



Roadmap Reaction Legend

Reaction 19.1

NaOH or acid

- The aldol reaction
- The reaction is catalytic in either acid or base
- In base the reaction involves formation of an enolate that attacks the carbonyl group of another molecule
- In acid, the reaction involves enol attack on a protonated carbonyl.
- Makes a new C-C bond

Reaction 19.2

Acid or base

- Aldol products readily dehydrate to create conjugated α,β -unsaturated carbonyl products
- The new C=C pi bond forms toward the carbonyl group because of conjugation

Reaction 19.3

1. NaOR 2. Mild HCl, H₂O

- The Claisen condensation
- The "R" group of the NaOR reagent should match the OR group of the starting ester
- The reaction involves formation of an enolate that attacks the carbonyl group of another molecule.
- Makes a new C-C bond

Reaction 19.5

1. 2° amine 2. RX 3. HCl, H₂O

- The initially formed enamine reacts as a nucleophile at the α -carbon atom
- Following reaction with the haloalkane, the 2° amine is removed in aqueous acid
- Makes a new C-C bond

Reaction 19.7

1. NaOEt 2. RX 3. NaOH, H₂O 4. HCl, H₂O

5. Heat

- The acetoester synthesis
- The acetoester enolate reacts with the haloalkane followed by ester hydrolysis and decarboxylation of the β -ketoacid
- Makes a new C-C bond

Reaction 19.9

Various enolates or amines

- The Michael reaction
- An example of conjugate addition
- The reaction involves attack by the enolate or amine nucleophile on the carbon-carbon double bond to give an enolate intermediate that protonates to give an enol that undergoes keto-enol tautomerism
- Makes a new C-C bond

Reaction 19.4

1. NaOR 2. Mild HCl, H₂O

- The Dieckmann condensation
- A cyclic version of the Claisen condensation involving an intramolecular reaction of a diester
- The R group of the NaOR reagent should match the OR group of the starting diester
- Makes a new C-C bond

Reaction 19.6

1. 2° amine 2. Acid chloride 3. HCl, H₂O

- The initially formed enamine reacts as a nucleophile at the α -carbon atom
- Following reaction with the acid chloride, the 2° amine is removed in aqueous acid
- Makes a new C-C bond

Reaction 19.8

1. NaOEt 2. RX 3. NaOH, H₂O 4. HCl, H₂O

5. Heat

- The malonic ester synthesis
- The acetoester enolate reacts with the haloalkane followed by ester hydrolysis and decarboxylation of the β -diacid
- Makes a new C-C bond

Reaction 19.11

1. R₂CuLi 2. HCl, H₂O

- The conjugate addition of a Gilman reagent
- Makes a new C-C bond