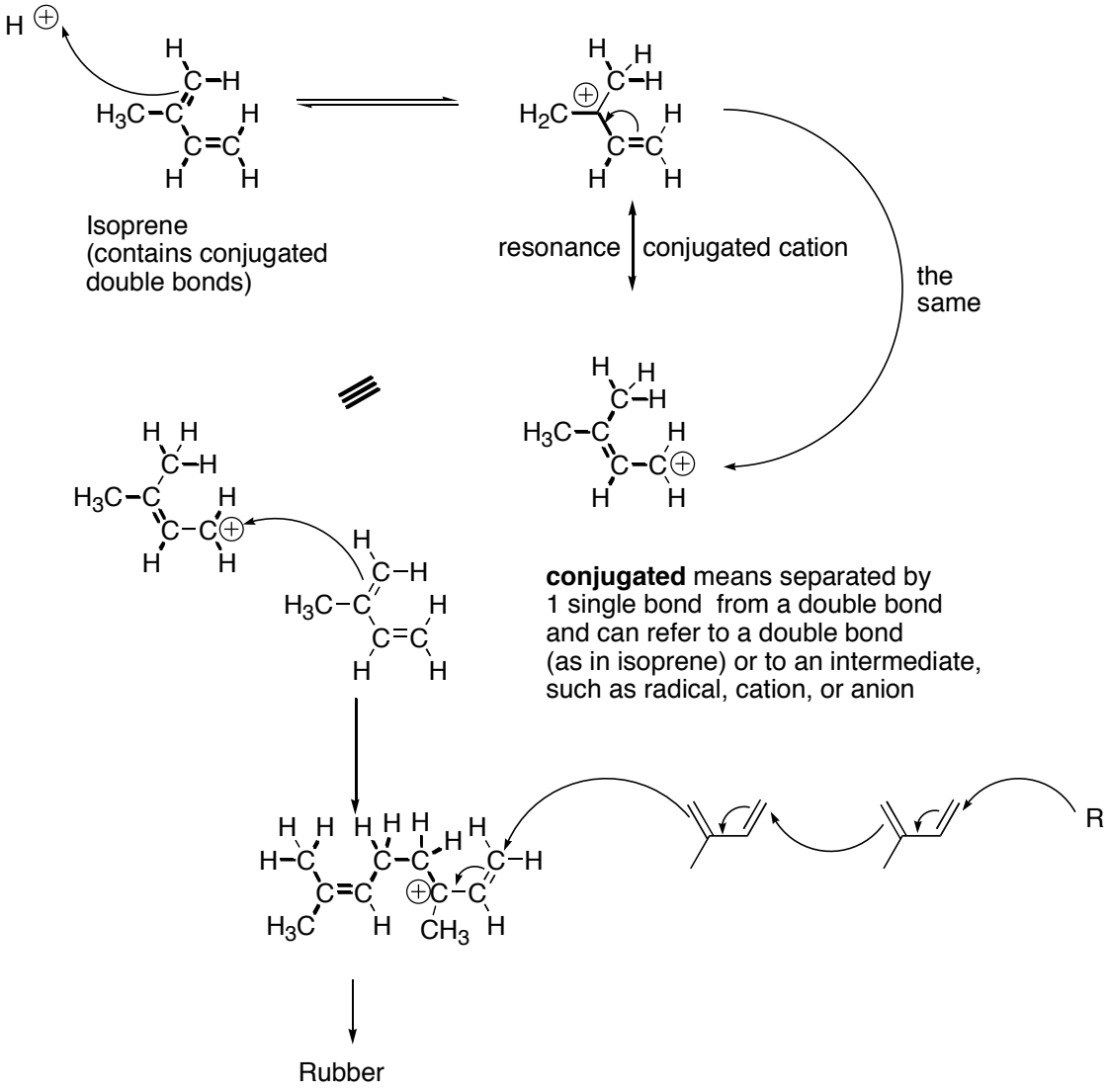
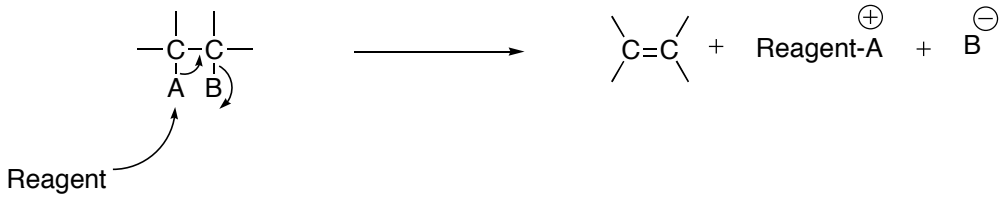


Elimination Reactions

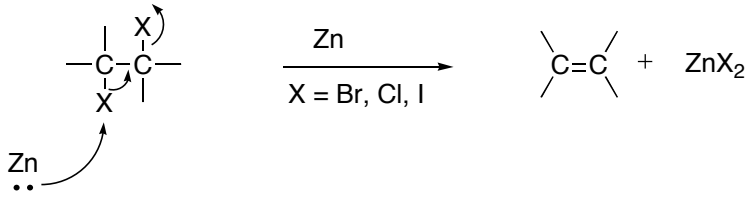
Synthesis of Alkenes and Alkynes

General

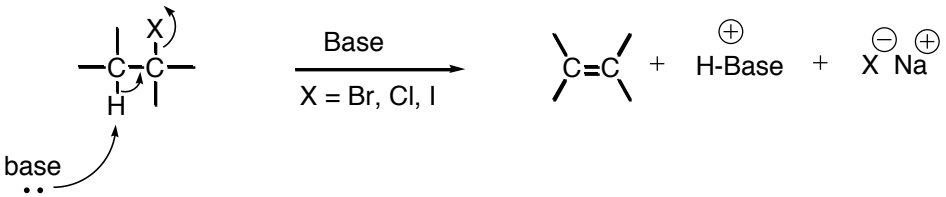


Three examples

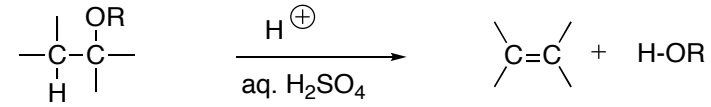
1. Dehalogenation



2. Dehydrohalogenation : Generally requires base e.g. $R\text{-}O^{-}\ Na^{+}$

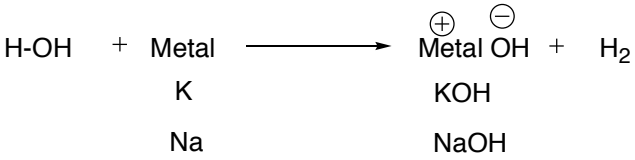


3. Dehydration/ Ether cleavage – general requires acid

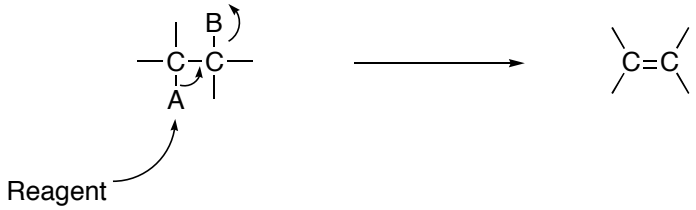


R= H or Alkyl

Demonstration

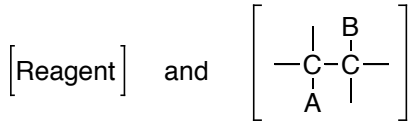


Mechanism of Elimination – E2

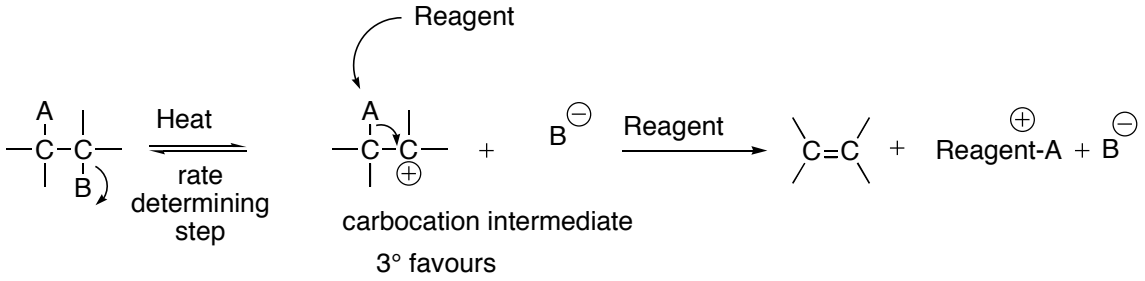


Concerted – all bonds break and form at the same time ∴ reaction is stereospecific.

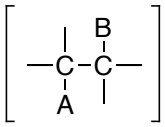
Bimolecular : Rate depends on 2 concentrations (brackets represent concentration)



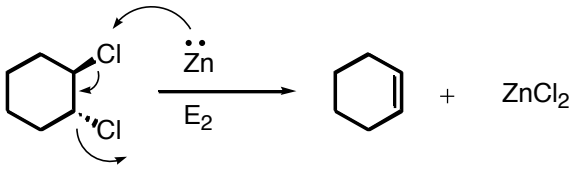
Mechanism of elimination – E1



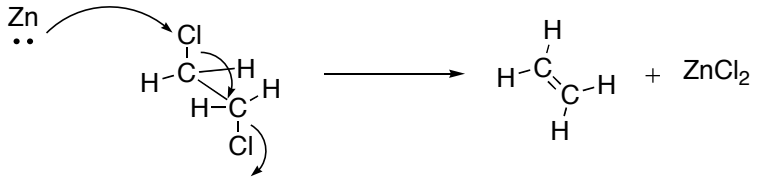
Stepwise
-not concerted
-carbocation intermediate
-not stereospecific
-unimolecular
-rate depends on one concentration



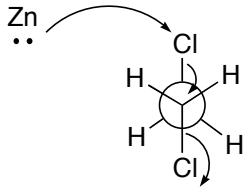
Dehalogenation – "Always" E2



Favored geometry – Anti-periplanar

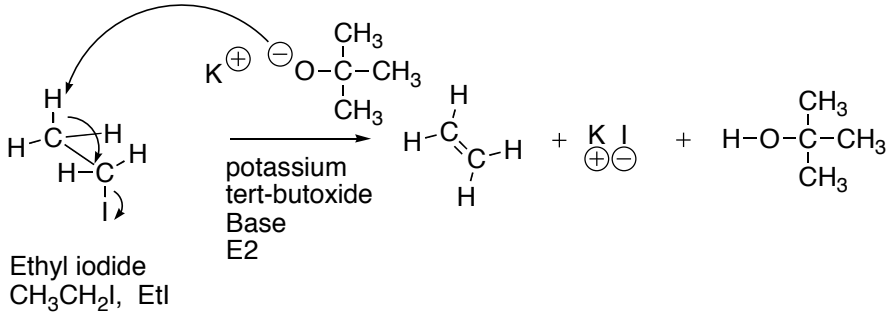


Newman Projection



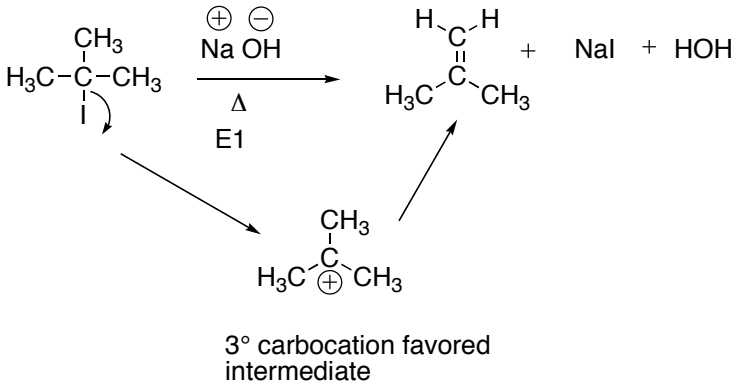
Anti-periplanar

Dehydrohalogenation



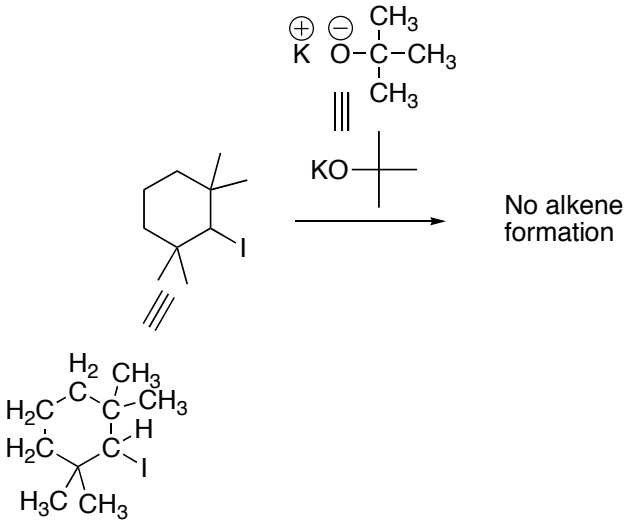
E^2 rxn above – if 1° alkyl halide (1° carbocation unfavored)

However often E_1 if 3° carbocation can be formed (below)

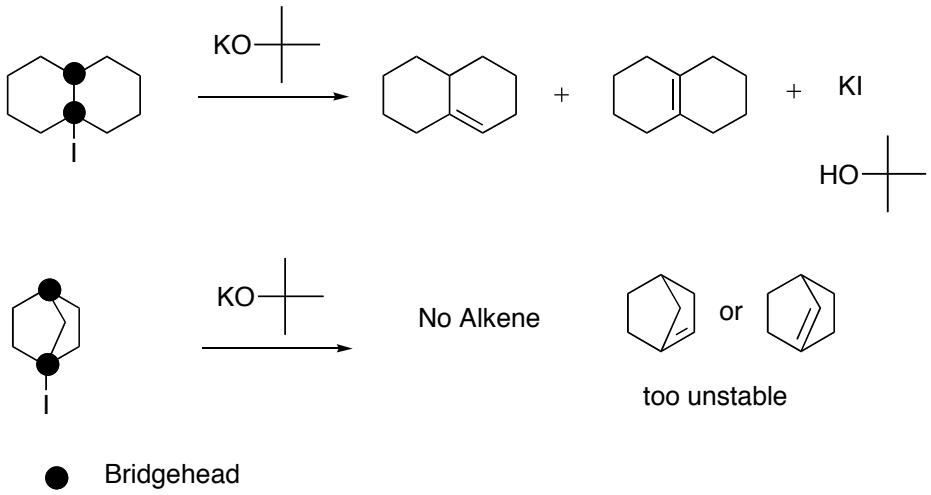


Limitations

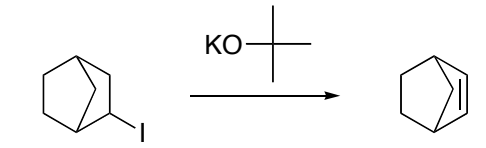
Must have H on adjacent carbon – reaction below does NOT work due to lack of H that can be removed



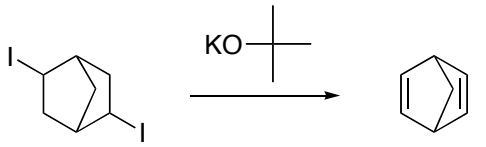
Bicyclic Systems – require special attention



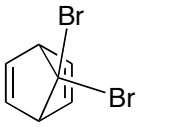
Bredt's rule – in bicyclic molecules no alkene to a brigehead carbon, if all bridges have ≥ 1 carbon and small rings (< 7). In top example one bridge has 0 carbons and alkene formation works



norbornene

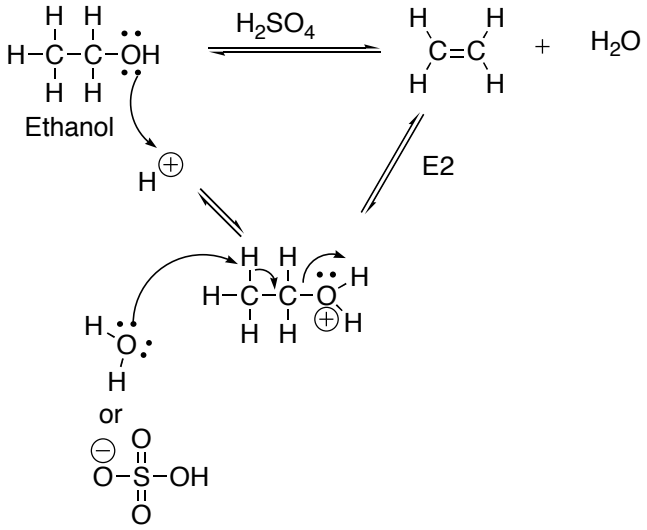


norbornadiene



Toxic

Elimination of H-OH or H-OR (generally requires acid eg. H_2SO_4)



HO^- or RO^- are bad leaving groups however HO-H or RO-H are good leaving groups