

# Chapter: 14

*Ch.Id:-ASU/GRF/EB/AEHFPOC/2022/Ch-14*

*DOI: <https://doi.org/10.52458/9789391842697.2022.eb.grf.asu.ch-14>*

## **AIM: TO CARRY OUT THE SYNTHESIS OF "SCHIFF-BASE" BY COMBINING ANILINE AND BENZALDEHYDE**

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## **Requirements**

### **Chemicals**

- Benzaldehyde
- Ethanol
- Aniline
- Glacial Acetic Acid

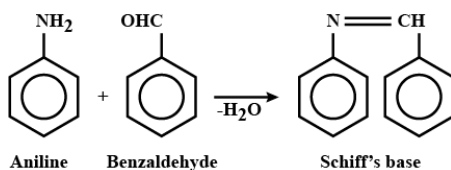
### **Apparatus**

- Round Bottom flask
- Measuring cylinder
- Filter paper
- Buchner funnel
- Beaker
- Conical flask
- Tripod stand
- Water condenser

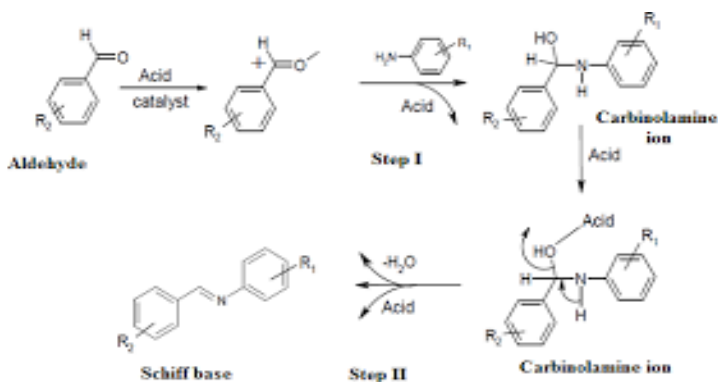
## **Theory**

The literature reveals that the Schiff base ligands are excellent Co-ordinating ligand as it forms a stable complex with different transition ions. In an ethanol medium with acetic acid, benzaldehyde and meta-nitroaniline condense to produce Schiff's bases. A condensation reaction between aniline and benzaldehyde produces an oxonium ion, which then engages in a traditional electrophilic aromatic substitution reaction.

## Reaction



## Mechanism



Aniline contains lone pair and benzaldehyde is an electron deficient compound. They react to produce an intermediate called carbinolamine. Finally, Schiff bases will form after the dehydration of intermediate. It's a type of condensation reaction.

## Physical Properties

### 1) Aniline

- It has a distinctive amine smell.
- It may absorb moisture.
- Water-soluble to a moderate extent.
- It has Molecular Weight of 226.23 g/mol

- It forms yellow precipitate when reacted with benzaldehyde and m-nitroaniline

## **2) Benzaldehyde**

- A colourless liquid with an aroma of almond oil is benzaldehyde.
- It is entirely soluble in ethanol and diethyl ether but slightly soluble in water.

## **3) Benzal-m-nitroaniline**

- It forms yellow crystals with water.
- It has a burning sweet odour.
- It has good solubility
- It has good elevated vapour pressure and has more density.

## **Chemical Properties**

### **1) Aniline**

- Secondary, tertiary, and quaternary salts are produced when amine interacts with alkyl halides.
- In the presence of pyridine, aniline interacts with acid chlorides and acid anhydrides to produce anilids, with benzoyl chloride and aqueous NaOH to produce N-phenyl benzamide, and with nitrous acid at low temperatures to produce diazonium salts.

### **2) Benzaldehyde**

- It has a kJ/mol affinity for protons.
- Gas basicity (kJ/mol) is present.

- The combustion enthalpy of the substance is standard liquid (kJ/mol).

### **3) Benzal m-nitroaniline**

- It reacts with benzaldehyde and m-nitroaniline to produce a yellow precipitate, and it has a molecular weight of 226.23 g/mol.

#### **Procedure**

1. A solution of 1.02 ml of benzaldehyde (0.01M) in 10 ml of ethanol and 1.38 g of Aniline (0.01M) were put to a 50 ml round bottom flask in order to prepare Schiff base.
2. To change the pH of the solution, a few drops of glacial acetic acid were added.
3. For five hours, the reaction mixture was refluxed.
4. After adding cool water to the reflux, the precipitate that results is filtered and then collected.
5. Re-crystallize it from the ethanol and thoroughly dry it at ambient temperature.
6. The Schiff base ligand yellow product was produced.
7. Dissolve the product in the suitable solvent to allow the Schiff base to recrystallize.
8. To obtain yellow crystalline solid particles of Schiff Base of benzaldehyde and aniline, cool the filtrate in an ice bath for an overnight period.

## **Applications**

1. Halloysite may be produced in large quantities with transition metal nanoclusters using Schiff bases in nanotechnology. This ubiquitous mineral has rolled nanosheets (nanotubes) in its natural structure that can assist both the production and the final metal nanocluster products. These nanoclusters, which can catalyze numerous chemical reactions, can be formed of the metals Ag, Ru, Rh, Pt, or Co.
2. Conjugated Schiff bases have a high absorption coefficient in the UV-visible range. The anisidine value, a gauge of oxidative deterioration for fats and oils, is based on this absorption.
3. Due to their crucial functions in living things, such as C-C bond breakage, transamination, and decarboxylation, Schiff bases are active against a variety of species.
4. A number of Schiff bases have anti-inflammatory, anti-allergy, anti-radical and anti-oxidative properties.

**Result:** From this experiment, Schiff base can be synthesized from aniline and benzaldehyde.