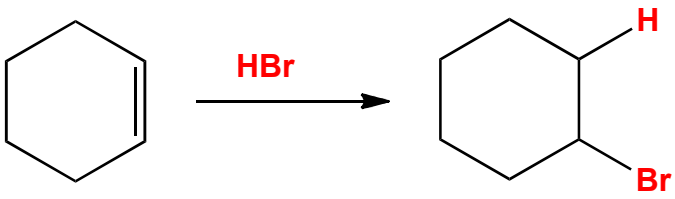
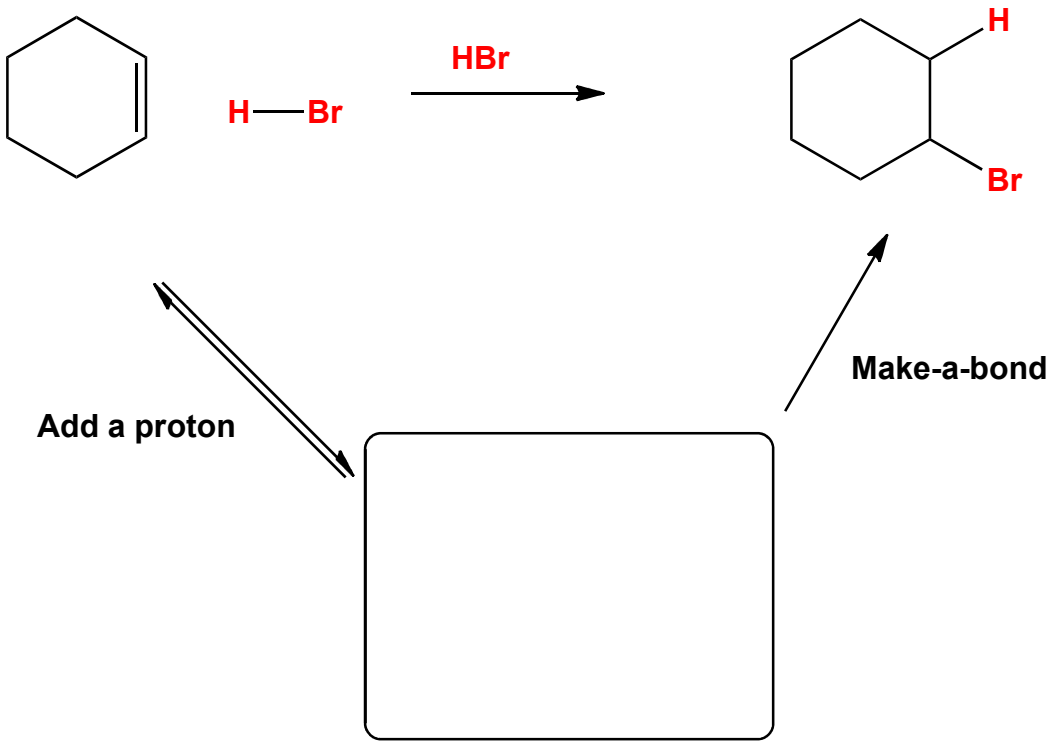
Reaction:



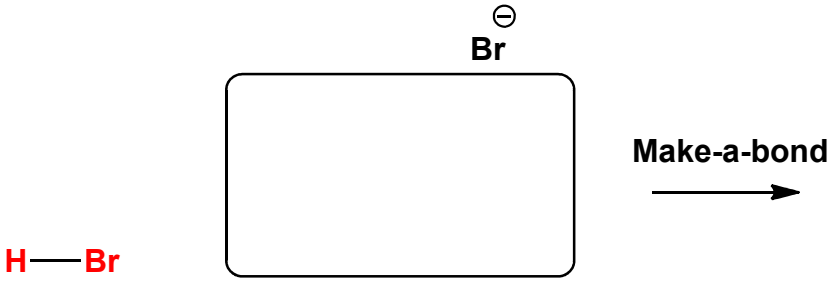


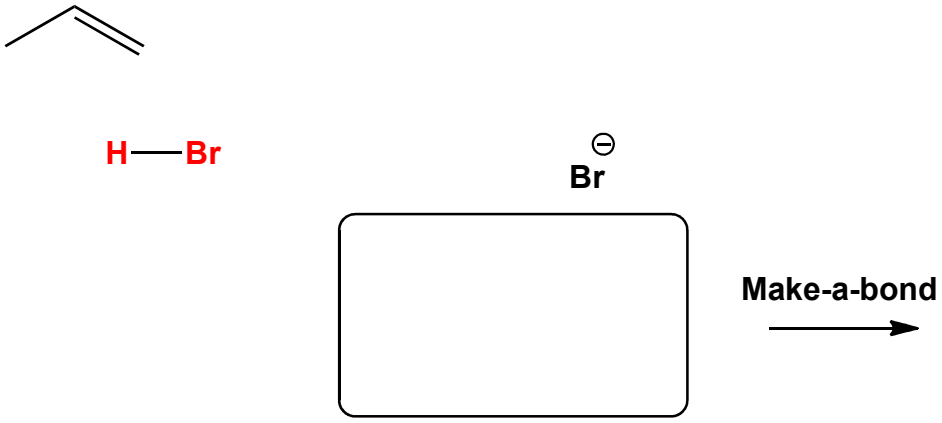
Reaction:

Regiochemistry: ***Markovnikov's Rule***

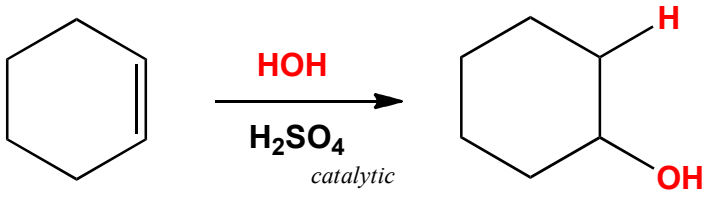
---

1) Add a proton--but where?



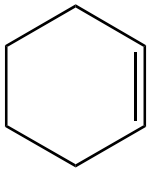


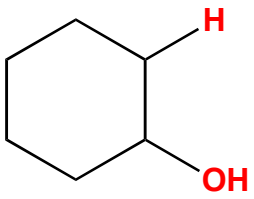
Reaction:



First-consider the acid/water reaction:

H_2SO_4 + HOH ⇌



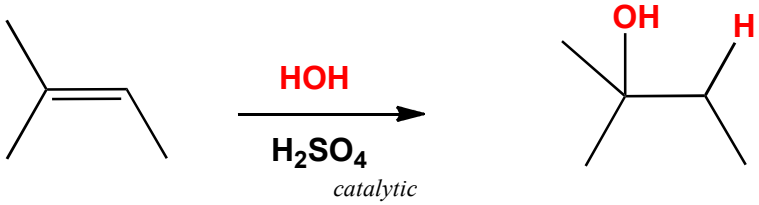


Add a proton
(protonate)

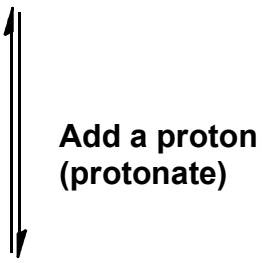
Remove a proton
(deprotonate)

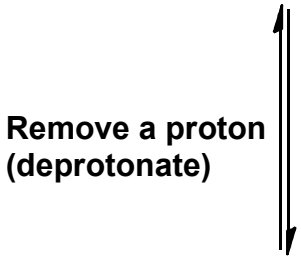
Make-a-bond ⇌

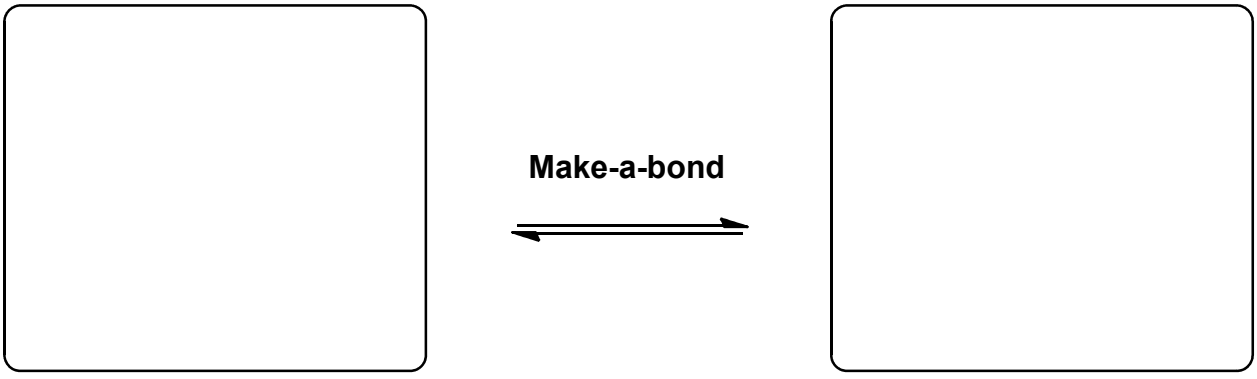
Reaction:



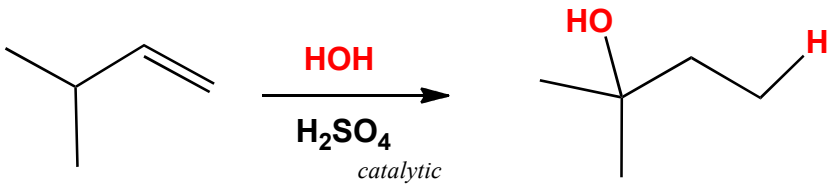
Regiochemistry: ***Markovnikov's Rule***



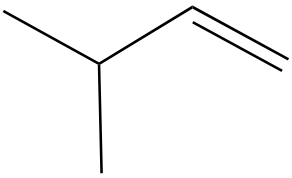


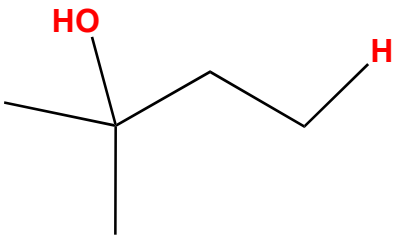


Reaction:



Note: rearrangement





Add a proton
(protonate)

Remove a proton
(deprotonate)

1,2 Hydride shift

Make-a-bond

Reaction:

Note: rearrangement

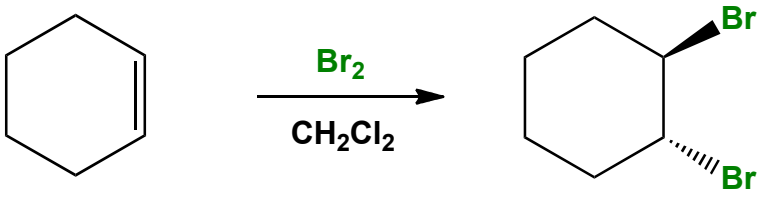
Add a proton
(protonate)

Remove a proton
(deprotonate)

1,2 Methyl shift

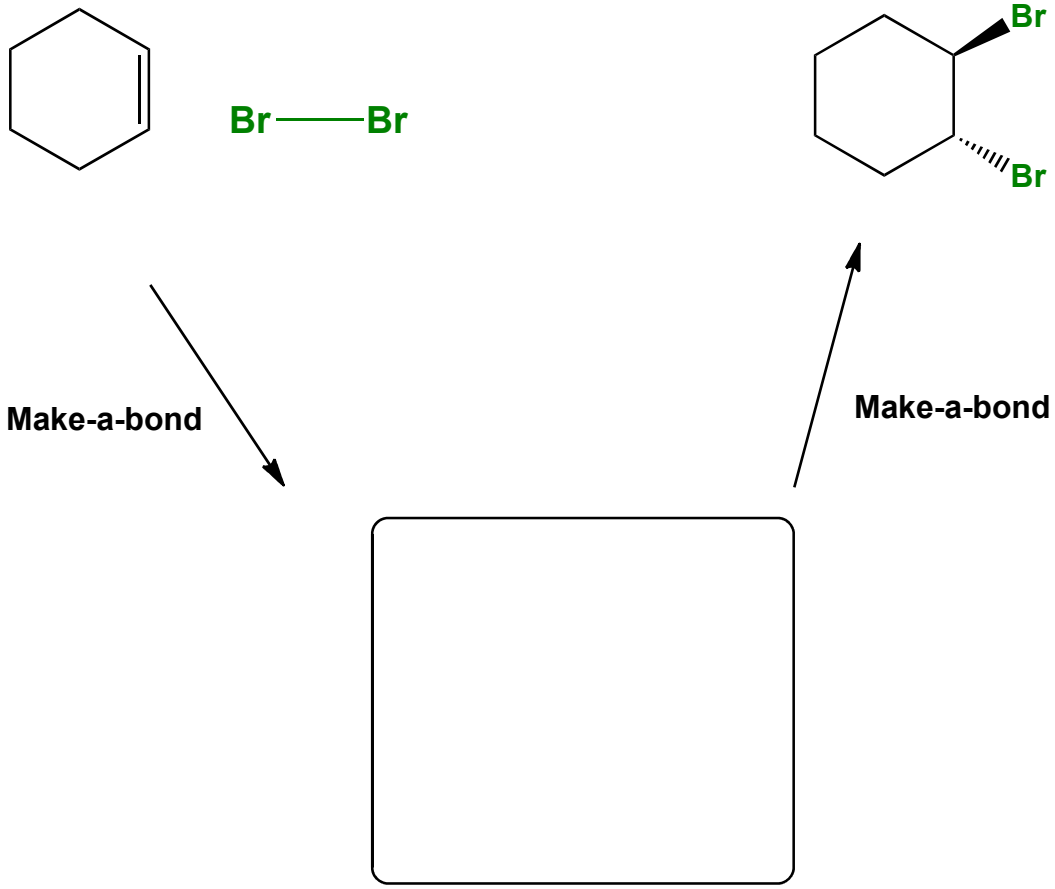
Make-a-bond

Reaction:



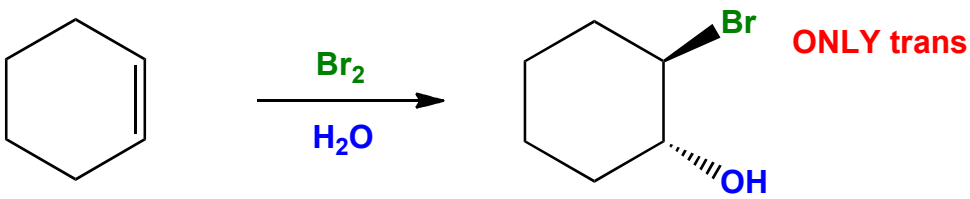
ONLY trans

Stereochemistry: trans addition

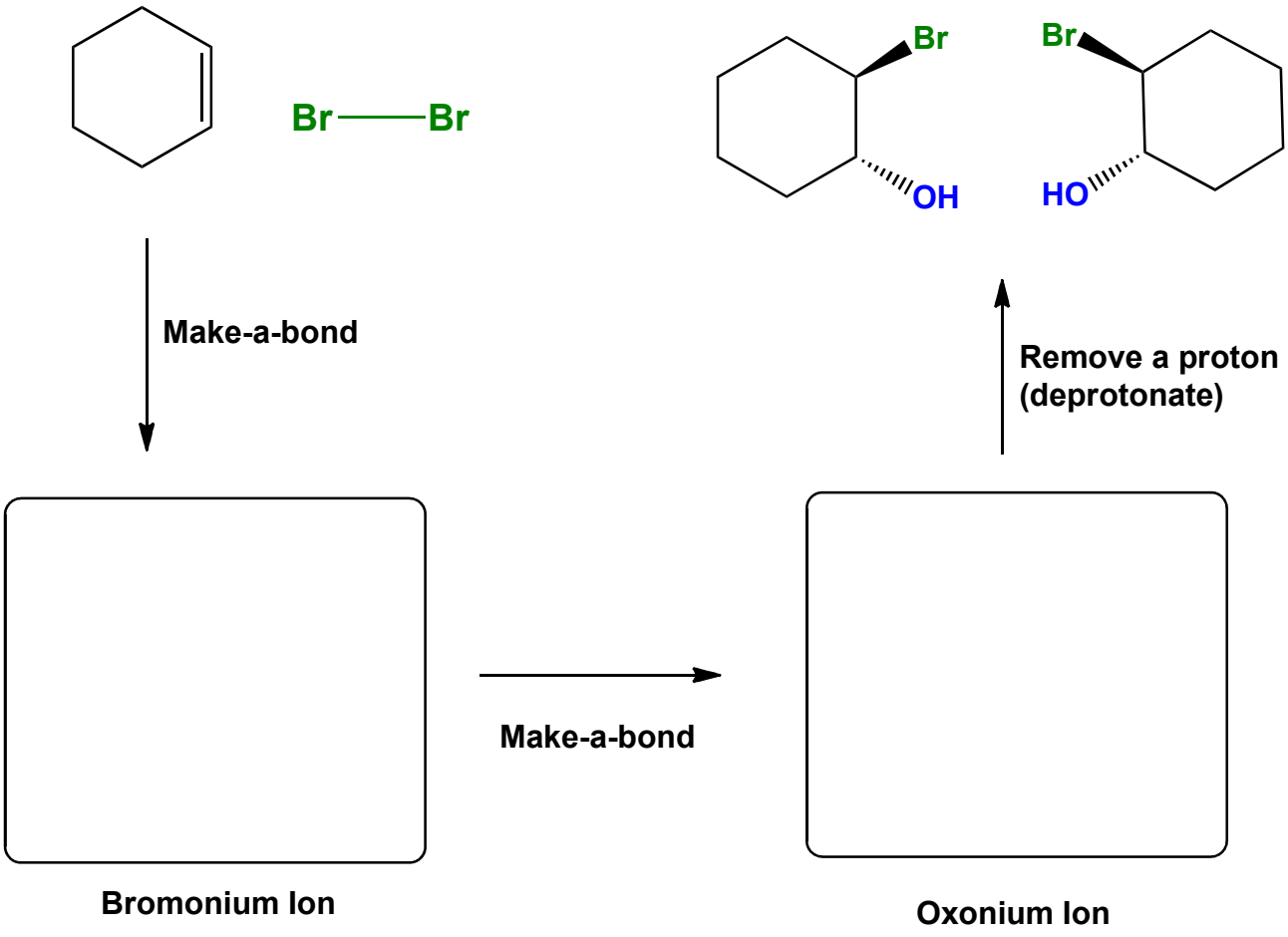


Bromonium Ion

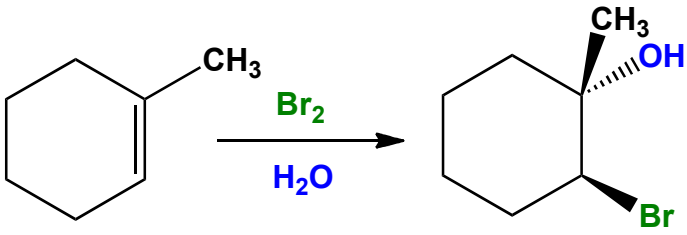
Reaction:



Stereochemistry: trans addition

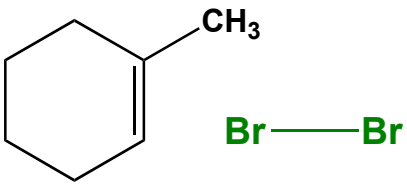


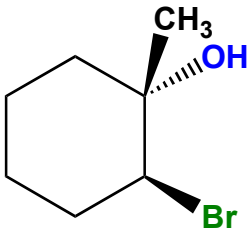
Reaction:



Stereochemistry: trans addition

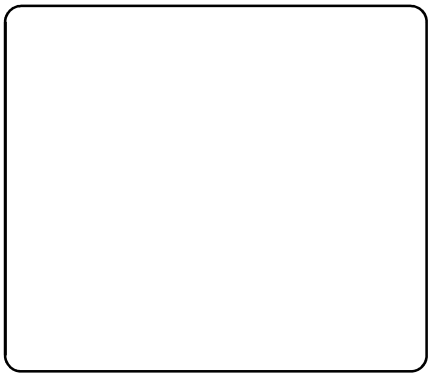
Regiochemistry: OH to the MOST hindered Carbon



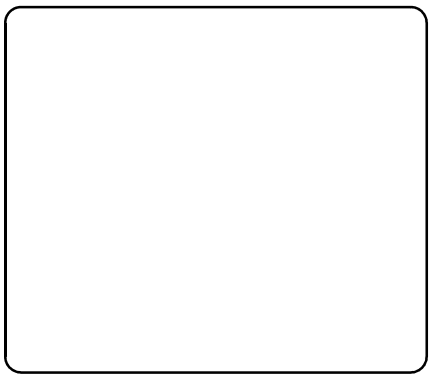


Make-a-bond

Remove a proton (deprotonate)

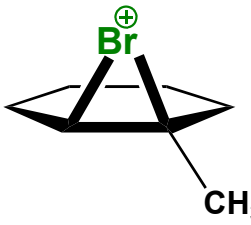


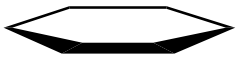
Make-a-bond



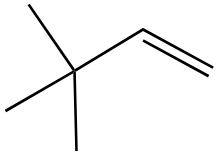
Bromonium Ion

Oxonium Ion



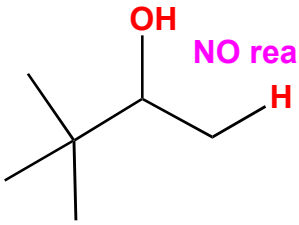


Reaction:



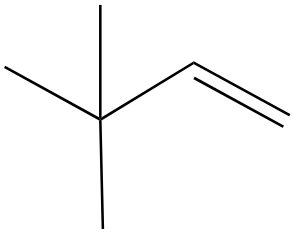
1) $Hg(OAc)_2$ *(aq)*

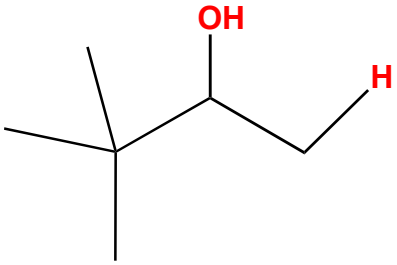
2) $NaBH_4$



NO rearrangement

Regiochemistry: ***Markovnikov's Rule***





Make-a-bond

2) $NaBH_4$

$H^{\ominus}$ removes the Hg

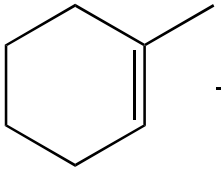
Mercurinium ion

Make-a-bond

Remove a proton (deprotonate)

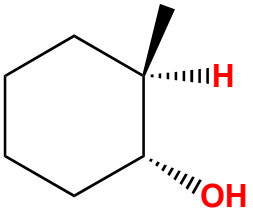
NO rearrangement

Reaction:



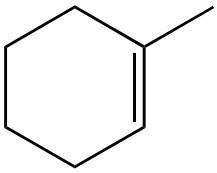
1) BH_3

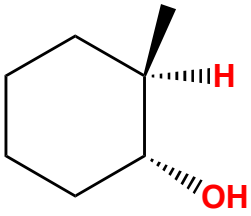
2) H_2O_2
NaOH



Stereochemistry:
SYN addition of H_2O

Regiochemistry: NON-*Markovnikov's Rule*



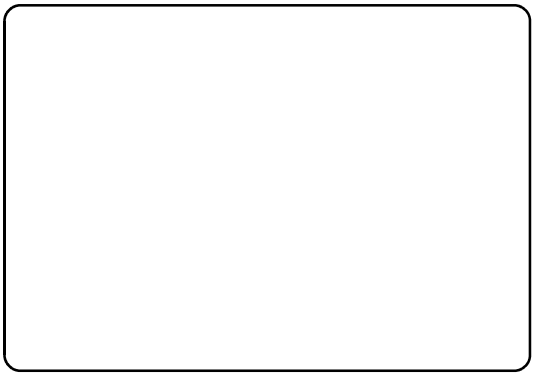


Make-a-bond

add B to the least hindered C;
Hydride adds syn

2) H_2O_2
NaOH

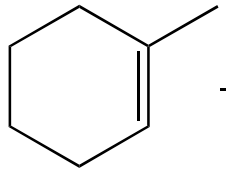
several steps
(don't need to know)



Organoborane Compound

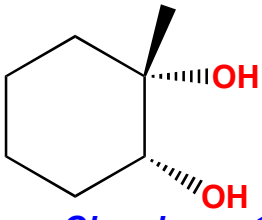
Stereochemistry:
SYN oxidation

Reaction:

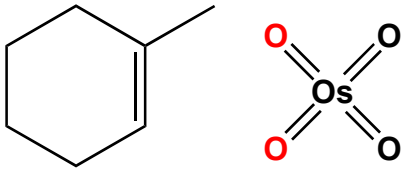


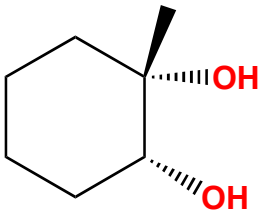
1) OsO_4

2) $NaHSO_3$ *(aq)*



Glycols are the product



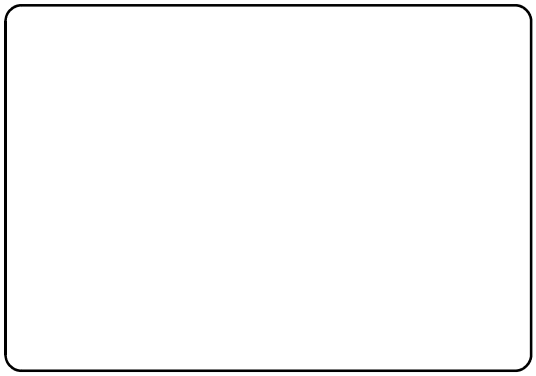


Make-a-bonds

OsO_4 adds both O atom simultaneously

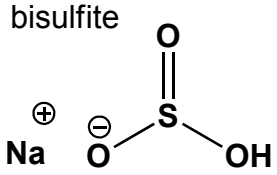
2) $NaHSO_3$

several steps
(don't need to know)



Osmate Ester

Sodium bisulfite



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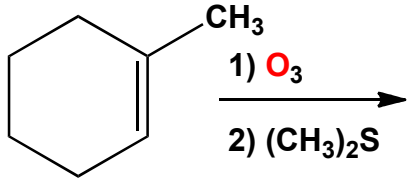
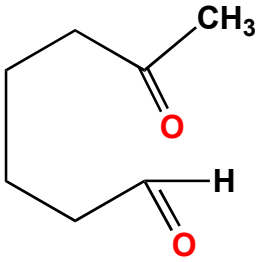
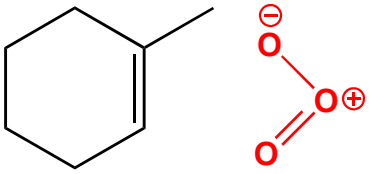
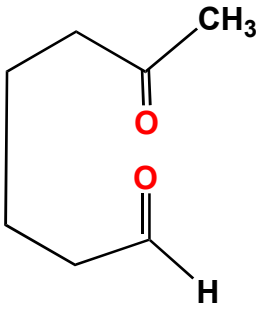




C---C bonds are broken

Ketones & aldehydes are products



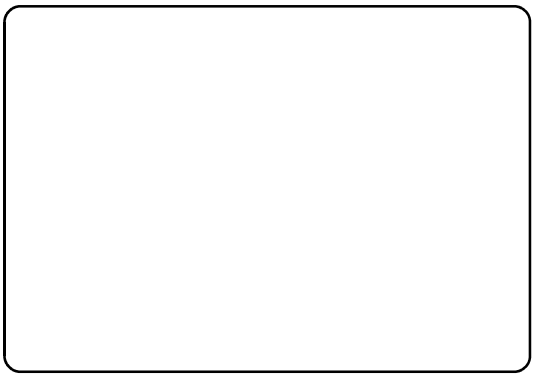


Make-a-bonds

O_3 adds simultaneously

2) $(CH_3)_2S$

several steps (don't need to know)



Molozonide