

Organometallic Compounds.

Unit - II

An organic compound in which a metal directly linked to a carbon is known as Organometallic Compound.

Types of organometallic compounds:

1. Simple organometallic compounds

* Metal linked only to the 'R' groups

Eg., dimethylzinc (CH₃-Zn-CH₃)

* These are covalent in nature.

2. Complex organometallic compound:

* Metal is attached to 'R' group along with 'X' (halide)

Eg., CH₃-Mg-Br. (methylmagnesium bromide).

* These have ionic character.

GRIGNARD REAGENTS

i) The organomagnesium halide are known as Grignard reagents.

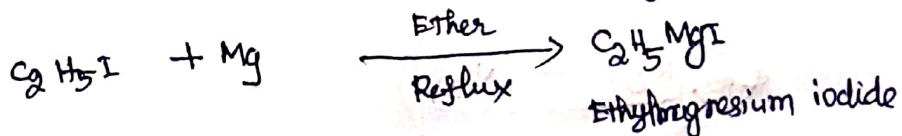
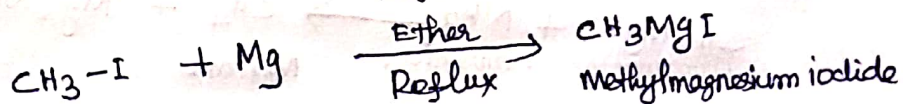
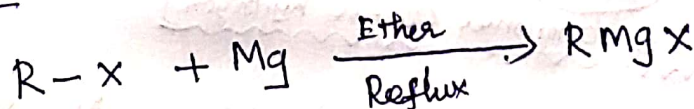
ii) The Grignard reagents are represented as R-Mg-X

where R = alkyl, alkenyl, alkynyl or aryl group and X = Cl, Br or I.

(iii) The Grignard reagent are very reactive.

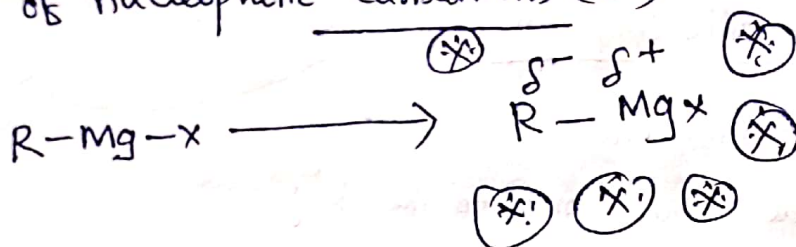
Preparation of Grignard reagent:

Grignard reagents are prepared by the action of magnesium on alkyl halide in anhydrous ether.



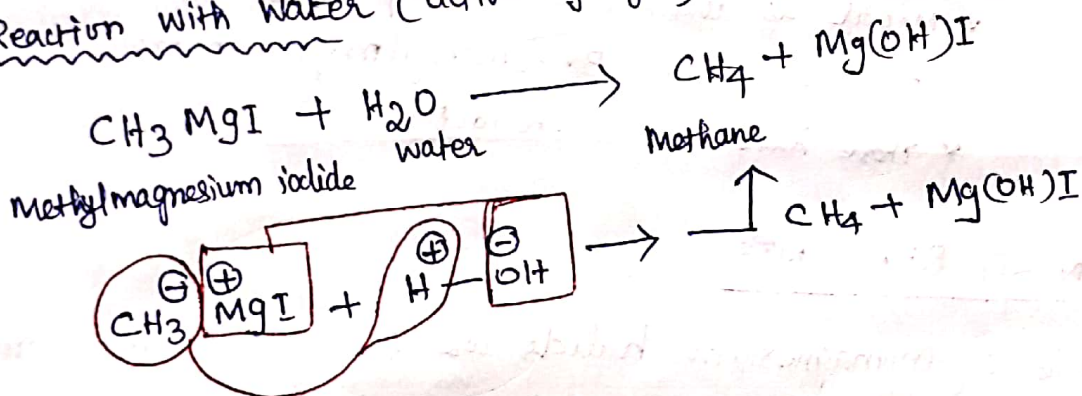
Reactivity of Grignard reagents:

The Grignard reagents may be regarded as polar compounds (electronegativity of 'Mg' and 'C' are widely different) and are sources of nucleophilic carbanions (C^-)

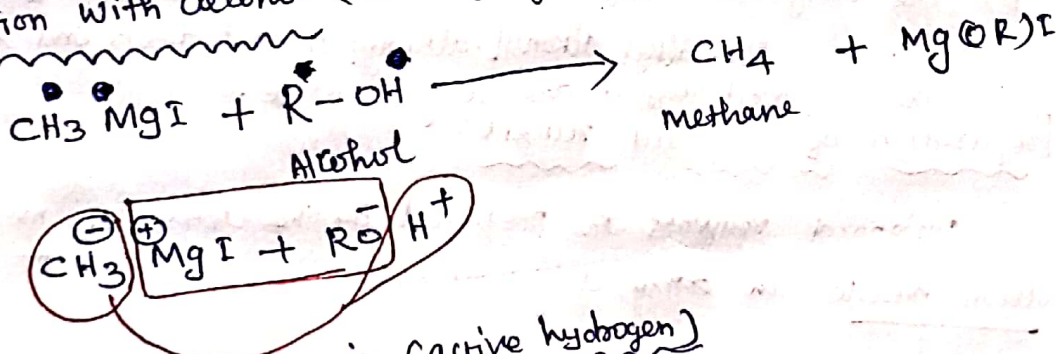


Reactions of Grignard reagent

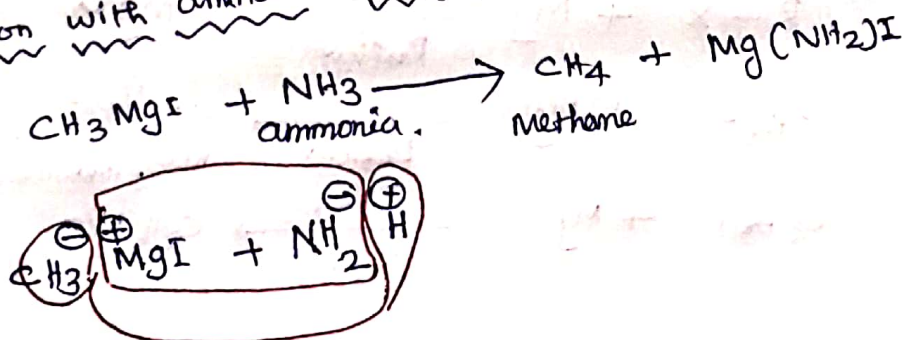
1. Reaction with water (active hydrogen)



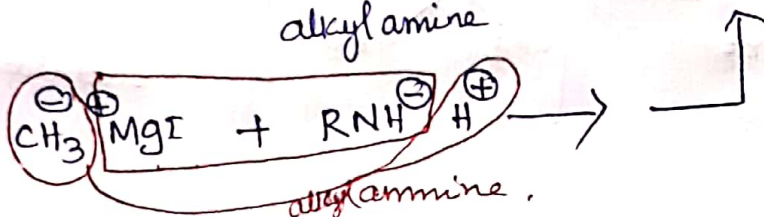
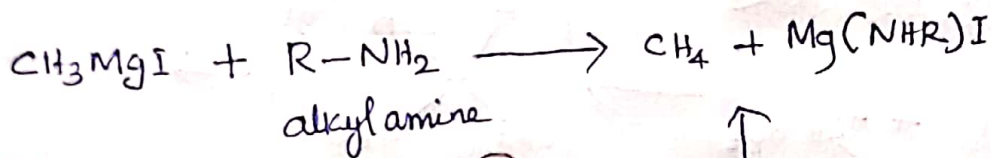
2. Reaction with alcohol (active hydrogen)



3. Reaction with ammonia (active hydrogen)

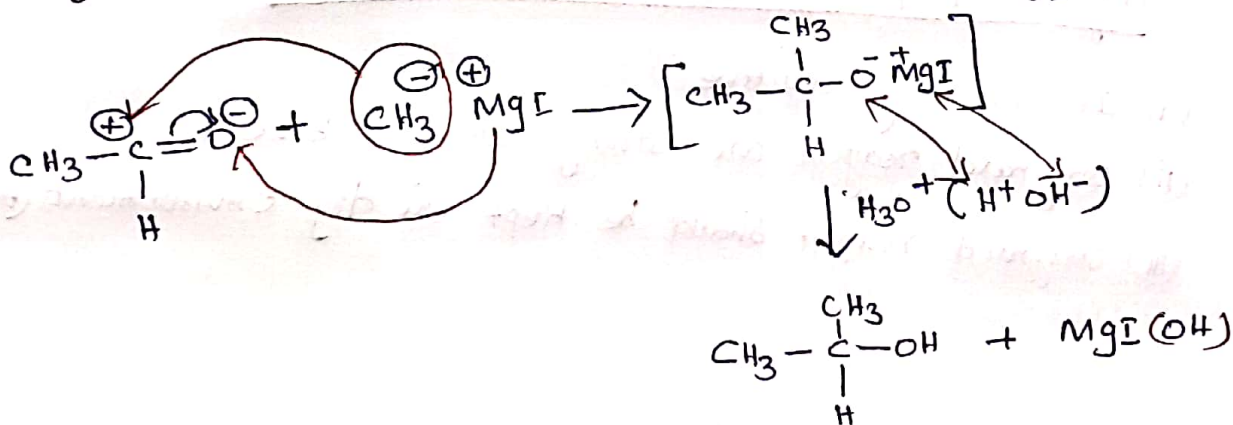
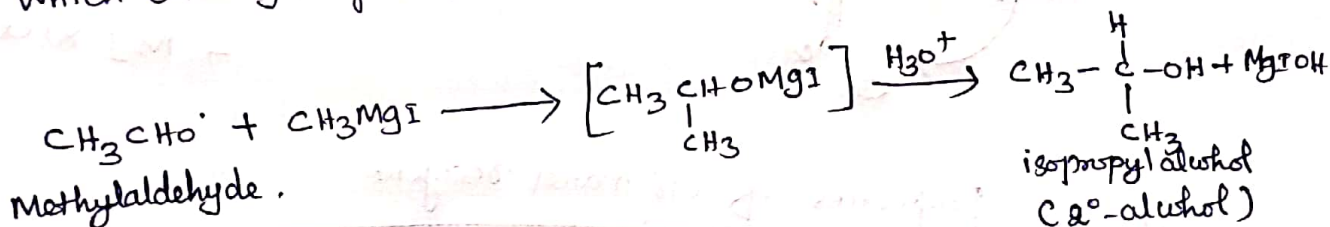


4. Reaction with Amine (active hydrogen)



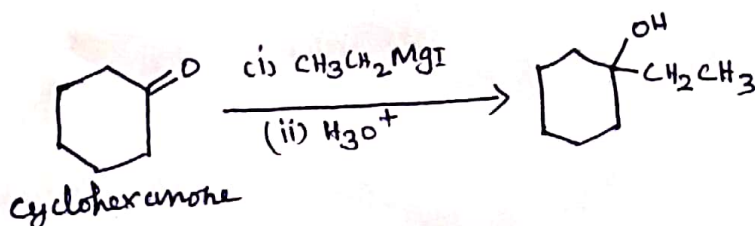
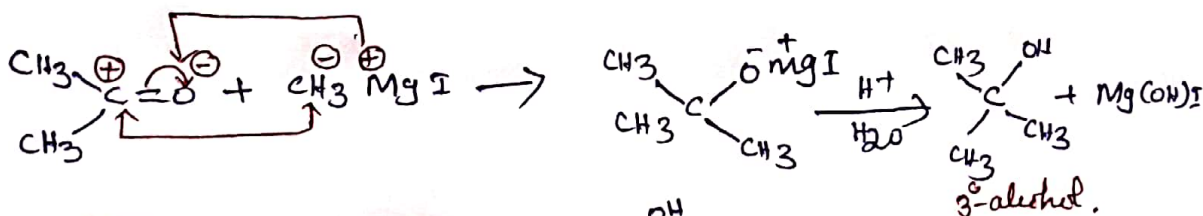
5. Reaction with aldehydes (Carbonyl compound)

Grignard reagents react with aldehydes to give addition products which on hydrolysis give 2° alcohols.

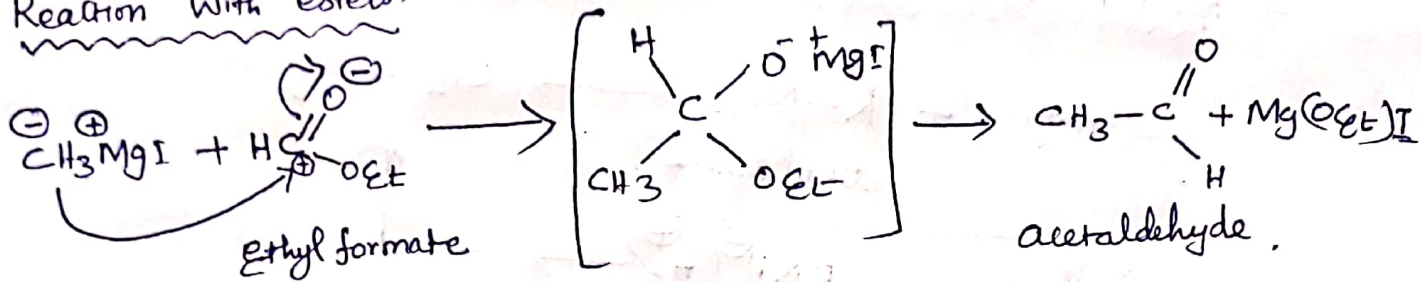


b. Reaction with Ketones: (Carbonyl Compound)

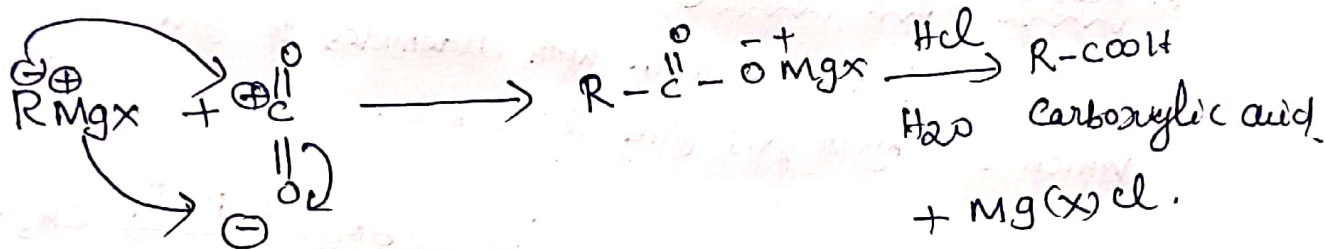
The ketone on reaction with Grignard reagents and subsequent hydrolysis give 3° alcohols.



⑦ Reaction with esters:



⑧ Reaction with carbon dioxide:



Physical properties of Grignard reagent:

- (i) It is very reactive.
- (ii) Grignard reagent are strong alkalis (Base)
- (iii) Grignard reagent should be kept in dry environment (in dry ether)