novozymes
Household Care

Laundry

Product application guideline

Novozymes Savinase®

Novozymes Savinase® is a commonly used protease in liquid and powder laundry formulations that delivers all-around stain removal. Consumers want laundry detergents that effectively remove stains every time. They want to see their clothes visibly cleaner than before washing. Savinase® is a robust protease for removal of soils that contain proteins, such as dairy products, cocoa, meat, egg, blood, gravy and grass. These relatively common soils typically add strong color to clothes, but with Savinase® consumers can see the difference after washing.

Benefits

Adding Savinase® to your detergent formulation ensures:

- Good performance on a variety of protein stains
- Very good storage stability
- A robust protease that is easy to formulate with
- Performance at low wash temperatures in high-pH powder detergents
- Cost-efficient sourcing

Performance

Proteins are amino acids linked together by peptide bonds. During a wash Savinase® catalytically breaks down peptide bonds, leading to solubilization of the peptides either by simple dissolution or by the available surfactants.

Savinase® has no particular specificity for, or requirement of, any amino acids on each side of the peptide bond and is therefore ideally suited for a washing situation where numerous types of protein-containing soils are present.

Stain removal effect

The stain removal effect of Savinase® can be demonstrated on a very broad range of commercially available test swatches. The following table shows only a subset of all the protein-containing stains that will respond to Savinase® treatment.

Company	Swatch number	Swatch content	Materials
EMPA	111	Blood	Cotton
	117	Blood/milk/ink	Poly/cotton
	116	Blood/milk/ink	Cotton
	164	Grass	Cotton
CFT	CS-01	Blood (aged)	Cotton
	C-03	Chocolate milk with carbon black	Cotton
	PC-03	Chocolate milk with carbon black	Poly/cotton
	C-05	Blood/milk/ink	Cotton
	C-10	Pigment, oil, milk	Cotton
	CS-37	Full egg with carbon black	Cotton
WFK	10 EG	Egg yolk, temperature treated	Cotton
Warwick Equest	062KC	Grass, scrubbed	Cotton

Table 1. Commercially available test swatches.

Examples of stain removal test results

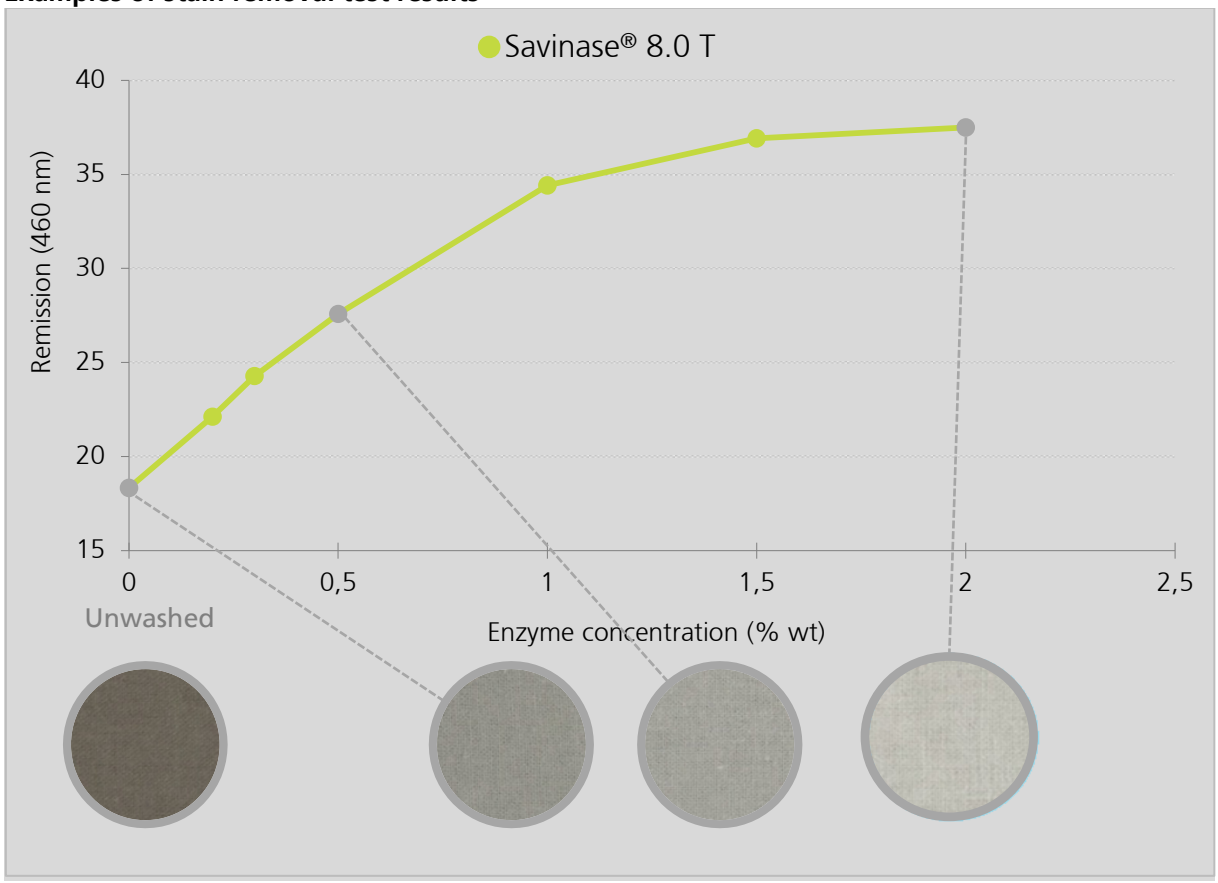


Fig. 1. Typical wash performance in a European powder detergent using Savinase® 8.0 T.
Conditions: 30°C, 15°dH, total washing time: 17 minutes (5 minutes for heating + 12 minutes washing time) in a Launder-O-Meter (LOM) washing machine with CFT C-05 blood/milk/ink on cotton.

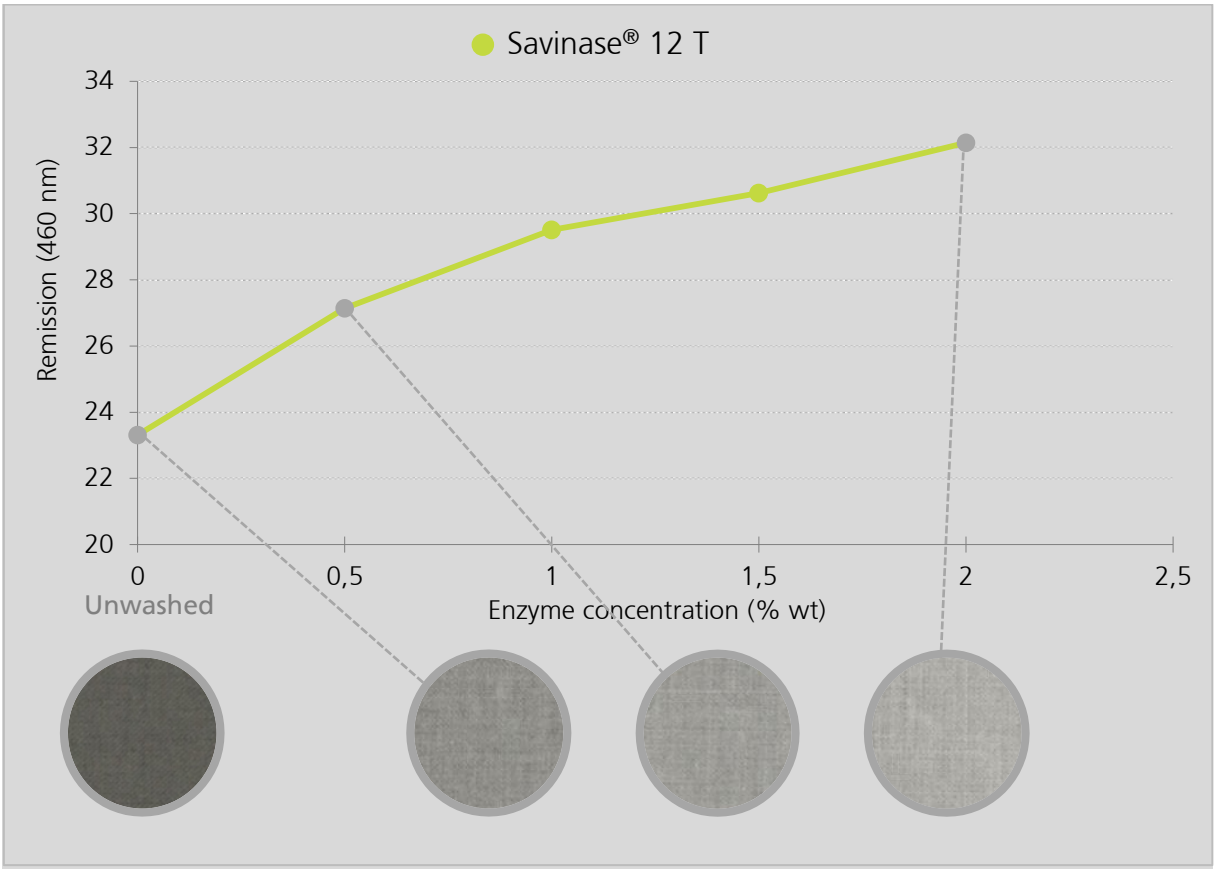


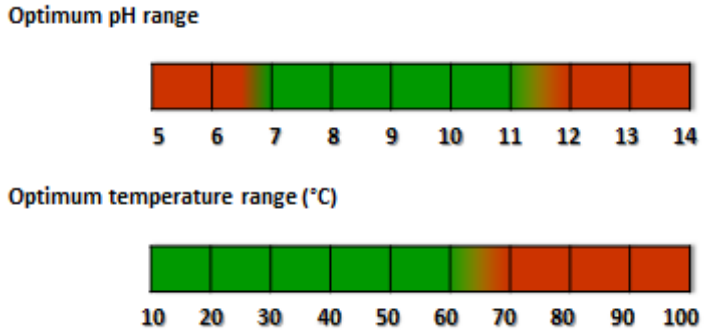
Fig. 2. Typical wash performance in an Asian powder detergent using Savinase® 12 T.
Conditions: 25°C, 15°dH, 15 minutes washing time in a Terg-O-To-Meter (TOM) washing machine with EMPA 117 blood/milk/ink on cotton/polyester.

Usage

The recommended dosage will vary from detergent to detergent and depends heavily on the washing conditions, but typically dosages from 0.2-2% (wt. in detergent) are used. Novozymes' Global Technical Service team is available to determine the relevant dosage in a particular detergent.

Optimum pH and temperature

Savinase® is recommended to be used in washing solutions with a pH ranging from 6.5-11 (liquid detergents with a pH higher than 9.5 are not recommended) and temperatures ranging from 10-65°C. As the achieved wash performance depends on the actual washing conditions and detergent composition, Novozymes strongly encourages customers to verify Savinase® performance in any particular detergent and washing conditions.



Product

Information about Savinase® is available at the Customer Center (www.mynovozymes.com). Savinase® is available as a granulate with different strengths and versions (T-granulate and Evity® T-granulate) and in three liquid versions, two of which are pre-stabilized (Ultra and Evity®).

Novozymes uses an automated procedure for measuring the standardized activity of Savinase®. All methods can be found at the Customer Center in the Analytical Methods section.

Stability in powder detergents

Savinase® is available in two granulate versions that are ideal for use in both powders and tablets (see the Customer Center for more information). One version is formulated as a robust solution suitable for normal conditions. The other one comes with Evity®: an even more stable, highly robust solution formulated to safeguard enzyme performance, even under tough conditions.

To compare the performance of Savinase® Evity® T and Savinase® T, Novozymes has performed wash performance experiments with Savinase® T and Savinase® Evity® T in powder detergent samples. The samples were stored at normal conditions (30°C/55% RH for 8 weeks) and accelerated conditions (37°C/70% RH for 4 weeks). The residual wash performance of these samples was calculated using the formula below, and the results are shown in figures 3 and 4.

$$\%\ residual\ wash\ performance = \frac{\left\{\sum R\ incubated\ sample_{enzyme} - \sum R\ incubated\ sample_{blank}\right\}}{\left\{\sum R\ fresh\ sample_{enzyme} - \sum R\ fresh\ sample_{blank}\right\}}\ x\ 100\%$$

Under normal storage conditions both Savinase® T and Savinase® Evity® T keep the same level of residual wash performance at around 100% (Figure 3).

The accelerated conditions are tougher than real-life conditions; however, they clearly show the robust performance of the Evity® solution, as Savinase® Evity® T maintains the high performance even after storage under tough accelerated conditions (Figure 4).

Residual wash performance
8 weeks – 30°C/55% relative humidity

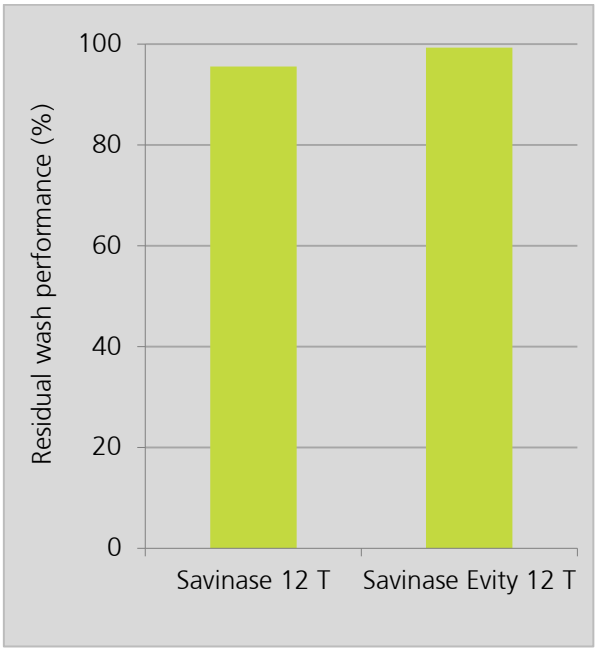


Fig. 3. % Residual wash performance at normal storage conditions.

Residual wash performance
4 weeks – 37°C/70% relative humidity

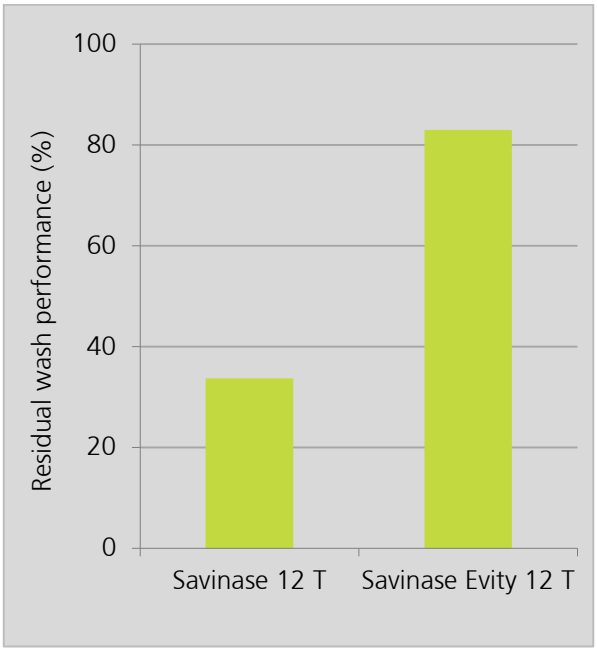


Fig. 4. % Residual wash performance at accelerated storage conditions.

Wash conditions

Conditions
• Washing machine: EU front loader • Washing temperature: 30°C • Detergent type: EU powder with bleach • Detergent dosage: 5 g/L • Enzyme dosage: 1.5 % w/w • Water hardness: 15°dH

Parameter measured
• Remission value (at 460 nm, UV excluded)

Stains
• CFT C-03 – Chocolate milk with carbon black • CFT PC-03 – Chocolate milk with carbon black • CFT C-05 – Blood, milk, ink • CFT C-10 – Pigment, oil, milk • CFT CS-1 – Blood (aged) • CFT CS-37 – Full egg, with carbon black • EMPA 111 – Blood • EMPA 117 – Blood/milk/ink • EMPA 164 – Grass • Warwick Equest 062KC – Grass, scrubbed

Novozymes' Global Technical Service team can help you secure the optimal storage stability of enzymes in powder detergents.

Stability in liquid detergents

Savinase® exists in three liquid formulation versions. One version does not have added stabilizers, while the other two are pre-stabilized versions (Ultra and Evity®). The Ultra and Evity® versions are commercially available and are suitable for formulations where the stabilization system is not so strong. The Savinase® Evity® version is boron free.

Novozymes has tested the stability of Savinase® Evity® 16 L and Savinase® Ultra 16 L by using conditions of 30° for 8 weeks and measured residual activity afterwards. Figure 5 shows that both Savinase® Evity® 16 L and Savinase® Ultra 16 L are approved for these conditions.

Novozymes' Global Technical Service team can help you secure the optimal storage stability of enzymes in liquid detergents.

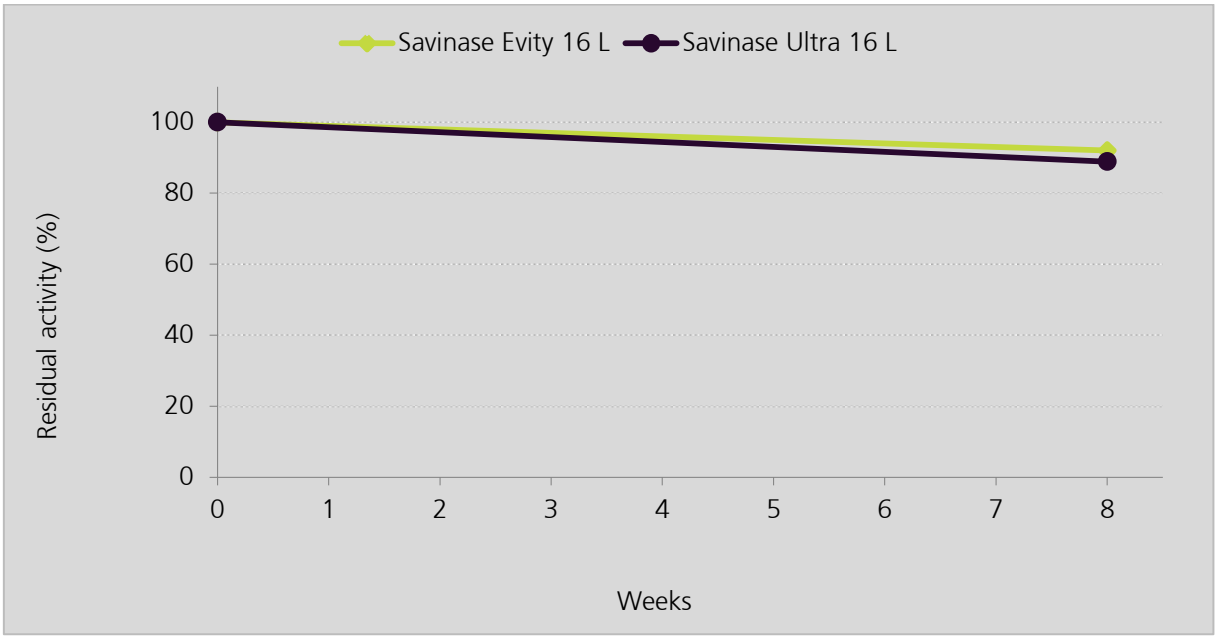


Fig. 5. Storage stability of Savinase® Evity® 16 L and Savinase® Ultra 16 L in a European liquid detergent, at 30°C – 8 weeks. Measured activity after 0 and 8 weeks incubation.

Safety, handling and storage

Safety, handling and storage guidelines are provided with all products.

Contact our Global Technical Service team

By combining technical expertise with in-depth consumer insight, Novozymes offers customers the possibility of requesting technical assistance prior, during and after application of any enzyme in detergents.

Our Global Technical Service team is committed to providing you with the highest level of technical service, and we are available in different locations around the globe.

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Novozymes is the world leader in bioinnovation. Together with customers across a broad array of industries we create tomorrow's industrial biosolutions, improving our customers' business, and the use of our planet's resources.

Our bioinnovation satisfies the demanding requirements of household care manufacturers for powerful solutions that combine advanced performance with the quality, value, and environmental friendliness that consumers increasingly desire.

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