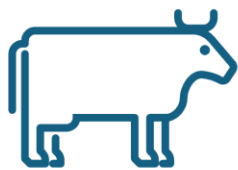


Keratinase

High activity keratinase for digesting keratin



DIGESTS PROTEIN



NOVEL FABRIC



UPCYCLING



VALORISING



BULK OPTION

Keratinase Technical Datasheet

1. Product Overview

Unlock cleaner, faster, and more sustainable protein processing with our industrial & food-grade keratinase - a high-performance enzyme designed to efficiently break down tough keratin structures in feathers, hair, and other resilient protein materials. Ideal for animal by-product valorisation, feed and pet food ingredient upgrading, collagen/peptide production, and protein hydrolysate applications, this keratinase delivers rapid hydrolysis under practical processing conditions, helping reduce harsh chemicals, shorten processing times, and improve yield of soluble proteins and amino acids. Produced under strict quality standards with consistent activity and reliable batch-to-batch performance, it's a cost-effective solution for manufacturers looking to boost functionality, digestibility, and sustainability - turning difficult waste streams into high-value, market-ready ingredients.

2. Product Characteristics

Parameter	Specification
Enzyme Class	Serine protease (EC 3.4.21)
Source	<i>Bacillus app.</i> (non-GM strain)
Appearance	Powder
Temperature Range	30–70 °C (operational)
Optimal Temperature	45–55 °C
pH Range	6.0 – 12.0
Optimal pH	9.5 – 11.0
Shelf Life	12–24 months (sealed, recommended storage conditions)

3. Enzymatic Properties

3.1 Mechanism of Action:

Keratinase acts by degrading the highly stable keratin protein through a coordinated process of substrate binding, reduction, and proteolytic cleavage. Keratin is resistant to degradation because of its tightly packed structure stabilized by hydrogen bonds, hydrophobic interactions, and numerous disulfide bridges between cysteine residues. Keratinase first binds to the keratin surface and, in many cases, works alongside reducing agents or associated disulfide reductases to disrupt these disulfide bonds, loosening the rigid structure. As a protease (commonly a serine or metalloprotease), the enzyme then hydrolyses internal peptide bonds within the polypeptide chain. In serine keratinases, a catalytic triad (serine–histidine–aspartate) facilitates nucleophilic attack on the carbonyl carbon of the peptide bond, forming a transient acyl–enzyme intermediate that is subsequently hydrolysed to release shorter peptides and amino acids. Through repeated cleavage events, the insoluble keratin polymer is progressively converted into soluble oligopeptides and free amino acids, enabling its utilization by microorganisms or industrial processing systems.

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3.2 Kinetics:

Keratinase typically follows Michaelis–Menten kinetics when acting on soluble keratin substrates or synthetic peptide analogues, where the reaction rate increases with substrate concentration until reaching a maximum velocity (V_{max}) at enzyme saturation. The affinity of keratinase for its substrate is reflected by the Michaelis constant (K_m), with lower K_m values indicating higher substrate affinity. Because native keratin is insoluble and structurally complex, its degradation often exhibits heterogeneous or surface-limited kinetics rather than ideal simple kinetics, meaning the reaction rate can depend on substrate accessibility and particle size. Enzyme activity is strongly influenced by environmental factors such as pH and temperature, with most microbial keratinases showing optimal activity under alkaline conditions (pH 8–11) and moderate to high temperatures (40–60 °C). Inhibition may occur through heavy metals, specific protease inhibitors (e.g., PMSF for serine keratinases), or product accumulation. Overall catalytic efficiency is expressed as k_{cat}/K_m , which reflects how effectively keratinase converts keratin into soluble peptides under given conditions.

3.3 Inhibitors:

- Heavy metals (Hg^{2+} , Cu^{2+})
- Urea, Guanidine hydrochloride, SDS
- Extreme low or high pH
- High temperatures above 75 deg. C
- High chelator concentrations (EDTA)

4. Applications

4.1 Improvement of Protein Digestibility

- Hydrolysis of keratin-rich proteins (feather meal, hair, wool by-products) into digestible peptides and amino acids for animal feed and pet food.

4.2 Production of Protein Hydrolysates

- Generation of bioactive peptides and amino acid supplements from keratin-containing raw materials.

4.3 Upcycling of Poultry By-Products

- Conversion of feathers into high-value protein ingredients for feed or food-grade applications.

4.4 Fortification of Animal Feed

- Enhancement of nutritional quality by increasing availability of sulphur-containing amino acids (e.g., cysteine, methionine).

4.5 Functional Ingredient Development

- Production of peptides with antioxidant, antimicrobial, or bioactive properties.

4.6 Waste Reduction in Food Processing

- Bioconversion of keratinous waste into usable protein sources, supporting sustainable food systems.

4.7 Improved Palatability in Pet Food

- Controlled protein hydrolysis to enhance flavor and digestibility.

4.8 Amino Acid Extraction

- Recovery of cysteine and other amino acids for use in food additives or nutraceutical formulations.

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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

- 35 g, 100 g, 1 kg, 10 kg and 25 kg bags.

7. Quality Control Specifications

Test	Specification
Activity assay	≥ labelled activity
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.

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10. Disclaimer

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