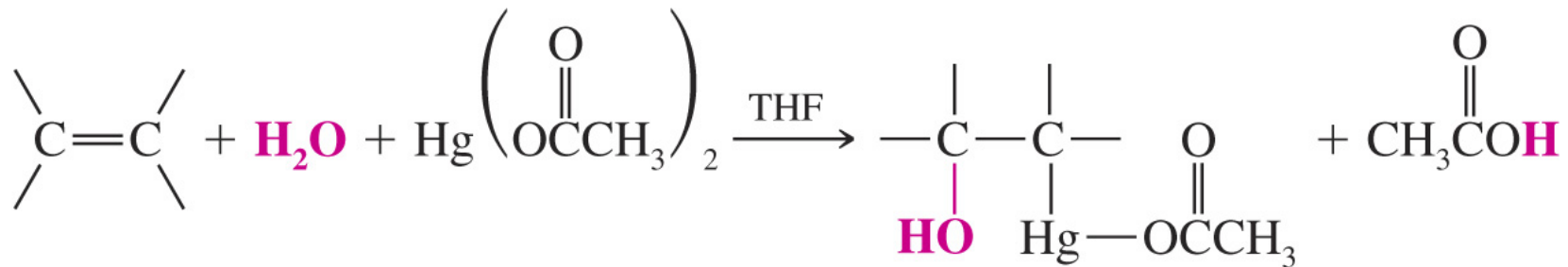
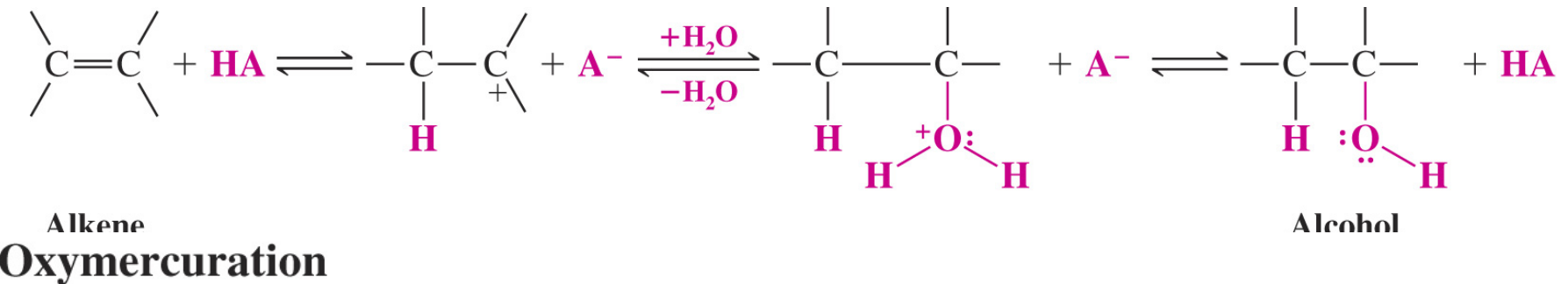
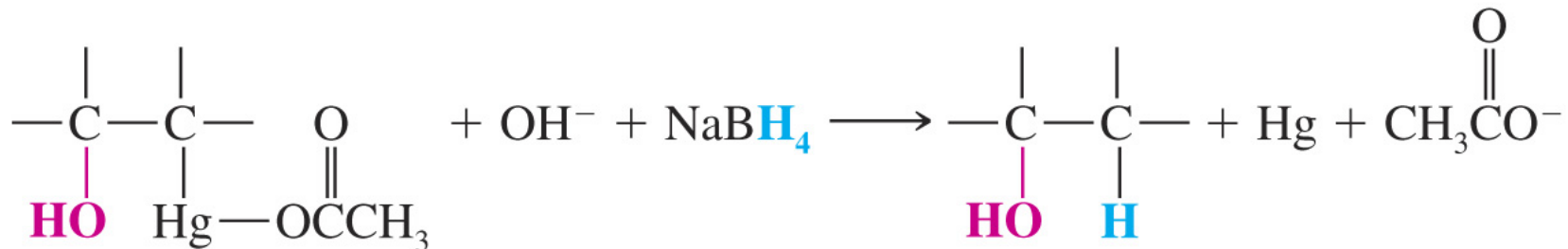


# 醇 (alcohols), 醛 (aldehydes), 酮 (ketones) 的重要反應 (第十一章, 第十二章, Chapter 17)

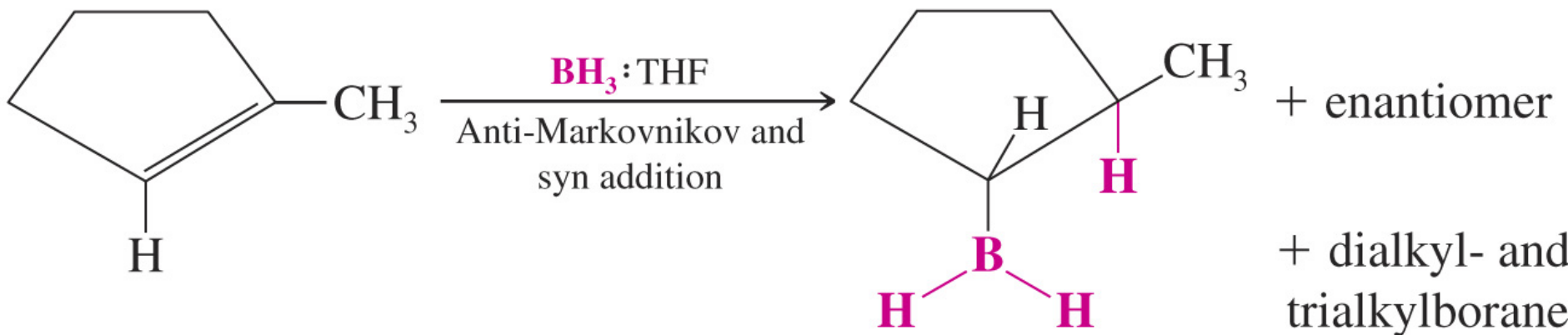
## 一) 醇類化合物的製備



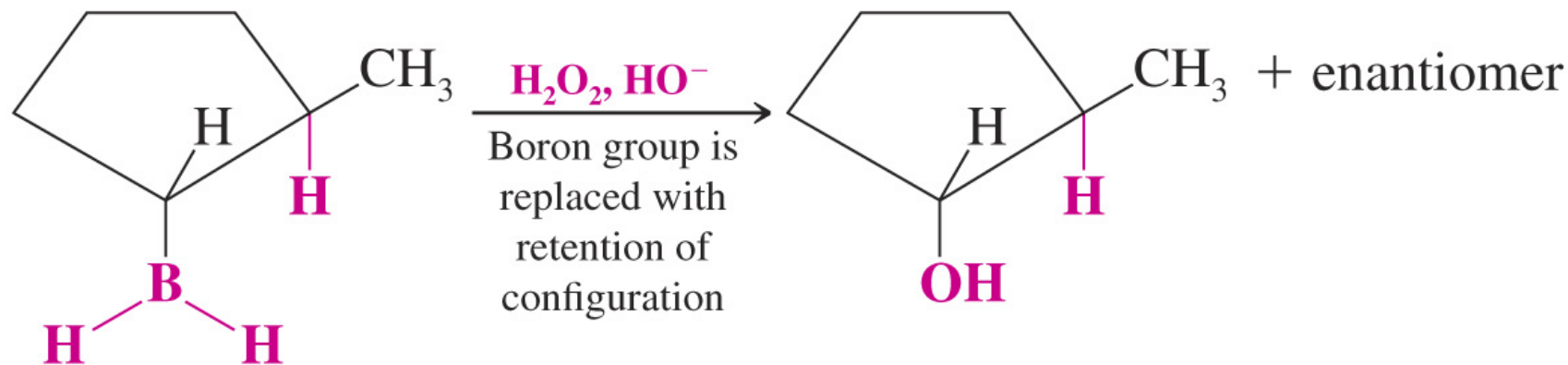
### Demercuration



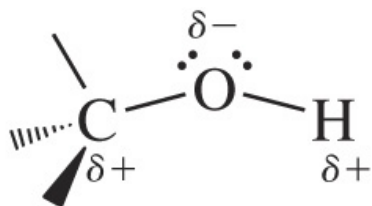
## Hydroboration



## Oxidation

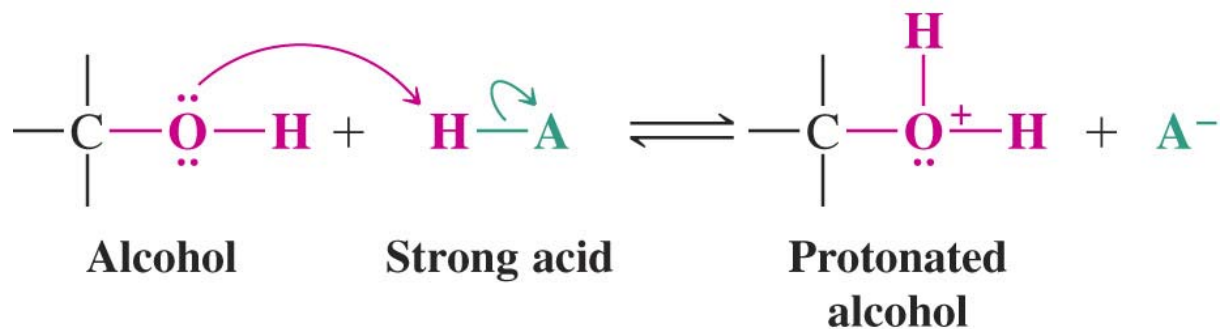


## 二) 醇類中的hydroxyl group被取代的反應

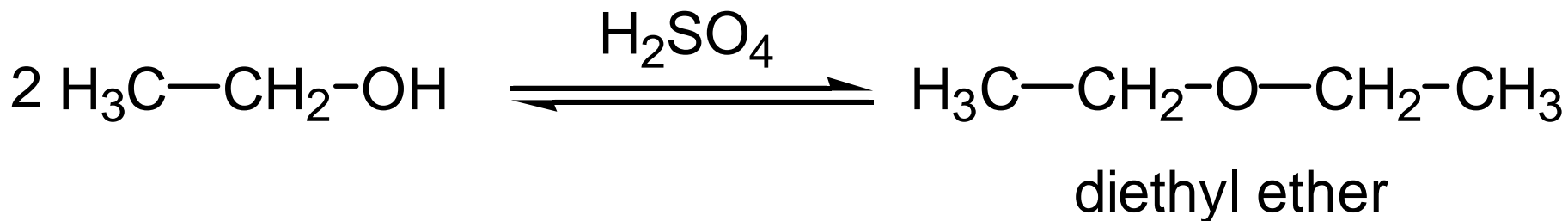
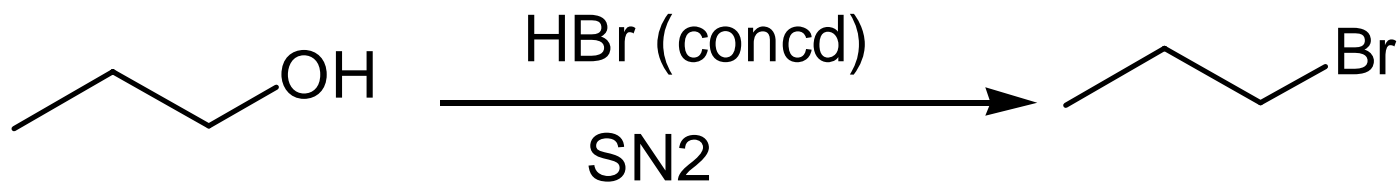
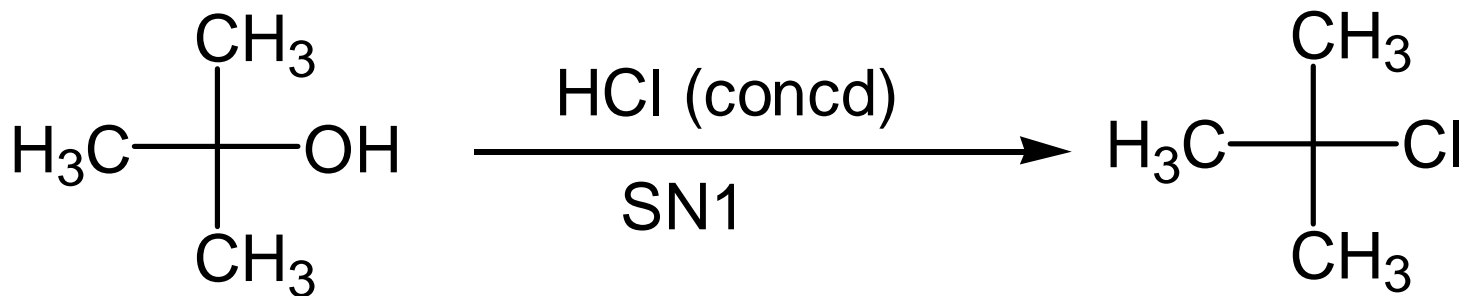


### The functional group of an alcohol

#### a) -OH 直接被取代

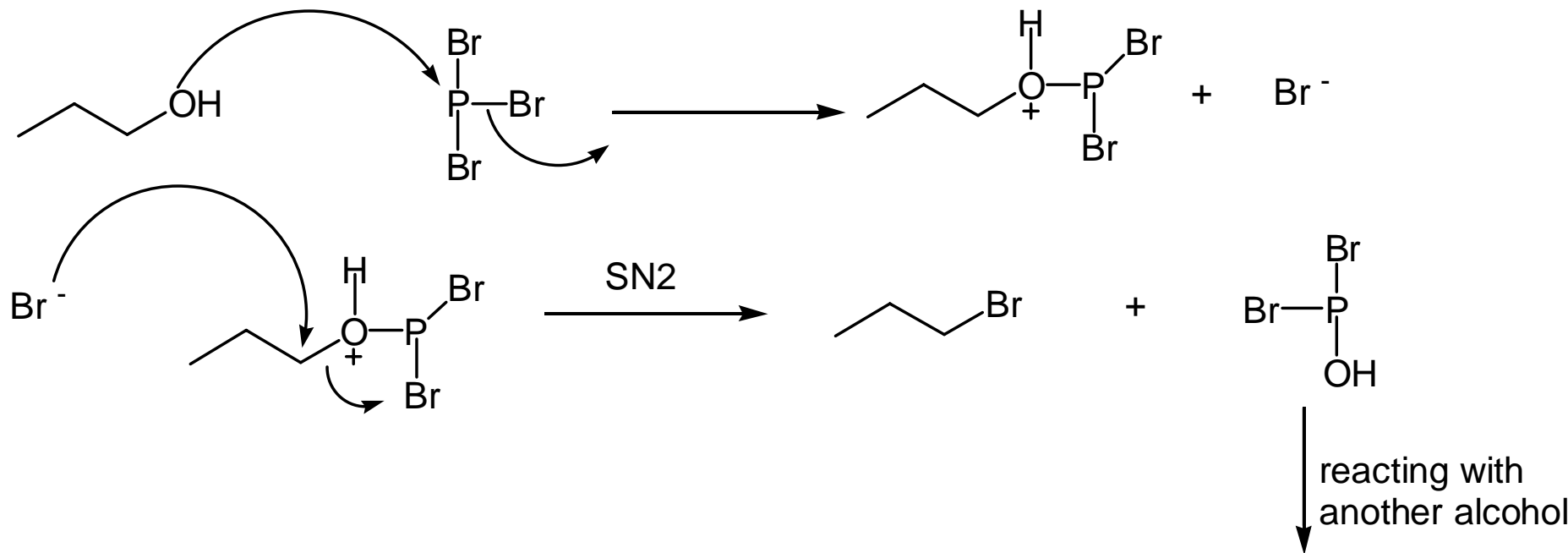


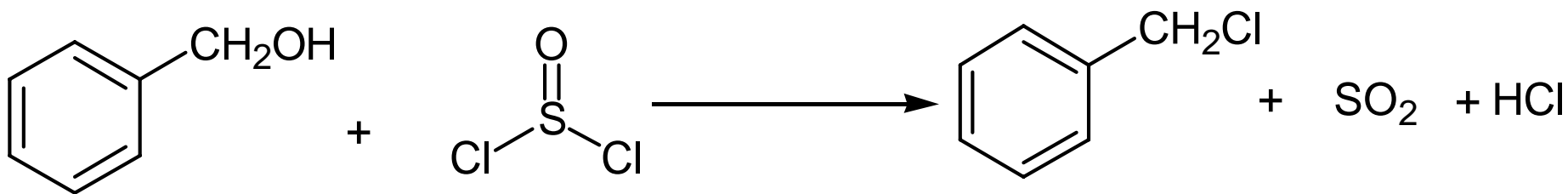
進行SN1或SN2反應



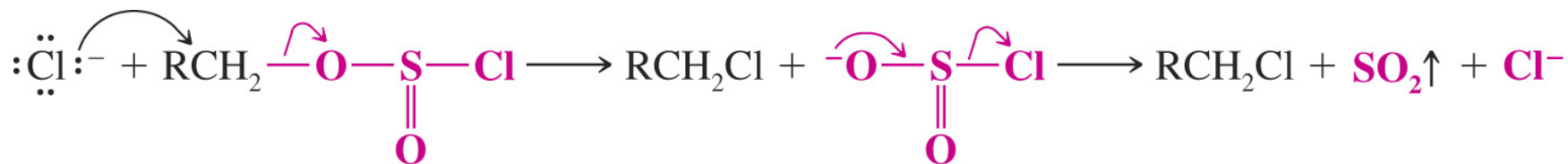
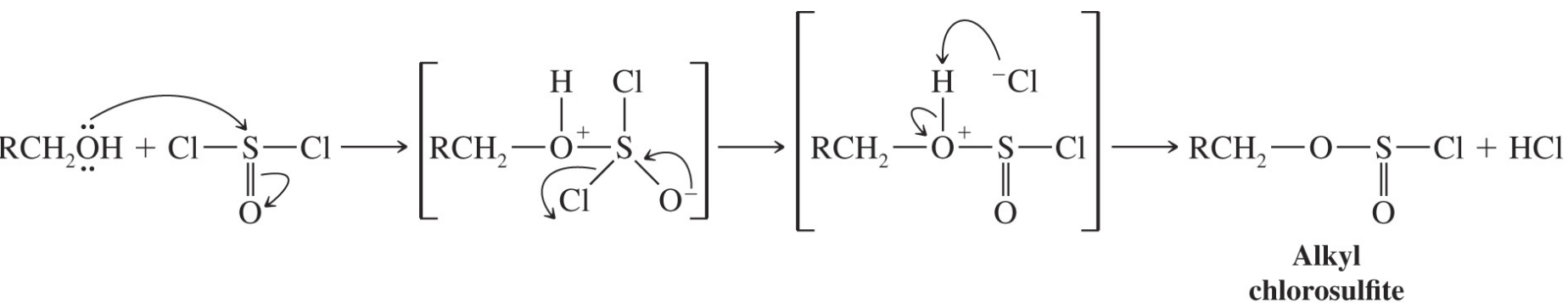


反應機制：

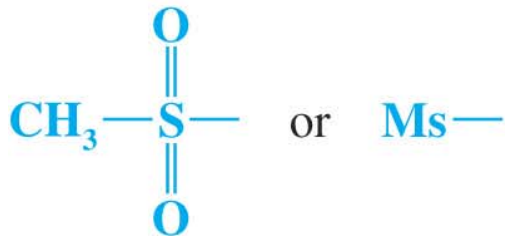




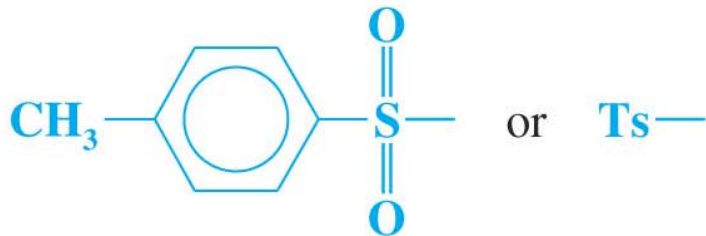
反應機制：



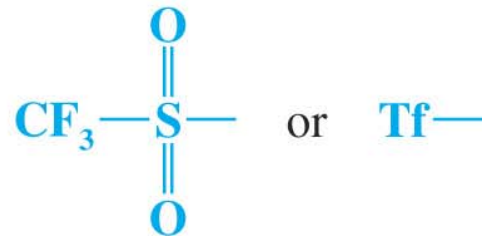
b) 將OH轉化成好的離去基團後再發生取代反應



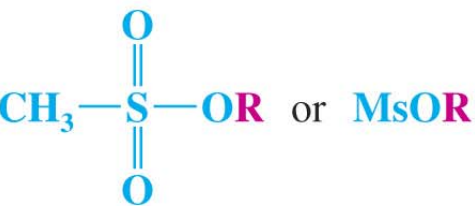
The mesyl group



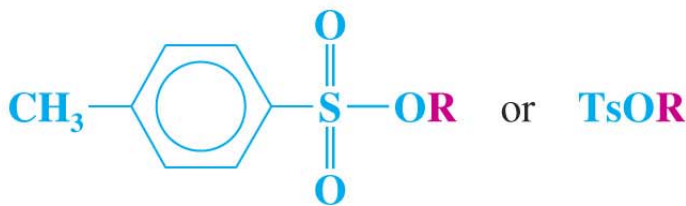
The tosyl group



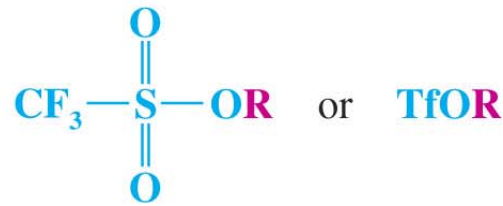
The triflyl group



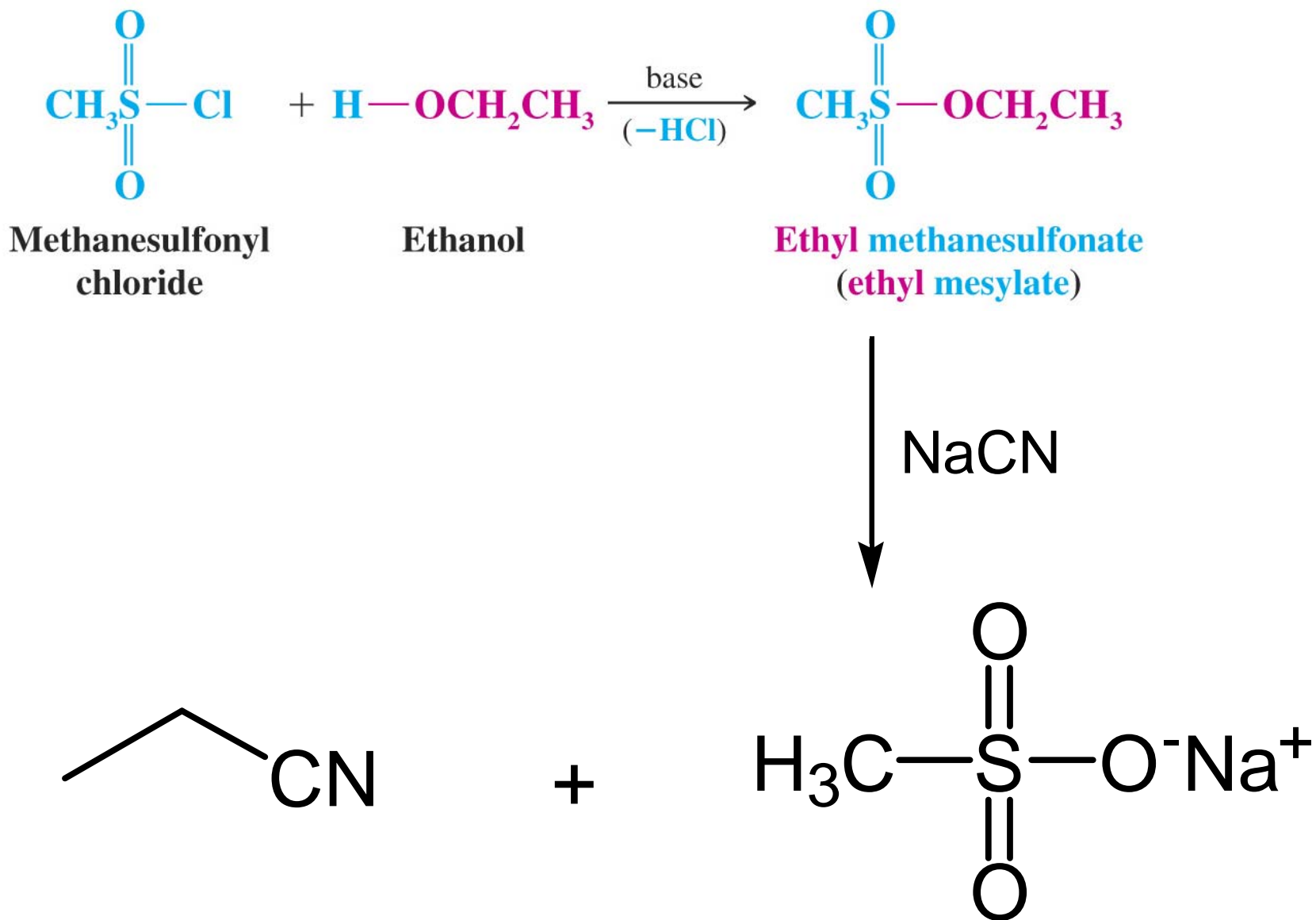
An alkyl mesylate



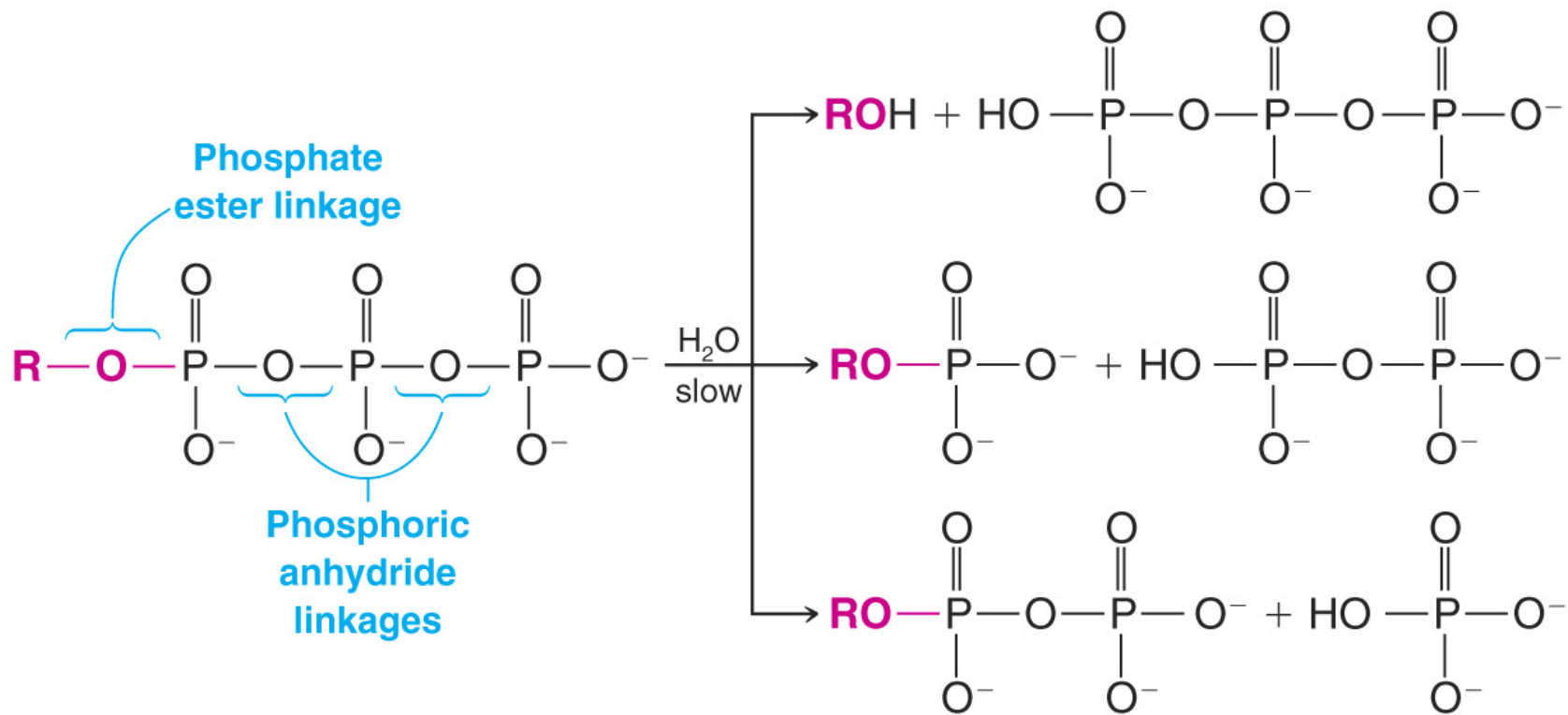
An alkyl tosylate



An alkyl triflate

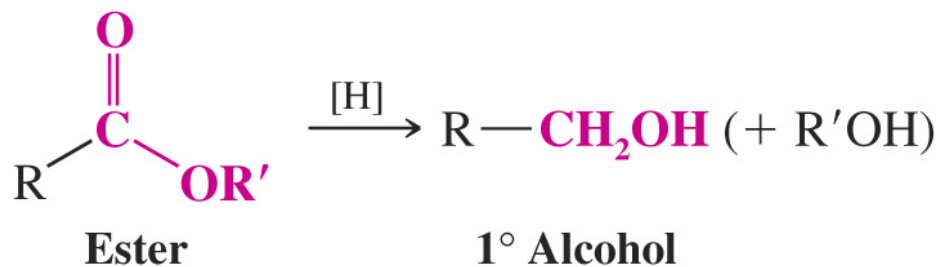
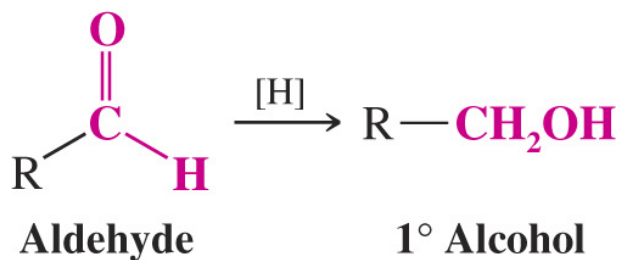
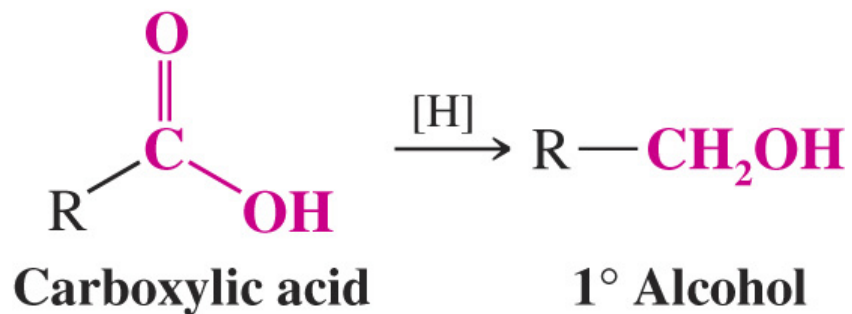
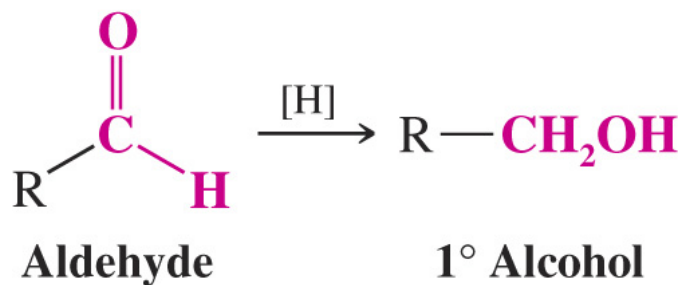


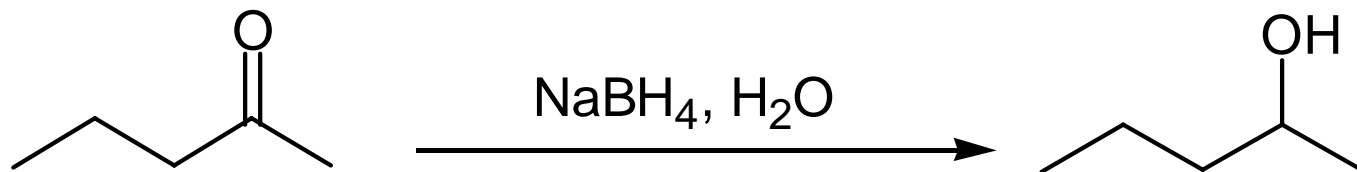
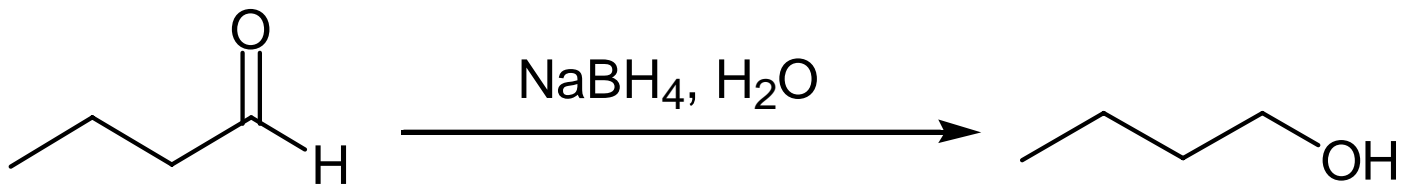




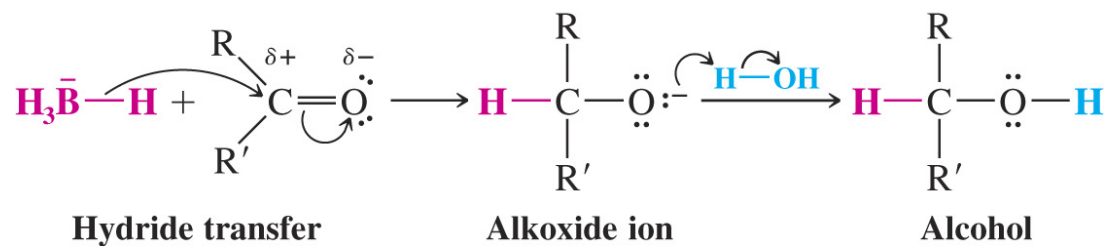
### 三) 醇以及其它有机化合物 (酮, 醛, 酸, 脂) 间的氧化-还原转换

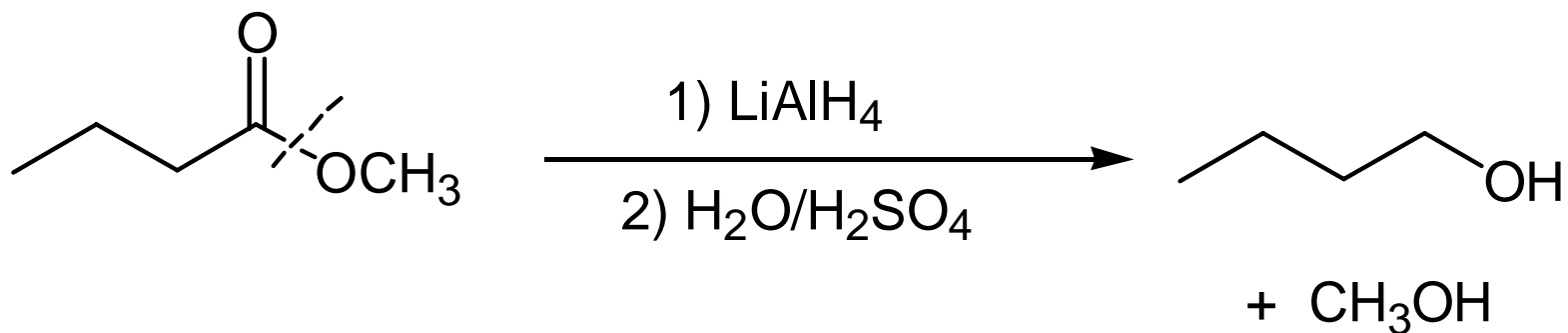
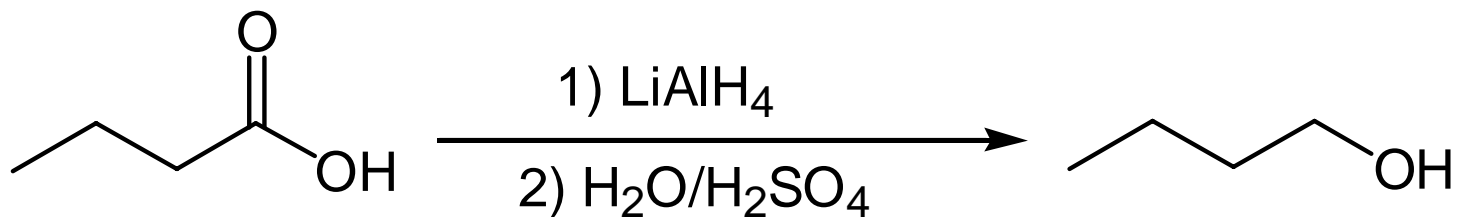
#### a) 酮, 醛, 酸, 脂經過還原轉化為醇





反應機制：

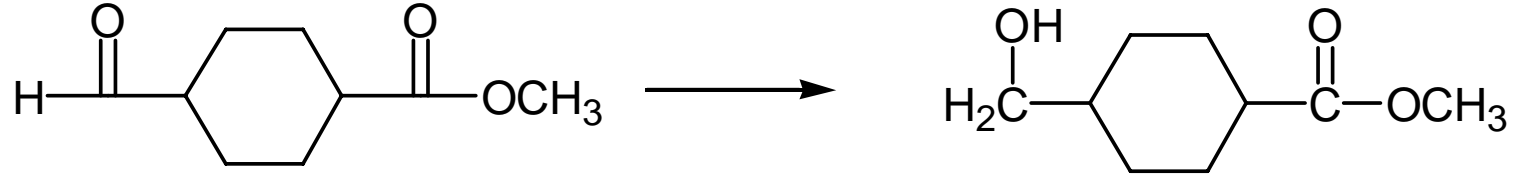
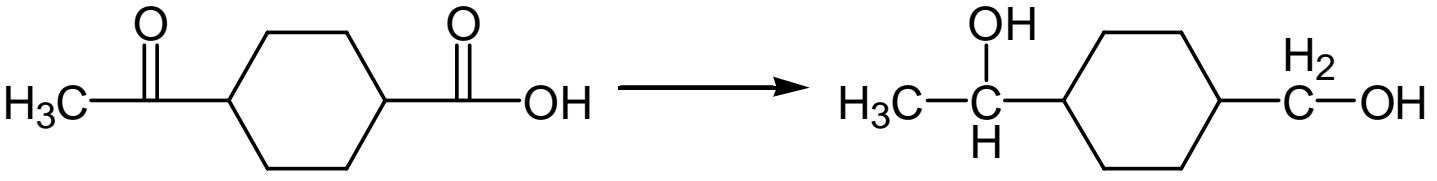
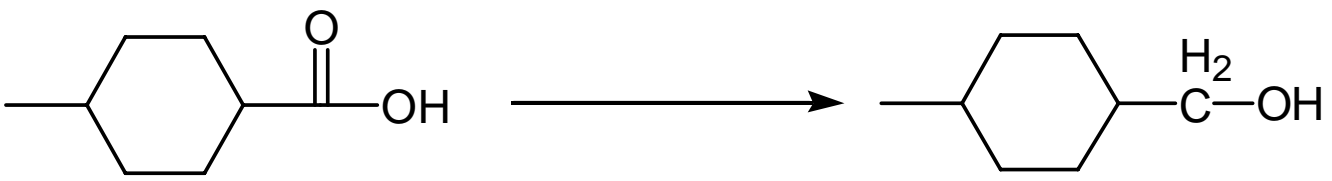




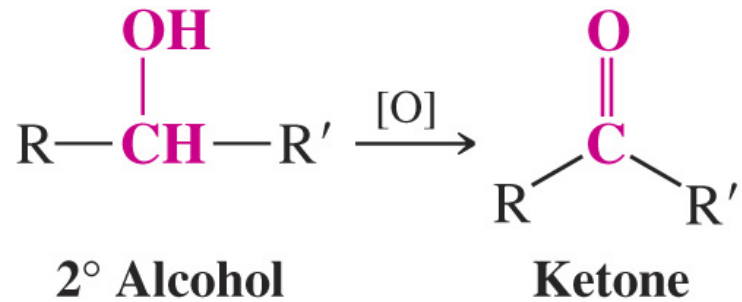
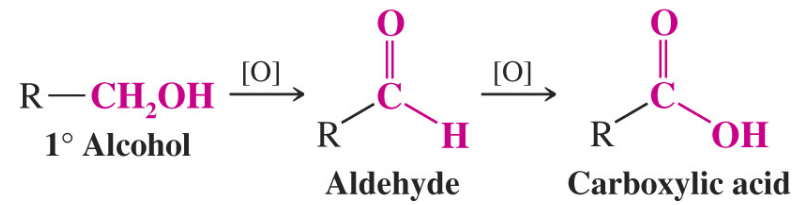
解釋反應機制：

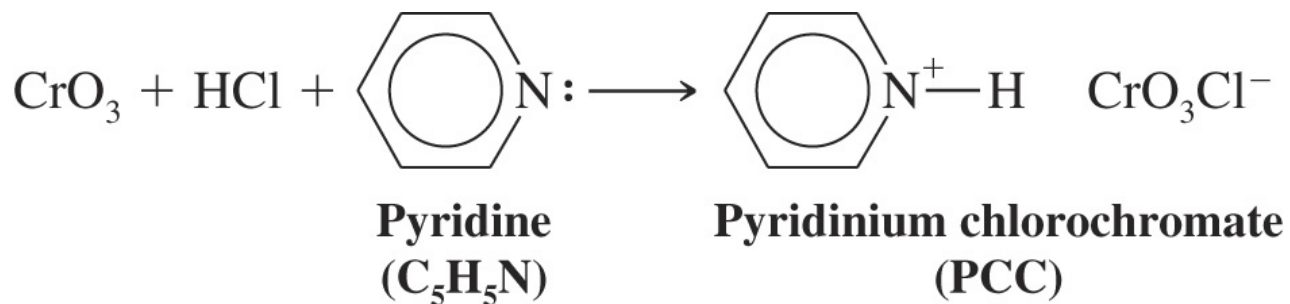
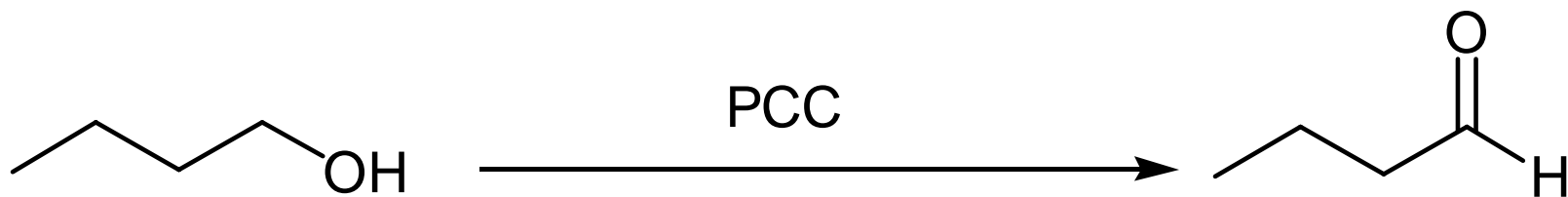
NaBH<sub>4</sub>只可還原酮，醛；而一般不與酸，脂發生作用；LiAlH<sub>4</sub>可將酮，醛，酸，脂都還原為醇。

習題:

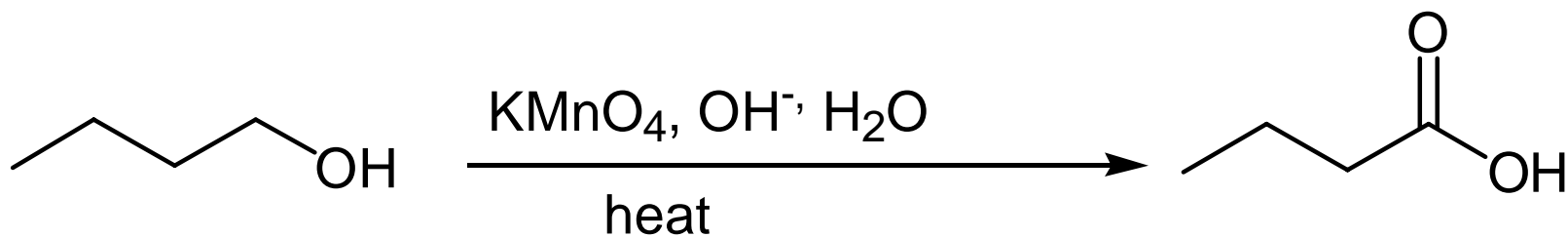


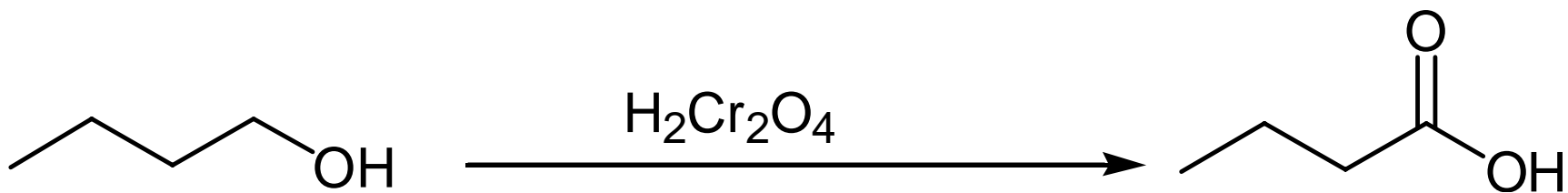
b) 醇經過氧化轉化成酮，醛，酸



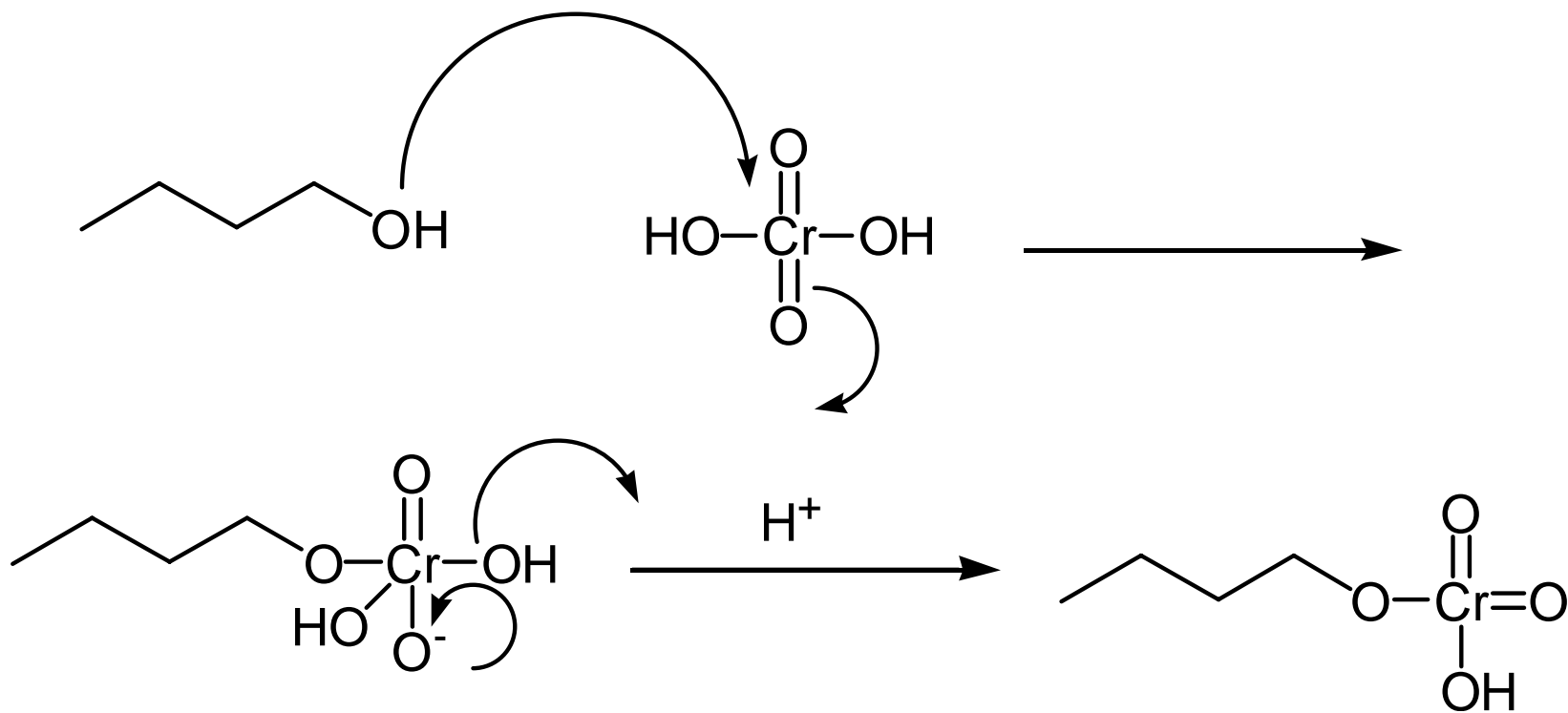


解釋反應機制：

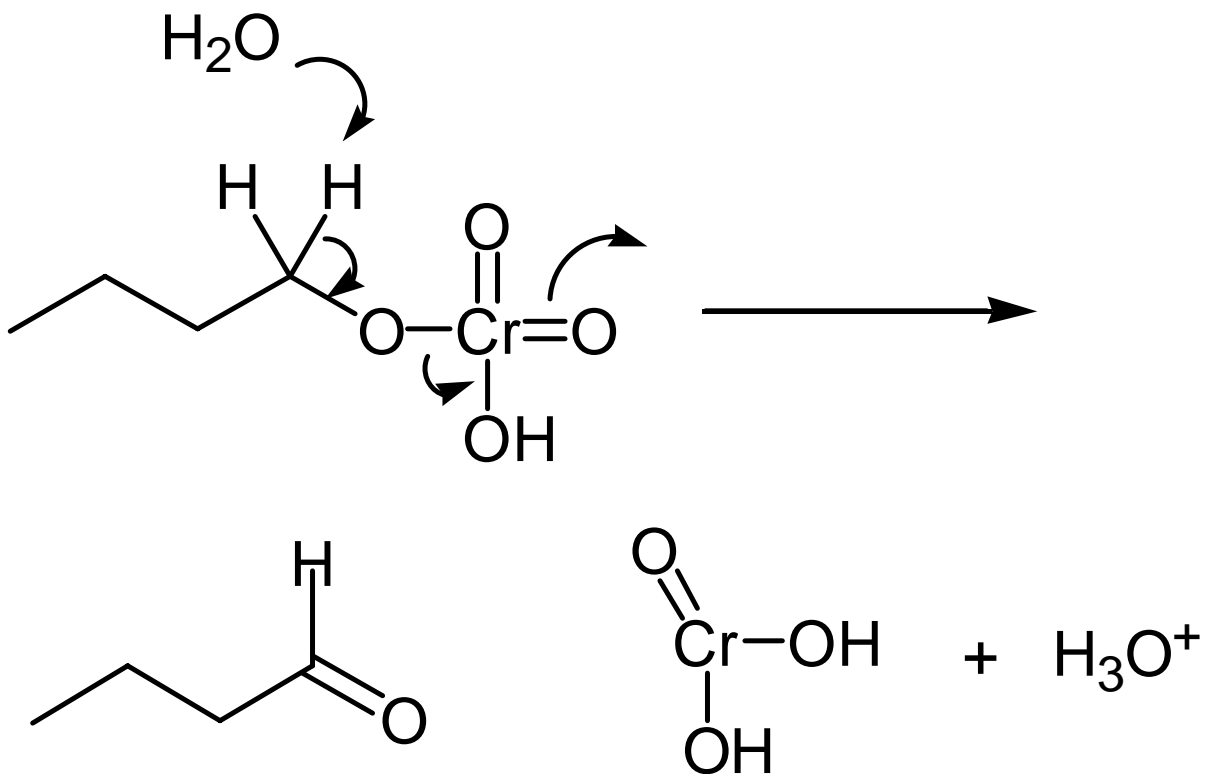


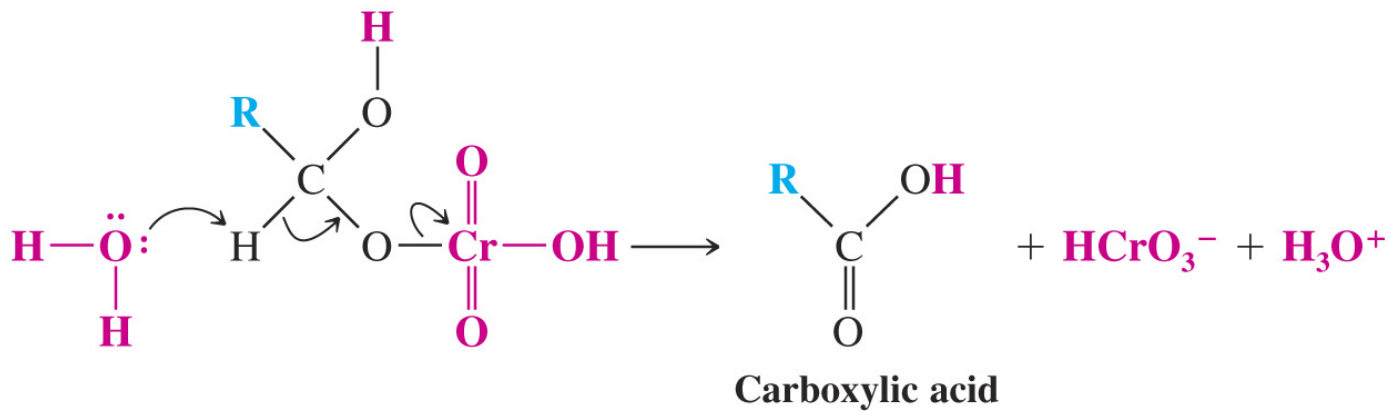
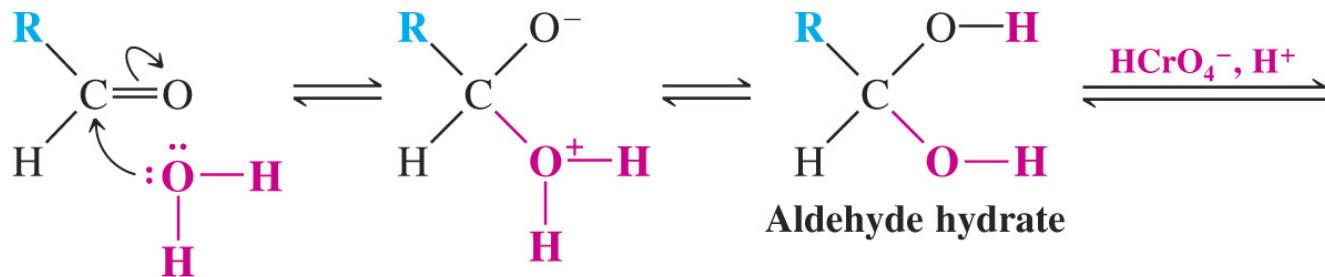


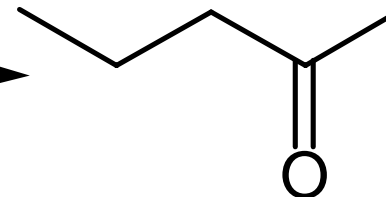
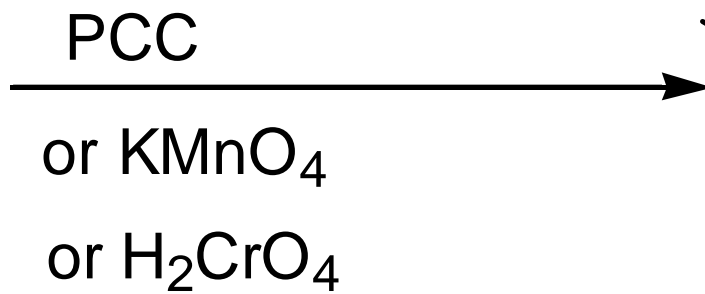
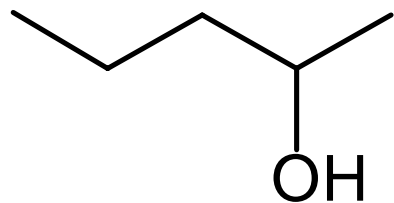
解釋反應機制：



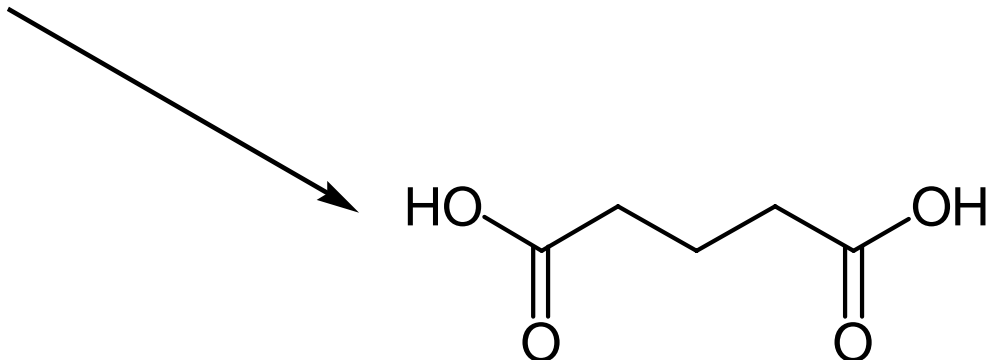
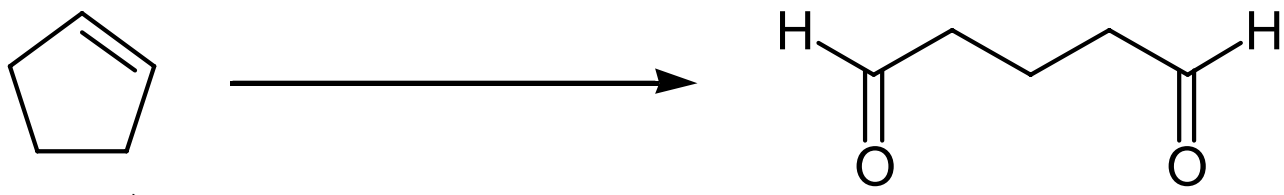
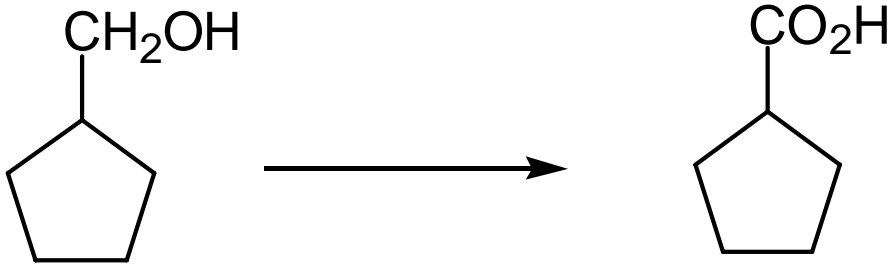
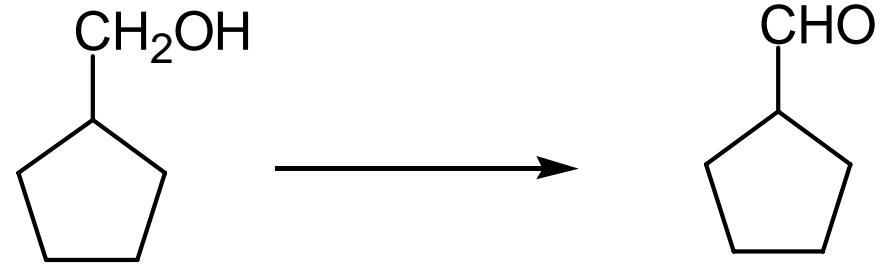






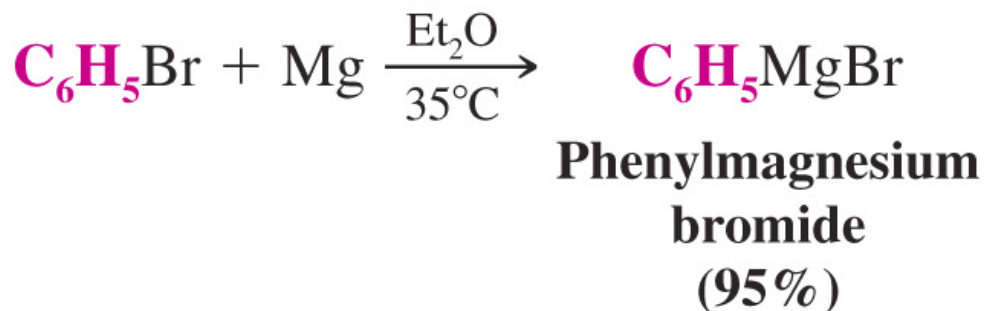
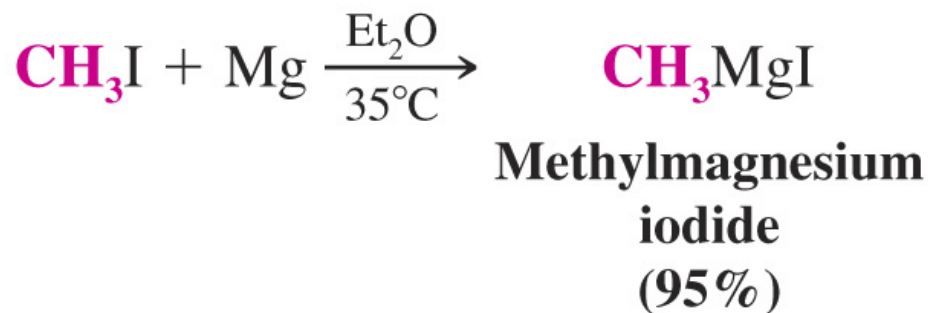
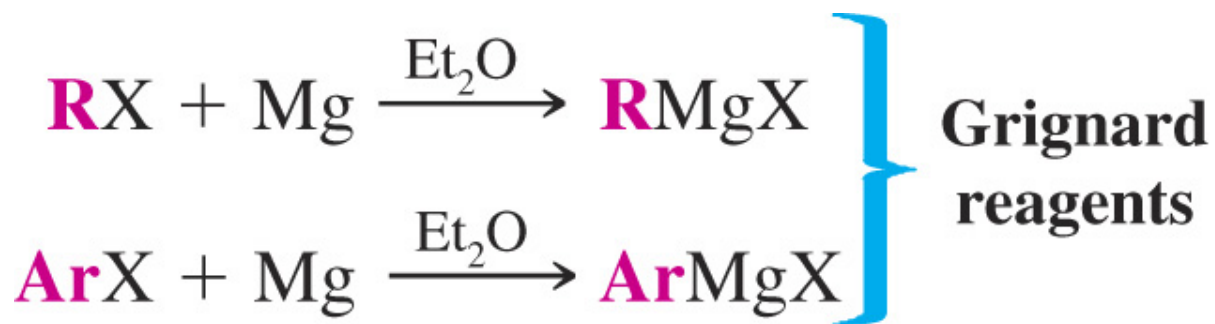


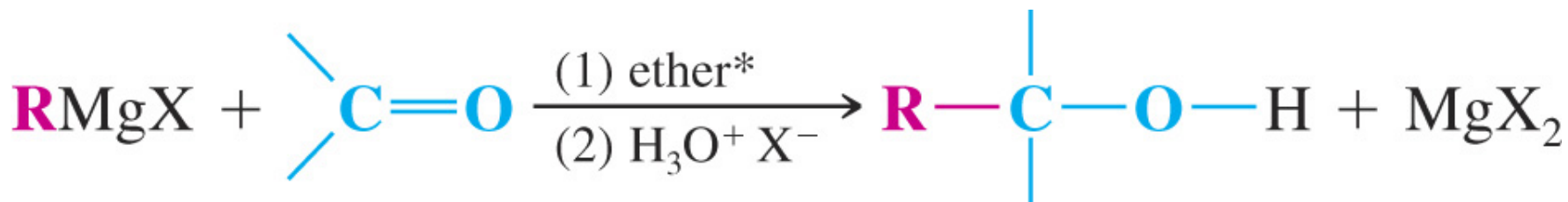
習題:



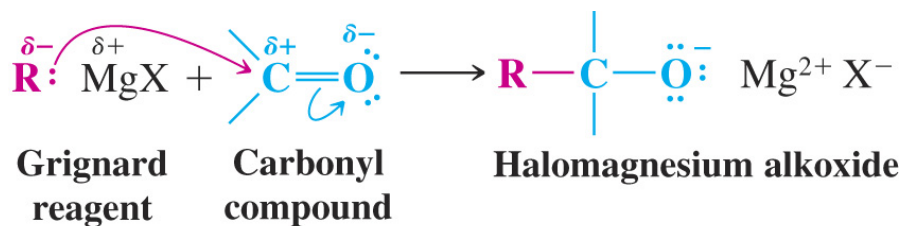
#### 四) 醛, 酮, 酸, 脂與金屬試劑的加成反應

Grignard reaction:

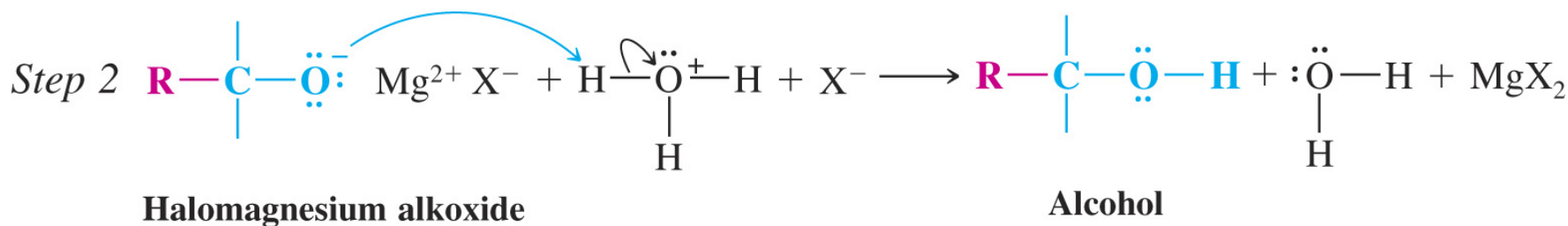




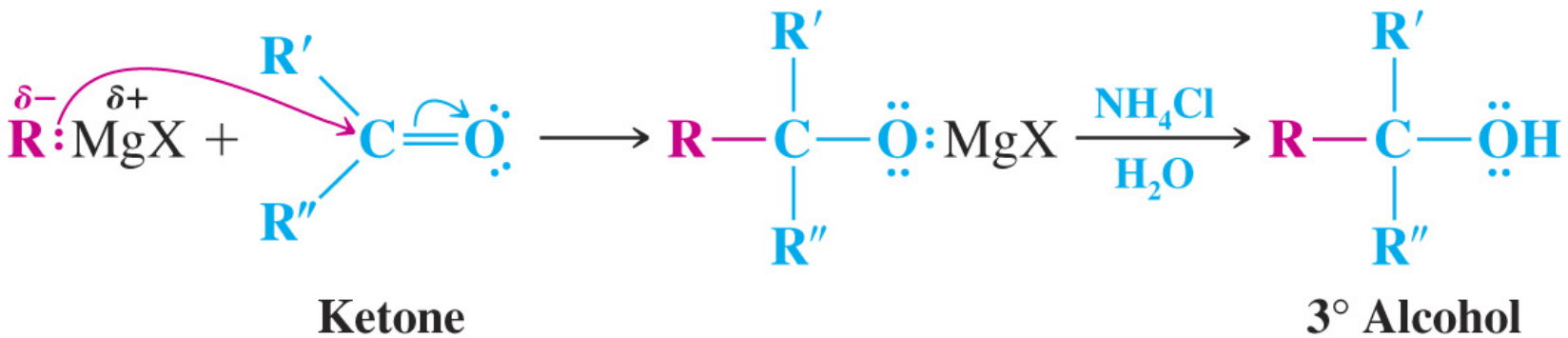
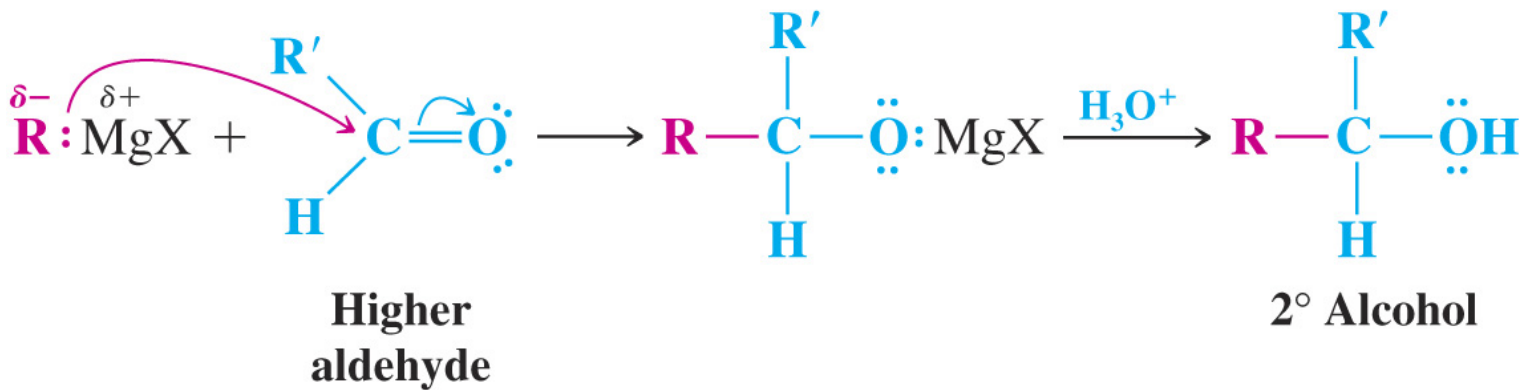
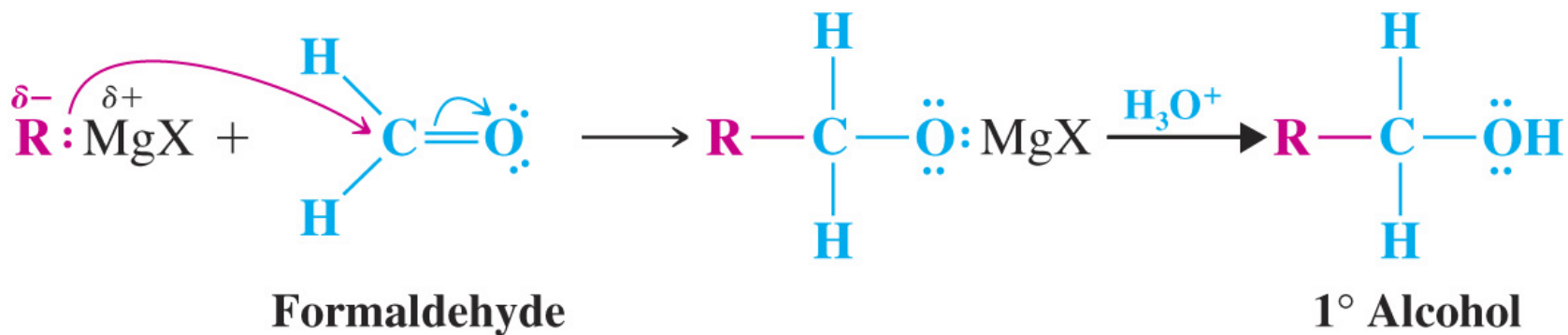
Step 1

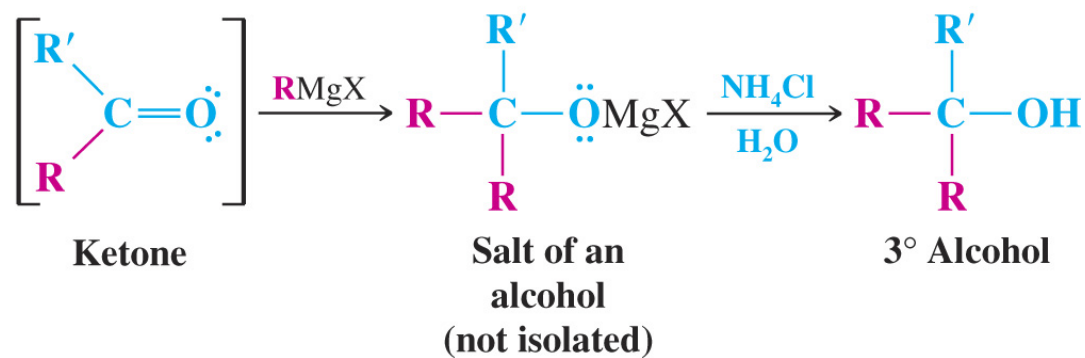
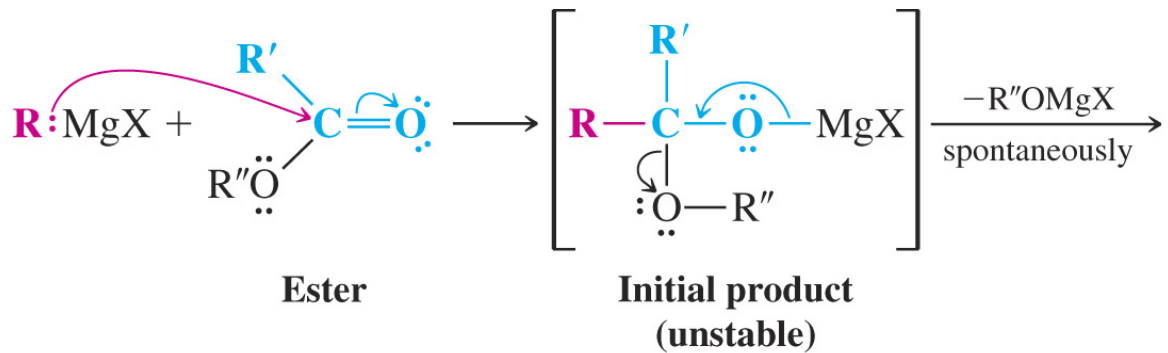


The strongly nucleophilic Grignard reagent uses its electron pair to form a bond to the carbon atom. One electron pair of the carbonyl group shifts out to the oxygen. This reaction is a nucleophilic addition to the carbonyl group, and it results in the formation of an alkoxide ion associated with  $\text{Mg}^{2+}$  and  $\text{X}^-$ .



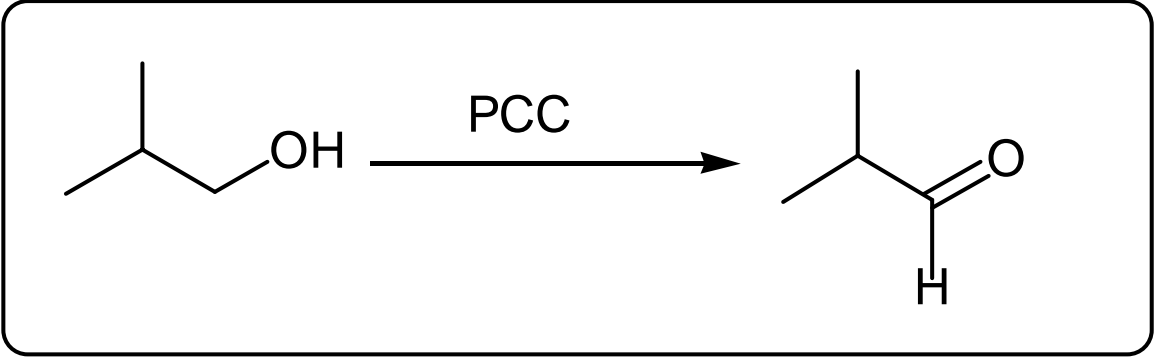
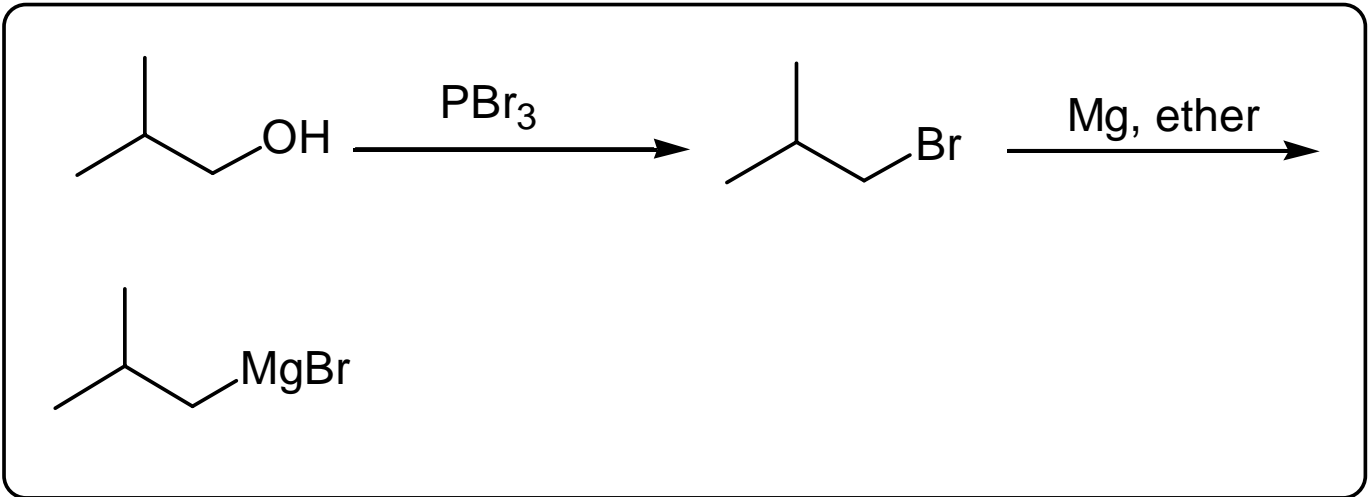
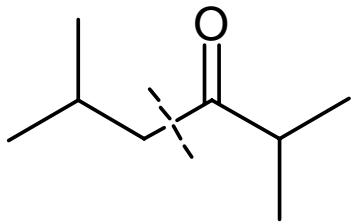
In the second step, the addition of aqueous  $\text{HX}$  causes protonation of the alkoxide ion; this leads to the formation of the alcohol and  $\text{MgX}_2$ .

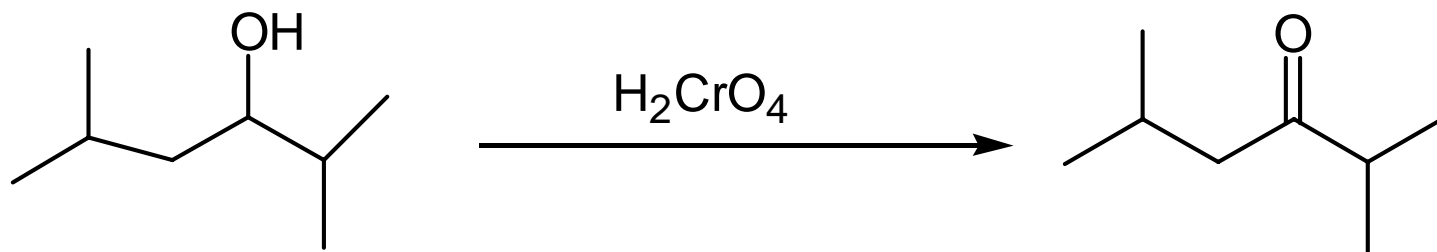
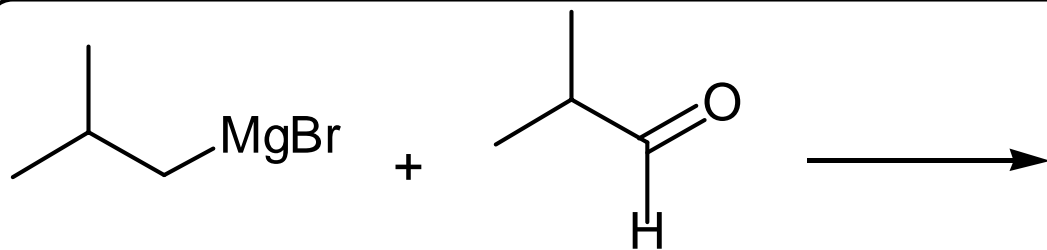


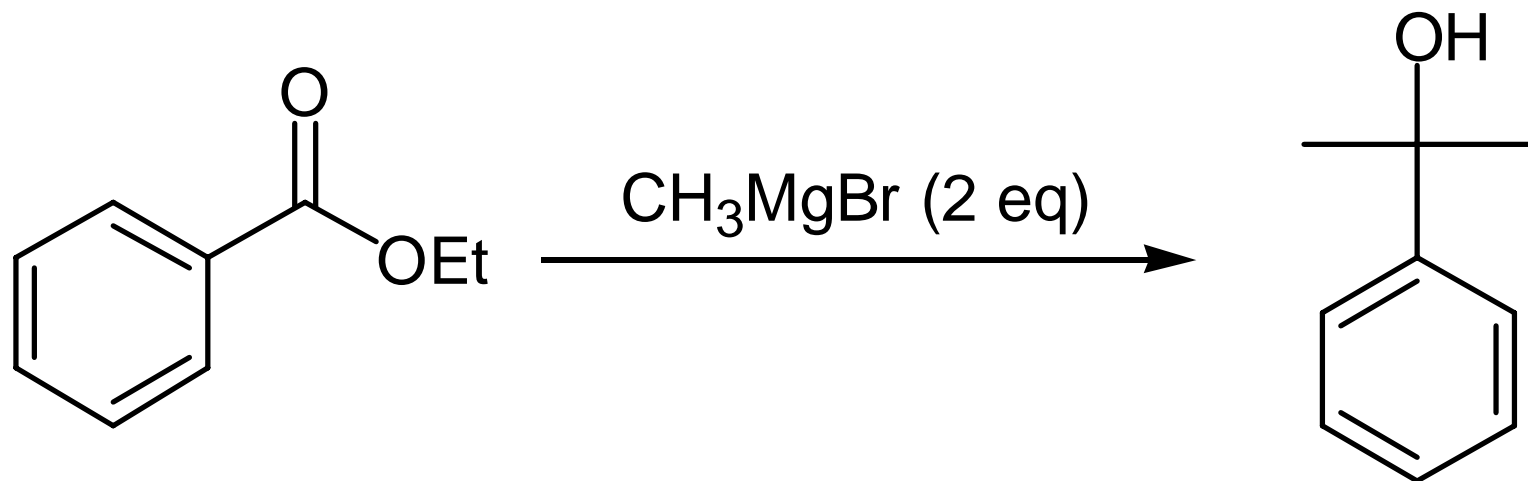




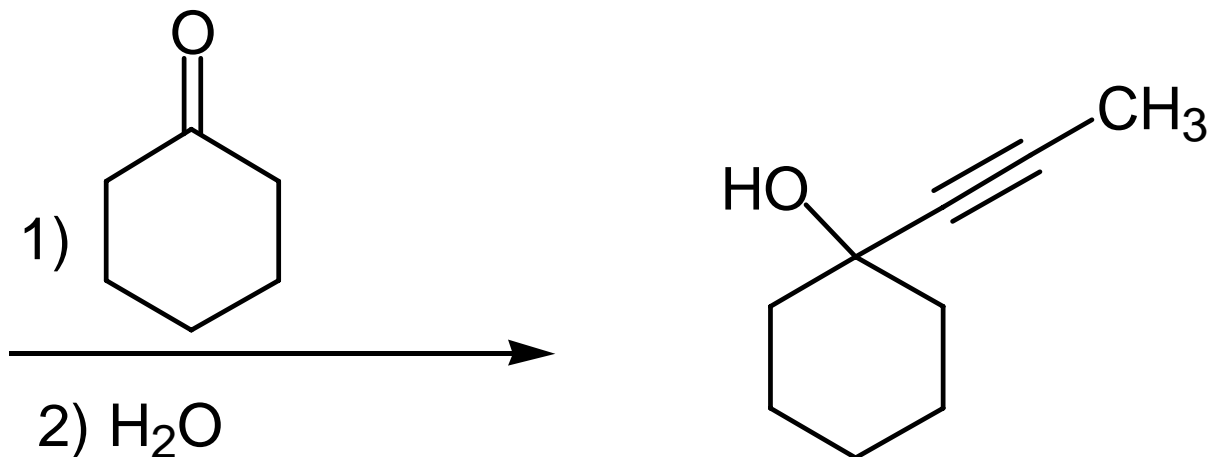
習題: 以不超過四個碳的醇為起始物合成:

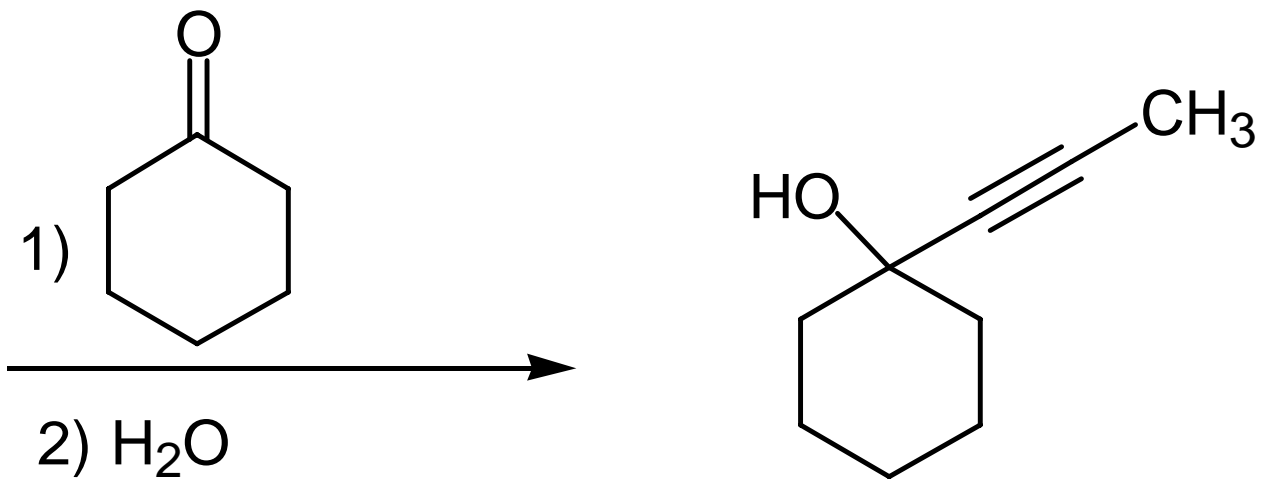
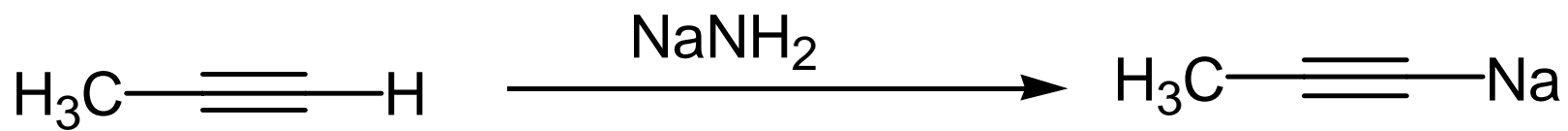






Lithium and sodium organo reagents:

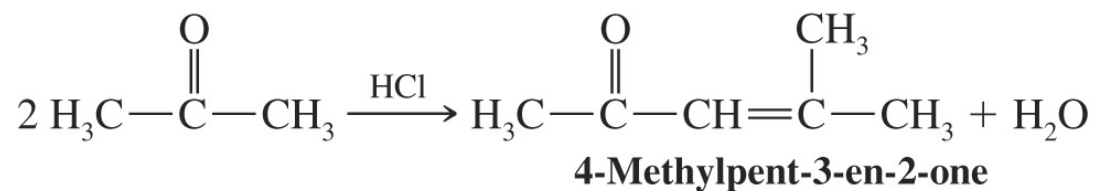




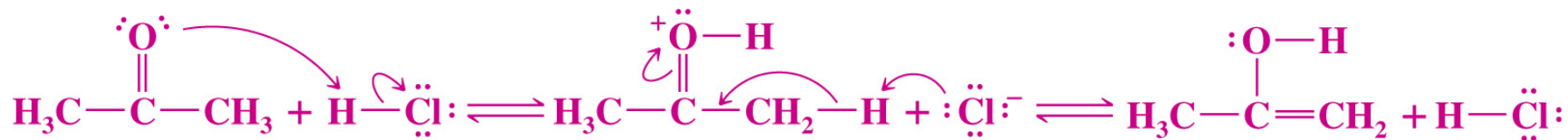
五)

a) 酸催化的Aldol反應:

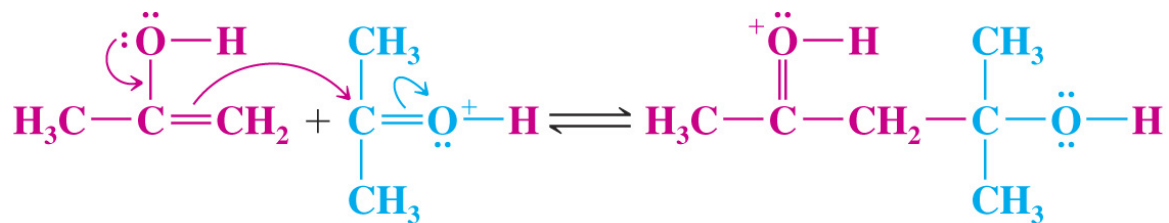
Reaction:



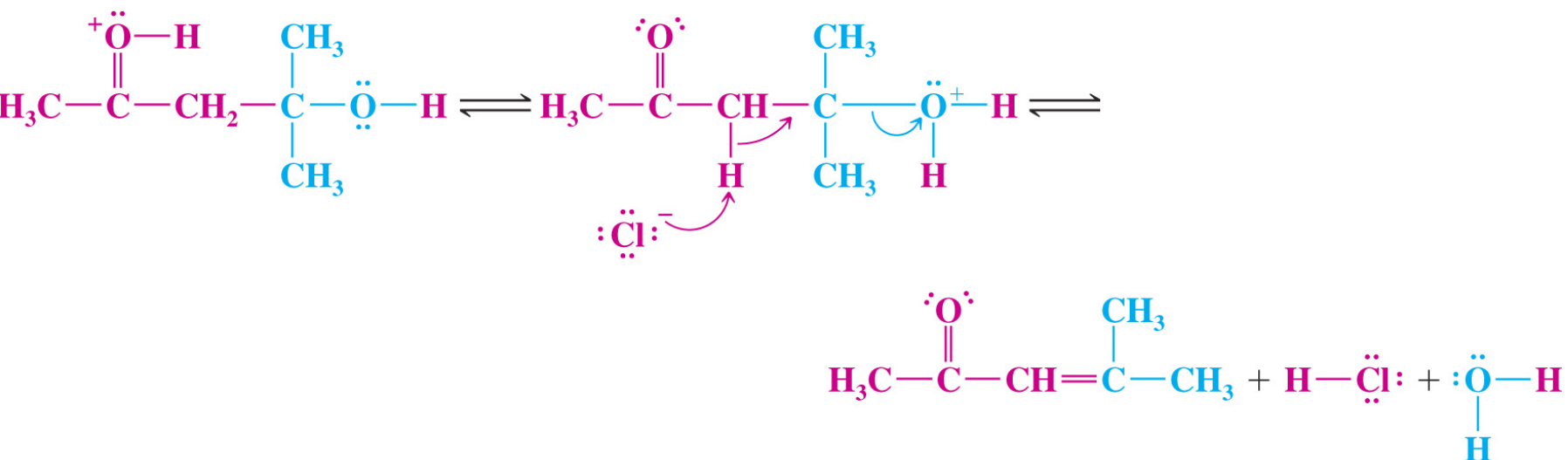
Mechanism:



The mechanism begins with the acid-catalyzed formation of the enol.

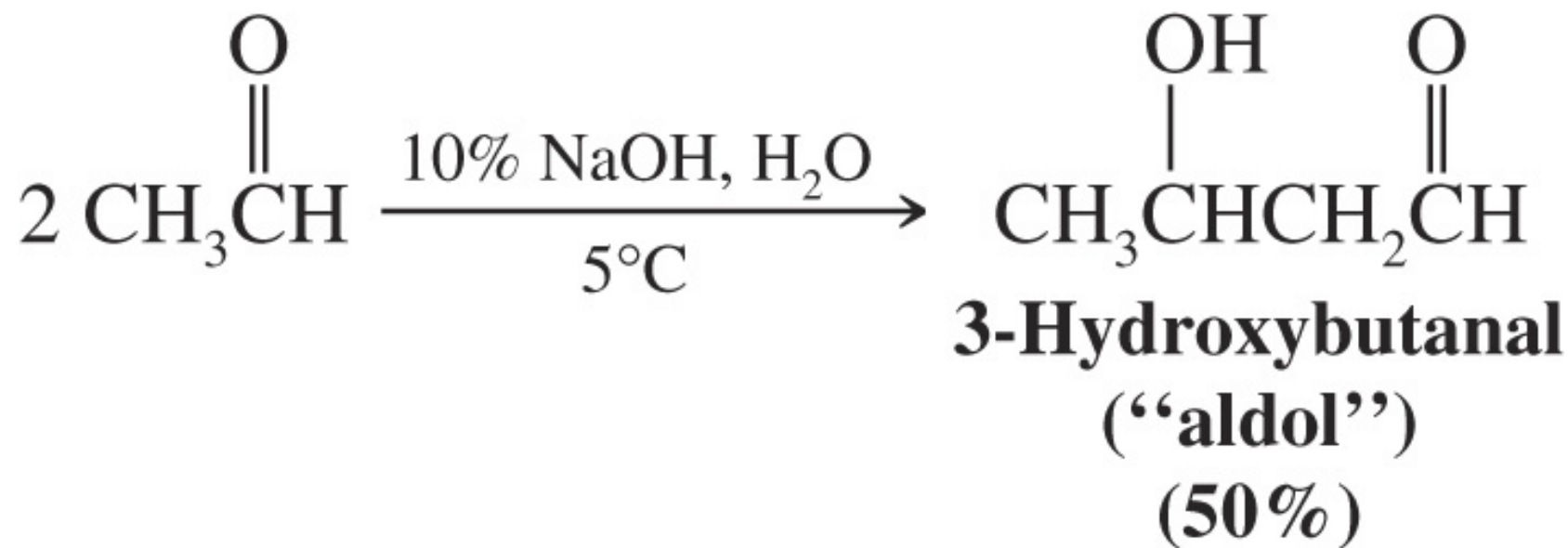


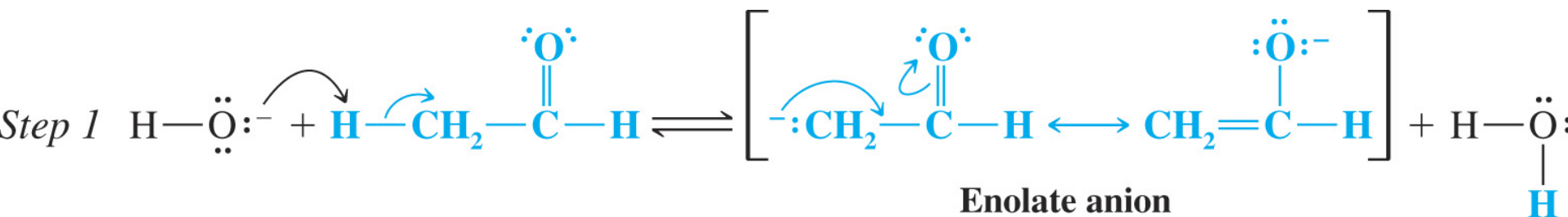
Then the enol adds to the protonated carbonyl group of another molecule of acetone.



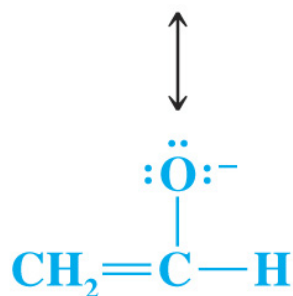
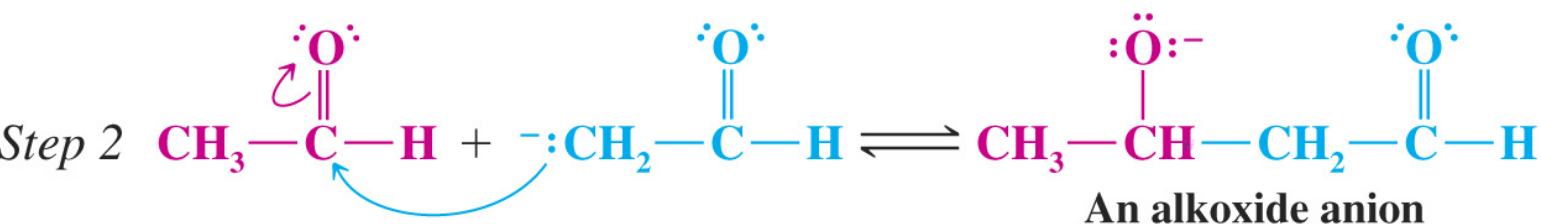
Finally, proton transfers and dehydration lead to the product.

b) 碱催化的Aldol反应:



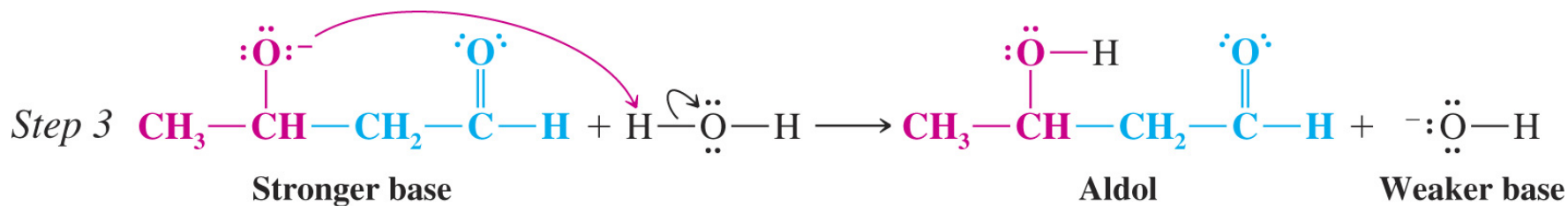


In this step the base (a hydroxide ion) removes a proton from the  $\alpha$  carbon of one molecule of acetaldehyde to give a resonance-stabilized enolate anion.



The enolate anion then acts as a nucleophile and attacks the carbonyl carbon of a second molecule of acetaldehyde, producing an alkoxide anion.





The alkoxide anion now removes a proton from a molecule of water to form the aldol.