

Laccase Technical Sheet

High activity enzyme to digest organic molecules



Laccase Technical Datasheet

1. Product Overview

Unlock superior product quality and cleaner processing with our Food-Grade Laccase, a highly effective enzyme designed for the food and beverage industry. This versatile biocatalyst enhances processing efficiency by selectively oxidizing phenolic compounds, helping improve product stability, clarity, colour, and shelf life. Ideal for applications in baking, beverage production, fruit and vegetable processing, and ingredient modification, our food-grade laccase supports manufacturers seeking natural, sustainable solutions while reducing the need for chemical additives. Produced under stringent quality standards and compliant with food industry requirements, our laccase delivers consistent performance, improved yields, and greater operational efficiency, enabling you to meet consumer demand for cleaner labels and higher-quality products.

2. Product Characteristics

Parameter	Specification
Enzyme Class	EC number 1.10.3.2
Source	<i>Trametes versicolor</i>
Activity	10,000 U per g
Appearance	Light brown powder
Temperature Range	30-60 °C
Optimal Temperature	45-55 °C
pH Range	4.6-6.6
Optimal pH	5.0-5.5
Shelf Life	24 months (sealed and kept under recommended storage conditions)

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3. Enzymatic Properties

3.1 Mechanism of Action:

Laccase is a multicopper oxidase enzyme that catalyses the oxidation of a wide range of phenolic and non-phenolic compounds by transferring electrons from the substrate to molecular oxygen. During this process, laccase removes electrons and protons from the target compound, generating reactive radical intermediates while simultaneously reducing oxygen to water. The enzyme contains multiple copper ions that facilitate electron transfer through its active site. Through these oxidation reactions, laccase can degrade lignin, synthetic dyes, environmental pollutants, and various aromatic compounds, making it valuable for applications in bioremediation, wastewater treatment, pulp and paper processing, textile industries, and biosensor development. In some cases, redox mediators are used to extend the substrate range and enhance the enzyme's oxidative capacity.

3.2 Inhibitors:

- Heavy metals (Hg^{2+} , Cu^{2+})
- Urea, Guanidine hydrochloride, SDS
- Extreme low or high pH
- High temperatures above 90 deg. C
- High chelator concentrations (EDTA)

4. Applications

Industrial Applications:

1. Pulp and Paper Industry

- Biobleaching of wood pulp, reducing the need for chlorine-based chemicals.
- Delignification of lignocellulosic materials.
- Improvement of paper quality and brightness.

2. Textile Industry

- Decolorisation and degradation of synthetic dyes in wastewater.
- Denim bleaching and finishing processes.
- Eco-friendly textile processing.

3. Wastewater Treatment and Bioremediation

- Removal of phenols, endocrine-disrupting compounds, pharmaceuticals, and pesticides.
- Treatment of industrial effluents from textile, paper, and chemical industries.
- Detoxification of environmental pollutants.

4. Biofuel and Biomass Processing

- Pretreatment of lignocellulosic biomass for bioethanol production.
- Lignin modification and degradation to improve enzymatic saccharification.

5. Chemical and Pharmaceutical Industries

- Green synthesis of fine chemicals and pharmaceuticals.
- Oxidative coupling and polymerisation reactions.
- Production of bio-based materials and specialty chemicals.

6. Cosmetics Industry

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- Development of hair dyes and skin-care formulations.
- Removal of phenolic compounds from cosmetic ingredients.
- 7. Biosensors and Bioelectronics**
 - Construction of biosensors for oxygen, phenols, and environmental contaminants.
 - Applications in biofuel cells and diagnostic devices.

Food-Grade Applications:

- 1. Beverage Stabilisation**
 - Removal of polyphenols causing haze formation in beer, wine, and fruit juices.
 - Improvement of clarity and shelf life.
- 2. Wine Production**
 - Reduction of undesirable phenolic compounds.
 - Prevention of browning and enhancement of product stability.
- 3. Fruit Juice Processing**
 - Clarification of juices.
 - Reduction of haze and sediment formation.
- 4. Baking Industry**
 - Improvement of dough strength and rheological properties through protein cross-linking.
 - Enhancement of bread volume and texture.
- 5. Food Ingredient Modification**
 - Cross-linking of proteins and polysaccharides to improve texture and functionality.
 - Production of novel food biopolymers.
- 6. Food Packaging**
 - Development of biodegradable and antimicrobial packaging materials.
 - Enzymatic grafting of functional compounds onto packaging films.
- 7. Removal of Food Contaminants**
 - Detoxification of phenolic compounds and certain food-processing by-products.
 - Reduction of undesirable flavours and colour defects.

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:

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

Refer to product SDS for complete safety details.

6. Packaging Options

- 0.1 kg, 1 kg, 10 kg, 25 kg

7. Quality Control Specifications

Test	Specification
Activity assay	≥ labelled activity
Microbial load	Total plate count ≤ 50,000 CFU / g
Pathogens	<i>Salmonella</i> negative, <i>E. coli</i> negative

9. Shelf Life

Powder: 24 months. When 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.

NOTE: THIS DOCUMENT CANCELS AND SUPERSEEDS ALL OTHER EDITIONS