Aconitase Activity Assay Kit

(Catalog #K716-100; 100 reactions; Store kit at 4˚C)

DATA SHEET

I. Introduction:

Aconitase (aconitate hydratase; EC 4.2.1.3) is an iron-sulfur protein containing an $[Fe_4S_4]^{2+}$ cluster that catalyzes the stereospecific isomerization of citrate to isocitrate via cis-aconitate in the tricarboxylic acid cycle, a non-redox-active process. Tissue contains two aconitases, a mitochondrial (m-) and a cytosolic (c-) aconitase. They are related, but distinctly different enzymes and are coded for on different chromosomes. Loss of aconitase activity in cells or other biological samples treated with pro-oxidants has been interpreted as a measure of oxidative damage. BioVision's Aconitase Assay Kit is a highly sensitive, simple, direct and HTS-ready colorimetric assay for measuring Aconitase activity in biological samples. In the assay, citrate is converted by aconitase into isocitrate, which is further processed resulting in a product that converts a nearly colorless probe into an intensely colored form (λ = 450nm).

II. Kit Contents:

Component	K716-100	Cap Color	Part Number
Assay Buffer	30 ml	WM	K716-100-1
Substrate (lyophilized)	1 vial	Blue	K716-100-2
Developer (lyophilized)	1 vial	Purple	K716-100-3
Enzyme Mix	200 µl	Green	K716-100-4
Cysteine (lyophilized)	1 vial	Red	K716-100-5
$(NH_4)Fe(SO_4)_2$ (lyophilized)	1 vial	Brown	K716-100-6
Isocitrate Standard (10 µmol; lyophilized)	1 vial	Yellow	K716-100-7

III. Storage and Handling:

Store Enzyme Mix at 4˚C and rest of the kit components at -20˚C, protected from light. Warm the assay buffer to room temperature before use. Briefly centrifuge vials before opening. Read the entire protocol before performing the assay.

IV. Reagent Reconstitution and General Consideration:

Substrate: Dissolve with 220 µl ddH_2O; sufficient for 100 assays.

Developer: Dissolve with 1.1 ml Assay Buffer before use; sufficient for 100 assays.

Aconitase Activation Solution: Dissolve cysteine and $(NH_4)_2Fe(SO_4)_2$ with 0.5 ml Assay Buffer separately, and store at -20°C. Take out 0.1 ml cysteine and $(NH_4)_2Fe(SO_4)_2$ solutions and mix together to prepare fresh activation solution.

All the solutions except the activated Aconitase (store at 4˚C) are stable for 1 month at -20°C. Ensure that the Assay Buffer is at room temperature before use. Keep samples, Enzyme Mix and Aconitase solution on ice during the assay.

V. Aconitase Activity Assay:

1. Sample Preparations:

Homogenize 20 - 40 mg tissue or 10^6 Cells on ice in 0.1 ml cold Assay Buffer; Centrifuge at 800 x g for 10 min at 4°C; Collect the supernatant for c-aconitase assay. For m-aconitase assay, centrifuge the supernatant at 20,000 x g for 15 min at 4°C and collect the pellet, dissolve into 0.1 ml cold Assay Buffer, sonicate for 20 sec. Keep samples at -80°C for storage.

Add 10 µl activation solutions to 100 µl sample; incubate on ice for 1 hr to activate aconitase in the sample.

Add 2 – 50 µl activated samples into each well, and adjust volume to 50 µl. We suggest using a background control group as well as several doses of your sample to ensure the readings are within the linear range.

2. Isocitrate Standard Curve:

Dissolve into 0.5 ml assay buffer to prepare 20 mM isocitrate standard solution. Take 20 µl 20 mM Standard Solution and add 180 µl Assay Buffer to prepare 2 mM isocitrate standard solution. Add 0, 2, 4, 6, 8, 10µl 2mM Isocitrate Standard solution into 96-well plate in duplicate to generate 0, 4, 8, 12, 16, 20 nmol/well Isocitrate standard. Bring the final volume to 50 µl with Assay Buffer.

3. Reaction Mix:

Mix enough reagents for the number of assays to be performed. For each well, prepare a total 50 µl Reaction Mix:

Sample Reaction Mix	Background Mix
46 µl Assay Buffer	48 µl Assay Buffer
2 µl Enzyme Mix	2 µl Enzyme Mix
2 µl Substrate	

Add 50 µl of the Sample Reaction Mix to each test samples, background control and Isocitrate standards. Mix well and incubate at 25°C for 30-60 min. Add 10µl Developer to each well, mix and incubate at 25°C for 10 min. Measure OD 450nm.

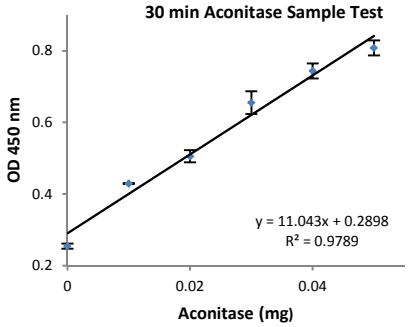
4. Calculation:

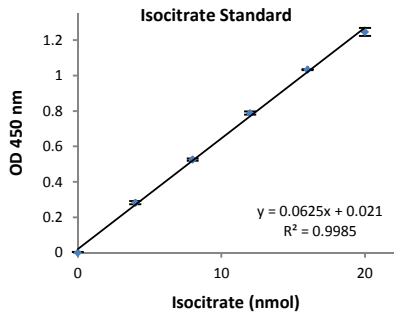
Plot the Isocitrate standard curve. $\Delta OD = OD_{sample} - OD_{background}$, apply the ΔOD to the Isocitrate standard curve to get B nmol of isocitrate generated by aconitase in 30 – 60 min.

$$\text{Aconitase Activity} = \frac{B}{T \times V} \times \text{Sample Dilution Factor} = \text{nmol/min/ml} = \text{mU/ml}$$

Where: **B** is the isocitrate amount from Standard Curve (in nmol)
T is the time incubated (in min)
V is the pretreated sample volume added into the reaction well (in ml)

Unit definition: One unit of Aconitase is the amount of enzyme that will isomerize 1.0 µmol of Citrate to Isocitrate per min at pH 7.4 at 25 °C.





RELATED PRODUCTS:

Colorimetric Glutathione Detection Kit	ApoGSH Glutathione Detection Kit
Glutathione Kit (GSH, GSSG and Total)	GST Fluorometric Assay Kit
GST Colorimetric Assay Kit	Triglyceride Assay Kit
Acid Phosphatase Assay Kit	ADP/ATP Ratio Assay Kit
Phosphate Fluorescence Assay Kit	Phosphate Colorimetric Assay Kit
NAD/NADH Quantification Kit	NADP/NADPH Quantitation Kit
Pyruvate Assay Kit	Lactate Assay Kit/ II

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GENERAL TROUBLESHOOTING GUIDE:

Problems	Cause	Solution
Assay not working	• Use of ice-cold assay buffer	• Assay buffer must be at room temperature
	• Omission of a step in the protocol	• Refer and follow the data sheet precisely
	• Plate read at incorrect wavelength	• Check the wavelength in the data sheet and the filter settings of the instrument
	• Use of a different 96-well plate	• Fluorescence: Black plates (clear bottoms) ; Luminescence: White plates ; Colorimeters: Clear plates
Samples with erratic readings	• Use of an incompatible sample type	• Refer data sheet for details about incompatible samples
	• Samples prepared in a different buffer	• Use the assay buffer provided in the kit or refer data sheet for instructions
	• Cell/ tissue samples were not completely homogenized	• Use Dounce homogenizer (increase the number of strokes); observe for lysis under microscope
	• Samples used after multiple free-thaw cycles	• Aliquot and freeze samples if needed to use multiple times
	• Presence of interfering substance in the sample	• Troubleshoot if needed
	• Use of old or inappropriately stored samples	• Use fresh samples or store at correct temperatures until use
Lower/ Higher readings in Samples and Standards	• Improperly thawed components	• Thaw all components completely and mix gently before use
	• Use of expired kit or improperly stored reagents	• Always check the expiry date and store the components appropriately
	• Allowing the reagents to sit for extended times on ice	• Always thaw and prepare fresh reaction mix before use
	• Incorrect incubation times or temperatures	• Refer datasheet & verify correct incubation times and temperatures
	• Incorrect volumes used	• Use calibrated pipettes and aliquot correctly
Readings do not follow a linear pattern for Standard curve	• Use of partially thawed components	• Thaw and resuspend all components before preparing the reaction mix
	• Pipetting errors in the standard	• Avoid pipetting small volumes
	• Pipetting errors in the reaction mix	• Prepare a master reaction mix whenever possible
	• Air bubbles formed in well	• Pipette gently against the wall of the tubes
	• Standard stock is at an incorrect concentration	• Always refer the dilutions in the data sheet
	• Calculation errors	• Recheck calculations after referring the data sheet
	• Substituting reagents from older kits/ lots	• Use fresh components from the same kit
Unanticipated results	• Measured at incorrect wavelength	• Check the equipment and the filter setting
	• Samples contain interfering substances	• Troubleshoot if it interferes with the kit
	• Use of incompatible sample type	• Refer data sheet to check if sample is compatible with the kit or optimization is needed
	• Sample readings above/below the linear range	• Concentrate/ Dilute sample so as to be in the linear range
Note: The most probable list of causes is under each problem section. Causes/ Solutions may overlap with other problems.		