

Protease (granulate) Technical Sheet

High activity cleaning grade protease for digesting protein



HIGH ACTIVITY



ECONOMICAL



CLEANING



WASHING



BULK OPTION

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1. Product Overview

Our protease is an alkaline protease for use in biological detergent products (both laundry and dishwashing). The product acts by hydrolysing insoluble protein soiling into soluble peptides and amino acids which can then be readily removed from clothing fabric or dishes. Our protease is particularly effective at removing common household soiling such as blood, grass, milk, gravy and blood. This enzyme is a particularly high strength enzyme derived from a genetically modified strain of *Bacillus subtilis*, and works in conjunction with the other laundry and dishwashing chemicals to remove most protein based stains under a broad range of conditions.

2. Product Characteristics

Parameter	Specification
Enzyme Class	Peptidase (EC 3.4.)
Source	<i>Bacillus subtilis</i>
Appearance	Off white granulates
Granulate	Titanium Dioxide
Activity	12 KPU / g
Units	Where 1 U is the amount of enzyme required to release 1 µg of tyrosine (or equivalent peptides) per minute from casein
Temperature Range	30–70 °C (operational)
Optimal Temperature	45–55 °C
pH Range	8.0–12.0
Optimal pH	10.0–11.0
Typical final dose rate	1-2 % by volume
Shelf Life	24 months (sealed and kept under recommended storage conditions)

3. Enzymatic Properties

3.1 Mechanism of Action:

Detergent-grade proteases function by hydrolysing peptide bonds in protein-based stains, breaking large insoluble proteins into smaller, water-soluble fragments that can be lifted and rinsed away. These enzymes typically operate through a serine- or metalloprotease-based catalytic mechanism, in which a catalytic residue (such as serine) or metal ion (such as Zn^{2+}) activates a water molecule to attack the peptide bond. In detergents, these proteases are engineered or selected to remain stable and active under harsh washing conditions, including high alkalinity, elevated temperatures, surfactants, and oxidizing agents. Their mechanism allows them to rapidly degrade proteins found in

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stains like blood, food residues, and body soils, thereby enhancing the cleaning power of detergent formulations. Reaction scheme:



3.2 Kinetics:

Protease reaction kinetics generally follow Michaelis–Menten behaviour, in which the enzyme binds a protein or peptide substrate to form an enzyme–substrate complex before catalysing peptide-bond hydrolysis. The reaction rate increases with substrate concentration until reaching $V_{\max}$, where all active sites are saturated. The K_m value reflects the affinity of the protease for its substrate, while k_{cat} represents the turnover number—how many peptide bonds the enzyme can cleave per second under saturating conditions. Many proteases show additional kinetic complexity, such as substrate specificity pockets that influence cleavage rates, pH-dependent activity profiles, and potential allosteric or substrate-inhibition effects at high substrate concentrations. Reaction rates are also strongly affected by environmental factors such as temperature, ionic strength, and the presence of cofactors or inhibitors, leading to a kinetic landscape that can differ significantly between protease classes and formulation environments (e.g., detergents vs. physiological conditions).

3.3 Inhibitors:

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

4. Key Applications

- Removal of protein-based stains such as blood, sweat, grass, egg, and dairy.
- Improvement of overall laundry cleaning performance, especially on body soils.
- Cold-water washing enhancement, allowing effective cleaning at lower temperatures.
- Automatic dishwashing, breaking down dried or baked-on food proteins.
- Industrial and institutional cleaning of protein-rich organic residues.
- Textile processing uses, including bio-polishing, degumming, and fabric softening.
- Stain pre-treatment formulations, boosting targeted removal of tough protein spots.
- Reduction of soil redeposition by breaking proteins into easily rinsed fragments.

5. Handling & Storage

5.1 Storage Conditions:

- Store at 4–25 °C in sealed containers
- Avoid direct sunlight and freezing

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- Keep away from acids, oxidizing agents, and heavy metals

5.2 Stability on Storage:

- Activity loss ~1–3% 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

- 100 g, 1 kg, 10 kg, 25 kg

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

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