Tuning the properties of Polyethylene by catalyst and comonomer design

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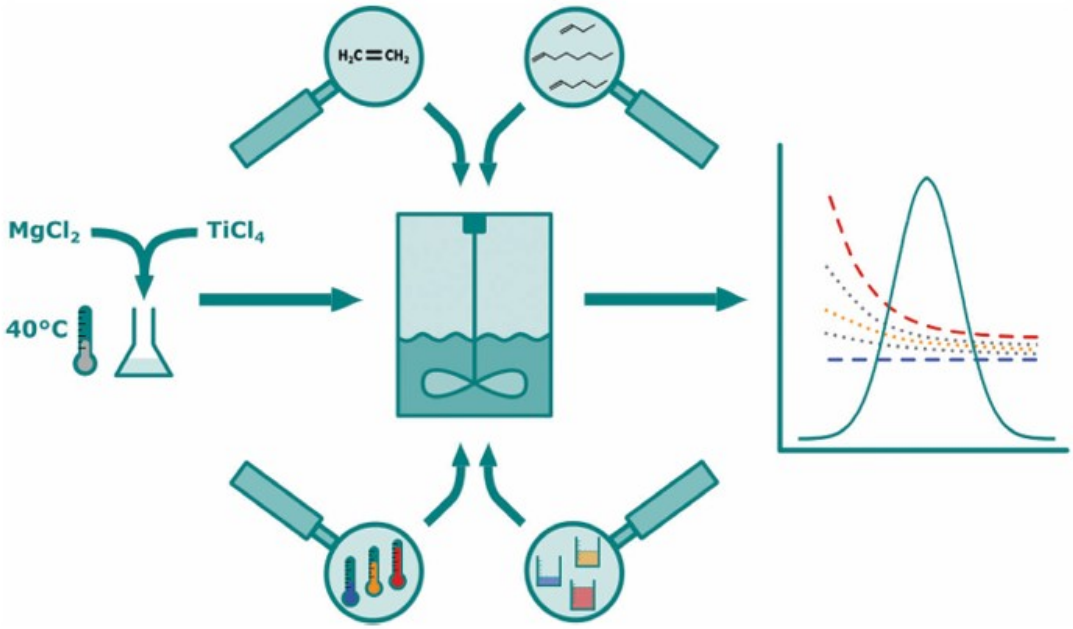
Ziegler-Natta (ZN) based co-polymerization processes for the production of linear low-density polyethylene (LLDPE) generally give rise to a non-uniform incorporation distribution of the comonomer. The comonomer is incorporated predominantly in lower molecular weight fractions, while the incorporation of the comonomer decreases towards higher molecular weight fractions. This puts ZN based LLDPE polymers at a disadvantage compared to polymers made by metallocene catalysts, which have a much more uniform incorporation distribution.
By adjusting the synthesis protocol of ZN catalyst peparation, e.g. by lowering the titanation temperature during, the comonomer incorporation behavior can be adjusted. However, polymerization process parameters also affect the resulting incorporation distribution. A targeted selection of the process conditions polymerization temperature, type and amount of comonomer can be used to influence the properties of the later LLDPE. [1, 2]



Keywords: Polymerization, Polyethylene, Ziegler-Natta catalysis

References

[1] Göpperl L., Pernusch D., Schwarz J. Paulik C., Impact of polymerization process parameters on improved comonomer incorporation behavior in Ziegler-Natta catalysis. *Macromol. React. Eng.* **2022**, 16, 2100042.
[2] Göpperl L., Cipullo R., Schwarzinger C., Paulik C., Branched Comonomers in LLDPE-Influence of Short Chain Branch Shape on Crystallinity. *Macromol. React. Eng.* **2023**, 17, 2300035.