

Product Information

Ribonuclease A from bovine pancreas

Sigma Type I-AS, 50-100 Kunitz units/mg protein

R5503

Product Description

CAS Registry Number: 9001-99-4

Enzyme Commission (EC) Number: 3.1.27.5

Synonyms: RNase A, Pancreatic ribonuclease, Ribonuclease 3'-pyrimidinonucleotidohydrolase, Ribonuclease I, Endoribonuclease I

Molecular mass:¹ 13.7 kDa (based on amino acid sequence)

Extinction coefficient:² $E_{1\%}^{1\text{cm}} = 7.1$ (280 nm)

Isoelectric point:³ pI = 9.6

Optimal temperature: 60 °C (activity range of 15-70 °C)

Optimal pH:⁴ 7.6 (activity range of 6-10)

Inhibitors: ribonuclease inhibitor

RNase A is an endoribonuclease that attacks at the 3'-phosphate of a pyrimidine nucleotide. For example, RNase A will cleave pG-pG-pC-pA-pG to give pG-pG-pCp and A-pG. The highest activity is exhibited with single-stranded RNA.⁵

RNase A is a single chain polypeptide with 4 disulfide bridges. In contrast to RNase B, RNase A is not a glycoprotein.⁶ RNase A can be inhibited by alkylation of His¹² or His¹¹⁹ (present in the active site of the enzyme).⁷ Activators of RNase A include potassium and sodium salts.

Several theses⁸ and dissertations⁹⁻¹⁶ have cited use of product R4875 in their protocols.

Precautions and Disclaimer

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.

Solubility

RNase A is soluble in water at 1 mg/mL.

Preparation Instructions

Solutions prepared from RNase A lyophilized powder can be made free of DNase by boiling. One procedure is as follows, according to one literature method:¹⁷

1. Prepare a 10 mg/mL stock solution in 10 mM sodium acetate buffer, pH 5.2.
2. Heat to 100 °C for 15 minutes. Allow to cool to room temperature.
3. Adjust to pH 7.4 using 0.1 volume of 1 M Trizma®-HCl, pH 7.4.
4. Aliquot and store at -20 °C.

If RNase A is boiled at a neutral pH, precipitation will occur. When boiled at a lower pH, some precipitation may occur because of protein impurities that are present.

Storage/Stability

This product is supplied as a lyophilized powder. Store RNase A at -20 °C.

RNase A is a very stable enzyme. Stock solutions stored in frozen aliquots remain active for at least 6 months. RNase A solutions have been reported to withstand temperatures up to 100 °C. At 100 °C, an RNase A solution is most stable between pH 2.0-4.5.¹⁸

Usage

A major application for RNase A is the removal of RNA from preparations of plasmid DNA. For this application, DNase-free RNase A is used at a final concentration of 10 µg/mL.¹⁹

References

1. Smyth, D.G. *et al.*, *J. Biol. Chem.*, **238**(1), 227-234 (1963).
2. Keller, P.J. *et al.*, *J. Biol. Chem.*, **233**(2), 344-349 (1958).

3. Tanford, C., and Hauenstein, J. D., *J. Am. Chem. Soc.*, **78(20)**, 5287-5291 (1956).
4. Schomberg, D., and Salzman, M., *Enzyme Handbook*, Vol. 3, 1-3, under EC 3.1.27.5 (1990).
5. Burrell, M.M., *Methods Mol. Biol.*, **16**, 263-270 (1993).
6. Plummer, T.H., Jr., and Hirs, C.H.W., *J. Biol. Chem.*, **238(4)**, 1396-1401 (1963).
7. Henrikson, R.L. *et al.*, *J. Biol. Chem.*, **240(7)**, 2921-2934 (1965).
8. Xu, Fuyu, "Localization of Expansin Expression During Adventitious and Lateral Rooting in Response to Auxin in Loblolly Pine". University of Maine, M.S. thesis, p. 59 (2002).
9. Castaño, Dolly Montoya, "Anaerobic, solvent-producing bacteria: Molecular characterisation, polysaccharolytic activity and agroindustrial waste degradation". Technische Universität München, Dr. rer. nat. dissertation, p. 45 (2003).
10. Shock, Lisa Sale, "Functional consequences of cytosine methylation in mitochondrial DNA catalyzed by DNA methyltransferase 1". Virginia Commonwealth University, Ph.D. dissertation, pp. 40, 184 (2011).
11. Bierle, Craig J., "Inhibition of the protein kinase R pathway by cytomegalovirus double-stranded RNA binding proteins". University of Washington, Ph.D. dissertation, p. 39 (2012).
12. Ewald, Christina, "Design, Ligand Binding and Folding of Ankyrin and Armadillo Repeat Proteins Studied by Solution NMR Spectroscopy". Universität Zürich, Dr. sc. nat. dissertation, pp. 144, 170 (2013).
13. Ramezanpour, Mahnaz, "Characterisation of Anti-Cancer Properties of Bioactive Compounds in Sea Anemone Venom". Flinders University of South Australia, Ph.D. dissertation, pp. 166, 171 (2015).
14. Dai, Dingli, "Caractérisation des interactions physiques et fonctionnelles entre le facteur d'assemblage de la chromatine, CAF-1, et des facteurs de la recombinaison homologue au cours de la réparation de l'ADN" ("Characterization of the physical and functional interactions between the chromatin assembly factor, CAF-1, and homologous recombination factors during DNA repair"). Université Paris-Saclay, Ph.D. dissertation, p. 17 (2018).
15. Dietz, Sabrina Franziska, "Identification and characterization of novel telomere binding proteins in *Caenorhabditis elegans*". Johannes Gutenberg-Universität Mainz, Dr. rer. nat. dissertation, p. 81 (2020).
16. Brosig, Annika Nicole, "The RNA interactome of pediatric T-cell leukemia: Identification of alterations in the RNA-bound proteome of T-ALL in the process of leukemogenesis and treatment with the HDAC inhibitor Vorinostat". Ruperto Carola University Heidelberg, Dr. rer. nat. dissertation, pp. 57, 58 (2021).
17. Sambrook, J., and Russell, D.W., *Molecular Cloning, A Laboratory Manual* (3rd ed). Cold Spring Harbor Laboratory Press (Cold Spring Harbor, NY), Volume 3, A4.39 (2001).
18. Crestfield, A.M. *et al.*, *J. Biol. Chem.*, **238(2)**, 618-621 (1963).
19. Sambrook and Russell, Volume 1, 1.78-1.79 (2001).

Notice

We provide information and advice to our customers on application technologies and regulatory matters to the best of our knowledge and ability, but without obligation or liability. Existing laws and regulations are to be observed in all cases by our customers. This also applies in respect to any rights of third parties. Our information and advice do not relieve our customers of their own responsibility for checking the suitability of our products for the envisaged purpose.

The information in this document is subject to change without notice and should not be construed as a commitment by the manufacturing or selling entity, or an affiliate. We assume no responsibility for any errors that may appear in this document.

Technical Assistance

Visit the tech service page at [SigmaAldrich.com/techservice](https://www.sigmaaldrich.com/techservice).

Standard Warranty

The applicable warranty for the products listed in this publication may be found at [SigmaAldrich.com/terms](https://www.sigmaaldrich.com/terms).

Contact Information

For the location of the office nearest you, go to [SigmaAldrich.com/offices](https://www.sigmaaldrich.com/offices).

The life science business of Merck operates as MilliporeSigma in the U.S. and Canada.

Merck and Sigma-Aldrich are trademarks of Merck KGaA, Darmstadt, Germany or its affiliates. All other trademarks are the property of their respective owners. Detailed information on trademarks is available via publicly accessible resources.

© 2022 Merck KGaA, Darmstadt, Germany and/or its affiliates. All Rights Reserved.
R5503pis Rev 07/22 RBG,MAM,KTA,GCY

MERCK