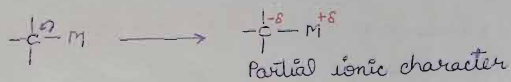


Organometallics

"Compounds which contain direct Carbon-Metal bond are known as organometallic compounds."

In organometallic compounds the electronegativity of Carbon is more than metal atom and this difference makes such compounds polar in nature. This polarity depends upon the difference in electronegativity of carbon and metal atoms.

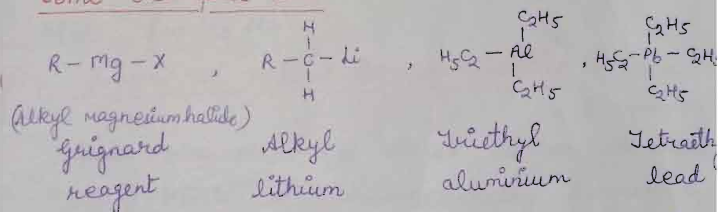
Carbon-metal bond



where: C - carbon atom

M - metal atom [Mg, Ca, Na, Li, Al, Sn etc.]

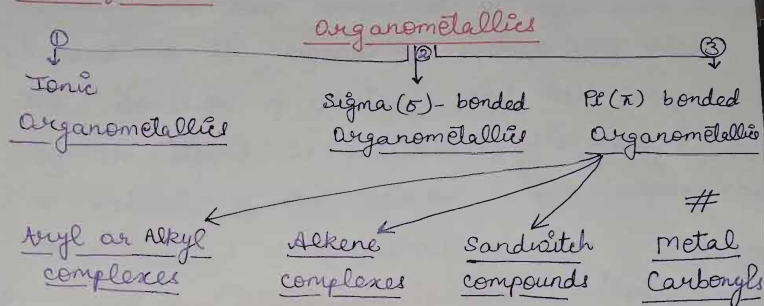
Some examples are



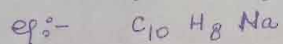
The reactivity of these compounds depend upon the percentage ionic character (i.e.

electropositivity of the metal) of the carbon-metal bond and is directly proportional to it.

Classification



① Ionic Organometallics :- Such compounds have hydrocarbon part i.e. negatively charged and metal ions i.e. positively charged, held together by electrostatic forces of attraction.

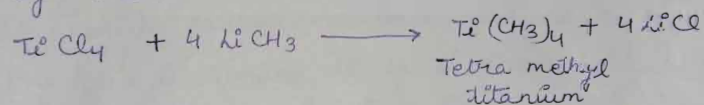


② Sigma (σ) bonded Organometallics :- Such compounds contain one or more metal-carbon covalent (sigma) bonds and are generally formed by non-transition metals with σ -covalent bond.

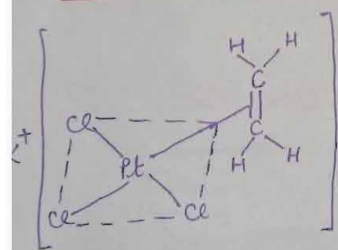
ex:- $Al(CH_3)_3$

Pi (π) bonded Organometallics :- The transition metals bind themselves to certain type of unsaturated hydrocarbons and their derivatives using their d-orbitals. In such compounds a metal atom is bonded to the ligands in such a way that the donation of electrons and back acceptance by the ligand is possible by the use of π -orbitals of the ligands. Such complexes are thus called π -complexes.

Arlyl or Alkyl complexes :- Simple organometallic compounds of transition metals prepared by reactions like -



Alkene complexes :- The complexes containing alkene as π bonding ligand (two electron donor or three electron donor etc.)
eg:- Ziese's salt



Ziese's salt

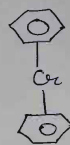
Sandwich complexes :- complexes in which transition metal is sandwiched with symmetrical delocalised organic system.

1) η^5 -0 Ferrocene i.e. $(\pi C_5H_5)_2 Fe$

or η^5 - π -cyclopentadienyl iron



2) Dibenzene chromium



Metal carbonyls :-

In addition to σ - and π -bonded organometallic there is another important class of organometallic compounds known as metal carbonyls, in which carbon monoxide acts as a ligand. This CO is bonded to metal through carbon atom. These are of two types -

- 1) mononuclear carbonyls :- which contain only one metallic atom per molecule.
- 2) Polynuclear carbonyls :- which contain two or more metallic atoms per molecule.

