CHEM 242 – Lecture 9 *27/01/2014*

Overheads: - Outline
Model: to show anti elimination

Recap Friday: E2 *vs* E1 Reactions

E2	*vs*	E1
- one step		- two steps
- no C^+		- C^+ intermediate (⇗ can rearrange!)
- rate = k[R-LG][base] (bimolecular)		- rate = k[R-LG] (unimolecular)
- regiochem = Zaitsev		- regiochem = Zaitsev
- ALL!!		- 3° > 2° (no 1°) {C^+ stability}

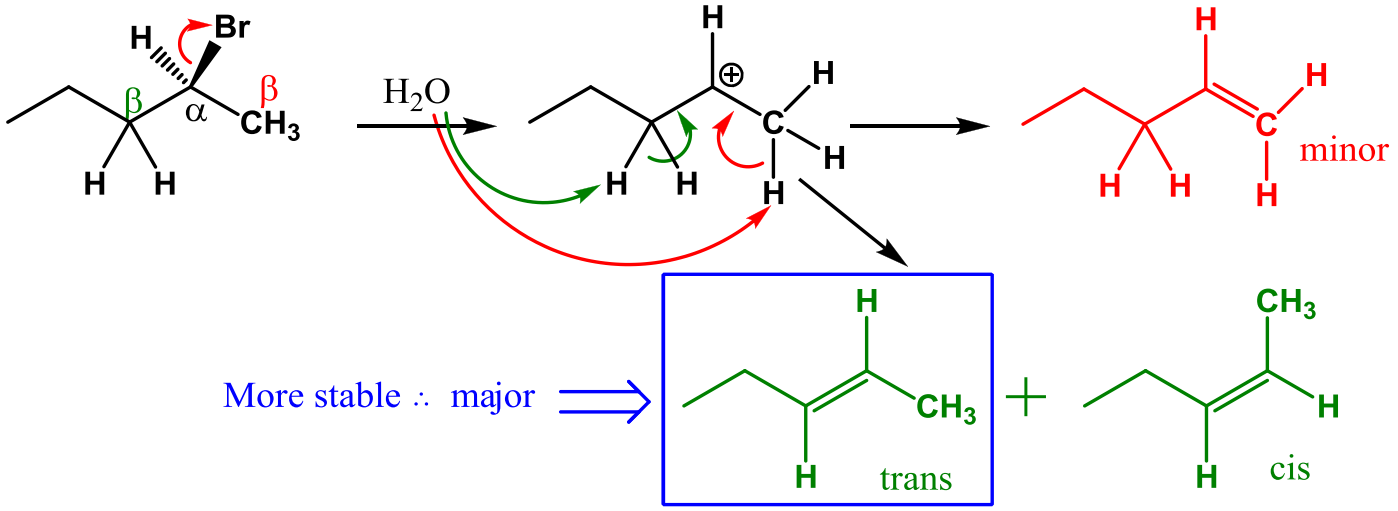
Other factors in predicting E1 vs E2:
2) Base Strength:

E2 needs strong base (OH^- or better)
⇨ high concentration helps increase rate
E1: weak base is ok (*eg* H_2O)
⇨ $NaHCO_3$, Na_2CO_3 are weak bases, but not good nucleophiles ∴ help E1
↳ recall Lab 2: side product with lower BP = E1 product

3) Solvents: polar aprotic = E2
protic = E1
} same reasons as S_N1 *vs* S_N2

Stereochemistry of Elimination Reactions (cis *vs* trans)

1) E1: Zaitsev: most stable alkene formed

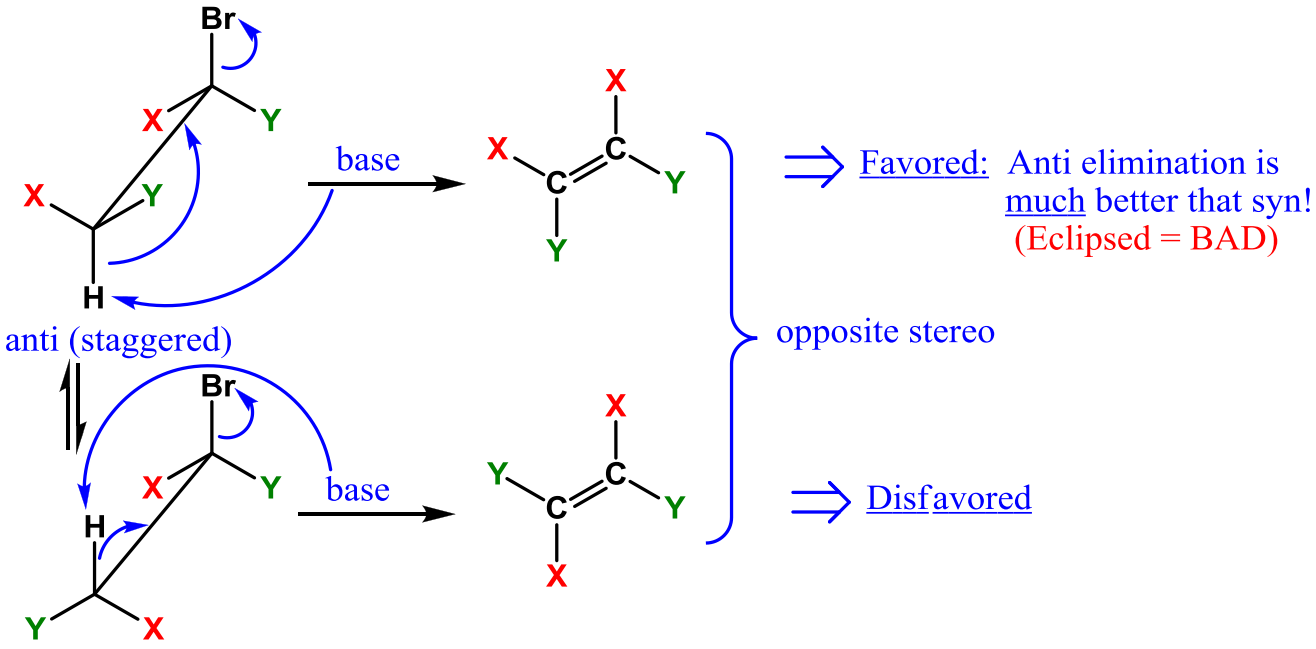


2) E2: more complicated!

⇨ reaction is concerted (one step)

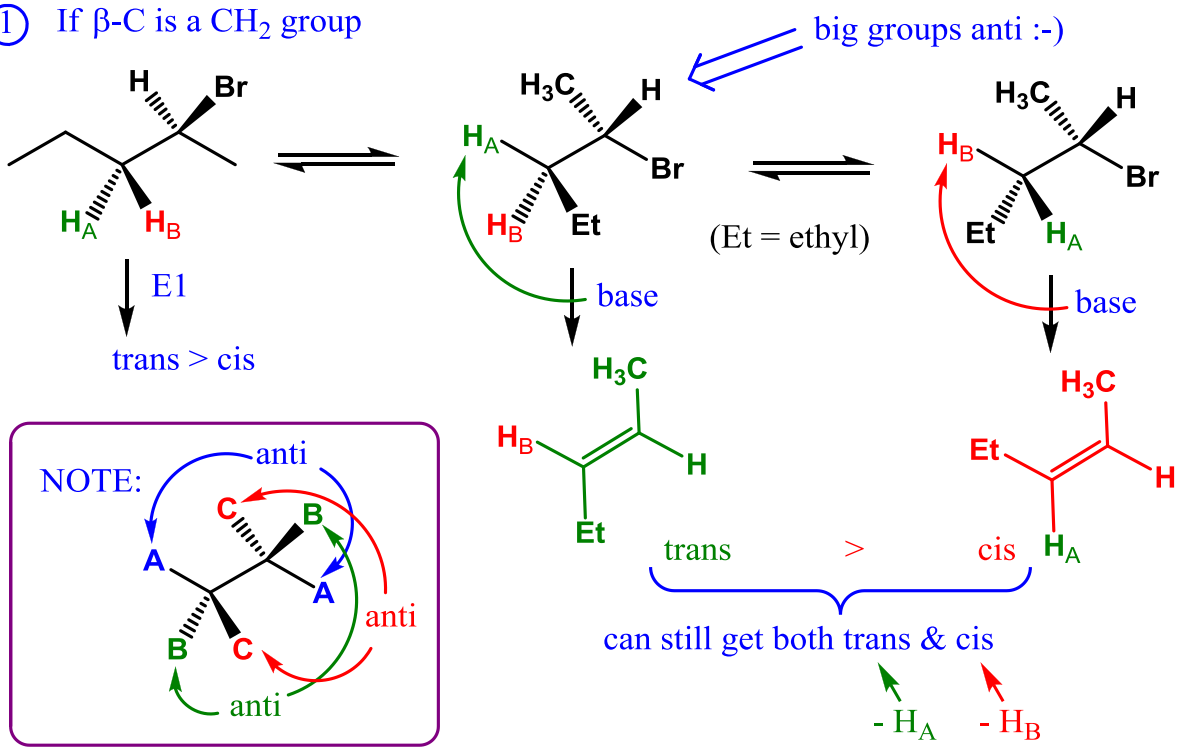
∴ orbitals must line up in same plane (*ie* β-H & LG must be in same plane)

Two ways possible:

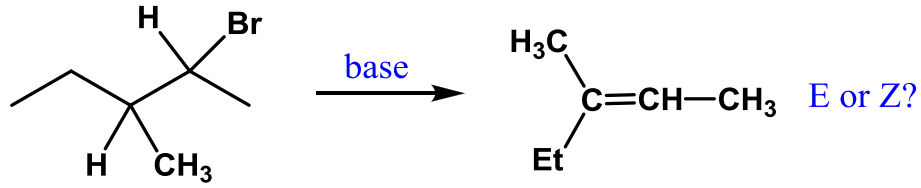


Consequences: - depends on the molecule

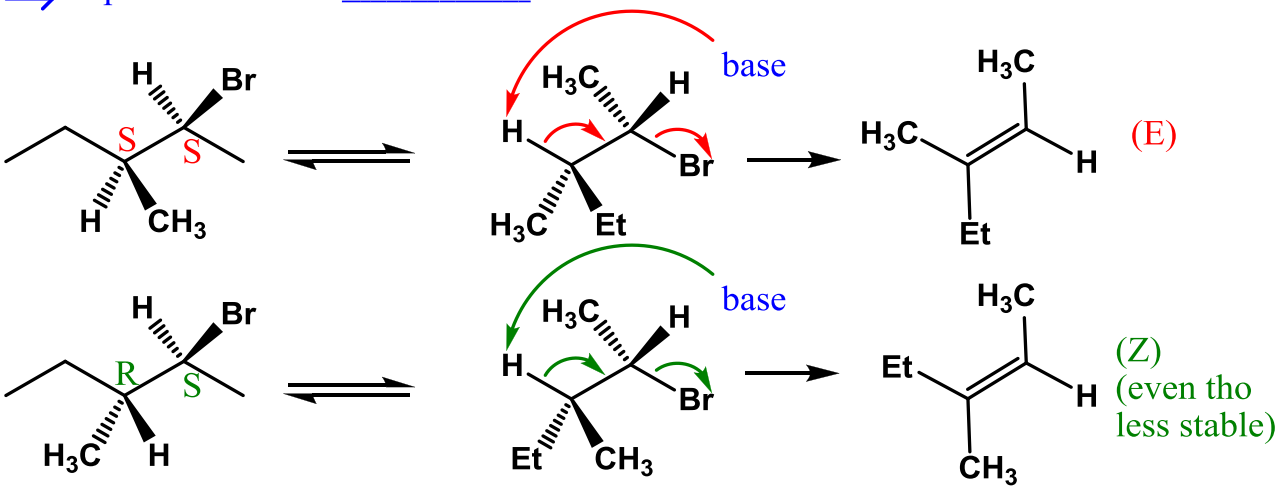
① If β-C is a CH_2 group



② If β-C is a CH group (only one "anti" possible!)

eg 

⇒ depends on which diastereomer of reactant!



So... S,S (or R,R) → E
R,S (or S,R) → Z
} stereospecific

But... E1: both give E > Z ∴ stereoselective

Summary: E1 → E (or trans) > Z (or cis)

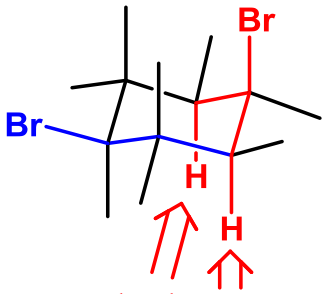
E2 for $R{-}CH_2{-}CR_2{-}Br$ → E > Z

E2 for $R_2{-}CH{-}CR_2{-}Br$ → anti elimination controls E or Z

Elimination from Cyclohexanes

- for E2 to go by anti elim., H & LG must both be axial (even though axial is BAD)

eq. Br is anti to C-C bond ⇒ ∴ can't eliminate



notice that the β-H must be trans to the LG!

only these 2 positions are anti to Br