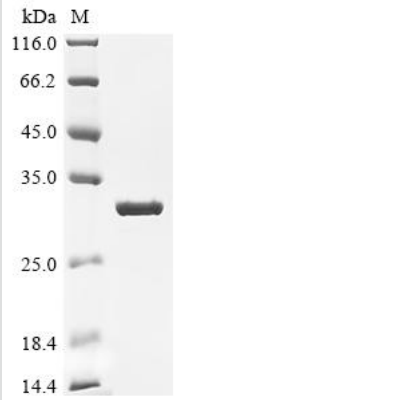
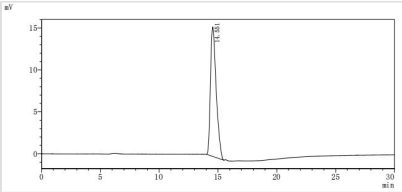
Recombinant Human Carbonic anhydrase 2 (CA2?) (Active)

Product Code	CSB-MP004370HU(A4)
Abbreviation	Recombinant Human CA2 protein (Active)
Storage	The shelf life is related to many factors, storage state, buffer ingredients, storage temperature and the stability of the protein itself. Generally, the shelf life of liquid form is 6 months at -20?/-80?. The shelf life of lyophilized form is 12 months at -20?/-80?.
Uniprot No.	P00918
Form	Lyophilized powder
Storage Buffer	Lyophilized from a 0.2 μm filtered 20 mM Tris-HCl,0.5 M NaCl,6% Trehalose, pH 8.0
Product Type	Recombinant Protein
Immunogen Species	Homo sapiens (Human)
Biological Activity	Measured by its esterase activity. The specific activity is >2600 pmol/min/μg.
Purity	Greater than 95% as determined by SDS-PAGE. Greater than 95% as determined by SEC-HPLC.
Sequence	MSHHWGYGKHNGPEHWHKDFPIAKGERQSPVDIDTHTAKYDPSLKPLSVSYDQATSLRILNNGHAFNVEFDDSQDKAVLKGGPLDGTYRLIQFHFHWGSLDGQGSEHTVDKKKYAAELHLVHWNTKYGDFGKAVQQPDGLAVLGIFLKVGSAKPGLQKVVDVLDSIKTKGKSADFTNFDPRGLLPESLDYWTYPGSLTTPPLLECVTWIVLKEPISVSSEQVLKFRKLNFNGEGEPEELMVDNWRPAQPLKNRQIKASFK
Source	Mammalian cell
Target Names	CA2
Expression Region	1-260aa
Notes	Repeated freezing and thawing is not recommended. Store working aliquots at 4? for up to one week.
Tag Info	C-terminal 10xHis-tagged
Mol. Weight	30.7kDa
Protein Length	Full Length
Image	



(Tris-Glycine gel) Discontinuous SDS-PAGE (reduced) with 5% enrichment gel and 15% separation gel.



The purity of CA2 was greater than 95% as determined by SEC-HPLC

Enzyme	Human CA2 (CSB-MP004370HU(A4))	0.0625μg/well
Substrate	4-NPA (sigma，N8130)	1mM
Reaction system	/	100μl
Reaction conditions	37℃ and 5min in dark	/
Buffer	12.5 mM Tris, 75 mM NaCl, pH 7.5	/
Enzyme activity unit (U/mg)	>2600 pmol/min/μg	/

Activity
Measured by its esterase activity. The specific activity is >2600 pmol/min/μg.

Description

The recombinant human CA2 protein is an enzymatically active construct expressed in mammalian cells to ensure proper folding and native-like functionality. It consists of the full-length sequence from amino acids 1 to 260 and includes a C-terminal 10xHis tag to facilitate purification and detection. Supplied as a lyophilized powder, the recombinant CA2 protein is highly pure, with levels exceeding 95% as confirmed by both SDS-PAGE and SEC-HPLC analyses. Its biological function is validated by esterase activity, showing a specific activity greater than 2600 pmol/min/μg. These characteristics make it a reliable tool for enzyme activity assays, inhibitor screening, and studies involving carbonic anhydrase function or regulation.

Human Carbonic Anhydrase 2 (CA2) is a crucial enzyme belonging to the carbonic anhydrase family, a group of metalloenzymes that significantly contribute to various physiological processes through the catalysis of the reversible reaction of carbon dioxide (CO?) and water (H?O) to bicarbonate (HCO??) and protons (H?) [1][2]. CA2 plays a key role in maintaining acid-base balance in biological systems, facilitating ion transport within cells, and regulating pH levels, which permeate several biological processes including respiration and metabolic activities [2].

In addition to its fundamental role in pH and ion homeostasis, CA2 has been recognized for its involvement in various health conditions. Variants of the CA2 gene have been linked to multiple diseases, including osteoporosis, certain types of cancer, ulcers, and obesity [1][3]. For instance, the expression levels of

CA2 may correlate with colorectal cancer (CRC) progression, whereby reduced expression of CA2 enhances the stem-cell-like characteristics of adenoma cells, presenting it as a potential biomarker for high-risk CRC [1][3].

CA2 also contributes significantly to bone resorption processes through its action in osteoclasts, where it is responsible for proton production that facilitates the dissolution of bone matrix [4]. The functional significance of CA2 is further underscored by its relationship with osteopetrosis, a condition resulting from defective osteoclast function due to mutations in the CA2 gene, thus illustrating its vital role in skeletal health [5], [6].

Moreover, CA2's potential as a therapeutic target has been subject to increasing interest. For example, its inhibition has been explored as a strategy to overcome drug resistance in glioblastoma, indicating that CA2's activity is closely linked to therapeutic outcomes in certain cancers [3]. The understanding of CA2 is not limited to its enzymatic functions, as it also plays a role in cellular signaling pathways and interactions with various transport proteins, thereby influencing broader physiological and pathological processes [7].

References:

[1] N. Maurya, S. Kushwaha, R. Vetukuri, & A. Mani. Unlocking the potential of the ca2, ca7, and itm2c gene signatures for the early detection of colorectal cancer: a comprehensive analysis of rna-seq data by utilizing machine learning algorithms. Genes, vol. 14, no. 10, p. 1836, 2023. https://doi.org/10.3390/genes14101836
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[3] K. Zhao, A. Schäfer, et al. Inhibition of carbonic anhydrase 2 overcomes temozolomide resistance in glioblastoma cells. International Journal of Molecular Sciences, vol. 23, no. 1, p. 157, 2021. https://doi.org/10.3390/ijms23010157
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[5] A. Coudert, M. Vernejoul, M. Muraca, & A. Fattore. Osteopetrosis and its relevance for the discovery of new functions associated with the skeleton. International Journal of Endocrinology, vol. 2015, p. 1-8, 2015. https://doi.org/10.1155/2015/372156
[6] B. Shamsian, N. Momtazmanesh, et al. Allogenic hematopoietic stem cell transplantation in an iranian patient with osteopetrosis caused by carbonic anhydrase ii deficiency: a case report. Pediatric Transplantation, vol. 28, no. 3, 2024. https://doi.org/10.1111/petr.14689
[7] P. Morgan, S. Pastoreková, A. Stuart-Tilley, S. Alper, & J. Casey. Interactions of transmembrane carbonic anhydrase, caix, with bicarbonate transporters. Ajp Cell Physiology, vol. 293, no. 2, p. C738-C748, 2007. https://doi.org/10.1152/ajpcell.00157.2007

Reconstitution We recommend that this vial be briefly centrifuged prior to opening to bring the

	contents to the bottom. Please reconstitute protein in deionized sterile water to a concentration of 0.1-1.0 mg/mL.We recommend to add 5-50% of glycerol (final concentration) and aliquot for long-term storage at -20?/-80?. Our default final concentration of glycerol is 50%. Customers could use it as reference.
Shelf Life	The shelf life is related to many factors, storage state, buffer ingredients, storage temperature and the stability of the protein itself. Generally, the shelf life of liquid form is 6 months at -20°C/-80°C. The shelf life of lyophilized form is 12 months at -20°C/-80°C.