

Metal arenes

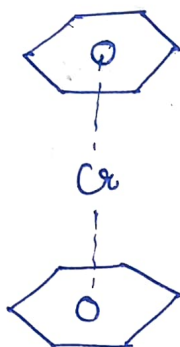
(1)

The Compounds in which metal atom bonded to aromatic hydrocarbons rings.

Preparation :-

Ligand exchange method :-

Metal arenes can be prepared by replacing existing ligands on metal complexes with an arene ligand.



Properties :-

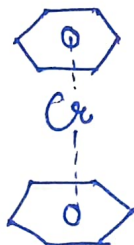
1) Stability :- Metal arenes are more stable.

Coordinate complex. It is more stable due to delocalization of π - e^- .

2) Reactivity :- It can undergo various reactions, such as oxidative addition, Reductive elimination and ligand substitution.

3) Magnetic Properties :- It shows Paramagnetic character due to the presence of vacant d-orbitals.

Structure :-



Bonding :-

The Bonding in metal arenes involves a combination of σ -Bonding and π -Bonding interactions.

π -Backbonding :- It involves the donation of electron density from the aromatic ring to empty metal d-orbitals.

Dinitrogen Complex.

It is also known as Nitrogenase Complexes.

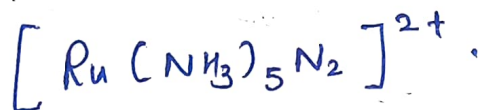
This compound is the binding of dinitrogen to central metal atom.

Preparation :-

Ligand exchange :-

The Complex is obtained by replacing other ligands in transition metal complexes with dinitrogen.

Example :-

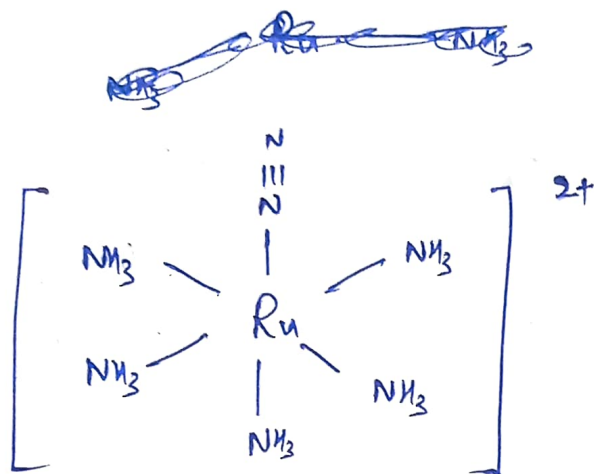
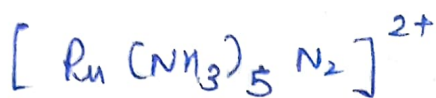


Properties :-

- 1) Reactivity :- It can undergo various reactions, such as Reduction, Protonation etc.
- 2) Nitrogen fixation :- In this catalyze the atmosphere N_2 into Ammonia (NH_3).

Structure :-

(3)



Bonding :-

σ -Donation :- It occurs through the donation of electron from N_2 atom to central metal atom.

π -Back Bonding :- It is the donation of e^- from central metal atom to π^* orbital N_2 atom.

Fluxional Molecule

Fluxional molecules are chemical compounds that undergo rapid interconversion between different conformations or isomers due to low-energy barriers.

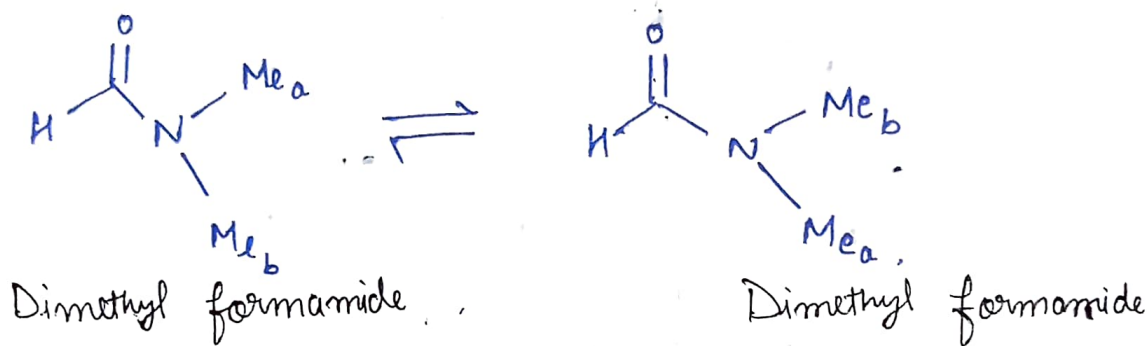
Preparation :-

Synthesis at low temperature :-

Some fluxional molecules can be synthesized under

Conditions of low temperature, where the barriers to interconversion between different conformations are lowered, allowing the formation of multiple isomers

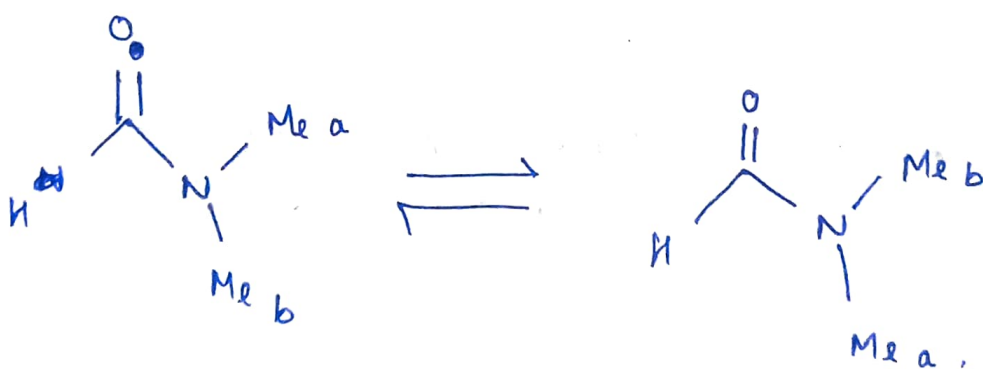
Example:-



Properties :-

- 1) Dynamic behaviour :- Fluxional molecules exhibit rapid interconversion b/w different isomers or conformations.
- 2) Temperature dependence :- The interconversion of fluxional molecule is temperature dependent. at low temperature the interconversion takes place.

Structure :-



Dimethyl formamide.

Isolobal Concept and its applications :-

This Concept is used in organometallic chemistry to relate the structure of organic and inorganic molecular fragments and to predict the bonding properties of organometallic compounds.

Applications of the isolobal Concept include :-

- 1) Ligand design:- The isolobal Concept is used in the design of ligands for transition metal complexes.
- 2) Rational Synthesis:- The isolobal concept aids in the rational synthesis of new compounds.
- 3) Catalysis:- The isolobal Concept is applied in the design of catalysts for various reactions.
- 4) organometallic Chemistry:- The isolobal concept is useful in organometallic Chemistry.