1.1.1.1.1.1.1.1 Ziegler Natta Mechanism

To avoid chain transfer, like in the radical polymerization process of “PE” and to achieve the desired tacticity, which is important in terms of “PP”, Ziegler Natta polymerization is used. Before the invention of Ziegler-Natta polymerizations no useful “PP” could be made, due to the fact that via radical polymerization atactic (randomly) arranged methyl groups result, which prevents any crystallinity in the material and result in an amorphous material with very little strength. This change by the use of the Ziegler Natta polymerization. The Ziegler Natta catalyst (a transition metal catalyst) and a co-catalyst (aluminum organic compound) build together a complex where monomers can be attached.

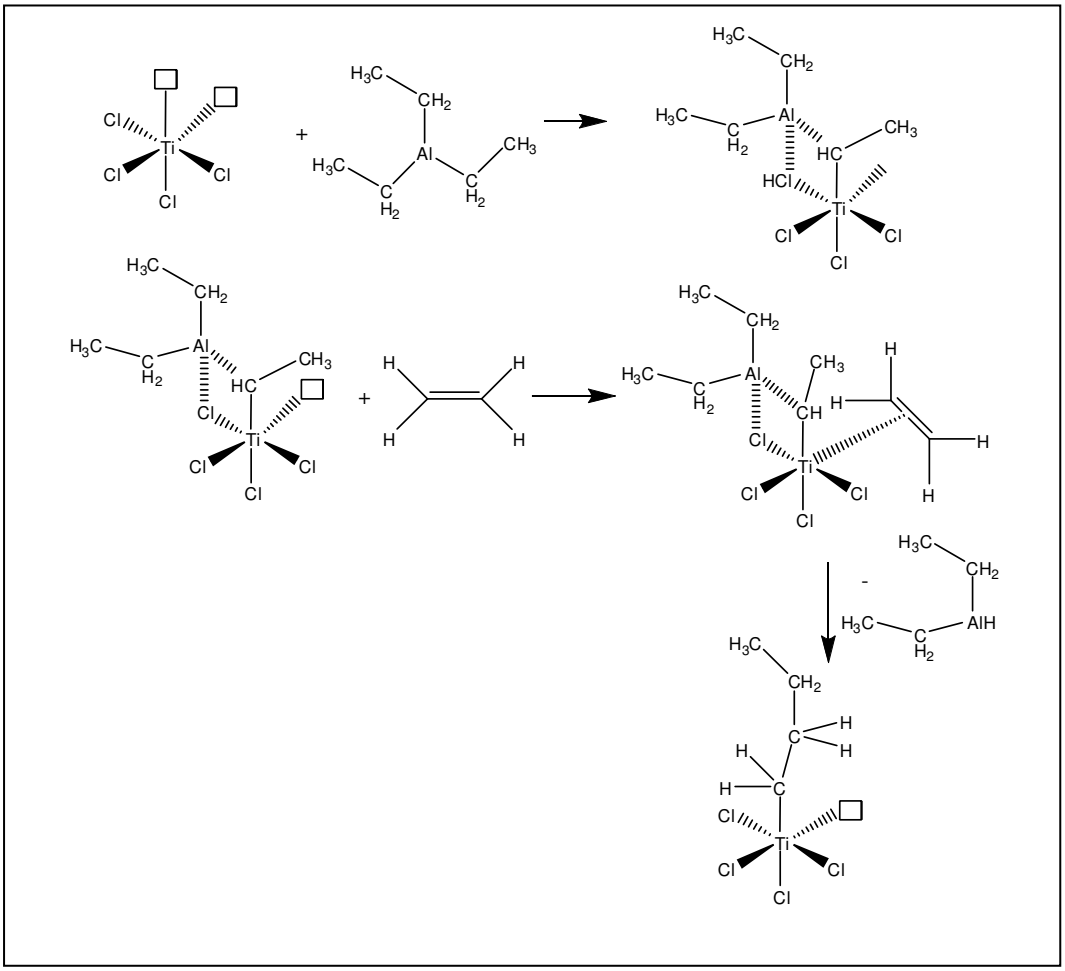

*Fig **Error! No text of specified style in document.**.1: ZIEGLER NATTA MECHANISMArlmann-Cossee- Mechanism23*

PP Principle mechanism of the reaction:[1]

The zirconocen complexes used for the olefin-polymerization are normally not catalytic active, therefore the cocatalysator methylalumoxan ("MAO") is used. "MAO" causes a methylation of the metallocen-dichloride to achieve a methyl or a chloride abstraction to yield a zirconocenium cation $[L_2ZrMe]^+$.

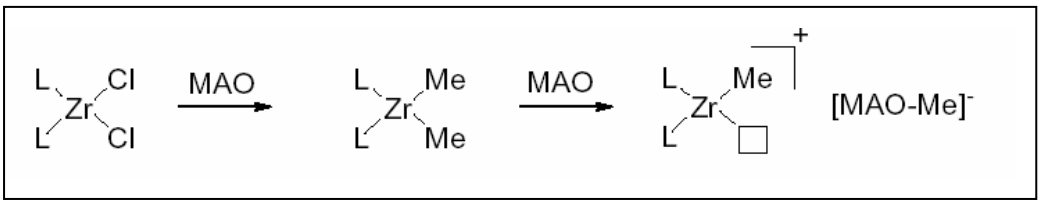

*Fig **Error! No text of specified style in document.**.2: Activation*

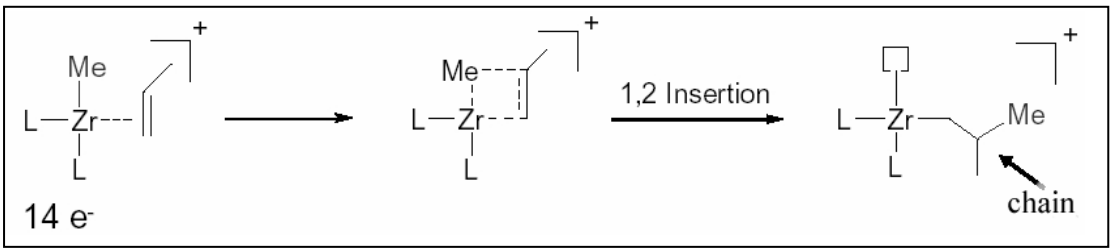

*Fig **Error! No text of specified style in document.**.3: Polyinsertion*

PET

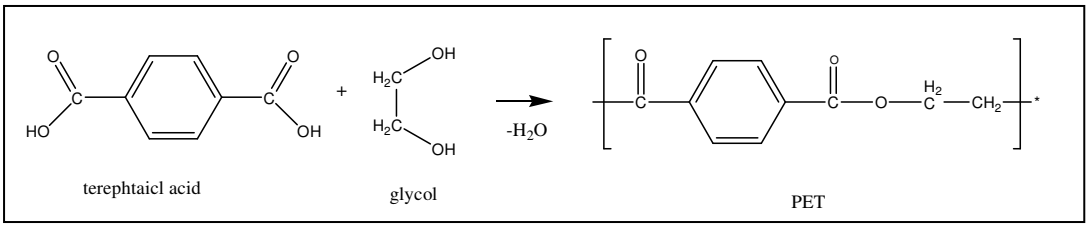

*Fig **Error! No text of specified style in document.**.4: PET polymerization*

[1] **Pusko Jezic ,Z.:** Polyethylene Fiber Development, Fibers and Binders from Nonwovens, Miller Freeman, San Francisco: 1992, p.256.