



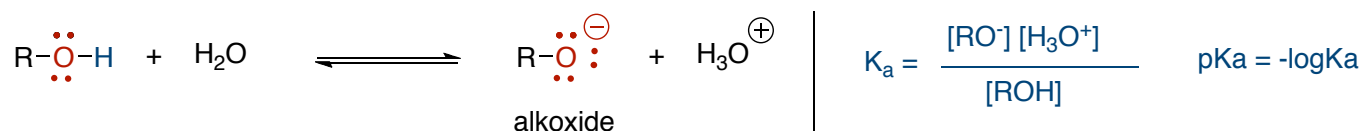
# Chem 342 • Organic Chemistry II

Lecture Summary 14 - 20 Feb 2009

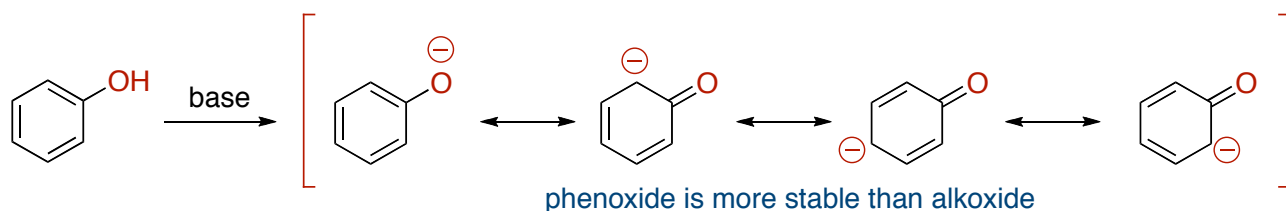
## Chapter 17 - Alcohols and Phenols

### Properties of Alcohols

Alcohols can be weakly acidic or weakly basic. The amount of solvent stabilization, inductive effects and resonance effects will influence the acidity of alcohols. Some  $pK_a$  values for various alcohols are listed below. Notice the phenols are much more acidic than normal alcohols. This is due to resonance stabilization of the negative charged formed after deprotonation.

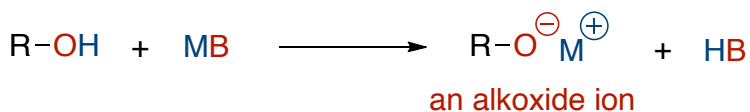


	$pK_a$		$pK_a$		$pK_a$
	18.0	CH <sub>3</sub> OH	15.5		10.5
	16.0	CF <sub>3</sub> CH <sub>2</sub> OH	12.4		7.2
HOH	15.7		9.9		



### Deprotonation of Alcohols

Alcohols need a pretty strong base to be deprotonated. With the exception of phenols, alcohols will not be deprotonated with hydroxide. Strong bases like sodium hydride, sodium amide, or reactive organometallics are generally used. Phenols can be deprotonated with NaOH as they are  $10^6$  times more acidic than alkanols.

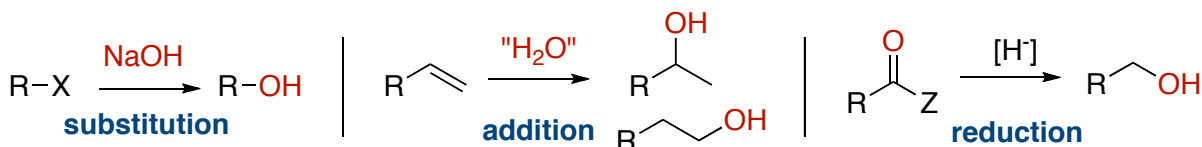


Good bases for alcohol deprotonation

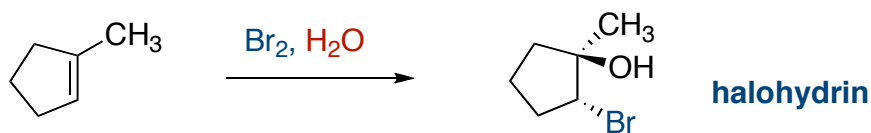
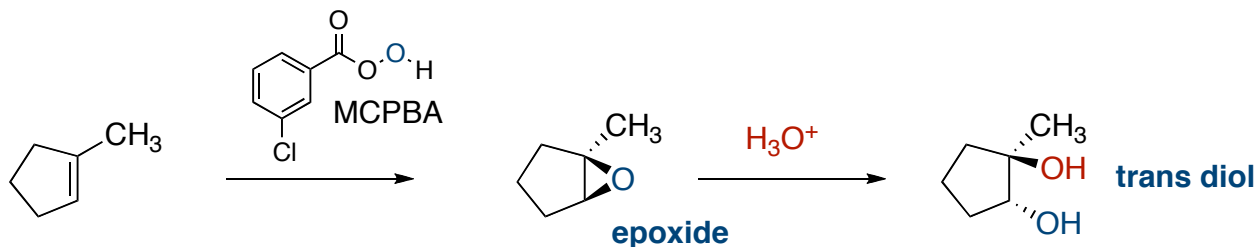
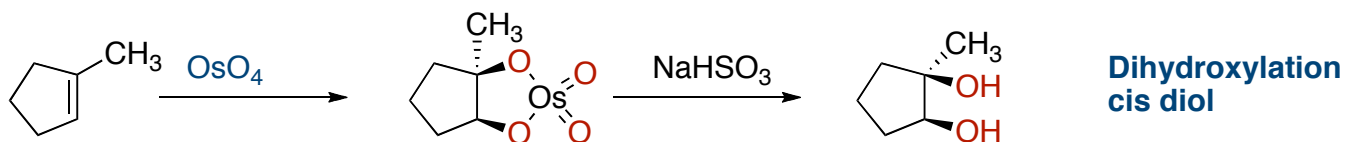
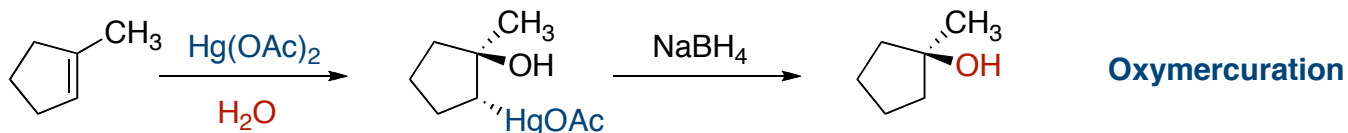
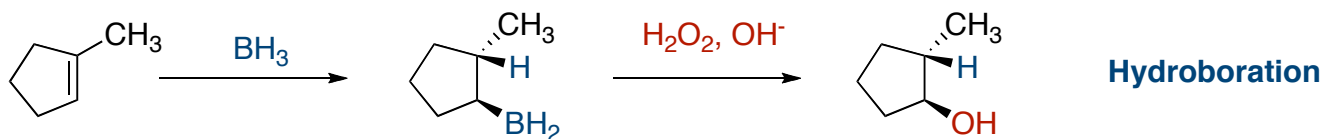
NaH, NaNH<sub>2</sub>, K (metal), R-Li, R-MgBr

### Preparation of Alcohols

Alcohols can be prepared by three general reaction types: substitution of alkyl halides, reduction of carbonyl compounds, and addition to alkenes.

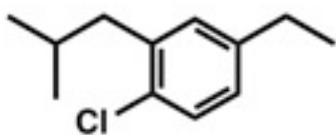


Recall some of the addition chemistry from last semester; hydroboration (anti Markovnikov), oxymercuration (Markovnikov), dihydroxylation. *Trans*-diols can be prepared by the acid catalyzed opening of epoxides with water. Epoxides can be prepared directly from alkenes with a peracid. Halohydrins can also be prepared by addition chemistry.



## Daily Quiz

Q: What is the best sequence of reactions to synthesize the following compound starting from benzene?



1: 1)  $\text{CH}_3\text{CH}(\text{CH}_3)\text{COCl}$ ,  $\text{AlCl}_3$   
2)  $\text{CH}_3\text{CH}_2\text{Cl}$ ,  $\text{AlCl}_3$   
3)  $\text{H}_2$ ,  $\text{Pd/C}$   
4)  $\text{Cl}_2$ ,  $\text{FeCl}_3$

2: 1)  $\text{CH}_3\text{CH}(\text{CH}_3)\text{COCl}$ ,  $\text{AlCl}_3$   
2)  $\text{CH}_3\text{CH}_2\text{Cl}$ ,  $\text{AlCl}_3$   
3)  $\text{Cl}_2$ ,  $\text{FeCl}_3$   
4)  $\text{H}_2$ ,  $\text{Pd/C}$

3: 1)  $\text{CH}_3\text{CH}_2\text{Cl}$ ,  $\text{AlCl}_3$   
2)  $\text{CH}_3\text{CH}(\text{CH}_3)\text{COCl}$ ,  $\text{AlCl}_3$   
3)  $\text{H}_2$ ,  $\text{Pd/C}$   
4)  $\text{Cl}_2$ ,  $\text{FeCl}_3$

4: 1)  $\text{Cl}_2$ ,  $\text{FeCl}_3$   
2)  $\text{CH}_3\text{CH}_2\text{Cl}$ ,  $\text{AlCl}_3$   
3)  $\text{CH}_3\text{CH}(\text{CH}_3)\text{COCl}$ ,  $\text{AlCl}_3$   
4)  $\text{H}_2$ ,  $\text{Pd/C}$