Polymer Add (Thailand) Co.,Ltd.

Office - 106, Chalaremprakiat, Lor 9, Soi 22, Yak 5, Nongbon, Prawet, Bangkok, Thailand 10250
Factory - 188/3, Moo 8, Tambon Bangpu Mai, Amphoe Muang Samut Prakan, Samutprakan, Thailand 10280
Mobile - Thai : 0804531391, English: 0839415475, **E-mail –** contact@polymeradd.co.th

ZINC GLYCEROLATE USE AS NUCLEATING AGENT

Zinc Glycerolate (CAS number 557-48-0) use as a nucleating agent in the production of Poly(Lactic Acid) (PLA), which is a biodegradable thermoplastic made from renewable resources like corn starch or sugarcane.

Crystallization Control
PLA typically exhibits slow and incomplete crystallization, which limits its thermal properties and processing speeds. By introducing nucleating agents like zinc glycerolate, the crystallization process can be accelerated, leading to more uniform and faster crystallization, particularly at lower cooling rates. This improves the thermal stability and processability of PLA, allowing it to be used in applications that require better thermal performance, such as containers and packaging materials.

Enhanced Thermal Properties
PLA's Glass transition temperature (Tg) and melting temperature (Tm) can be increased with the use of effective nucleating agents. This is because nucleating agents facilitate the formation of smaller, more uniform crystalline structures, which increases the polymer's thermal stability and heat resistance. Zinc glycerolate has been shown to promote a more crystalline morphology in PLA, improving its heat distortion temperature (HDT), which is important for high-temperature applications.

Improved Mechanical Properties
The presence of a nucleating agent like zinc glycerolate can lead to better mechanical properties in PLA, such as increased tensile strength and flexural modulus, due to the more orderly arrangement of polymer chains in the crystalline regions. A well-nucleated PLA material can also exhibit improved impact resistance and rigidity, making it suitable for a wider range of applications.

Eco-friendly and Biocompatible
Since zinc glycerolate is a zinc salt of glycerol, it is biocompatible and relatively non-toxic, making it an attractive option for use in food-contact packaging ,medical, and pharmaceutical applications where biodegradability and safety are key considerations.

Mechanism of Action
Zinc glycerolate works as a heterogeneous nucleating agent by providing active sites around which the PLA chains can arrange themselves into crystalline structures. The zinc ion (Zn^{2+}) interacts with the polymer chains, promoting more organized packing of the polymer molecules in the solid state. The glycerolate component can also help improve the dispersion of the nucleating agent in the PLA matrix, allowing for better overall crystallization and more homogeneous material properties.

Potential Benefits in PLA Processing

- Faster crystallization during the cooling phase, which can reduce cycle times in injection molding or extrusion processes.
- Improved transparency in PLA films and packaging products, as controlled crystallization can prevent haze caused by uneven crystallinity.
- Higher heat resistance and better mechanical strength for PLA in demanding applications, such as automotive parts, consumer goods, and biodegradable packaging.

Polymer Add (Thailand) Co.,Ltd.

Office - 106, Chalaremprakiat, Lor 9, Soi 22, Yak 5, Nongbon, Prawet, Bangkok, Thailand 10250
Factory - 188/3, Moo 8, Tambon Bangpu Mai, Amphoe Muang Samut Prakan, Samutprakan, Thailand 10280
Mobile - Thai : 0804531391, English: 0839415475, **E-mail –** contact@polymeradd.co.th

Typical Dosage Range

Low End: 0.1% to 0.3% by weight
For mild nucleation and to achieve slight improvements in crystallization speed, thermal stability, and mechanical properties. This is useful when minor enhancements are needed **without significantly altering the transparency or optical properties of PLA**.

Mid-Range: 0.5% by weight
A moderate dosage that provides a **balance between crystallization rate and optical properties**, especially in applications like packaging where clarity is important. It offers better control over crystallization without excessive haze or opacity.

Higher End: 1% by weight
For strong nucleation that promotes rapid crystallization and significantly improves thermal stability and mechanical performance. This is used in applications **requiring higher heat resistance, such as automotive parts or high-performance containers.**