

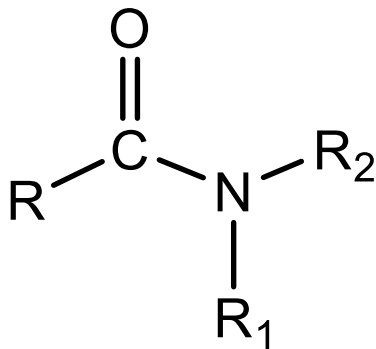


Tishk International University
Faculty of Pharmacy / 2nd Year
Practical Organic Chemistry II
Experiment 03

Preparation of ***Acetanilide***

An introduction to amides

Amides are derivatives of organic acid (Carboxylic acid) with the general formula (RCO-NR₂) in which a carbon atom is attached to oxygen in double bond and also attached to an amino group.

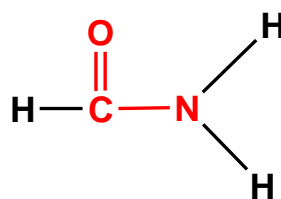
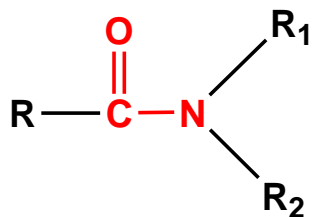


Classification of amides

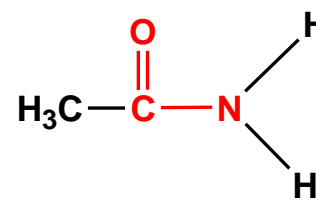
Amides are divided into three types, according to the substituents on nitrogen.

1- Primary amides:-

When R₁ and R₂ equal to hydrogen group.



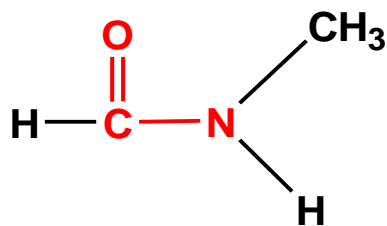
Formamide



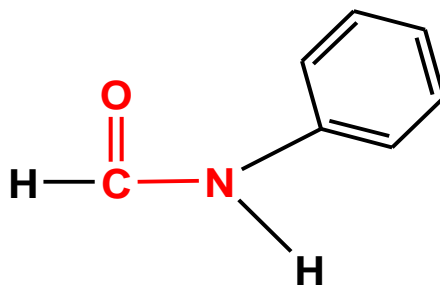
Acetamide

2- Secondary amides:-

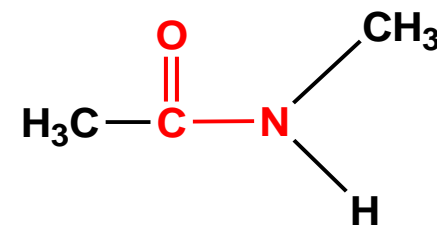
When R1 or R2 substituted by an alkyl or phenyl group.



N-Methyl-formamide



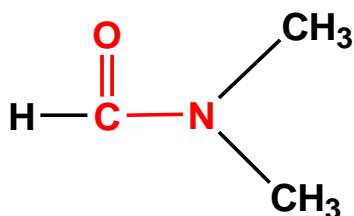
N-Phenyl-formamide



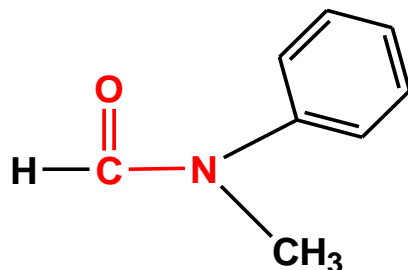
N-Methyl-acetamide

3- Tertiary amides:-

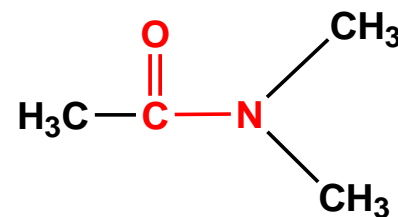
When both R1 and R2 substituted by an alkyl or phenyl group.



N,N-Dimethyl-formamide

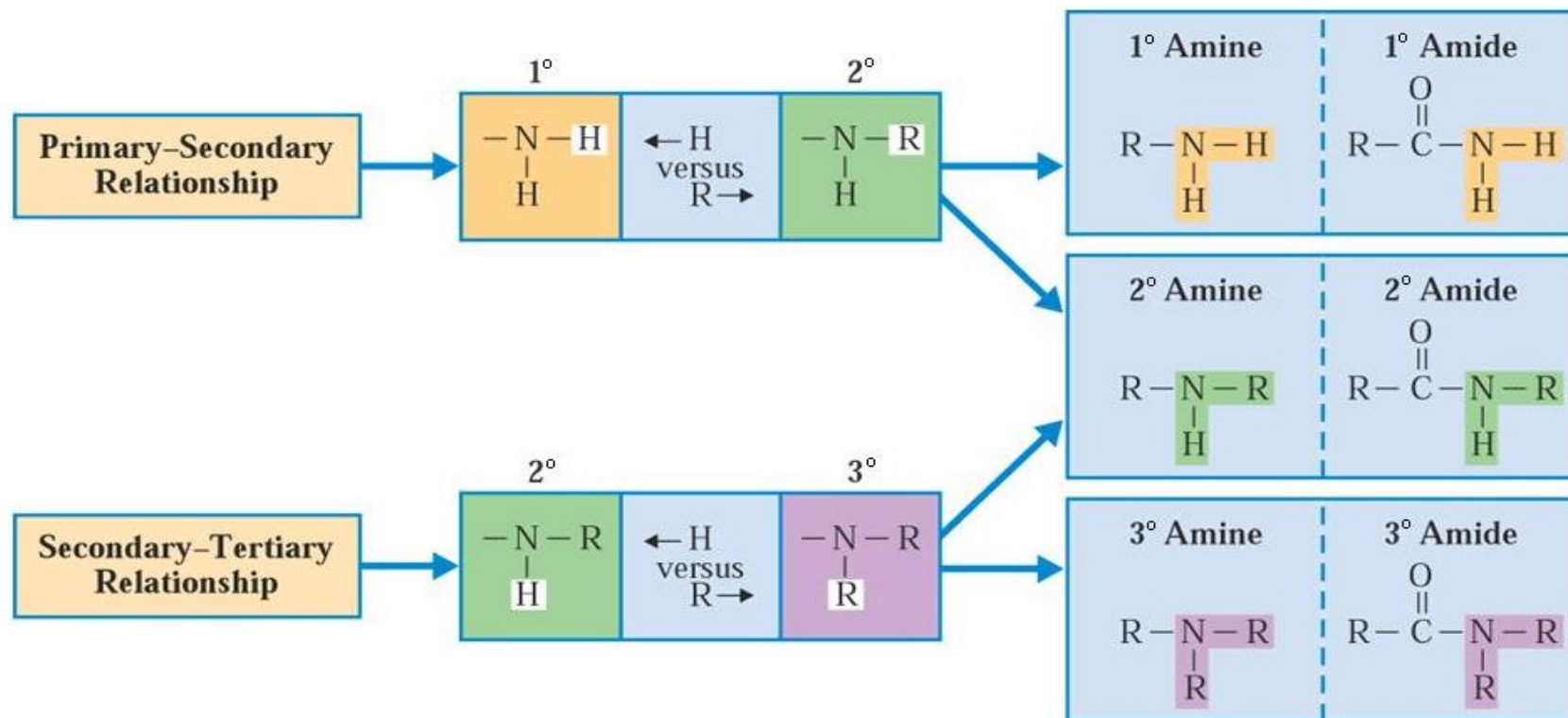


N-Methyl-*N*-phenyl-formamide



N,N-Dimethyl-acetamide

Experiment 03 Preparation of Acetanilide



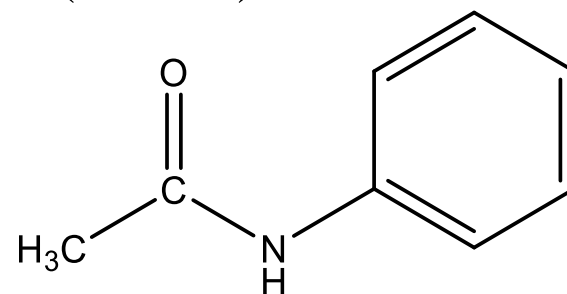
H.W ///: What is the main differences between amines and amides?

Acetanilide

Acetanilide is a solid organic compound, type secondary amide with white to grey color, an odorless.



- The molecular weight of acetanilide (135.17 g/mol)
- Molecular formula is (C₈H₉NO).
- Melting point (114.3 °C) and boiling point (304 °C).
- Density: 1.22 g/cm³
- IUPAC name: N-phenylethanamide



Acetanilide

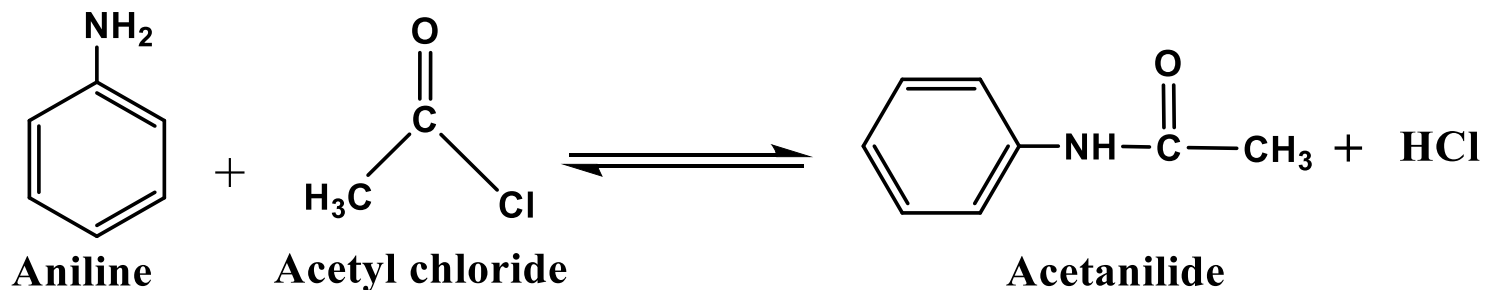
N-Phenyl-acetamide

Solubility of acetanilide

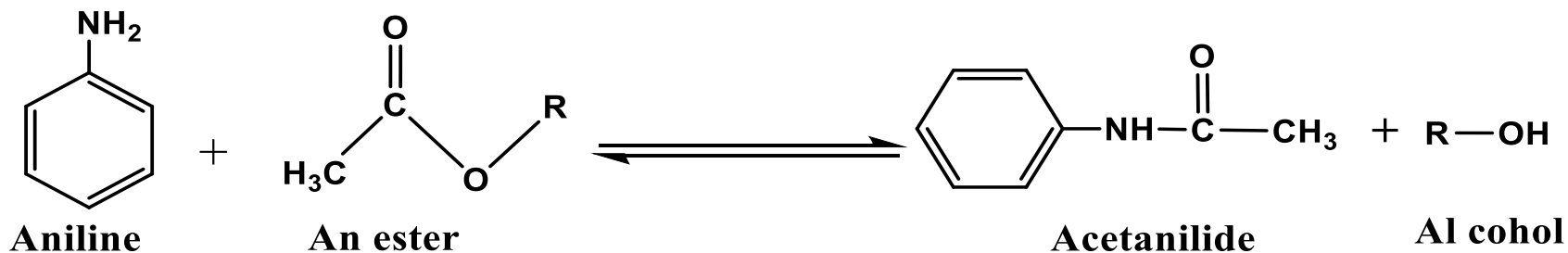
Acetanilide soluble in hot water ,alcohol (small alcohol) ethanol and methanol, ether, chloroform, acetone, glycerol, and benzene.

Preparation method

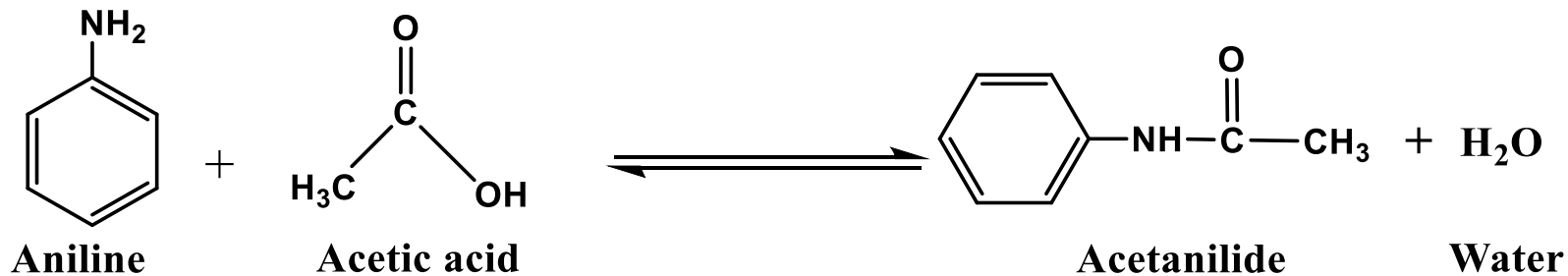
1- Reaction of aniline with acetyl chloride.



2- Reaction of aniline with an ester.



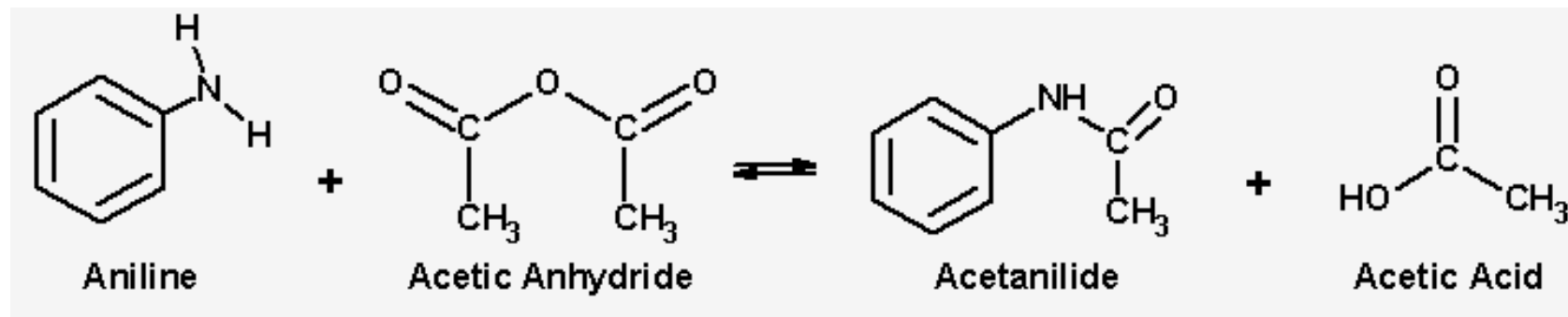
3- Reaction of aniline with acetic acid.



4- Reaction of aniline with acetic anhydride.

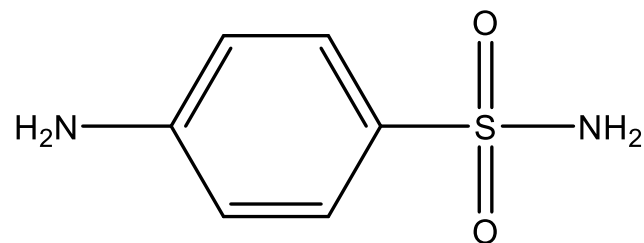
Today's Reaction

The Synthesis of Acetanilide, an Amide, through a Nucleophilic Acyl Substitution (addition / elimination) reaction between Aniline, an Amine, acting as the Nucleophile, and an Acyl group from Acetic Anhydride acting as the Electrophile.



Uses of acetanilide

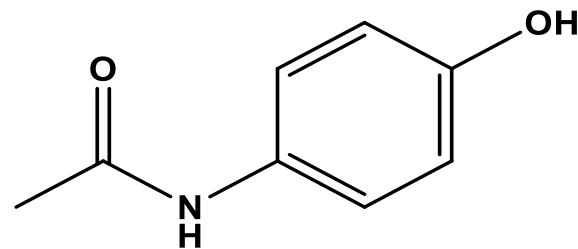
1- Chemically it used to prepare several substituted aromatic compounds, such as sulfanilamide



sulfanilamide

2- Industrially it used as a dye in dyeing process.

3-Pharmaceutically it used as intermediate to prepare several drugs such as acetaminophen



acetaminophen

Procedure

- 1- In a conical flask containing (60ml) of distilled water add (2ml) of concentrated hydrochloric acid (HCl).
- 2- Add (3ml) of aniline to the solution with shaking.
- 3- Add (3ml) of acetic anhydride to the solution in a small portion, using a burette for such addition. then boil the solution to about (5min).
- 4- Add (10ml) of (10%) sodium bicarbonate to the hot solution.
- 5- Cool the solution at room temperature, then in an ice bath.
- 6- Separate the produced precipitate from the solution by filtration process.
- 7- Dry, weight out then calculate percentage yield of the prepared acetanilide.
- 8- *All the addition should be stepwise inside the hood.*