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ProductInformation

Cathepsin B
from human placenta

Product Number **C 0150**
Storage Temperature -20 °C

Product Description

CAS Number: 9047-22-7
Molecular Weight: 24.5 kDa[1]
pI: 5.4[1]
Synonym: Cathepsin B_1

Cathepsin B is a lysosomal cysteine proteinase which will hydrolyze proteins with a broad specificity for peptide bonds, but will preferentially cleave at the caboxyl side of Arg-Arg bonds in small molecule substrates. Lysosomal cathepsin B has also been shown to degrade soluble monomeric collagen and in soluble polymeric collagen *in vitro*.

The pH optimum of cathepsin B with insoluble collagen as the substrate is pH 3.3, with little activity outside the pH range 2.5-4.0.[1,2] The pH optimum with α-N-benzoyl-α-arginine amide is pH 5.5.[3] Other suitable substrates include α-N-benzoyl-DL-arginine p-nitroanilide, α-N-Benzoyl-DL-arginine β -naphthylamide, α-N-benzoyl-L-arginine ethyl ester, p-tosyl-L-arginine methyl ester, and α-N-benzoyl-arginine-arginine-2-naphthylamide.[1,3,4]

An excellent fluorogenic substrate for Cathepsin B is Nα-benzoyl-Arg-Arg-7-amido-4-methylcoumarin. The K_m value this substrate is 0.39 mM, with a pH optimum of 6.0. The fluorescence of the free aminomethylcoumarin released is detected by excitation at 370 nm and emission at 460 nm. The fluoresence of the aminomethylcourarin is unaffected by pH over the range of pH 4 to pH 7.[4]

Cathepsin B is a thiol protease and is inhibited by the following thiol protease inhibitors, with collagen as the substrate and assayed at pH 3.5[1]:

Inhibitor	Final Conc.(mM)	% Inhibition
Iodoacetic Acid	1.0	91
Mercuric Chloride	0.1	87
2,2'-Dipyridyldisulfide	2.0	32
Leupeptin	0.1	88
Antipain	0.1	88

Cathepsin B has been found to cleave procaspase 1 and procaspase 11, and to induce apoptosis in digitonin-permeabilized cells. Translocation of cathepsin B from the cytoplasm to the nucleus contributes to bile salt induced apoptosis of rat hepatocytes. Levels of cathepsin B in PC12 cells significantly decrease 12 to 24 hours after apoptosis is induced.[5-9]

Precautions and Disclaimer

For Laboratory Use Only. Not for drug, household or other uses.

Preparation Instructions

This product is soluble in water (1 mg/ml) or 0.1% BRIJ™ 35, yielding a clear solution.

References

1. Evans, P., and Etherington, D. J., Characterization of Cathepsin B and collagenolytic cathepsin from human placenta. Eur. J. Biochem., **83(1)**, 87-97 (1978).
2. Etherington, D. J., Bovine spleen cathepsin B1 and collagenolytic cathepsin. A comparative study of the properties of the two enzymes in the degradation of native collagen. Biochem. J., **153(2)**, 199-209 (1976).
3. Swanson, A. A., et. al., Human placental cathepsin B1: Isolation and some physical properties. Biochem. J., **137(2)**, 223-228 (1974).
4. Barrett, A. J., and Kirschke, H., Cathepsin B, cathepsin H, and cathepsin L. Methods Enzymol., **80(Pt C)**, 535-561 (1981).
5. Roberts, L.R., et al., Cathepsin B contributes to bile salt-induced apoptosis of rat hepatocytes. Gastroenterology 113, 1714-1726 (1997)
6. Ohsawa, Y., et al., An ultrastructural and immunohistochemical study of PC12 cells during apoptosis induced by serum deprivation with special reference to autophagy and lysosomal cathepsins. Arch. Histol. Cytol. 61, 395-403 (1998)
7. Shibata, M., et al., Participation of cathepsins B and D in apoptosis of PC12 cells following serum deprivation. Biochem. Biophys. Res. Comm. 251, 199-203 (1998)

8. Shibata, M., et al., Participation of cathepsins B and D in apoptosis of PC12 cells following serum deprivation. Biochem. Biophys. Res. Comm. 251, 199-203 (1998)

9. Vancompernolle, K., et al., Atractyloside-induced release of cathepsin B, a protease with caspase-processing activity. FEBS Lett. 438, 150-158 (1998)

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