

Condensation Organocatalysts

The condensed organic reaction is a reaction in which two or more organic molecules interact to form a macromolecule by covalent bonding, often accompanied by a loss of small molecules (such as water, hydrogen chloride, and alcohol.) An organocatalyst capable of catalyzing a condensation organic reaction is called condensation organocatalyst.

Applications

- **Catalytic Aldol condensation:** A reaction in which two molecules are combined to allow a carbonyl compound such as an aldehyde, a ketone or a carboxylic acid derivative to form a new carbon-carbon bond next to a carbonyl group. These reactions are usually carried out under the catalysis of a base such as sodium acetate, and sodium alkoxide.
- **Catalytic Claisen condensation reaction:** The ester-containing α -active hydrogen undergoes a condensation reaction under the action of an alkaline reagent such as sodium alkoxide or trityl sodium to form a β -ketoester compound, which is called a Claisen condensation reaction. The reaction can also be used for the intramolecular cyclization of a dicarboxylic acid ester, which is also known as the Dieckmann reaction. For example, ethyl acetate forms ethyl acetoacetate under the action of sodium ethoxide.
- **Catalytic Perkin condensation reaction:** The aromatic aldehyde and the aliphatic carboxylic acid anhydride form a cinnamic acid type compound under the action of the corresponding sodium carboxylate.



Figure 1. Perkin condensation reaction

- **Catalytic Benzoin condensation reaction:** Aromatic aldehydes undergo two molecules of condensation under the action of thiamine hydrochloride to form benzoin compounds. The use of thiamine hydrochloride as a catalyst has the characteristics of simple operation, material saving, short time consumption and light pollution. The benzoin condensation reaction can also be catalyzed by thiazole, and the principle is the same as thiamine hydrochloride.
- **Catalytic Knoevenagel condensation reaction:** The compound having an active methylene group (such as malonate, β -ketoester, cyanoacetate, and nitroacetate.) is condensed and dehydrated with an aldehyde or a ketone under the catalysis of an amine or an amine carboxylate to obtain an α,β -unsaturated compound, which is called a Knoevenagel condensation reaction.

References

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3. Zhang Fan, Xu Danqian, Liu Baoyou et al. (2005) "Broensted acidic ionic liquid catalyzes the condensation reaction of aldehydes (ketones) with glycols." *Journal of Catalysis*. 156,1336-1342.

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