

Product Information

Acetylcholinesterasefrom *Electrophorus electricus* (electric eel)Catalog Number **C2888**

Storage Temperature –20 °C

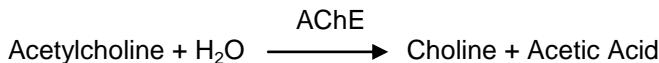
CAS RN 9000-81-1

EC 3.1.1.7

Synonyms: AchE, Acetylcholine acetylhydrolase, cholinesterase, true cholinesterase

Product Description

Acetylcholinesterase (AChE) is a membrane-bound enzyme found in excitable tissues, such as synaptic junctions, and is involved in nerve impulse transmission.¹ It is the major enzyme responsible for the degradation of acetylcholine *in vivo*, using the following reaction.



A model of the mechanism of AChE, which may explain its high catalytic rate with acetylcholine, has been proposed.²

Acetylcholinesterase, like butyrylcholinesterase (BChE; EC 3.1.1.8), is a serine hydrolase that belongs to the esterase/lipase family. AChE and BChE share substantial structural similarities, but differ in substrate specificities and inhibitor sensitivities.³ Using acetylcholine as a substrate, electric eel AChE has an activity 30-100 times greater than when butyrylcholine is used as the substrate.

AChE is a specific cholinesterase. It is a polymeric glycoprotein with two α and two β chains that differ by the C-terminus polypeptide.⁴ The molecule has two catalytic sites.¹³ Guanidine and 2-mercaptoethanol are required to release the four subunits. AChE exists in three different molecular forms as a result of different C-terminus splicing schemes.⁵ The three molecular forms have sedimentation coefficients of approximately 8, 14, and 18S.^{1,6} Using proteolytic enzymes, these forms can be converted to a form with a sedimentation coefficient of 11S. This form is similar to that purified from toluene-treated tissue.

AchE has applications in the detection of organophosphate and carbamate insecticides,³ the development of sensors for direct detection of organophosphates,⁷ the study of nerve impulse conduction, and the generation of biochemical currents.

Electric eel AChE exists as a tetrameric glycoprotein containing saccharides related or identical to sialic acid, N-acetylglucosamine, N-acetylgalactosamine, mannose and/or glucose, and, galactose.⁹

Molecular mass:^{4,8,10} 230–260 kDa

Isoelectric point:¹¹ 5.35

Optimal pH: 7.6

Extinction coefficient: $E_{280}^{1\%} = 18.0$

Inhibitors: Fasciculin 2, huperzine-A, physostigmine (eserine), tetrahydroaminoacridine, diisopropylfluorophosphate

K_i :¹² Fasciculin 2, 0.33 mM (23 °C, pH 8)

This enzyme is purified from the electric organ of the eel *E. electricus*. The product is supplied as a light yellow to tan lyophilized powder containing Trizma® buffer salts.

Specific activity: $\geq 1,000$ units/mg

Unit definition: one unit will hydrolyze 1.0 μ mole of acetylcholine to choline and acetate per minute at pH 8.0 and 37 °C.

This enzyme assay reaction is performed titrimetrically in a 50.4 mL reaction mixture containing 4 mM acetylcholine chloride, 40 mM MgCl₂, 100 mM NaCl, and 12–24 units AChE, at pH 8.0 at 37 °C.

Protein: $\geq 60\%$

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

The enzyme is soluble in water (1 mg/mL), and is also soluble in 0.1 M Trizma-HCl, pH 7.5 (2 mg/mL), yielding a clear solution. The enzyme can be solubilized and diluted in 0.02 M sodium phosphate buffer, pH 7.0. For dilute enzyme solutions (<1 mg/mL), add 1 mg/mL of BSA to stabilize the enzyme.

Storage/Stability

The enzyme is stable at -20 °C for >2 years.

For stabilization of AChE solutions, especially dilute solutions, add 1 mg/mL of BSA. These solutions will be stable in the refrigerator for at least six months. Because AChE is acid-labile, solutions must be buffered near neutral pH.³

References

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KAD,RBG,GCY,JWM,MAM 10/18-1