# Quadrant II – Transcript and Related Materials

**Programme:** Bachelor of Science (Third Year)

**Subject:** Chemistry

**Paper Code:** CHC-109

**Paper Title:** Inorganic Chemistry (Section A)

**Unit:** 1

**Module Name:** Preparation and Properties of Alkyls and Aryls of Hg and Ti.

**Name of the Presenter:** Dr. Daniel M Coutinho

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**Notes**

## ORGANOMERCURY COMPOUNDS

Organomercury compounds are of two types

- R-Hg-X
- $R_2$-Hg

Where R is an alkyl group and X is an Halide group

### Method of Preparation

1. By the reaction of Grignard reagent

$$2\ R\text{-}MgX + HgBr_2 \xrightarrow{THF} (R)_2Hg + 2MgBr$$

Alkyl Magnesium Halide  Dialkyl Mercury

2. By the reaction of diazomethane with $HgCl_2$

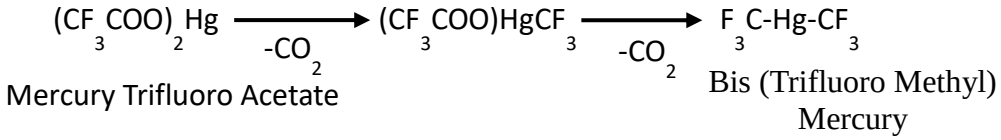
$$CH_2N_2 + HgCl_2 \longrightarrow Cl(CH_2)HgCl + N_2$$

Chloro Methyl Mercuric Chloride

$$CH_2N_2 + Cl(CH_2)HgCl \longrightarrow (CH_2Cl)Hg + N_2$$

Bis (Chloro Methyl) Mercury

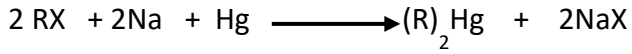
3. By the decorboxylation of mercuric trifluoro acetate



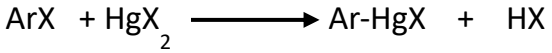

Mercury Trifluoro Acetate

Bis (Trifluoro Methyl) Mercury

4. By the treatment of alkyl halides or aryl sulfates with sodium amalgam



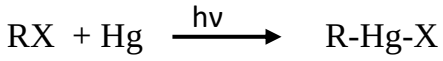

5. Mercuration of Aryl halides




Aryl Halides

Aryl mercuric halide

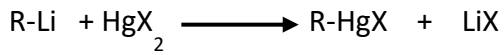
6. By the reaction of alkyl halides with Hg in the presence of light




Alkyl Halides

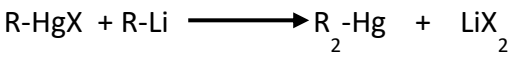
Alkyl mercuric halide

7. By the reaction of organolithium compounds with mercuric halides




Alkyl Lithium

Aryl mercuric halide

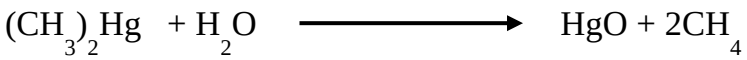


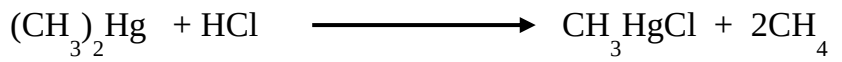

## Physical Properties

1. Organometallic compounds of Mercury are colourless, volatile liquids.
2. They are covalent compounds that are soluble in organic solvents (non-polar solvents) like benzene.
3. They are very poisonous

## Chemical Properties

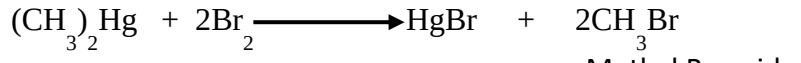
1. They are slowly hydrolysed by water but rapidly by acid to give alkanes





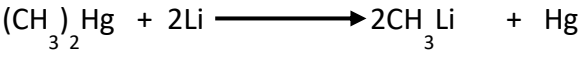
Dimethyl Mercury  Methyl Mercuric Chloride

2. They are decomposed by halogens to give alkyl halides

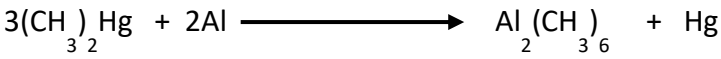


Dimethyl Mercury  Methyl Bromide

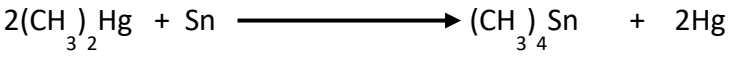
3. They react with more electropositive metals to form organometallic compounds



Dimethyl Mercury  Methyl Lithium



Trimethyl Aluminium



Tetramethyl Tin

**Uses**

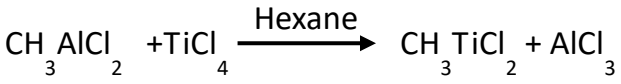
1. Mercurochrome (2,7-dibromo-4-hydoxy mercurifluoroscein) is used as an antiseptic.
2. Ethyl mercuric chloride is used as a fungiside to protect young plants and seeds from fungal infection.
3. Organo mercury compounds are used in the synthesis of different types of compounds.

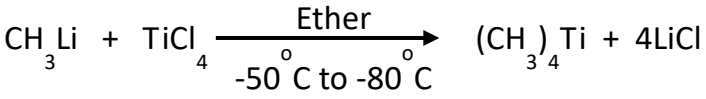
# ORGANOTITANIUM COMPOUNDS

- Compound containing a C-Ti bond are called organotitanium compounds
- Ti can be in the tetravalent, trivalent or divalent state in these compounds

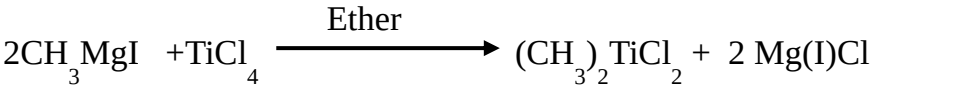
## Method of Preparation

1. From organolithium and organoaluminium compounds



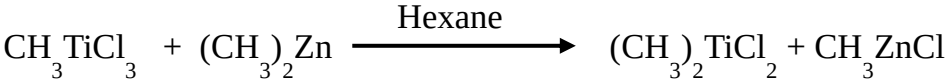




2. From Grignard reagent

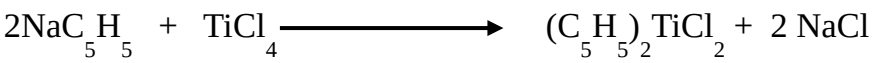



Dimethyl Titanium (IV) Dichloride

3. From organozinc compounds

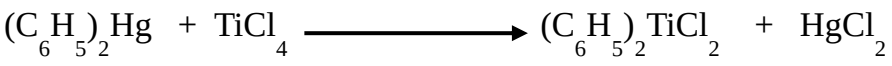



4. From cyclopentadienyl compounds




Bis (Cyclopentadienyl)
Titanium (IV) Dichloride

5. From organomercury compounds



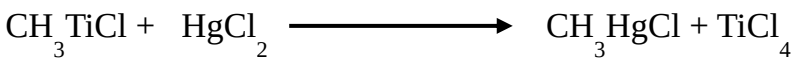

Bis (Phenyl) Titanium (IV) Dichloride

## Physical Properties

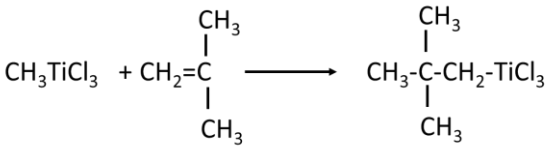
- $(C_2H_5)_2Ti$ is a green crystalline solid. It is thermally unstable and decomposes at about 140$^oC$ before melting.
- Alkyls and aryls of Titanium are unstable and decompose at room temperature
- They are readily oxidized by air and are rapidly hydrolysed by water.

## Chemical Properties

1. Synthesis of organomercury compounds

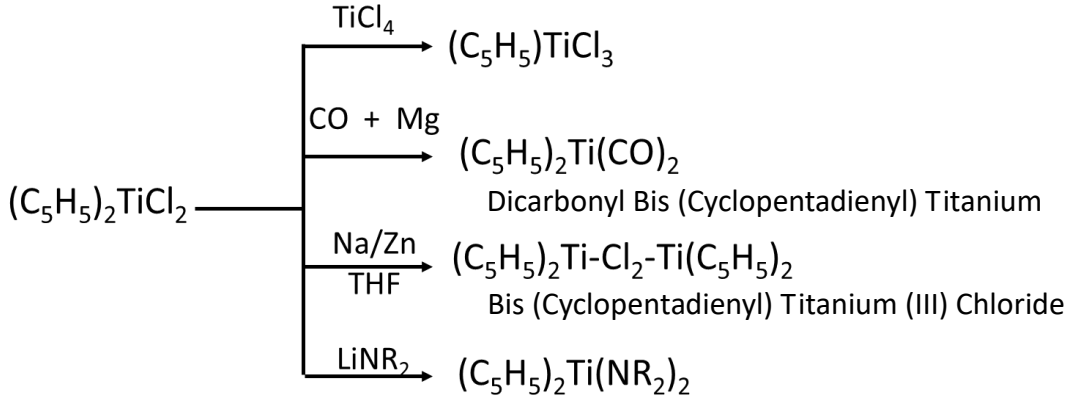



2. Synthesis of neopentyl derivatives




Neopentyl Titanium (IV) Trichloride

3. Synthesis of organomercury compounds

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