

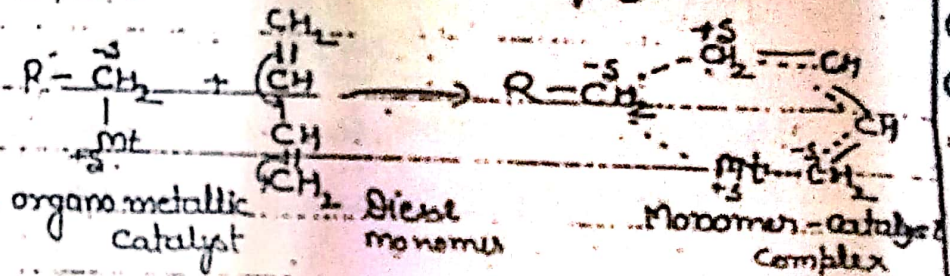
CO-ORDINATION POLYMERISATION

✓ Polymerisation reactions of olefins & dienes taking place in presence of organo-metallic compounds ^{as catalyst} are called co-ordination polymerisation.

✓ A co-ordination bond is formed b/w carbon atom of monomer and metal ~~of~~ catalyst.

Metals are transition metals like = Ti, Mo, V, Cr, Ni, Rh etc.

Initiation step $\Rightarrow$ (Formation of $\wedge$ Complex b/w ~~the organometallic & monomers~~ ^{monomer catalyst} ~~compound~~ ^{compound}).



In the formation of the monomer-catalyst complex, a co-ordination bond is involved b/w a carbon atom of a monomer and metal of the catalyst, that is why the polymerisation is known as (co-ordination polymerisation).

Propagat ^{group} $\rightarrow$ The co-ordinate metal-carbon bond formed in the monomer-catalyst complex, act as an active centre from where propagation starts.

~~The incoming monomer is incorporated~~
at the active centre of the metal-carbon bond.

Zeiglar-Natta catalyst

Catalyst - halides of IV - VIII gp element

Co-catalyst - organometallic compds

Generally alkyls, aryls and hydrides of gp I-IVth

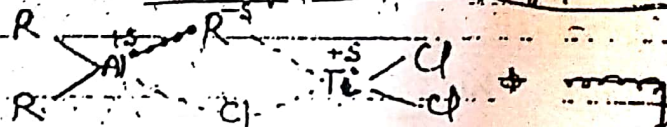
Catalyst = Titanium chloride ($TiCl_3$ or $TiCl_4$)

Co-catalyst = $Al(C_2H_5)_3$.. $Al(C_2H_5)_2Cl$

* Aluminium alkyl act as a electron acceptor
Ti halide act as a electron donor

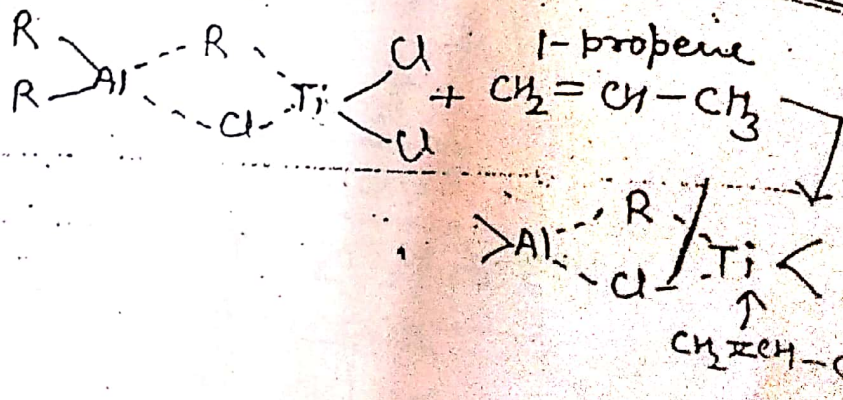
Bimetallic mechanism $\Rightarrow$ by Natta

① When catalyst & co-catalyst are mixed
there is chemisorption of aluminium alkyl
on $TiCl_3$ and form a bridge complex

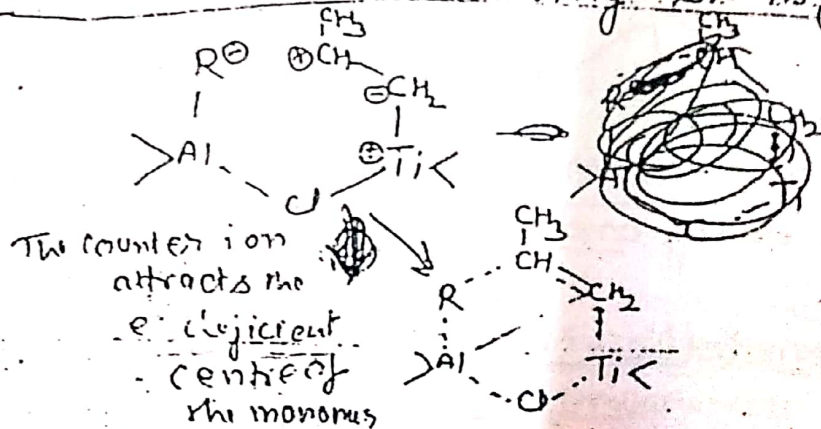


This complex acts a active centre

② The monomer is attract towards Ti-C
bond (C from alkyl group R) in active
centre and form π complex with Ti ion.

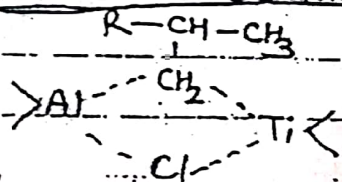


- ③ The bond b/w R and Ti breaks and form Ti ion $[Ti^+]$ and forms bond. Ti^+ ion attracts the π e's of monomer and thus transition state ring str. is formed.

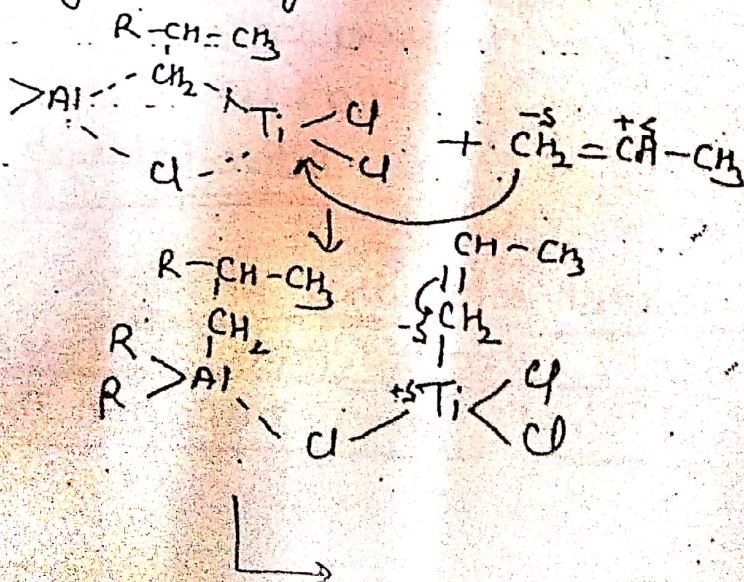


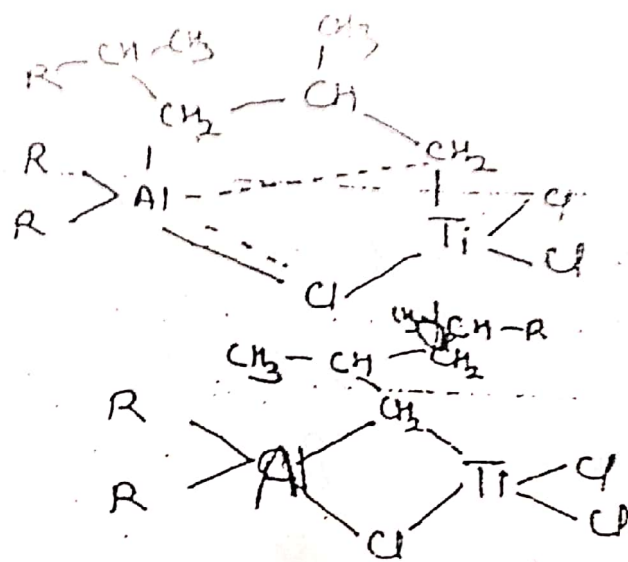
Transition state

- ④ This transition state gives rise to the chain growth at metal carbon bond and form new active centre.



- Thus the monomer is added repeatedly and polymer is formed.





Thus the monomer is added ~~is added~~ repeatedly and polymer is formed.

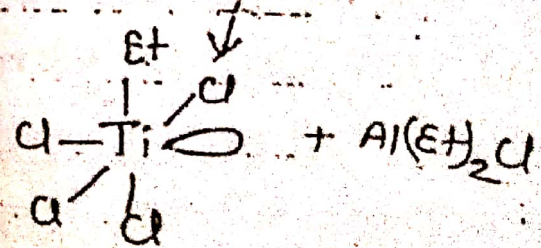
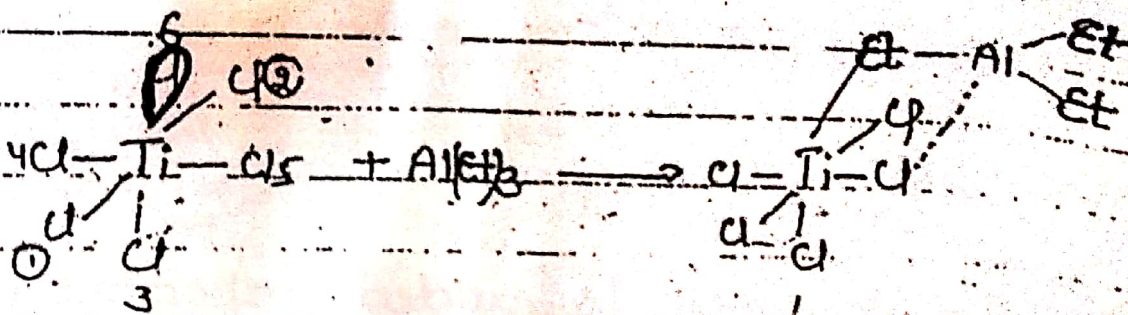
Monometallic - Mechanism $\Rightarrow$

given by cossee

$\rightarrow$ Ti-R act as active centre

Used for the alkylation ~~for~~ the titanium chloride

①



Active-Catalyst

* Active-catalyst ^{has} octahedral structure.

monomer is attracted towards the vacant d orbital and form transition π -Complex