

Experimental 6

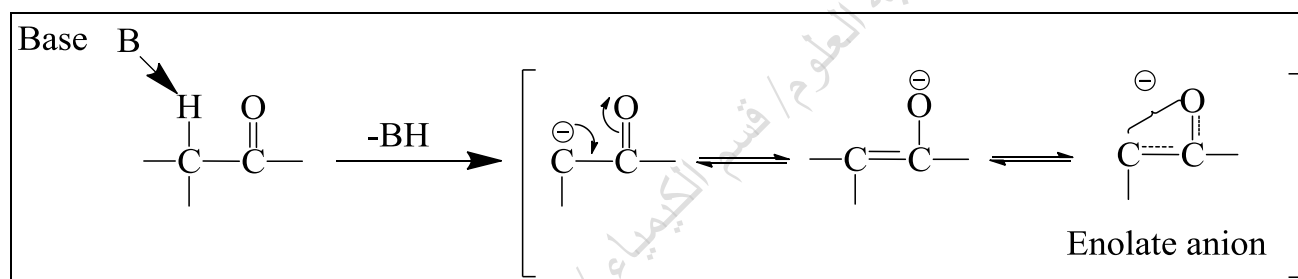
Aldol Condensation

Theoretical part:

Acidity of α hydrogens.

The carbonyl group strengthens is acidity of the hydrogen atoms attached to the α -carbon and by doing this, gives rise to a whole set of chemical reactions.

Ionization of an α -hydrogen



Resonance that is possible only through participation by the carbonyl group. Resonance of this kind is not possible for carbanions formed by ionization of β -hydrogens, γ -hydrogens. The susceptibility of the carbonyl group to nucleophilic attack is due to the ability of oxygen to accommodate the negative charge that develops as a result of the attack.

Conditions of aldol condensation:

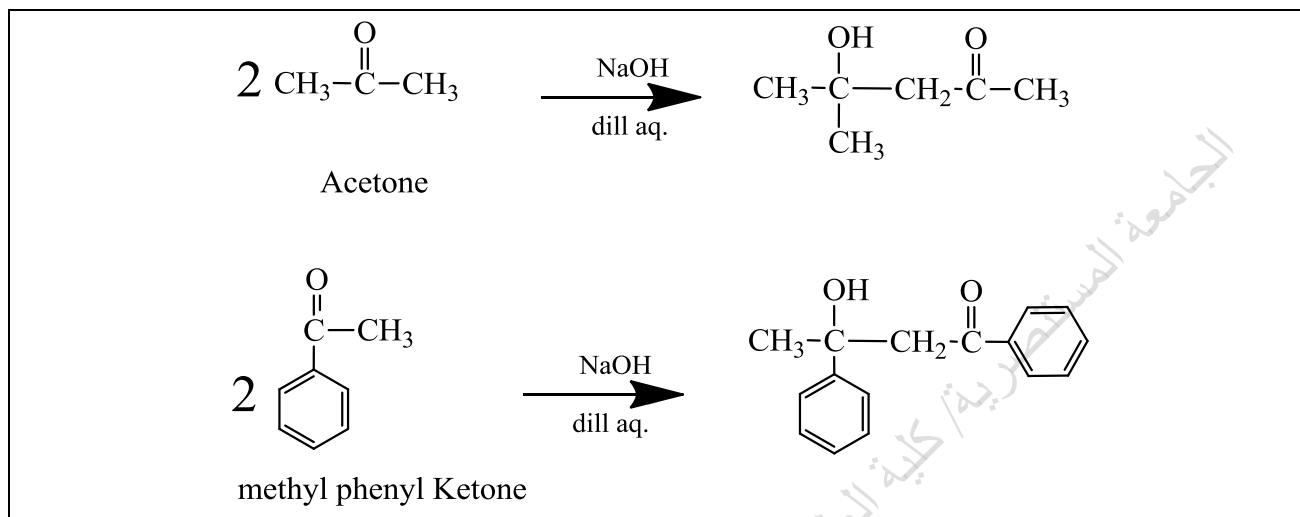
1- Two molecules of an aldehyde or a ketone may combine to form a β -hydroxy

aldehyde or β -hydroxyl ketone.

2- Under the influence of dilute base NaOH 10% .

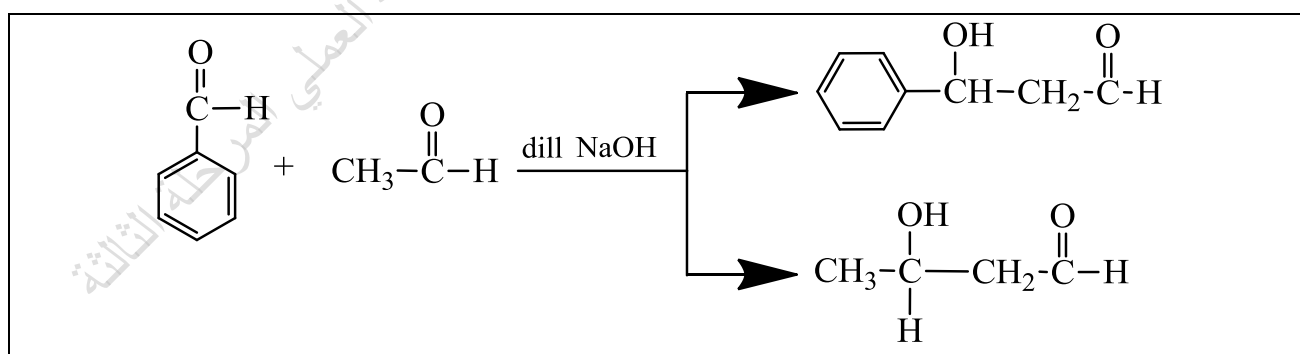
3-One molecule of aldehyde or ketone must be contain an α -hydrogen.

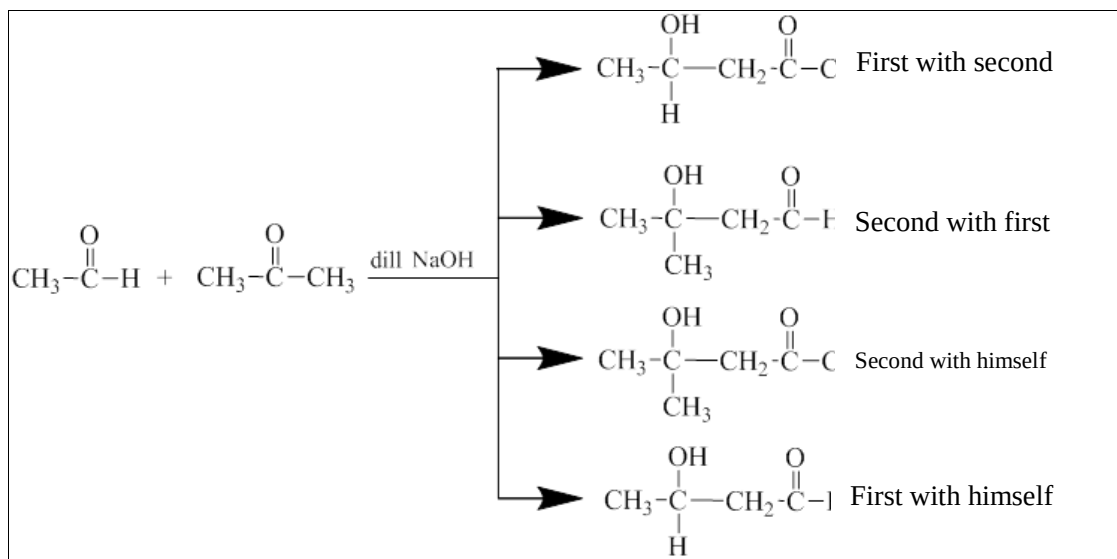
Examples:



Crossed aldol condensation:

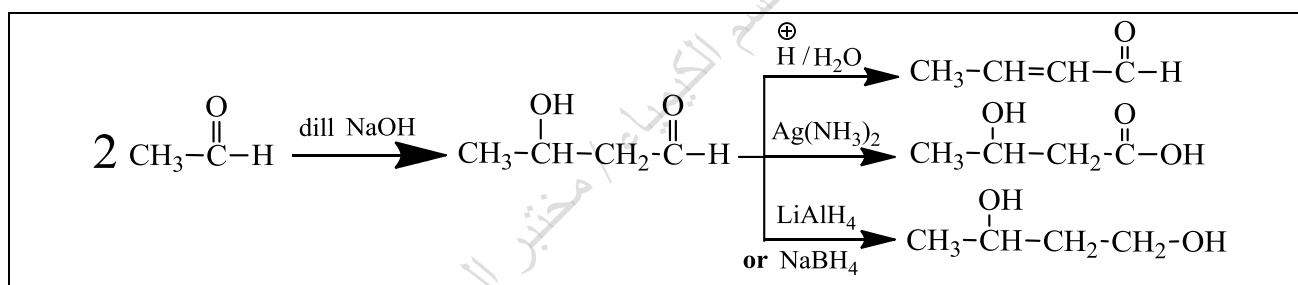
An aldol condensation between two different carbonyl compounds is called crossed aldol condensation, it is not always feasible in the laboratory, since a mixture of the four possible products may be obtained. On a commercial scale, however, such a synthesis may be worthwhile if the mixture can be separated and the compound marketed.



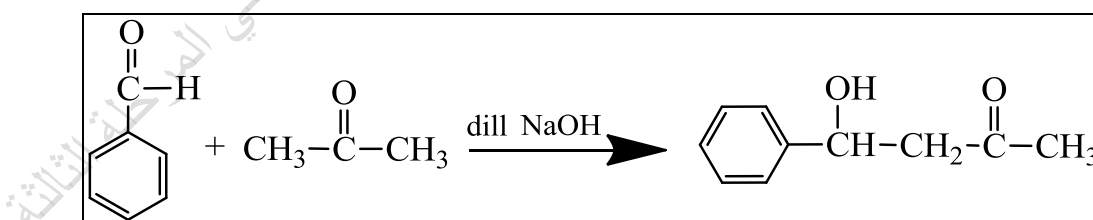


Uses of Aldol Condensation in synthesis:

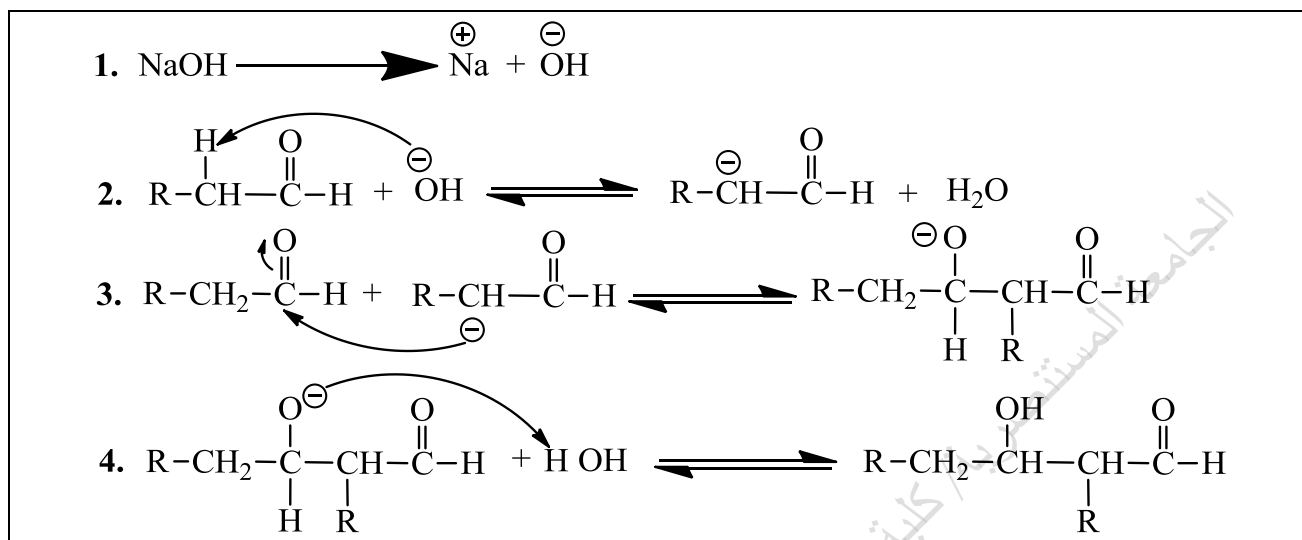
It gives many different products.



Interaction equation : preparation of (4-hydroxy-4-phenylbutan-2-one)



The mechanism for the reaction:



Experimental part:

- 1- In a (100ml) beaker is added (1ml) acetone and (0.5ml) of benzaldehyde.
- 2- In a (100ml) beaker is added a mixture of (0.5g) sodium hydroxide, (3.5ml) of ethanol and (4ml) of water.
- 3- Half of Contents of the first beaker is poured into the second beaker and stirring the mixture is left for (5mins).
- 4- The rest of mixture is added and left for (15mins).
- 5- The solid formed is filtered and dried.
- 6- The product is weighed and the percentage of yield is calculated.