Xylo-oligosaccharide Specification Sheet

I. Basic Product Information

1. Product Name

Chinese Name: 低聚木糖

English Name: Xylo-oligosaccharide (XOS for short)

Synonym: Xylooligosaccharide

2. Core Identification Information

CAS No.: 35466-34-9 (World Health Organization)

INS No.: None (no uniform number assigned by the Codex Alimentarius Commission)

CNS No.: 19.028 (National Food Safety Standard of China)

UN No.: None (non-dangerous goods)

Molecular Formula: $C_5nH_{8n+2}O_{4n+1}$ ($2 \leq n \leq 9$)

Molecular Weight: 132.13n+18.02 (282.28 ~ 942.93)

3. Product Type

Food Additive (Prebiotic, Dietary Fiber) / Food Ingredient / Novel Food Ingredient / Soluble Dietary Fiber

4. Product Definition

A functional oligosaccharide mixture prepared from corn cob, corn stover, wheat straw and other raw materials through pretreatment, enzymatic hydrolysis, separation and purification, drying or concentration processes. It is composed of 2–9 xylose units linked by β-1,4 glycosidic bonds, with main components including xylobiose (X_2), xylotriose (X_3), xylotetraose (X_4), and xylopentaose to xylononaose (X_5~X_9). Among them, xylobiose to xylotetraose ($XOS_{2\sim4}$) are the core functional components.

5. Production Process

Using corn cob, corn stover etc. as raw materials, pretreatment is carried out by steam explosion or high-pressure cooking. Some processes may be assisted by glacial acetic acid soaking and sodium hydroxide stirring. Then xylanase enzymatic hydrolysis is performed, followed by separation and purification via membrane separation, activated carbon decolorization, diatomite filtration aid and other steps. The final product is obtained by drying (solid product, maltodextrin may be added as excipient) or concentration (liquid product). The whole process complies with GB 14881, the hygienic standard for food production.

6. Implementation Standards

- Food Ingredient / Additive: GB/T 23528.3-2025 *Quality Requirements for Oligosaccharides – Part 3: Xylo-oligosaccharide* (replacing GB/T 35545-2017)
- Novel Food Ingredient: Announcements No. 12 (2008) and No. 20 (2014) of the National Health Commission
- General Food Safety: GB 2762, GB 2763, GB 7718, GB 28050, GB 14881

- International Standards: JECFA (Joint FAO/WHO Expert Committee on Food Additives), FCC (Food Chemicals Codex), U.S. GRAS Notices (GRN No.458, GRN No.816)

7. Product Classification

(1) By Raw Material Source

- Corn Cob Type: Produced from corn cob via pretreatment, enzymatic hydrolysis and purification; main component is a mixture of X_2–X_9, most widely applied.
- Straw Type: Produced from corn stover or wheat straw via steam explosion and enzymatic hydrolysis; composition consistent with corn cob-based products, meeting green raw material requirements.

(2) By Product Form

- Solid Product: Powder, granules (Types XOS-35/70/80/95/99); maltodextrin may be added as excipient for certain grades.
- Liquid Product: Syrup (Types XOS-70/95), viscous transparent liquid without drying.

II. Technical Specification Indexes

1. Sensory Requirements (Applicable to Solid / Liquid Products)

★**Color:** White to pale yellow (solid); colorless to yellow (liquid).

★**Appearance:** Powder/granules, free of caking and visible impurities; liquid, viscous and transparent, free of layering, precipitation and visible impurities.

★**Odor:** Characteristic odor of xylo-oligosaccharide, no off-odor, rancidity or pungent smell.

★**Taste:** Pure sweet taste, no bitterness or astringency, refreshing mouthfeel.

2. Physicochemical Indexes (Core)

(1) Solid Products (Powder / Granules)

★**Xylo-oligosaccharide (dry basis)%:** Super Grade ≥99.0, Premium Grade ≥95.0, High Purity Grade ≥80.0, Food Grade (70%) ≥70.0, Food Grade (35%) ≥35.0.

★**$XOS_{2\sim4}$ (dry basis),%:** Super Grade ≥70.0, Premium Grade ≥65.0, High Purity Grade ≥60.0, Food Grade (70%) ≥50.0, Food Grade (35%) not specified.

★**Dry Matter, %:** Super Grade ≥95.0, Premium Grade ≥95.0, High Purity Grade ≥94.0, Food Grade (70%) ≥93.0, Food Grade (35%) ≥92.0.

★**Moisture, %:** Super Grade ≤5.0, Premium Grade ≤5.0, High Purity Grade ≤5.0, Food Grade (70%) ≤5.0, Food Grade (35%) ≤6.0.

★**Ash, %:** All grades ≤0.3.

★**pH (10% aqueous solution):** All grades 3.5~6.0.

★**Light Transmittance (10% aqueous solution), %:** Super Grade ≥95.0, Premium Grade ≥90.0, High Purity Grade ≥85.0, Food Grade (70%) ≥80.0, Food Grade (35%) ≥75.0.

★**Arsenic (As), mg/kg:** All grades ≤0.3.

★**Lead (Pb), mg/kg:** All grades ≤0.4.

★**Total Plate Count, CFU/g:** Super Grade & Premium Grade ≤1000, High Purity Grade ≤3000, Food Grade (70%) ≤5000, Food Grade (35%) ≤10000.

★**Coliforms, MPN/100g:** Super Grade & Premium Grade ≤30, High Purity Grade & Food Grade (70%) ≤90, Food Grade (35%) ≤150.

★**Molds / Yeasts, CFU/g:** Super Grade & Premium Grade ≤25, High Purity Grade ≤50, Food Grade (70%) ≤100, Food Grade (35%) ≤200.

★**Pathogenic Bacteria:** Salmonella, Shigella, Staphylococcus aureus shall be absent in all grades.

(2) Liquid Products (Syrup)

★**Xylo-oligosaccharide (dry basis), %:** High-Purity Syrup ≥95.0, Food-Grade Syrup ≥70.0.

★**$XOS_{2\sim4}$ (dry basis), %:** High-Purity Syrup ≥65.0, Food-Grade Syrup ≥50.0.

★**Dry Matter, %:** Both grades ≥70.0.

★**Moisture, %:** Both grades ≤25.0.

★**pH:** Both grades 3.5~6.0.

★**Light Transmittance, %:** Both grades ≥70.0.

★**Microbiological Indexes:** Consistent with the corresponding grade of solid products.

3. Key Component Distribution (High-Purity XOS, Dry Basis)

★**Xylobiose (X_2):** 35~45%, core functional component with strongest prebiotic activity, readily utilized by intestinal beneficial bacteria.

★**Xylotriose (X_3):** 25~35%, core functional component, synergizes with xylobiose for prebiotic effect, excellent stability.

★**Xylotetraose (X_4):** 10~15%, functional component, enhances intestinal flora regulation, outstanding acid and heat resistance.

★**Xylopentaose (X_5) and above:** 5~10%, functional component, assists in regulating intestinal environment and improving overall efficacy.

★**Xylose / Other Monosaccharides:** ≤5.0%, residual sugars that do not affect core efficacy and comply with national and international standards.

III. Product Properties and Functions

1. Physical Properties

⊙ **Solubility:** Freely soluble in water, solubility ≥60% (25°C), aqueous solution transparent, no precipitation or layering.

⊙ **Sweetness:** 40%~50% that of sucrose, refreshing and mild sweetness, no after-bitterness or off-odor, can replace part of sucrose.

⊙ **Calorie Value: Approx.** 1.2~1.8 kcal/g, low-calorie, much lower than sucrose (4 kcal/g), suitable for low-calorie

foods.

⊙ **Stability:** Stable at pH 3.5~6.0 and temperature ≤150℃, excellent acid and heat resistance, compatible with high-temperature sterilization in food processing.

⊙ **Anti-crystallization:** Good anti-crystallization ability, improves food texture and prevents caking and graining.

2. Functional Properties

⊙ **Prebiotic Effect:** Not decomposed by human digestive enzymes, reaches the large intestine directly, selectively proliferates beneficial bacteria such as Bifidobacterium and Lactobacillus, inhibits harmful bacteria such as Escherichia coli, regulates intestinal flora balance, with low effective dosage (3 g per day is effective).

⊙ **Dietary Fiber Function:** Soluble dietary fiber, promotes intestinal peristalsis, increases stool volume, relieves constipation, lowers intestinal pH, reduces production of harmful intestinal substances.

⊙ **Metabolic Characteristics:** Does not raise blood glucose or cause dental caries, suitable for diabetics, sugar-controlled individuals, obese people and children; GI ≈ 7 (very low glycemic response).

⊙ **Nutrient Fortification:** As a novel food ingredient and nutrient fortifier, can be used in various foods (excluding infant foods) to enhance nutritional value, complying with relevant national regulations for novel food ingredients.

⊙ **Auxiliary Functions:** Helps protect gastric mucosa, enhances immunity, can be used as raw material for health foods to support R&D of intestinal health and immune health products.

IV. Application Fields and Usage Limits

1. Application Fields

⊙ **Food Industry:** Dairy products (yogurt, milk powder, cheese), beverages (juice, tea drinks, functional drinks), baked goods (bread, cakes, biscuits), confectionery (gummies, chocolate), snack foods, condiments (soy sauce, vinegar, sauces).

⊙ **Health Foods:** Probiotic preparations, intestinal health products, weight management products, immune-regulating products, used as core functional raw material.

⊙ **Pet Food / Feed: P**et treats, main meals, improves pet intestinal health and reduces intestinal diseases.

⊙ **Other Fields:** Pharmaceutical excipients (improves tolerance of intestinal administration), feed additives (enhances intestinal health of livestock and poultry, promotes growth).

2. Usage Limits (Based on NHC Announcements and GB 2760)

⊙ **Infant Foods:** Prohibited (clearly specified in national novel food ingredient announcements, excluding infant foods).

⊙ **Various Foods (excluding infant foods):** Used appropriately according to production needs.

⊙ **Recommended Adult Intake:** ≤3.0 g/day (calculated as xylobiose–xyloseptaose); excessive intake (>10 g/day) may cause mild bloating or diarrhea, which resolves spontaneously after discontinuation.

⊙ **Health Foods:** Dosage set according to product efficacy; xylo-oligosaccharide content is usually 15–20 g per 100 g product, complying with health food raw material specifications.

V. Packaging, Transportation and Storage

1. Packaging

⊙ Solid Products: Food-grade aluminum foil bags, kraft paper bags, fiber drums with PE liners; specifications: 1 kg/bag, 5 kg/bag, 25 kg/drum. Grades with maltodextrin must clearly label excipient name and content on packaging.

⊙ Liquid Products: Food-grade plastic drums, stainless steel drums; specifications: 25 kg/drum, 50 kg/drum, 200 kg/drum, well-sealed to prevent leakage.

⊙ Packaging Labeling: Complies with GB 7718, including product name, specification, purity, XOS content, implementation standard, production date, shelf life, storage conditions, raw material source, manufacturer information. Novel food ingredients shall be marked “Novel Food Ingredient”.

2. Transportation

Transport at ambient temperature, avoid sunlight, rain, heavy pressure and collision. Strictly prohibited from mixed transport with toxic, harmful, odorous or easily contaminating items. Liquid products must be placed upright to prevent tipping and leakage. Transportation complies with food transport hygiene standards.

3. Storage

⊙ Solid Products: Cool, dry and ventilated place, temperature ≤25℃, relative humidity ≤65%, sealed storage; shelf life 24 months.

⊙ Liquid Products: Cool and dark place, temperature ≤20℃, sealed storage to prevent moisture absorption and deterioration; shelf life 12 months.

⊙ After opening, keep sealed and use as soon as possible (solid products within 1 month, liquid products within 15 days) to avoid moisture absorption, contamination and microbial growth.

VI. Inspection Rules

1. Products shall be inspected batch by batch and released only after passing inspection. Each batch shall be accompanied by an inspection report.
2. Inspection Items: Sensory, physicochemical and microbiological indexes, conducted in accordance with GB/T 23528.3-2025, GB 5009 series standards and T/GDFDTAEC 02-2022. Xylo-oligosaccharide content is determined by high-performance liquid chromatography.
3. Sampling Method: Implemented in accordance with GB/T 6678. Sampling volume shall be no less than three times the required test amount. Retained samples shall be stored for 3 months after shelf life under the same conditions as product storage.
4. Type Inspection: Conducted at least once per year. Additional type inspection is required in case of major changes in raw materials or processes, covering all technical indexes.

VII. Safety and Compliance Statement

1. This product complies with national food safety standards of China, relevant announcements and

regulations for novel food ingredients. Production process meets GB 14881 hygienic standard for food production.

2. When used as food ingredient / additive, strictly follow dosage regulations of NHC announcements, GB 2760 etc. Prohibited for use in infant foods.
3. Allergy Alert: No known allergens. Special populations (e.g. patients with intestinal diseases, pregnant and lactating women) are advised to use under medical supervision.
4. This product is non-GMO, non-irradiated, free of solvent residues, preservatives, pigments and flavors. Heavy metal contents meet national standards.

Xylo-oligosaccharide Nutrition Facts Table

I. Xylo-oligosaccharide Nutrition Facts (Per 100 g, Dry Basis)

Item	Content (Per 100 g)	NRV%
Energy	1.2~1.8 kcal/g (120~180 kcal/100g)	6~9%
Protein	≤0.1 g	≤0.2%
Fat	≤0.1 g	≤0.2%
Total Carbohydrate	≤99.0 g	33%
— Available Carbohydrate (Sugars)	≤5.0 g	2.5%
— Dietary Fiber (Soluble, as XOS)	≥35.0~99.0 g (by purity grade)	≥140~396%
Sodium	≤1 mg	≤0.1%
Moisture	≤5.0~6.0 g (by purity grade)	—

Core Basis

JECFA (Joint FAO/WHO Expert Committee on Food Additives), FCC (Food Chemicals Codex), U.S. GRAS certification, China GB 28050-2025, GB/T 23528.3-2025, Announcements No.12 (2008) and No.20 (2014) of the National Health Commission, T/GDFDTAEC 02-2022

Remarks

• Energy: Internationally recognized as 1.2~1.8 kcal/g, low-calorie property in line with JECFA and EFSA standards, much lower than sucrose, suitable for low-calorie diets.

• Dietary Fiber: Xylo-oligosaccharide is soluble dietary fiber, globally recognized (CAC/CODEX, FDA, EFSA, National Health Commission of China), effectively supplements human dietary fiber intake.

• GI Value: GI ≈ 7 (very low glycemic index), does not raise blood glucose or stimulate insulin secretion, suitable for sugar-controlled individuals, diabetics and obese people.

• Purity Description: Super Grade (≥99.0g), Premium Grade (≥95.0g), High Purity Grade (≥80.0g), Food Grade (≥70.0g, ≥35.0g). Dietary fiber content grades accordingly, and $XOS_{2\sim4}$ content increases with purity.

• Intake Notice: Recommended adult daily intake ≤3.0g. Excessive intake may cause mild bloating, a normal physiological reaction that resolves spontaneously after stopping use.

II. Label Description

1. Product Name

・Chinese: 低聚木糖（水溶性膳食纤维 / 新食品原料）

・English: Xylo-oligosaccharide (XOS, Soluble Dietary Fiber)

2. Nutrition Claims

• Low Calorie

• High in Dietary Fiber

• Soluble Dietary Fiber

• Low Glycemic Index

• Low Sodium

• Allergen Free

• Non-GMO

• Novel Food Ingredient

3. Compliant Functional Claims

• Dietary fiber helps maintain normal intestinal function.

• Low glycemic property, suitable for sugar-controlled individuals.

• Low calorie and high fiber, supportive of weight management.

• Prebiotic effect that selectively proliferates intestinal beneficial bacteria (internationally compliant; in China, avoid "health function" wording, prioritize dietary fiber-related claims).

• As a novel food ingredient, can be used in various foods (excluding infant foods) to enhance nutritional value.

4. Compliance Statement

✅ Implementation Standards:

• International: CAC/GSFA, JECFA, FCC, U.S. GRAS (GRN No.458, GRN No.816)

• China: GB/T 23528.3-2025, GB 2760, GB 28050, GB 14881, Announcements No.12 (2008) and No.20 (2014) of the National Health Commission

✅ Production Specifications: Complies with cGMP, ISO 9001, HACCP requirements; production process meets GB 14881 hygienic standard for food production.

✅ Safety Statement: Non-GMO, allergen-free, non-irradiated, no solvent residues, heavy metals meet national standards, free of preservatives, pigments and flavors. Prohibited for use in infant foods.