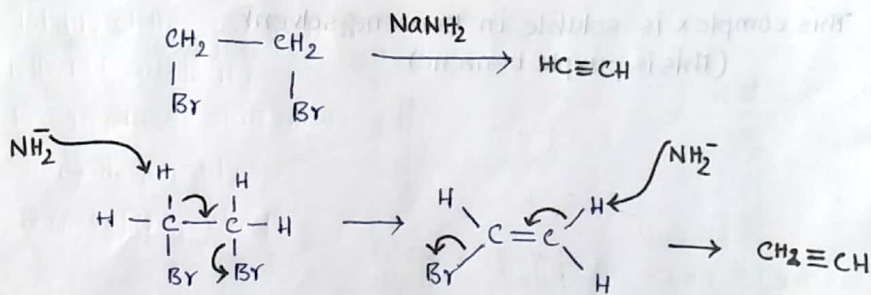
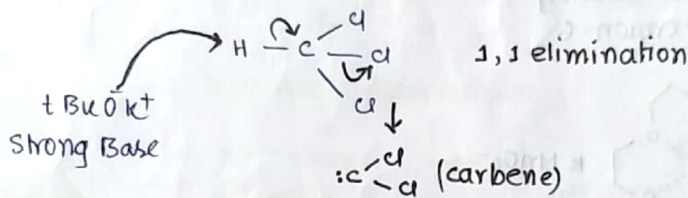
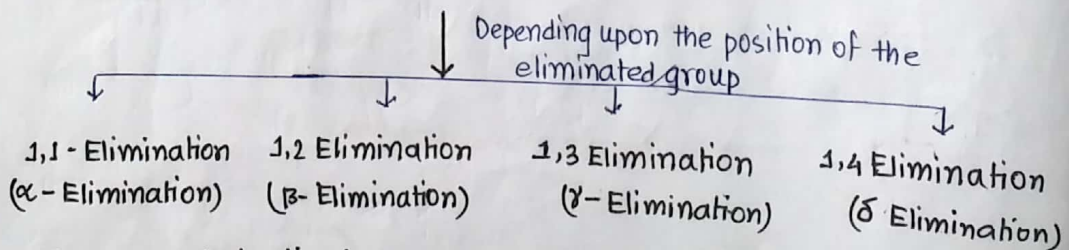


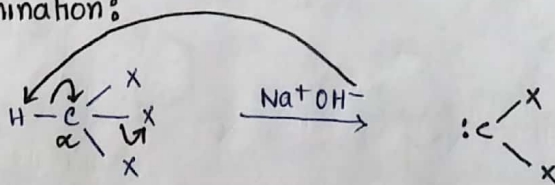
Basicity is the important factor for elimination whereas nucleophilicity is the important factor for substitution.



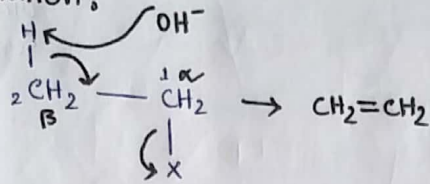
Elimination Reaction



(i) 1,1 Elimination:

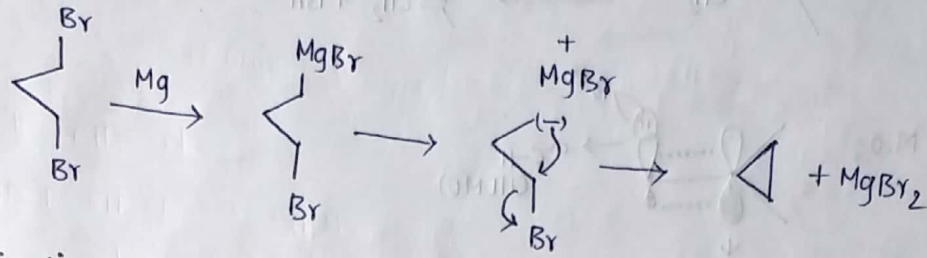


1,2 Elimination:

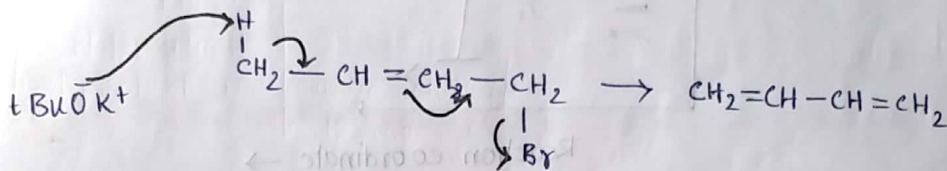
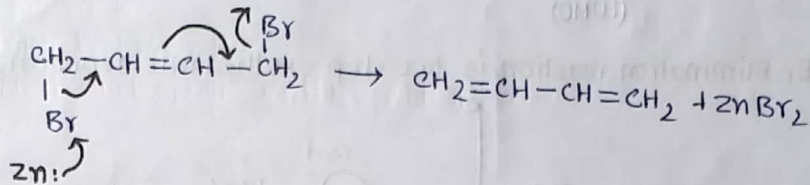


Rathin Jana  
Sem-2 cc-4  
Organic Chem

1,3 Elimination:



1,4 Elimination:



1,2 Elimination  
(β-Elimination)

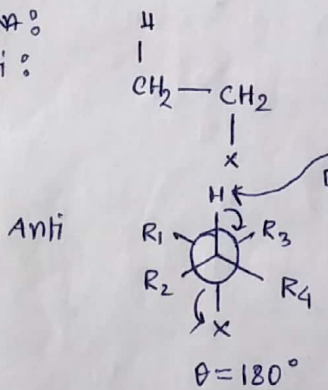
Depending upon kinetics

- (i) E<sub>1</sub> Elimination
- (ii) E<sub>1cB</sub> Elimination
- (iii) E<sub>2</sub> Elimination

Depending upon the Stereochemical relationship between the Eliminated groups.

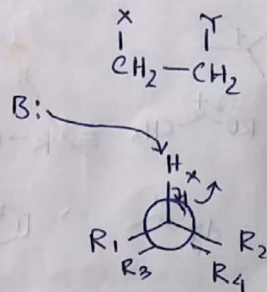
- (i) Syn Elimination
- (ii) Anti Elimination

Syn:  
Anti:



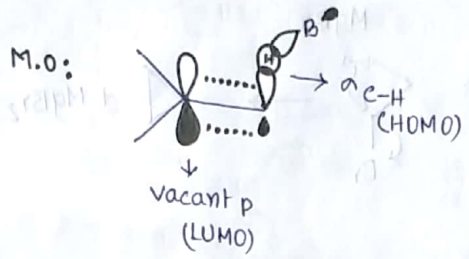
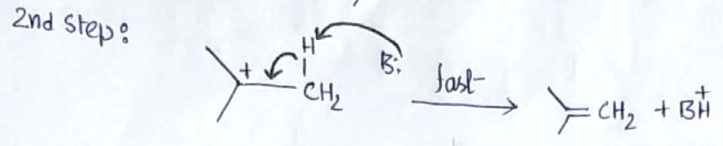
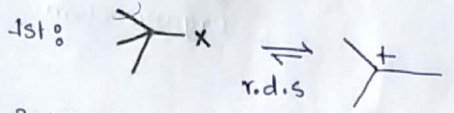
Anti Elimination

ASyn:

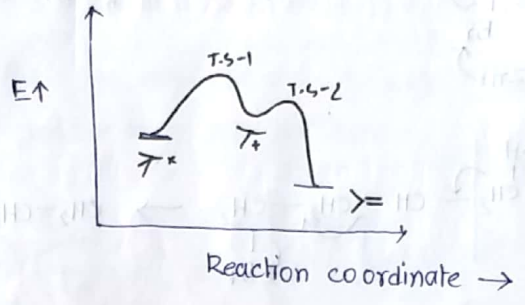


Syn Elimination

**E<sub>1</sub> Elimination :**



E<sub>1</sub> Elimination reaction is two step exothermic reaction.

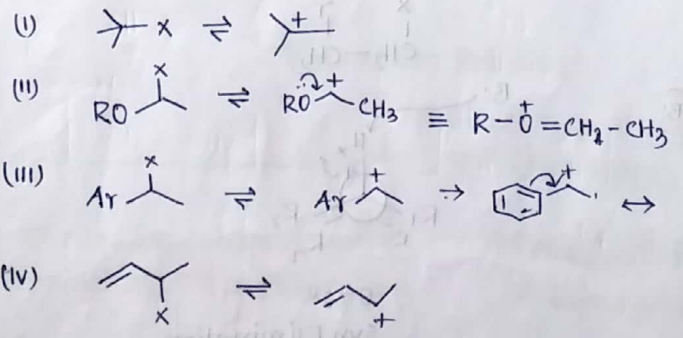


rate  $\propto [\gamma X]$   
rate =  $k[\gamma X]$

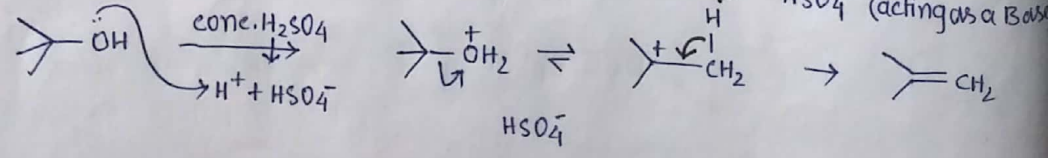
E<sub>1</sub> Elimination reaction depends upon the following factor :-

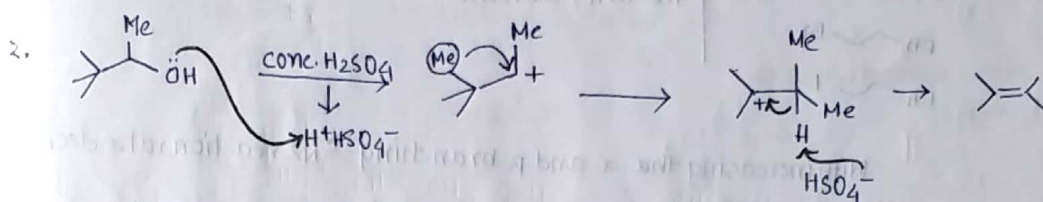
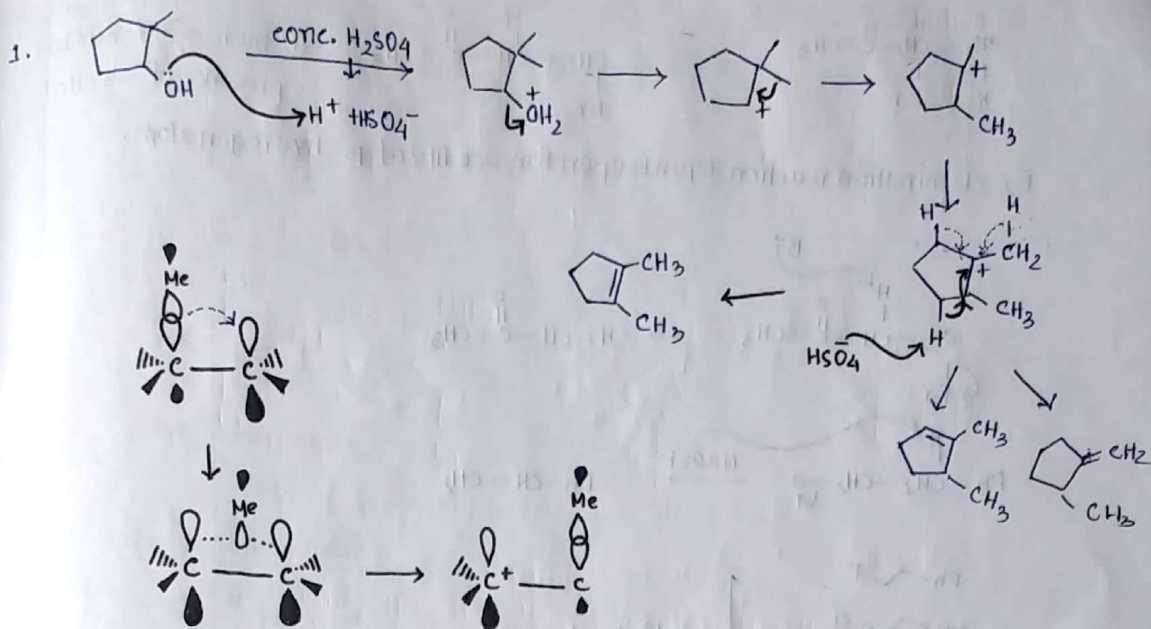
- (i) Stability of the carbocation.
- (ii) Effect of substrate.
- (iii) Leaving group ability.
- (iv) Solvent polarity.
- (v) Temperature effect.

Type of substrate —

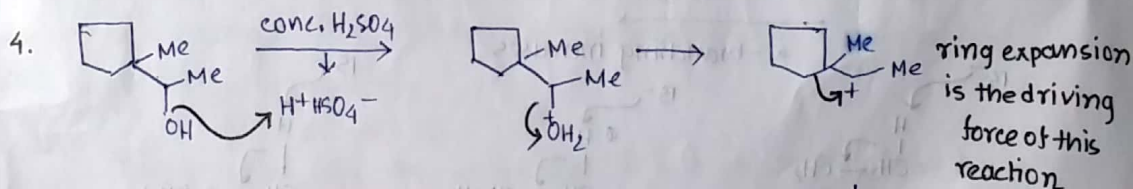
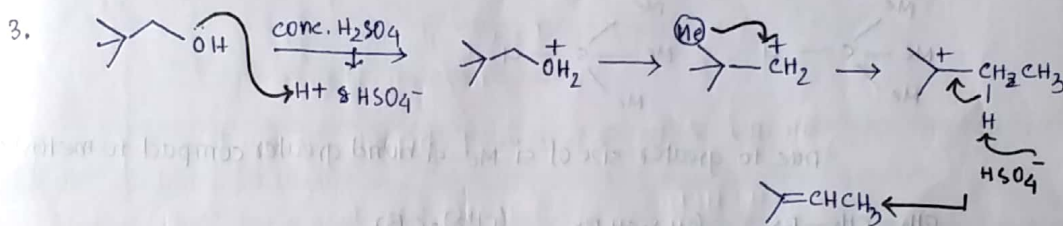


**Dehydration of Alkohol :**

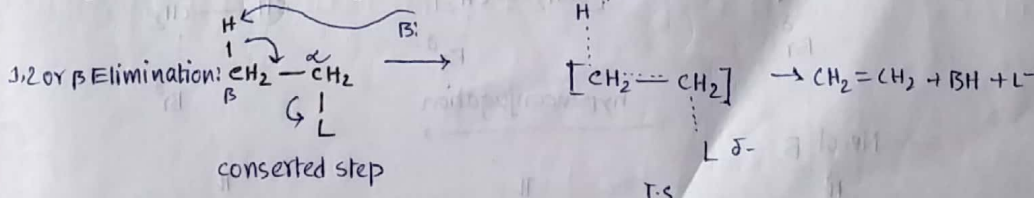




In  $\text{E}_1$  reaction generally the more substituted product predominates

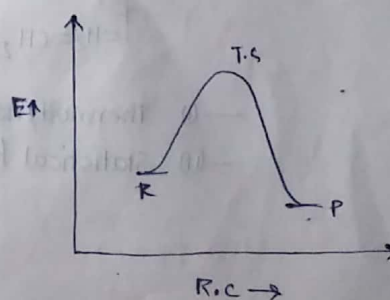


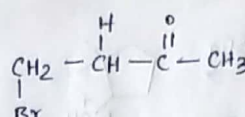
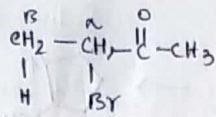
$\text{E}_2$  Elimination reaction:



$\text{E}_2$   $\text{E}_1$  reaction rate depends upon the following factors—

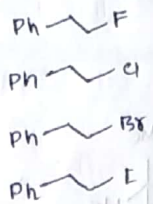
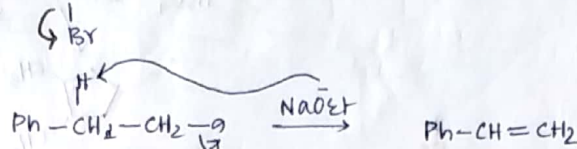
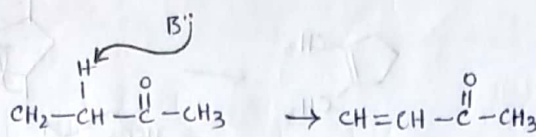
- Effect of the substrate
- Basicity of the Base
- Leaving group ability
- solvent polarity





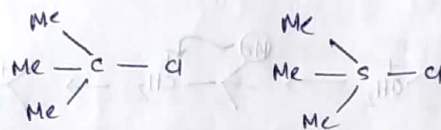
⊕ more acidic due to presence of -I effect

E<sub>2</sub> elimination reaction depends upon the acidity of β-hydrogen atom.

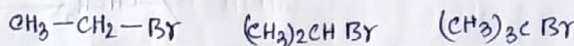


↑ reactivity decrease

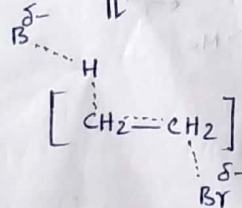
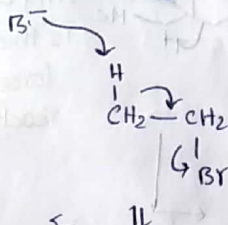
With increasing the α and β branching S<sub>N</sub>2 reaction rate decreases and E<sub>2</sub> rate increases.



Due to greater size of Si Me-Si bond greater compact to methyl C

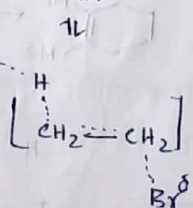
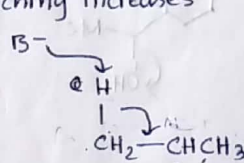
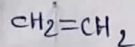


α-branching increases



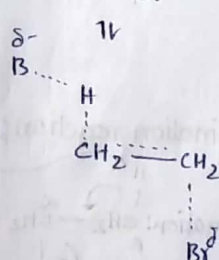
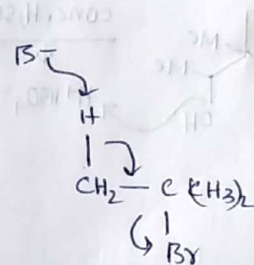
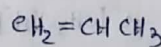
No. of β

1

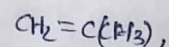


hyperconjugation

1

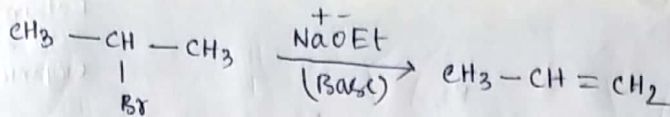


1

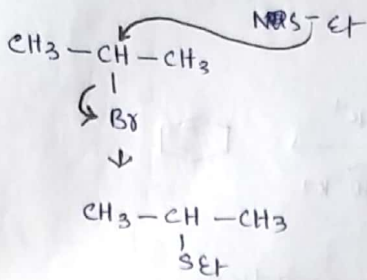


more substituted

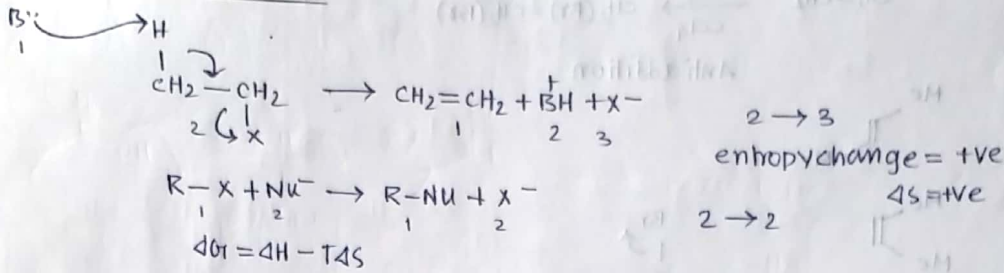
- (i) Thermodynamic stability of product
- (ii) Statistical factor



↓ NaOEt (Nucleophile) due to polarizability



### Temperature Effect



$$\Delta G = \Delta H - T\Delta S$$

= -ve more negative

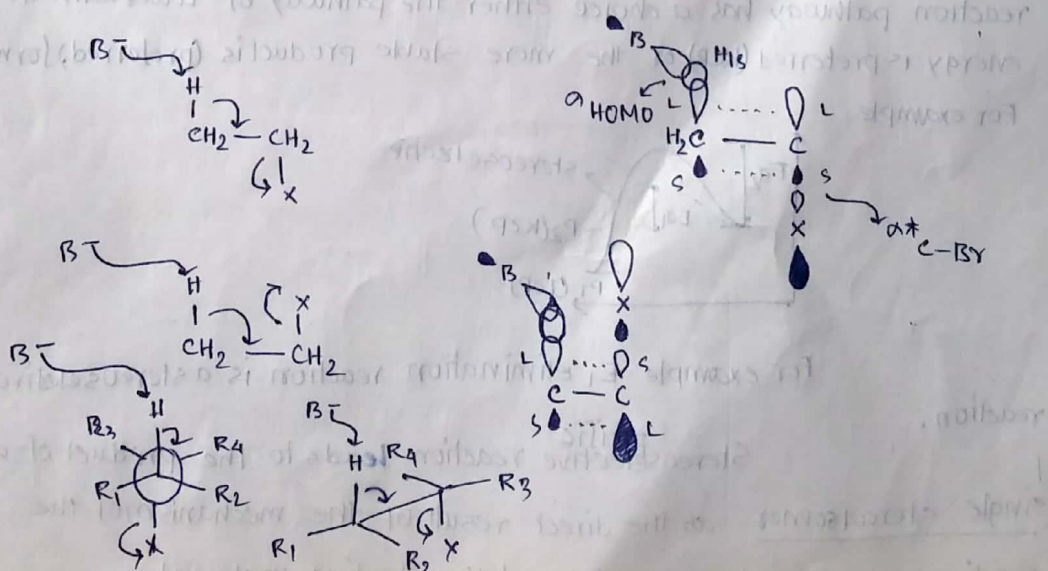
E<sub>2</sub> elimination spontaneous

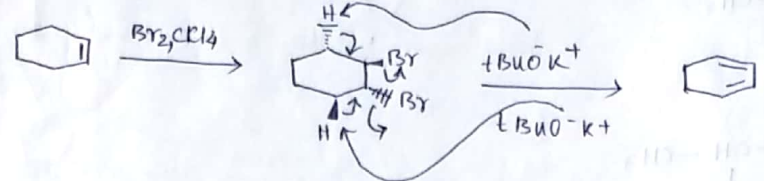
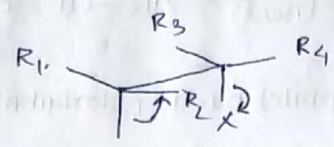
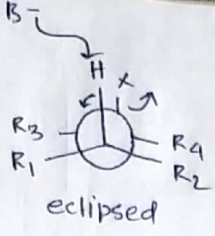
Temperature has an important role to play deciding whether the reaction is an elimination or substitution. In elimination 2 mole become 3 moles but in substitution two mole reactant forms 2 new molecules. Two reaction therefore differs in the change in the entropy during reaction. ΔS is greater for elimination than substitution.

$$\Delta G = \Delta H - T\Delta S$$

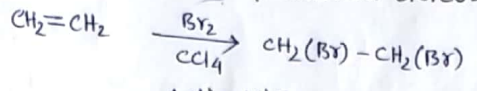
This equation says that a reaction in which ΔS is positive becomes more favourable (ΔG = -ve) at higher temperature. Therefore elimination will be favourable at higher temperature.

### Molecular orbital diagram:

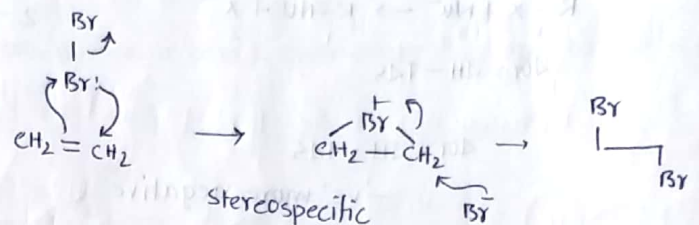
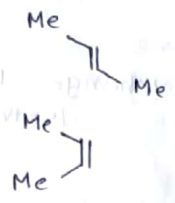




Stereospecific and stereoselective reaction

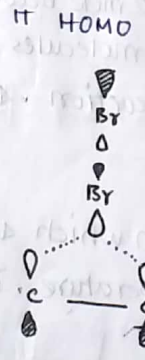


Antiaddition

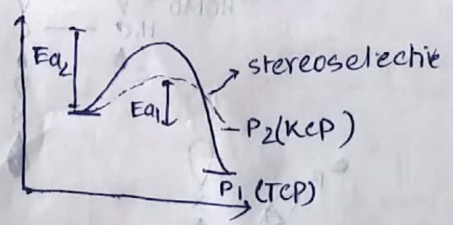


Stereospecific  
100% antiaddition

Initially  $Br_2$  acts as an electrophile  $\pi$  nucleophile  
 $\pi$  HOMO  $\sigma^* \text{ LUMO } Br-Br$



A stereoselective reaction gives predominant product because of reaction pathway has a choice either the pathway of lower activation energy is preferred (KCP) or the more stable product is (preferred) formed (TCP)  
For example

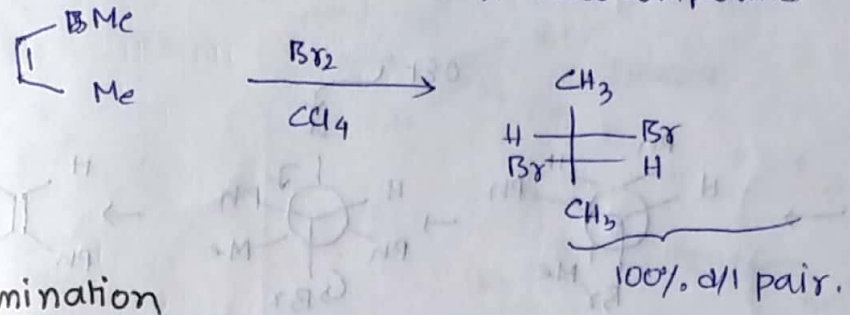
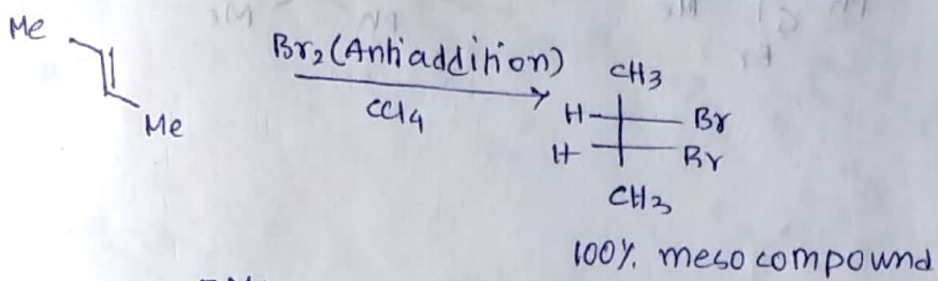


For example  $E_1$  elimination reaction is a stereoselective reaction.

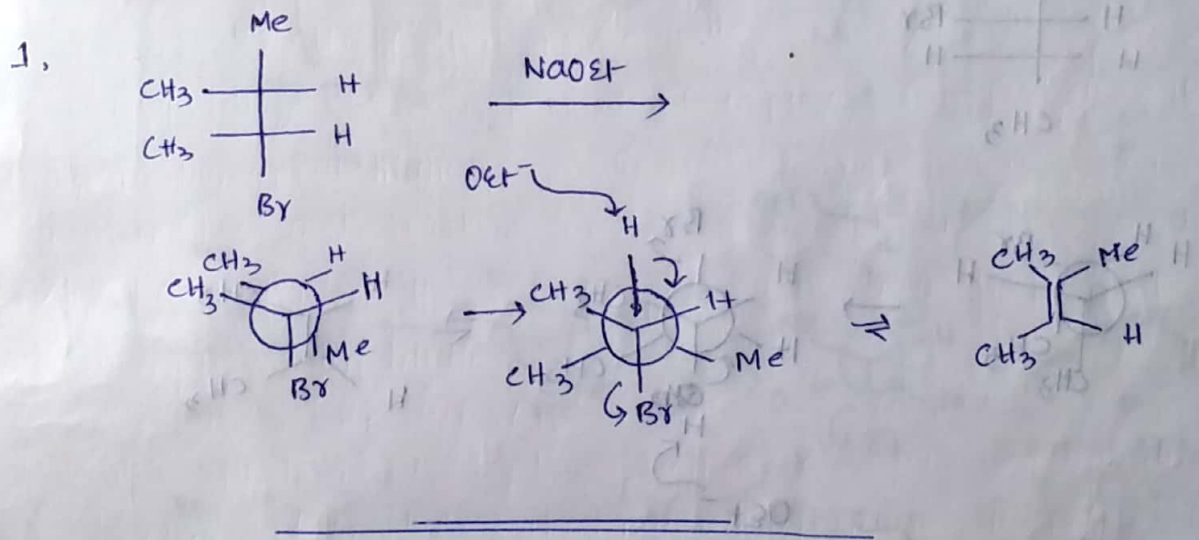
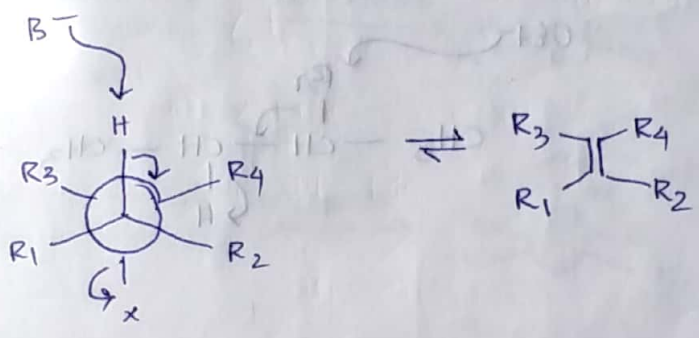
Stereospecific reaction leads to the product of a single stereoisomer as the direct result of the mechanism of the reaction and the stereochemistry of the starting material.

There is no choice. The reaction gives different diastereomeric product from each of the stereoisomer of the starting material.

For example - Br<sub>2</sub> addition to 2-Butene is a stereospecific reaction.



E<sub>2</sub> Elimination



Ph.