Lysozyme

(Muramidase; N-acetylmuramidase glycanohydrolase) isolated from hen egg white

Peptidoglycane N-acylmuramoylhydrolase, EC 3.2.1.17

Hydrochloride (crystals):

Cat. No. 10 837 059 001 10 g

Introduction

The bacteriostatic properties of the enzyme lysozyme were first described by Alexander Fleming, the discoverer of penicillin, although its in vivo antibacterial activity and role in the regeneration of tissue were not demonstrated until much later. Lysozyme lyses various microorganisms by hydrolysing the (1–4) glucoside linkages of the glycosaminoglycans (mucopolysaccharides) their cell walls are composed of. Most body fluids contain some lysozyme: it has been found in urine, tears, salvia, blood, and milk and in cell plasma. It occurs in leucocytes, neutrophilic granulocytes, monocytes, and macrophages in high concentrations, but little is found in lymphocytes. Lysozyme plays an important part both in regulating the immune response in organisms and in reactions to infection and inflammation. Its effects are achieved partly by direct physicochemical action and partly by activation of the immune system. As an enzyme it supports bacteriolysis via the immune system and increases leucocytic phagocytosis, and it can also potentiate antibiotic activity.

Applications

- Preparation of protoplasts.
- Bacteriostasis.
- Pharmacology (anti-inflammatory effect on mucous membrane; healing of tissue; protection against bleeding; normalization of mucus secretion; dissolution of pyogens; potentiation of antibiotics).
- Food and drinks (flavour enhancer).
- Sample preparation prior to isolation of nucleic acids.

Product description

Constitution

Lysozyme is a positively charged polypeptide (14.4 kDa) consisting of 129 amino acid residues (1):

<table>
<thead>
<tr>
<th>Residues</th>
<th>Sequence</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>KVFGCRCAAA AAKRQHLDNY RDSGLNWC AAKFESNENT QATNRTYDGS</td>
</tr>
<tr>
<td>91</td>
<td>TDYGILCNIS RWONDGRTIQ GSNLONPC SALLSIDITA SVNCAKVKS</td>
</tr>
<tr>
<td>101</td>
<td>DGGGMNAAWA WRNRCGSTDV QAARWRCRL</td>
</tr>
</tbody>
</table>

Specific activity

With Micrococcus luteus as substrate, the specific activity of lysozyme at a temperature of +25° C is approx. 50,000 units/mg, (2) where the unit is the Shugar unit. This unit is that quantity of enzyme in 1 ml of a suspension of Micrococcus luteus of pH 7.0 whose initial absorbance at a wavelength of 450 nm is 0.750 for a pathlength of 10 mm which causes the absorbance to decrease at the rate of 0.001 per min, all measurements being carried out at a temperature of +25° C (3).

Specificity

Lysozyme hydrolytically cleaves the bonds between N-acetyl-β-D-glucosamine and N-acetylmuramic acid residues (GlcNAc β1-4Mur) in mucopolysaccharides and the glycan skeletons of the corresponding peptidoglycans (the latter are glycosaminoglycans linked to or crosslinked by peptide chains). It therefore destroys the cell walls of bacteria.

Solubility

Lysozyme hydrochloride is readily soluble in water and buffer solutions but insoluble in organic solvents.

Stability

Lysozyme hydrochloride crystals are stable at a temperature of +2 to +8° C. Aqueous solutions of the hydrochloride (2 mg/ml) can be stored for several days at +2 to +8° C or 15 to 25° C for several weeks.

Isoelectric point

The isoelectric point of lysozyme is pH 10.6–10.9.

Typical analysis

- Purity: 95–100%
- Activity: > 23 000 Shugar units/mg

Microbiological assay

- Total plate count: 100/g
- Fungi and yeasts: 10/g
- E. coli: not detected in 25 g
- Salmonella: not detected in 25 g

Temperature and pH stability

Acid solutions of lysozyme are stable, even at temperatures up to +100° C. In alkaline solution, the activity of lysozyme falls rapidly at elevated temperatures.

Substrates

Lyophilized cells from Micrococcus luteus (= Micrococcus lysodeikticus) (ATCC strain 4698).

Inhibitors

Surfactants (sodium dodecyl sulfate*, C12 or higher alcohols and fatty acids) or iodine (4).
References

4 Smith, G.N. et al. (1949) Arch. Biochem. 21, 383.

* available from Roche Applied Science

Changes to previous version

Regulatory Disclaimer updated

Ordering Information

Roche Applied Science offers a large selection of reagents and systems for life science research. For a complete overview of related products and manuals, please visit and bookmark our home page, www.roche-applied-science.com, including our Special Interest Site for Tissue Dissociation: http://www.collagenase.com.

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