

Hello everyone.

Welcome to this inorganic class

of third year, BSc Semester 6.

Today, we are going to discuss the

Module- definition and nomenclature

of organometallic compounds

of Unit organometallic chemistry.

The outline of this module is

definition and nomenclature

of organometallic compounds.

At the end of this module,

students will be able to define

organometallic compounds and will be

able to write the IUPAC nomenclature

of the organometallic compounds.

Now what are organometallic compounds?

Organometallic compounds are the

compounds which contain one or more

metal carbon linkage, for example.

Tetra ethyl lead, diethyl zinc.

In Tetraethyl lead, lead is directly linked

to carbon from the ethyl group.

Now some compounds like triethoxy

aluminium, sodium acetate etc.

They are not included in organometallic

compounds because in these compounds the

metal is not directly linked to carbon.

Let us see IUPAC nomenclature.

Nomenclature of simple compounds.

It can be written as, the simple alkyl group

Will be written 1st and the metal will be

written after the alkyl or aryl group.

For example,

CH_3Li that is Methyl lithium

$(\text{C}_2\text{H}_5)_2\text{Zn}$ that is diethyl zinc and so on.

Nomenclature of carbonyls.

Carbonyls are the compounds

which contain CO as ligand and the

metal is in zero oxidation state.

For example $\text{Ni}(\text{CO})_4$.

this is there

are four CO groups.

And metal is nickel which is

in zero oxidation state.

So it can be written as

Tetra carbonyl nickel.

Next is $\text{Mn}_2(\text{CO})_{10}$ there are 10 carbonyl groups.

So this can be written as deca.

Carbonyl dimanganese and it has.

Also, zero oxidation state.

Similarly we have other compounds

like $\text{Fe}_2(\text{CO})_9$, $\text{Co}_2(\text{CO})_8$ and we also

have ions like $\text{V}(\text{CO})_6^-$,

that is hexa carbonyl vanadate ion.

Now if the ligands,

if it acts as a bridge between 2 metal atoms,

then we have to write a Greek letter,

μ .

Before their names so this prefix

μ will be repeated for the

name of each bridging ligand.

And now here is example $\text{Co}_3(\text{CO})_9$.

And in this there are two cobalt metal.

And there are two carbonyl groups

which forms a bridge between

these two cobalt atoms.

So we can write this as di methyl carbonyl bis

Trimethyl cobalt.

Similarly we have next

compound $\text{Co}_2(\text{CO})_8$.

This can be written as trimethyl carbonyl bis.

Trimethyl iron.

Now,

if there are two metal atoms which has

metal metal linkage then this can be

classified as symmetrical or unsymmetrical.

In symmetrical metal carbonyls they are named

by the use of multiple prefixes like bis,

tris etc.

Based on the number of groups.

So in this example we have two

cobalt linked by a metal metal bond

and there are four carbonyl groups.

So this can be written as bis

Tetracarbonyl. Cobalt.

Then we have unsymmetrical metal carbonyls.

In this, one of the central metal atom.

Is treated.

And other metal atom is treated as a

ligand and so here we have two metal atoms,

Rhenium and cobalt.

So we write this as penta carbonyl,

Tetra, carbonyl, cobalto, rhenium.

So rhenium is considered as a central

metal atom and cobalt with four carbonyl

groups is considered as a ligand.

The nomenclature of Sigma

and Pi bonded ligands.

This Sigma and Pi notations.

They are used to distinguish

between one carbon bonded and

multiple carbon bonded ligands.

Now we have here example

of cyclopentadienyl ligand.

So we write Sigma when it is 1 carbon

bonded and π is written to indicate

that it is 5 carbon bonded ligands.

For unsaturated molecules or groups,

the prefix eta or hepto is used.

Now Eta one indicate that there

is mono hepto that means there is

only one carbon which is linked.

Eta two is dihapto to eta

three is trihapto and so on.

Here are some examples to indicate this

eta linkage so we have FeC_5H_5 twice,

which can be written as bis

eta 5 cyclopentadienyl iron.

Similarly,

we can write chromium C_6H_6 twice.

Now this is benzene ligand,

which has six carbon,

so this can be written as

Bis Eta 6 benzene chromium.

Similarly, we can write other compounds.

Nomenclature of other compounds like cobalt,

$\text{Co}(\text{C}_3\text{H}_5)_3$, here, C_3 .

There are three carbons.

We write it as eta three that

is allyl tri carbonyl cobalt.

Similarly C_6H_6 chromium

Co_3 there are two groups,

so one can be written as Eta six

that is Benzene and tri carbonyl.

So here are some of the references.

For this module, thank you.