Product Information

Deoxyribonuclease I bovine

Recombinant, expressed in *Pichia pastoris*, buffered aqueous glycerol solution, ≥ 5,000 units/mg protein

D5319

Product Description

CAS Registry Number: 9003-98-9

Enzyme Commission (EC) Number: 3.1.21.1

Synonyms: DNase I,
Deoxyribonucleate 5'-Oligonucleotidohydrolase

Molecular mass: ~39 kDa

Extinction Coefficient: $E_{280}^{1\%}$ = 11.1

Deoxyribonuclease I (DNase I) is an endonuclease that acts on phosphodiester bonds adjacent to pyrimidines to produce polynucleotides with terminal 5'-phosphates. A tetranucleotide is the smallest average digestion product. DNase I hydrolyzes single-stranded and double-stranded DNA.

- In the presence of Mg^{2+} ions, DNase I attacks each strand of DNA independently and the cleavage sites are random.
- If Mn^{2+} ions are present, both DNA strands are cleaved at approximately the same site.[1]

When chromatin DNA is digested, the reaction rate is restricted by the association of DNA with histones.[1]

DNase I is found in most cells and tissues. In mammals, the pancreas is one of the best sources for the enzyme. Pancreatic DNase I was the first isolated DNase.

DNase I can be used to remove DNA from protein and nucleic acid samples, and to nick DNA as a first step to incorporate labeled bases into DNA.

This recombinant bovine DNase I is a glycoprotein, produced without the addition of any animal-derived materials. Several theses[2] and dissertations[3-7] have cited use of product D5319 in their protocols.

Activators

DNase I has an absolute requirement for divalent metal cations:

- Mg^{2+} is the most commonly used divalent cation.[8,9]
- Mn^{2+}, Ca^{2+}, Co^{2+}, and Zn^{2+} will also activate DNase I.[8-10]

A concentration of 5 mM Ca^{2+} will stabilize DNase I against proteolytic digestion. 0.1 mM Ca^{2+} is needed to reduce the rate of inactivation by one-half.[11]

Inhibitors

- 2-Mercaptoethanol (the reduced enzyme is inactive, but can be reactivated in the presence of Ca^{2+} or Mg^{2+} ions)[10]
- Chelators (such as EDTA)
- Sodium dodecyl sulfate (SDS)[12]
- Actin[13]

There is no single general inhibitor specific for DNase I.[2] Citrate inhibits Mg^{2+}-activated DNase I, but not Mn^{2+}-activated DNase I.

Optimal pH

The optimal pH of DNase I activity is dependent on the divalent ion present. In the presence of both Mg^{2+} and Ca^{2+}, the optimal pH is between 7-8, while in the absence of Ca^{2+}, the optimal pH is between 5.5-6.0.[14]

Precautions and Disclaimer

This product is for R&D use only. Not for drug, household, or other uses. Please consult the Safety Data Sheet for information regarding hazards and safe handling practices.

Product

This product is supplied as a solution in 4 mg/mL glycine (pH 5.0), 5 mM calcium acetate, and 50% glycerol.

Specific activity: ≥ 5,000 units/mg protein

Unit definition: One unit will produce a change in A_{260} of 0.001 per minute per mL at pH 5.0 at 25 °C using DNA, Type I or III, as the substrate. This enzyme assay reaction is performed in 83 mM acetate buffer (pH 5.0), at 25 °C, containing 4.2 mM Mg^{2+}, in a 3 mL reaction.

Impurities

Protease: None Detected

RNase: None detected

Storage/Stability

This product retains activity for at least two years when stored at –20 °C.

References

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