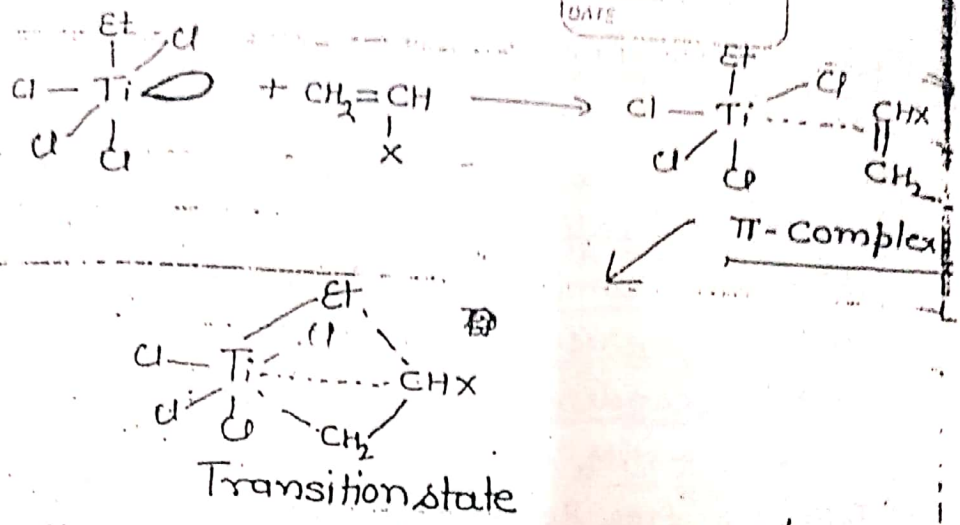
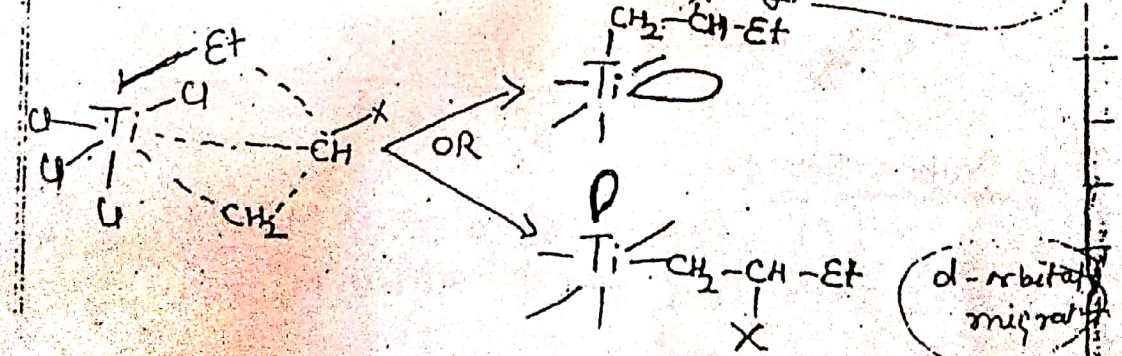


(i) This transition give rise to growth of polymer chain by the monomeric insertion at the Ti-Et bond.

(ii) Vacant d-orbital can be regenerated either at the same position or at the position of Ethyl.

(a) When vacant d-orbital is regenerated at same position all the time. Incoming monomer units will also have same position and isotactic polymer is formed.

(b) If d-orbital migrate from one position to another alternately, then polymers formed will be syndiotactic



STEREO-REGULAR POLYMERS

→ In stereo-regular polymers each monomer segment is in a regular configuration and this regular configuration gives structural regularity.

→ And this structural regularity arises by Geometrical and optical isomerism.

① optical isomerism ⇒ It means how different substituents are attached on asymetric carbon atom

ⓐ Isotactic polymers:- when R gps are present on one side of plane of c-c chain.

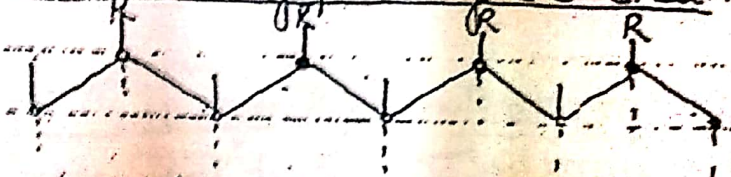


fig:- Isotactic

ⓑ Syndiotactic polymers :- when R groups are present alternately above & below the plane of carbon-carbon chain.

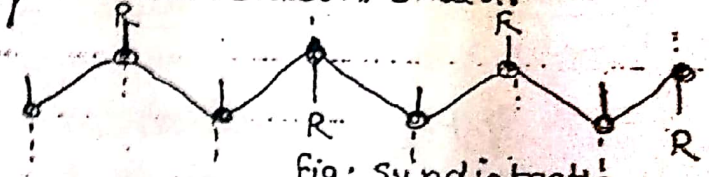


fig:- syndiotactic

ⓒ Atactic polymers ⇒ when R gps are present randomly.

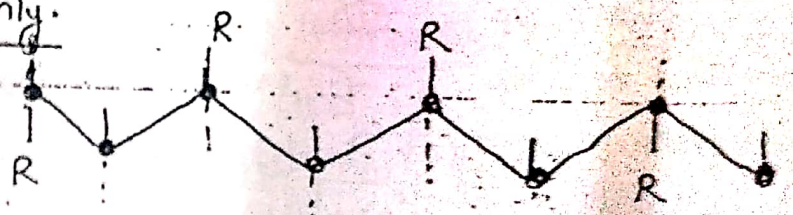


fig:- Atactic

→ These three types of polymers have different properties

① Isotactic and syndiotactic have high m.p & less soluble

② Atactic has low m.p & easily soluble

★ In optical isomerism ⇒ single bond (C-C) atoms are involved

Geometrical isomerism :-

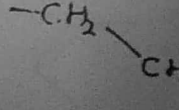
In this type of isomerism double bond C=C atoms are involved. It depends on how the different substituent are attached to carbon-carbon double bond.

Eg: 1,3 butadiene polymerisation.

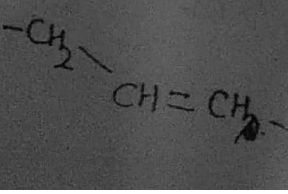
$$n\,CH_2=CH-CH=CH_2 \xrightarrow{\text{Polymerisation}} \{CH_2-CH=CH-CH_2\}_n$$

★ Isomerism depends on whether the CH_2 gps are close to or away from each other.

① Cis-configuration ⇒ when $-CH_2$ gps are on same side of double bond and close to each other (called cis-configuration)

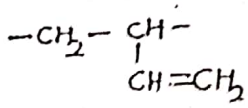


(ii) Trans-configuration ⇒ when $-CH_2$ gps are on opposite side and are not close.



(iii) 1, 2 vinyl configuration ⇒

In this case the three types of optical isomerism i.e atactic, isotactic and syndiotactic configuration are possible.



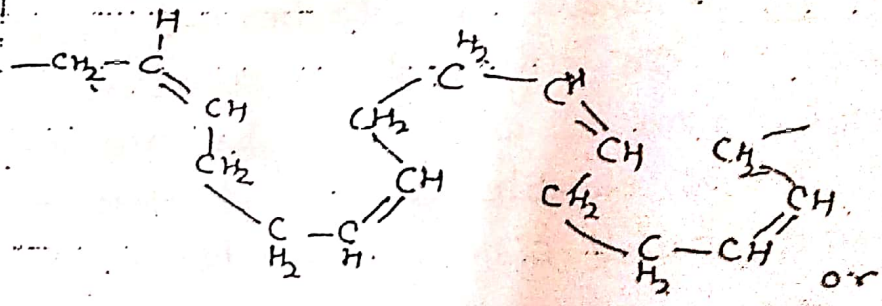
1, 2 vinyl configuration

★ In cis- configuration, there is a bending back of C-C chain.

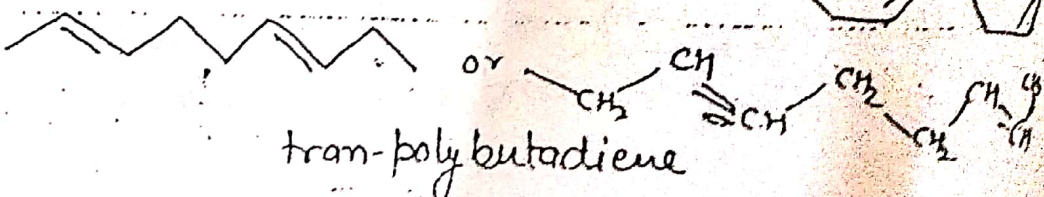
★ In trans- configuration there is a straightening out of the C-C chain.

∴ In 100% (cis- polymerisation of cis-butadiene molecules assumes shape of spring and has good elongation.

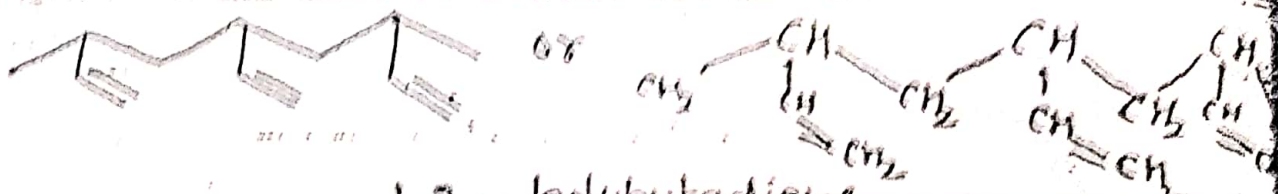
∴ In 100% trans-poly butadiene molecule has stiffness rod like structure and has less elongation.



cis-poly butadiene



tran-poly butadiene



1,2 - polybutadiene

fig : Configuration of 100% cis, 100% trans and 100% 1,2 polybutadiene molecules.

In practice, however, polymerisation of butadiene to 100% cis or 100% transis extremely difficult and we usually obtain mixtures of cis and Trans configuration.

Property of polymer depends on cis and Trans ratio.