

## Chapter 12: Alcohols

Today –Reactions with Alcohols

12.4 Preparation of Alcohols by Reduction

12.6 Preparation of Alcohols with Grignard

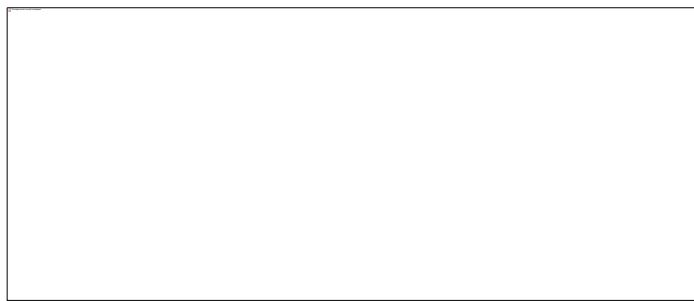
12.9 Reactions of Alcohols

12.10 Oxidation of Alcohols



Reagents that can donate a HYDRIDE are  
generally good reducing agents:

Sodium borohydride



Lithium aluminum hydride (LAH or  $\text{LiAlH}_4$ )

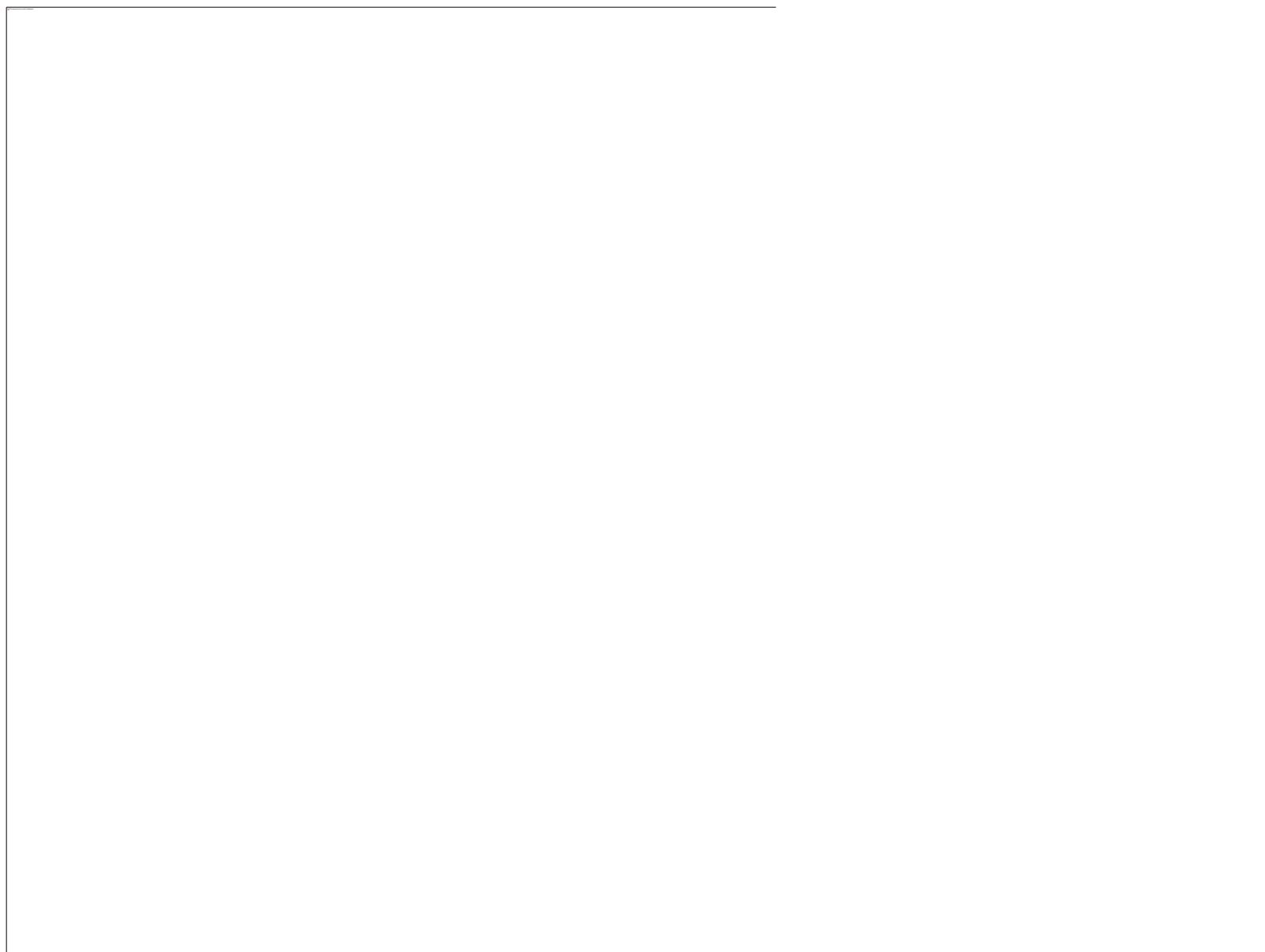


# Alcohols via Reduction

# Oxidation of Alcohols

- We saw how alcohols can be formed by the reduction of a carbonyl.
- The reverse process is also possible with the right reagents.

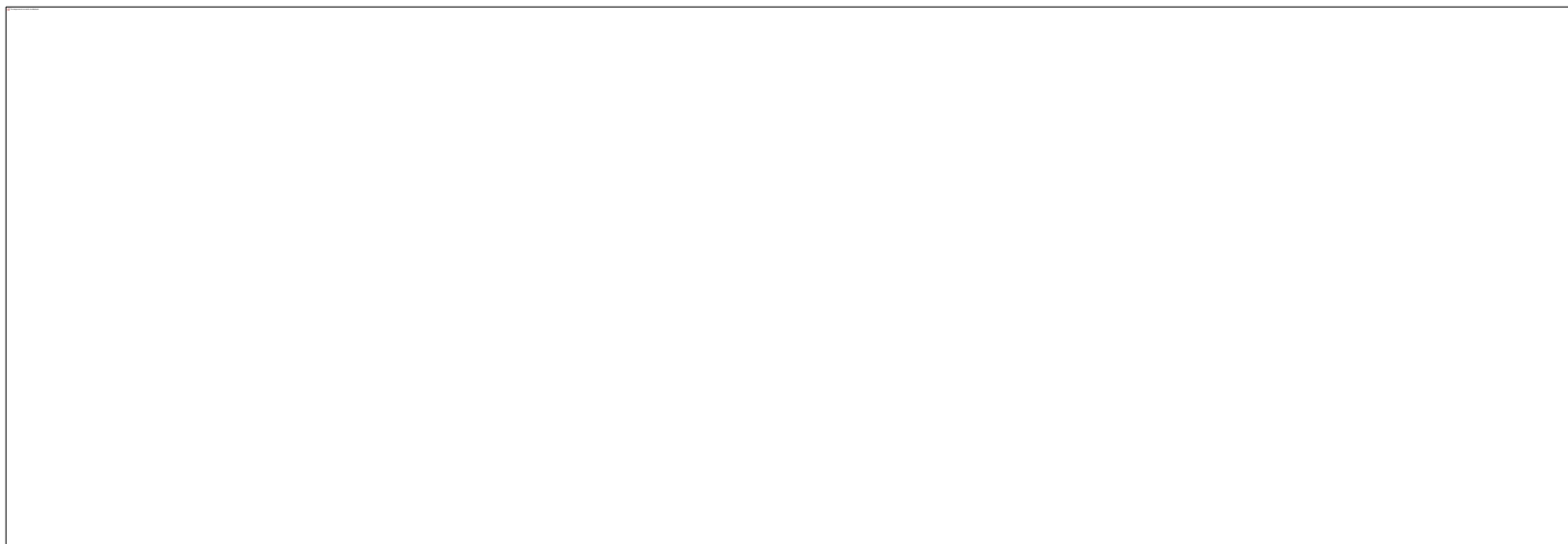
# Oxidation of Alcohols





# Oxidation of Secondary Alcohols

- Effective with inexpensive reagents such as  $\text{Na}_2\text{Cr}_2\text{O}_7$  in acetic acid
- PCC is used for sensitive alcohols at lower temperatures





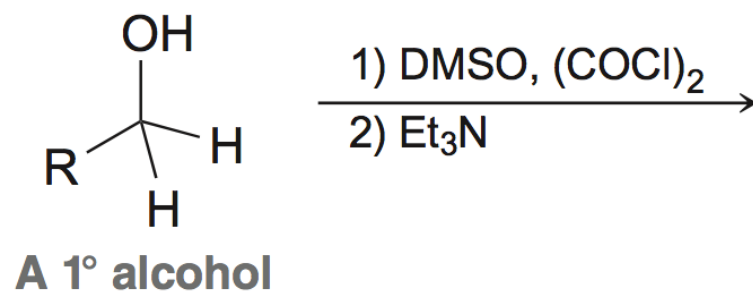
# Oxidation of Alcohols

- Chromium reagents are toxic and horrible for the environment.

## *1. Swern oxidation –*

# Oxidation of Alcohols

- Like PCC, the **Swern oxidation** converts

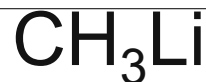
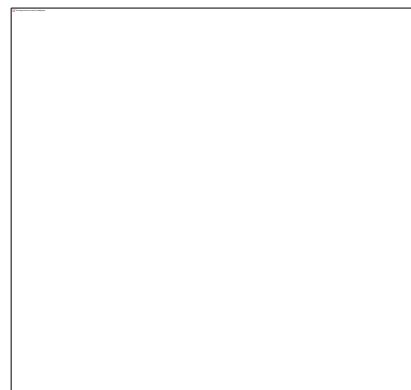
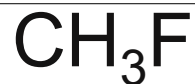
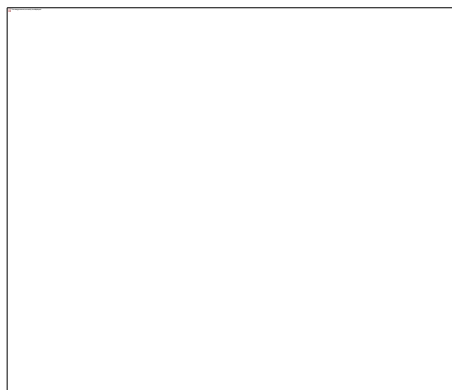


# Oxidation of Alcohols

2. **Dess-Martin periodane oxidation (DMP)** – yields analogous results as the Swern oxidation:

# Organometallic Compounds

An organic compound containing a carbon–metal bond

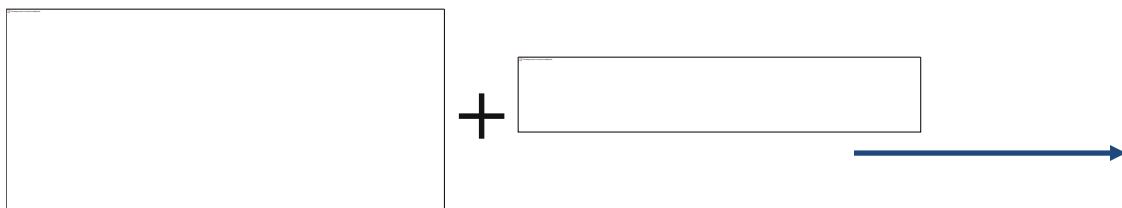
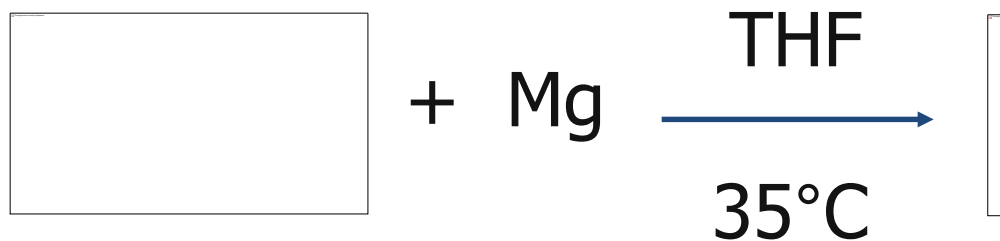


organometallics are a source  
of *nucleophilic* carbon

# Preparation of Organomagnesium Compounds

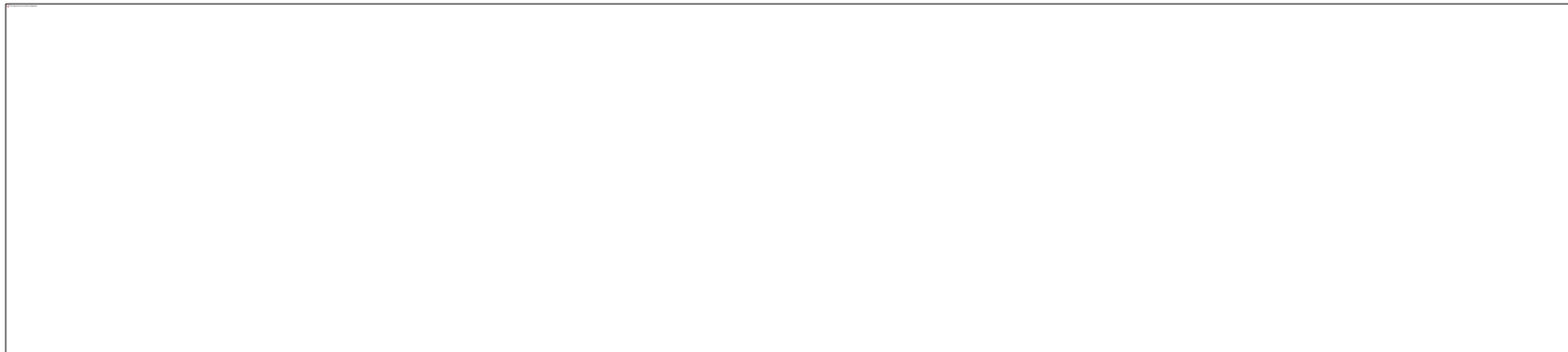
## Grignard Reagents

prepared by reaction of alkyl halides with magnesium

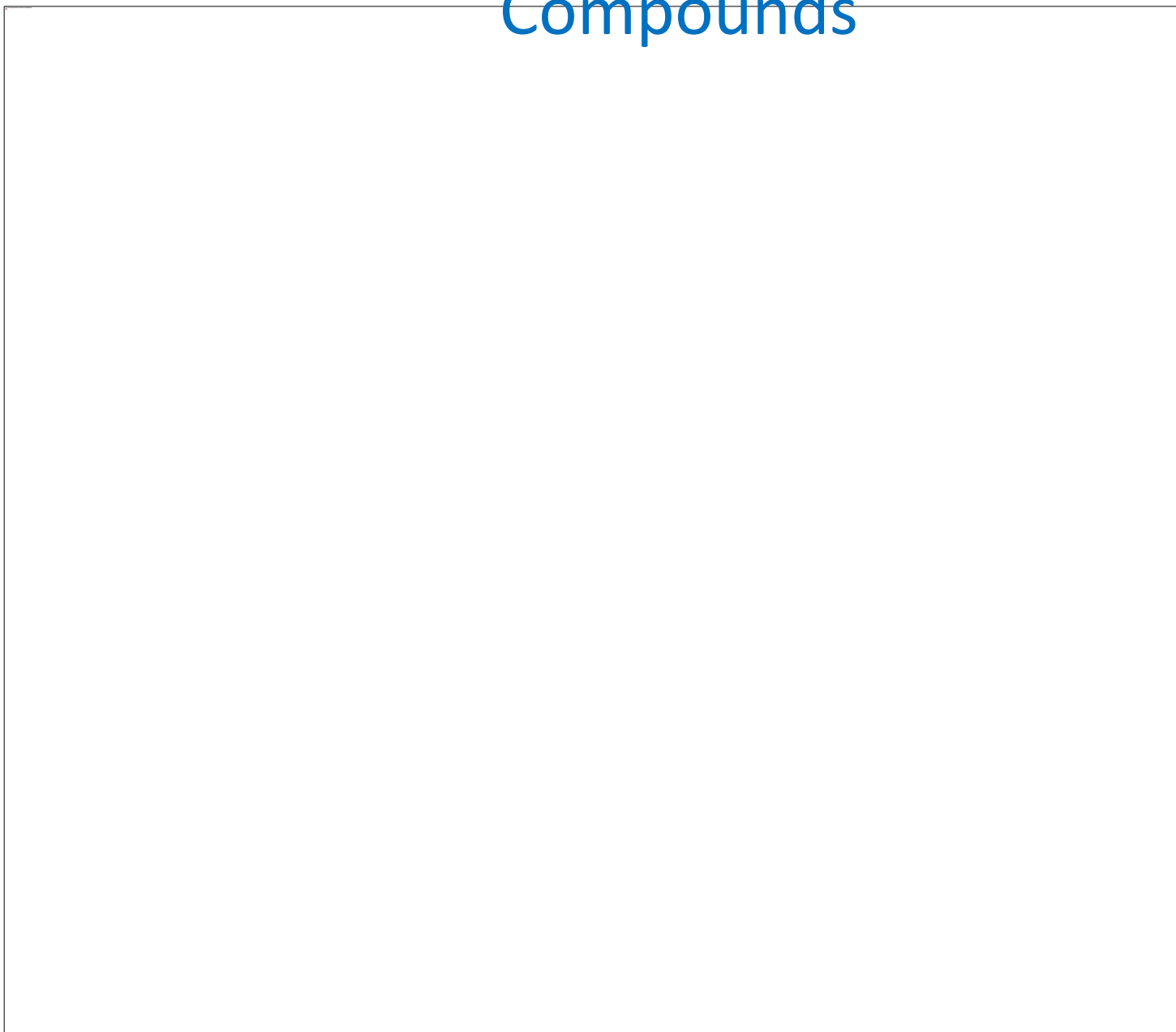


# Protection of Alcohols

- Hydroxyl groups can easily transfer their proton to a basic reagent
- This can prevent desired reactions
- Converting the hydroxyl to a (removable) functional group without an acidic proton protects the alcohol

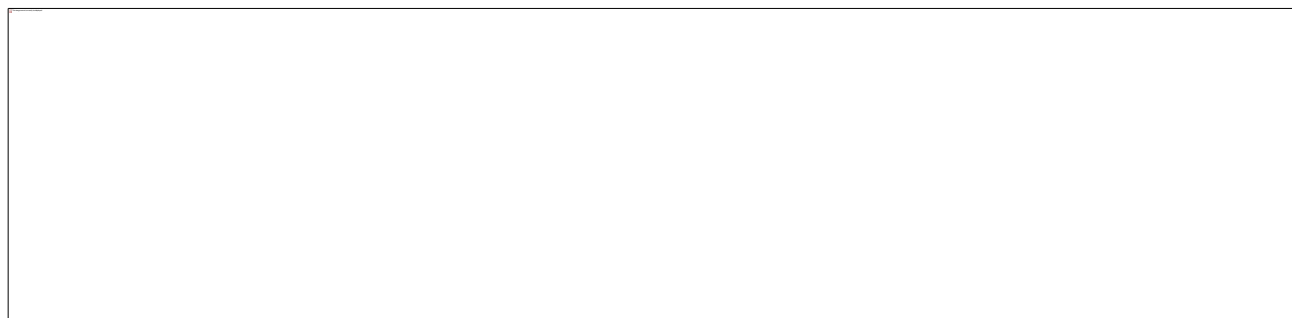


# Reactions of Grignard Reagents with Carbonyl Compounds



# Protection of Alcohols

- Consider the reaction below. WHY won't it work?





# For Next Time....

Suggested Homework Problems Chapter 9

# 1, 7, 9, 13, 18, 20, 32-37, 41, 44, 52, 57

Suggested Homework Problems Chapter 10

# 1, 2, 12, 16, 23, 24, 33, 42

Suggested Homework Problems Chapter 12!

# 1, 4, 5, 7, 13, 17, 27-32, 34, 43-45