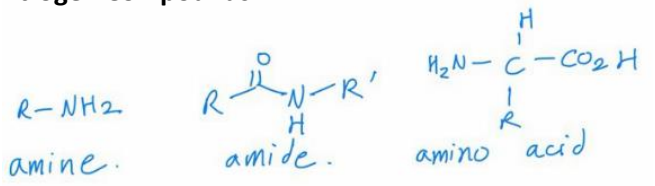
Nitrogen Compounds



Preparation of Amines

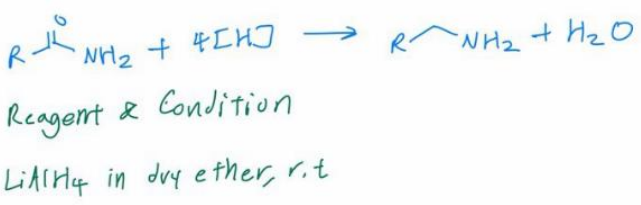
Nucleophilic Substitution of halogenoalkane -> amine

- Refer to Halogen Derivatives Masterclass

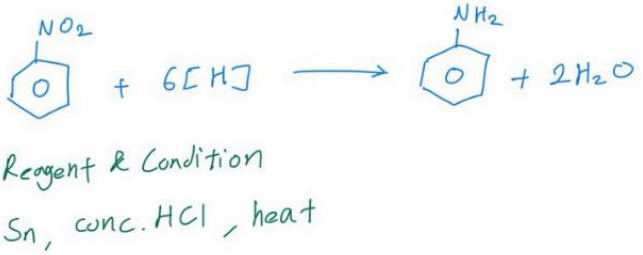
Reduction of -CN -> amines

- Refer to Halogen Derivatives Masterclass

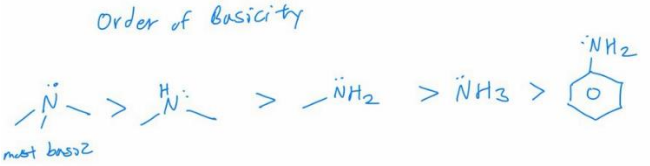
Reduction of Amides -> Amines



Reduction of Nitrobenzene -> Amine



Basicity of Amines



When the number of electron-donating alkyl groups bonded to N atom increases -> the electron density on N atom increases -> lone pair on N is more available for donation -> more basic

Phenylamine is the weakest base

- Lone pair on N delocalized into the benzene ring due to p-orbital of N atom having side-on overlap with pi electron cloud of benzene ring
    - Lone pair less available for donation

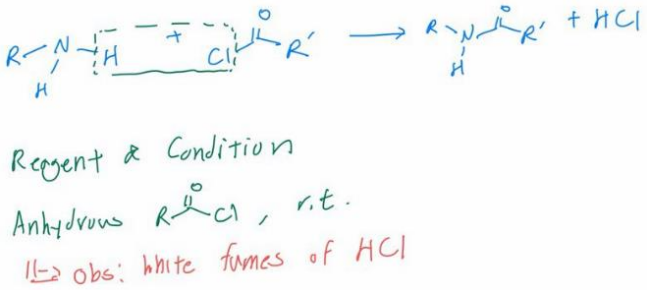
Note: Number/Proximity/Strength of Electron-donating or Electron-Withdrawing group affects the electron density of N atom and thus availability of lone pair of N atom for donation

Reaction of Amines

Nucleophilic Substitution with Halogenoalkane

- Refer to Halogen Derivatives Masterclass

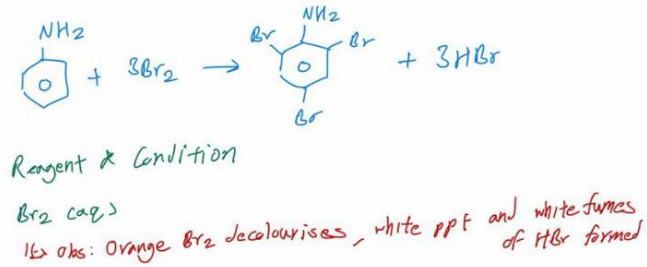
Nucleophilic Substitution with Acyl Chloride



Electrophilic Substitution of Phenylamine

-NH_2 has the same electron-donating properties as -OH to the benzene ring

- 2,4-directing



Lack of basicity in Amides

- Lone Pair on N delocalizes into the pi electron cloud of adjacent C=O bond
    - Lone pair not available for donation

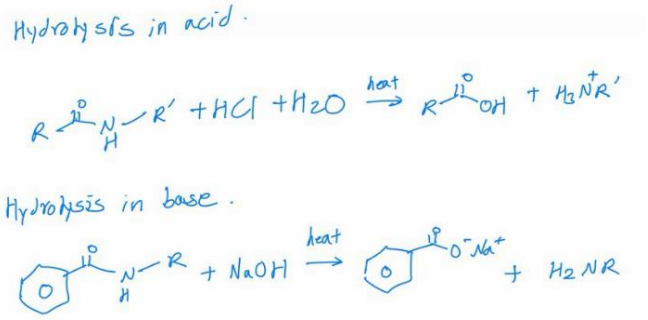
Preparation of Amides

Nucleophilic Substitution with Acyl Chloride

- Refer Earlier in Masterclass

Reaction of Amides

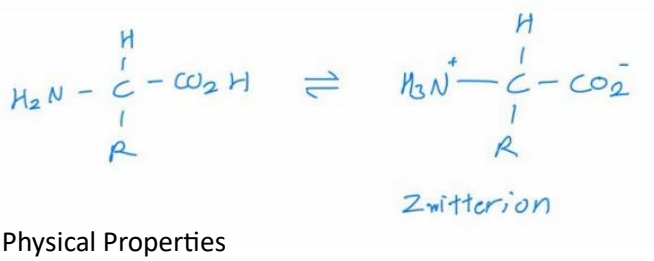
Hydrolysis



Reduction of Amide -> Amine

- Refer Earlier in Masterclass

Amino Acid and Zwitterion



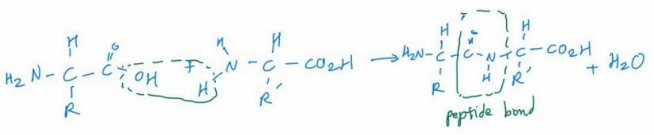
Physical Properties

- Amino Acids exist as crystalline solid with high melting points (above 200°C)
- Amino Acids are amphoteric in nature, can act as acid or base

Reaction of Amino Acids

- Has both acidic and basic properties

Formation of Peptide Bond btwn amino acids



Hydrolysis of Peptide Bond