Product Specification Sheet for Mannitol (D-Mannitol)

Mannitol (D-Mannitol) is a hexahydric sugar alcohol-based functional sweetener, anti-caking agent, and excipient, derived from natural seaweed extraction or refined via glucose isomerization and hydrogenation. As a food additive (sweetener, humectant, stabilizer, anti-caking agent, leavening agent), it can be produced through **extraction and refining from kelp/seaweed**, or via **epimerization, high-pressure hydrogenation, purification, and crystallization from starch sugars**. With **60%–70% sweetness of sucrose**, low calorie, **zero glycemic index (GI)**, low hygroscopicity, and high stability, it caters to sugar control, anti-caries, food anti-caking, pharmaceutical excipient, and daily chemical moisturizing needs. It is widely used in **food, beverages, confectionery, baking, pharmaceuticals, oral care, and cosmetics**.

1. Basic Information

- **Chinese Name**: Mannitol (D-Mannitol, Mannite, Hexanehexol, Cordycepic Acid)
- **English Name**: **Mannitol** (D-Mannitol, Mannite, Hexanehexol)
- **CAS No.**: 69-65-8 (D-form), 87-78-5
- **INS No.**: 421
- **CNS No.**: 19.007
- **UN No.**: None (Non-Dangerous Goods)
- **Product Type**: Food Additive (Sugar Alcohol Sweetener, Humectant, Stabilizer, Anti-Caking Agent, Leavening Agent), Pharmaceutical Excipient, Functional Excipient Sweetener
- **Compliance Standards**: GB 1886.177-2016, GB 2760-2024, Chinese Pharmacopoeia (ChP 2025 Edition), U.S. FDA GRAS, EU E421, JECFA, FCC, USP/NF
- **Manufacturing Processes**:
  - **Natural Extraction**: High-purity mannitol is produced from kelp/seaweed via alkali refining, acidification, concentration, decolorization, ion exchange, crystallization, and drying after iodine extraction.
  - **Synthetic Process**: Using corn starch-hydrolyzed glucose as raw material, mannose is produced via epimerization, followed by nickel-catalyzed high-pressure hydrogenation, purification, concentration, crystallization, and drying to obtain crystalline powder/granules.

2. Appearance & Characteristics

2.1 Appearance & Form

- **White crystalline powder/granules/needle-like crystals**, free of visible impurities, with excellent flowability; **extremely low hygroscopicity (far lower than sorbitol)**, resistant to caking, and highly stable.

2.2 Odor & Taste

- Odorless, with a **pure, cool sweetness** (**60%–70% of sucrose**), refreshing taste, moderate cooling sensation, no off-odor or foreign taste, no bitter aftertaste or metallic flavor.

2.3 Solubility

- **Freely soluble in water** (1 g dissolves in ~5.5 mL water at 25°C), slightly soluble in ethanol and glycerol, **insoluble in non-polar solvents** (ether, chloroform, etc.); aqueous solution is clear and transparent, dissolves

endothermically, providing a cool mouthfeel.

2.4 Sweetness Profile

- **60%–70% sweetness of sucrose**, with a smooth sweetness curve and fresh cooling sensation. Blending with sucrose or high-intensity sweeteners (stevia, sucralose) corrects off-flavors and optimizes taste.

2.5 Caloric Value

- **≈1.6–2.4 kcal/g (6.7–10.0 kJ/g)**, significantly lower than sucrose (4.0 kcal/g); low-calorie profile suitable for weight management and energy-controlled diets.

2.6 Glycemic Index (GI)

- **≈0 (Zero GI)**, virtually unabsorbed in the small intestine, metabolism **insulin-independent**, does not raise blood glucose; ideal for diabetics and sugar-controlled diets.

2.7 Stability

- **Heat-resistant (≤220°C)**, acid/alkali-resistant (pH 3.0–11.0), chemically inert; **no Maillard browning**, no reaction with proteins/amino acids; compatible with baking, high-temperature sterilization, acidic beverages, hard-boiled candy, and other rigorous processes.

2.8 Hygroscopicity & Moisturizing

- **Extremely low hygroscopicity (crystalline form)**, the lowest among sugar alcohols; moderate moisturizing properties maintain product moisture balance, prevent cracking/softening, and extend shelf life.

3. Physical & Chemical Specifications

(Note: Original Chinese text had formatting errors; the following reflects standard technical parameters)

Key Indicators (GB 1886.177-2016)

Item	Standard Requirement
Assay (Dry Basis)	≥98.0%
Loss on Drying	≤0.3%
Residue on Ignition	≤0.1%
pH (10% Aqueous Solution)	4.5–7.0
Heavy Metals (as Pb)	≤1 mg/kg
Arsenic (As)	≤0.5 mg/kg
Nickel (Ni)	≤1 mg/kg
Lead (Pb)	≤0.5 mg/kg
Total Plate Count	≤100 CFU/g
Yeast & Mold	≤50 CFU/g
E. coli	Negative/25 g
Salmonella	Negative/25 g

4. Functional Properties

4.1 Sugar Control & Metabolism

- **Zero GI, insulin-independent**: No blood glucose spike, suitable for diabetics, prediabetics, and sugar-controlled diets.

- **Low calorie**: Reduces total energy intake, supports weight management.
- **Non-fermentable in oral cavity**: **Anti-caries**, prevents tooth decay and plaque formation.

4.2 Processing & Stability

- **Anti-caking & flow aid**: Low hygroscopicity prevents agglomeration, improves powder flow in mixing, tableting, and packaging.
- **High thermal/chemical stability**: Resists degradation in high-temperature, acidic, or alkaline processes; no browning or off-flavors.
- **Excellent excipient**: Ideal for **tableting, hard candy, chewable tablets**; provides good compressibility and moldability.

4.3 Moisturizing & Texture

- **Moisture regulation**: Maintains texture in baked goods, confections, and cosmetics; prevents drying or stickiness.
- **Cooling effect**: Dissolves endothermically, delivering a refreshing taste in candies, gums, and oral care products.

5. Application Fields

5.1 Food & Beverage

- Sugar-free confectionery (hard candy, chewing gum, chocolate): Anti-caries, cool taste, non-caking.
- Baked goods (cakes, biscuits, pastries): Improves texture, extends shelf life, low-calorie sweetening.
- Beverages (soft drinks, sports drinks, sugar-free syrups): Zero GI, stable in acidic conditions.
- Cereals, snacks, dried fruits: Anti-caking, moisture control, sugar reduction.

5.2 Pharmaceuticals

- Tablet/capsule excipient: Diluent, binder, disintegrant aid; high stability, compatibility.
- Oral care (toothpaste, mouthwash): Anti-caries, plaque inhibition, cooling sensation.
- Injectables/infusions: Osmotic diuretic, stabilizer.

5.3 Daily Chemicals & Cosmetics

- Skincare, masks, toiletries: Moisturizing, low irritation, refreshing feel, stable formulation.
- Cosmetic powders (pressed powder, loose powder): Anti-caking, smooth texture, non-hygroscopic.

5.4 Feed Additives

- Pet food, livestock feed: Improves palatability, anti-caking, moisturizing, gut health regulation, low-allergen safety.

6. Core Advantages

Natural Source / Clean Label:

Derived from seaweed or green synthesis from starch sugars; **non-artificial**, aligns with clean-label and healthy consumption trends.

Zero GI, Low Calorie – Top Choice for Sugar Control:

Zero glycemic response, insulin-independent, ultra-low calorie; ideal for diabetics, sugar-controlled, weight-loss, and obese populations.

King of Anti-Caking – Extremely Low Hygroscopicity:

Lowest hygroscopicity among sugar alcohols; eliminates caking, enhances processing and storage stability.

Anti-Caries & Oral Health:

Non-cariogenic, inhibits plaque; suitable for sugar-free foods and all oral care products.

Superior Processing Stability:

Heat/acid/alkali-resistant, non-browning, non-reactive; compatible with all manufacturing processes.

Cool Taste + Excellent Excipient Performance:

Pure cooling sensation, excellent formability; **preferred for tableting, hard candy, chewables**.

Multi-Functional Across All Sectors:

Combines sweetening, anti-caking, excipient, moisturizing, stabilizing, and cooling functions; spans food, pharma, cosmetics, and feed industries.

7. Quality Assurance

Full COA (Certificate of Analysis) provided per batch:

Complete testing of physical/chemical, microbiological, heavy metal, and nickel residues; fully traceable data.

Manufacturing Systems:

Strictly compliant with **HACCP, ISO 22000, FSSC 22000, GMP (Pharmaceutical Grade)**; full aseptic/cleanroom control.

Certifications Available:

Non-GMO, Halal, Kosher, FDA GRAS, EU E421, ChP, USP, EP.

End-to-End Quality Traceability:

Full raw material-to-finished product traceability, high batch-to-batch consistency; meets **food-grade and pharmaceutical-grade dual standards**.

Nutrition Facts of Mannitol

Nutrition Facts (Per 100g, Crystalline Form)

Item	Per 100g	% NRV*
Energy	≤1000 kJ (240 kcal)	12%
Protein	0g	0%
Fat	0g	0%
Carbohydrate	≥98.0g	33%
— **Mannitol**	≥98.0g	—
Dietary Fiber	0g	0%
Sodium	0mg	0%

*% NRV = % Nutrient Reference Value (based on GB 28050-2025)

Labeling Specifications

1. Nutrition Facts Labeling: Strictly follow the above format, compliant with **GB 28050-2025**; energy calculated as ≤10.0 kJ/g, NRV% calculation compliant.

2. Warning Statement: Prominently displayed (font size ≥ 1/2 of product name):

"Excessive consumption may cause gastrointestinal discomfort; use with caution by individuals with sensitive intestines."

3. Compliance Declaration:

"This product complies with GB 1886.177-2016 and GB 2760-2024. It may be used as a food additive (sweetener, humectant, stabilizer, anti-caking agent, leavening agent) in appropriate quantities as required for production."

4. Product Name Labeling: Display both **Chinese: Mannitol (D-Mannitol)** and **English: Mannitol**; clearly indicate **crystalline form (powder/granules/needles)** and content specification.

5. Claims Permitted: Low calorie, zero GI, anti-caries, anti-caking agent, stabilizer, excipient.

6. Claims Prohibited: Medical efficacy claims (e.g., "blood sugar reduction, cure disease, weight loss, dehydration").

Key Notes

1. **NRV% Calculation**: Per GB 28050-2025: Energy NRV = 8400 kJ; Carbohydrate NRV = 300 g; mannitol energy coefficient ≤10.0 kJ/g.
2. **Carbohydrate Labeling Logic**: Mannitol is a sugar alcohol carbohydrate, included in total carbohydrates; **zero GI** allows compliant "sugar-free/low sugar/sugar-control" labeling.
3. **Metabolic Characteristics**: Virtually unabsorbed in the small intestine, gently fermented in the large intestine; better tolerance than most sugar alcohols; safe and side-effect-free at recommended dosages.
4. **Export Labeling**: Supplement with region-specific compliance marks for overseas markets (e.g., FDA GRAS, EU E421, JECFA, ChP, USP certifications).