Organometallic Compound

Chemistry

2021-10-01

Contents

Organometallic compounds

Components of organometallic compounds

- Metals
- Metalloids
- Non metals

Father of organometallic compounds

The father of organometallic compounds is

- Henry Guilman

Condition for organometallic compound

- There must be bonding between carbon and metal.
- The carbon must be of organic compound

Nature of bond in organometallic compound The bond in organometallic compound is

- covalent bond

Carbon atom in organometallic compound The carbon atom in organometallic compound is that of

- Organic molecule

Quantity of metal atom in organometallic compound

The minimum quantity of metal atom in organometallic compound is

- 1

Examples of metal atoms in organometallic compound

The examples of metal atoms in organometallic compound are

- Lithium
- Magnesium
- Aluminium
- Potassium
- Calcium
- Chromium
- Cobalt
- Nickel
- Copper
- Zinc

Examples of metalloids in organometallic compound

The examples of metalloids in organometallic compound are

- Germanium
- Silicon

Examples of non metals in organometallic compound

The examples of non metals in organometallic compound are

- Boron

Examples of organometallic compound

The examples of organometallic compounds are

- Diethyl zinc
- Organocadmium
- Organocopper
- Tetramethylsilane
- Tetraethyl lead
- Organolithium

- Ferrocene
- Zeigler-Natta Catalyst
- Wilkinson's Catalyst

Molecular formula for diethyl zinc

$$(C_2H_5)_2Zn$$

Molecular formula for organocadmium

$$(CH_3)_2Cd$$

Molecular formula for organocopper

$$R_2Cu$$

Molecular formula for tetramethylsilane

$$(CH_3)_4\,Si$$

Molecular formula for tetraethyl lead

$$Pb(CH_3)_4$$

Molecular formula for organolithium

$$CH_3{-}Li$$

Molecular formula for ferrocene

$$(C_5H_5)_2Fe$$

History

First synthesizer of organometallic compound

The first synthesize of organometallic compound was

- William C. Zeise

First synthesized of organometallic compound

The first synthesized organometallic compound is

- Zeise's salt

Molecular formula for Zeise's salt

The molecular formula for Zeise's salt is

- $$\mathrm{K[PtCl_3\,(C_2H_4)]}$$

Molecular formula for wilkinson's catalyst

The molecular formula for wilkinson's catalyst is

- $$[(C6H5)3P3RhCl]$$

Name for wilkinson's catalyst

The name for wilkinson's catalyst is

- Triphenyl phosphine rhodium chloride

Molecular formula for Ziegler - Natta catalyst

The molecular formula for Ziegler - Natta catalyst is

- $$[(C2H5)3AlTiCl4]$$

Precautions of organometaliic compound

$\mathrm{B(OCH_3)_3}$

$\mathrm{B(OCH_3)_3}$ is not organometallic compound. - The bond between carbon is with oxygen. - There is no bond with carbon and metal.

$\mathrm{(C_3H_7O_4)Ti}$

$\mathrm{(C_3HtO_4)Ti}$ is not organometallic compound.

- The bond between carbon is with oxygen.
- There is no bond between carbon and metal.

Physical properties of organometallic compounds

Toxicity of organometallic compounds

Organometallic compounds are

- Highly toxic

Oxidation and reduction agent in organometallic compounds

Organometallic compounds act as

- Reducing agent

Melting point of organometallic compounds

The melting point of organometallic compounds is

- Low

Solubility of organometallic compounds in water

The solubility of organometallic compounds in water is

- Insoluble in water

Solubility of organometallic compounds in organic solvent.

The solubility of organometallic compounds in organic solvent is

- Soluble in organic solvent

Reactivity of organometallic compounds

The reactivity of organometallic compounds is

- Highly reactive

Applications of organometallic compounds

Applications of solvent in organometallic compounds

Organometallic compounds are used as

- solvents

Application for additive in oragnometallic compounds

Organometallic compounds are used as additive as

- TEL

Application of TEL as organometallic compound

TEL is used in fuel as

- Antiknocking agent

Application of Wilkinson's catalyst in organometallic compounds

Wilkinson's catalyst is used in

- Hydrogenation of alkene

Type of wilkinson's catalyst

The types of wilkinson's catalyst is

- Heterogenous

Application of Ziegler Natta catalyst of organometallic compounds

Zeigler Natta catalyst is used in

- Polymerization of alkene

Type of zielger natta catalyst

The type of ziegler natta catalyst is

- Heterogenous

Applications of grignard's reagent in organometallic compounds

Grignard's reagent is used to prepare

- Alcohol
- Carboxylic acid

Applications of organoarsenic organometallic compounds

Organoarsenic compounds are used for

- Treatment of syphillis

Application of pallidium of organometallic compounds

Palladium compounds are used in

- Catalyzing coupling reactions

Classification of organometallic compounds

Basis for classifiction of organometallic compounds

The basis for classification of organometallic compounds is

- Nature of bonds

Types of organometallic compounds on the basis of classification

The types of organometallic compounds are

- Sigma Bonded Organometallic compounds
- Pi bonded organometallic compounds
- Sigma and pi bonded organometallic compounds

Nature of bond between carbon atom and metal atom in sigma bonded organometallic compounds

The bond between carbon atom and metal atom in sigma bonded organometallic compounds is

- Sigma

Examples of sigma bonded organometallic compounds

The examples of sigma bonded organometallic compounds are

- $$C_2H_5MgBr$$

  (Ethyl Magnesium Bromide)

Nature of bond between carbon atom and metal atom in pi bonded organometallic compounds

The bond between carbon atom and metal atom in sigma bonded organometallic compounds is

- Pi

Examples of sigma and bonded organometallic compounds

The examples of sigma bonded organometallic compounds are

- $$Co(C_5H_5)_2$$

  Cobaltocene
- $$Ru(C_5H_5)_2$$

  Ruthocene
- $$Fe(C_5H_5)_2$$

  Ferrocene

Nature of bond between carbon atom and metal atom in sigma and pi bonded organometallic compounds

The bond between carbon atom and metal atom in sigma bonded organometallic compounds is

- Sigma and Pi

Examples of sigma and pi bonded organometallic compounds

The examples of sigma bonded organometallic compounds are

- Tetracatbonyl nickel
  $$Ni(CO)_4$$
- Pentacarbonyl iron
  $$Fe(CO)_5$$
- Hexacarbonyl chromide
  $$Cr(CO)_5$$

Nature of metal carbon bond in organometallic compounds

The bond between metal and carbon atom in organometallic compound is

- Polar

Charge in carbon atom in organometallic compound

The carbon atom in organometallic compound has charge of

- Partial negative

Charge in metal atom in organometallic compound

The metal atom in organometallic compound has charge of

- Partial postive

Cause of negative charge of carbon atom in organometallic compound

The cause of negative charge of carbon atom in organometallic compound is

- Metals are highly electropositive.

Preparation of organometallic compound

Grignard reagent

Grignard reagents are

- Alkyl magnesium halide

Preparer for Grignard Reagent

The preparer for grignard reagent is

- Victor grignard

Nobel Prize for Victor Grignard

The date for nobel prize award for Victor Grignard was on

- 1912

Reaction of preparation of organometallic compound of grignard's reagent from haloalkane

$$\mathrm{R{-}X + Mg \longrightarrow RMgX}$$

Reactants in preparation of organometallic compound grignard reagent from haloalkane

- Alkyl Halide
- Magnesium metal

$$\mathrm{RX, Mg}$$

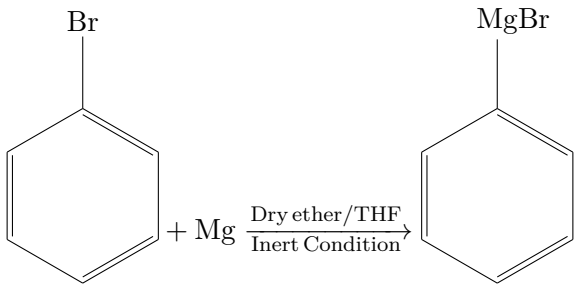
Products in preparation of organometallic compound grignard regagent from haloalkane

$$\mathrm{RMgX}$$

- Alkyl Magneisum halide

Haloarene

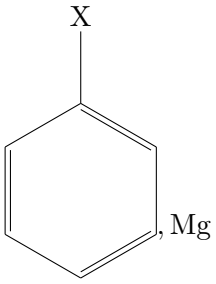
Reaction of preparation of organometallic compound grignard reagent from haloarene



Condition for preparation of organometallic compound grignard reagent from haloarene
The condition for preparation of organometallic compound grignard reagent from haloarene is - Presence of dry ether - Presence of THF - Presence of Inert Condition

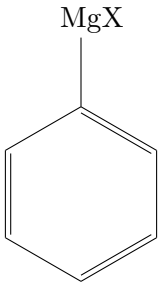
Reactants in Reaction of preparation of organometallic compound grignard reagent from haloarene

- Haloobenze
- Magneisum Metal



Products in Reaction of preparation of organometallic compound grignard reagent from haloarene

- Phenyl magnesium halide



Reaction of preparation of organometallic compound organolithium compound

$$2\,\mathrm{Li} + \mathrm{CH_3Cl} \longrightarrow \mathrm{LiCH_3} + \mathrm{LiCl}$$

Reactants in preparation of organometallic compound organolithium compound

- Lithium
- Chloromethane

$$\mathrm{Li}, \mathrm{CH_3Cl}$$

Products in preparation of organometallic compound organolithium compound

- Methylithium
- Lithium chloride

$$\mathrm{LiCH_3, LiCl}$$

Reaction of preparation of organometallic compound of organocopper compound

$$\mathrm{Cu_2H_2 + CuCl \longrightarrow Cu_2C_2}$$

Reactants in preparation of organometallic compound of organocopper compound

- Copper hydride
- Copper chloride

$$\mathrm{Cu_2H_2, CuCl}$$

Products in preparation of organometallic compound of organocopper compound

- Copper acetylide

$$\mathrm{Cu_2C_2}$$

Reaction of preparation of organometallic compound organocadmium compound

$$\mathrm{2\,RMgX + CdCl_2 \longrightarrow R_2Cd + 2\,MgXCl}$$

Reactants in preparation of organometallic compound organocadmium compound

- Cadmium Chloride
- Alkyl Magnesium Halide

$$\mathrm{RMgX, CdCl_2}$$

Products in preparation of organometallic compound organocadmium compound

- Alkyl Cadmium
- Magnesium Dihalide

$$\mathrm{R_2Cd, MgXCl}$$

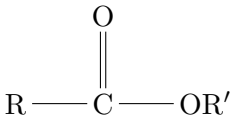
Chemical Properties

Reactions

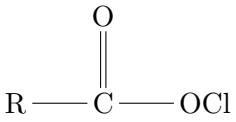
The reactions of organometallic compound with grignard reagent are

- Preparation of alcohol
- Preparation of carboxylic acid
- Preparation of alkanes
- Reaction with esters
- Reaction with acid chloride

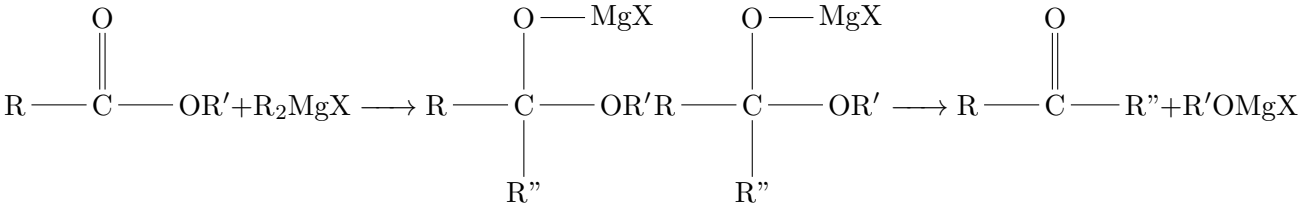
Molecular formula for ester



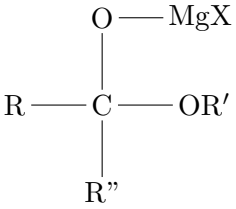
Molecular formula for acid chloride



Reaction of organometallic compound of grignard reagent with ester

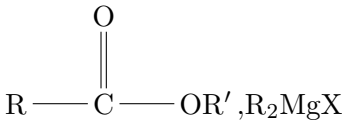


Intermediate compound in reaction of organometallic compound of grignard reagent with ester



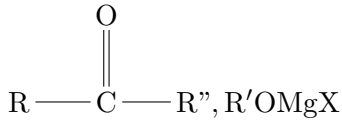
Reactants in reaction of organometallic compound of grignard reagent with ester

- Ester
- Grignard Reagent(Alkyl Magnesium Halide)

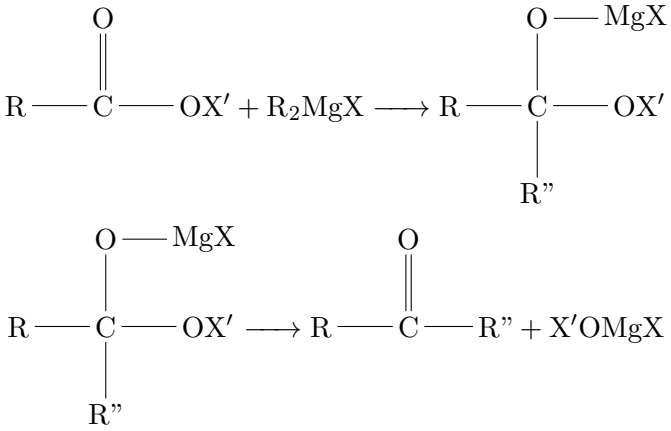


Products in reaction of organometallic compound of grignard reagent with ester

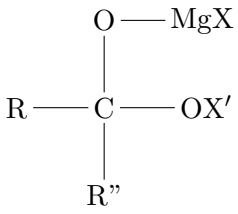
- Ketone



Reaction of organometallic compound of grignard reagent with acid chlorides

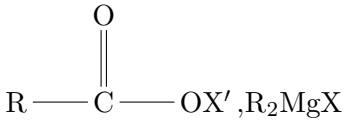


Intermediate compound in reaction of organometallic compound of grignard reagent with ester



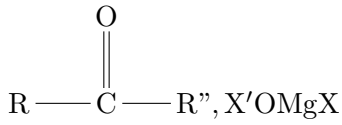
Reactants in reaction of organometallic compound of grignard reagent with acid chloride

- Acid chloride
- Grignard reagent (Alkyl Magnesium Halide)

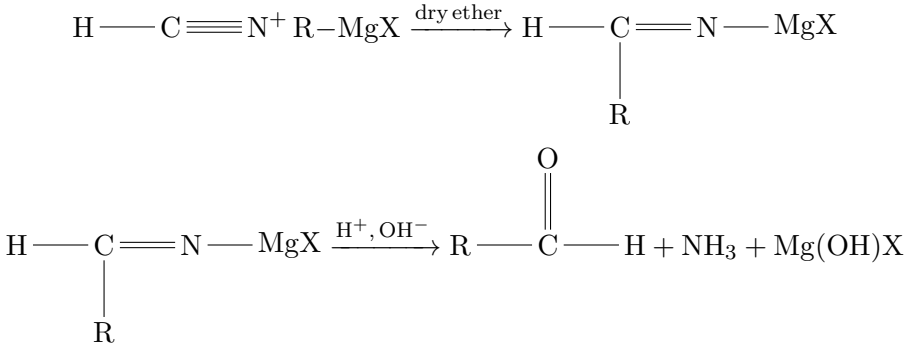


Products in reaction of griganrd reagent with acid chloride

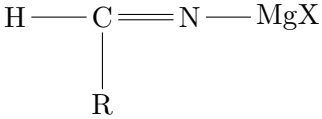
- Ketone



Reaction of organometallic compound as grignard reagent with hydrogen cyanide

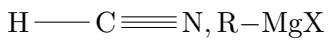


Intermediate compound in reaction of organometallic compound with hydrogen cyanide with grignard reagent



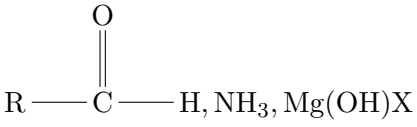
Reactants in reaction of organometallic compound as grignard reagent with hydrogen cyanide

- Hydrogen Cyanide
- Grignard reagent (Alkyl Magnesium Halide)

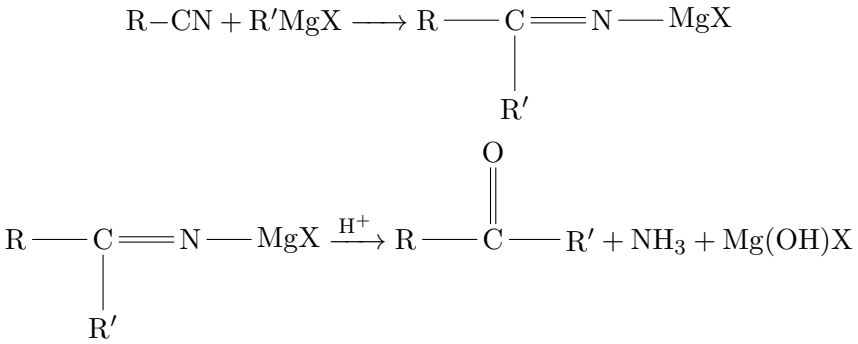


Products in reaction of organometallic compound as grignard reagent with hydrogen cyanide

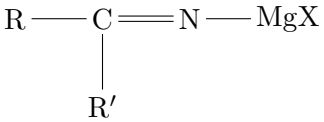
- Aldehyde
- Ammonia
- Magnesium Hydroxy Halide



Reaction of organometallic compound as grignard reagent with alkane nitrile



Intermediate compound in reaction of organometallic compound with alkane nitrile with grignard reagent



Reactants in organometallic compound as grignard reagent with alkane nitrile

- Alkane nitrile
- Grignard reagent (Alkyl magnesium halide)

$$\mathrm{R-CN, R'MgX}$$

Products in organometallic compound as grignard reagent with alknae nitrile

- Ketone
- Ammonia
- Magnesium Hydroxy Halide