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1,3,2,4-Bis-(4-methylbenzylidene)sorbitol (p-MDBS)
CAS No.: 135861-56-2

1. Product Introduction & Context
Chemical identity (generic name) 1,3:2,4-Bis-(4-methylbenzylidene)sorbitol

Industrial classification
Organic sorbitol-based nucleating and clarifying agent (para-methyl substituted dibenzylidene sorbitol derivative)

Typical role of the product in polymer systems
p-MDBS is used as a low-dosage organic nucleating and clarifying agent to control crystallisation behaviour and optical appearance in semi-crystalline polymers, primarily polypropylene. The para-methyl substitution provides a balance between nucleation efficiency and optical clarity.

Rationale for offering the product in micronised form
In coarse crystalline form, p-MDBS may dissolve slowly or unevenly in polymer melts, leading to variability in clarity and crystallisation performance. Micronisation improves dispersion consistency, reduces dependency on high shear conditions, and supports predictable behaviour at industrial processing scale.

General problem statement addressed
Processors targeting improved clarity and controlled crystallisation often face inconsistency due to incomplete additive dissolution. Micronised p-MDBS addresses dispersion-related variability while maintaining low addition levels.

2. Chemical & Physical Nature (High-Level Overview)
Chemical family and structural nature
p-MDBS is an aromatic acetal of D-sorbitol formed by condensation with para-methylbenzaldehyde. The para-methyl substitution influences molecular symmetry, solubility characteristics, and crystallisation behaviour compared with unsubstituted DBS and more heavily substituted derivatives.

Thermal behaviour (qualitative)
The additive dissolves in polymer melts at standard polyolefin processing temperatures and recrystallises during cooling, forming a fine internal network that affects polymer crystal growth.

Interaction characteristics relevant to processing
The interaction is physical rather than chemical. p-MDBS forms a self-assembled fibrillar structure within the polymer matrix during cooling.

Stability under typical industrial processing conditions
Functionally stable under controlled processing conditions; however, residence time and thermal history have a pronounced influence on sensory outcomes.
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: Improved melt homogeneity
Functional efficiency: More reliable nucleation at lower effective dosages

Optical performance: Reduced risk of haze caused by undissolved particles

Processing consistency: Improved reproducibility across production batches

Coarse vs micronised material behaviour
Coarse p-MDBS may require elevated shear and extended residence time for complete dissolution. Micronised material reduces these dependencies and improves processing reliability.

4. Functional Mechanism (How the Product Works)
Upon cooling from the melt, p-MDBS self-assembles into a fine fibrillar network that acts as a heterogeneous nucleation framework. This network increases nucleation density and promotes finer polymer crystal structures, influencing both mechanical and optical properties. The mechanism is structural and independent of specific resin brands.

5. Key Application Areas

Polypropylene (PP)

Aspect	**Description**
System context	Injection moulding, clarified PP compounds, thin-wall articles
Functional role	Clarity improvement, crystallisation control, stiffness enhancement
Micronisation benefits	Rapid dissolution and uniform nucleation at low addition levels

Selected Polyolefin Compounds

Aspect	**Description**
System context	Specialty compounds requiring controlled morphology
Functional role	Fine tuning of crystalline structure
Micronisation benefits	Predictable performance in low-dosage systems

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6. Performance Benefits & Market Context
Qualitative performance benefits
- High clarity potential relative to unsubstituted DBS
- Uniform crystallisation morphology
- Stiffness enhancement without mineral fillers

Improved surface appearance consistency

Market evolution and competitive positioning

Despite its strong clarity performance, p-MDBS has been progressively overtaken in commercial use by DMDBS. This shift has been driven less by optical capability and more by processing robustness and sensory performance. Under certain processing conditions, p-MDBS has historically been associated with the development of a roasted or caramelised odour, particularly when exposed to prolonged residence time, localized overheating, or insufficient dispersion within the extruder.

In response, current industrial grades have evolved to address these limitations through improved purity control, tighter residual aldehyde management, optimised particle size distribution, and the use of flow-modified or treated formulations that reduce adhesion to metal surfaces. These changes have significantly reduced the incidence of odour formation and broadened the processing window, allowing p-MDBS to be used more reliably where high clarity remains a priority.

7. Compatibility & Processing Considerations

- Compatible with common polyolefin systems, particularly PP
- Typically introduced via compounding or masterbatch routes
- Processing temperatures should align with standard polyolefin practices
- Excessive overheating or extended residence time should be avoided
- Dry handling and contamination control are recommended

8. Regulatory & Compliance Position (High-Level)

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

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

9. Limitations & Non-Recommended Uses

- Not ideal for applications with highly sensitive odour requirements without validation
- Reduced effectiveness in heavily filled or pigmented systems
- Not suitable for prolonged high-temperature exposure without process control
- Not intended for non-polymer or non-industrial uses

10. Reference to Technical Specifications

Detailed physical properties, purity limits, and particle size data are provided in the Technical Data Sheet (TDS). This article intentionally avoids duplication of TDS content

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

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

12. Disclaimer & User Responsibility