

Dr.D.K.Awasthi

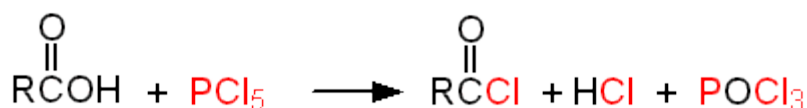
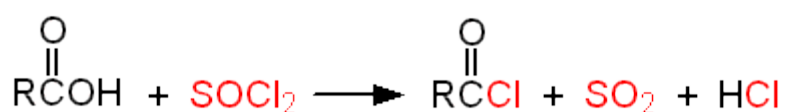
B.Sc.4th semester

Department of chemistry

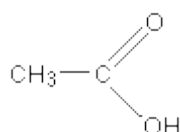
Sri J.N.M.P.G. College Lucknow

Acid Chloride

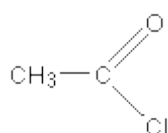
Preparation



Acyl chlorides (also known as acid chlorides) are one of a number of types of compounds known as "acid derivatives". This is ethanoic acid:



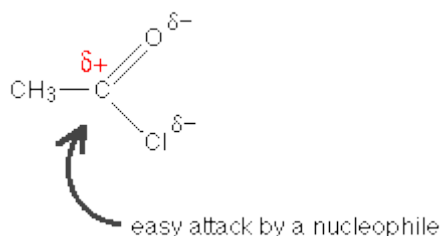
If you remove the -OH group and replace it by a -Cl, you have produced an acyl chloride.



This molecule is known as ethanoyl chloride .

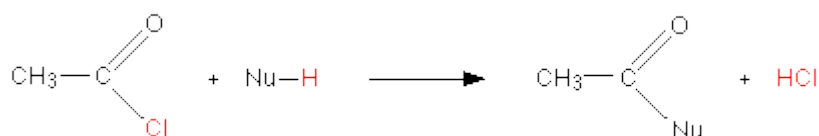
Why are acyl chlorides attacked by nucleophiles?

The carbon atom in the -COCl group has both an oxygen atom and a chlorine atom attached to it. Both of these are very electronegative. They both pull electrons towards themselves, leaving the carbon atom quite positively charged.



Reacting molecule as "Nu-H". Nu is the bit of the molecule which contains the nucleophilic oxygen or nitrogen

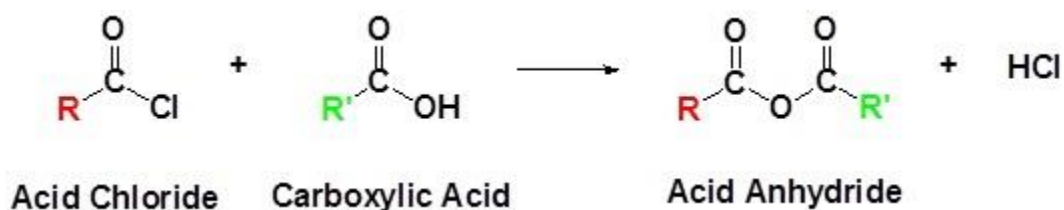
atom. The attached hydrogen turns out to be essential to the reaction. The general equation for the reaction is:

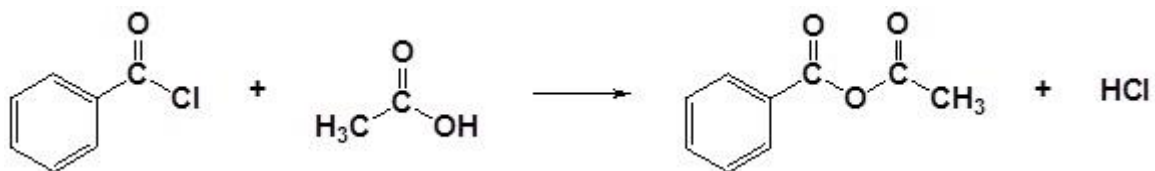


, the net effect is that you replace the -Cl by -Nu, and hydrogen chloride is formed

Since the initial attack is by a nucleophile, and the overall result is substitution, . The first involves an addition reaction, which is followed by an elimination reaction where HCl is produced. Hence the mechanism is also known as nucleophilic addition / elimination

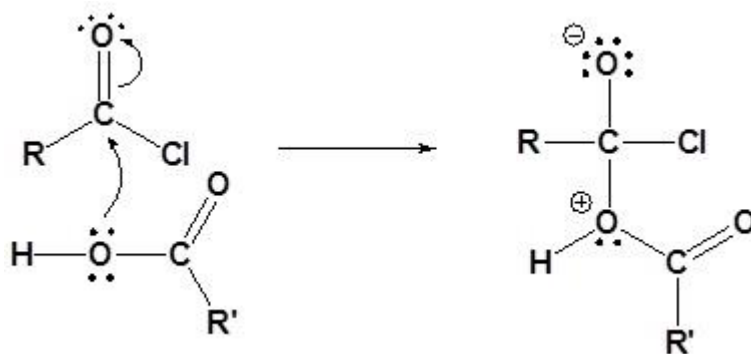
Acid chlorides react with carboxylic acids to form anhydrides.



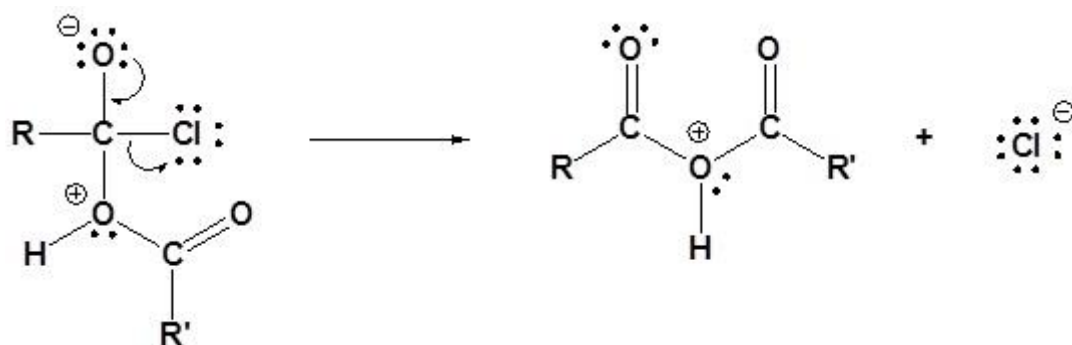


Mechanism

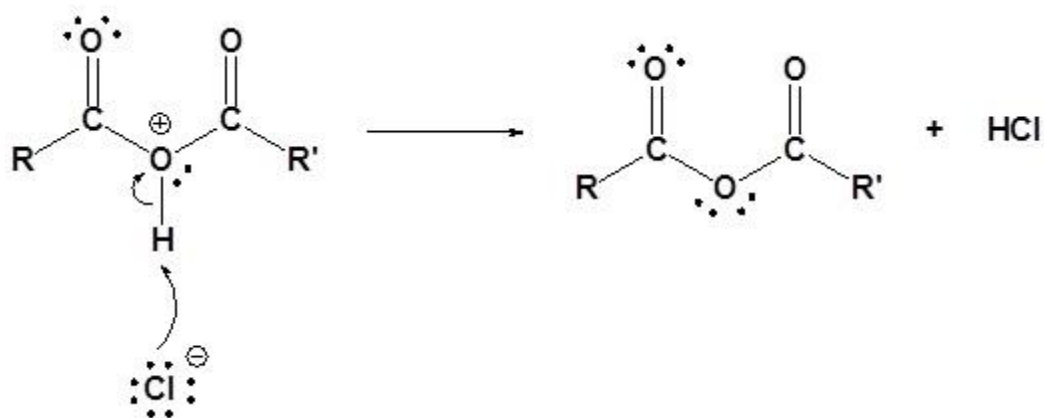
1) Nucleophilic attack by the alcohol



2) Leaving group is removed



3) Deprotonation



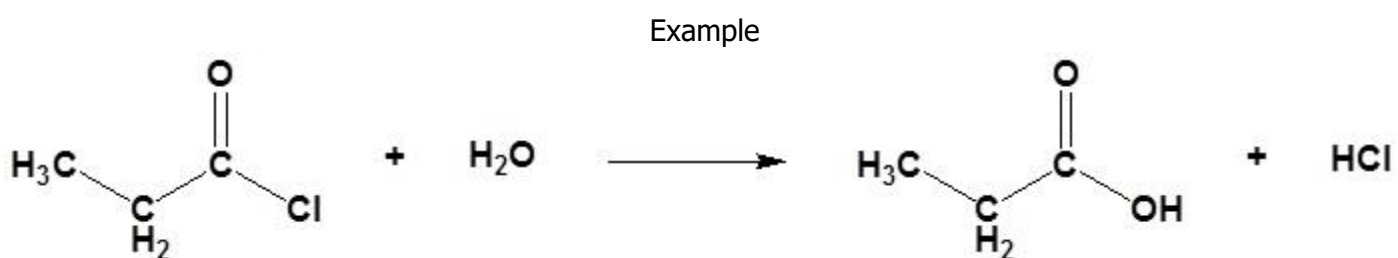
Acid chlorides react with water to form carboxylic acids.

General reaction



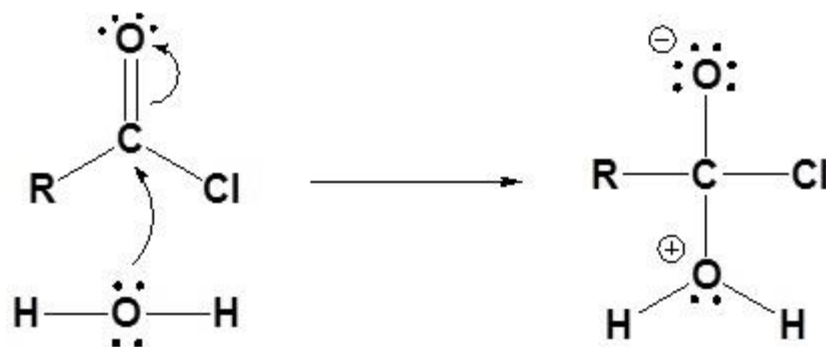
Acid Chloride

Carboxylic Acid

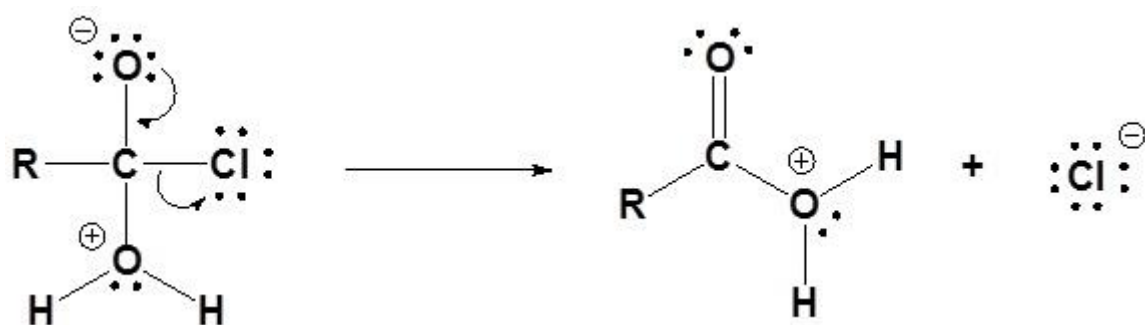


Mechanism

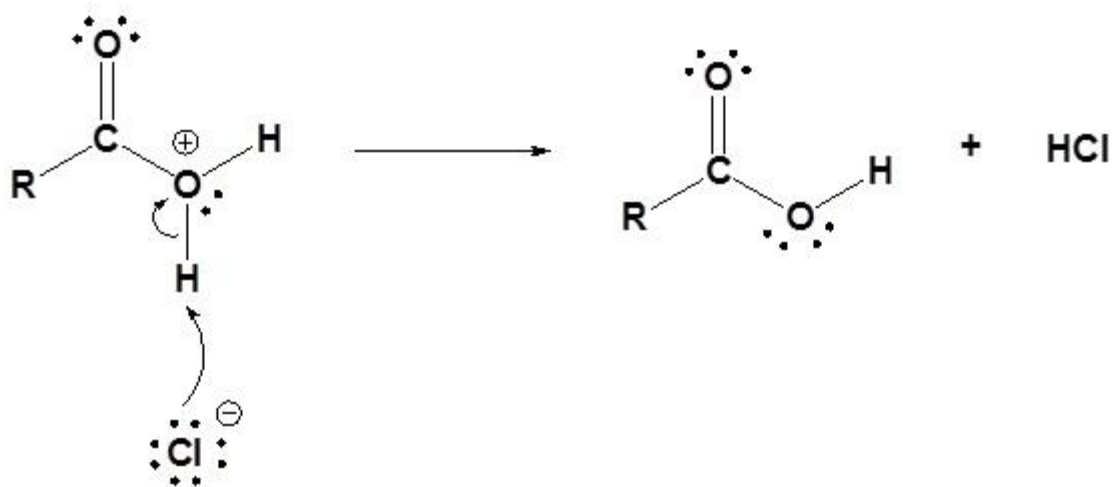
1) Nucleophilic attack by water



2) Leaving group is removed

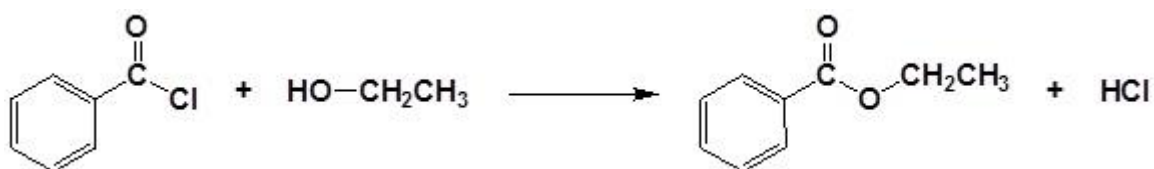
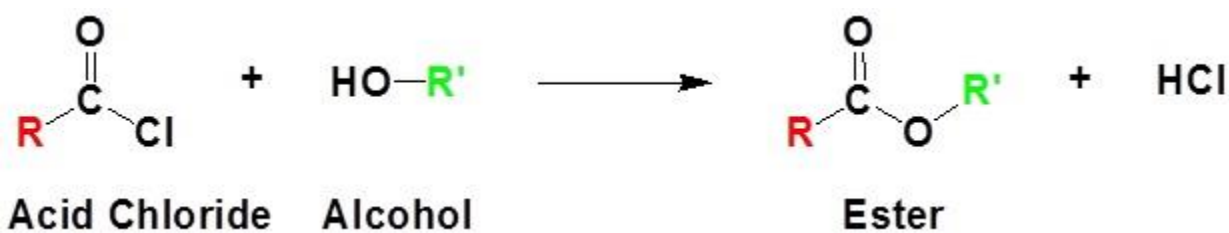


3) Deprotonation



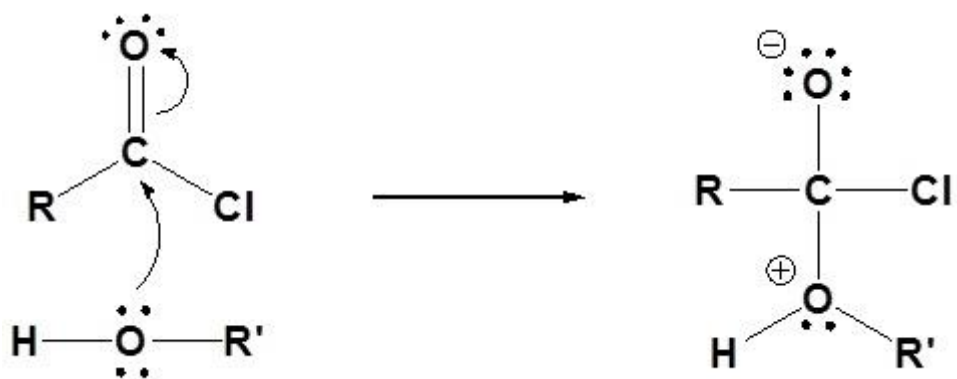
Acid chlorides react with alcohols to form esters

General Reaction

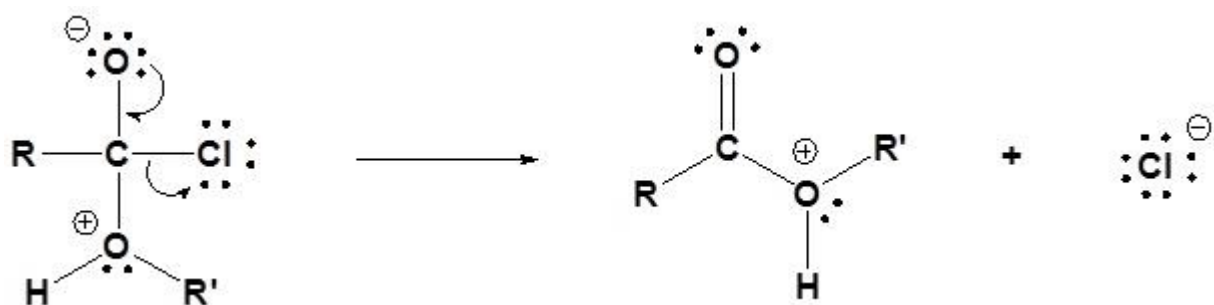


Mechanism

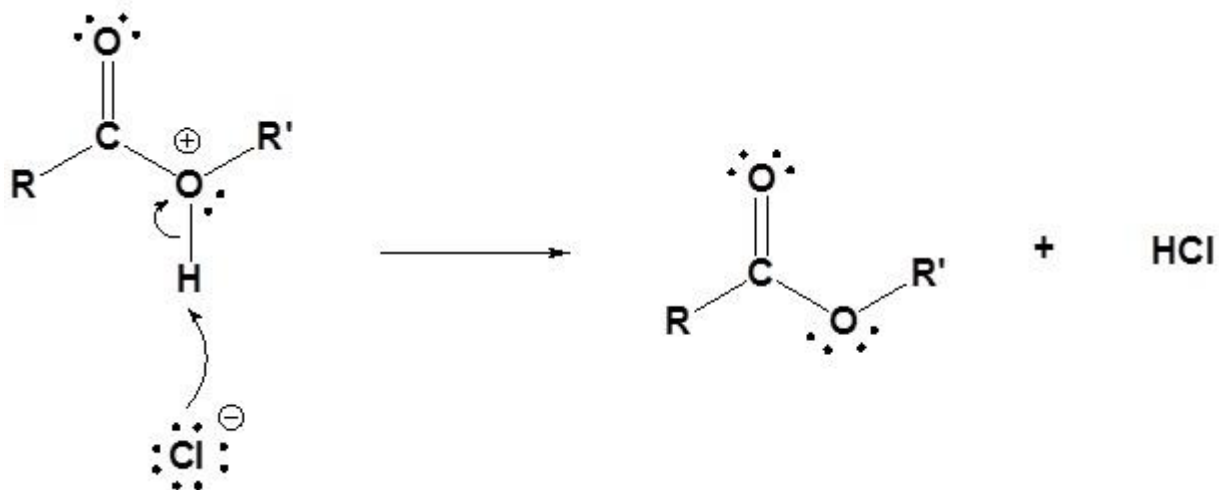
1) Nucleophilic attack by the alcohol



2) Leaving group is removed

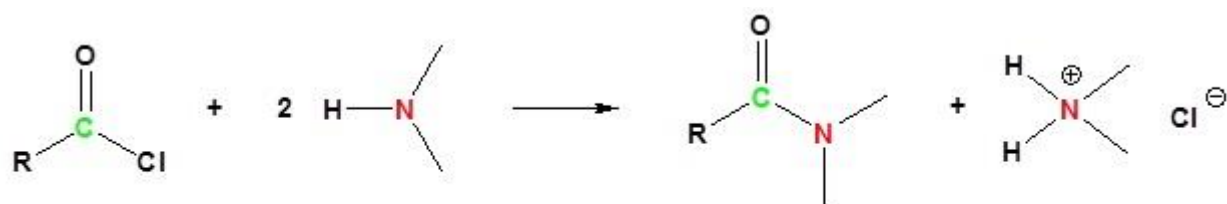


3) Deprotonation



Acid chlorides react with ammonia, 1° amines and 2° amines to form amides.

General Reaction



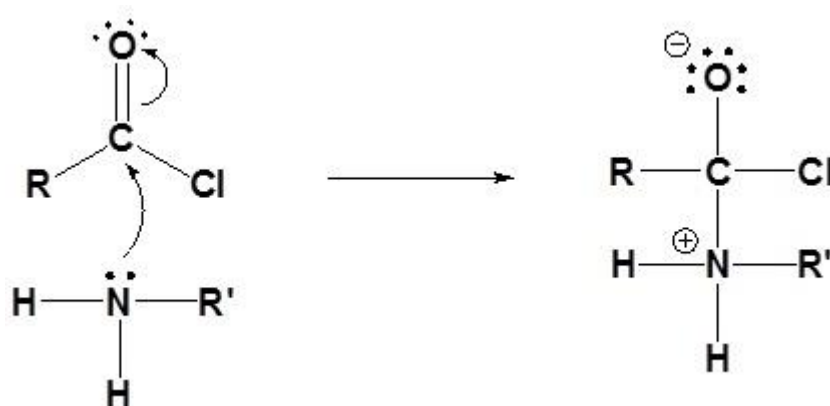
Acid Chloride

Amine

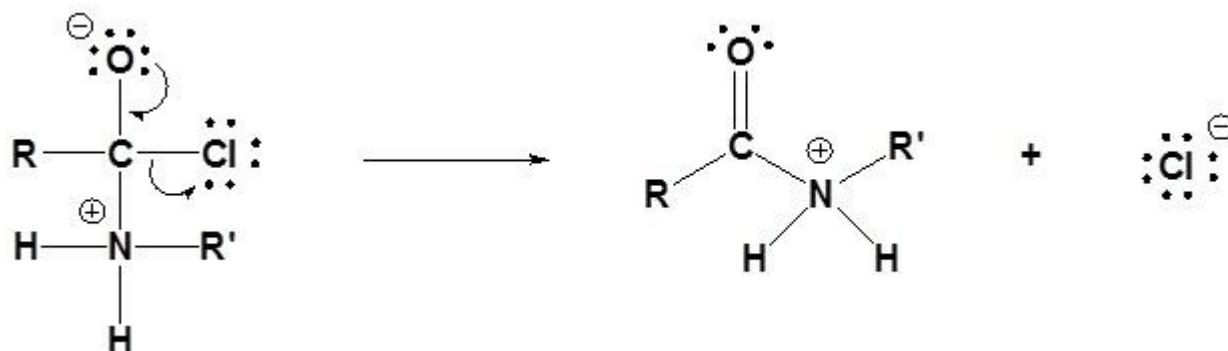
Amide

Mechanism

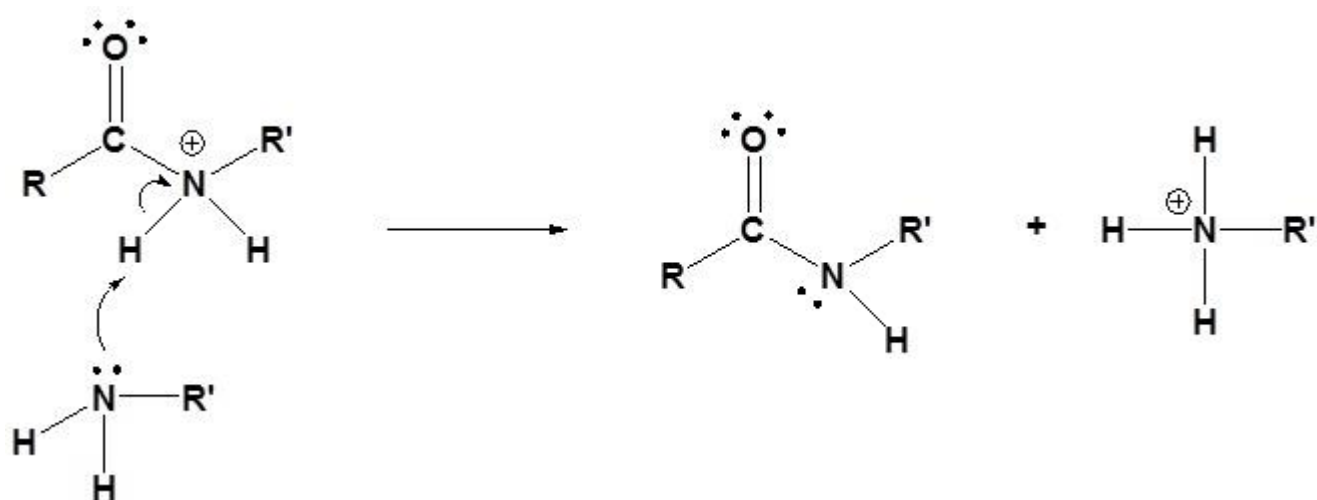
1) Nucleophilic attack by the amine



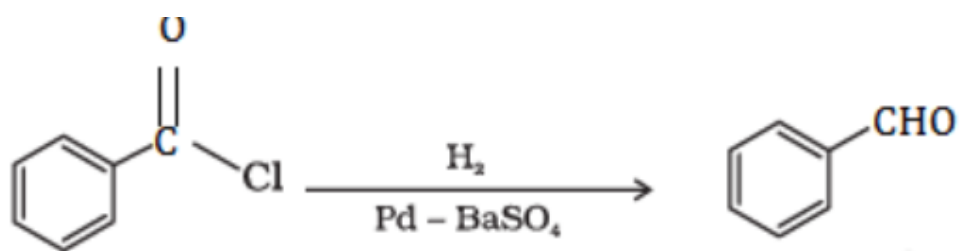
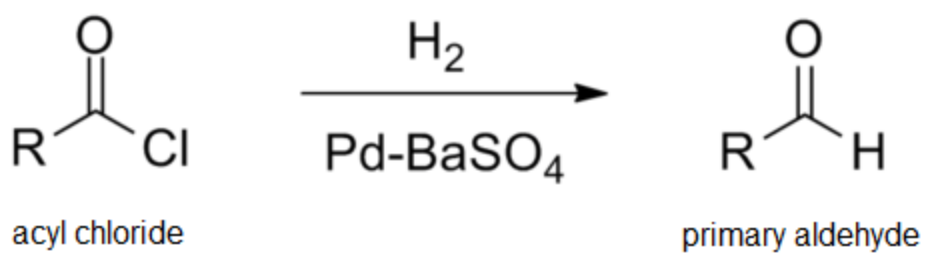
2) Leaving group is removed



3) Deprotonation



Rosenmund Reaction



Benzoyl chloride

Benzaldehyde

