Creative Enzymes®

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	Blood CO2 transport and excretion is largely dependent on the rapid catalysis of the CO2 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).
Activators	HPO42-(Rowlett et al. 1991); SO32-(Rowlett et al. 1991)

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Inhibitors	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)
Pathway	Bile secretion, organism-specific biosystem; Collecting duct acid secretion, organism-specific biosystem; Metabolism, organism-specific biosystem
Function	carbonate dehydratase activity; zinc ion binding
Unit Definition	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.

Storage and Shipping Information

Storage	2-8°C