

When studying OChem  $\rightarrow$  Call a NIRRS  
Learn each of these things for every  
reaction  $\rightarrow$  then you will be able to  
predict mechanisms and therefore products

**Nature** of the reaction; what is the starting material/product? (i.e. alkene converted to an alcohol)

**Intermediate** (or "Important transition state" if applicable) of the reaction, the key to the mechanism (carbocation, halonium ion, etc.)

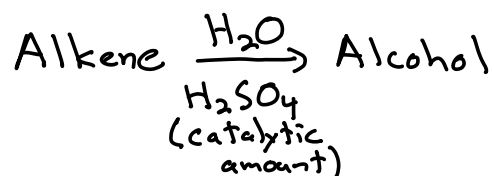
**Reagents** Learn the exact way to designate the reagents for each reaction

**Regiochemistry** What is the regiochemistry of addition? (Markovnikov, non-Markovnikov, etc.)

**Stereochemistry** of addition (anti, syn or mixed)

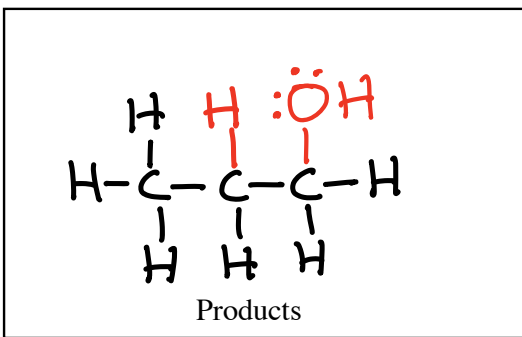
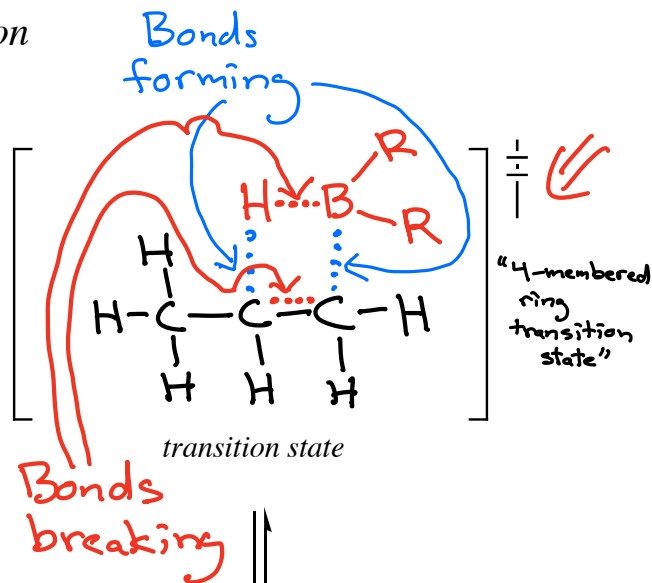
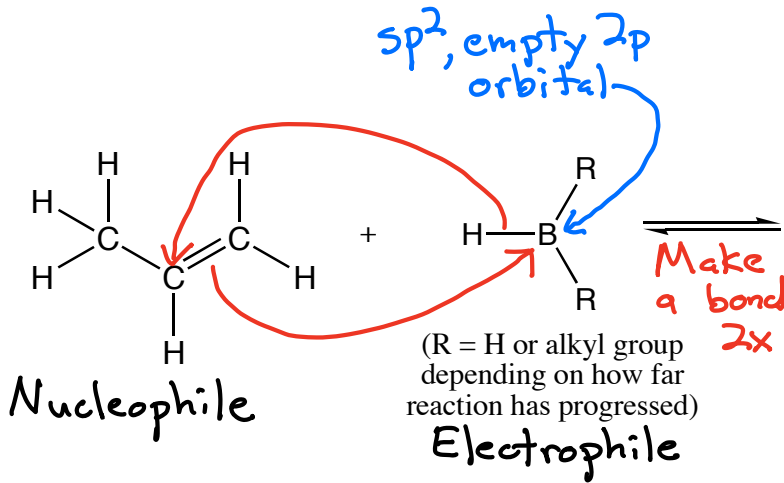


Carbocation  
Markovnikov  
Mixed

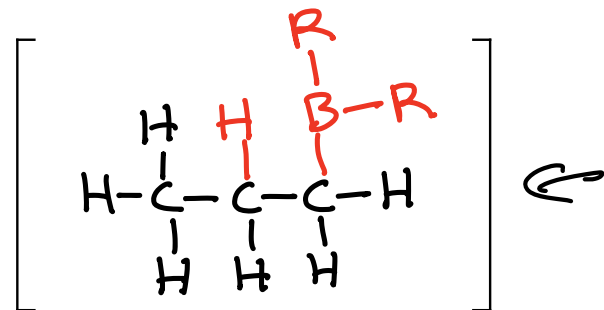


Carbocation  
Markovnikov  
Mixed

# Hydroboration-Oxidation



Not responsible for this mechanism  
 2.  $\text{H}_2\text{O}_2 / \text{HO}^-$   
 (Chemist opens flask and adds new reagent)



*H → More substituted C atom*  
*OH → Less substituted C atom*

*Steric strain in the first transition state*

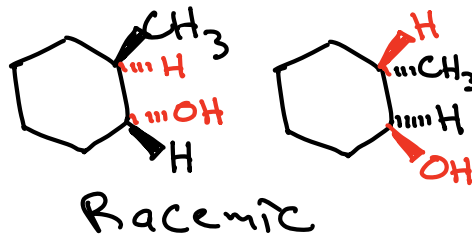
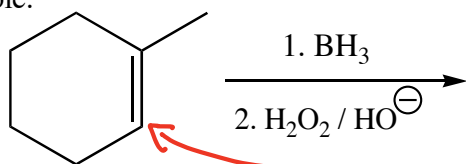
*H and OH are syn*

Summary: The pi bond of the alkene attacks the Lewis acid (electrophile) B atom at the same time a new bond forms between C and H. In 2nd step OH replaces  $\text{B}(\text{R})_2$ . "4-membered ring transition state"

Regiochemistry: *Non-Markovnikov*

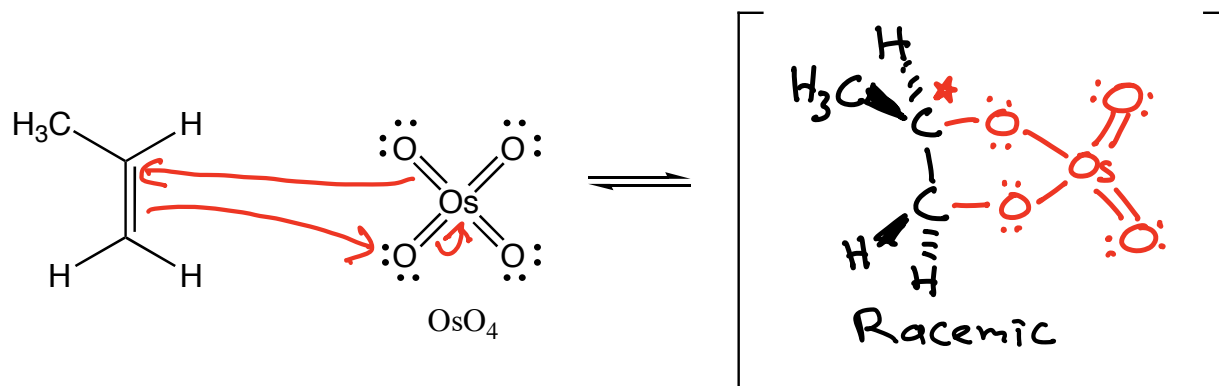
Stereochemistry: *Syn*

Example:

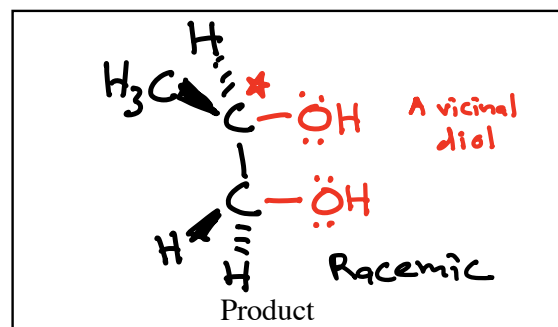


*Less substituted C atom* (pointing to the secondary carbon in the cyclohexene)

$OsO_4$  Partial Mechanism



2.  $NaHSO_3 / H_2O$   
(Chemist opens up flask)  $\Downarrow$  Not responsible for mechanism

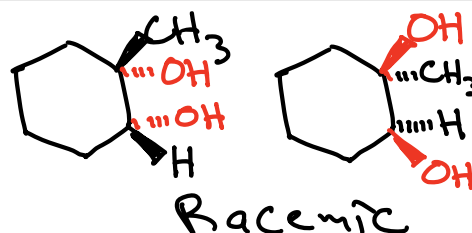
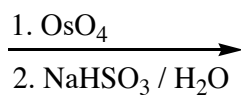
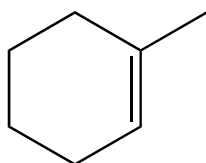


Summary: The mechanism involves a cyclic osmate ester, explaining the syn stereochemistry of addition.

Regiochemistry: N/A

Stereochemistry: Syn

Example:



For midterm 2, you are not responsible for any material past this point.

Stinking Molecules! → We have evolved to avoid spoiled food that would make us sick

We are VERY sensitive to these molecules!

products of bacterial breakdown



Rotten Fish



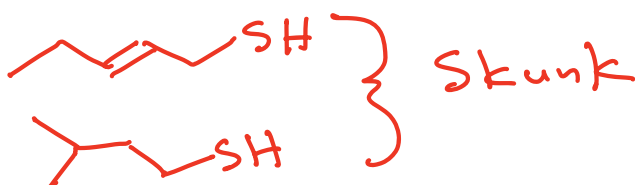
Rotten Mammal

$H_2S$   
Rotten Eggs



Barf!

Neutralize with a base → ammoniac or baking soda to remove the smell!



Skunk

Natural Gas

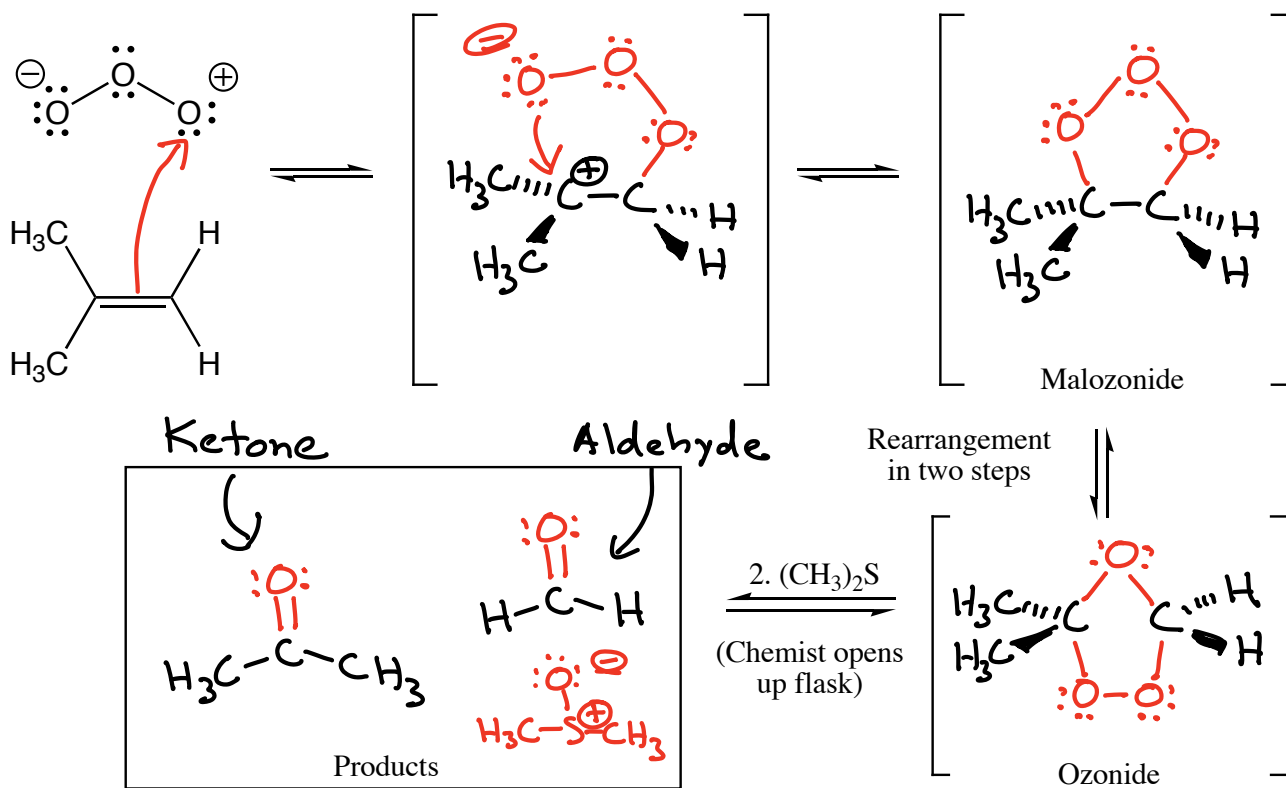
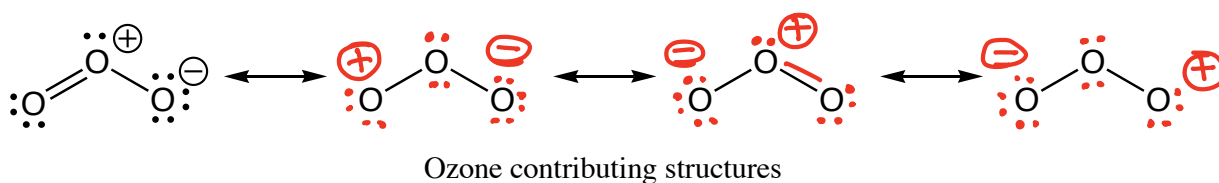
90% - 95% methane

5% - 10% ethane

+SH and CC(C)S added as an odorant so it can be detected → Texas tragedy inspired this innovation

This breaks C=C bonds !!!

### Ozonolysis Partial Mechanism

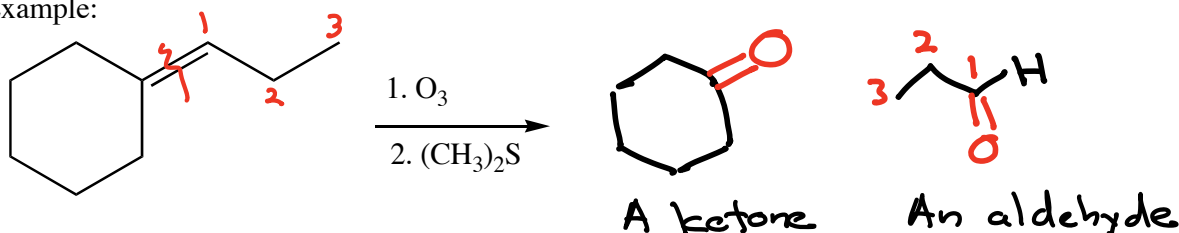


Summary: Reaction of an alkene with  $\text{O}_3$  gives a malozonide than an ozonide intermediate (the C=C pi bond then C-C sigma bond is broken). Adding  $(\text{CH}_3)_2\text{S}$  decomposes the ozonide into ketone and aldehyde products **Breaks C=C bond!**

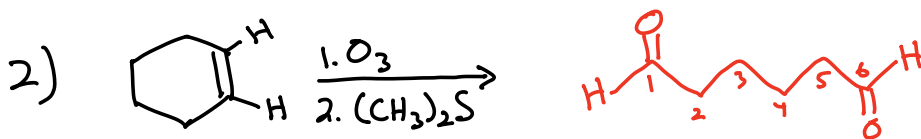
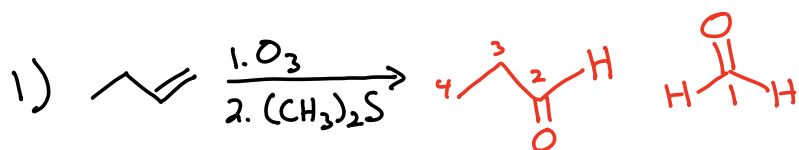
Regiochemistry: N/A

Stereochemistry: N/A

Example:



Ozonolysis is the only reaction that breaks C=C bonds!



Notice the numbers!

