

Organo Metallic Compounds of Magnesium

(or)

Alkyl Magnesium Halides

(or)

Grignard Reagents

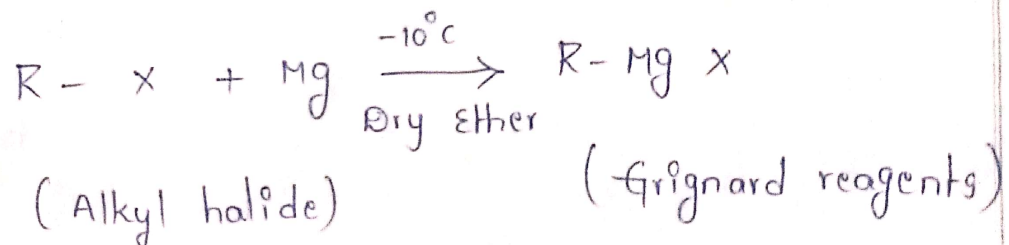
The organo metallic compounds which are in the form of $R-MgX$ are called as "Grignard Reagents."

Eg:- CH_3-MgCl , C_2H_5-MgCl -- Etc.

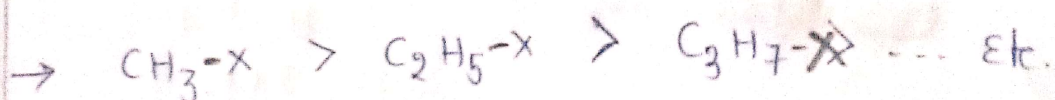
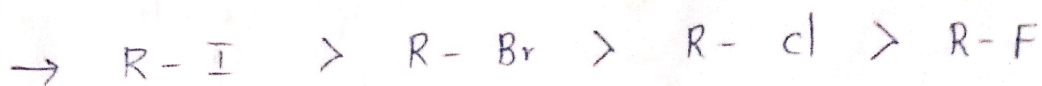
preparation

→ Alkyl halides react with magnesium in presence of dry ether at $-10^\circ C$ to form

Grignard reagents.



Reactivity order :-



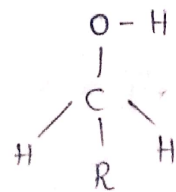
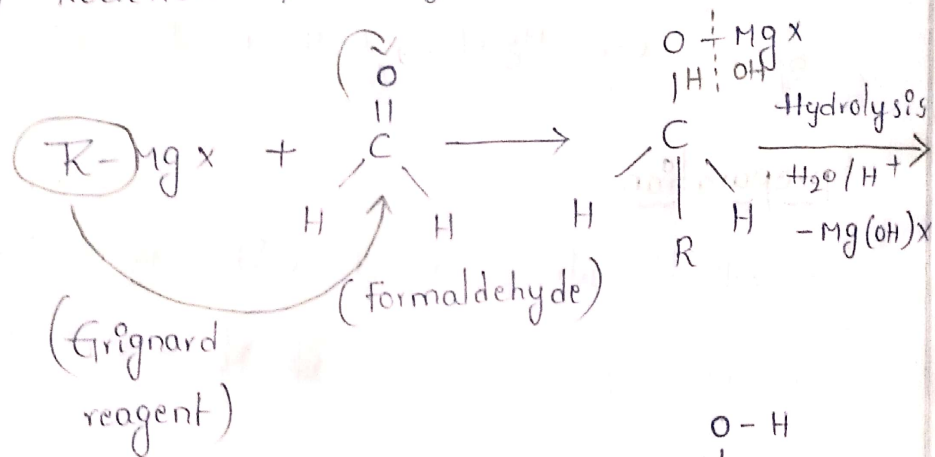
Synthetic Application of Grignard reagents:-

(or) chemical reactions of Grignard reagents:-

a) Nucleophilic addition reactions of Grignard reagents.

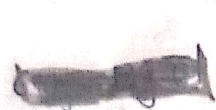
I Reaction of Grignard reagents with Carbonyl compounds. (or) preparation of different alcohols from $R-MgX$.

i) Reaction of $R-MgX$ with formaldehyde

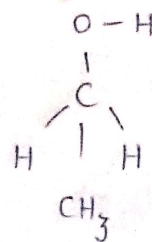


(1° Alcohol)

Eg:- If $R-MgX = CH_3MgCl$

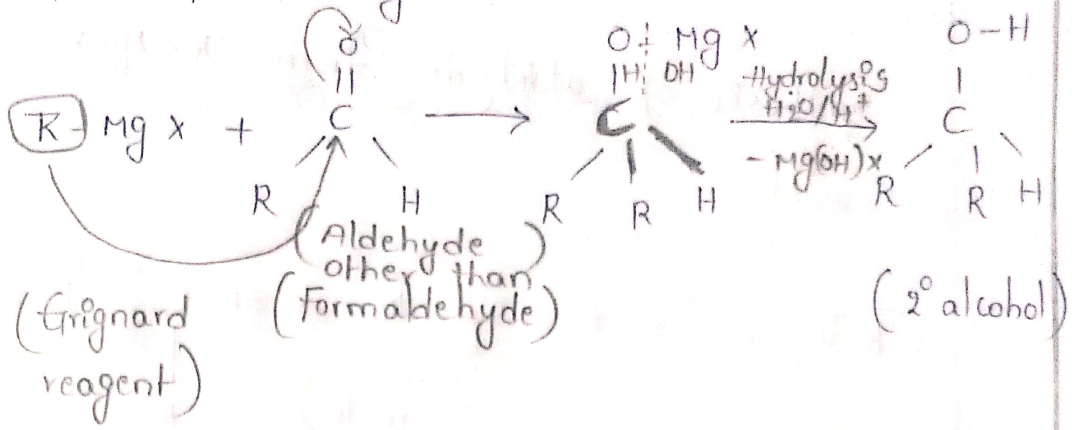


then product

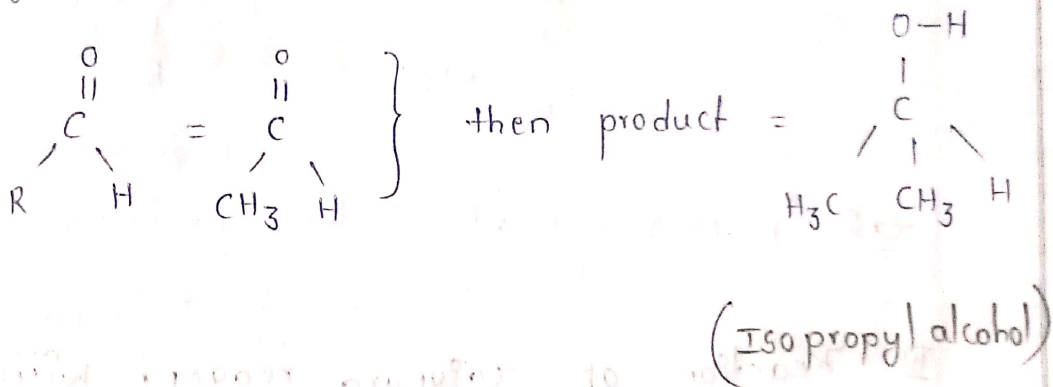


(Ethyl alcohol)

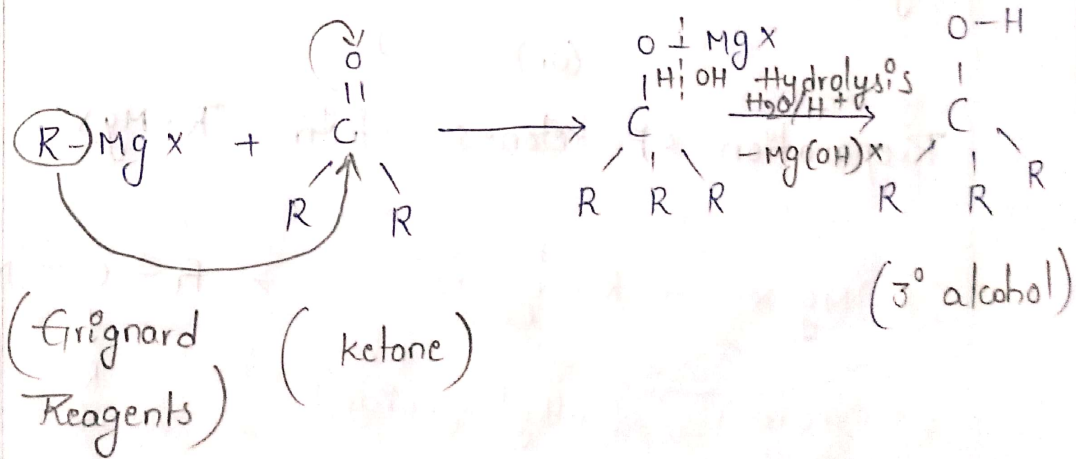
ii) Reaction of R-MgX with Aldehydes other than formaldehyde.



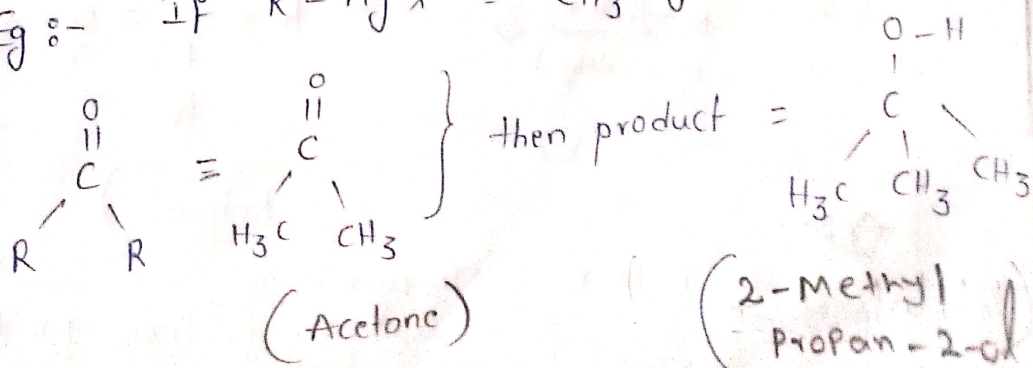
Eg:- If R-MgX = CH₃MgCl



iii) Reaction of R-MgX with ketones.

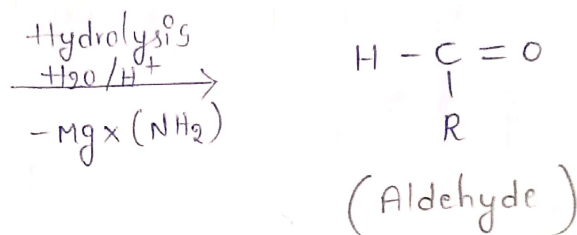
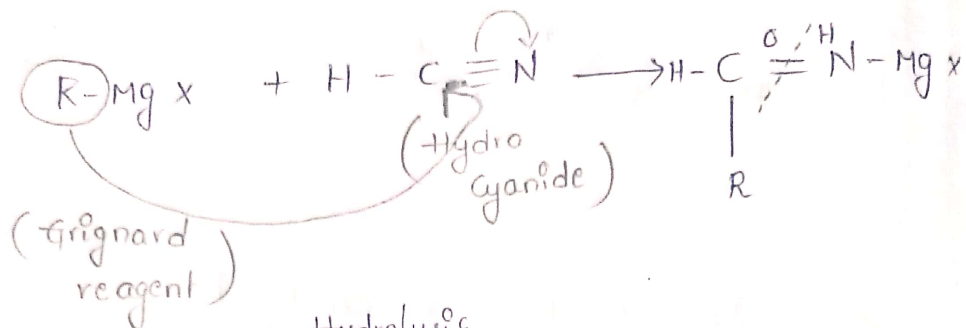


Eg:- If R-MgX = CH₃MgCl

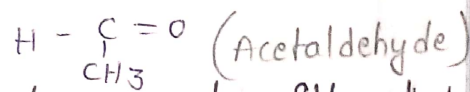


II Reaction of Grignard reagent with HCN
(or)

Synthesis of aldehyde from R-MgX
(or)
(Preparation)



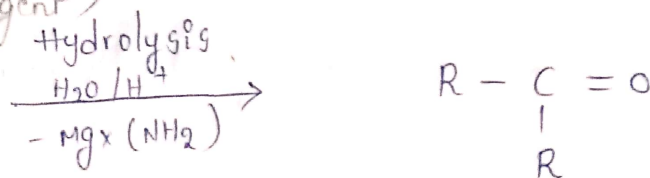
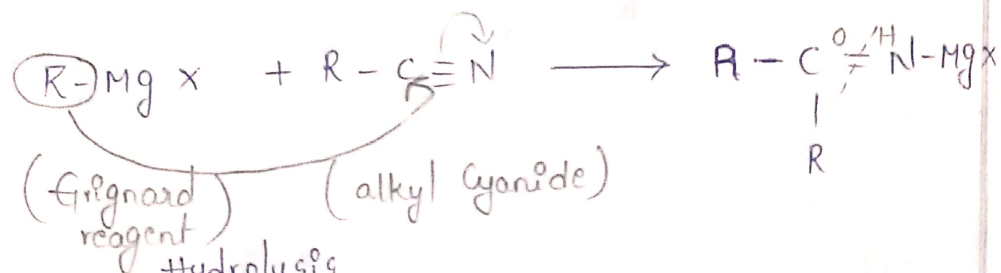
Ex: - R-MgX = CH₃MgX then product =



III Reaction of Grignard reagent with alkyl
Cyanides (R-CN)

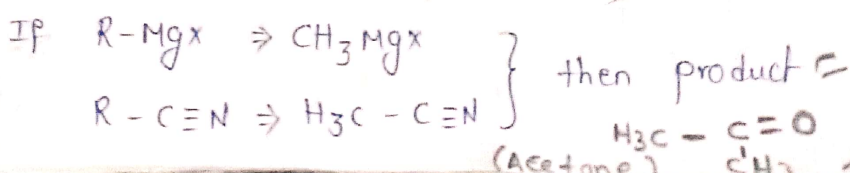
(or)

Preparation of ketones from R-MgX



(ketones)

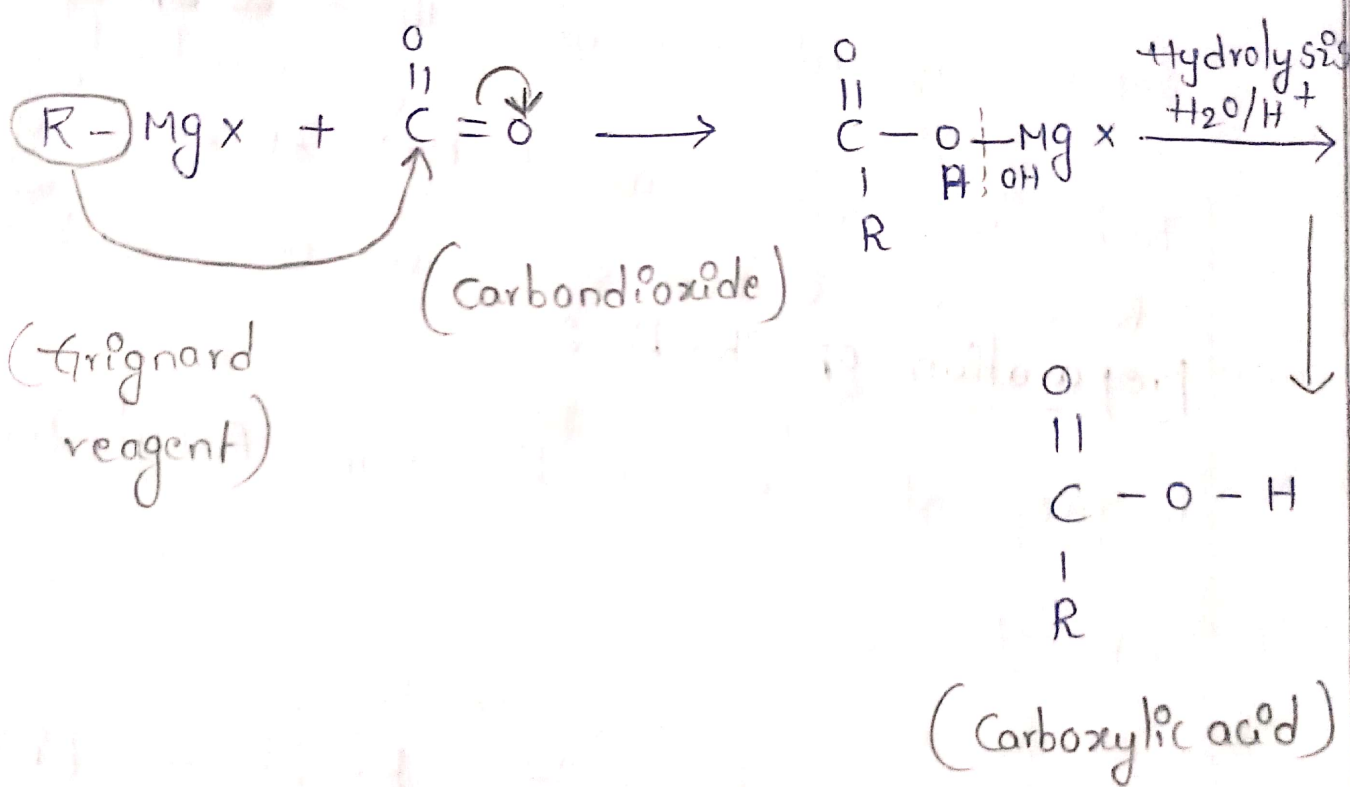
Ex: -



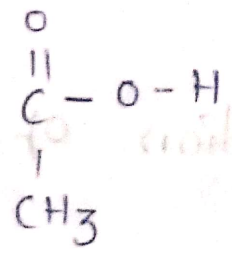
IV Reaction of Grignard reagent with Carbondioxide. (CO₂)

(or)

Preparation of Carboxylic acids from R-MgX

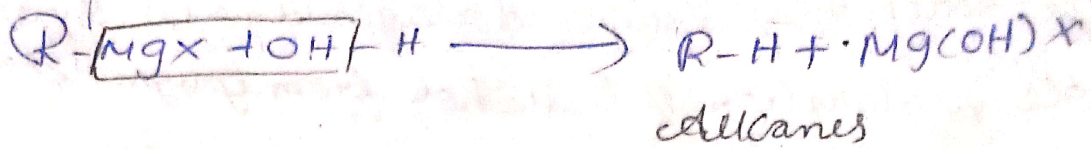


Eg:- If R-MgX = CH₃MgX then product =



(Acetic acid)

⑤ Reaction of Grignard reagents with compounds having active hydrogens (⑤) preparation of Alkanes from Grignard reagents -



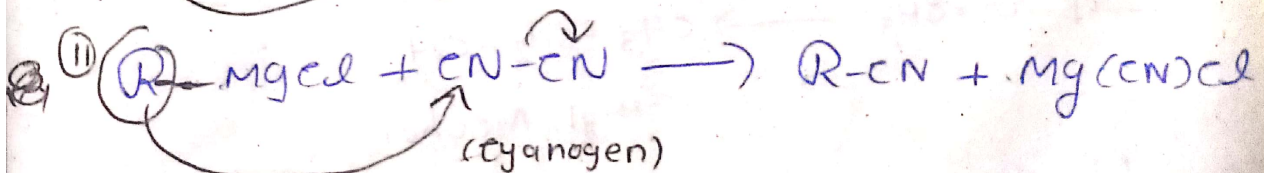
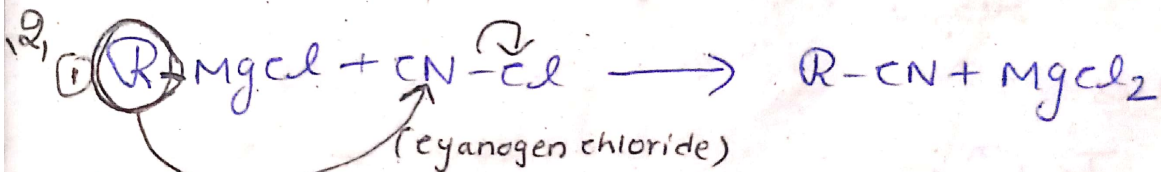
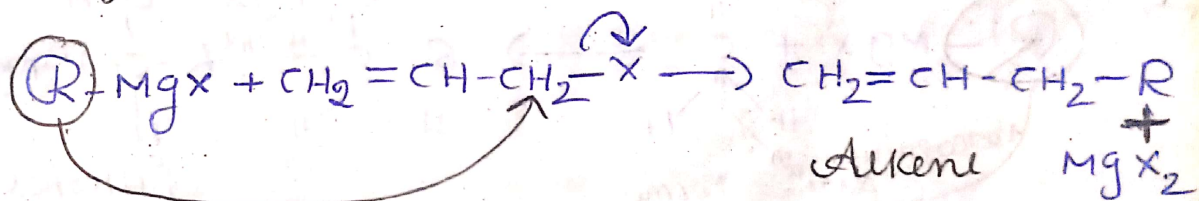
Cases:

If $\text{R} = \text{CH}_3 - \text{CH}_3$ is the product,
Methane

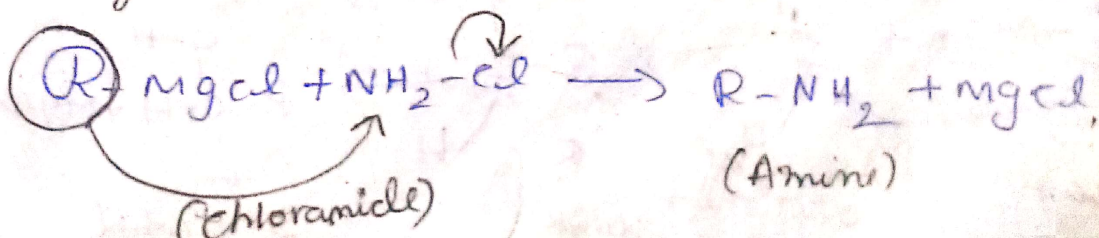
If $\text{R} = \text{C}_2\text{H}_5 - \text{C}_2\text{H}_5$ is the product,
Ethane

⑤ Nucleophilic Substitution reactions of Grignard reagents:-

1) preparation of Alkenes from Grignard reagent:-



3) preparation of Amines from Grignard reagent



④ Reaction of Grignard reagents with Epoxide
the preparation of 1° Alcohol from Grignard reagent

