Alkenes II

Electrophilic Addition Rxns

- Hydrohalogenation
- Halogenation
- Halohydrin Formation

Ref 8 : 1, 2, 12, 13

Prob 8 : 2a, 2c, 16, 17, 35, 36, 48

Adv Rdg 8 : 5 – 11

General

alkenes

- act as nucleophiles (base, ...)
- react w/ electrophilic reagents (Lewis acids, ...)
- undergo electrophilic add^{n} rxns

complications: *regiochemistry?*, *stereochemistry?*

Electrophiles

(Lewis acids; e^- sinks)

cmpds w/	**Ex.**
empty "AO"	
low energy empty σ* MO	

1.) Hydrohalogenation

(add^{n} of HCl, HBr, HI ; usually in ether)

Overall:

Mech:

regiochemistry: where will X go, left or right?

Regiochemistry

" X goes to the more substituted C"
(= Markovnikov's Rule)

Ex.

• more stable carbocation formed in step 1
• recall C^+ stability:

3° > 2° > 1° > methyl

$\therefore$

Stability due to Hyperconjugation

aside on:
conjugation
= "interaction between adjacent p orbitals"
e.g.,

hyperconjugation in carbocations:
= sideways overlap
between "empty p orbital"
and "σ bond on adjacent C"
"spreads pos. charge, makes cation more stable"

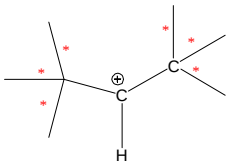
hyperconjugation

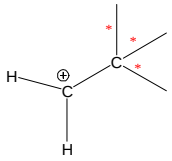
Illustration

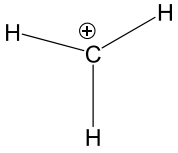
• empty p orbital
and C,C or C,H σ bond line up
• σ bond feeds e^-'s into empty p AO
$\therefore$ pos. charge spread;
cation stabilized

hyperconjugation

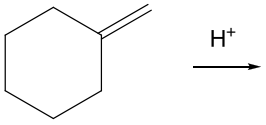
• the more adjacent σ bonds, the more stable

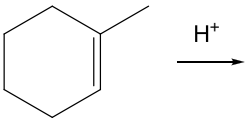


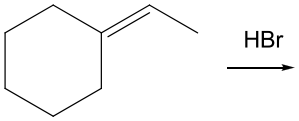




Practice







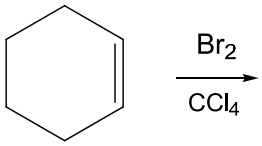
2.) Halogenation

Add^{n} of X_2 in a non-nucleophilic solvent, esp. CCl_4

Detailed Mech.

Detailed Mech.

Example



Halohydrin Formation

"Halogenation in H_2O"

Detailed Example

Practice