

# Lysozyme

## Introduction

Lysozyme, also called muramidase or N-acetylmuramide glycanohydrase, is an alkaline enzyme capable of hydrolyzing mucopolysaccharides in pathogenic bacteria. By breaking the  $\beta$ -1,4 glycosidic bond between N-acetylmuramic acid and N-acetylglucosamine in the cell wall, it decomposes the insoluble mucopolysaccharide in the cell wall into soluble glycopeptides, causing the cell wall rupture contents to escape and realize bacterial lysis

Lysozyme can also directly bind to negatively charged viral proteins, and form double salts with DNA, RNA, and apoproteins to inactivate the virus. Therefore, the enzyme has antibacterial, anti-inflammatory and antiviral effects. It is derived from egg white and is a non-toxic, non-side effect protein.

## Packing and storage

1. During transportation, it should be protected from rain, moisture and sunlight.
2. 18 months at room temperature (20 °C) and in dry and cool place when sealed;  
36 months at -18°C

## Specification

### 1. Sensory requirements

Items	Requirements
Status	Amorphous powder
Odor	Slightly sweet without peculiar smell
Color	White
Impurity	No visible impurities

### 2. Physical and chemical specifications

Items	Specifications
Water (%)	$\leq 6.0$
pH	3.0~7.0
Ash (%)	$\leq 1.5$
Solubility (%)	$\geq 95(1.5\%)$
Activity (u/mg)	$\geq 20000$
Purity (%)	$\geq 95$

Definition of enzyme activity: the amount of enzyme that decreases 0.001 optical density value

per minute at A450nm when hydrolysing M. lysodeikis at pH 6.24 and 25 °C is 1 unit of activity.

### 3. Microbiological control

Items	Specifications
Total Plate Count (cfu/g)	<1000
Yeast and mold (cfu/g)	<100
E. Coli (mpn/g)	2.0
Salmonella /25g	Can't be detected
Staphylococcus aureus /25g	Can't be detected

### Use condition

Working temperature: 25~50°C      Working PH: 6~7  
 Optimum temperature: 25°C      Optimum PH: 6.24

The chemical properties are very stable. When the pH value changes drastically in the range of 1.2-11.3, its structure is almost unchanged. In an acidic environment, lysozyme is very stable to heat. In environment with pH 4-7, it can still maintain its original enzyme activity at 100 °C for 1min.

### Applications

1. In medicine, it can be used as a natural anti-infective substance with bactericidal effect: it has antibacterial, antiviral, hemostatic, swelling and pain relief functions, and it also speeds up tissue recovery; it is used clinically for oral diseases and can be used in combination with antibacterial drugs to treat bacterial and viral infections.

2. It can be used as a preservative in food preservation. Its main function is to hydrolyze the bacterial cell wall. In the cell, it can destroy the pathogenic bacteria after phagocytosis. The enzyme can decompose bacillus subtilis and micrococcus radiodurans among gram-positive bacteria; it can also dissolve gram-negative bacteria such as Escherichia coli, Proteus and Vibrio parahaemolyticus, and its most effective concentration is 0.05%; combined with phytic acid, polyphosphate, glycine, etc., its antiseptic effect can be improved.

a. The most important application of lysozyme in food field is in the cheese industry. Lysozyme is used to solve the problem of late butyric expansion in cheese. The recommended dosage is 2.5-25 grams of lysozyme per 100 kg of milk. The amount added varies with the amount of bacteria in the milk.

b. It is used to ferment wine and has an effect on lactic acid bacteria without

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disturbing alcohol fermentation. Adding 20mg / kg lysozyme to low-grade wine has no adverse effect on the flavor of the wine, and it can also prevent the growth of acid-producing bacteria. At the same time, it is less affected by wine clarifying agents. It is a good preservative for low-grade wine. For example, in Japan, lysozyme is used for the preservation of Sake.

c. Lysozyme can also be used for preserving beverages and juices at pH 6.0-7.5.

d. Adding lysozyme makes milk more suitable for infants. In addition, it has bactericidal effect on milk and enhances the growth ability of bifidobacteria. So as to ensure the good reproduction of bifidobacteria in the baby's intestine.

e. Application of lysozyme in fresh seafood and meat products. Studies have shown that the combined use of lysozyme, sodium chloride in meat products can prolong the shelf life of meat products, and its antiseptic effect is better than when used alone. For some fresh seafood and aquatic products, the storage period can be extended after lysozyme treatment. The recommended dosage is 0.05-0.1%.