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SUCROSE BENZOATE AS A PLASTICIZER FOR FOOD-CONTACT BIOPOLYESTER FILMS

Sucrose Benzoate is a non-toxic, food-safe, and biodegradable plasticizer derived from renewable sources (sugar and benzoic acid).

BENEFITS

Factor	Details
Sustainability Trends	Demand for bio-based and compostable materials in food packaging is rising
Regulatory Compliance	Complies with FDA 21 CFR 178.3740 for food-contact use, a key criterion in packaging markets
Phthalate-Free Requirements	Replaces conventional petroleum-derived plasticizers banned or restricted in many jurisdictions
Polyester Compatibility	Compatible with PLA, PBAT, PBS, and other biopolyesters, making it suitable for extrusion
Thermal Stability	Can withstand typical film-processing temperatures (~190–230°C) without degradation

SUCROSE BENZOATE REPLACES WHICH PLASTICIZERS

Conventional Plasticizer	Reason for Replacement
Acetyl Tributyl Citrate (ATBC)	Sucrose Benzoate offers lower migration, better stiffness retention
Glycerol Esters	Less volatile; improved mechanical strength in polyester systems
Diethyl Phthalate (DEP)	Safer alternative, especially for food-contact and compostable products
Triethyl Citrate (TEC)	Comparable plasticization but better thermal and hydrolytic stability
Epoxidized Soybean Oil (ESBO)	Not compatible with PLA/PBAT; Sucrose Benzoate blends more uniformly

Note: Sucrose Benzoate is not a general-purpose plasticizer, but is optimized for polyesters and their blends, especially where food contact and biodegradability are required.

KEY BENEFITS OF USING SUCROSE BENZOATE IN BIOPOLYESTER FILMS

Benefit	Description
Food-Safe & FDA-Compliant	Approved under FDA 21 CFR 178.3740; suitable for direct food-contact applications
Biodegradable & Renewable	Derived from natural feedstocks; supports "green packaging" goals
Improved Flexibility	Increases elongation at break in rigid biopolyester matrices like PLA
Low Migration & Non-Volatile	Less prone to leaching or evaporation over time; safer and more stable in packaged foods
Excellent Optical Clarity	Maintains high transparency in thin films (<50 µm)
Thermal Process Stability	Does not decompose under typical extrusion or thermoforming temperatures

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Odorless & Non-Tacky	Neutral odor profile; no off-taste or off-smell in food-contact applications
Blending Versatility	Can be used alone or with other bio-based plasticizers (e.g. citrate esters) for tuned flexibility

IDEAL APPLICATIONS

Industry	**Specific Use**
Biodegradable Films	Shopping bags, produce wraps, waste liners
Food Packaging	Transparent trays, sealed pouches, bakery wraps
Thermoformable Sheets	Rigid Biopolyester sheets for clamshells and containers
Compostable Packaging	Blends with PLA or PBAT for certified compostable products

TECHNICAL INFORMATION SHEET

Sucrose Benzoate – Micronized Food-Grade Plasticizer for Biopolyester Films

PRODUCT OVERVIEW

Property	**Description**
Chemical Name	Sucrose Benzoate
CAS Number	115-12-6
Appearance	White to pale yellow solid; available in micronized powder form
Function	Plasticizer
Origin	Derived from sucrose (natural sugar) and benzoic acid (aromatic acid)
Food Contact Compliance	Complies with FDA 21 CFR 178.3740 (subject to purity and migration test)
Biodegradability	Suitable for use in compostable and biodegradable packaging systems
Thermal Stability	Stable up to 220–230 °C during typical polyester melt processing
Recommended Dosage	5–20% w/w depending on flexibility and process requirements

COMPATIBILITY & APPLICATIONS

Target Polymers	PLA, PBAT, PBS, PHBV, PHA, and aliphatic-aromatic copolyesters
Film Performance	Improves flexibility, elongation at break, seal strength, and softness
End Applications	- Biodegradable food wraps- Compostable shopping bags- Thermoformable trays

PARTICLE SIZE RECOMMENDATIONS FOR MICRONIZED SUCROSE BENZOATE

Application Type	**Recommended D100 (Max)**	**Preferred D50 Range**	**Purpose**
Melt Compounding (Film Grade)	< 250 µm	50–150 µm	Ensures smooth feeding, fast melt-in, no unmelted particles
Dry Blending with Resins	< 100 µm	20–70 µm	Promotes rapid melting, better dispersion in direct-use blends

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HANDLING & STORAGE GUIDANCE

Parameter	Recommendation
Moisture Sensitivity	Slightly hygroscopic; store in dry conditions below 40% RH
Anti-Caking Agents	Optionally add 0.5–1.0% talc or dispersible silica if caking occurs
Packaging	10, 15 Kg bag with liner / 25 Kg HDPE Drum.

SUCROSE BENZOATE – INCOMPATIBILITIES AND PROCESSING CAUTIONS

INCOMPATIBLE POLYMERS OR ADDITIVES

Material / Additive	**Reason for Incompatibility**
Polyolefins (PE, PP, EVA)	Poor miscibility due to high polarity difference; leads to phase separation or exudation
PVC (Polyvinyl Chloride)	Limited solubility; may lead to blooming, poor gelation, or embrittlement
Non-Polar Waxes (e.g. PE Wax)	Incompatible; Sucrose Benzoate is highly polar and may not disperse uniformly in waxy systems
Highly Alkaline Additives (e.g. CaO)	Risk of ester hydrolysis at elevated temperatures; leads to degradation
Amine-Functional Additives	May react slowly with ester linkages, especially in presence of heat and moisture
Hydrophilic Fillers (e.g. Starch)	Risk of uneven blending or poor moisture resistance in final film

CRITICAL PROCESS CONDITIONS TO AVOID

Condition	**Issue Caused**
Excess Moisture (>0.5%)	Sucrose Benzoate is mildly hygroscopic → leads to agglomeration, poor flow, or ester hydrolysis
Processing >240 °C	Decomposition risk → color change, odor, reduction in plasticizing effect
Extended Residence Time	Overheating can cause ester breakdown or discoloration (yellowing in clear films)
High Shear in Open Systems	Causes localized hot spots, especially in single-screw extruders without melt temperature control
Direct Contact with Strong Bases	May initiate ester saponification under heat, degrading plasticizer functionality

STORAGE & HANDLING WARNINGS

Condition	Suggested Practice
Humidity >50% RH	Use foil-lined or double-lined HDPE bags; include desiccant if stored >1 month

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Open-Air Exposure	Minimize to prevent moisture absorption and oxidation of residual benzoate groups

SAFE AND COMPATIBLE USAGE CONDITIONS

- Ideal melt compounding temperature: 190–220 °C
- Preferred resin types: PLA, PBAT, PBS, PHBV
- Stable in neutral to slightly acidic environments
- Compatible with citric acid esters, glycerides, and biopolyester-compatible masterbatches

DISCLAIMER

- The information provided in this document is based on our current knowledge, internal testing, and literature references, and is offered in good faith to assist users in evaluating the product's suitability for their intended application.
- However, Polymer Add Thailand Co., Ltd. does not warrant the completeness or accuracy of this data for all potential processing conditions or end-use formulations.
- The product described herein is supplied according to standard specifications only and is not customized for any specific downstream application or performance requirement.
- It is the sole responsibility of the end user to determine the product's suitability, performance, safety, and compliance under actual processing, compounding, and regulatory environments.
- We do not accept any liability for product misuse, unintended blending, incompatibility with other materials, or unforeseen hazardous reactions during or after further processing.
- No warranty, express or implied, including merchantability or fitness for a particular purpose, is given.
- Use of this product constitutes acceptance of these terms.

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