Pectinase

High activity pectinase for digesting pectin

Pectinase Technical Datasheet

1. Product Overview

A high-activity food grade pectinase enzyme is a versatile biocatalyst widely used in the food and beverage industry for its ability to break down pectin, a complex polysaccharide found in plant cell walls. Its primary applications include fruit juice clarification, where it improves juice yield and clarity by reducing viscosity and preventing haze formation; wine production, enhancing extraction of colour, aroma, and flavour while facilitating filtration; and fruit-based product processing, such as jams, purees, and nectars, by softening fruit tissue and improving texture. Key benefits of this enzyme include increased process efficiency, higher product yield, improved sensory qualities, and reduced energy consumption during processing. Additionally, as a food-grade enzyme, it is safe for consumption and supports cleaner, more sustainable production methods by reducing the need for chemical clarifying agents.

2. Product Characteristics

Parameter	Specification
Enzyme Class	Hydrolase – (EC 3.2.1.15, EC 4.2.2.10)
Source	*Aspergillus niger*
Appearance	Brown liquid
Activity	1,250 PME / g, 150 PL U / g
Units	Pectin-methyl-esterase (PEM)
	Pectin lyase (PL)
Total Protein	22-27 % w/v
Density	1.05-1.20 g per mL
Temperature Range	15–60 °C (operational)
Optimal Temperature	45–60 °C
pH Range	3.5 – 8.0
Optimal pH	5.8 – 6.5
Shelf Life	12–24 months (sealed, recommended storage conditions)

3. Enzymatic Properties

3.1 Mechanism of Action:

Pectinases act by degrading pectin, a structural polysaccharide found in plant cell walls, through one of several complementary catalytic mechanisms depending on the enzyme subtype. Hydrolases such as polygalacturonases cleave the α-1,4-glycosidic linkages between galacturonic acid residues via

water-mediated hydrolysis, progressively breaking long homogalacturonan chains into shorter oligomers. Esterases, including pectin methylesterases, remove methyl ester groups from the galacturonic acid backbone, increasing the substrate's negative charge and making it more accessible to other pectin-degrading enzymes. Lyases such as pectin lyases and pectate lyases use a β-elimination mechanism to cleave de-esterified pectins, generating unsaturated oligogalacturonides. Together, these actions weaken the plant cell wall matrix by disrupting pectic substances, leading to tissue maceration and increased cell wall permeability—an effect exploited in fruit juice clarification, textile processing, and biomass degradation.

3.2 Kinetics:

The reaction kinetics of a pectinase enzyme follow typical Michaelis–Menten behaviour, in which the rate of pectin hydrolysis increases with substrate concentration until reaching a maximum velocity (V_{max}) when the enzyme's active sites are saturated. The affinity between pectinase and its pectic substrate is reflected in the Michaelis constant (K_m), with lower K_m values indicating tighter binding. Because pectin is a heterogeneous polymer, kinetic parameters can vary depending on its degree of esterification, molecular size, and conformation, all of which influence enzyme–substrate complex formation. Pectinase activity is also strongly shaped by environmental factors: optimal temperature and pH accelerate catalytic turnover (k_{cat}), whereas deviations can lead to partial denaturation or altered substrate ionization that slows reaction rates. In industrial or biological systems, product inhibition—often by oligogalacturonides—may further modulate kinetics, causing the reaction rate to decline as hydrolysis proceeds. Overall, pectinase kinetics represent a balance between substrate accessibility, enzyme stability, and catalytic efficiency.

3.3 Inhibitors:

- Heavy metals (Hg^{2+}, Cu^{2+})
- Low and high pH
- Temperatures above 65 deg. C
- Oxidants
- High chelator concentrations (EDTA)

4. Applications

4.1 Fruit juice clarification and yield improvement – Pectinases degrade colloidal pectin that causes haze and high viscosity, allowing faster juice extraction, better filtration, and greater clarity in apple, citrus, grape, and berry juices.

4.2 Juice pressing and mash liquefaction – By breaking down pectin-rich middle lamellae, they soften fruit tissues, increasing pressability and improving overall juice recovery from pulped fruit.

4.3 Wine processing – In winemaking, pectinases aid in must clarification, accelerate settling, increase juice release from grapes, and improve the extraction of colour and aroma compounds from skins.

4.4 Jam, jelly, and puree consistency control – Controlled pectin degradation helps adjust viscosity, reduce gelling, and create consistent textures in jams, jellies, sauces, and purees.

4.5 Plant-based beverage production – Pectinases help reduce viscosity and stabilize suspensions in beverages made from fruits and vegetables.

4.6 Aromatic compound release – Some pectinase preparations contain side activities (e.g., glycosidases) that enhance the release of bound flavor molecules, improving aroma profiles in fruit products and wines.

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

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)	1.05–1.20 g / mL

Test	Specification
Moisture (powder)	≤ 8%
Microbial load	Total plate count ≤ 50,000 CFU / g
Pathogens	*Salmonella* negative, *E. coli* negative

9. Shelf Life

- **Liquid:** 12 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.

THIS SHEET SUPERCEEDS AND CANCELS ALL PREVIOUS EDITIONS