

# α-Ketoglutarate Assay Kit

(Catalog #K677-100; 100 assays; Store Kit at -20°C)

## I. Introduction:

α-Ketoglutarate (α-KG) is a key intermediate in the Krebs cycle, coming after isocitrate and before succinyl CoA. Anaplerotic reactions replenish the cycle by synthesizing α-KG from transamination of glutamate, or through the action of glutamate dehydrogenase. α-KG is an important nitrogen transporter. Being a key intermediate, it is one of the organic acids measured in newborns as an indicator of inborn errors of metabolism. BioVision's α-Ketoglutarate Assay Kit provides a simple, sensitive and rapid means for quantifying α-KG in a variety of samples. In the assay, α-ketoglutarate is transaminated with the generation of pyruvate which is utilized to convert a nearly colorless probe to both color ( $\lambda_{max} = 570\text{nm}$ ) and fluorescence (Ex/Em = 535/587 nm). The α-Ketoglutarate Assay Kit is useful for detecting α-ketoglutarate in the range of 0.01 to 10 nmoles.

## II. Kit Contents:

Components	K677-100	Cap Code	Part Number
α-KG Assay Buffer	25 ml	WM	K677-100-1
α-KG OxiRed Probe (in DMSO)	0.2 ml	Red	K677-100-2A
α-KG Converting Enzyme (lyophilized)	1 vial	Purple	K677-100-4
α-KG Development Enzyme Mix (lyophilized)	1 vial	Green	K677-100-5
α-KG Standard (10 μmol, lyophilized)	1 vial	Yellow	K677-100-6

## III. Storage and Handling:

Store kit at -20°C, protect from light. Warm α-KG Assay Buffer to room temperature before use. Briefly centrifuge all small vials prior to opening.

## IV. Reagent Preparation and Storage Conditions:

**α-KG Probe:** Ready to use as supplied. Warm to room temperature before using to melt frozen DMSO. Protect from light and moisture. Stable for 2 months at -20°C.

**α-KG Converting Enzyme, α-KG Enzyme Mix:** Dissolve with 220 μl α-KG Buffer separately. Pipette up and down to dissolve. Aliquot into vials with sufficient amount for each experiment and store at -20°C. Avoid repeated freeze/thaw cycles. Use within two months.

**α-KG Standard:** Dissolve in 100 μl dH<sub>2</sub>O to generate 100 mM (100nmol/μl) α-KG Standard solution. Keep cold while in use. Store at -20°C.

## V. Assay Protocol:

### 1. Standard Curve Preparations:

Dilute the α-KG Standard to 1 nmol/μl by adding 10 μl of the Standard to 990 μl of dH<sub>2</sub>O, mix well. Add 0, 2, 4, 6, 8, 10 μl into a series of standards wells on a 96-well plate. Adjust volume to 50 μl/well with Assay Buffer to generate 0, 2, 4, 6, 8, 10 nmol/well of the Standard.

**Fluorometric Assay:** Dilute further dilute by adding 10 μl to 90 μl of dH<sub>2</sub>O. Add 0, 2, 4, 6, 8, 10 μl into a series of standards well on a 96-well plate. Adjust the volume to 50 μl/well to generate 0, 0.2, 0.4, 0.6, 0.8, 1.0 nmol/well.

### 2. Sample Preparation:

Tissue (20 mg) or cells ( $2 \times 10^6$ ) are rapidly homogenized with 100 μl of ice cold PBS or other buffer (pH 6.5 - 8). Enzymes in samples may interfere with the assay. We suggest deproteinizing samples using a perchloric acid/KOH protocol (BioVision, Cat.#K808-200) or 10 kDa molecular weight cut off spin columns (BioVision, Cat# 1997-25). Add 1 - 50 μl samples into duplicate wells of a 96-well plate and bring volume to 50 μl with Assay Buffer. We suggest testing several doses of your samples to ensure readings are within the linear range.

- Mix enough reagent for the number of samples and standards to be performed: For each well, prepare a total 50 μl Reaction Mix containing:

	Sample	Bkgd. Control*
α-KG Assay Buffer	44 μl	46 μl
α-KG Converting Enzyme	2 μl	----
α-KG Enzyme Mix	2 μl	2 μl
α-KG probe	2 μl	2 μl

Add 50 μl of the Reaction Mix to each well containing the α-KG Standard, samples or background control\*.

**\*Note1:** Pyruvate generates background. If pyruvate is suspected in your sample, you can do the background control omitting the converting enzyme. The background control can be subtracted from the α-KG reading.

**Note2 (optional):** for fluorometric assay use 0.4 μl α-KG OxiRed Probe and 45.6 μl (47.6 μl for Bkgd Control) α-KG assay buffer to reduce background

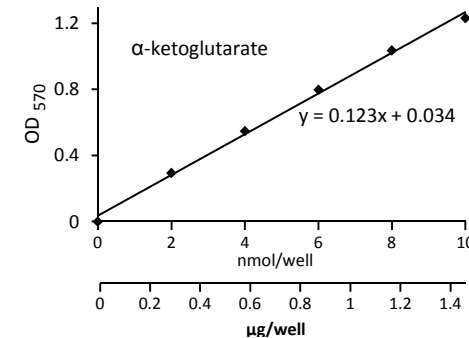
- Incubate for 30 min at 37°C, protect from light.
- Measure OD at 570 nm or fluorescence using Ex/Em = 535/587 nm.
- Calculation:** Correct background by subtracting the value of the 0 α-KG blank from all readings. Plot the standard curve. Apply the corrected sample readings to the standard curve to get α-KG amount in the sample wells. The α-KG concentrations in the test samples:

$$C = Ay/Sv \text{ (nmol/}\mu\text{l; or } \mu\text{mol/ml; or mM)}$$

Where: Ay is the amount of α-KG (nmol) in your sample from the standard curve.

Sv is the sample volume (μl) added to the sample well.

α-Ketoglutarate molecular weight: 146.11



α-Ketoglutarate standard curve generated using this kit protocol.

## RELATED PRODUCTS:

Apoptosis Detection Kits & Reagents	Cell Proliferation & Senescence Kits
Glucose, Sucrose Assay Kit	Cholesterol, LDL/HDL Assay Kits
Glutathione Assay Kit	Ethanol and Uric Acid Assay Kit
NAD/NADH and NADP/NADPH Assay Kit	Lactate Assay Kits
TAC Total Antioxidant Capacity	Mono or Polysaccharide Assay Kits
Malic acid Assay Kit	Pyruvate Assay Kit
Glycogen Assay Kit	Fatty Acid Assay Kit
Galactose Assay Kit	Nitric Oxide Assay Kit
Fructose Assay Kit	Iron Assay Kit

**GENERAL TROUBLESHOOTING GUIDE:**

<b>Problems</b>	<b>Cause</b>	<b>Solution</b>
Assay not working	<ul style="list-style-type: none"> <li>• Use of ice-cold assay buffer</li> <li>• Omission of a step in the protocol</li> <li>• Plate read at incorrect wavelength</li> <li>• Use of a different 96-well plate</li> </ul>	<ul style="list-style-type: none"> <li>• Assay buffer must be at room temperature</li> <li>• Refer and follow the data sheet precisely</li> <li>• Check the wavelength in the data sheet and the filter settings of the instrument</li> <li>• Fluorescence: Black plates (clear bottoms) ; Luminescence: White plates ; Colorimeters: Clear plates</li> </ul>
Samples with erratic readings	<ul style="list-style-type: none"> <li>• Use of an incompatible sample type</li> <li>• Samples prepared in a different buffer</li> <li>• Samples were not deproteinized (if indicated in datasheet)</li> <li>• Cell/ tissue samples were not completely homogenized</li> <li>• Samples used after multiple free-thaw cycles</li> <li>• Presence of interfering substance in the sample</li> <li>• Use of old or inappropriately stored samples</li> </ul>	<ul style="list-style-type: none"> <li>• Refer data sheet for details about incompatible samples</li> <li>• Use the assay buffer provided in the kit or refer data sheet for instructions</li> <li>• Use the 10 kDa spin cut-off filter or PCA precipitation as indicated</li> <li>• Use Dounce homogenizer (increase the number of strokes); observe for lysis under microscope</li> <li>• Aliquot and freeze samples if needed to use multiple times</li> <li>• Troubleshoot if needed, deproteinize samples</li> <li>• Use fresh samples or store at correct temperatures till use</li> </ul>
Lower/ Higher readings in Samples and Standards	<ul style="list-style-type: none"> <li>• Improperly thawed components</li> <li>• Use of expired kit or improperly stored reagents</li> <li>• Allowing the reagents to sit for extended times on ice</li> <li>• Incorrect incubation times or temperatures</li> <li>• Incorrect volumes used</li> </ul>	<ul style="list-style-type: none"> <li>• Thaw all components completely and mix gently before use</li> <li>• Always check the expiry date and store the components appropriately</li> <li>• Always thaw and prepare fresh reaction mix before use</li> <li>• Refer datasheet &amp; verify correct incubation times and temperatures</li> <li>• Use calibrated pipettes and aliquot correctly</li> </ul>
Readings do not follow a linear pattern for Standard curve	<ul style="list-style-type: none"> <li>• Use of partially thawed components</li> <li>• Pipetting errors in the standard</li> <li>• Pipetting errors in the reaction mix</li> <li>• Air bubbles formed in well</li> <li>• Standard stock is at an incorrect concentration</li> <li>• Calculation errors</li> <li>• Substituting reagents from older kits/ lots</li> </ul>	<ul style="list-style-type: none"> <li>• Thaw and resuspend all components before preparing the reaction mix</li> <li>• Avoid pipetting small volumes</li> <li>• Prepare a master reaction mix whenever possible</li> <li>• Pipette gently against the wall of the tubes</li> <li>• Always refer the dilutions in the data sheet</li> <li>• Recheck calculations after referring the data sheet</li> <li>• Use fresh components from the same kit</li> </ul>
Unanticipated results	<ul style="list-style-type: none"> <li>• Measured at incorrect wavelength</li> <li>• Samples contain interfering substances</li> <li>• Use of incompatible sample type</li> <li>• Sample readings above/below the linear range</li> </ul>	<ul style="list-style-type: none"> <li>• Check the equipment and the filter setting</li> <li>• Troubleshoot if it interferes with the kit</li> <li>• Refer data sheet to check if sample is compatible with the kit or optimization is needed</li> <li>• Concentrate/ Dilute sample so as to be in the linear range</li> </ul>
<p><b>Note:</b> The most probable list of causes is under each problem section. Causes/ Solutions may overlap with other problems.</p>		