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

1,3,2,4-Di(3',4'-dimethylbenzylidene)-D-sorbitol (DMDBS)

CAS No.: 135861-95-5

1. Product Introduction & Context

Chemical identity (generic name)
1,3,2,4-Di(3',4'-dimethylbenzylidene)-D-sorbitol

Industrial classification

Organic sorbitol-based nucleating and clarifying agent (alkyl-substituted dibenzylidene sorbitol derivative)

Typical role of the product in polymer systems

DMDBS is used as a low-dosage organic nucleating and clarifying agent to control crystallisation behaviour in semi-crystalline polymers, primarily polyolefins. The dimethyl substitution on the aromatic rings modifies solubility characteristics, dissolution temperature, and nucleation efficiency compared with unsubstituted DBS.

Rationale for offering the product in micronised form

In coarse crystalline form, DMDBS may exhibit delayed dissolution or uneven dispersion in polymer melts. Micronisation improves dispersion reliability, reduces dependency on excessive shear or residence time, and supports predictable nucleation performance under industrial processing conditions.

General problem statement addressed

Polymer processors seeking consistent crystallisation control and optical performance often face variability arising from incomplete additive dissolution. Micronised DMDBS addresses dispersion-related variability while maintaining low addition levels and avoiding inorganic fillers.

2. Chemical & Physical Nature (High-Level Overview)

Chemical family and structural nature

DMDBS is an alkyl-substituted aromatic acetal of D-sorbitol, formed by condensation with dimethyl-substituted benzaldehydes. The methyl substitution alters molecular flexibility and interaction with polymer melts relative to chlorinated or unsubstituted DBS derivatives.

Thermal behaviour (qualitative)

The material dissolves in polymer melts at typical polyolefin processing temperatures and recrystallises during cooling, forming an internal network that influences polymer crystallisation kinetics.

Interaction characteristics relevant to processing

The interaction mechanism is physical rather than chemical. DMDBS self-assembles within the polymer matrix during cooling, acting as a nucleation framework.

Stability under typical industrial processing conditions

Functionally stable under standard polyolefin processing conditions when appropriate temperature control and residence time are maintained.

Detailed numerical values are intentionally excluded and are provided in the Technical Data Sheet.

3. Role of Micronisation (Particle Size Relevance)

Typical micronisation range (indicative)

Micronised grades are supplied with controlled fine particle size distributions (e.g., D90 / D100 in the low-micron range).

Impact of fine particle size

- **Dispersion uniformity:** More homogeneous distribution in melt processing
- **Functional efficiency:** Reliable nucleation at lower effective dosages
- **Optical and surface performance:** Reduced risk of haze or surface defects caused by undissolved particles
- **Processing consistency:** Improved batch-to-batch reproducibility

Coarse vs micronised material behaviour

Coarse DMDBS may require higher shear and longer residence time for complete dissolution, increasing process variability. Micronised material reduces these dependencies and improves reproducibility.

4. Functional Mechanism (How the Product Works)

During cooling from the melt, DMDBS self-assembles into a fine fibrillar network within the polymer matrix. This network acts as a heterogeneous nucleation framework, increasing nucleation density and promoting finer polymer crystal formation. The mechanism is structural and independent of specific resin brands or formulations.

5. Key Application Areas

Polypropylene (PP)

Aspect	Description

System context	Injection moulding, clarified PP compounds, thin-wall moulded articles
Functional role	Crystallisation control, stiffness enhancement, clarity modulation
Micronisation benefits	Ensures rapid dissolution and uniform nucleation at low addition levels

Polyethylene (PE)

Aspect	**Description**
System context	Selected HDPE and LLDPE moulded or compounded systems
Functional role	Modification of crystallisation behaviour
Micronisation benefits	Reduces risk of undispersed additive affecting appearance

Specialty Polymer Compounds

Aspect	**Description**
System context	Custom formulations requiring controlled morphology
Functional role	Fine adjustment of crystalline structure
Micronisation benefits	Predictable behaviour in low-dosage systems

6. Performance Benefits (Qualitative)

- More uniform crystallisation morphology
- Improved clarity or translucency relative to non-nucleated systems
- Increased stiffness without mineral fillers
- Potential reduction in processing cycle variability
- Improved surface appearance consistency

Observed performance depends on formulation design and processing conditions.

7. Compatibility & Processing Considerations

- Compatible with common polyolefin families such as PP and PE
- Typically introduced via compounding, masterbatch, or controlled direct addition
- Processing temperatures should align with standard polyolefin practices
- Excessive overheating or extended residence time may affect colour or odour
- Dry, contamination-free handling is recommended

Silica-treated / pre-blended grade justification

From a commercial and operational standpoint, DMDBS is frequently supplied in a silica-treated or pre-blended form to ensure stable powder flow and predictable processing behaviour. The inclusion of a controlled flow modifier improves feeding consistency and dispersion within the extruder, reducing the tendency of fine DMDBS particles to adhere to metal surfaces under thermal and shear conditions. In untreated form, industrial processing experience has shown that DMDBS can accumulate on extruder walls, leading to localized thermal stress, browning, or caramelisation effects that adversely affect final product appearance and process stability. Silica-treated or pre-blended grades mitigate these risks, supporting consistent processing, reduced downtime, and improved overall production reliability.

8. Regulatory & Compliance Position (High-Level)

- Classified as an industrial polymer additive
- Certain grades may be listed for food-contact plastic applications, subject to jurisdiction and migration limits
- Regulatory acceptance depends on purity, residual aldehydes, and supplier documentation
- Requirements vary by region and end-use sector

End users must independently verify regulatory compliance for their specific market and application.

9. Limitations & Non-Recommended Uses

- Not intended for applications demanding ultra-high optical clarity where newer sorbitol derivatives are specified
- Limited effectiveness in highly filled or heavily pigmented systems
- Not recommended for prolonged high-temperature exposure without validation
- Not suitable for non-polymer or non-industrial uses

10. Reference to Technical Specifications

- Physical properties, particle size distribution, purity limits, and analytical data are provided in the Technical Data Sheet (TDS)
- This article intentionally avoids duplicating TDS content

11. Handling, Storage & Safety (Article-Level)

- Store in a cool, dry place in sealed packaging
- Protect from moisture and contamination
- Handle powders using appropriate dust-control measures
- Refer to the Material Safety Data Sheet (MSDS) for detailed safety, health, and regulatory information

12. Disclaimer & User Responsibility

This document is intended for general technical information only. Product performance depends on formulation design, processing conditions, and end-use requirements. No express or implied warranties are provided. Users are responsible for conducting their own trials and validations prior to commercial use. Polymer Add (Thailand) Co., Ltd. accepts no liability arising from misuse or improper application of this product.