## BOLI® Enzymes - Catalyzing Your Success!



For over two decades, BOLI® has been a prestigious enzyme brand in China. With advanced submerged fermentation, extraction, and refining technologies, our world-class facilities are ISO 9001,ISO14001, and FSSC 22000 certified and operate in strict compliance with GMP standards. Our Halal-and Kosher-certified enzyme products have been exported to over 20 countries worldwide. Supported by a professional technical team and strong collaborations with renowned research institutes and universities across China,we deliver tailored enzyme solutions that meet customer needs.


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KOF-K PARVE Kosher Certified K#2089

# Bakery Enzyme Manufacturer



# Our Story

For over two decades, BOLI® has been a prestigious enzyme brand in China. With world-class facilities are ISO 9001, ISO 14001, and FSSC 22000 certified and operate in and have been exported to 20+ countries worldwide. Supported by a professional universities in China, we deliver tailored enzyme solutions that meet customer needs.

BOLI® Enzymes – Catalyzing Your Success!

**Wuxi Boli Bioproducts Co.,Ltd.** was created.Specialized in the research and development of enzyme technology,technical services and sales of enzymes, we have established good track records and reputation in the industry with our professional expertise.




1998

2005



**Jiangsu Boli Bioproducts Co.,Ltd.** was set up in Jiangyan Economic Development Zone, Taizhou city, Jiangsu province,occupying an area of around 20,000 m². Equipped with most advanced enzyme production facilities and technology,the Company is engaged in R&D,production of BOLI® enzymes with an annual capacity of 30,000 tons.

**Wuxi Rite Import&Export Co.,Ltd.** was set up.Ever since then, BOLI® enzyme products have been exported to more than 20 countries in the world,including American, European and South-East Asian countries,and have been appreciated by many prominent overseas customers.



2011

2015




**Shanghai Boli Bioproducts Co.,Ltd.** was established,which has enabled us to enlarge the market share of BOLI® enzymes both at home and abroad.

**Jiangsu Boli-Jiangnan University Joint R&D center of Industrial Enzymes** was established.It is engaged in the screening, molecular modification and construction of the microorganisms that produce enzymes, establish standard assay methods of enzymatic properties.



2017

2020



**Jiangsu Boyang Bioproducts Co.,Ltd.** put into operations.Located in the National Economic&Technological Development Zone, Nantong city, covering an area of around 30,000 m², this new food-grade enzyme production site was set up with cutting-edge technology of enzyme production.

# Our Qualification

National High-Technology Enterprise

Food Production License

Feed Additives Production License

ISO 9001/14001/22000 certificates

FSSC 22000 certificate

Halal certificate

Kosher certificate




# Manufacturing Process



Strain Cultivation



Fermentation



Filtration



Extraction



Vacuum Drying & Granulation



Quality Inspection



Metal Detector for Powder Products

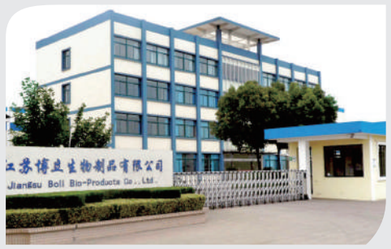


Air-conditioned Warehouse of Finished Products



Packing Liquid Products

# Our Factories




Taizhou Factory



Our Team




Nantong Factory



Maintenance



Fermentation Workshop



QC Laboratory



Fermentation Workshop



QC Laboratory



Extraction Workshop



Raw Material Warehouse



Extraction Workshop



Wastewater Treatment

# Our
# Customers & Location




> Taizhou Plant > Nantong Plant > Shanghai Office > Wuxi Office > Wuxi R&D Center

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| Dough Strengthening & Flavor Enhancement | Lipase LP |
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| Heat-Processed Foods | Asparaginase |
| Natural Preservation | Cultured Grain Products |



# Bacterial Alpha-Amylase

## 【Overview】

Bacterial alpha-amylase (EC 3.2.1.1, α-1,4-glucan 4-glucanohydrolase) is produced from Bacillus subtilis through submerged fermentation, extraction and refinement processes. It is an endo-amylase that randomly hydrolyzes internal α-1,4 glycosidic bonds in starch, glycogen, and their degradation products, rapidly reducing the viscosity of gelatinized starch solutions and producing soluble dextrins and oligosaccharides. Excessive hydrolysis can produce small amounts of glucose and maltose.

## 【Functions】

The core functions of bacterial alpha-amylase in baking are to significantly enhance dough fermentation stability, increase bread volume and crumb fineness, and effectively delay starch retrogradation by producing dextrins, improving finished product texture and shelf life.



### ▶ Efficient starch liquefaction promoting fermentation

Bacterial alpha-amylase randomly cleaves α-1,4 glycosidic bonds endolytically, rapidly degrading long-chain starch into dextrins and oligosaccharides, providing a continuous fermentable sugar source for yeast and significantly enhancing dough gas production.

### ▶ High temperature resistance ensuring activity throughout baking

Unlike fungal alpha-amylase (optimal 50-60°C), bacterial alpha-amylase has strong heat resistance, remaining active at gelatinization temperatures(80-90°C) until the internal temperature of the dough exceeds 100°C. This allows it to continue acting during early baking, improving oven spring and significantly increasing bread volume.

### ▶ Texture improvement, enhanced elasticity and softness

Consequently, the generated dextrins can bind with the gluten network, enhancing dough extensibility and gas retention, which yields a finer, moister crumb and more elastic mouthfeel.

### ▶ Slows down starch retrogradation, prolongs shelf life

By reducing the molecular order of starch and slowing down starch recrystallization (staling), it helps bread stay soft during storage and reduces hardening.

## 【Product characteristics, models and dosage】

**Bacterial Alpha-Amylase**

| Model | Activity | Effective pH | Optimal pH | Effective Temperature | Optimal Temperature | Recommended Dosage (g/100kg flour) |
|---|---|---|---|---|---|---|
| BAA-0040 | 4,000 U/g | 6.0-7.0 | 6.0-6.5 (inactivated below pH 5.0) | 30-90°C (more stable under 60°C) | 60-70°C (At 70–90°C, higher temperature increases reaction rate but also accelerates enzyme inactivation.) | 2.5-5 (25-50 ppm) |
| BAA-0100 | 10,000 U/g | | | | | 1-2 (10-20 ppm) |
| BAA-0200 | 20,000 U/g | | | | | 0.5 -1 (5-10ppm) |

- Calcium ions play a protective role in the stability of bacterial alpha-amylase. In the absence of calcium ions, the enzyme activity is completely lost. A certain concentration of calcium ions can broaden the pH range of the enzyme. A calcium ion concentration of 150 ppm is generally required.
- Excessive addition may cause the dough to become too soft, reduce gas retention, and even lead to baking collapse or a sticky crumb. It is recommended to conduct small-scale tests first and adjust the dosage according to flour quality and process conditions.



# Maltogenic Amylase

## 【Overview】

Maltogenic amylase (EC 3.2.1.133, 1,4-α-D-glucan α-maltohydrolase) is produced from selected strains of Bacillus subtilis through submerged fermentation and purification. This enzyme is a special type of α-amylase. It hydrolyzes amylopectin to generate maltose, oligosaccharides, and small-molecule dextrins, thereby interfering with starch recrystallization and the entanglement between starch granules and protein macromolecules. By slowing down starch granule recrystallization, it reduces the rate of bread staling and extends its shelf life.

## 【Function】

Maltogenic amylase is primarily used in baking to slow down starch staling, maintain bread softness, and extend shelf life. Its core function is to interfere with the recrystallization process by hydrolyzing amylopectin, thereby preserving product elasticity and a moist mouthfeel.



### Long-lasting freshness and inhibition of hardening

Maltogenic amylase effectively reduces the starch retrogradation rate, preventing bread from quickly becoming dry, hard, and crumbly after cooling. It is especially suitable for long-shelf-life pre-packaged bread, toast, and cake products, significantly reducing losses caused by staling.

### Texture improvement and elasticity retention

The moderate modification of starch structure increases water-binding capacity, leading to better water retention. The crumb is moister, softer, and offers springy chewiness, enhancing the overall eating experience.

### Wide applicability and excellent process compatibility

Works well with high-sugar, low-sugar, sugar-free, and high-fat laminated breads, and matches perfectly with standard baking processes.

## 【Product characteristics, models and dosage】

| Maltogenic Amylase | | | | | | |
|---|---|---|---|---|---|---|
| Model | Activity | Effective pH | Optimal pH | Effective Temperature | Optimal Temperature | Recommended Dosage (g/100kg flour) |
| MAA-1500 | 1,500,000 U/g | 4.0-7.0 | 4.5-6.0 | 30-85°C | 55-70°C | 2-10 (20-100 ppm) |

◎ Actual dosage may be adjusted based on flour quality and processing conditions.



# Fungal Alpha-Amylase

## 【Overview】

Fungal alpha-amylase (EC 3.2.1.1, 1,4-α-D-glucan hydrolase) is produced from Aspergillus oryzae var. through submerged fermentation, extraction and refinement processes. This endo-amylase quickly hydrolyzes internal α-1,4 glycosidic bonds in gelatinized starch, amylose, and amylopectin solutions, yielding soluble dextrins and maltose.

## 【Function】

The primary function of fungal alpha-amylase in baking is to hydrolyze damaged starch, producing maltose and dextrins, which significantly enhance dough fermentation efficiency, increase bread volume, improve crumb structure, and slow down staling.



### Enhance fermentation and increase dough vitality

The maltose produced by enzymatic hydrolysis provides ample nutrition for yeast, significantly increasing its metabolic rate. This enables the dough to release more carbon dioxide during the proofing stage, improving gas retention and extensibility while avoiding issues such as collapse or under-fermentation.

### Increase bread volume and reduce weight loss

The synergy between ample gas production and a well-developed gluten network allows the dough to expand more fully during baking, increasing loaf volume by 10 - 15% while reducing moisture loss and improving yield.

### Improve internal texture and create a fine crumb structure

The bread crumb becomes softer with moderate elasticity, and the air cells are evenly and finely distributed, forming an ideal "honeycomb structure" that greatly enhances chewiness and mouthfeel.

### Enhance crust color and flavor

The reducing sugars produced by enzymatic hydrolysis participate in the Maillard reaction during baking, giving the bread crust an attractive golden-yellow color and generating rich, toasty flavor compounds, thereby improving overall sensory quality.

### Slow down starch retrogradation and extend shelf life

By modifying the starch molecular structure and interfering with the recrystallization process (staling), it effectively slows the rate at which bread dries out and hardens, helping the product stay fresh in taste for several days.

## 【Product characteristics, models and dosage】

**Fungal Alpha-Amylase**

| Model | Activity | Effective pH | Optimal pH | Effective Temperature | Optimal Temperature | Recommended Dosage (g/100kg flour) |
|---|---|---|---|---|---|---|
| FAA-5000 | 50,000 U/g | 4.0-6.5 | 4.8-5.4 | 35-65°C | 45-55°C | 0.24-2.5 (2.4-25 ppm) |
| FAA-5200 | 100,000 U/g | | | | | 0.12-1.25 (1.2-12.5 ppm) |

◎ Actual dosage may be adjusted based on flour quality and processing conditions.



# Beta-Amylase

## 【Overview】

Beta-Amylase (EC 3.2.1.2, α-1,4-glucan maltohydrolase) is produced from Bacillus subtilis through submerged fermentation, extraction, and refinement processes. As an exo-amylase, it catalyzes the hydrolysis of (1-4)-α-D-glucosidic linkages in polysaccharides, successively cleaving maltose units from the non-reducing end of the chain.

## 【Function】

The core function of beta-amylase in baking is to efficiently generate maltose to support yeast fermentation, improve bread flavor and color, and synergistically slow down starch staling while maintaining softness of the finished product.

### Promote fermentation and increase dough expansion

Natural flour contains only a very limited amount of beta-amylase, especially when the wheat is aged or has low enzyme activity. Supplementing with additional beta-amylase can greatly increase maltose yield, enhance yeast activity, and lead to more thorough proofing and a lighter, fluffier crumb.

### Improved flavor and crust color

The maltose released by the enzyme adds a gentle sweetness to the bread. As a reducing sugar, it also helps create an appealing golden-brown crust through the Maillard reaction, making the bread look and taste better.

### Slow down staling and extend shelf life

The dextrins and oligosaccharides produced by beta-amylase help retain moisture. They interfere with the recrystallization of starch, slow down the hardening of bread, and keep it soft for several days.

### Compatible with traditional processes and enhances natural flavor

In traditional baking that uses malt flour or malt extract, beta-amylase is the main active component. It not only replaces some chemical improvers but also supports clean label, enhancing the product’ s natural qualities.

## 【Product characteristics, models and dosage】

**Beta-Amylase**

| Model | Activity | Effective pH | Optimal pH | Effective Temperature | Optimal Temperature | Recommended Dosage (g/100kg flour) |
|---|---|---|---|---|---|---|
| FBBA-70 | 700,000 U/g | 4.2 - 6.5 | 4.5 - 5.5 | 45-70°C | 50-60°C | 20-50 (200-500 ppm) |
| FBBA-72 | 1,400,000 U/g | | | | | 10-25 (100-250 ppm) |

The exact dosage should be determined by testing.



# Xylanase

## 【Overview】

Xylanase NXY (EC 3.2.1.8, endo-1,4-β-xylanase) is a powdered enzyme preparation produced from fungal sources through submerged fermentation, extraction, and refinement processes. It improves dough stability and increases bread volume.

## 【Function】

Flour contains about 2 - 3% pentosans (mostly arabinoxylan), some soluble in water and some not. The water-insoluble ones interfere with gluten development, causing sticky dough and poor machinability. Xylanase works by turning those insoluble pentosans into soluble forms, and then breaking them down into small compounds like xylose and xylobiose. This leads to several advantages in baking :



### ▶ Improved dough properties

After hydrolysis, water that was originally trapped by pentosans is released. This water is then reabsorbed by gluten proteins, strengthening the gluten network, making the dough drier and less sticky, and greatly improving machinability.

### ▶ Better gas production and retention

The small-molecule sugars released during hydrolysis feed the yeast, increasing gas production. Meanwhile, the water-soluble pentosans become more viscous, wrapping around $CO_2$ bubbles and making the bubble film stronger and more stretchable, thus enhancing oven spring.

### ▶ Increased bread volume

The strengthened gluten network combined with good gas retention can boost bread volume by 10 - 20%, resulting in a finer crumb and more uniform air cells.

### ▶ Slow down product staling

The optimized gluten network enhances the water-holding capacity of the crumb and reduces moisture loss from the crust, thereby extending shelf life.

## 【Product characteristics, models and dosage】

| Xylanase | | | | | | |
|---|---|---|---|---|---|---|
| Model | Activity | Effective pH | Optimal pH | Effective Temperature | Optimal Temperature | Recommended Dosage (g/100kg flour) |
| NXY-0250 | 25,000 U/g | 5.5-7.5 | 6.0-6.5 | 35-65°C | 45-50°C | 1-5 (10-50 ppm) |
| NXY-2500 | 250,000 U/g | | | | | 0.1-0.5 (1-5 ppm) |

◎ The actual dosage should be determined by trials according to the flour quality and process conditions.



# Neutral Protease

## 【Overview】

Neutral protease (EC 3.4.24.28) is produced from Bacillus subtilis through submerged fermentation, extraction, and refinement processes. It is used to hydrolyze proteins under neutral conditions, producing peptides and small amounts of amino acids.

## 【Function】

In baking, neutral protease mainly works by weakening gluten, improving dough handling properties, and enhancing the texture and flavor of the finished product. It hydrolyzes peptide bonds in gluten proteins, moderately reducing dough strength and making the dough easier to stretch and shape. At the same time, it promotes fermentation and the Maillard reaction, resulting in better color and aroma.



### ▶ Regulating gluten strength and dough handling

The gluten proteins in flour (glutenin and gliadin) determine the elasticity and extensibility of dough. Neutral protease specifically cleaves peptide bonds in these proteins, moderately weakening the gluten network. This makes the dough softer and more extensible, reduces resistance during mechanical processing, and prevents shrinkage during shaping. It is especially suitable for products that require high plasticity, such as Cantonese mooncake pastry, semi-sweet biscuits, and soft bread.

### ▶ Boosting fermentation and volume

The small peptides and amino acids produced by enzymatic hydrolysis not only improve dough rheology but also serve as a high-quality nitrogen source for yeast, stimulating its metabolic activity and making gas production more stable and sustained. This directly enhances the oven spring of the dough, resulting in a fluffier crumb and a fuller loaf volume.

### ▶ Better mouthfeel and flavor

In biscuits and crackers, moderate gluten degradation reduces toughness and enhances crispiness and layered texture.
In bread, the amino acids participate in the Maillard reaction during baking, promoting a golden-yellow color and generating more flavor compounds, resulting in a richer aroma.

### ▶ Boosting efficiency and flexibility with different flours

This is especially important when using aged flour, where endogenous enzyme activity is reduced and fermentation power is insufficient. Adding neutral protease compensates for this deficiency, shortens mixing time, improves oven spring, stabilizes finished product quality, and reduces production risks caused by fluctuations in raw material quality.

## 【Product characteristics, models and dosage】

**Neutral Protease**

| Model | Activity | Effective pH | Optimal pH | Effective Temperature | Optimal Temperature | Recommended Dosage (g/100kg flour) |
|---|---|---|---|---|---|---|
| NP-2000 | 200,000 U/g | 5.0-10.0 | 6.0-8.0 | 30-60°C | 45-55°C | 2.5-12.5 (25-125ppm) |
| NP-8000 | 800,000 U/g | | | | | 0.6-3 (6-30ppm) |

◎ The actual dosage should be determined by trials according to the flour quality and process conditions.



# Glucoamylase

## 【Overview】

Glucoamylase (EC 3.2.1.3, α-1,4-glucan glucohydrolase) is produced from selected strains of Aspergillus niger through submerged fermentation and refinement processes, offering a very high sugar conversion yield. This exo-enzyme sequentially hydrolyzes α-1,4 glucosidic bonds from the non-reducing end of starch, and also slowly hydrolyzes α-1,6 and α-1,3 bonds, producing glucose.

We offer two types of glucoamylase: conventional glucoamylase and thermostable glucoamylase.

## 【Function】

The core function of glucoamylase in baking is to efficiently produce glucose, which promotes fermentation and enhances the Maillard reaction, thereby significantly improving bread color, flavor, and volume, as well as improving the stability of frozen dough.



### Feeding the yeast for better fermentation

Glucoamylase removes glucose units one by one from the non-reducing end of starch molecules, continuously converting amylopectin and dextrins in flour into glucose that yeast can use. This provides a steady source of sugar for fermentation, especially during the later stages of dough fermentation or when thawing frozen dough, making up for a lack of natural sugars. It effectively boosts gas production, resulting in larger volume and a looser crumb in bread, steamed buns, and similar products.

### Promote the Maillard reaction and improve color and aroma

The glucose produced by glucoamylase reacts with proteins during baking via the Maillard reaction, giving the bread crust an attractive golden-red color and generating various aromatic aldehydes and esters, which impart a rich, toasty flavor to the product. This is especially critical in low-sugar or sugar-free formulas, where it prevents the finished product from turning out pale and bland.

### Optimize dough texture and improve handling properties

Moderate addition of glucoamylase reduces dough stickiness, improves extensibility and molding performance, and is especially suitable for high-hydration or continuous mechanical production. At the same time, by controlling the degree of starch degradation, it enhances dough gas retention, resulting in a more uniform and finer crumb structure.

### Slow down starch staling and extend shelf life

Glucoamylase shortens the long starch chains, thereby interfering with the recrystallization of amylose. This slows down the hardening of bread and steamed buns during storage, helping products maintain a soft mouthfeel for a longer time.

This is particularly important in frozen dough, premixes, and long-shelf-life products.

## 【Product model, characteristics, and recommended dosage】

**Glucoamylase**

| Type | Model | Activity | Effective pH | Optimal pH | Effective Temperature | Optimal Temperature | Recommended Dosage (g/100kg flour) |
|---|---|---|---|---|---|---|---|
| Conventional type | PUREMEI NDS | 200,000 U/g | 3.0-5.5 | 3.5-4.5 | 50-65°C | 55-60°C | 5-10 (50-100ppm) |
| | PUREMEI GDS | 300,000 U/g | | | | | 3.33-6.67 (33-67ppm) |
| Thermostable type | GA-6000FG | 600,000 U/g | 3.0-5.5 | 3.5-4.5 | 58-75°C | 62-70°C | 1-2 (10-20ppm) |
| | GA-8000FG | 800,000 U/g | | | | | 1.25-2.5 (12.5-25ppm) |

The dosage must be precisely controlled through trials. Excess addition can lead to excessive sugar accumulation, resulting in over-browning, sticky crumb, or collapse.



# Glucose Oxidase

## 【Overview】

Glucose oxidase GLU (EC 1.1.3.4, β-D-glucose oxidoreductase) is produced from selected strains of Aspergillus niger through submerged fermentation and refinement processes. In the presence of oxygen, this enzyme converts glucose into gluconic acid and hydrogen peroxide. The hydrogen peroxide then acts as a strong oxidizer, converting sulfhydryl groups (—SH) in gluten into disulfide bonds (—S—S—), which strengthens the gluten, improves dough extensibility, and boosts bread volume.

## 【Function】

The mechanism of glucose oxidase in baking is as follows: in the presence of oxygen, it turns glucose into gluconic acid and hydrogen peroxide. The hydrogen peroxide then acts as a strong oxidant, oxidizing sulfhydryl groups (–SH) in gluten proteins into disulfide bonds (–S–S–), thereby strengthening the gluten network and improving dough elasticity, gas retention, and baking stability. This process brings several key benefits to baking quality :



### Strengthened gluten structure

Disulfide bonds are the key chemical bonds for crosslinking gluten proteins (glutenin and gliadin). By increasing the number of disulfide bonds, the gluten network becomes tighter and stronger, giving the dough more elasticity and toughness.

### Better dough rheology

A stronger gluten makes the dough more tolerant to mixing, minimizes mechanical damage, reduces softening, prolongs stability time, and enhances processability.

### Better gas retention

A stronger gluten network traps the carbon dioxide produced by yeast fermentation more effectively, keeping it from leaking out during proofing and the first few minutes of baking. This results in larger loaf volume and a more uniform crumb structure.

### Better appearance and mouthfeel

After baking, the bread has a well-risen shape, a bright and glossy crust, a fine and delicate crumb, and a chewy yet non-sticky texture.

### Slows down staling better

The more you add, the better the bread resists staling — even better than the traditional additive potassium bromate.

### A natural alternative to chemical additives

This natural enzyme safely replaces potassium bromate — a potential carcinogen — and supports healthier food.

## 【Product model, characteristics, and recommended dosage】

**Glucose Oxidase**

| Model | Activity | Effective pH | Optimal pH | Effective Temperature | Optimal Temperature | Recommended Dosage (g/100kg flour) |
|---|---|---|---|---|---|---|
| GLU-0100 | 10,000 U/g | 4.0-6.5 | 5.0-6.0 | 20-50°C | 20-35°C | 1-6 (10-60ppm) |
| GLU-0200 | 20,000 U/g | | | | | 0.5-3 (5-30ppm) |

◎ Actual dosage should be determined through trials based on flour quality and process conditions.



# Transglutaminase （TG）

## 【Overview】

BOLI® transglutaminase is produced from strains of Streptomyces mobaraensis through submerged fermentation, extraction, and refinement processes. It is a new type of functional food additive.

## 【Function】

This enzyme catalyzes crosslinking reactions between protein molecules, forming a more stable protein network, which brings multiple positive effects on dough and finished products.



### ▶ Better dough handling

TG enzyme strengthens the crosslinking between gluten proteins (such as glutenin and gliadin), improving dough elasticity, extensibility, and gas retention. This allows the dough to better retain carbon dioxide during fermentation, resulting in larger volume and higher specific volume after baking.

### ▶ Better mouthfeel

Bread made with TG enzyme is softer and more delicate, cakes have a moister texture, and biscuits become crispier.

### ▶ Slows down staling and extends shelf life

TG enzyme strengthens the protein network, reducing moisture loss, and effectively slows down starch retrogradation and bread staling.

### ▶ More nutritious and healthier

The crosslinking done by the enzyme makes protein easier to digest and more bioavailable. It also incorporates useful amino acids such as lysine into the protein, boosting nutrition. In addition, TG enzyme can partially replace additives like emulsifiers and stabilizers, making products more natural and healthier.

### ▶ Supports gluten-free product development

For gluten-free baked goods (such as chestnut flour dough), TG enzyme can crosslink other plant proteins (e.g., rice and pea protein) to mimic the gluten structure, significantly improving their elasticity and processing performance.

## 【Product model, characteristics, and recommended dosage】

**Transglutaminase （TG）**

| Model | Activity | Effective pH | Optimal pH | Effective Temperature | Optimal Temperature | Recommended Dosage (g/100kg flour) |
|---|---|---|---|---|---|---|
| TG-0500 | 5,000 U/g | 4.0-9.0 | 6.0-7.5 | 0-65°C | 40-55°C | 2-8 (20-80ppm) |

◎ Actual dosage should be determined through trials based on flour quality and process conditions.



# Lipase LP

## 【Overview】

Lipase LP (EC 3.1.1.3, glyceride hydrolase) is produced from selected strains of Aspergillus niger through submerged fermentation, extraction and refinement processes. It has very high enzyme activity and conversion yield, and can hydrolyze fats to produce mono- or diglycerides and free fatty acids, while also catalyzing ester synthesis and transesterification reactions.

## 【Function】

The most critical function of lipase LP in baking is to hydrolyze triglycerides and polar lipids in flour and fats, generating lysophospholipids and monoacylglycerols that have emulsifying properties. This fundamentally strengthens the gluten network, significantly improving dough elasticity, gas retention, and processing stability. This is the key to several important qualities in finished baked products as follows :



### Build stronger gluten and improve handling

Lysophospholipids (LPC) generated by lipase can effectively promote glutenin crosslinking, enhancing the strength and extensibility of the gluten network. This makes the dough more resistant to mixing and less likely to collapse during proofing, especially in high-hydration or long fermentation processes.

### Increase bread volume and improve crumb fineness

The strengthened gluten better locks in the gas produced by yeast, achieving a strong oven spring in the early stage of baking. This significantly increases the specific volume of the bread, resulting in fine, uniform air cells and a softer mouthfeel.

### Natural whitening and better visual quality

The enzymatic hydrolysis releases fat-soluble natural pigments such as carotenoids, which oxidize and fade in air, producing a natural whitening effect. This gives the bread crumb a bright white color without relying on chemical bleaching agents.

### Slow down starch staling and extend shelf life

The MAG (monoacylglycerols) generated can form complexes with amylose, inhibiting its retrogradation and crystallization. This effectively slows the hardening of bread, keeping it soft for at least 1–2 days, and helps to extend shelf life .

### Replace chemical emulsifiers for a clean label

Due to its natural origin and efficient emulsifying properties, lipase LP can partially or completely replace chemical additives such as DATEM (diacetyl tartaric acid ester of mono- and diglycerides) and SSL (sodium stearoyl lactylate), meeting the demand for a clean label.

## 【Product model, characteristics, and recommended dosage】

**Lipase LP**

| Model | Activity | Effective pH | Optimal pH | Effective Temperature | Optimal Temperature | Recommended Dosage (g/100kg flour) |
|---|---|---|---|---|---|---|
| LP-2000 | 200,000U/g | 3.0-12.0 | 3.0-11.0 | 15-60°C | 35-55°C | 0.5-5 (5-50ppm) |

◎ Actual dosage should be determined through trials based on flour quality and process conditions.



# Lipase LPU

## 【Overview】

Lipase LPU is produced from selected strains of Trichoderma reesei through submerged fermentation, extraction, and refinement. It is an enzyme that catalyzes the synthesis or hydrolysis of ester compounds.

## 【Function】

The role of lipase LPU in baking is to catalyze the esterification of alcohols with fatty acids, producing aromatic esters, thereby significantly enhancing the flavor of fermented dough products such as steamed buns and bread, and improving overall sensory quality.

This enzyme does not directly improve dough physical properties; instead, it enriches and naturalizes the aroma profile by regulating the synthesis of flavor compounds. Its core functions are as follows :



### ▶ Generate aromatic esters and enhance flavor complexity

During yeast fermentation, the esterase combines ethanol, higher alcohols, and free fatty acids to produce volatile esters such as ethyl acetate (pear-like aroma), isoamyl acetate (banana-like aroma), and ethyl hexanoate (pineapple-like aroma), giving the dough products unique fruity and sweet notes.

### ▶ Mimic traditional fermentation flavor

Traditional sourdough has a rich flavor because it contains wild yeasts and lactic acid bacteria that produce natural esterases, which continuously synthesize various esters during long fermentation. Modern industrial production can achieve this effect by adding specific esterases or selecting yeast strains with high esterification activity.

### ▶ Flavor harmony and off-flavor masking

When using improvers such as lipase LP, excessive hydrolysis of lipids may cause slight rancidity. A moderate amount of esterification consumes free fatty acids, reduces off-flavor precursors, and masks potential off-flavors with pleasant aromas, achieving a cleaner flavor profile.

## 【Product model, characteristics, and recommended dosage】

**Lipase LPU**

| Model | Activity | Effective pH | Optimal pH | Effective Temperature | Optimal Temperature | Recommended Dosage (g/100kg flour) |
|---|---|---|---|---|---|---|
| LPU-0250 | 5,000U/g | 3.0-6.0 | 3.5-5.5 | 15-50°C | 30-48°C | 0.5-3 (5-30ppm) |

◎ Actual dosage should be determined through trials based on flour quality and process conditions.






# Asparaginase

## 【Overview】

BOLI® brand asparaginase Acrylost 5200FG is produced from Aspergillus niger through submerged fermentation, extraction, and refinement processes. Its application in the food industry is mainly focused on reducing the formation of acrylamide, a potential carcinogen, in heat-processed foods. Acrylamide is a compound formed during high-temperature processing (e.g. frying, baking) via the Maillard reaction between asparagine and reducing sugars in food, and is considered potentially carcinogenic. Therefore, reducing the acrylamide content in food through the action of asparaginase is of great significance for improving food safety.

## 【Benefits】

### ▶ Optimizes food processing while preserving original flavor

Traditional methods for reducing acrylamide, such as changing heating time and temperature, blanching, and soaking in water, are effective but may affect the texture and appearance of the food. Asparaginase, on the other hand, specifically reduces the level of free L-asparagine, thereby lowering the precursor of acrylamide, reducing acrylamide content while maintaining food quality.



### ▶ Easy to use

Process compatibility: This product works under broad temperature and pH conditions, and can be added directly to existing production lines without complex equipment modifications.
Addition flexibility : This product can be incorporated directly into raw material pretreatment or processing steps.

### ▶ Significantly reduces acrylamide content

According to laboratory and industrial-scale trial results from Jiangnan University, acrylamide content in many products can be reduced by up to 90%.

## 【Product Characteristics 】

**Declared enzymes** : Asparaginase
**Systemic name** : EC 3.5.1.1，L-Asparaginase
**Appearance** : Light yellow powder
**Activity** : 3,800 U/g
**Solubility** : Soluble in water

## 【Applications】

Asparaginase Acrylost 5200FG can be applied to formulated potato chips, thin crackers, snack foods, cereals, and similar products, effectively reducing the formation of acrylamide.

## 【Application conditions and recommended dosage】

**Asparaginase**

| Effective pH | Optimal pH | Effective Temperature | Optimal Temperature | Recommended Dosage (g/100kg flour) | |
|---|---|---|---|---|---|
| 5.0-10.5 | 6.5-10.0 | 50-95°C | 65-90°C | Potato chips | 40-120 (400-1200 ppm) |
| | | | | Biscuits | 6.5-27 (65-270 ppm) |
| | | | | Cereals | 3-10 (30-100 ppm) |

◎ The optimal dosage of Acrylost 5200FG depends on substrate, equipment, and process conditions. To determine the optimal enzyme dosage, it is recommended to conduct a series of small-scale trials prior to use.





# Cultured Grain Products

## 【Overview】

Cultured grain products are specially designed to meet the market demand of alternatives to chemical preservatives. They are produced by fermenting cereal raw materials with propionic acid bacteria, followed by filtration, concentration, and drying, resulting in a natural food ingredient. Due to the good anti-spoilage and pathogen-inhibiting properties, these products are increasingly used in the baking, meat, and sauce industries in Europe and America.

## 【Main Functions】

Anti-spoilage and pathogen inhibition. While replacing chemical preservatives, they can also provide calcium that the body needs, and thus help enhance food nutrition.



## 【Appearance characteristics】

Off-white to light cream, free flowing powder, with typical faint propionic & fermented odor.

## 【Product model】

Cultured Wheat Product CWP-50: Fermented from wheat

Cultured Corn Product CDP-50: Fermented from dextrose

## 【Recommended dosage】

Dosage：0.3-0.6%

Actual dosage should be determined after testing.