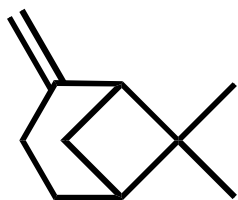
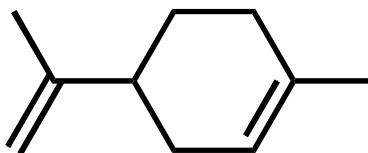


Ch. 7: Part 3 Alkenes

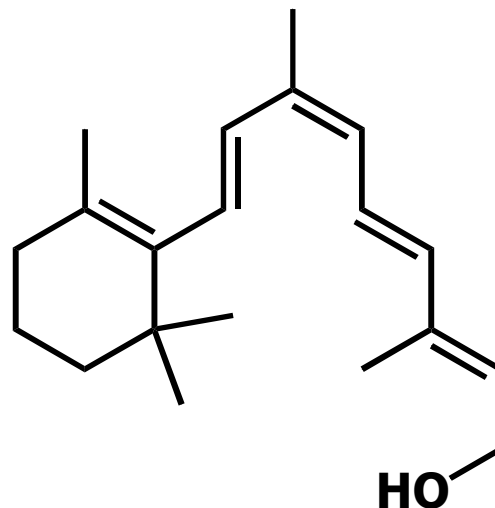
Structure and Formation



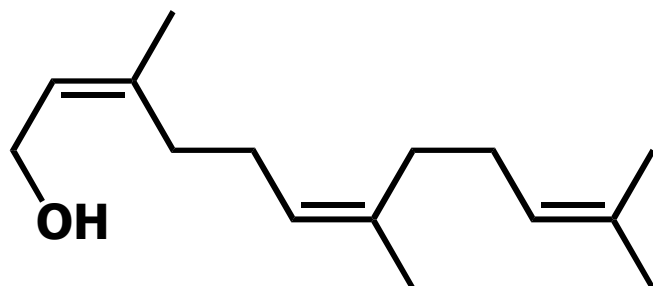
pinene



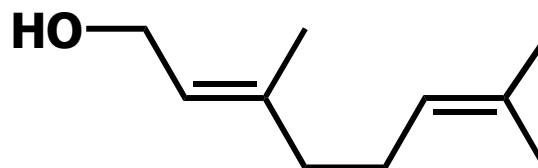
limonene



retinol



farnesol



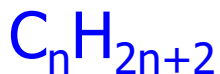
geraniol

Molecular Formula of an Alkene

Noncyclic alkene:



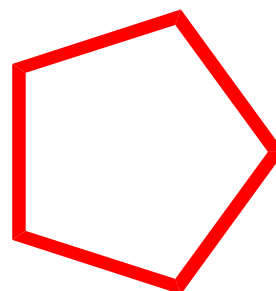
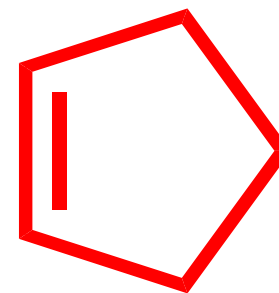
Alkane



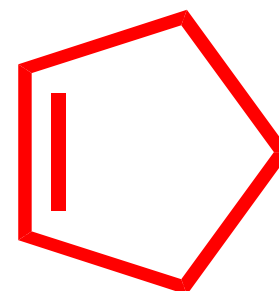
Alkene



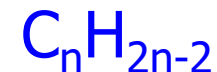
Cyclic alkene:



Cycloalkane

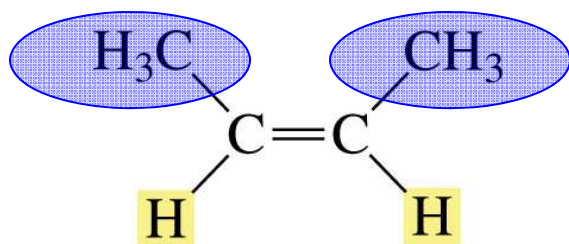
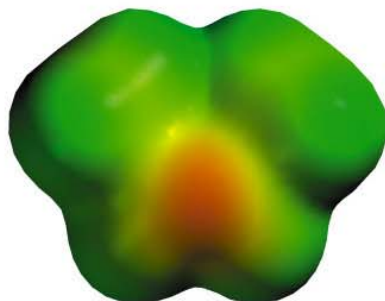
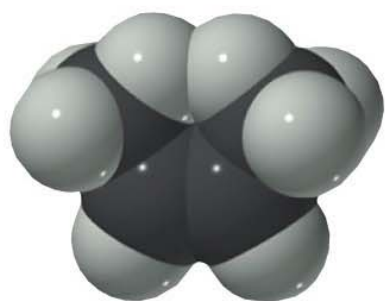


Cycloalkene



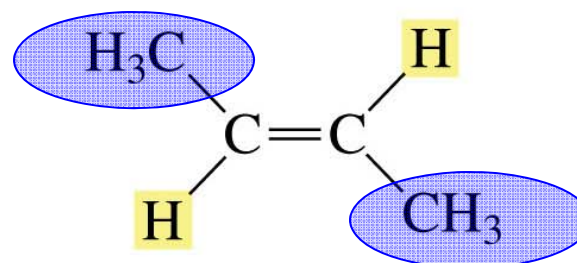
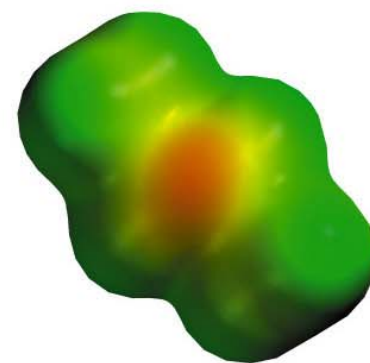
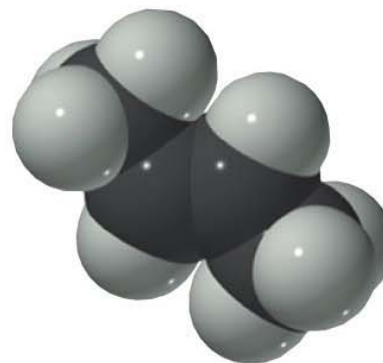
► **Unsaturation** indicates that there are fewer hydrogens attached to carbon than in an alkane.

Isomers of Alkene



Cis-2-butene
Bp~4C

**cis (identical or
analogous substituents
on same side)**

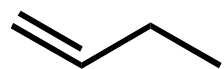


Trans-2-butene
Bp~1C

**trans (identical or
analogous substituents
on opposite sides)**

Systematic Nomenclature of Alkenes

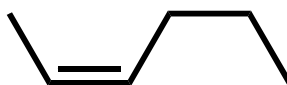
1. Number the longest continuous chain containing the functional group



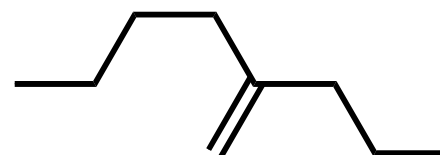
1-butene



2-butene

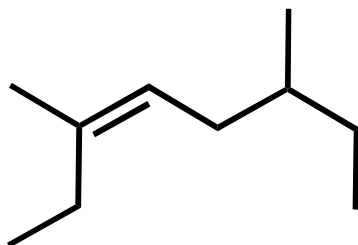


2-hexene

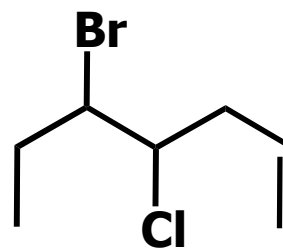


2-propyl-1-hexene

2. Cite the substituents in alphabetical order

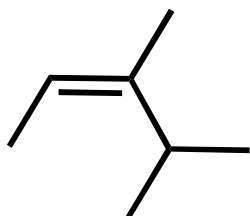


3,6-dimethyl-3-octene

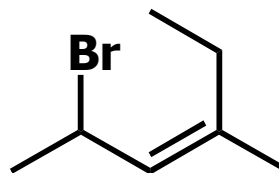


5-bromo-4-chloro-1-heptene

3. Name with the lowest functional group number and then the lowest substituent numbers

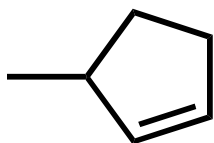


3,4-dimethyl-2-pentene

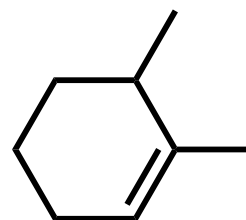


2-bromo-4-methyl-3-hexene

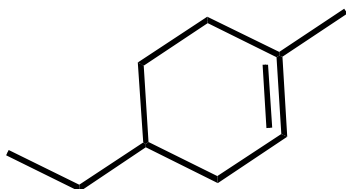
4. No numbering of the functional group is needed in a cyclic alkene



3-methylcyclopentene



2,3-Dimethyl-cyclohexene

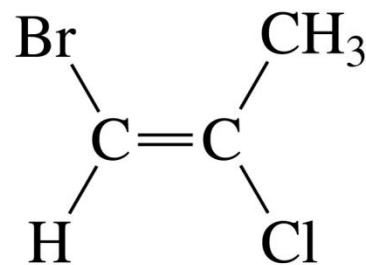
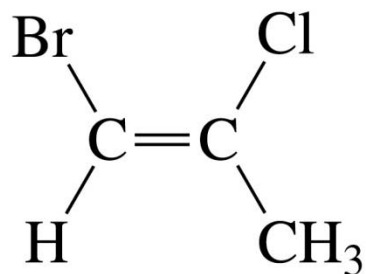


4-ethyl-1-methylcyclohexene

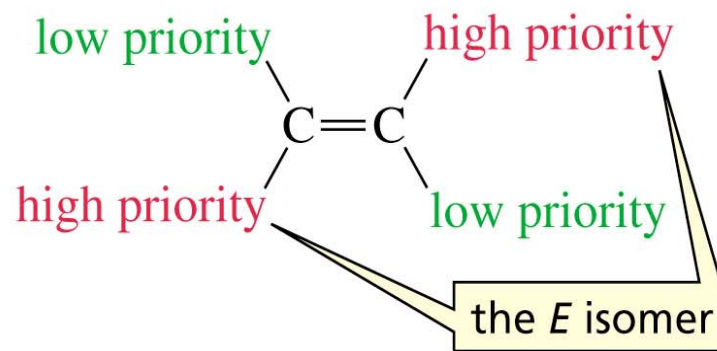
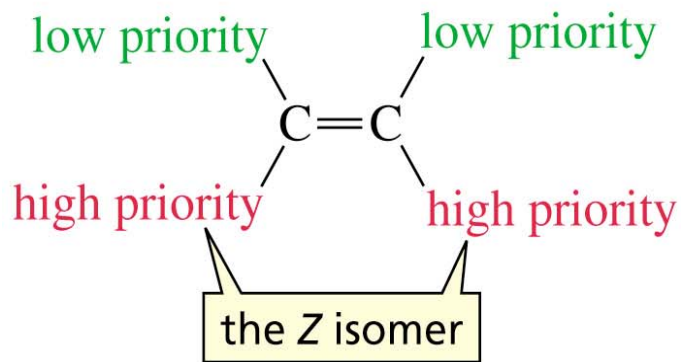


1,3-cyclopentadiene

E and Z isomers



1-Bromo-2-chloro-propene

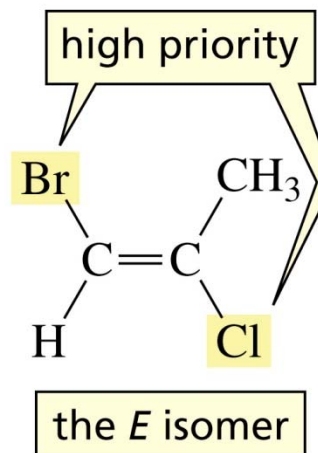
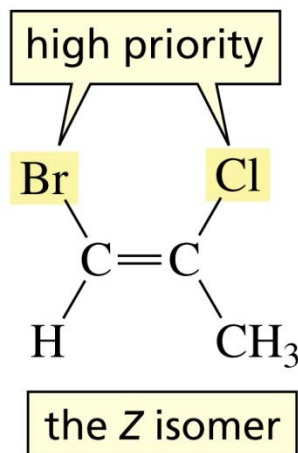


E – Entgegen – opposite sides

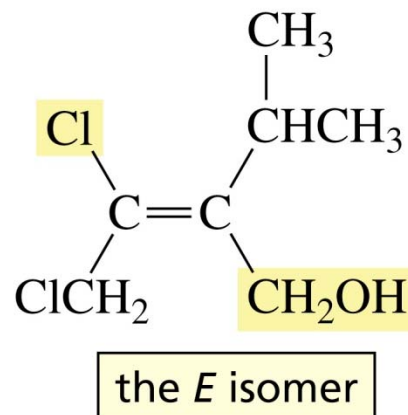
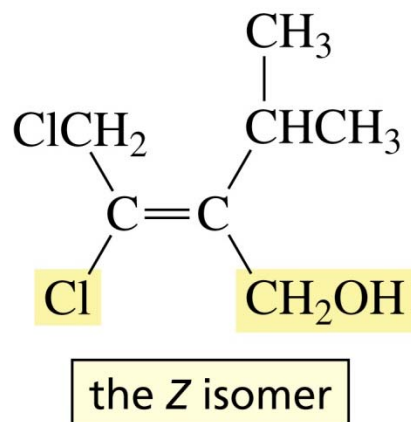
Z – Zusammen – same side

Naming by the *E,Z* System

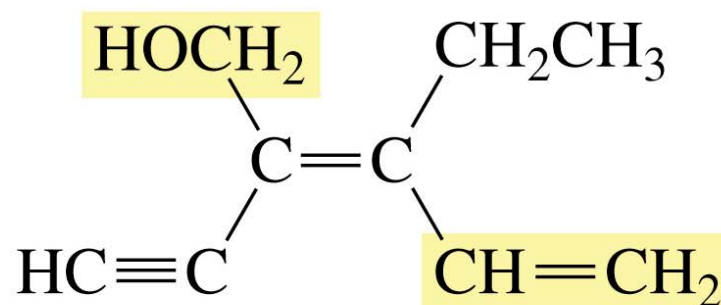
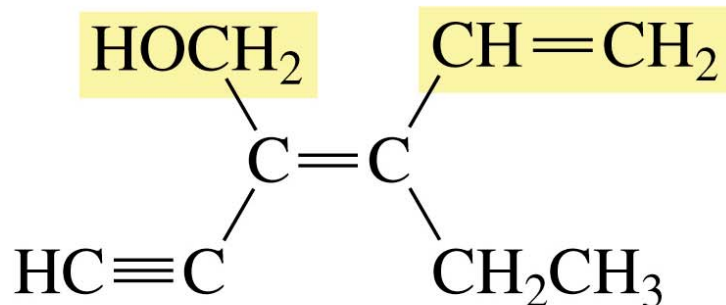
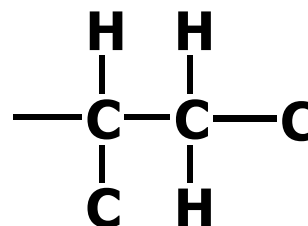
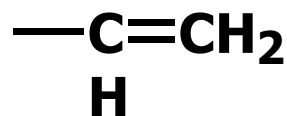
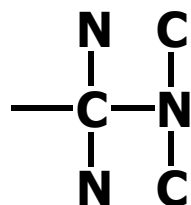
Rule 1: Consider the atomic number of the atoms bonded directly to a specific *sp*² carbon.



Rule 2: If there is a tie, consider the atoms attached to the tie.



Rule 3: Multiple bonds are treated as attachment of multiple single bonds.



Chapter 7:

Part 4: E2 Reactions to make Alkenes

1. SN1 vs. SN2
2. The E2 Mechanism
3. Regiochemistry of the E2 Mechanism
4. The Stereochemistry of the E2 Mechanism

When an alkyl halide can undergo either S_N1 or S_N2 ,

the concentration of the nucleophile,

the reactivity of the nucleophile,

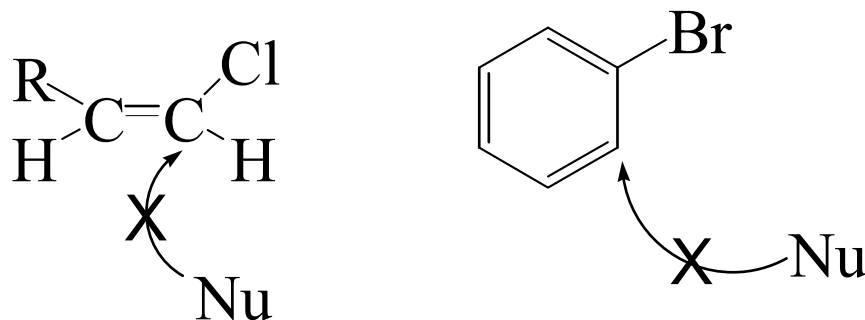
and the solvent of the reaction

will determine which reaction will predominate

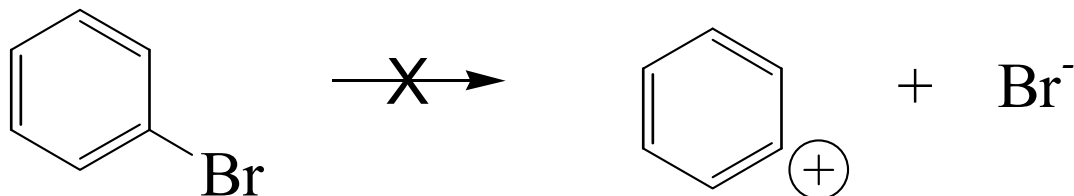
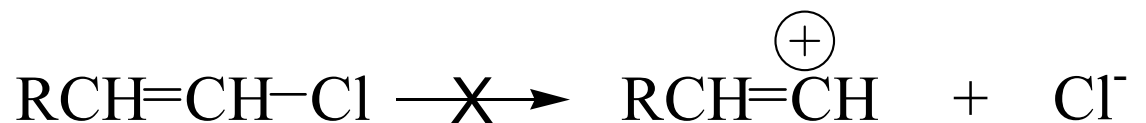
An S_N2 reaction is favored by a high concentration of a good nucleophile

An S_N1 reaction is favored by a low concentration of a nucleophile or by a poor nucleophile

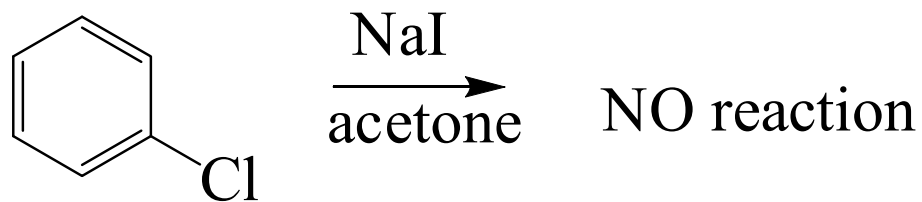
Vinyl and aryl halides do not undergo S_N2 because



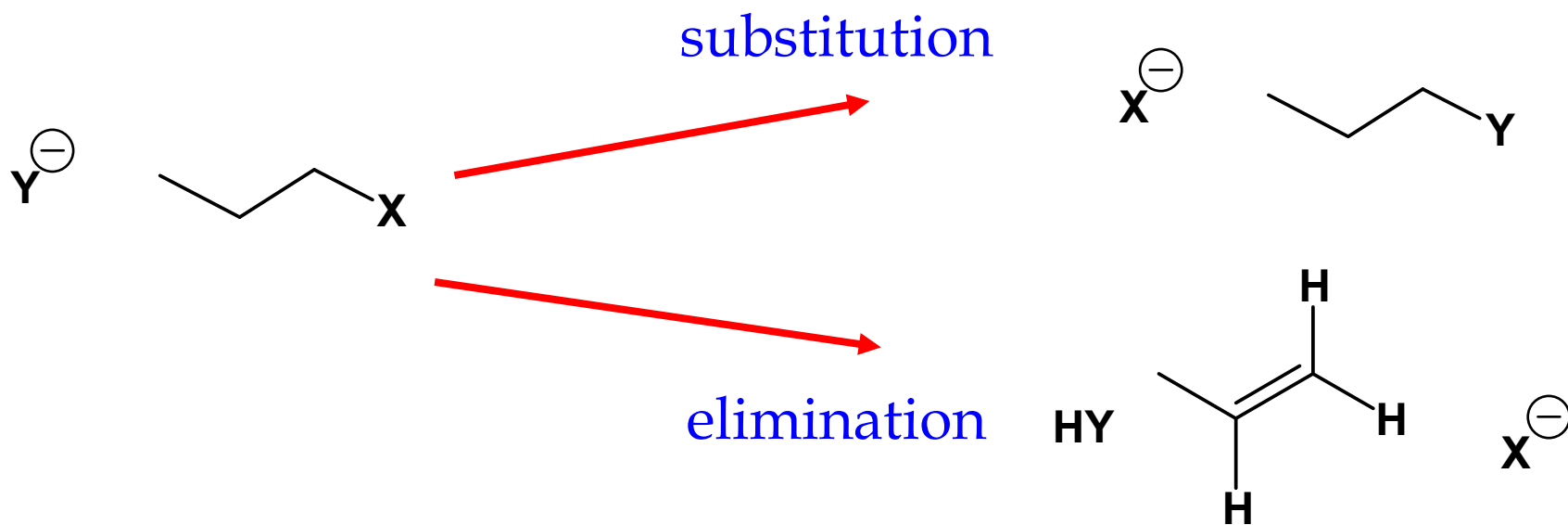
Vinyl and aryl halides do not undergo S_N1 because



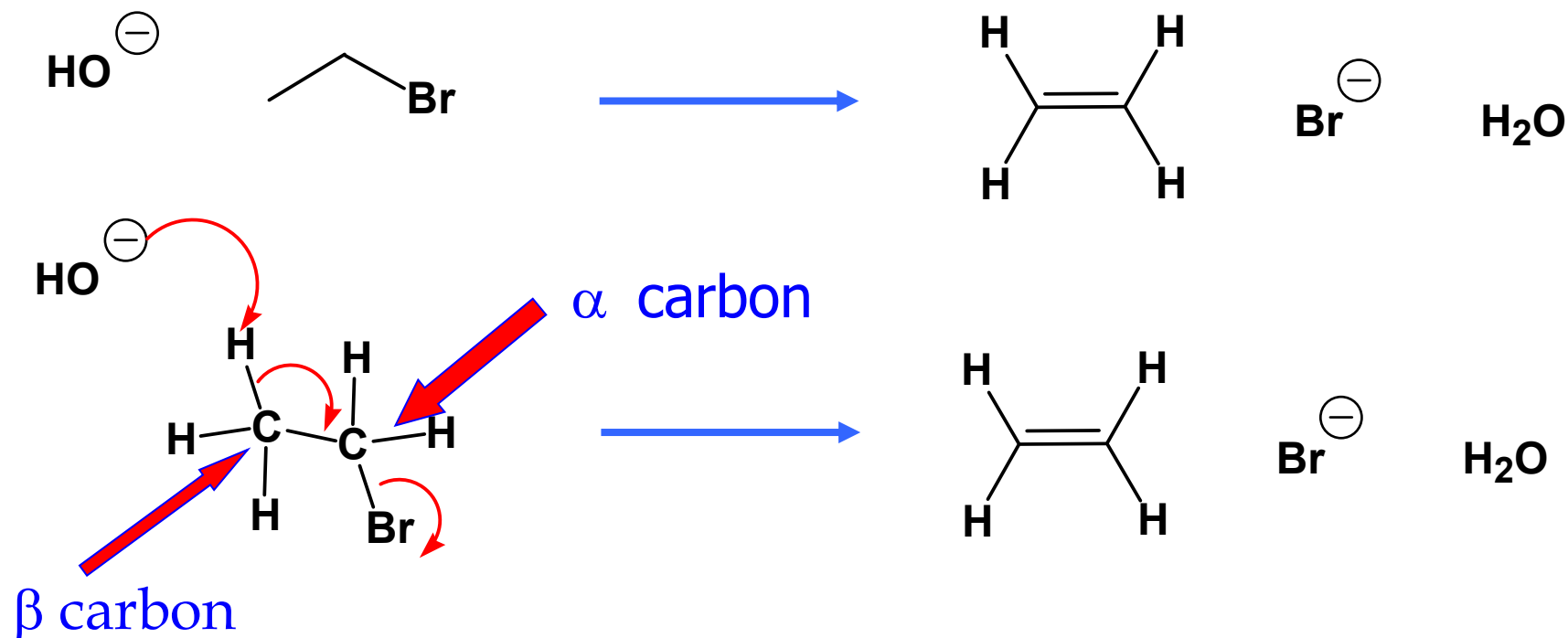
So S_N2 and S_N1 do NOT work. On the test....



In addition to substitution, an alkyl halide can undergo an elimination reaction



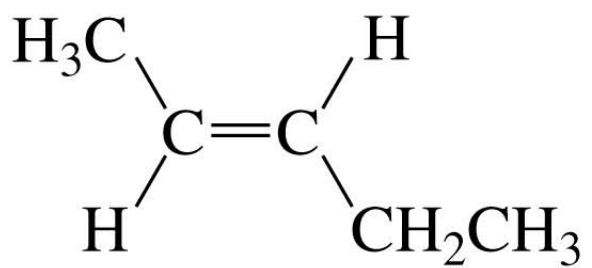
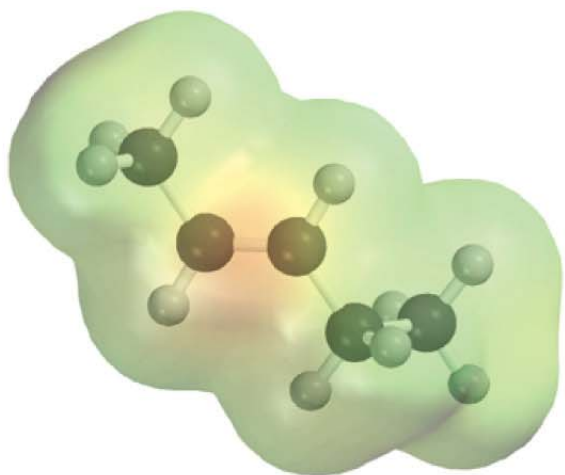
The E2 Reaction



The presence of a leaving group creates a slight positive charge at the electrophilic carbon and at the protons on the α carbon.

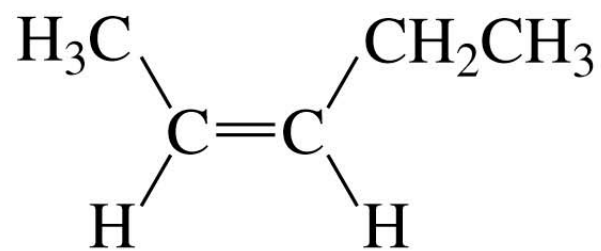
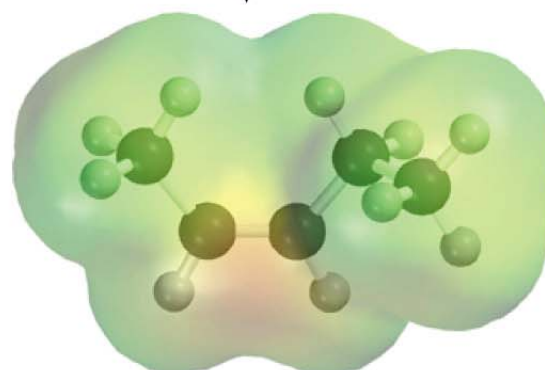
A basic reagent can thus attack this proton and cause elimination.

The driving force is the protonation of a stronger base and formation of a weaker one.



(E)-2-pentene

interacting electron
clouds cause steric strain



(Z)-2-pentene

Characteristics of the E2 mechanism

- Second order kinetics: $\text{rate} = k[\text{RX}][\text{B}]$
 - bimolecular rate-determining step
- Concerted Reaction
- Reaction is regiospecific
 - more substituted alkene is preferred product
- Reaction is stereospecific
 - trans is preferred

For Next Time....

Suggested Homework Problems Chapter 7

#1,14,21,26, 31, 36,38,41,44,50,52,53,59,64,65