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Product Information

Deoxyribonuclease I, bovine
recombinant, expressed in *Pichia pastoris*
lyophilized powder

Catalog Number **D2821**
Storage Temperature 2–8 °C

CAS RN 9003-98-9
EC 3.1.21.1
Synonyms: DNase I,
Deoxyribonucleate 5′-Oligonucleotidohydrolase

Product Description
Deoxyribonuclease I (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 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- 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 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.

Activators:
DNase I has an absolute requirement for divalent metal cations. Mg^{2+} is the most commonly used divalent cation.[2] Mn^{2+}, Ca^{2+}, Co^{2+}, and Zn^{2+} will also activate DNase I.[2,3] 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.[4]

Inhibitors:
2-Mercaptoethanol (the reduced enzyme is inactive, but can be reactivated in the presence of Ca^{2+} or Mg^{2+} ions);[3] chelators (e.g. EDTA); sodium dodecyl sulfate (SDS);[5] actin.[7] There is no 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.[6]

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

This recombinant bovine DNase I is a glycoprotein, produced without the addition of any animal-derived materials. It is supplied as a **lyophilized powder** containing a glycine stabilizer.

Molecular mass: ~39 kDa

Specific activity: ≥4,000 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

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.

Preparation Instructions
Reconstitute with water. Avoid phosphate buffer and calcium chelators. To avoid multiple freeze-thaw cycles, glycerol can be added to a concentration of 50%.

Storage/Stability
This product retains activity for 2–3 years when stored at 2–8 °C.

References

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2. Weir, A.F., in *Enzymes of Molecular Biology*, Vol. 16 of *Methods in Molecular Biology*, Burrell, M.M., ed. (Humana Press, 1993), Ch. 2, 2-16.
3. Price, P.A., *et al.*, Effect of divalent cations on the reduction and re-formation of the disulfide bonds of deoxyribonuclease. *J. Biol Chem.*, **244**, 929-932 (1969).
4. Price, P.A., *et al.*, Properties of chromatographically purified bovine pancreatic deoxyribonuclease. *J. Biol Chem.*, **244**, 917-923 (1969).
5. Liao, T.-H., Reversible inactivation of pancreatic deoxyribonuclease A by sodium dodecyl sulfate. Removal of COOH-terminal residues from the denatured protein by carboxypeptidase A. *J. Biol. Chem.*, **250**, 3831-3836 (1975).
6. Love, J.D., and Hewitt, R.R., The relationship between human serum and human pancreatic DNase I. *J. Biol. Chem.,* **254**, 12588-12594 (1979).

DT,RC,GCY,LS,RBG,MAM 07/15-1