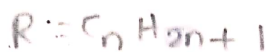


ORGANO METALLIC COMPOUNDS

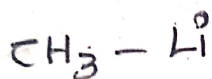
Organo metallic Compounds:-

The compounds in which a metal atom is directly attached to carbon of a hydrocarbon part are known as "Organo metallic compounds."

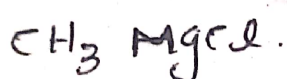


R-Li - Alkyl lithium

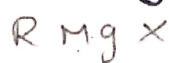
Ex:-



Methyl lithium



methyl magnesium chloride



Classification of Organo Metallic Compounds:-

(a) Classification of O.M.C's Based on composition

O.M.C's

Based On Composition.

Simple O.M.C's

Mixed O.M.C's

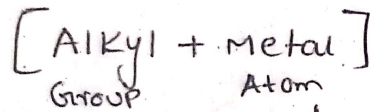
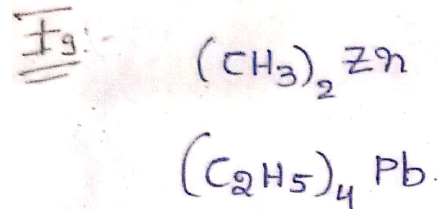


O.M.C's

Based on Composition.

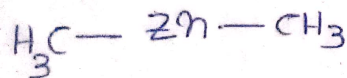
Simple O.M.C's

The O.M.C's which consists of only alkyl groups and metal atom are called as simple O.M.C's.



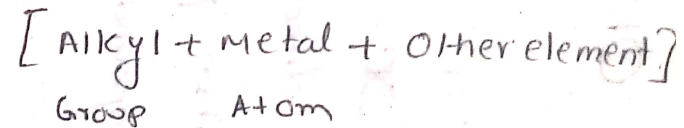
Symmetrical Simple
O.M.C's

Eg



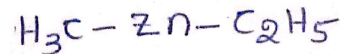
Mixed O.M.C's

The O.M.C's which consists of other elements along with metal atom and alkyl groups are called as mixed O.M.C's.



Un symmetrical Simple
O.M.C's

Eg



Classification of O.M.C's based on nature of carbon-metal (C-M) bond

O.M.C's

Based on nature of C-M bond

Ionic O.M.C's

* The O.M.C's in which carbon-metal (C-M) bond is ionic bond, are called as Ionic O.M.C's

* Generally high electro positive metals [s-block elements except Li] forms Ionic O.M.C's

σ -bonded O.M.C's

* The O.M.C's in which carbon-metal (C-M) bond is a σ bond are called as σ -bonded O.M.C's

* Generally less electro positive metals and non metals [p-block elements] form σ -bonded O.M.C's

[Sandwich] π -bonded O.M.C's

* The O.M.C's in which carbon-metal (C-M) bond is a π bond are called as π -bonded O.M.C's

* Generally transition elements [d-block elements] form π -bonded O.M.C's

Bridge bonded O.M.C's


* The O.M.C's in which the metal ions are bridged through alkyl groups are called as Bridge bonded O.M.C's

* Generally the elements like Al, Mg, Be -- etc form bridge bonded O.M.C's

* Generally in ionic o.m.c's the hydride carbon part exist as carbanion (C^-)

ionic o.m.c's are Soluble in polar Solvents and in-

Soluble in organic Solvents.

Example:  Na^+
Cyclopentadienyl Sodium
CaCa, BaBa ---
--- eHc

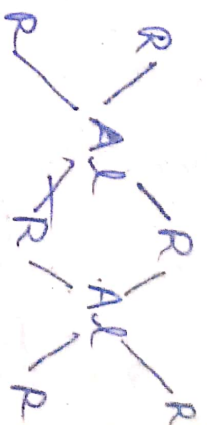
Example: $(C_6H_5)_4Pb$ ---
--- eHc

* In π -bonded o.m.c's

The delocalised π -orbital of the ~~atom~~ aromatic ring overlaps with the empty d-orbitals of transition elements R

π -bonded o.m.c's are also called as Sandwich o.m.c's

Fig



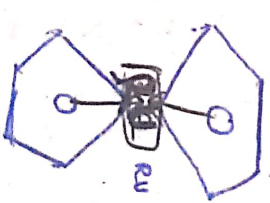
Al_2R_6

$[Mg(C_2H_5)_2]_n$

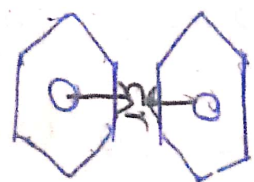
$[Be(CH_3)_2]_n$

Example:  delocalised π -orbital
Empty orbital
delocalised

Ferrocene π -orbital



Ruthenocene



Chromocene

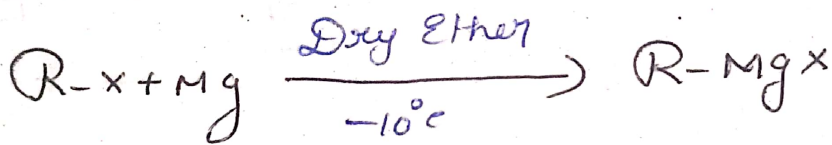
I Grignard reagent (or) Organo metall
Compounds (or) Alkyl magnesium halides.

The O.M.C which are in the form
of $R-MgX$ are called as Grignard
reagent.

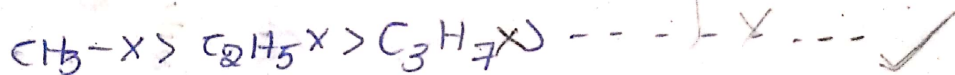
Ex :- ~~$R-X$~~ CH_3MgCl, C_2H_5MgBr - - -

preparation of Grignard reagents:-

Alkyl halides react with magnesium in
presence of dry ether to form Grignard
reagents.



Reactivity Order:-



II Synthetic Applications of Grignard reagents:-

(or) chemical reactions of Grignard reagents
(or) preparation of different organic compounds
using Grignard reagent:

(a) Reaction of Grignard reagents with compounds
having Active hydrogens (or) preparation of
Alkanes from Grignard reagents -



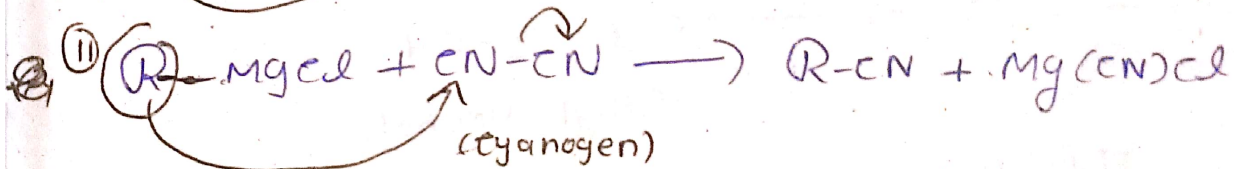
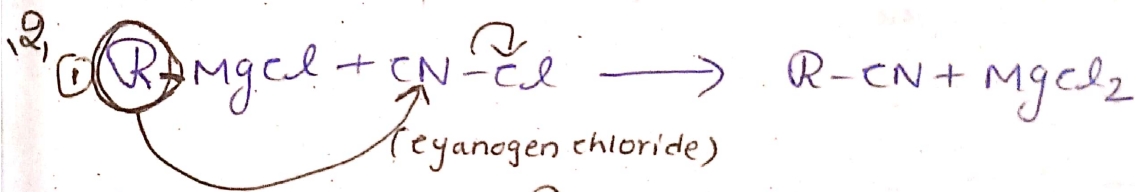
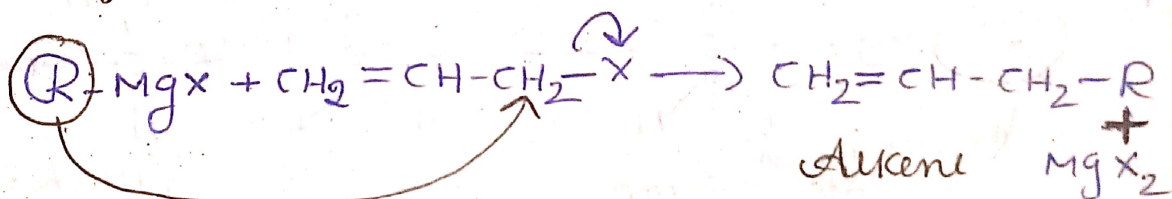
Cases:

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

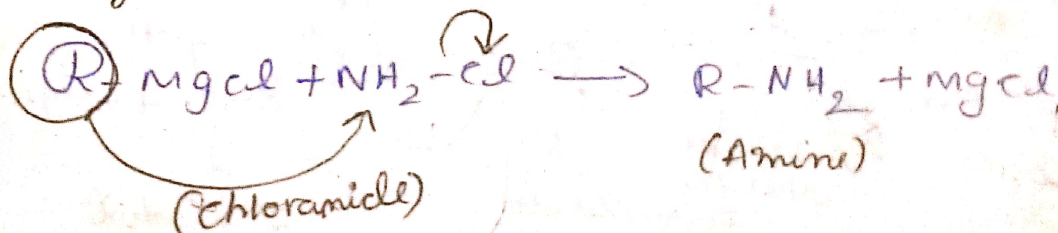
If $\text{R} = \text{C}_2\text{H}_5 - \text{C}_2\text{H}_5$ is the product,
Ethane

(b) Nucleophilic Substitution reactions of Grignard reagents:-

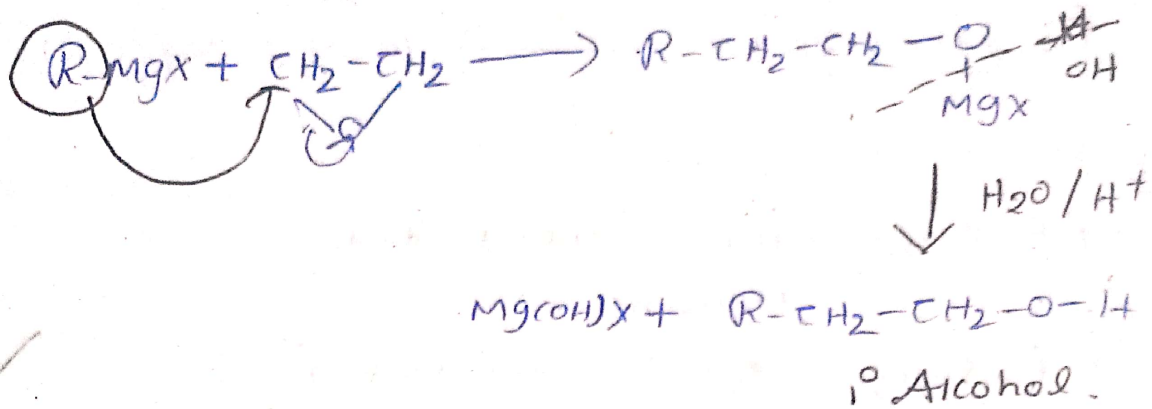
1) preparation of Alkenes from Grignard reagent:-



3) preparation of Amines from Grignard reagent

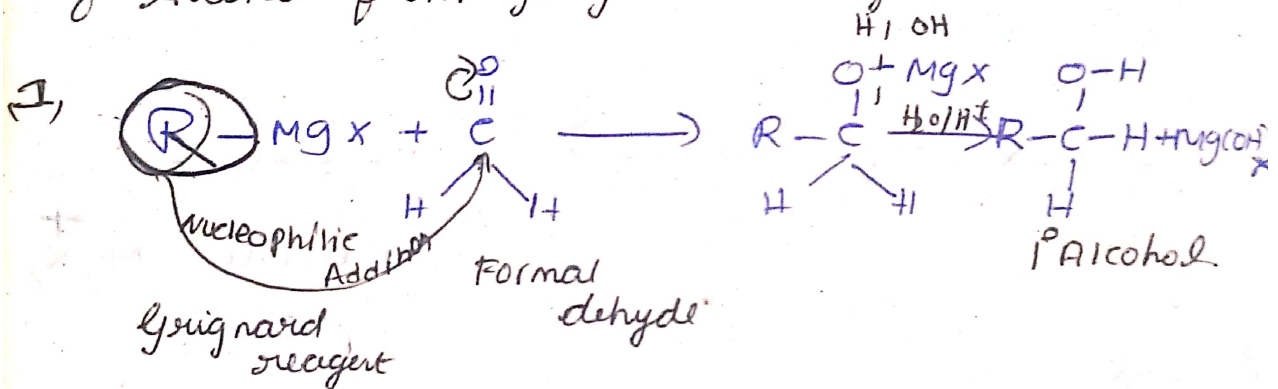


④ Reaction of Grignard reagents with Epoxides
 or preparation of 1° Alcohol from Grignard reagent



✓
 (c) Nucleophilic Addition reactions of Grignard reagents

→ Reaction of Grignard reagents with carbonyl compound (or) preparation of different types of Alcohol from Grignard reagent:



Cases:

