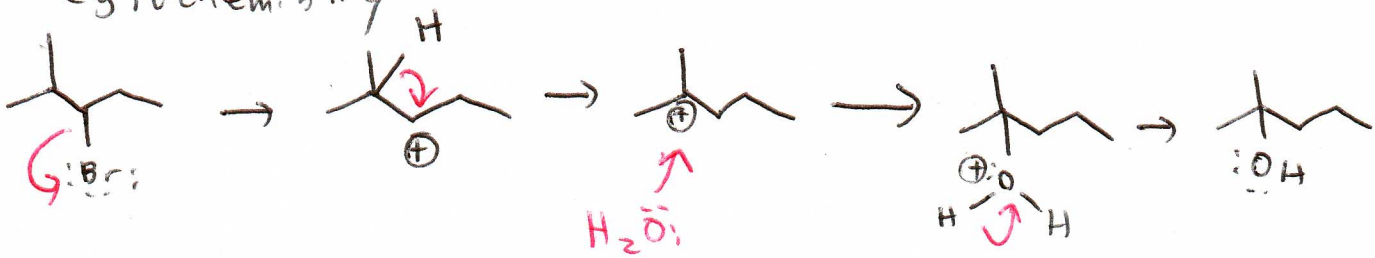
6) Regiochemistry

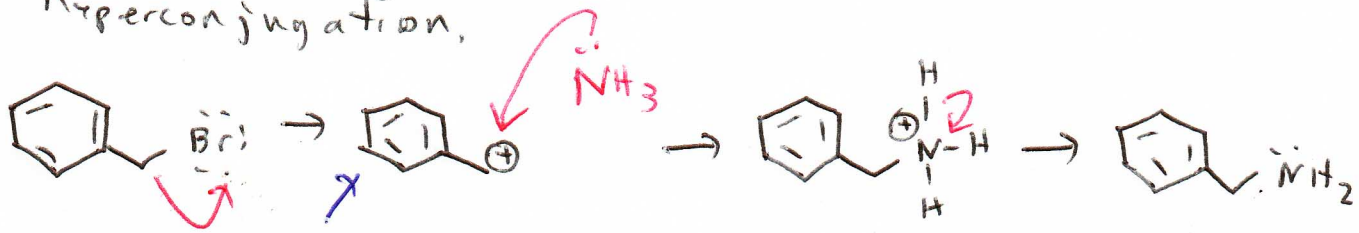


1) substrate

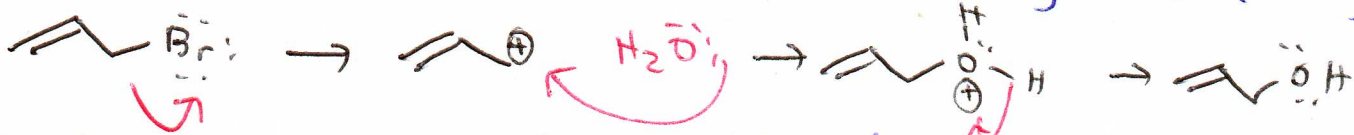
$3^\circ >>> 2^\circ > 1^\circ \sim$ methyl

reactivity in SN1 reactions

3° substrates are far more reactive in SN1 rxns than since 3° carbocations are far more stabilized by hyperconjugation.



Even though this is a 1° carbocation, it forms easily due to conjugation with the neighboring benzene ring.



Allyl substrates are also reactive due to conjugation.

vinyl 

vinyl → attached to the double bond

Vinyl substrates do not undergo SN1 rxns since vinyl carbocations are unfavorable due to increased s-character of the orbital (sp hybrids better tolerate ⊖ charges but poorly tolerate ⊕ charges).

Vinyl substrates do not undergo SN2 rxns because the electrons in the π bond repel the nucleophile.

2) nucleophile

For SN1 rxns, poor nucleophiles - particularly non-basic ones - are preferred, since SN1 rxns depend on the carbocation having time to form

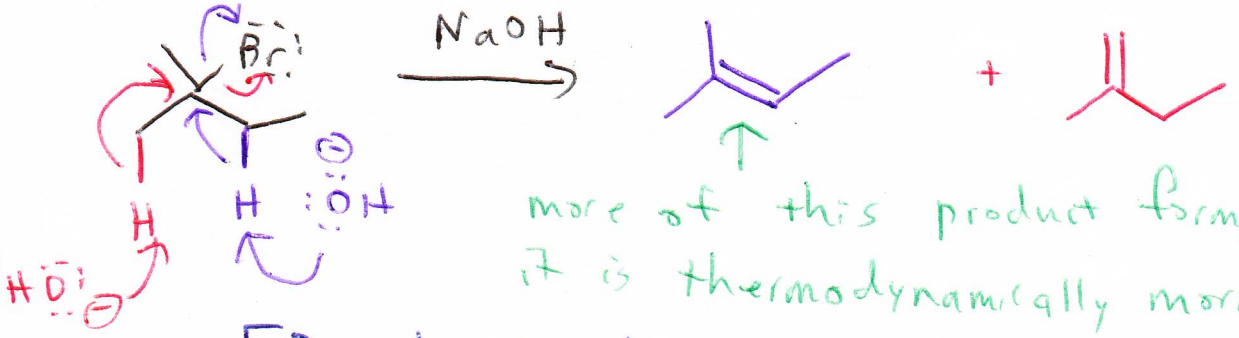
3) leaving groups

Good leaving groups are conjugate bases of strong acids,

4) solvent

For SN1 rxns, polar protic solvents are normally used; the nucleophile is often the solvent itself.

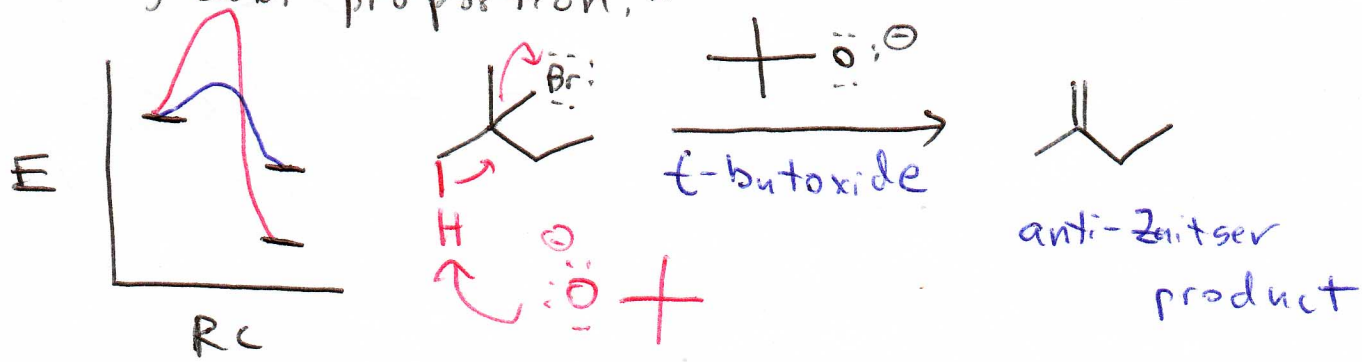
Eliminations



more of this product forms because it is thermodynamically more favorable,

E2 - bimolecular elimination

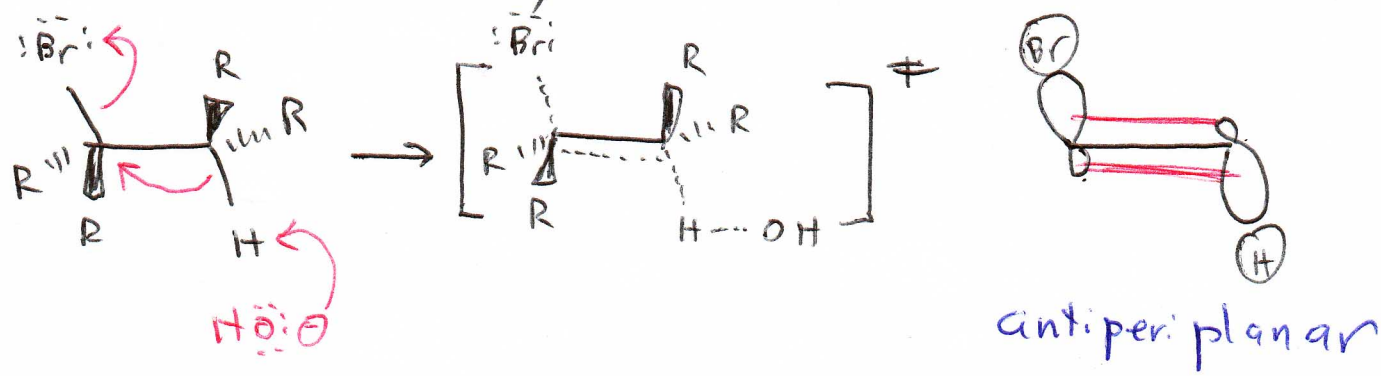
Zaitsev's rule - In eliminations, the more heavily substituted alkene will normally be formed in greater proportion, *



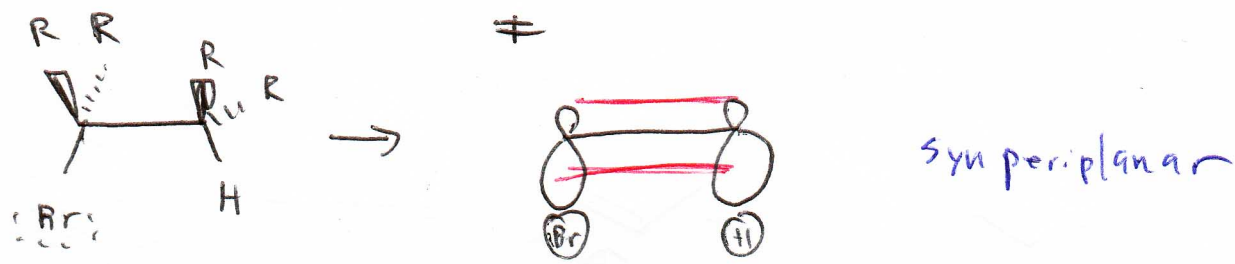
If a nucleophile is very sterically hindered, it can cause the formation of a less stable alkene due to kinetic effects (more hindered nucleophiles make it more difficult to remove more hindered hydrogens),

E2

1) utility → alkyl halides → alkenes
2) reagents → strong, basic nucleophiles
3) conditions → polar aprotic solvents
5) stereochemistry

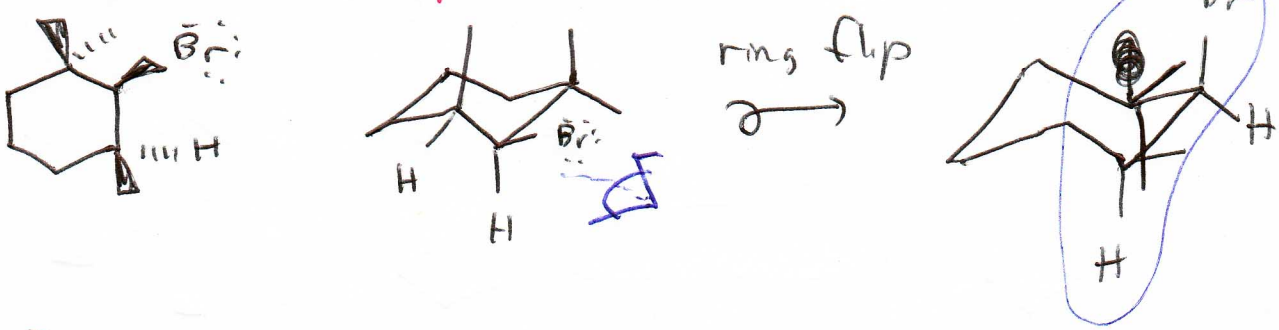


antiperiplanar

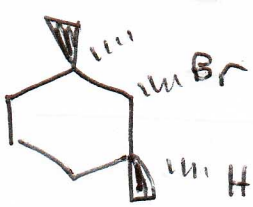


synperiplanar

Elimations can only occur if the hydrogen removed is synperiplanar or antiperiplanar to the leaving group.



antiperiplanar



will E2 occur?