Enolizable aldehydes and enolizable ketones, in the presence of an acid or base catalyst in aqueous medium at high temperature, undergo a reaction, giving an α, β-unsaturated aldehyde or an α, β-unsaturated ketone, respectively, as the product. This reaction is known as aldol condensation. The base-catalyzed aldol condensation, in which the catalyst is usually the hydroxide ion, is more common.

\[
\text{CH}_3\text{CHO} \quad \xrightarrow{\text{catalyst: NaOH}} \quad \xrightarrow{\text{H}_2\text{O}, \Delta} \quad \text{CH}_3\text{C}==\text{CHCHO}
\]

**Mechanism**

Step 1: The hydroxide ion deprotonates the aldehyde reversibly.

Step 2: Enolate ion 1 adds to the unreacted aldehyde.

Step 3: Alkoxide ion 2 is protonated by water.

Step 4: Aldol 3 is an enolizable aldehyde. A small amount of it is converted to the corresponding enolate ion (4) by the hydroxide ion.

Step 5: Enolate ion 4 loses a hydroxide ion.

Step 1 through 3 are an aldol reaction, steps 4 and 5 a 1,2-elimination via E1cB mechanism. Thus, aldol condensation is
aldol reaction

Contributors

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