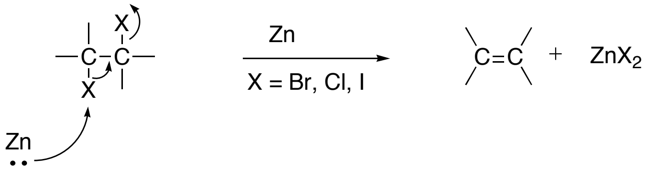
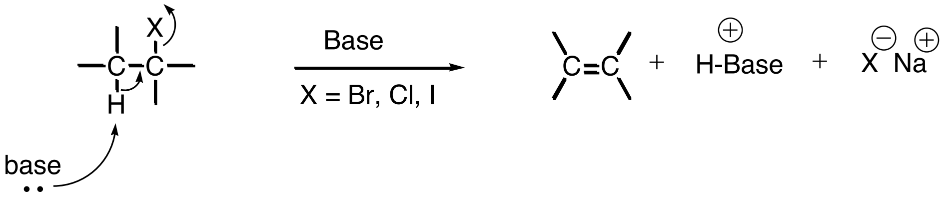
Elimination Reactions

Three examples/types:

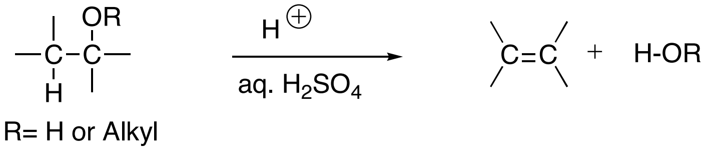
1) Dehalogenation - Always E_2



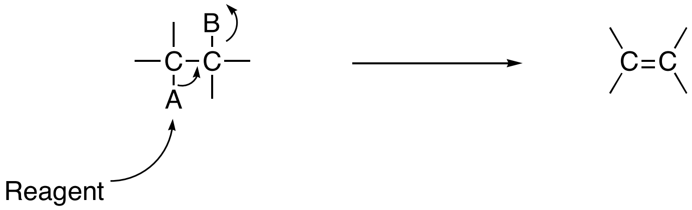
2) Dehydrohalogenation - Generally requires base (e.g. $R\text{-}O^- Na^+$). Can be E_1 or E_2.



3) Dehydration / Ether Cleavage – Generally requires acid. Can be E_1 or E_2

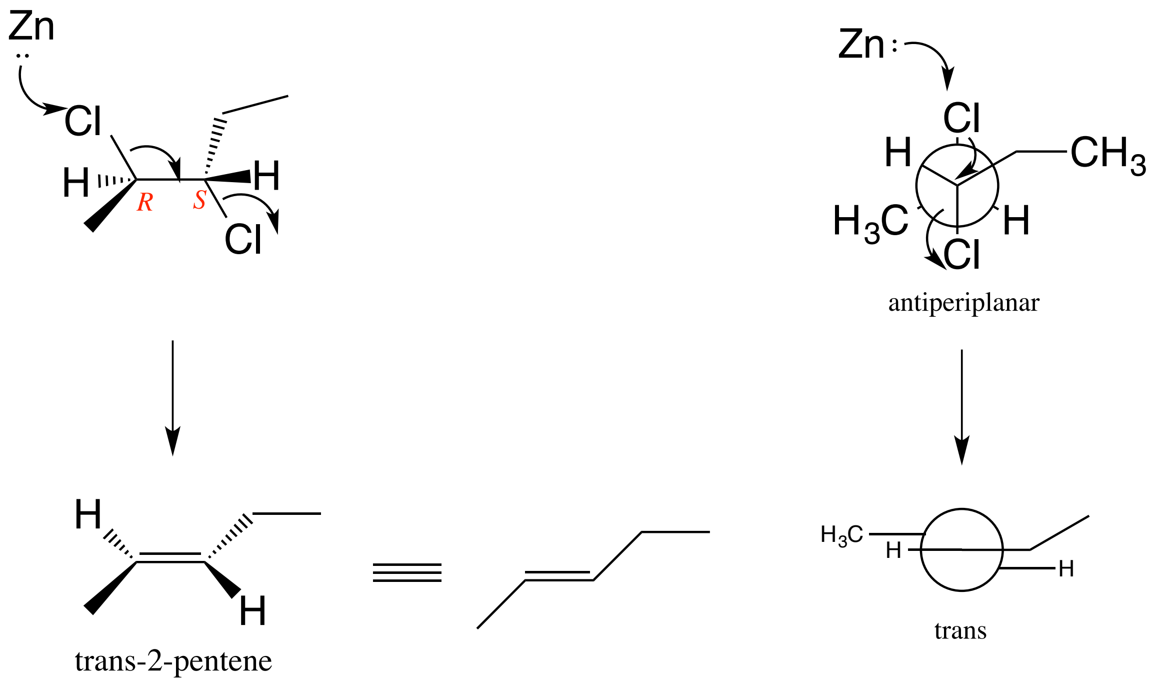


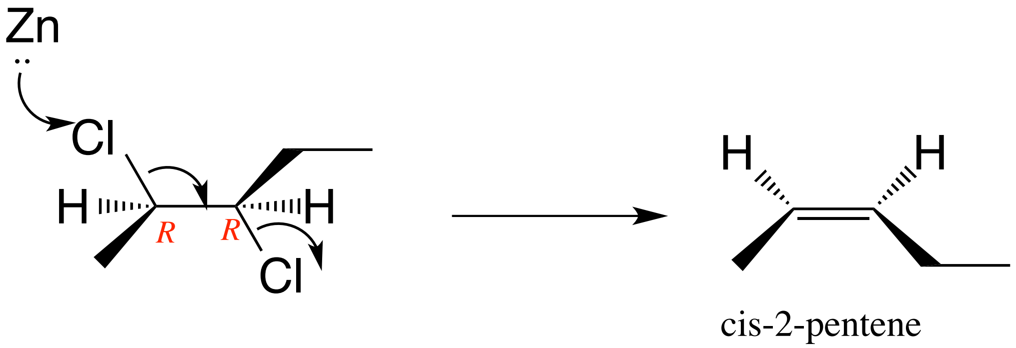
Mechanism of E2 Reactions Continued:



Geometry of abstracted proton and leaving group is antiperiplanar

Example: Dehalogenation – E2

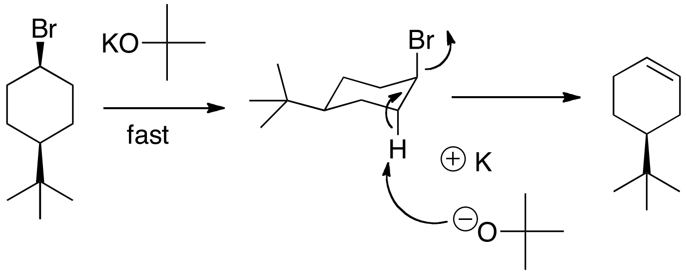


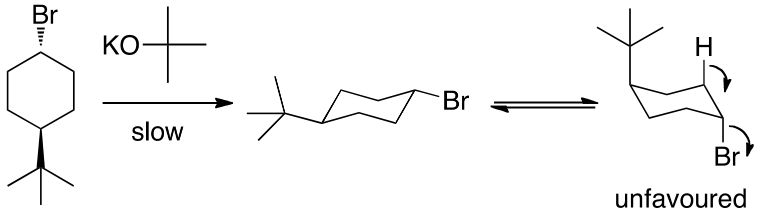


The R,S starting material goes to trans-2-pentene
The R,R starting material goes to cis-2-pentene

- E2 is a **stereospecific reaction** because the stereochemistry of the starting material determines the stereochemistry of the product

Dehydrohalogenation



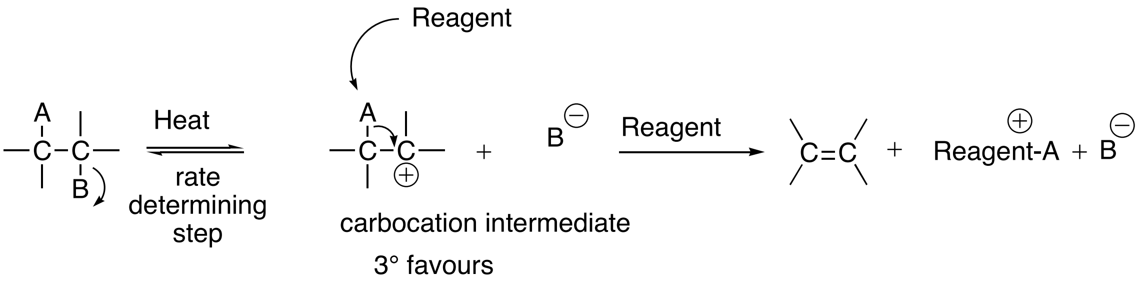


(unfavoured conformation)

The top reaction proceeds fast by E2. The second reaction proceeds slowly and gives a low yield.

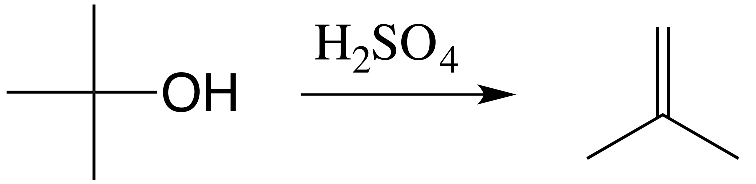
- The top reaction has hydrogen **antiperiplanar** to the leaving group. A bulky base abstracts a proton to generate a cycloalkene.
- The bottom reaction proceeds slowly because hydrogen and the leaving group aren't antiperiplanar. In order to get the two groups antiperiplanar the chair needs to change into the unfavourable conformation that has the tert-butyl substituent axial.

Mechanism of E1 Reactions



Examples:

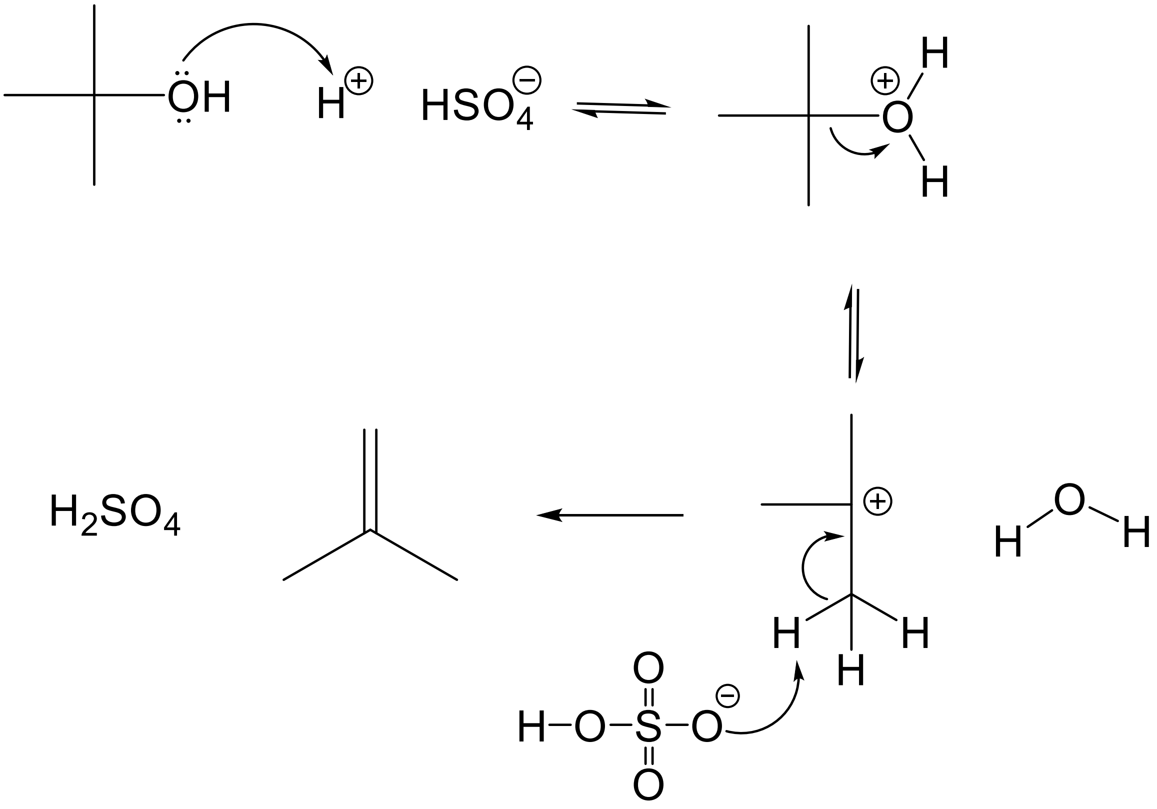
1.



t-butyl alcohol

2-methylpropene

Mechanism:



2.