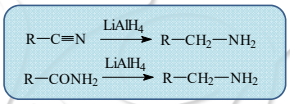
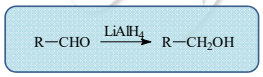
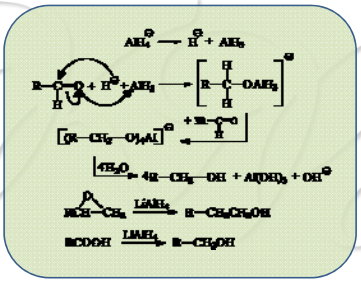
Preparation of Primary Amines by Action from Amides ve Nitriles



- $LiAlH_4$ is converted to alcohols by reducing R-CHO, R_2C=O, R-COOH,  RCOOR, RCOCl molecules.

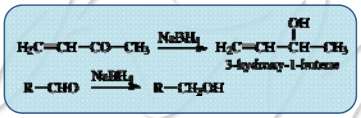


Reaction Mechanism of $LiAlH_4$



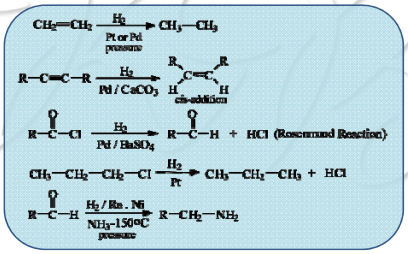
Reduction of Carbonyl Derivatives with $NaBH_4$

$NaBH_4$ is a weaker reduction agent than $LiAlH_4$. It is used to reduce aldehydes and ketones majorly. The reduction process with $NaBH_4$ can be carried out in an aqueous medium or alcohol.



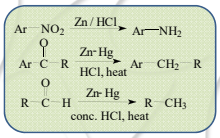
Catalytic Reduction (Hydrogenolysis)

Hydrogenolysis is called that is opened by hydrogen and a metal catalyser the bond in the ethylenic and acetylenic unsaturated structures and the bond between carbon and heteroatom. These metals are platinum (Pt), rutenium (Ru), palladium (Pd) and nickel (Ni).

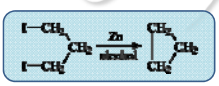


Examples of Reduction using Metal / Acid System

- It is used Zn, Fe, Sn / HCl, H_2SO_4 and $SnCl_2$, $FeSO_4$. When metal is treated with acid, the hydrogen gas is formed on the rise.

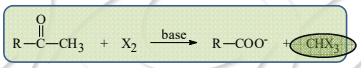


- Zn also reduces in aqueous and alcoholic medium.

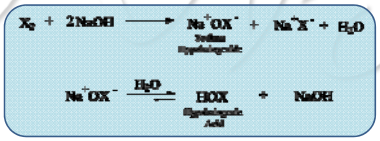


Haloform Reaction

- The halogenation of the α-C atom of many ketone compounds can be carried out in the form of total halogenation in a basic medium. So methyl ketones [CH_3-CO-] contain three halogen atoms in α-C and are formed trihalomethyl ketones.

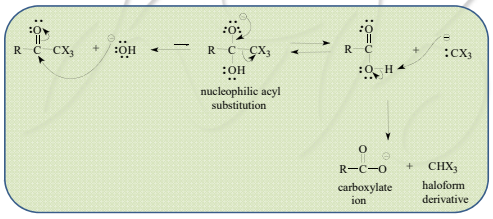


- The haloform reaction takes place via the hypohalogenide derivative of halogens in basic medium.



Reaction Mechanism

- The trihalomethyl group of the resulting compound forms a leaving group for the nucleophilic acyl substitution, resulting in the formation of the carboxylated aryl which is displaced by the basic OH^- group of the medium. However, the immediate rapid proton exchange completes the formation of the haloform derivative with the carboxylate anion.



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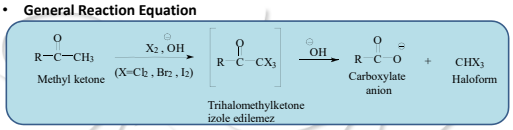
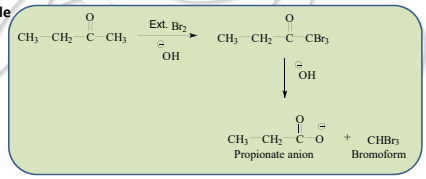
Haloform Reaction

- **General Reaction Equation**



- **Example**



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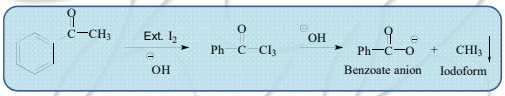
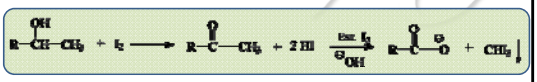
Haloform Reaction

- When halogen is I_2, the haloform derivative (iodoform) is a solid compound which can be isolated in the form of a yellow precipitate. This reaction can also be used as a diagnostic reaction for methyl ketones with the so-called "iodoform test". However bromoform and chloroform are liquid and volatile. They can not be easily isolated from the reaction medium.



- Since I_2 is an oxidant, a positive iodoform test with alcohols is observed. Because first, the alcohol is oxidized to methyl ketone, followed by the haloform reaction.



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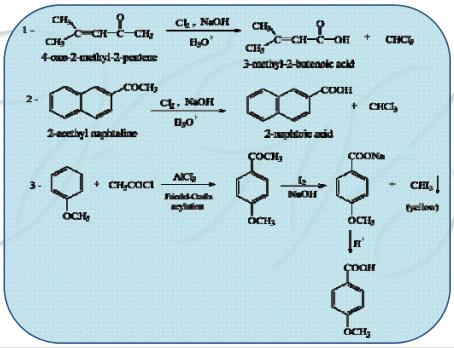
Example Haloform Reactions



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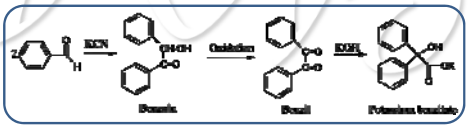
Benzilic Acid Synthesis

- Benzilic acid synthesis can be seen as a method of obtaining α-hydroxy carboxylic acid. The benzilic acid is synthesized by the action of benzaldehyde.
- When the benzaldehyde molecule is boiled with KCN in alcoholic medium, the two molecule benzaldehyde gives the benzoin molecule as a condensed molecule.
- Benzil molecule with α-diketone structure is formed by oxidation of benzoin. The benzilic acid salt is formed by the molecular rearrangement (**conversion reaction**) of this structure in the alkaline solution.



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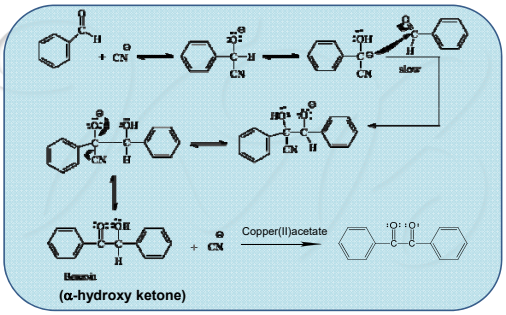
General Reaction Equation



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