



# Selectivity

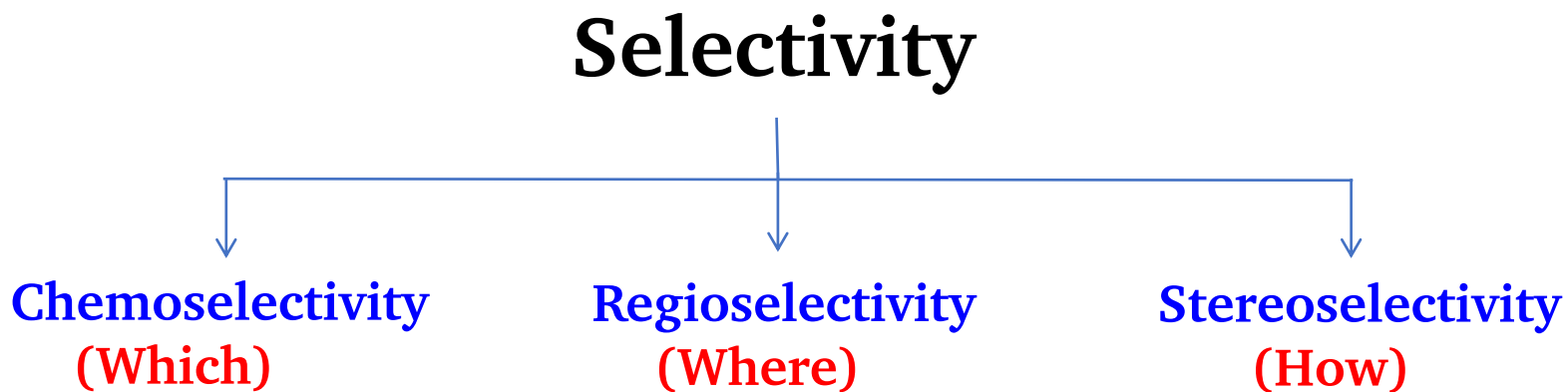


**Krishna P. Kaliappan**  
**Department of Chemistry**  
**Indian Institute of Technology-Bombay**  
**Mumbai 400 076 INDIA**

**<http://www.chem.iitb.ac.in/~kpk>**  
**[kpk@chem.iitb.ac.in](mailto:kpk@chem.iitb.ac.in)**



# Selectivity





# Chemoselectivity

Preferential selectivity of **one functional group over other**

**Reaction of** one of two identical functional groups

**Two** different functional groups **of** unequal reactivity

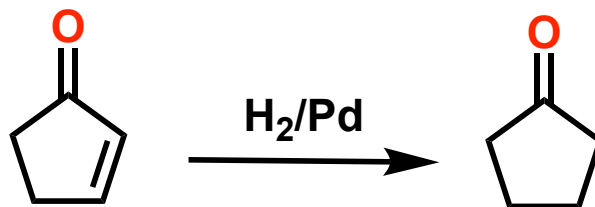
**Reaction of a** group once, **when it** may react again



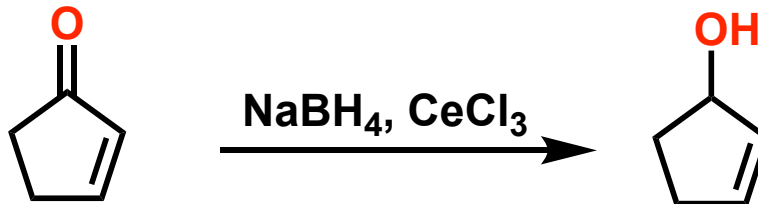
# Chemoselectivity

## Selective Reduction:

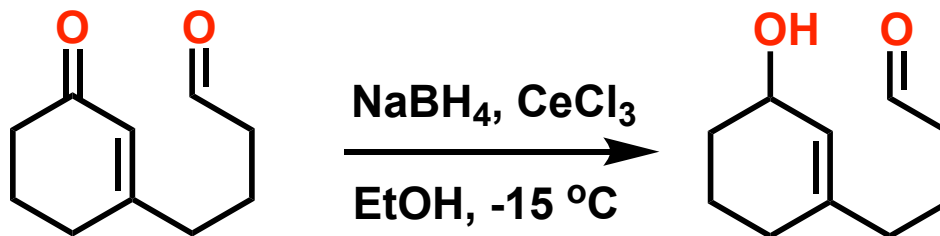
Chemoselective reduction of C=C over C=O:



Chemoselective reduction of C=O over C=C:



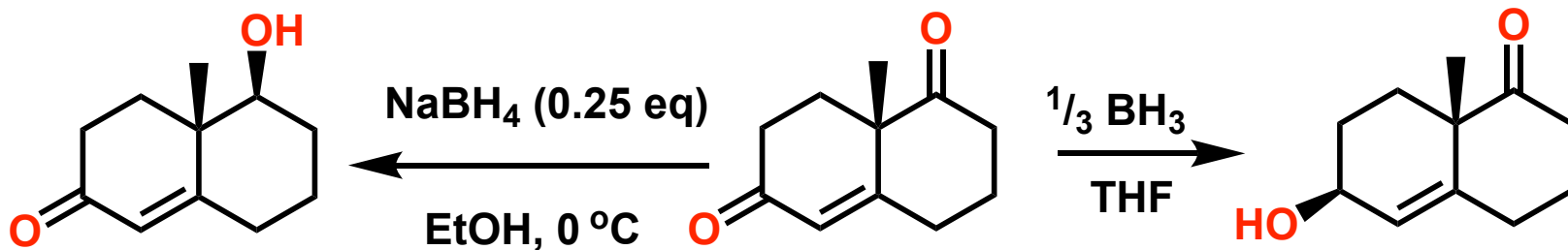
Chemoselective reduction of  $\alpha,\beta$ -unsaturated ketones over allylic alcohols:



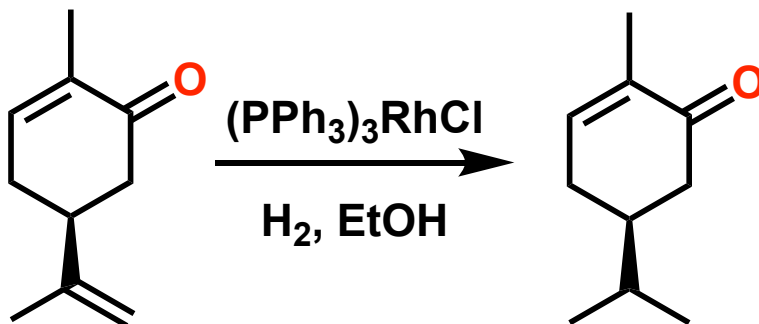


# Chemoselectivity

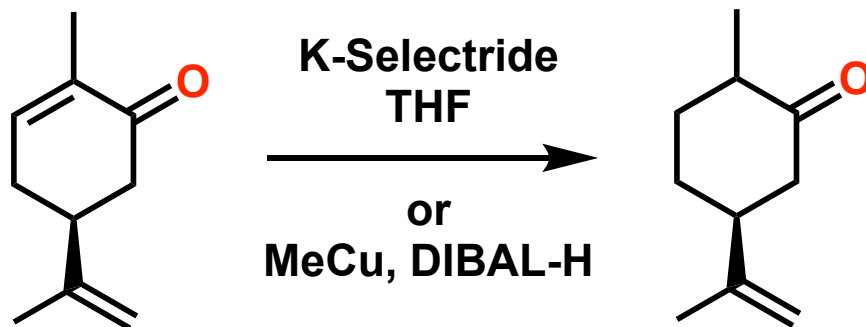
## Selective Reduction:



## Chemoselective reduction of alkenes over alkenones:



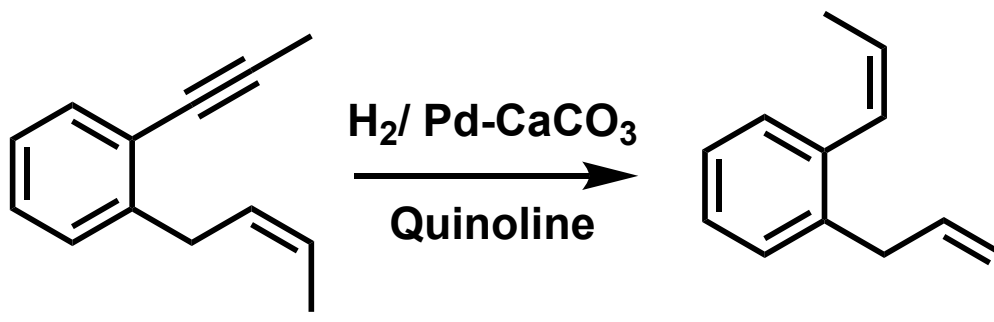
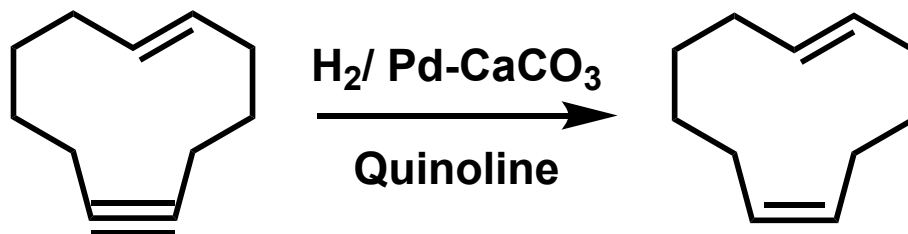
## Chemoselective reduction of alkenones over alkenes:



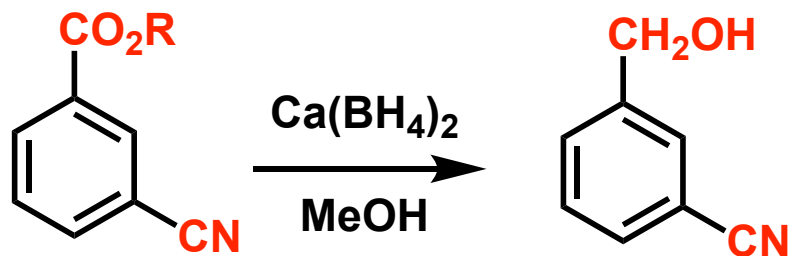


# Chemoselectivity

Chemoselective reduction of alkynes over alkenes:



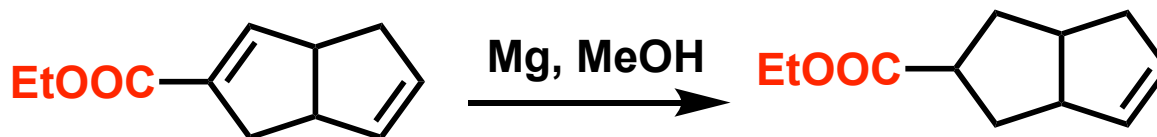
Chemoselective reduction of  $\text{COOR}$  over  $\text{CN}$ :



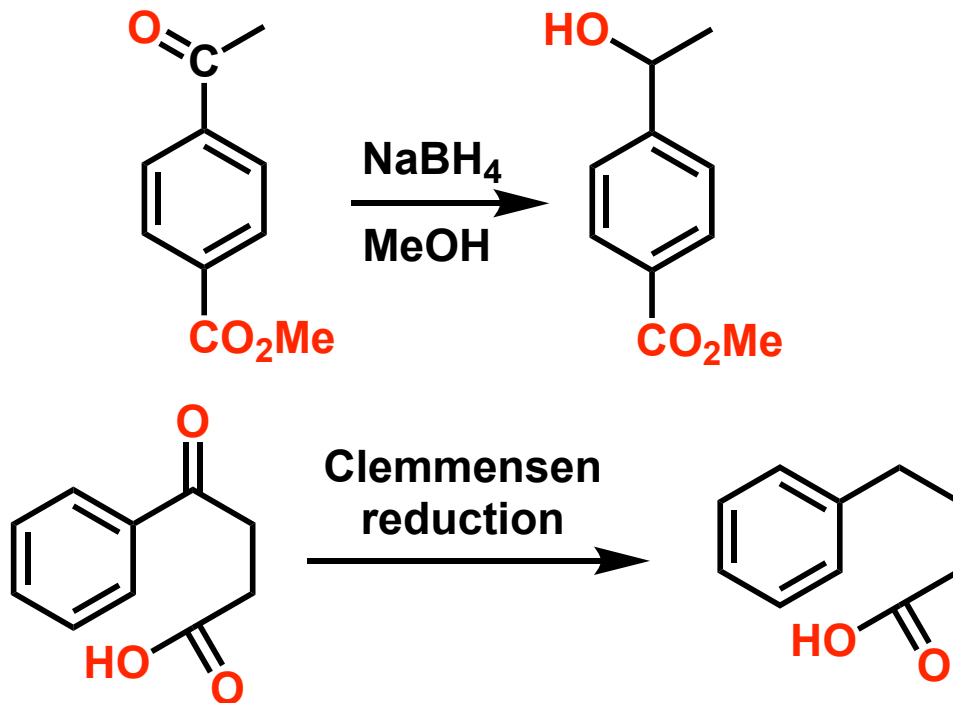


# Chemoselectivity

Chemoselective reduction of  $\alpha,\beta$ -unsaturated esters in presence of alkenes :



Chemoselective reduction of C=O over COOR:

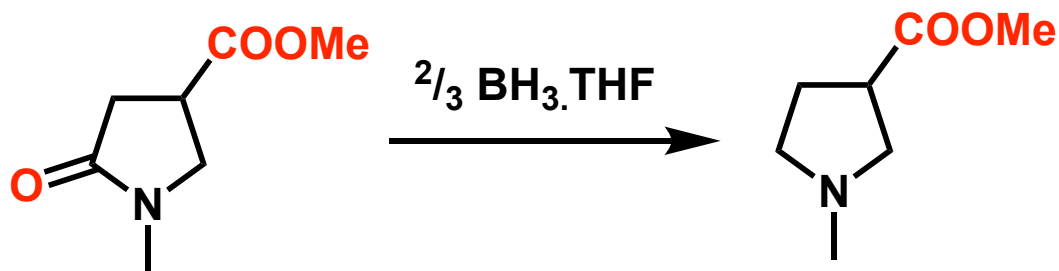




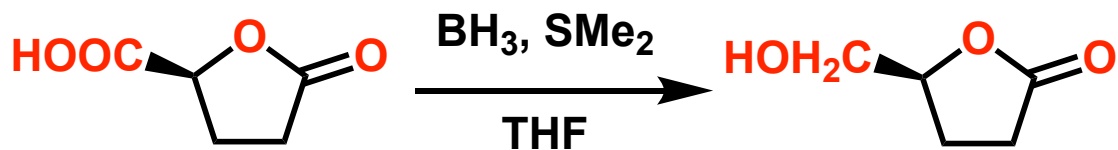


# Chemoselectivity

Chemoselective reduction of amides in presence of esters:



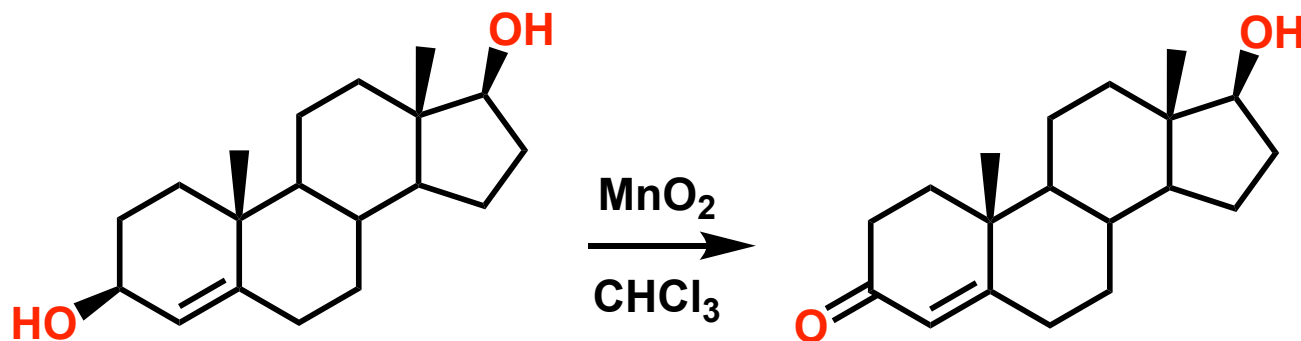
Chemoselective reduction of carboxylic acids in presence of esters, nitro and cyano groups:



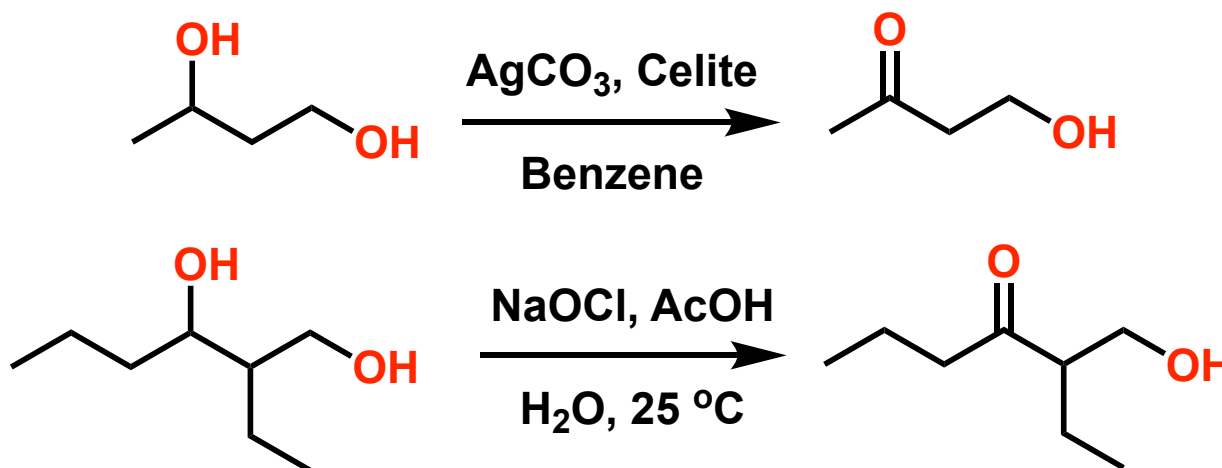


# Chemoselectivity

Chemoselective oxidation of allylic alcohols over other alcohols:



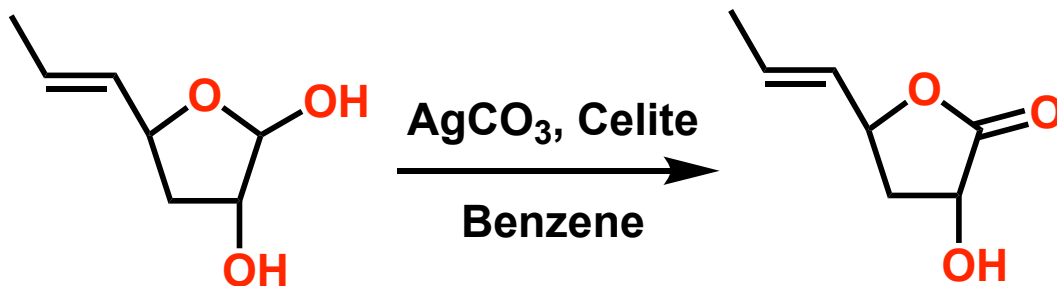
Chemoselective oxidation of secondary alcohols over primary alcohols:



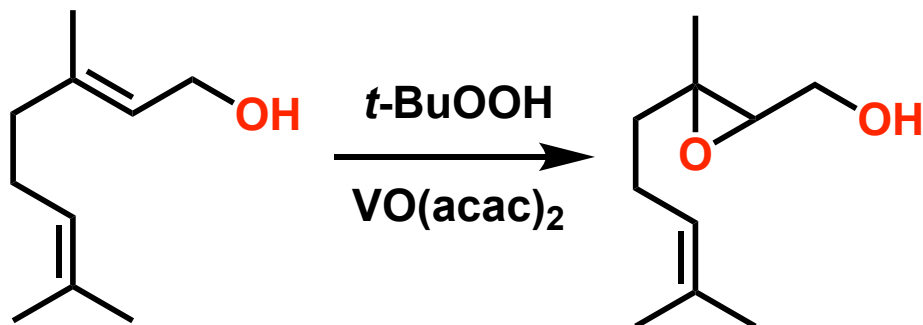


# Chemoselectivity

Chemoselective oxidation of lactols over other alcohols:



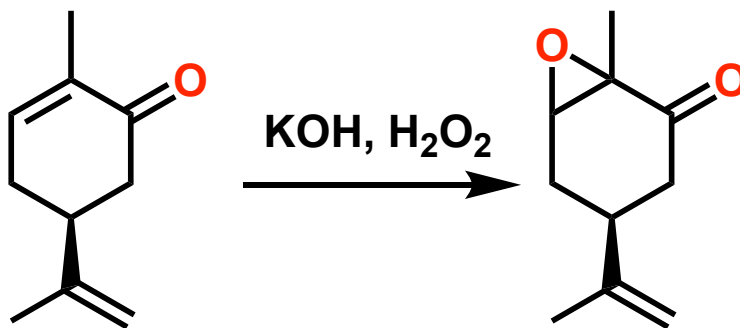
Chemoselective epoxidation of allylic alcohols over unfunctionalized alkenes



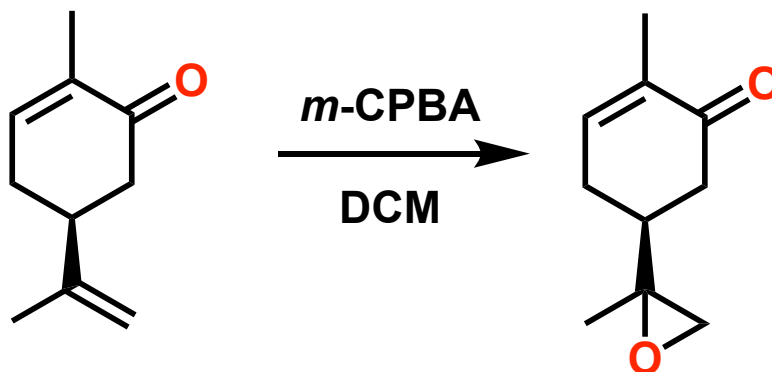


# Chemoselectivity

Chemoselective epoxidation of  $\alpha,\beta$ -unsaturated ketones over alkenes:



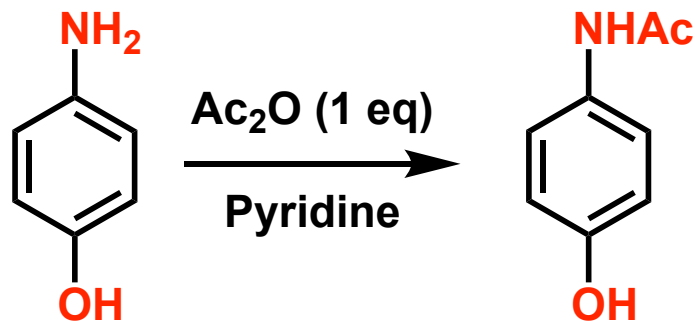
Chemoselective epoxidation of alkenes over  $\alpha,\beta$ -unsaturated ketones:



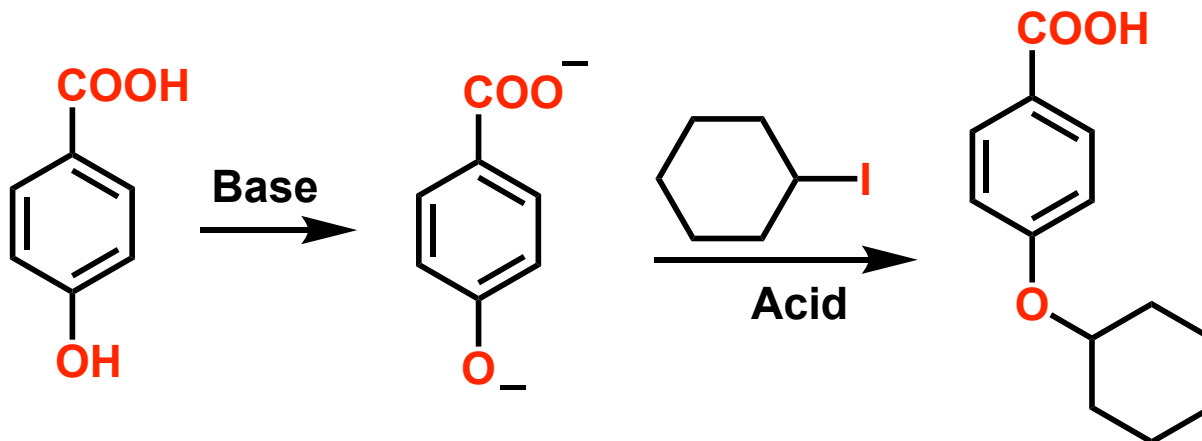


# Chemoselectivity

Chemoselective acylation of amines over phenols:



Chemoselective alkylation of phenols over carboxylic acids:

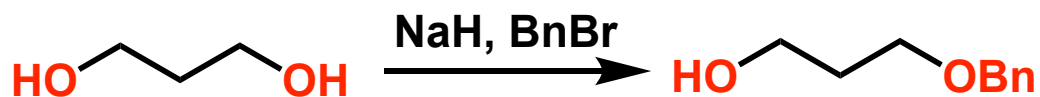




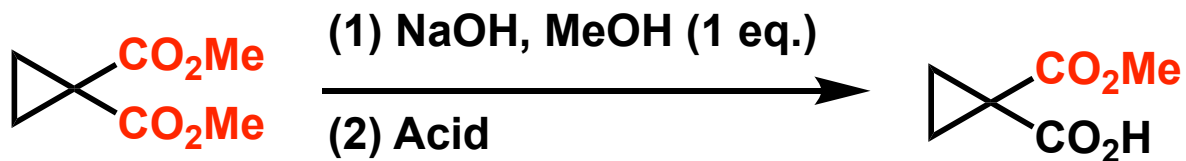
# Chemoselectivity

## Reaction of One of Two Identical Functional Groups:

### Monoprotection of a diol:



### Monohydrolysis of an ester:

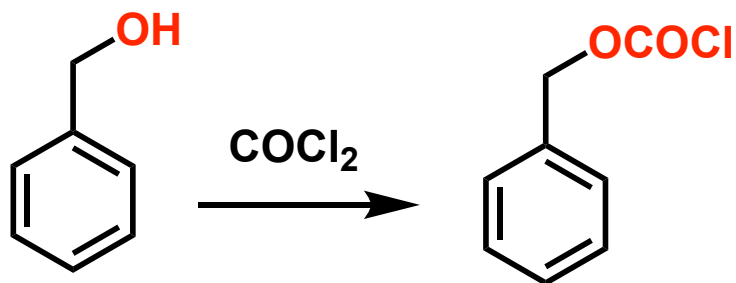




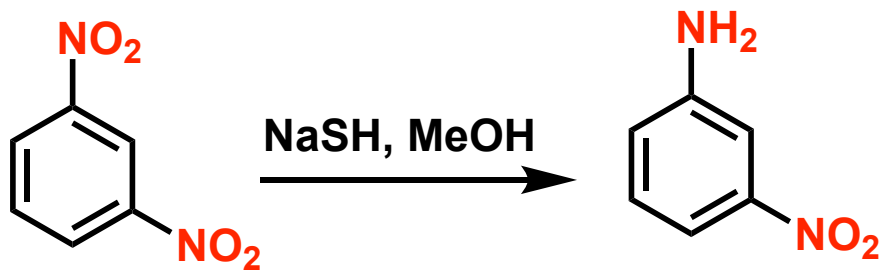
# Chemoselectivity

Reaction of A Group Once When It May React Again:

Preparation of half esters:



Partial reduction of dinitro compounds:

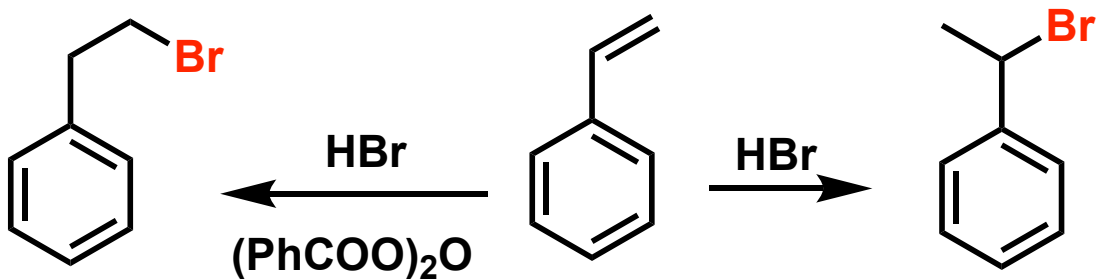




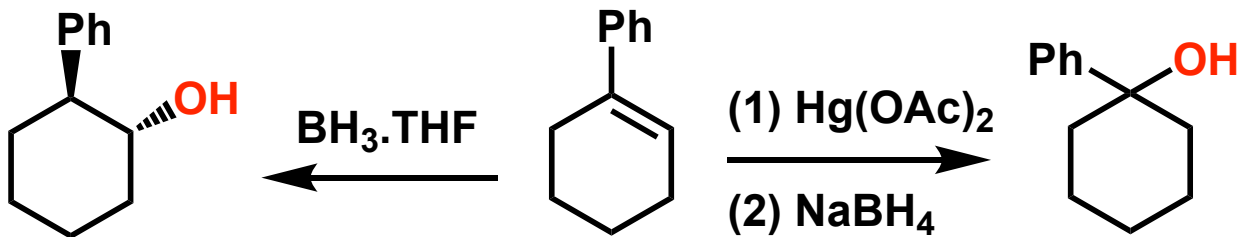
# Regioselectivity

Preferential reactivity of one site over the other site of the same functional group

Addition of HBr to alkenes:



Hydration of alkenes:

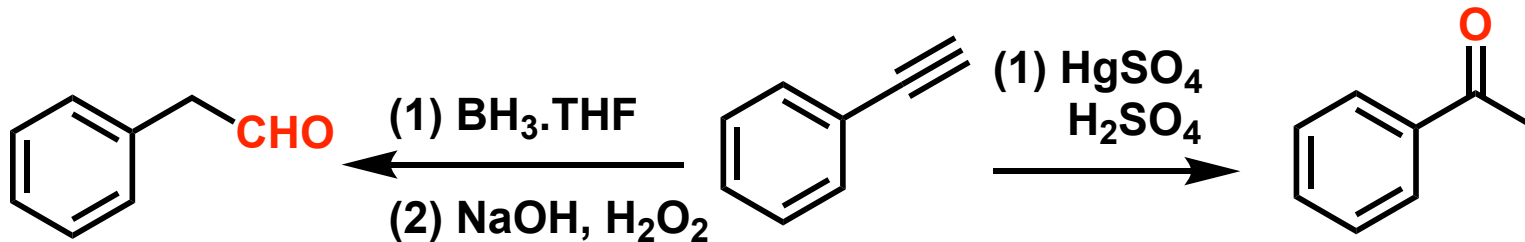




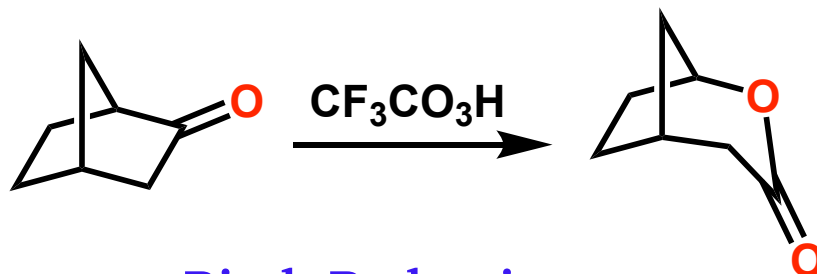


# Regioselectivity

## Hydration of alkynes:



## Baeyer-Villiger Oxidation:



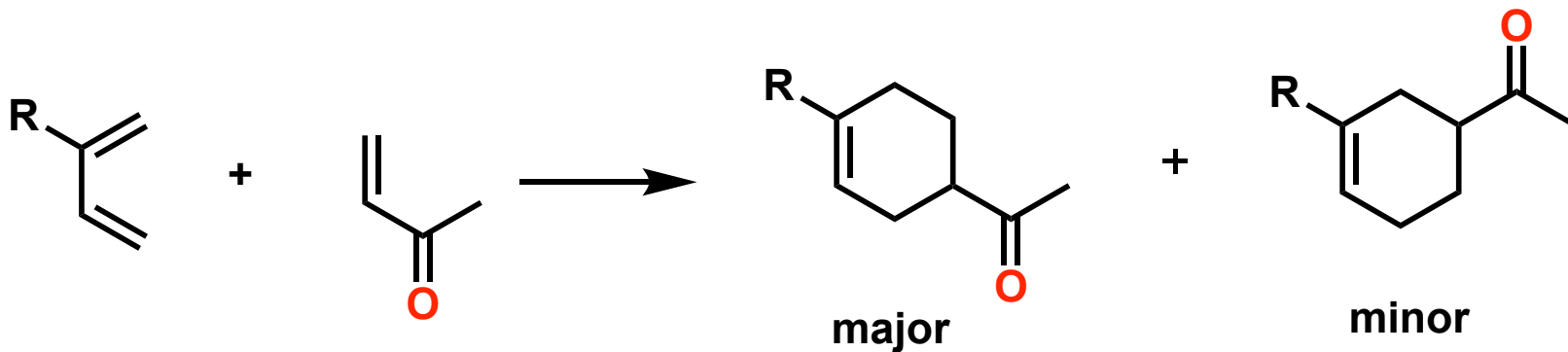
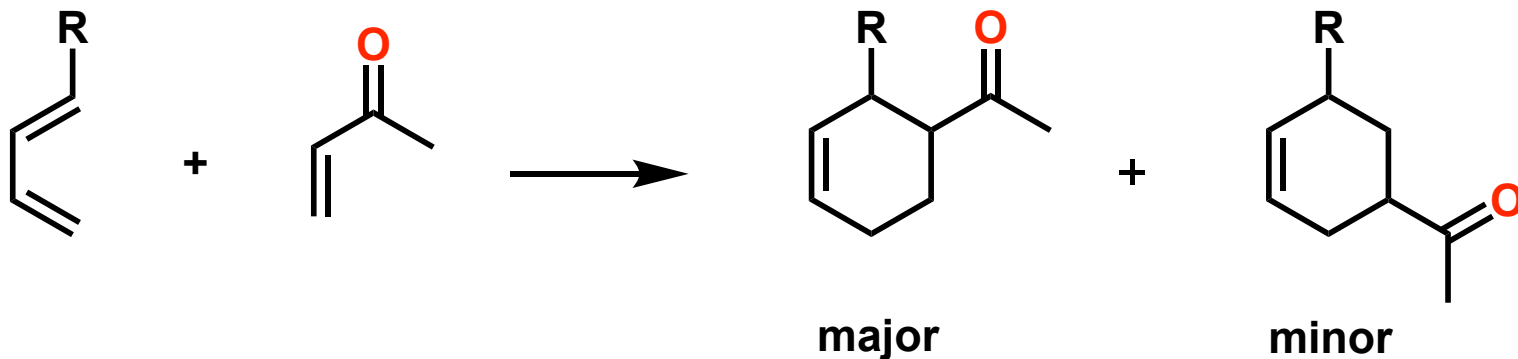
## Birch Reduction:





# Regioselectivity

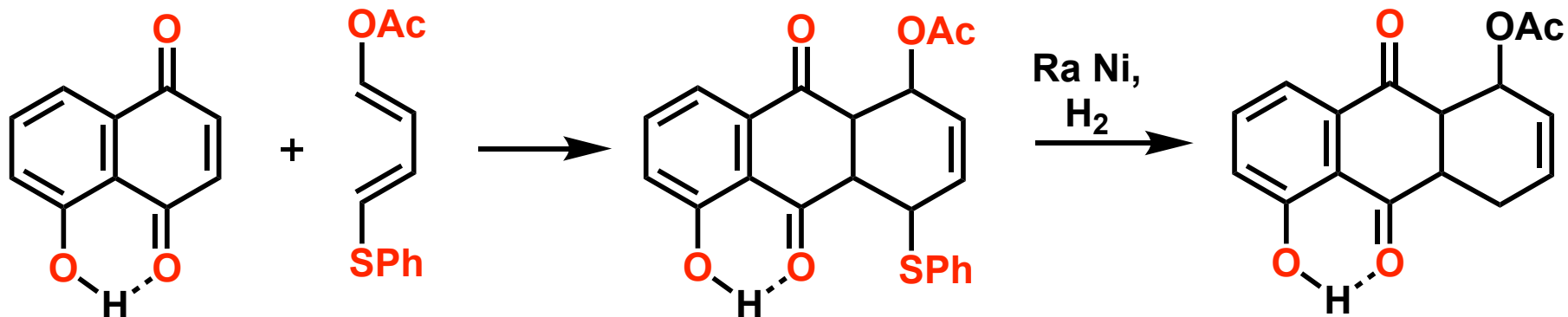
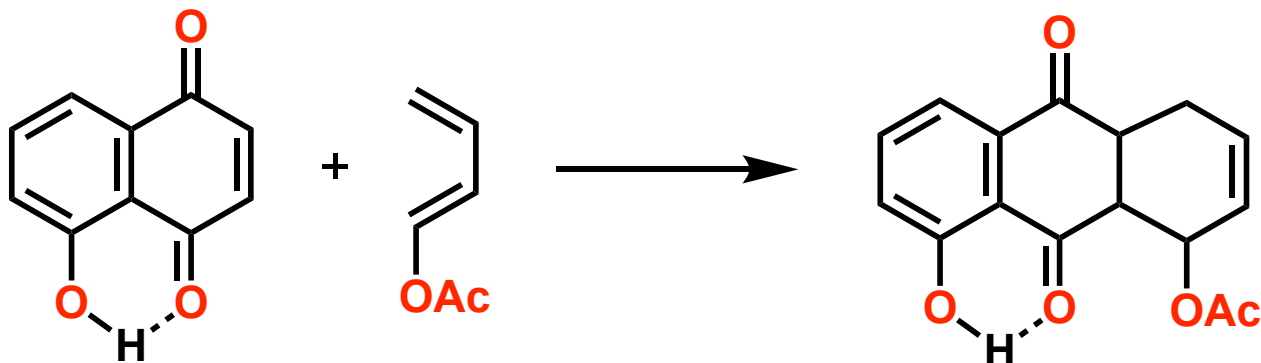
## Diels-Alder Reaction:





# Regioselectivity

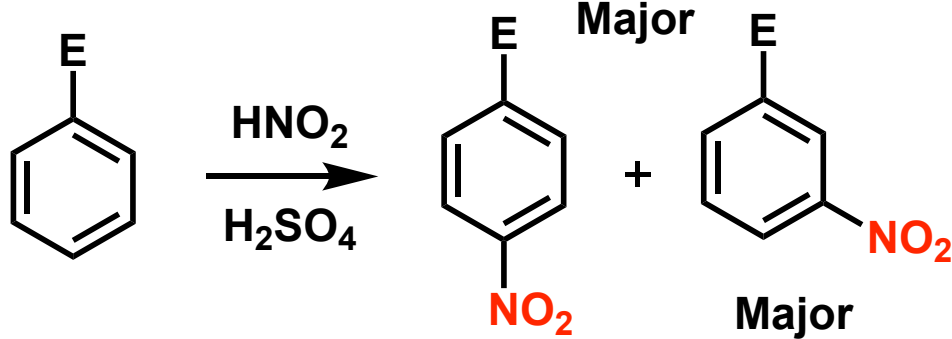
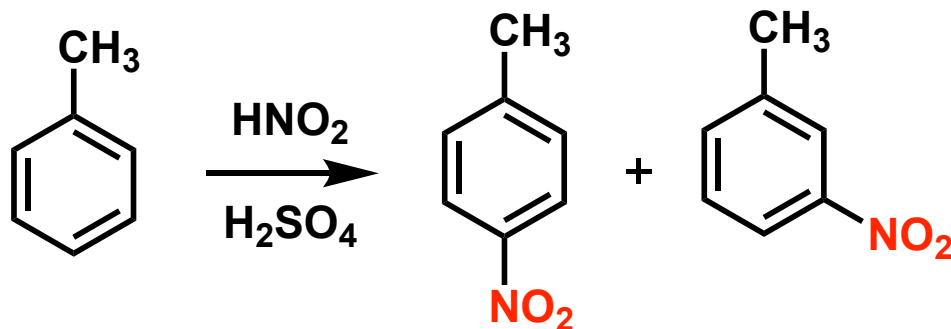
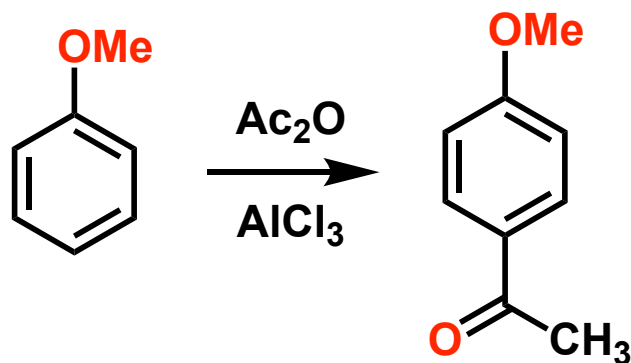
## Diels-Alder Reaction:





# Regioselectivity

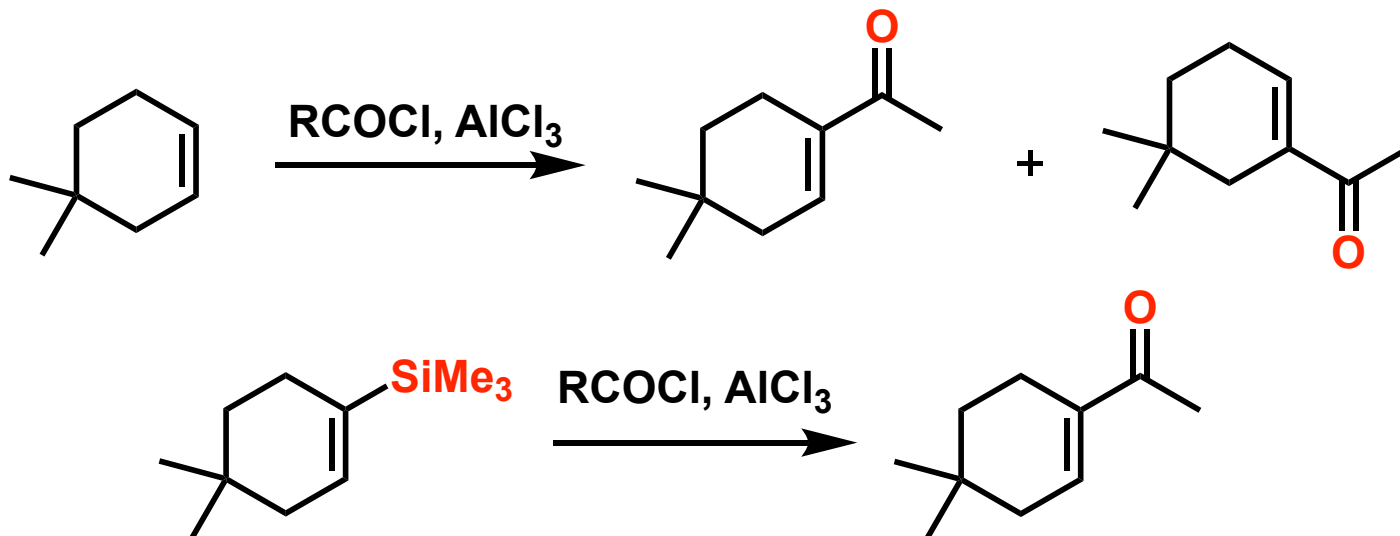
Aromatic electrophilic substitution:





# Regioselectivity

## Aromatic electrophilic substitution:



## Epoxide Opening:

