

Native Bovine Carbonic Anhydrase

Cat. No. NATE-0101

Lot. No. (See product label)

Introduction

Description

The carbonic anhydrases (or carbonate dehydratases) form a family of enzymes that catalyze the rapid interconversion of carbon dioxide and water to bicarbonate and protons (or vice versa), a reversible reaction that occurs relatively slowly in the absence of a catalyst. The active site of most carbonic anhydrases contains a zinc ion; they are therefore classified as metalloenzymes.

Applications

CO₂ determination in blood; Elimination of CO₂ in reagents for acidity testing; Carboxy group transfers; Reduction reactions.

Synonyms

carbonic anhydrases; carbonate dehydratases; EC 4.2.1.1; anhydrase; carbonate anhydrase; carbonic acid anhydrase; carboxyanhydrase; carbonic anhydrase A; carbonate hydro-lyase

Product Information

Species

Bovine

Source

Bovine Erythrocytes

Form

lyophilized powder

EC Number

EC 4.2.1.1

CAS No.

9001-03-0

Molecular Weight

29.0 kDa (Theoretical) 30 kDa (Lindskog et al. 1971)

Activity

> 3,000 units per mg dry weight

Isoelectric point

6.40 (Theoretical)

Optimum pH

7.0-7.5 (Demir et al. 2000, and Tasgin et al. 2009)

Composition

Sixteen CA isozymes have been described so far in mammals. Erythrocyte CAs, CA-I and CA-II, are most well known. CA-I, CA-II, CA-III, CA-VII, and CA-XIII are cytosolic. CA-IV, CA-IX, CA-XII, CA-XIV, and CA-XV are membrane bound. CA-VI is secreted in saliva. CA-VA and CA-VB are mitochondrial. There are also three acatalytic forms referred to as CA-related proteins (CARPs): CARP-VIII, CARP-X, and CARP-XI (Coban et al. 2009). The zinc metal is always bound to histidines 93, 95, and 118 (mature chain numbering). A hydrogen bonded network, linked to the zinc-bonded water molecule and these histidines either directly or indirectly, includes 28-Ser, 91-Glu, 105-Glu, 106-His, 116-His, 193-Tyr, 198-Thr, 208-Trp, and 223-Asn. These residues have been found to be highly conserved (Lindskog 1982, and Lindskog et al. 1984). Bovine and human CA I and II contain a unique C-terminal knot structure, which has been shown to be important in enzymatic and mechanical properties (Alam et al. 2002).

Specificity

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<i>Specificity</i>	Blood CO ₂ transport and excretion is largely dependent on the rapid catalysis of the CO ₂ reactions within the erythrocyte by CA (Tufts et al. 2003). Bovine CA reversibly hydrates alkyl pyruvates and it exhibits hydratase activity toward a wide variety of substrates (Pocker et al. 1974, and Wells et al. 1975).
<i>Activators</i>	HPO ₄ ²⁻ -(Rowlett et al. 1991); SO ₃ ²⁻ -(Rowlett et al. 1991)
<i>Inhibitors</i>	Monovalent anions (Lindskog et al. 1971, and Ward and Cull 1972); Sulfonates and sulfonamides (Pocker and Watamori 1973, and Binford et al. 1974); Imidazole (Edsall 1968)
<i>Pathway</i>	Bile secretion, organism-specific biosystem; Collecting duct acid secretion, organism-specific biosystem; Metabolism, organism-specific biosystem
<i>Function</i>	carbonate dehydratase activity; zinc ion binding
<i>Unit Definition</i>	One Unit is determined by the electrometric method of Wilbur and Anderson (J. Biol. Chem., 176, 147 (1948)), in which the time required (in seconds) for a saturated CO ₂ solution to lower the pH of 0.02M Tris-HCl buffer from 8.3 to 6.3, at 0-4°C is determined.
<i>Storage and Shipping Information</i>	
<i>Storage</i>	2-8°C