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1,3:2,4-Dibenzylidene-D-sorbitol (DBS)

CAS No.: 32647-67-9

1. Product Introduction & Context

Chemical name	1,3:2,4-Dibenzylidene-D-sorbitol (DBS)
Industrial classification	Organic sorbitol-based nucleating and clarifying agent
CAS	32647-67-9

Typical role in polymer systems

DBS is used at low addition levels to control crystallisation behaviour in semi-crystalline polymers, primarily polyolefins. It promotes finer crystal formation, influencing optical clarity, stiffness, and processing behaviour.

Rationale for offering the product in micronised form

In its coarse or crystalline form, DBS dispersion in polymer melts can be inconsistent. Micronisation improves dispersion uniformity, functional efficiency, and repeatability during compounding or direct addition.

General problem statement addressed

Polyolefin processors frequently face trade-offs between clarity, stiffness, and cycle time. Conventional fillers or nucleating agents may improve one parameter while negatively impacting others. DBS addresses crystallisation control without introducing inorganic solids or high loadings.

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

Chemical family and structure
DBS is an acetal derivative of D-sorbitol formed through condensation with benzaldehyde, resulting in a rigid, aromatic-substituted organic structure.

Thermal behaviour (qualitative)
The material dissolves in polymer melts at typical polyolefin processing temperatures and re-crystallises during cooling.

Interaction characteristics
DBS interacts physically rather than chemically with the polymer matrix, forming a fine internal network that influences crystallisation.

Stability under processing conditions
When processed within standard polyolefin temperature windows, DBS remains functionally stable. Excessive temperature or residence time may affect colour or odour.

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

3. Role of Micronisation (Particle Size Relevance)

Micronised DBS is commonly supplied in fine powder form with controlled upper particle size limits (e.g., D90 / D100 in the low-micron range).

Impact of fine particle size

- Dispersion uniformity: Improved distribution during compounding or melt mixing
- Functional efficiency: More consistent nucleation at lower effective dosages
- Optical performance: Reduced risk of haze from undissolved particles
- Processing consistency: Stable performance across batches and equipment

Comparison: coarse vs micronised DBS

Coarse DBS may require higher shear or longer mixing to dissolve fully, increasing variability. Micronised DBS reduces this dependency, improving reproducibility.

4. Functional Mechanism (How the Product Works)

DBS functions as an organic nucleating agent. Upon cooling from the melt, it self-assembles into a fine fibrillar network within the polymer. This network acts as a template for polymer crystallisation, increasing the number of nucleation sites and reducing crystal size. The mechanism is physical and structural, independent of specific formulations or brand systems.

5. Key Application Areas

Polypropylene (PP)

- System context: Injection moulding, thin-wall moulding, clarified PP compounds
- Functional role: Crystallisation control and clarity improvement
- Why micronisation matters: Ensures rapid dissolution and uniform nucleation at low loadings

Polyethylene (PE)

- System context: Selected HDPE and LLDPE moulded or compounded grades
- Functional role: Modulation of crystallisation behaviour
- Why micronisation matters: Reduces risk of undispersed particles affecting surface appearance

Specialty Compounds

- System context: Custom polymer blends requiring controlled stiffness or appearance

- Functional role: Fine tuning of morphology
- Why micronisation matters: Predictable performance in low-dosage systems

6. Performance Benefits (Qualitative)

- Improved clarity or translucency in semi-crystalline polymers
- More uniform crystallisation structure
- Increased stiffness without mineral fillers
- Potential reduction in moulding cycle time
- Improved surface finish and gloss consistency

Benefits are formulation- and process-dependent and should be validated by the user.

7. Compatibility & Processing Considerations

- Compatible with common polyolefin systems such as PP and PE
- Typically introduced via compounding, masterbatch, or controlled direct addition
- Processing temperatures should align with standard polyolefin practices
- Excessive shear or overheating may impact appearance or odour
- Clean handling and dry conditions are recommended to maintain consistency

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 status depends on purity, residuals, and supplier documentation
- Compliance requirements vary by region and end use

Users are responsible for verifying regulatory suitability for their specific application and market.

9. Limitations & Non-Recommended Uses

- Not intended for applications requiring ultra-high optical clarity where newer sorbitol derivatives are specified
- Limited effectiveness in heavily filled, pigmented, or opaque systems
- Not recommended for applications with prolonged high-temperature residence times without prior evaluation
- Not suitable for use outside polymer processing contexts

10. Reference to Technical Specifications

Detailed technical information, including particle size distribution, purity limits, thermal data, and analytical methods, is provided separately in the Technical Data Sheet (TDS). This article intentionally avoids duplication of TDS content.

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

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

12. Disclaimer & User Responsibility

This document is provided for general technical information only. Performance and suitability depend on formulation design, processing conditions, and end-use requirements. No guarantees are expressed or implied. Users must conduct their own trials and validations prior to commercial use. Polymer Add Thailand Co., Ltd. accepts no liability for improper use, handling, or application of the product.

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