A guide to Novozymes
Household Care

Rethink Tomorrow
Household Care
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Novozymes delivers a comprehensive range of sustainable bio-innovations for manufacturers of household care products that satisfy their demanding requirements for powerful solutions combining advanced performance with the quality, value, and environmental friendliness that consumers increasingly desire.

We offer meaningful innovation for laundry and dishwashing products based on our deep customer insight and technical expertise, enabling our customers to drive sustainable choices.
Laundry

Sensitive
Sports Wash
Super Quick
Mix
Spin
Spin
Rinse

Cotton
Intensive
Wool
Easy Care
Novozymes Household Care offers a variety of solutions to raise the performance of primary and secondary detergency in laundry products. In the past, the cleaning power of enzymes was exploited in detergents as a performance aid – but now enzymes, especially in a multi-enzyme solution, offer the possibility of radical reformulation changes.

Enzyme synergy in a multi-enzyme solution boosts individual enzyme performance to offer basic detergency on complex food items that was previously only provided by large quantities of traditional detergent ingredients.

Enzymes used in laundry detergents act on the basic components of stains and soils so they can be washed away more easily. Since one enzyme molecule can act on many substrate molecules (such as soils and stains), a small amount of enzyme added to a laundry detergent can provide a big cleaning benefit to the consumer.

Benefits

- Get a higher degree of stain removal, whiteness, color care, and fabric care
- Replace traditional chemical ingredients like surfactants and builders with readily biodegradable enzymes to offer consumers a more environmentally friendly detergent
- Offer consumers a detergent that cleans well at low wash temperatures
- Develop a more compact detergent without compromising performance
Biodetergency
Biodetergency
Get basic cleaning with enzymes

Enzymes are powerful cleaners, and in a multi-enzyme solution they can offer basic detergency that has usually been offered by traditional detergent ingredients like surfactants and builders. Detergent manufacturers can replace a percentage of traditional ingredients with enzymes to offer consumers a more powerful, cost-effective, and sustainable detergent.

Benefits

- Enable low wash temperature and compaction
- Replace traditional detergent ingredients like surfactants and builders with readily biodegradable enzymes
- Improve overall washing performance
- Stabilize formulation costs
- Offer new consumer claims

Lipoclean®
Substitute surfactants for sustainable cleaning

Lipoclean is an alternative to current surfactant technology and an essential part of any enzyme solution used to replace detergent ingredients.

Replace on average 25% of a detergent's surfactant system with a multi-enzyme solution containing Lipoclean to get a high-performing, greener detergent without compromising formulation costs.

The key benefits of replacing surfactants with a multi-enzyme solution containing Lipoclean are:

- Enhances performance, especially on greasy stains
- Ensures a more sustainable detergent that offers satisfactory cleaning at low wash temperatures
- Stabilizes formulation costs

<table>
<thead>
<tr>
<th>Trade name</th>
<th>Lipoclean®</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enzyme class</td>
<td>Lipase (EC 3.1.1.3)</td>
</tr>
<tr>
<td>Type of stain</td>
<td>Triglycerides (fatty stains: oils, dairy soils, etc.)</td>
</tr>
<tr>
<td>Primary activity</td>
<td>Hydrolysis of ester bonds in triacylglycerol</td>
</tr>
<tr>
<td>Reaction products</td>
<td>Fatty acid, monoacylglycerol, diacylglycerol</td>
</tr>
<tr>
<td>Standard formulation</td>
<td>Granulate</td>
</tr>
<tr>
<td>Consumer claims</td>
<td>Low wash temperatures, improved performance on hard-to-remove grease stains, a more biodegradable detergent</td>
</tr>
</tbody>
</table>
Whiteness
Whiteness

Enzymatic whiteness is a revolutionary solution for laundry detergents that provides whiteness through preventing soil redeposition and thus fabric graying. Washing and wearing damage cotton fibers, resulting in areas with bristly cellulose microfibrils. These microfibrils trap particulate dirt – for instance, outdoor dirt – during washing and prevent whites from staying white. Enzymes cleave off damaged microfibrils and release any captured dirt particles, thus preventing particulate soil from depositing and participating in fabric graying.

Traditionally, bleaching agents like TAED, perborate, NBS, and PAP have been used to make clothes look whiter. However, bleaching agents cannot prevent soil deposition or mask particulate soilings on fabrics from, for example, traffic dirt or clay from outdoor activities. Enzymatic solutions take whiteness one step further than bleaching agents as they do not just cover up these soilings but remove them. Therefore, enzymes offer a higher degree of whiteness by removing particulate soils that even bleach-containing detergents leave behind.

Benefits

- Keep whites white and clothes looking like new
- Avoid fabric graying by preventing soil deposition on clothes
# Celluclean®
## Taking white wider and making colors brighter

**Benefits**
- Prevents deposition of particulate soils on cotton fabrics, making clothes cleaner and whiter
- Cleaves off damaged cellulose microfibrils to release captured dirt particles, thus preventing soil deposition and fabric graying
- Keeps stripes and colored clothes looking bright, even after several washes
- Degrades beta-glucan stains, thus preventing soil deposition and keeping clothes clean

<table>
<thead>
<tr>
<th>Trade name</th>
<th>Celluclean®</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enzyme class</td>
<td>Cellulase (EC 3.2.1.4)</td>
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<tr>
<td>Primary activity</td>
<td>Hydrolysis of β-1,4-glucosidic bonds in cellulose</td>
</tr>
<tr>
<td>Reaction products</td>
<td>Cello-oligosaccharides</td>
</tr>
<tr>
<td>Standard formulation</td>
<td>Granulate, liquid</td>
</tr>
<tr>
<td>Consumer claims</td>
<td>Whiteness, brightness, soil anti-redeposition</td>
</tr>
<tr>
<td>Comments</td>
<td>Alkaline pH profile</td>
</tr>
</tbody>
</table>

# Celluclean® Classic
## Making clothes whiter and brighter

**Benefits**
- Prevents deposition of particulate soils on cotton fabrics, making clothes cleaner and whiter
- Cleaves off damaged cellulose microfibrils to release captured dirt particles, thus preventing soil deposition and fabric graying
- Keeps stripes and colored clothes looking bright, even after several washes
- Degrades beta-glucan stains, thus preventing soil deposition and keeping clothes clean
- Offers good results at low wash temperatures

<table>
<thead>
<tr>
<th>Trade name</th>
<th>Celluclean® Classic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enzyme class</td>
<td>Multicomponent cellulases</td>
</tr>
<tr>
<td>Primary activity</td>
<td>Hydrolysis of β-1,4-glucosidic bonds in cellulose</td>
</tr>
<tr>
<td>Reaction products</td>
<td>Oligosaccharides</td>
</tr>
<tr>
<td>Standard formulation</td>
<td>Granulate, liquid</td>
</tr>
<tr>
<td>Consumer claims</td>
<td>Whiteness, brightness, soil anti-redeposition, low wash temperature</td>
</tr>
<tr>
<td>Comments</td>
<td>In combination with other enzymes it enhances the removal of a variety of food residues. Can also perform depilling</td>
</tr>
</tbody>
</table>
Color and fabric care
Enzymes enable detergent manufacturers to offer color and fabric care claims and produce detergents that reduce the visible wear of fabrics, keeping garments looking new.

Many clothes are discarded because they no longer look nice; the colors have faded or fuzz and pills have appeared. Enzymes improve the appearance of fabrics and prolong their lifetime.

**Benefits**

- Enzymes cleave protruding fibers from fabric surfaces, thus maintaining the new appearance of cotton fabrics, keeping surfaces smooth and colors bright
- Enzymes remove fuzz and pills from worn cotton fabrics
Carezyme®
Premium
Restoring clothes

Benefits
- Effectively removes fuzz and pills from cotton fabrics
- Restores fabrics to recreate the new appearance as well as the original color and softness
- Prevents black clothes from turning gray
- Enhances color clarity and color contrast
- Provides formulation flexibility and increased stability

Trade name | Carezyme® Premium
---|---
Enzyme class | Cellulase (EC 3.2.1.4)
Primary activity | Hydrolysis of β-1,4-glucosidic bonds in cellulose
Reaction products | Cello-oligosaccharides
Standard formulation | Granulate, liquid
Consumer claims | Fabric care, color care, softness, restoration
Comments | Specially designed to offer fabric and color care

Trade name | Carezyme®
---|---
Enzyme class | Cellulase (EC 3.2.1.4)
Primary activity | Hydrolysis of β-1,4-glucosidic bonds in cellulose
Reaction products | Cello-oligosaccharides
Standard formulation | Granulate, liquid
Consumer claims | Fabric care, color care, softness
Comments | Specially designed to offer fabric and color care
Stain removal
Detergent enzymes are designed to penetrate fabric layers to remove a variety of stains. Enzymes degrade stains into smaller, more water-soluble parts that can be removed more easily during washing.

There are a variety of stain removal enzymes: protease for protein stain removal; amylase for starch stain removal; lipase for grease removal; mannanase for mannan-based stain removal; and pectate lyase for pectin-based stain removal.

Our solutions take stain removal one step further than bleaching agents because rather than just covering up stains, they actually degrade them. If stains remain on clothes, the residues of these stains may act as a kind of glue and attract soil particles in the wash water, resulting in fabric graying and dirty clothes.

**Benefits**

- Enhance the washing performance of detergents by effectively breaking down specific stain components
- Remove common stubborn stains such as meat, pasta, milk, chocolate, grass, lipstick, blood, sweat, and sebum
- Offer outstanding stain removal in combination with surfactants; the enzymes degrade the soil, while the surfactants remove the degraded soil by bringing it into suspension
Protein removal
# Alcalase®
## A gentler and cleaner wash

### Benefits
- The best protease for a low-pH detergent (6.5–8.5)
- Gentle on wool

### Trade name
- **Alcalase®**

<table>
<thead>
<tr>
<th>Trade name</th>
<th>Alcalase®</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enzyme class</td>
<td>Protease. Subtilisin (EC 3.4.21.62)</td>
</tr>
<tr>
<td>Type of stain</td>
<td>Protein (cocoa, blood, grass, gravy, etc.)</td>
</tr>
<tr>
<td>Primary activity</td>
<td>Hydrolysis of peptide bonds in proteins</td>
</tr>
<tr>
<td>Reaction products</td>
<td>Peptides and amino acids</td>
</tr>
<tr>
<td>Standard formulation</td>
<td>Granulate, liquid</td>
</tr>
<tr>
<td>Consumer claims</td>
<td>Stain removal and cleanness</td>
</tr>
<tr>
<td>Comments</td>
<td>Gentle on wool, used in low-pH detergents</td>
</tr>
</tbody>
</table>

# Alcalase® Ultra
## A gentler and cleaner wash

### Benefits
- The best protease for a low-pH detergent (6.5–8.5)
- Gentle on wool
- Enables a more environmentally friendly detergent as it replaces the need for borate/MPG in liquid detergents

### Trade name
- **Alcalase® Ultra**

<table>
<thead>
<tr>
<th>Trade name</th>
<th>Alcalase® Ultra</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enzyme class</td>
<td>Protease. Subtilisin (EC 3.4.21.62)</td>
</tr>
<tr>
<td>Type of stain</td>
<td>Protein (cocoa, blood, grass, gravy, etc.)</td>
</tr>
<tr>
<td>Primary activity</td>
<td>Hydrolysis of peptide bonds in proteins</td>
</tr>
<tr>
<td>Reaction products</td>
<td>Peptides and amino acids</td>
</tr>
<tr>
<td>Standard formulation</td>
<td>Liquid</td>
</tr>
<tr>
<td>Consumer claims</td>
<td>Stain removal and cleanness</td>
</tr>
<tr>
<td>Comments</td>
<td>Replaces the need for borate/MPG in liquid detergents, gentle on wool, used in low-pH detergents</td>
</tr>
</tbody>
</table>
Easyzyme®
Making it easy to wash with laundry bars

Benefits

• A protease formulated for superior enzyme performance and stability in laundry soap bars
• Easyzyme enables enzyme stabilization without negative effects on the laundry soap bar’s physical characteristics
• Key ingredient in Novozymes’ patented solution for making enzymatic soap bars
• Dramatic improvement in cleaning effect of laundry soap bars
• Consumers can do their laundry with half the effort in half the time
• Superior stain removal means less rewash = less rinse = saving water
• Mild on hands
• Opens up a new product category with higher margins than low-quality soaps

<table>
<thead>
<tr>
<th>Trade name</th>
<th>Easyzyme®</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enzyme class</td>
<td>Protease. Subtilisin (EC 3.4.21.62)</td>
</tr>
<tr>
<td>Type of stain</td>
<td>Protein (collar and cuff, body soils, blood, grass, gravy, etc.)</td>
</tr>
<tr>
<td>Primary activity</td>
<td>Hydrolysis of peptide bonds in proteins</td>
</tr>
<tr>
<td>Reaction products</td>
<td>Peptides and amino acids</td>
</tr>
<tr>
<td>Standard formulation</td>
<td>Liquid</td>
</tr>
<tr>
<td>Consumer claims</td>
<td>• Half the effort • Half the time • Easy cleaning • Superior stain removal • Softer hands • Breakthrough innovation • Easyzyme inside • Novozymes (innovation) inside • Unique formula</td>
</tr>
<tr>
<td>Comments</td>
<td>Easyzyme is the key ingredient in Novozymes’ patented process for stabilizing enzymes in laundry soap bars</td>
</tr>
</tbody>
</table>
Everlase®
The all-round bleach-tolerant protease

Benefits

- Offers good performance on a variety of protein stains
- Performs well in bleach-containing powders
- Ideal for multi-enzyme liquid detergents

<table>
<thead>
<tr>
<th>Trade name</th>
<th>Everlase®</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enzyme class</td>
<td>Protease. Subtilisin (EC 3.4.21.62)</td>
</tr>
<tr>
<td>Type of stain</td>
<td>Protein (cocoa, blood, grass, gravy, etc.)</td>
</tr>
<tr>
<td>Primary activity</td>
<td>Hydrolysis of peptide bonds in proteins</td>
</tr>
<tr>
<td>Reaction products</td>
<td>Peptides and amino acids</td>
</tr>
<tr>
<td>Standard formulation</td>
<td>Granulate, liquid</td>
</tr>
<tr>
<td>Consumer claims</td>
<td>Stain removal and cleanness</td>
</tr>
<tr>
<td>Comments</td>
<td>Compatible with other enzymes in liquid detergents, bleach tolerant</td>
</tr>
</tbody>
</table>
Liquanase®*

The superior protease that leaves no trace

Benefits

- The best-performing protease for liquid detergents
- Tough on stubborn blood stains
- Offers good wash performance at low wash temperatures
- Shows better compatibility with other enzyme types than other proteases on the market

Trade name | Liquanase® (same protease as Kannase®)
---|---
Enzyme class | Protease. Subtilisin (EC 3.4.21.62)
Type of stain | Protein (cocoa, blood, grass, gravy, etc.)
Primary activity | Hydrolysis of peptide bonds in proteins
Reaction products | Peptides and amino acids
Standard formulation | Liquid
Consumer claims | Blood stain removal, low-temperature washing
Comments | Compatible with other enzyme classes

Liquanase® Ultra*

The superior protease that leaves no trace

Benefits

- The best-performing protease for liquid detergents
- Tough on stubborn blood stains
- Offers good wash performance at low wash temperatures
- Shows better compatibility with other enzyme types than other proteases on the market
- Enables a more environmentally friendly detergent by eliminating the need for borate in liquid detergents

Trade name | Liquanase® Ultra
---|---
Enzyme class | Protease. Subtilisin (EC 3.4.21.62)
Type of stain | Protein (cocoa, blood, grass, gravy, etc.)
Primary activity | Hydrolysis of peptide bonds in proteins
Reaction products | Peptides and amino acids
Standard formulation | Liquid
Consumer claims | Stain removal, anti-redeposition, whiteness
Comments | Eliminates the need for borate in liquid detergents, compatible with other enzyme classes

* Liquanase is not available in North America

* Liquanase Ultra is not available in North America
Polarzyme®
Wash cold and clean

Benefits

• High-efficiency protease that cleans well at low wash temperatures
• Ideal for handwash detergent formulations

<table>
<thead>
<tr>
<th>Trade name</th>
<th>Polarzyme®</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enzyme class</td>
<td>Protease. Subtilisin (EC 3.4.21.62)</td>
</tr>
<tr>
<td>Type of stain</td>
<td>Protein (cocoa, blood, grass, gravy, etc.)</td>
</tr>
<tr>
<td>Primary activity</td>
<td>Hydrolysis of peptide bonds in proteins</td>
</tr>
<tr>
<td>Reaction products</td>
<td>Peptides and amino acids</td>
</tr>
<tr>
<td>Standard formulation</td>
<td>Granulate</td>
</tr>
<tr>
<td>Consumer claims</td>
<td>Stain removal, cleanness, cold wash</td>
</tr>
<tr>
<td>Comments</td>
<td>Low-temperature protease</td>
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</table>
Savinase®
A robust protease for a variety of detergent formulations

Benefits

• Offers good performance on a variety of protein stains
• A robust protease that is easy to formulate with
• Cleans well at low wash temperatures in high-pH powder detergents
• Cost-efficient

Trade name: Savinase®
Enzyme class: Protease. Subtilisin (EC 3.4.21.62)
Type of stain: Protein (cocoa, blood, grass, gravy, etc.)
Primary activity: Hydrolysis of peptide bonds in proteins
Reaction products: Peptides and amino acids
Standard formulation: Granulate, liquid
Consumer claims: Protein stain removal, low-temperature washing
Comments: Robust, all-round protease, cost-efficient

Savinase® Ultra
A robust protease for a variety of detergent formulations

Benefits

• Offers good performance on a variety of protein stains
• A robust protease that is easy to formulate with
• Cleans well at low wash temperatures in high-pH powder detergents
• Cost-efficient
• Enables a more environmentally friendly detergent by eliminating the need for borate in liquid detergents

Trade name: Savinase® Ultra
Enzyme class: Protease. Subtilisin (EC 3.4.21.62)
Type of stain: Protein (cocoa, blood, grass, gravy, etc.)
Primary activity: Hydrolysis of peptide bonds in proteins
Reaction products: Peptides and amino acids
Standard formulation: Liquid
Consumer claims: Protein stain removal, low-temperature washing
Comments: Eliminates the need for borate/MPG in liquid detergents, robust, all-round protease, cost-efficient
Novozymes’ Ultra technology  
Preserving your investment in liquid detergents

Novozymes developed the Ultra technology to ensure protease stability in liquid formulations. Novozymes’ Ultra technology is based on the addition of a stabilizer and is available in different concentrations. Many of Novozymes’ proteases for liquid detergents are available with Ultra technology.

Benefits

- Stabilize proteases in liquid formulations and prevent cannibalization of the enzyme
- Obtain significant cost savings in expensive ingredients such as propylene glycol
- Reduce the amount of chemicals needed to stabilize enzymes in a liquid formulation
Starch removal
**Duramyl®**

Ideal for bleach-containing formulations

**Benefits**

- Removes difficult starch-based stains
- Enables formulation of bleach-containing detergents due to excellent storage stability with bleach
- Offers superior wash performance at medium temperatures

**Trade name** | **Duramyl®**
---|---
Enzyme class | Amylase (EC 3.2.1.1)
Type of stain | Amylose/amyllopectin (rice, grain, potato, etc.)
Primary activity | Hydrolysis of endo-1,4 bonds in starch (both in amyllose and amyllopectin)
Reaction products | Oligosaccharides
Standard formulation | Granulate
Consumer claims | Stain removal, cleanness, whiteness
Comments | Excellent storage stability in bleach-containing detergents, superior performance at medium temperatures
Stainzyme®

The high-performance stain fighter

Benefits

- Effectively degrades a wide range of commercial food products and is most powerful on starch-based stains
- Easily removes stains at low wash temperatures and in short wash cycles

**Trade name** | **Stainzyme®**
--- | ---
Enzyme class | Amylase (EC 3.2.1.1)
Type of stain | Amylose/amylopectin (rice, grain, potato, etc.)
Primary activity | Hydrolysis of endo-1,4 bonds in starch (both in amylose and amylopectin)
Reaction products | Oligosaccharides
Standard formulation | Granulate, liquid
Consumer claims | Stain removal, cleanness
Comments | Effective at low wash temperatures and in short wash cycles

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Stainzyme® Plus

Superior performance under the toughest conditions

Benefits

- Delivers state-of-the-art wash performance at low wash temperatures in short wash cycles and at low dosages
- Prevents soil redeposition on starch stains to ensure that whites remain white
- Ensures high performance due to high level of in-wash bleach tolerance

**Trade name** | **Stainzyme® Plus**
--- | ---
Enzyme class | Amylase (EC 3.2.1.1)
Type of stain | Amylose/amylopectin (rice, grain, potato, etc.)
Primary activity | Hydrolysis of endo-1,4 bonds in starch (both in amylose and amylopectin)
Reaction products | Oligosaccharides
Standard formulation | Granulate, liquid
Consumer claims | Stain removal, anti-redeposition, whiteness
Comments | Bleach tolerant
**Termamyl®**

A robust starch stain remover

**Benefits**

- A robust standard amylase that efficiently removes starch-based stains
- Eliminates starch films that can form on fabric, resulting in fabric graying
- Washes effectively at high alkalinity and temperature

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**Trade name**

<table>
<thead>
<tr>
<th>Termamyl®</th>
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</table>

<table>
<thead>
<tr>
<th>Enzyme class</th>
<th>Amylase (EC 3.2.1.1)</th>
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</thead>
<tbody>
<tr>
<td>Type of stain</td>
<td>Amylose/amylopectin (rice, grain, potato, etc.)</td>
</tr>
<tr>
<td>Primary activity</td>
<td>Hydrolysis of endo-1,4 bonds in starch (both in amylose and amylopectin)</td>
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<tr>
<td>Reaction products</td>
<td>Oligosaccharides</td>
</tr>
<tr>
<td>Standard formulation</td>
<td>Granulate, liquid</td>
</tr>
<tr>
<td>Consumer claims</td>
<td>Stain removal, cleanness, whiteness</td>
</tr>
<tr>
<td>Comments</td>
<td>Robust, washes well at high alkalinity and temperature</td>
</tr>
</tbody>
</table>

---

**Termamyl® Ultra**

Efficient starch removal in liquid detergents

**Benefits**

- Maintains performance over a long time, even in the presence of builders and complexing agents
- Offers efficient starch removal and whiteness performance in liquid detergents

---

**Trade name**

<table>
<thead>
<tr>
<th>Termamyl® Ultra</th>
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</table>

<table>
<thead>
<tr>
<th>Enzyme class</th>
<th>Amylase (EC 3.2.1.1)</th>
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<tr>
<td>Type of stain</td>
<td>Amylose/amylopectin (rice, grain, potato, etc.)</td>
</tr>
<tr>
<td>Primary activity</td>
<td>Hydrolysis of endo-1,4 bonds in starch (both in amylose and amylopectin)</td>
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<tr>
<td>Reaction products</td>
<td>Oligosaccharides</td>
</tr>
<tr>
<td>Standard formulation</td>
<td>Liquid</td>
</tr>
<tr>
<td>Consumer claims</td>
<td>Stain removal, cleanness, whiteness</td>
</tr>
<tr>
<td>Comments</td>
<td>Stable in the presence of builders and complexing agents</td>
</tr>
</tbody>
</table>

* The Ultra technology available with Termamyl is not based on the protease stabilizer technology. It is based on enzyme modifications, which makes Termamyl Ultra more robust in formulations with complexing agents.
Grease removal
Lipex®
Say goodbye to fatty stains

**Benefits**
- Efficient first-wash removal of laundry stains that contain edible fats or oils
- Effectively cleans under neutral to alkaline conditions and performs well across a broad temperature range
- Removes the fatty stain on the surface of the fibers and also performs deep cleaning within the fibers of the fabric

<table>
<thead>
<tr>
<th>Trade name</th>
<th>Lipex®</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enzyme class</td>
<td>Lipase (EC 3.1.1.3)</td>
</tr>
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<td>Type of stain</td>
<td>Triacylglycerol (fatty stains: oils, dairy soils, etc.)</td>
</tr>
<tr>
<td>Primary activity</td>
<td>Hydrolysis of ester bonds in triacylglycerol</td>
</tr>
<tr>
<td>Reaction products</td>
<td>Fatty acids, monoacylglycerol, diacylglycerol</td>
</tr>
<tr>
<td>Standard formulation</td>
<td>Granulate, liquid</td>
</tr>
<tr>
<td>Consumer claims</td>
<td>Grease stain removal</td>
</tr>
<tr>
<td>Comments</td>
<td>Efficient first-wash lipase</td>
</tr>
</tbody>
</table>

Lipolase®
Removes grease stains wash after wash

**Benefits**
- Offers excellent all-round performance on fatty and oily stains
- Works effectively under alkaline conditions and across a broad temperature range
- Removes fatty stains such as lipstick, frying fats, butter, salad oil, sauces, and tough stains on collars and cuffs containing residues of human sebum

<table>
<thead>
<tr>
<th>Trade name</th>
<th>Lipolase®</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enzyme class</td>
<td>Lipase (EC 3.1.1.3)</td>
</tr>
<tr>
<td>Type of stain</td>
<td>Triacylglycerol (fatty stains: oils, dairy soils, etc.)</td>
</tr>
<tr>
<td>Primary activity</td>
<td>Hydrolysis of ester bonds in triacylglycerol</td>
</tr>
<tr>
<td>Reaction products</td>
<td>Fatty acids, monoacylglycerol, diacylglycerol</td>
</tr>
<tr>
<td>Standard formulation</td>
<td>Granulate, liquid</td>
</tr>
<tr>
<td>Consumer claims</td>
<td>Stain removal, cleaness</td>
</tr>
<tr>
<td>Comments</td>
<td>Shows highest activity during the drying process, and consequently the first effects are seen after the second wash</td>
</tr>
</tbody>
</table>
Complex stain removal
Mannaway®
Adding new power to your detergent brand

Benefits

- Degrades hard-to-remove mannan stains
- Prevents soil anti-redeposition and fabric graying
- Offers exceptional cleaning performance and in-depth cleaning

Mannan, also known as gum, is a carbohydrate found extensively in food products, household agents, and personal care products. Some examples are: salad dressing, ketchup, mayonnaise, ice cream, frozen desserts, milkshakes, body lotions, and toothpaste.

### Trade name: Mannaway®
- Enzyme class: Mannanase (EC 3.2.1.78)
- Type of stain: Mannan (typically guar gum and locust bean gum)
- Primary activity: Hydrolysis of internal β-1,4 bonds in mannose polymers
- Reaction products: Shorter mannose oligosaccharides
- Standard formulation: Granulate, liquid
- Consumer claims: Stain removal, anti-redeposition, whiteness
- Comments: For complex food stains containing mannan

XPect®*
The natural choice for fruit stains

Benefits

- Provides unique stain removal benefits on a wide range of pectin-based stains
- Enables the same or better performance at low wash temperatures compared to regular temperatures on a variety of fruit- and pectin-based stains
- Removes fruit- and pectin-based stains rather than masking them as bleaching agents do

Pectin is a polysaccharide found in a variety of fruits, including banana, tangerines, tomatoes, and others. Pectin, which is usually extracted from citrus fruits, is also used as a thickener and texturiser in tomato sauces, marmalades, fruit juices, drinking yogurts and low-fat dairy products.

### Trade name: XPect®*
- Enzyme class: Pectate lyase (EC 4.2.2.2)
- Type of stain: Pectin
- Primary activity: α-1,4 linked polygalactosyluronic acid
- Reaction products: De-esterified pectins
- Standard formulation: Granulate, liquid
- Consumer claims: Fruit and vegetable stain removal
- Comments: For complex food, fruit, and vegetable stains containing pectin

* XPect is not available in China and Japan
Dishwash
Modern dishwashing detergents face increasing consumer demands for efficient cleaning of all tableware. As cleaness is the main criterion for dishwashing detergents, enzymes are a key ingredient for effectively removing difficult and dried-on soils from dishes and leaving glassware shiny.

Enzymes clean well in mild conditions and therefore prevent degradation of glassware, ensuring the sparkling dishes that end consumers demand wash after wash.

In addition, enzymes also enable environmentally friendly, phosphate-free detergents. Phosphates have been used in dishwashing detergents to get dishes clean, but they harm the aquatic environment and are increasingly being banned in detergents around the world. Detergent manufacturers can replace phosphates with a multi-enzyme solution that provides the same excellent cleaning performance.

Novozymes offers amylases for starch soil removal and proteases for protein soil removal in dishwashing detergents.

Benefits

- Get a higher degree of soil removal, and hence cleaner dishes
- Prevent degradation of glassware with enzymes as they clean well in mild conditions
- Get good cleaning performance in phosphate-free detergents with readily biodegradable enzymes
Evity®
Approved for tough conditions

Novozymes Evity is an enzyme stabilization platform. Designed for tough conditions, Evity enables consistent enzyme performance in all detergents, including phosphate-free detergents.
Protein removal
### Blaze®

**Best-in-class protein removal**

**Benefits**
- Effectively removes protein-based soils such as egg yolk and minced meat
- Improved performance in phosphate-free detergents
- Highly efficient in temperatures as low as 40°C
- Synergistic effect with Stainzyme® Plus for improved starch removal

<table>
<thead>
<tr>
<th>Trade name</th>
<th>Blaze®</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enzyme class</td>
<td>Protease. Subtilisin (EC 3.4.21.62)</td>
</tr>
<tr>
<td>Type of stain</td>
<td>Protein based soils, egg yolk and minced meat are common in dishwash</td>
</tr>
<tr>
<td>Primary activity</td>
<td>Broad specificity for peptide bonds</td>
</tr>
<tr>
<td>Reaction products</td>
<td>Peptides</td>
</tr>
<tr>
<td>Standard formulation</td>
<td>Granulate</td>
</tr>
<tr>
<td>Consumer claims</td>
<td>Best-in-class soil removal</td>
</tr>
</tbody>
</table>

### Everlase®

**The all-round bleach-tolerant protease**

**Benefits**
- Works efficiently in powder and tablet formulations with low levels of oxygen bleach
- Offers excellent cleaning performance, even after storage

<table>
<thead>
<tr>
<th>Trade name</th>
<th>Everlase®</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enzyme class</td>
<td>Protease. Subtilisin (EC 3.4.21.62)</td>
</tr>
<tr>
<td>Type of stain</td>
<td>Protein (cocoa, blood, grass, gravy, etc.)</td>
</tr>
<tr>
<td>Primary activity</td>
<td>Hydrolysis of peptide bonds in proteins</td>
</tr>
<tr>
<td>Reaction products</td>
<td>Peptides and amino acids</td>
</tr>
<tr>
<td>Standard formulation</td>
<td>Granulate, liquid</td>
</tr>
<tr>
<td>Consumer claims</td>
<td>Soil removal, shine</td>
</tr>
<tr>
<td>Comments</td>
<td>Excellent storage stability, ideal for bleach-based formulations</td>
</tr>
</tbody>
</table>

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* Comes with Evity®

* Not available in Canada
Savinase®
A robust protease for a variety of detergent formulations

Benefits
- Cleans effectively in a variety of wash conditions and detergent formulations
- Works well in highly alkaline conditions and medium-temperature wash conditions with optimal activity at 55 °C
- Ideal for gel formulations

<table>
<thead>
<tr>
<th>Trade name</th>
<th>Savinase®</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enzyme class</td>
<td>Protease. Subtilisin (EC 3.4.21.62)</td>
</tr>
<tr>
<td>Type of stain</td>
<td>Protein (cocoa, blood, grass, gravy, etc.)</td>
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<td>Primary activity</td>
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<tr>
<td>Reaction products</td>
<td>Peptides and amino acids</td>
</tr>
<tr>
<td>Standard formulation</td>
<td>Granulate, liquid</td>
</tr>
<tr>
<td>Consumer claims</td>
<td>Soil removal</td>
</tr>
<tr>
<td>Comments</td>
<td>Robust, cost-efficient</td>
</tr>
</tbody>
</table>
Starch removal
**Duramyl**
Ideal for bleach-containing formulations

**Benefits**
- Superior performance on starch-based soils
- Excellent storage stability in bleach-containing detergents

<table>
<thead>
<tr>
<th>Trade name</th>
<th>Duramyl®</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enzyme class</td>
<td>Amylase (EC 3.2.1.1)</td>
</tr>
<tr>
<td>Type of stain</td>
<td>Amylose/amylopectin (rice, grain, potato, etc.)</td>
</tr>
<tr>
<td>Primary activity</td>
<td>Hydrolysis of endo-1,4 bonds in starch (both in amylose and amylopectin)</td>
</tr>
<tr>
<td>Reaction products</td>
<td>Oligosaccharides</td>
</tr>
<tr>
<td>Standard formulation</td>
<td>Granulate</td>
</tr>
<tr>
<td>Consumer claims</td>
<td>Soil removal</td>
</tr>
<tr>
<td>Comments</td>
<td>Excellent storage stability in bleach-containing detergents, superior performance at medium temperatures</td>
</tr>
</tbody>
</table>

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**Stainzyme**
A groundbreaking stain fighter

**Benefits**
- Highly effective at degrading a wide range of commercial food products; most powerful on starch-based soils
- Prevents repeated deposition of starch-based soils on dishes wash after wash

<table>
<thead>
<tr>
<th>Trade name</th>
<th>Stainzyme®</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enzyme class</td>
<td>Amylase (EC 3.2.1.1)</td>
</tr>
<tr>
<td>Type of stain</td>
<td>Amylose/amylopectin (rice, grain, potato, etc.)</td>
</tr>
<tr>
<td>Primary activity</td>
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</tr>
<tr>
<td>Reaction products</td>
<td>Oligosaccharides</td>
</tr>
<tr>
<td>Standard formulation</td>
<td>Granulate, liquid</td>
</tr>
<tr>
<td>Consumer claims</td>
<td>Starch soil removal, shine</td>
</tr>
<tr>
<td>Comments</td>
<td>Prevents deposition of soils on dishes</td>
</tr>
</tbody>
</table>
Stainzyme® Plus*
Consistent, premium performance

**Trade name** | **Trade name**
---|---
Stainzyme® Plus | Termamyl®

**Benefits**
- Efficiently removes starch-based soils
- Effective at high alkalinity and at high temperature

**Stainzyme® Plus**

- **Enzyme class**: Amylase (EC 3.2.1.1)
- **Type of stain**: Amylose/amylopectin (rice, grain, potato, etc.)
- **Primary activity**: Hydrolysis of endo-1,4 bonds in starch (both in amylose and amylopectin)
- **Reaction products**: Oligosaccharides
- **Standard formulation**: Granulate, liquid
- **Consumer claims**: Soil removal
- **Comments**: Robust in bleach-based formulations

* Comes with Evity®

**Termamyl®**

- **Enzyme class**: Amylase (EC 3.2.1.1)
- **Type of stain**: Amylose/amylopectin (rice, grain, potato, etc.)
- **Primary activity**: Hydrolysis of endo-1,4 bonds in starch (both in amylose and amylopectin)
- **Reaction products**: Oligosaccharides
- **Standard formulation**: Granulate, liquid
- **Consumer claims**: Soil removal
- **Comments**: Particularly good for ADW detergents
For further information regarding Novozymes’ product range and its applications please contact Customer Solutions or your Account Manager at Novozymes.