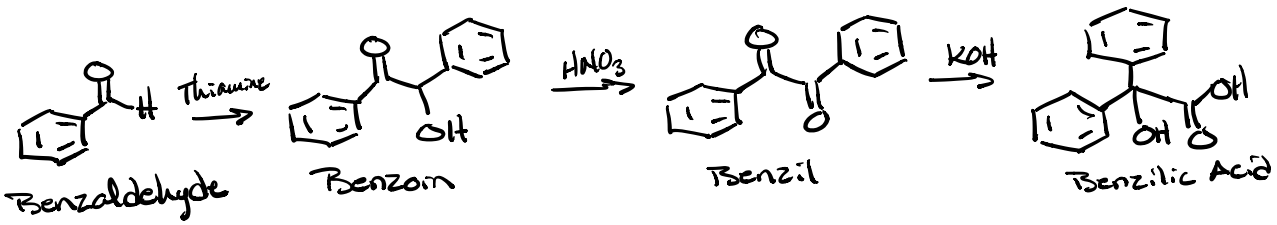
# Multistep formal Report




## Abstract – what was done & what was found

Benzilic acid was synthesized from benzaldehyde in there steps in a multistep reaction. ...

## Introduction ⇒ need for multiple steps
⇒ Look up Taxol

Methodes & Materials

materials list ⇒ all chemicals

Instruments ⇒ meltemps, FTIR, FTIR Software

Procedure for benzoin

Procedure for benzil

Procedure for benzilic acid

# Results Section

one idea

| | mp | % yield | FTIR $cm^{-1}$ | Characterization |
|---|---|---|---|---|
| Benzoin | x-x°C | y% | 3400 $cm^{-1}$ | alcohol |
| | | | 1680 $cm^{-1}$ | Ketone |
| Benzil | x-x°C | y% | 1690 $cm^{-1}$ | Ketone |
| | | | 1660 $cm^{-1}$ | C=C |
| Benzilic acid | x-x°C | y% | 3500 $cm^{-1}$ | alcohol |
| | | | 3400 $cm^{-1}$ | Carboxylic acid |
| | | | 1690 $cm^{-1}$ | Carbonyl |

overall yield of Benzilic acid from benzaldehyde was ~5%

¶ for each material that gives the results in paragraph form. Here you can include a description (physical) of the material

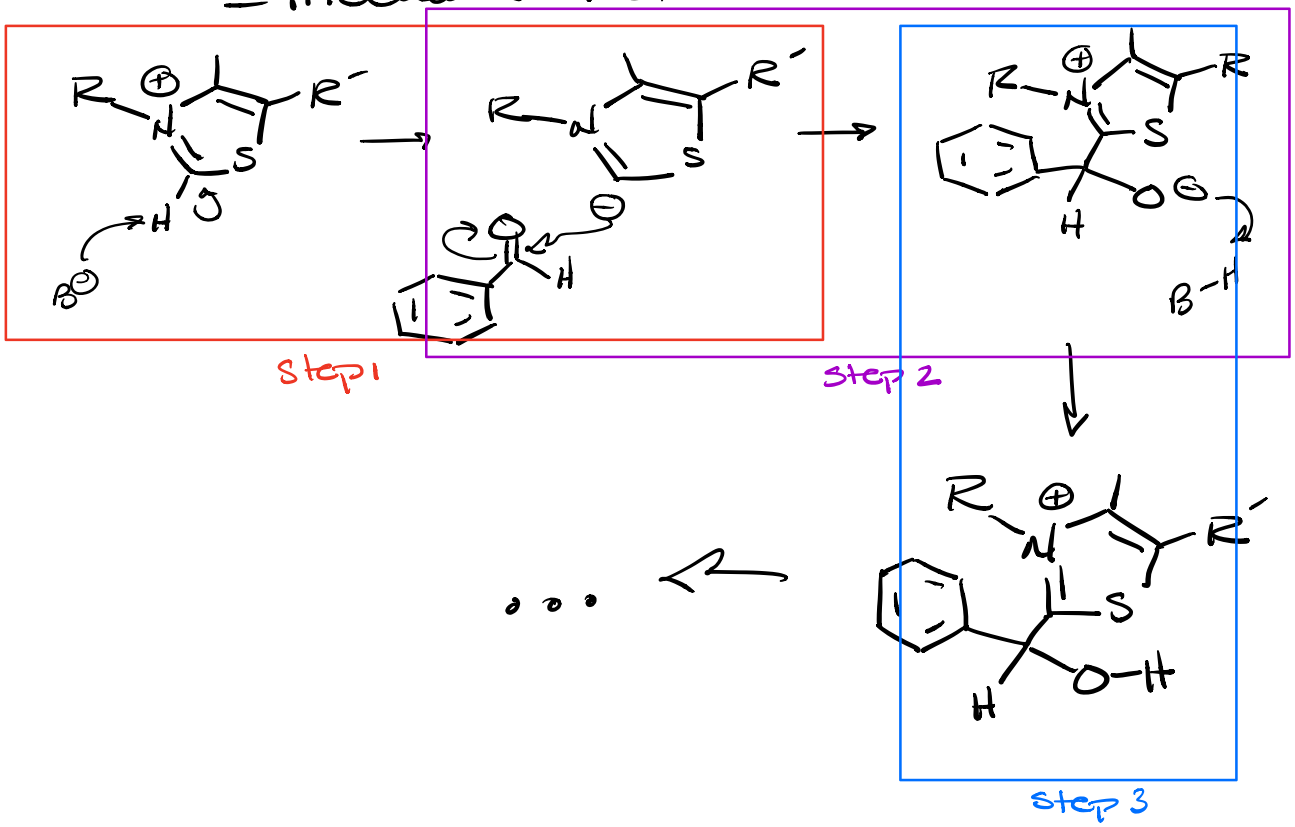
$$\text{overall \%} = \frac{\%\,\text{Benzoin}}{100} \times \frac{\%\,\text{Benzil}}{100} \times \frac{\%\,\text{Benzilic acid}}{100} \times 100$$

Benzoin Benzil Benzilic acid

# Discussion

outline

- mechanism of benzoin reaction



The formation of benzoin from benzaldehyde is catalysed by thiamine hydrochloride. The first step in this reaction is the deprotonation of thiamine hydrochloride by hydroxide

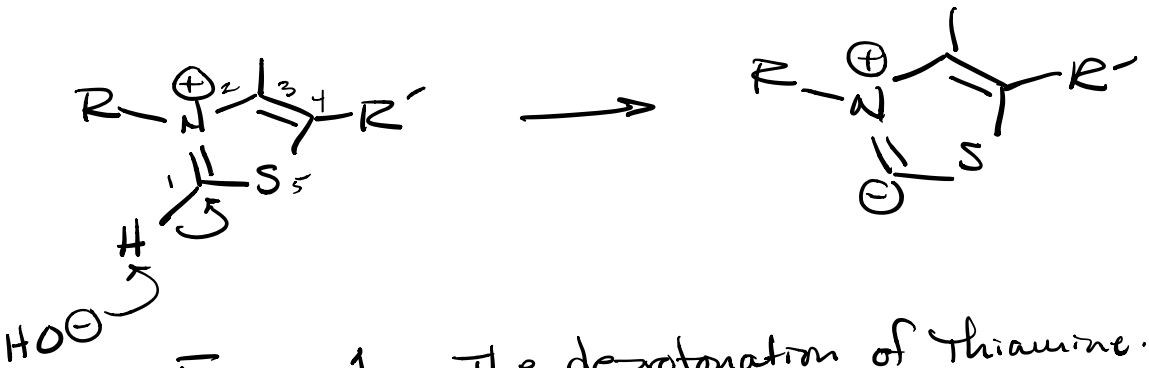


Figure 1. The deprotonation of thiamine.HCl

The next P address the why

Thiamine hydrochloride is deprotonated at the carbon between the nitrogen and sulfur. The resulting anion is stabilized by the adjacent nitrogen cation forming an ylide. The ylide is a carbon nucleophile and proceeds to conduct a nucleophilic attack on benzaldehyde

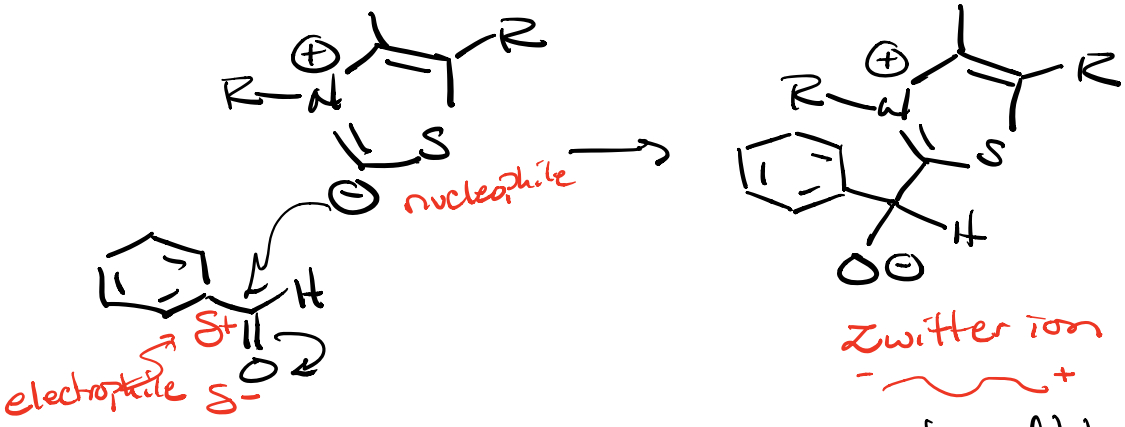



Figure 2. Nucleophilic attack on benzaldehyde

↑ next paragraph describes the why

...

all steps

⇒ next is characterization paragraphs

- % yield
- MP
- FTIR

⇒ move on to benzil

- mechanism
- characterization
  %yield, MP, FTIR

⇒ Benzilic Acid

- mechanism
- Characterization

% yield, mp, FTIR

⇒ Conclusion

Restatement of abstract

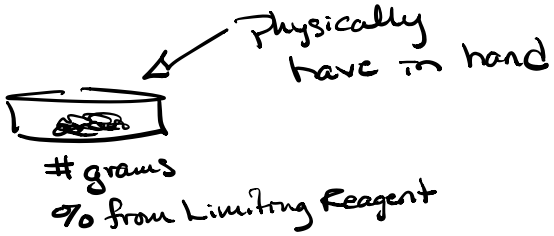
⇒ Separation schemes

⇒ lab notes

⇒ FTIR

Multiple types of yields used in literature.

Isolated yield

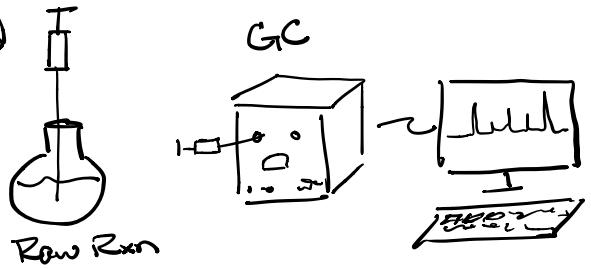


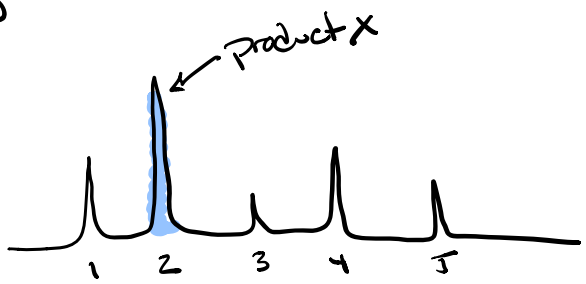

Instramental yield

GC yield

mass-spec yield

HPLC yield




$$\% \text{ Product X} = \frac{\text{Area X}}{\text{Area } 1+2+3+4+5} \times 100$$