The Reformatsky reaction (sometimes spelled Reformatskii reaction) is an organic reaction which condenses aldehydes or ketones, with α-halo esters, using a metallic zinc to form β-hydroxy-esters:

\[
\begin{align*}
\text{R}_1\text{R}_2\text{O} - & + \text{BrR}_3\text{O} - \rightarrow \text{R}_1\text{R}_2\text{O} - \text{ZnBr} - + \text{H}_2\text{O} \\
\text{R}_1\text{R}_2\text{O} - \text{Zn} - & + \text{R}_3\text{O} - \rightarrow \text{R}_1\text{R}_2\text{O} - \text{ZnBr} - + \text{H}_2\text{O}
\end{align*}
\]

The organozinc reagent, also called a 'Reformatsky enolate', is prepared by treating an alpha-halo ester with zinc dust. Reformatsky enolates are less reactive than lithium enolates or Grignard reagents and hence nucleophilic addition to the ester group does not occur. The reaction was discovered by Sergey Nikolaevich Reformatsky.

---

**Structure of the reagent**

The crystal structures of the THF complexes of the Reformatsky reagents tert-butyl bromozincacetate and ethyl bromozincacetate have been determined. Both form cyclic eight-membered dimers in the solid state, but differ in stereochemistry: the eight-membered ring in the ethyl derivative adopts a tub-shaped conformation and has cis bromo groups and cis THF ligands, whereas in the tert-butyl derivative, the ring is in a chair form and the bromo groups and THF ligands are trans.

---

**Reaction Mechanism**

Zinc metal is inserted into the carbon-halogen bond of the α-haloester by oxidative addition 1. This compound dimerizes and rearranges to form two zinc enolates 2. The oxygen on an aldehyde or ketone coordinates to the zinc to form the six-member chair like transition state 3. A rearrangement occurs in which zinc switches to the aldehyde or ketone oxygen.
and a carbon-carbon bond is formed 4. Acid workup 5,6 removes zinc to yield zinc(II) salts and a β-hydroxy-ester 7.

Variations

In one variation of the Reformatsky reaction an iodolactam is coupled with an aldehyde with triethylborane in toluene at -78 °C.