



# Reformatsky Reaction



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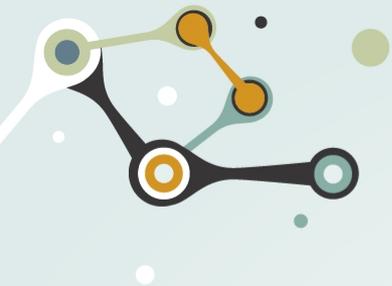


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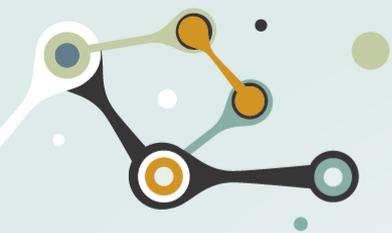
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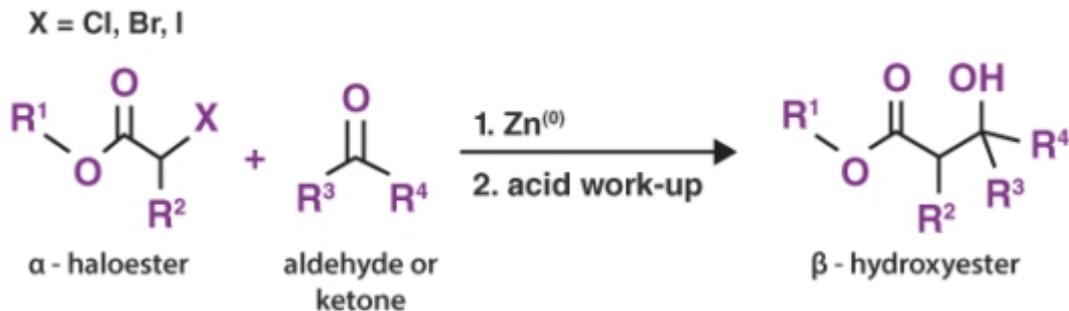
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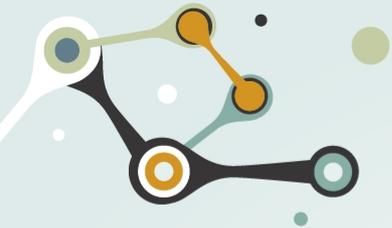
# Introduction

This is a type of reaction that occurs between an alpha-haloester and a carbonyl compound which can be a ketone, aldehyde, or an ester. The reaction mostly takes place in the presence of zinc. The reaction is also a representation of the extended reactions between carbonyl compounds with a dialkylzinc or an alkyl zinc halide.



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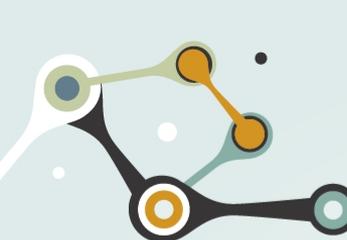
# Defination

According to the general definition, Reformatsky reaction is defined as an organic reaction that is used to convert ketone or an aldehyde and  $\alpha$ -haloester to a  $\beta$ -hydroxyester by using metallic zinc and acid workup. Here, inert solvent like diethyl ether or THF (tetrahydrofuran) is often used as a solvent for the reaction.

**Condensation reaction of carbonyl compounds with alpha haloester in presence of zinc metal is known as Reformatsky reaction.**

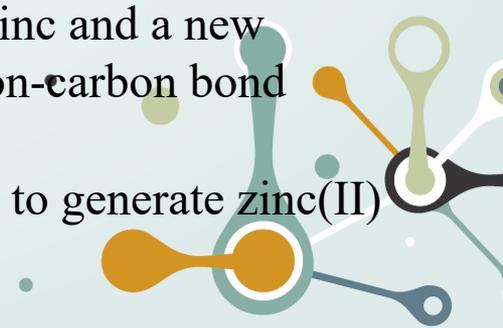
The solvent most often used in this reaction is benzene or ether or a benzene ether mixture.

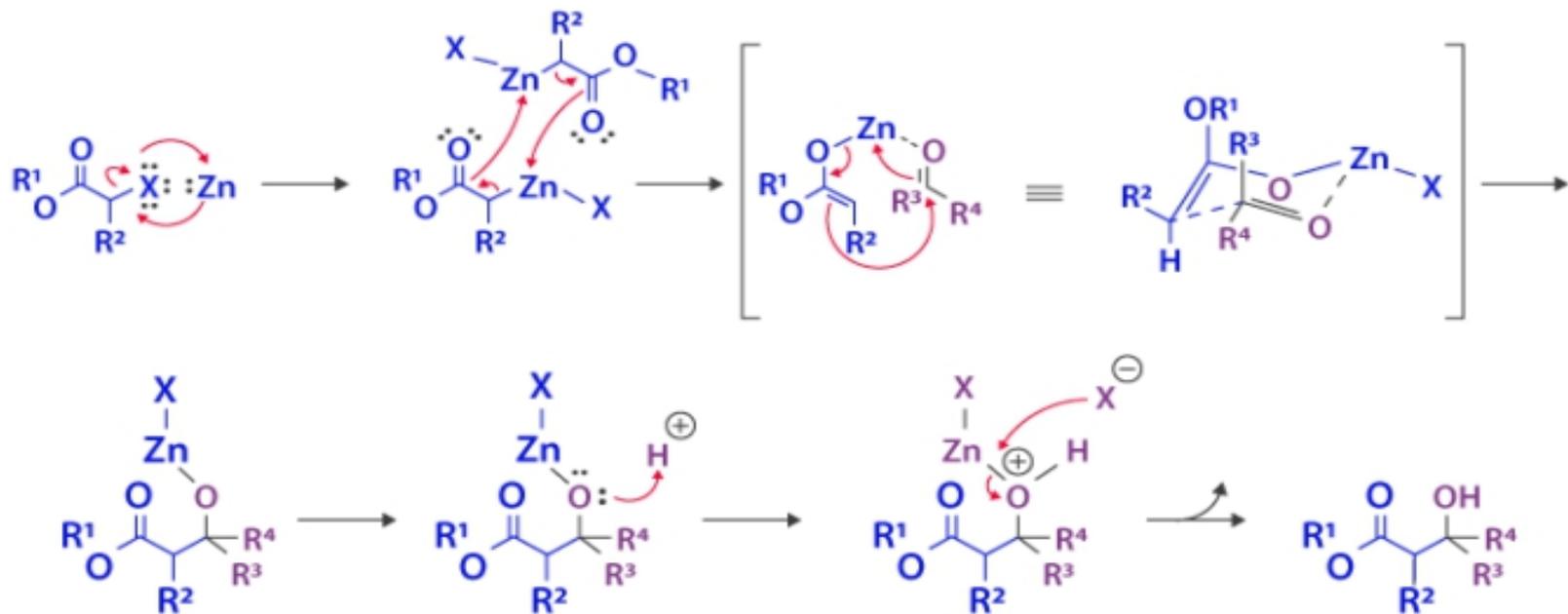




# Mechanism of the Reaction



- The Reformatsky reaction usually commences with the oxidative addition or insertion of the zinc into the carbon-halogen bond of  $\alpha$ -haloester.
  - The main purpose of using zinc is that it allows the generation of an enolate even without using Bronsted base which normally condenses with the ketone or aldehyde itself.
  - After the insertion, the compounds coordinate with each other leading to the formation of a dimer. This compound further experiences a rearrangement which results in the emergence of two zinc enolates.
  - Then, the oxygen of the ketone or aldehyde coordinates to the zinc and a new rearrangement is formed where the two reagents now have a carbon-carbon bond between them.
  - Following that, an acid workup splits the zinc and oxygen bond to generate zinc(II) salt and  $\beta$ -hydroxy ester as the final products.
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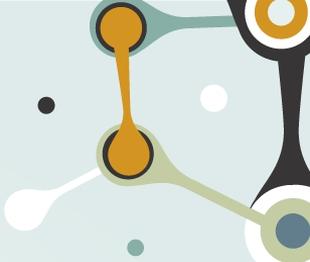


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Notably, the product  $\alpha$ -hydroxy esters are important substances required for natural products synthesis and in pharmaceuticals.



# Advantages



**Some significant advantages of this reaction are;**

1. Reformatsky reaction can be conducted with highly hindered ketones. The reaction facilitates the successful addition of nucleophiles to delta positive carbon atom of a ketone.
2. Reformatsky mechanism can be easily adapted for intramolecular aldol reactions.
3. The organozinc halide reagents used in the Reformatsky Reaction are relatively stable. They are also available commercially.
4. Reformatsky results in the isolation of beta-hydroxy ester.
5. Other merit of Reformatsky reaction is convenience since the reaction is alternative to the reaction of an aldehyde or a ketone with the preferred lithium enolate of an ester.
6. Yields of Reformatsky were found to be improved on using freshly prepared zinc powder a heated column of zinc dust, copper-zinc couple, acid-washed zinc and trimethylchlorosilane.

# References



- <https://coolgyan.org/chemistry/reformatsky-reaction/>
- <https://byjus.com/chemistry/reformatsky-reaction/>
- <https://www.organic-chemistry.org/namedreactions/reformatsky-reaction.shtm>



*Thank You*