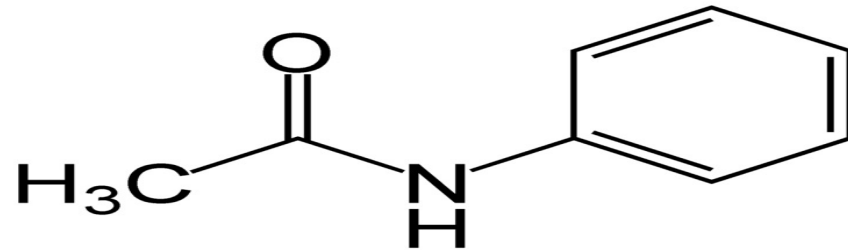# Synthesis of Acetanilide

Prepared by:

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Introduction:

- Acetanilide is an aniline derivatives that was found to have both analgesic and antipyretic properties. It was introduced in 1886.


- However, the toxic evident of this substance promote the need of searching of less toxic derivatives of aniline like phenacetin in 1887.
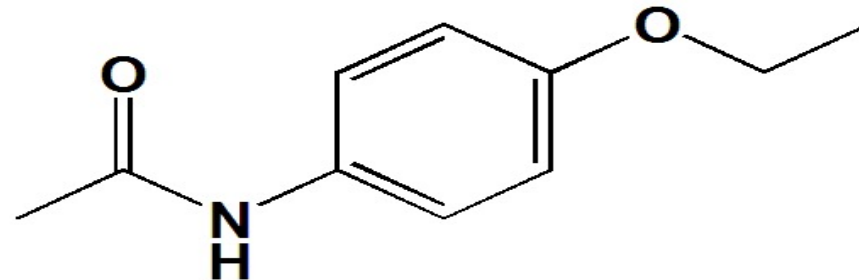
phenacetin

Introduction:

- Phenacetin was withdraw in 1983 owing to its carcinogenic effect.

- in 1948, it was discovered that acetanilide metabolizes in to acetyl-para-amino-phenol (paracetamol), and this metabolite has the analgesic and antipyretic properties.
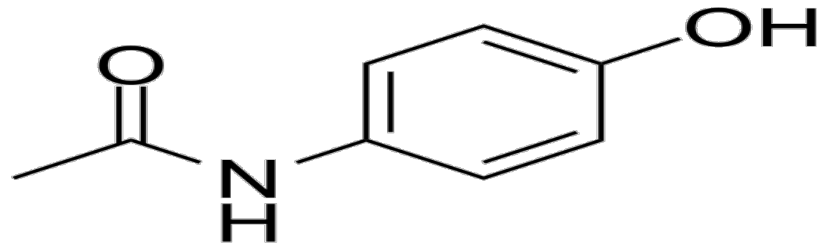
- As a result, acetanilide was slowly replaced by its metabolite paracetamol, which is still quite well known in the pharmaceutical field.

Properties of Acetanilide:

➢ **Here are some of the basic properties of this organic compound:**

- **Appearance:** It is a white solid with a flaky appearance.

- **Odor:** This is an odorless compound.

- **Solubility:** Acetanilide is a little soluble in water. It is also soluble in diethyl ether, ethanol, benzene and acetone.

- **Molecular Weight:** Its molecular weight is 135.17 g/mol.

- **Melting Point:** It has a melting point of 114.3 °C.

- **Density:** The density of Acetanilide is 1.219 g/ cm^3

Synthesis of Acetanilide:

- In this experiment, *acetanilide* would be prepared from *aniline* by acetylating it with **acetic anhydride** in the presence of **concentrated *Hcl*** and *anhydrous Sodium acetate.*

Aniline + Aceticanhydride → Acetanilide
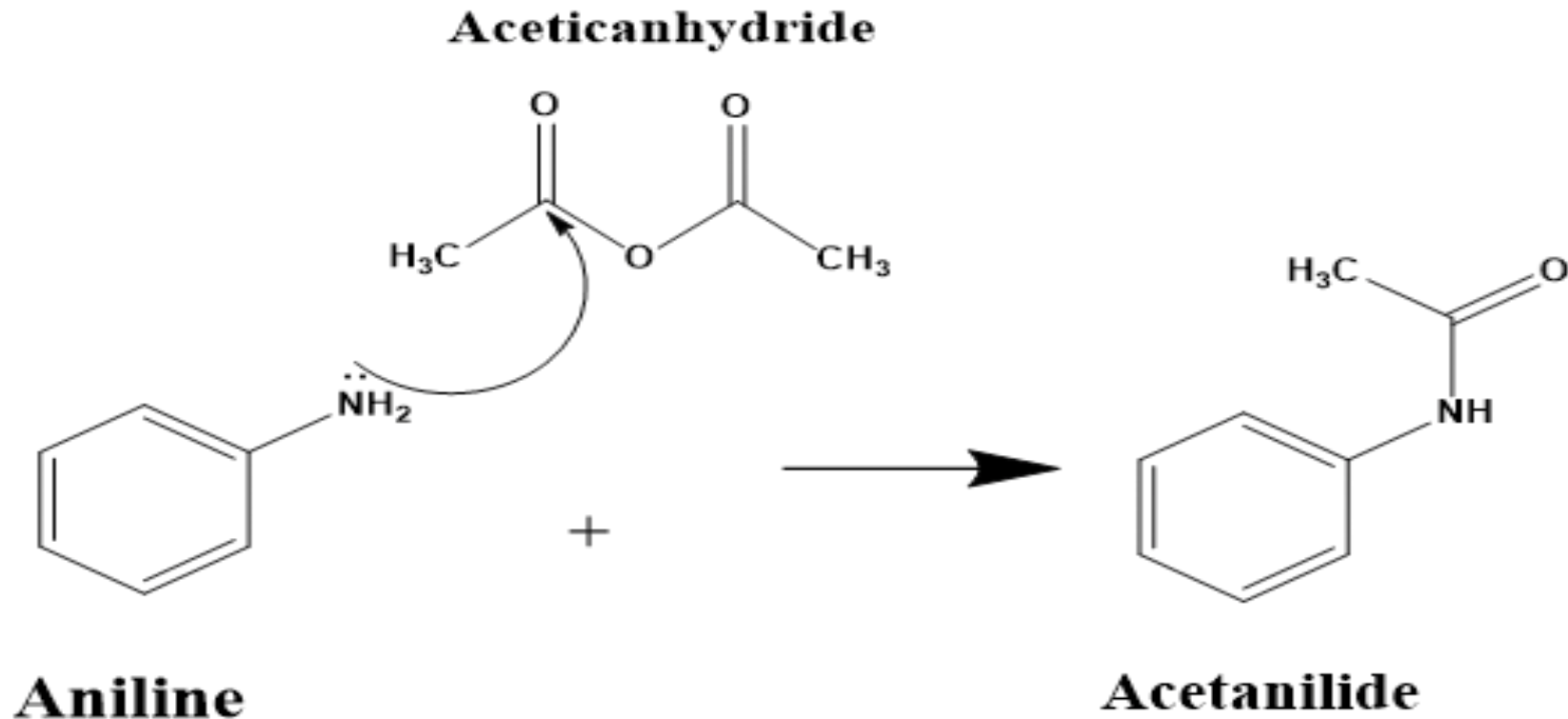
Principle:

- Both *aniline* & *acetic anhydride* are somewhat viscous liquids, so simply mixing them together does not result in the efficient formation of acetanilide.

- Therefore, a solvent is used (water) to dissolve and evenly disperse the reactants in it.

- *Aniline* is not soluble in water, so concentrated *HCl* is added in order to dissolve it.
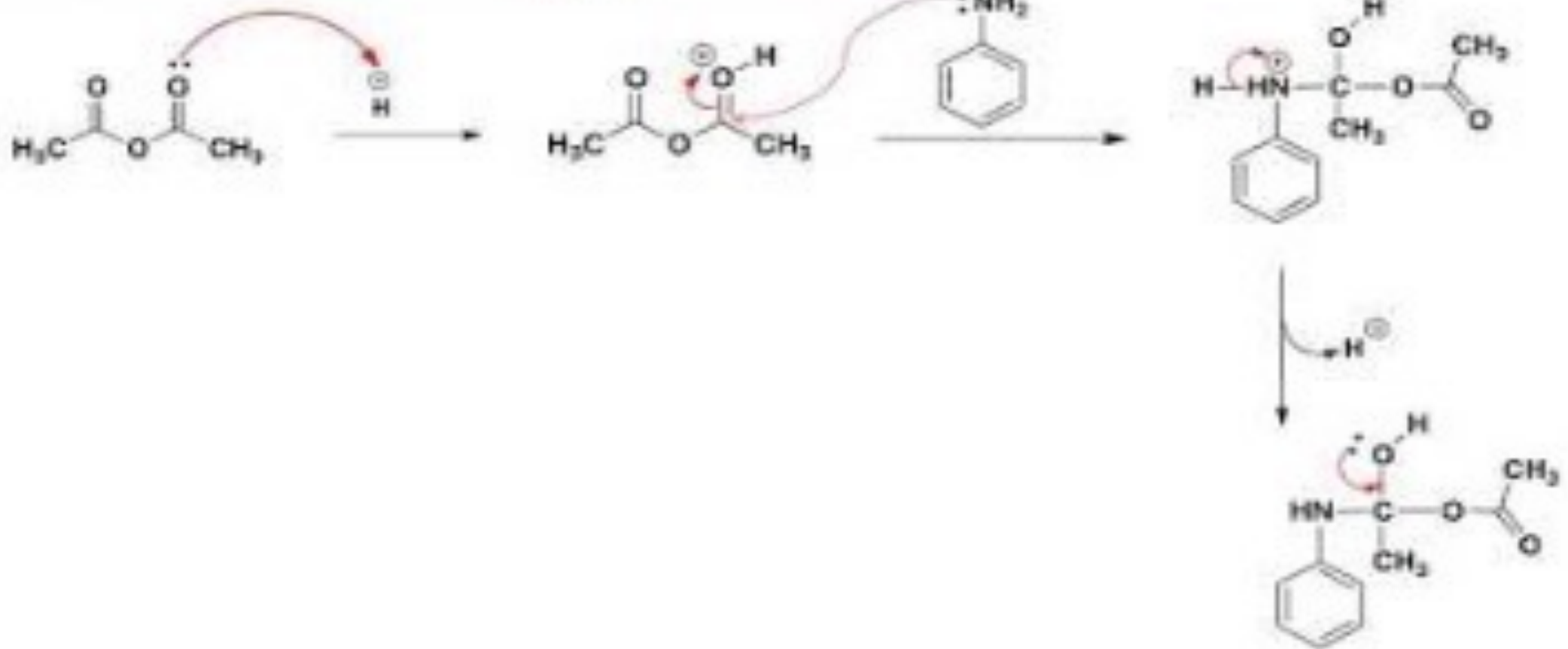

insoluble   conc. *HCl*   soluble
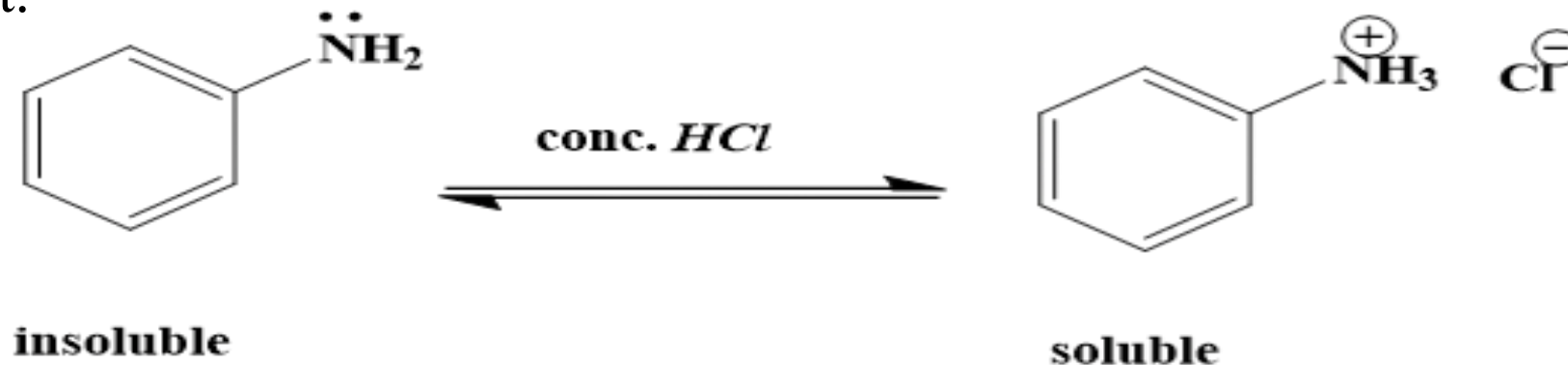
Principle:

- Only the free *aniline* can act as *nucleophile*, why?

- Therefore, *Sodium acetate* will used in order to shift the reaction below to the left.
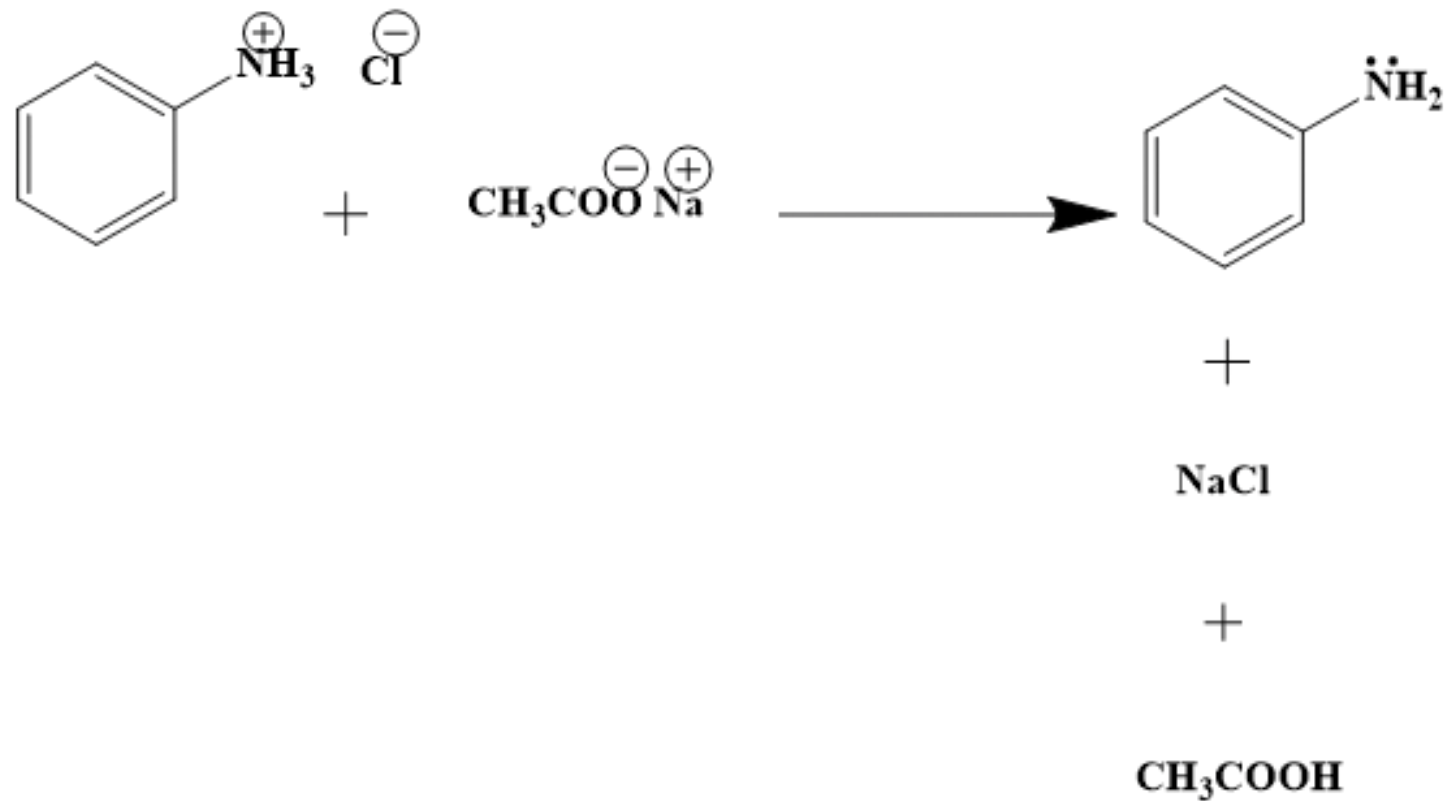
Mechanism of Acetanilide Reaction:

Procedure 1:

1- Conical flask **A**:
- Mix (2ml) of aniline with (4ml) of distilled water & drop wise of concentrated HCl.

 2- Conical flask **B** :
- Dissolve (2.4gm) of un hydrous sodium acetate in (10ml) of distilled water, then add (6ml) of acetic anhydride.

3- Immediately Transfer the content of conical flask **B** to the content of conical flask **A** with shaking.

Procedure 1:

4- Cool the mixture (fridge) or add crushed ice until white crystals start to precipitate.

5- Filter the product and wash it with water.

6- Recrystallizes the acetanilide with minimum volume of hot distilled water, and then filters it.

7- Allow the product to dry at room temperature.

8- Calculate the percent of yield.

OR:
Procedure 2: that was adopt in our lab.

1- Mix(2ml) of aniline with (4ml) of water in conical flask.

2- Stirring the mixture by using magnetic stirrer apparatus.

3- Measure (2.5ml) acetic anhydride and add (1drop) of concentrated HCL to it.

4- Add the acetic anhydride to aniline mixture very slowly (drop by drop) with continuous stirring, the crystals of acetanilide will form at the end of addition.

Procedure 2: that was adopt in our lab.

5- Recrystallizes the acetanilide with minimum volume of hot distilled water, and then filters it.

6- Allow the product to dry at room temperature.

7- Calculate the percent of yield.

Calculations:

- Moles (Aniline) = Moles (Acetanilide)

- Wt / M.Wt (Aniline) = Wt / M.Wt (Acetanilide)

- Density of aniline = 1.02 g/cm³

- Wt = V* D

- Wt = 2ml * 1.02 =2.04g

- **2.04** g /**93.13 g** mol^{-1} = **Theoretical Wt** / **135.17** mol^{-1}

- **% yield** = Practical Wt / Theoretical Wt

Thank You For Listening