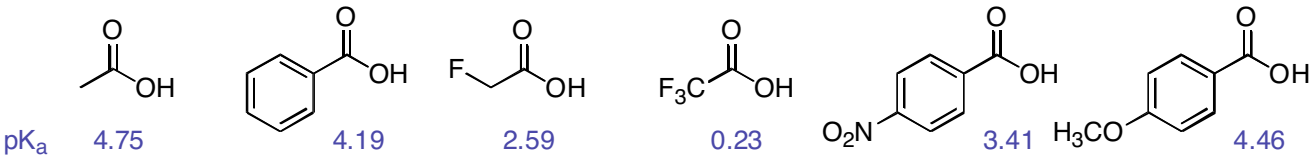
These notes can be obtained at: http://www.ndsu.nodak.edu/instruct/grcook/chem342/notes.shtml

Chapter 20: Carboxylic Acids

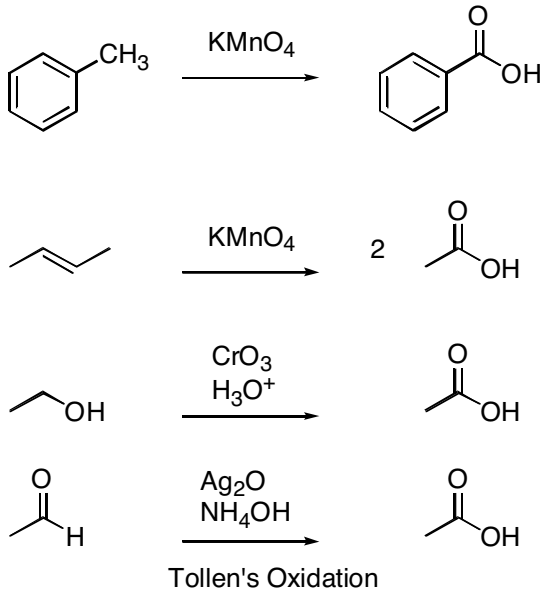
Carboxylic Acid Properties

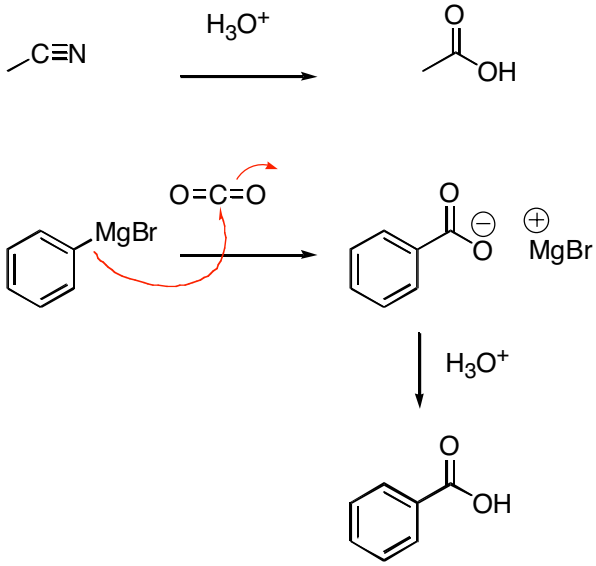
The pK_a of carboxylic acids can vary depending on the electronic nature of the substituents.



Preparation of Carboxylic Acids

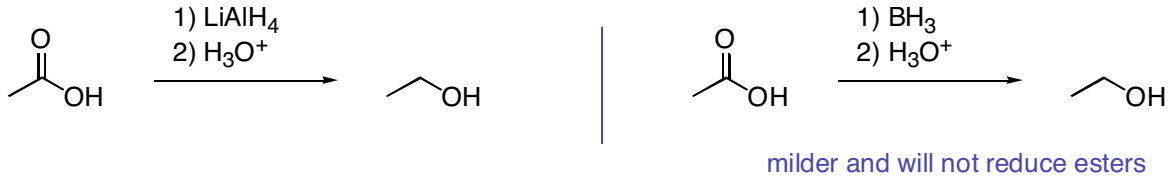
Acids can be made by several types of oxidation reactions, hydrolysis of nitriles, or by the addition of Grignard reagents to carbon dioxide.





Reactions of Carboxylic Acids

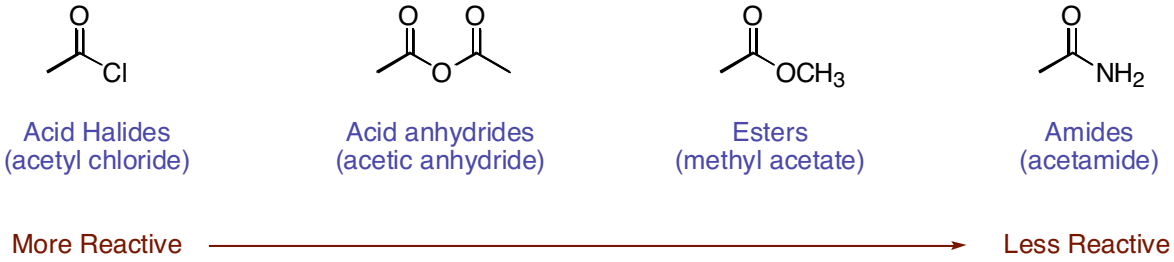
As we saw before, acids can be reduced with lithium aluminum hydride. Borane will also reduce acids under milder conditions. Note that borane will not reduce esters, so it is possible to reduce a carboxylic acid and leave an ester untouched. More reactions of acids in the next chapter.



Chapter 21: Carboxylic Acid Derivatives and Nucleophilic Acyl Subsitution Reactions

Carboxylic Derivatives

Much of the chemistry of carboxylic acids occur with and to form derivatives. From the most reactive to the least reactive, acid halides, anhydrides, esters, and amides represent the most common carboxylic acid derivatives.



Nucleophilic Acyl Substitution

Nearly all the chemistry of carboxylic acid derivatives involves the addition of a nucleophilic to the carbonyl carbon followed by loss of a leaving group to affect a nucleophilic substitution on the acyl carbon. This is a two step process. Often the leaving group is very electronegative and the nucleophile is weak (neutral). An example is the formation of an ester from an acid chloride. These reactions form HCl and a base is used to neutralize the acid by deprotonating the intermediate.