

endo-Cellulase

High activity cellulase for digesting cellulose



BIOFUEL



FRUIT PROCESSING



BREWING



GRAIN DIGESTION



IMPROVED YIELDS



BULK OPTION

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1. Product Overview

Food grade endo-Cellulase is a high-performance enzyme designed to optimise plant-based processing, improve product texture, and enhance overall production efficiency. Acting within the cellulose chains of plant fibres, endo-Cellulase breaks down complex polysaccharides into smaller, more manageable units, unlocking the natural potential of raw materials. This enzymatic action delivers superior clarity, smoothness, and stability in fruit and vegetable juices, purees, and plant-based beverages. In baking, it improves dough handling, crumb structure, and moisture retention, while in dietary fiber modification, it enhances nutrient bioavailability and digestive properties. Produced under stringent food-grade standards, our endo-Cellulase offers a clean-label, eco-friendly alternative to harsh mechanical or chemical processing methods, ensuring consistent results and greater yield. Whether your goal is to elevate product quality, reduce processing costs, or innovate within the health and wellness market, our endo-Cellulase delivers natural efficiency with measurable results.

2. Product Characteristics

Parameter	Specification
Enzyme Class	endo-β-1,4-glucanase (EC 3.2.1.4)
Source	<i>Aspergillus niger</i> (non-GM strain)
Appearance	Brown liquid
Activity	8,000 U / g
Density	1.05-1.20 g per mL
Temperature Range	15–55 °C (operational)
Optimal Temperature	50–55 °C
pH Range	3.4 – 8.0
Optimal pH	4.5 – 5.5
Shelf Life	12–24 months (sealed, recommended storage conditions)

3. Enzymatic Properties

3.1 Mechanism of Action:

Endo-cellulase (endoglucanase, EC 3.2.1.4) catalyses the internal cleavage of β-1,4-glycosidic bonds within the cellulose polymer, creating new chain ends and reducing the degree of polymerization. Unlike exo-cellulases, which act processively from chain ends, endo-cellulases bind randomly along accessible, amorphous regions of the cellulose fiber. The enzyme’s active site typically contains two key catalytic residues—often a proton donor and a nucleophile/base—that work together in an acid–base hydrolysis mechanism. Upon substrate binding, the proton donor facilitates cleavage of the glycosidic bond, while a water molecule activated by the second residue

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attacks the glycosidic linkage, releasing shorter oligosaccharides. This disruptive, non-processive action increases cellulose accessibility for other cellulolytic enzymes and plays a central role in the synergistic breakdown of plant cell wall material.

3.2 Kinetics:

Endo-cellulase follows Michaelis–Menten–type reaction kinetics, but with behaviour characteristic of enzymes acting on insoluble, polymeric substrates. Because cellulose is heterogeneous and partially crystalline, the observed rate depends not only on substrate concentration but also on substrate accessibility, degree of polymerization, and amorphous versus crystalline content. Endo-cellulases exhibit an initial rapid phase in which they hydrolyse accessible β -1,4 linkages within amorphous regions, followed by a slower phase as easily cleavable sites become depleted. The reaction rate increases with temperature and typically peaks between 45–60°C, while optimal pH often lies between 4.5–6.0, depending on the enzyme source. Product inhibition may occur because accumulating cellooligosaccharides can bind to the active site and reduce catalytic efficiency. Since endo-cellulases work non-processively and generate new chain ends for exo-cellulases, their kinetics in complex cellulase systems often reflect synergistic interactions, making their effective catalytic rate dependent on the presence of other cellulases and the physical structure of the substrate.

- $K_m = 1\text{--}10 \text{ mg per mL}$
- $V_{\max} = 500 \text{ U / mg}$
- $K_{\text{cat}} = 200 \text{ s}^{-1}$

3.3 Inhibitors:

- Heavy metals (Hg^{2+} , Cu^{2+})
- Urea, Guanidine hydrochloride, SDS
- Extreme low or high pH
- High temperatures above 60 deg. C
- High chelator concentrations (EDTA)

4. Applications

4.1 Fruit and Vegetable Processing

- Breaks down cell wall cellulose to increase juice yield.
- Improves pressability and reduces viscosity.
- Enhances clarification and reduces haziness in apple, pear, berry, and tropical fruit juices.

4.2 Extraction of Plant-Based Ingredients:

- Aids in extracting natural colours, polyphenols, flavours, and bioactive compounds.
- Common in production of plant extracts, beverages, and nutraceutical ingredients.

4.3 Improvement of Purees and Pulps:

- Enhances texture, flow properties, and smoothness of vegetable and fruit purees.
- Helps standardize consistency in products like tomato paste, baby food, and fruit preparations.

4.4 Wine and Cider Production:

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- Supports maceration of grape or apple skins by breaking down cellulose in the cell wall network.
- Improves aroma extraction, juice release, and clarification.

4.5 Plant-Based Dairy & Alternative Protein Processing:

- Improves extraction of proteins, fibers, and soluble solids from oats, barley, nuts, and legumes.
- Helps reduce viscosity in plant-based milk production.

4.6 Baking and Dough Applications:

- Breaks down fiber-rich components in whole grains to improve dough handling, volume, and crumb quality.
- Contributes to softness and improved water absorption in flour blends.

4.7 Tea, Coffee, and Herbal Processing:

- Enhances extraction of aromatics, polyphenols, and soluble solids during controlled enzymatic treatment.

4.8 Dietary Fiber Modification:

- Used to modify insoluble cellulose into more functional, soluble, or fermentable fiber forms.
- Can improve nutritional and sensory attributes of high-fiber foods.

4.9 Pre-treatment for Further Enzymatic Processes

- In multi-enzyme blends, endo-Cellulase opens plant cell walls so other carbohydrases (e.g., hemicellulases, pectinases) can act more effectively.

5. Handling & Storage

5.1 Storage Conditions:

- Store at 4–25 °C in sealed containers
- Avoid direct sunlight and freezing
- Keep away from acids, oxidizing agents, and heavy metals

5.2 Stability on Storage:

- Activity loss ~1–5% per month at room temperature
- Refrigeration improves stability

5.3 Safety Information:

- Non-toxic and biodegradable
- May cause allergic reactions via inhalation or skin contact
- Use protective clothing, gloves, goggles
- Avoid aerosol formation

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Refer to product MSDS for complete safety details.

6. Packaging Options

- 0.1 L, 1 L, 10 L, 25 L (1000 kg totes available upon request)

7. Quality Control Specifications

Test	Specification
Activity assay	≥ labelled activity
Density (liquid)	1.1–1.2 g / mL
Moisture (powder)	≤ 8%
Microbial load	Total plate count ≤ 50,000 CFU / g
Pathogens	<i>Salmonella</i> negative, <i>E. coli</i> negative

9. Shelf Life

- **Liquid:** 12 months
 - **Powder:** 24 months
- Stored in original container, sealed, in cool conditions.

10. Disclaimer

This technical data sheet provides general information. Application testing is recommended to determine optimal use conditions.