

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)

Inhibitors Monovalent anions (Lindskog et al. 1971 and Ward and Cull 1972); Sulfonates and sulfonamides (Pocker

Inhibitors	Monovalent anions (Lindskog et al. 1971, and Ward and Carl 1972), Sulfonates and sulfonamides (Rockey 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 CO2 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