BQC

REDOX TECHNOLOGIES

KB03012

Catalase Activity Assay Kit

96 well plate
100/200/400 tests

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1. General information

PRECAUTIONS

Please read this manual carefully before beginning the assay.

This product is designed for **research use only**. It is not approved for human or animal use or clinical diagnosis. All chemicals should be handled with care and in accordance with laboratory safety practices. It is recommended to use basic Personal Protective Equipment.

Do not use after the expiration date stated on the packaging.

Do not mix or substitute reagents or materials from other kit batches or vendors.

For the **material safety data sheet** (MSDS) please contact us at info@bioquochem.com

TECHNICAL RECOMMENDATIONS

Store reagents as indicated in **Materials and storage** section.

Be sure to keep the bottle capped when not in use.

Let the components reach room temperature (RT) before use.

Immediately before use, gently invert and rotate reagent bottles several times to mix the contents thoroughly.

Avoid foaming or bubbles when mixing or reconstituting components.

Avoid cross contamination of samples or reagents by changing pipette tips between sample, standard and reagent additions.

Be sure to use the optimal microplate for the assay. Flat bottom transparent microplates for UV/VIS applications, and black microplates for fluorescence measurements.

2. Technical specifications

Available sizes

100/200/400 tests

Required sample volume

20 µL/test

Compatible samples

Biological samples (plasma/serum), cell lysates and tissue homogenates

Type of detection

Colorimetric (540 nm)

3. Materials and storage

MATERIALS SUPPLIED

Item	No. Tests	Units	Storage
Reagent A	100	1	4 °C
	200	1	
	400	1	
Reagent B	100	1	4 °C
	200	1	
	400	2	
Reagent C	100	1	4 °C
	200	1	
	400	1	
Reagent D	100	1	-20 °C
	200	1	
	400	1	
Reagent E	100	1	4 °C
	200	1	
	400	1	
Reagent F	100	1	4 °C
	200	1	
	400	1	
Reagent G	100	1	4 °C
	200	2	
	400	4	
Reagent H	100	1	4 °C
	200	2	
	400	4	
Standard	100	1	4 °C
	200	2	
	400	4	
Transparent 96-Well Microplate	100	1	RT
	200	2	
	400	4	

MATERIALS NEEDED BUT NOT SUPPLIED

- Double distilled water (ddH_2O) as Milli-Q Ultrapure Water.
- Labware materials (micropipettes, tubes, stirring/mixing equipment).
- Colorimetric microplate reader – equipped with filter for OD 540 nm.

STORAGE CONDITIONS

On receipt, store kit components as indicated above. Under these conditions, the reagents are stable in the original packaging until the expiration date stated on the outside of the box. After reconstitution, standard solutions are unstable in the presence of oxygen. Prepare a fresh set of standards for every use.

4. Introduction

Catalases (EC 1.11.1.6) are antioxidant enzymes that catalyze the conversion of hydrogen peroxide (H_2O_2) to water (H_2O) and molecular oxygen (O_2).

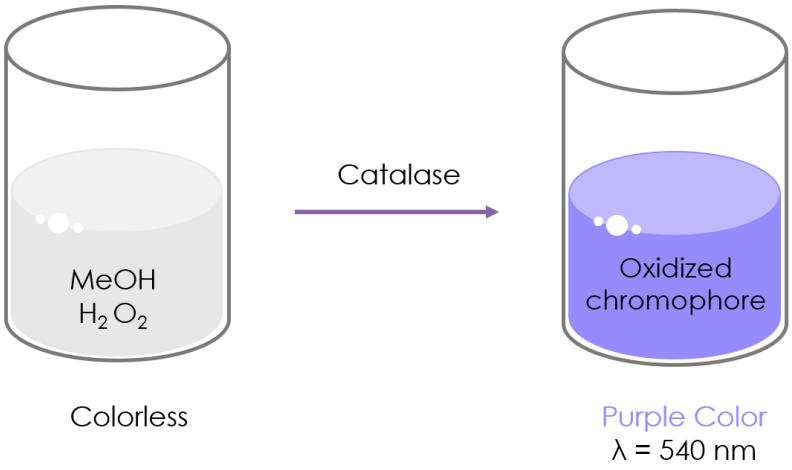
Catalase is a crucial antioxidant enzyme that mitigates oxidative stress by destroying H_2O_2. H_2O_2 is an oxidative stress inducer that can cause damage to cell at relatively low concentrations. H_2O_2 is also precursor to certain oxidant radical species (e.g. hydroxyl radical).

Catalase exists in almost all aerobic organisms (plants, animals, and microbes).

BQC Catalase Activity Assay Kit is a highly sensitive and reproducible assay to measure the catalase activity in biological samples such as plasma, tissue homogenates or cell lysates.

5. Assay principle

BQC Catalase Activity Assay Kit is based on the peroxidatic activity of the enzyme. In the presence of MeOH and H_2O_2 the enzyme catalyzes the generation of formaldehyde. Once produced, formaldehyde is detected through its reaction with a specific chromophore. This chromophore undergoes a color change from colorless to purple (λ_{max} 540 nm) upon oxidation by formaldehyde. Catalase activity can be, therefore, determined by measuring the formaldehyde generation at 540 nm.



Principle of Catalase Activity Assay Kit

6. Assay preparation

REAGENT PREPARATION

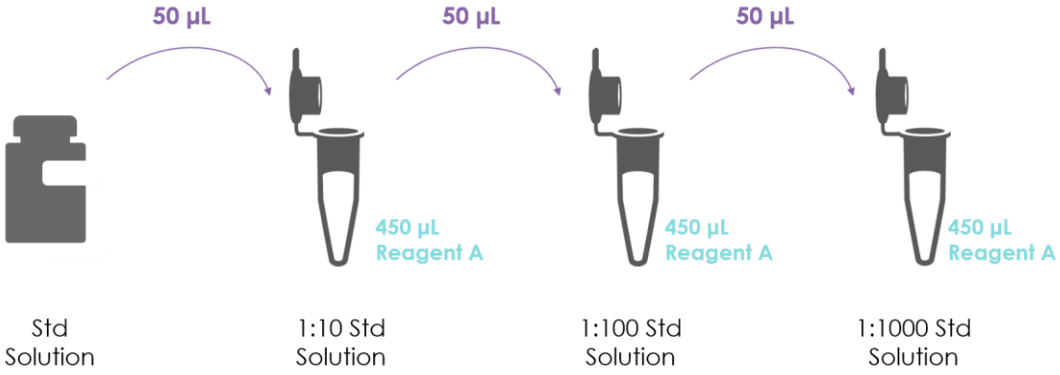
All assay reagents not listed below are ready to use as supplied. Allow the reagents to reach room temperature before use.

Positive Control: A catalase positive control (Reagent D) is included in this kit. Using the positive control is completely optional and it is not required for the correct performance of the assay. Resuspend each vial of Reagent D in 100 µL of Reagent B to prepare the positive control.

> **CAUTION:** This solution is stable for at least 2 hours at room temperature. To use it at a different time, store at -20 °C.

R.E. Working Solution: Add 40 µL of Reagent E to 9.96 mL of ddH_2O. This solution is stable for at least 2 hours. Discard remaining R.E. Working Solution after the assay.

Standard Solution: Make three serial ten-fold dilutions to obtain a 1:1000 dilution of the Standard (for each 1:10 dilution, add 50 µL of the Standard Solution to 450 µL of Reagent A) as depicted below. Use this 1:1000 diluted solution to prepare the standard curve.



STANDARD CALIBRATION

Prepare standards for the calibration curve from the 1:1000 diluted Standard solution according to the following Table. Discard standard solutions after use.

Standard	Standard solution 1:1000 diluted (µL)	Reagent A (µL)	*Enzymatic activity (U/mL)
Std 1 (Reagent Blank)	0	500	**0**
Std 2	15	485	**6.4**
Std 3	30	470	**12.8**
Std 4	45	455	**19.1**
Std 5	60	440	**25.5**
Std 6	75	425	**31.9**

* Standard is expressed as enzymatic activity of catalase (U/mL). One unit is the amount of enzyme that catalyses the reaction of 1 µmol of substrate per minute.

PLATE SET UP

BQC recommends running the standards, samples, and blanks at least in duplicate (triplicate recommended). There is no specific pattern for using the wells on the plate. A proposed layout of standards (Std), positive control (PC) and samples (S) to be measured is shown below.

NOTE: If sample blanks are included in the assay, it is necessary to reserve some wells of the plate for these blanks

	1	2	3	4	5	6	7	8	9	10	11	12
A	Std 1	Std 1	S2	S2	S10	S10	S18	S18	S26	S26	S34	S34
B	Std 2	Std 2	S3	S3	S11	S11	S19	S19	S27	S27	S35	S35
C	Std 3	Std 3	S4	S4	S12	S12	S20	S20	S28	S28	S36	S36
D	Std 4	Std 4	S5	S5	S13	S13	S21	S21	S29	S29	S37	S37
E	Std 5	Std 5	S6	S6	S14	S14	S22	S22	S30	S30	S38	S38
F	Std 6	Std 6	S7	S7	S15	S15	S23	S23	S31	S31	S39	S39
G	PC	PC	S8	S8	S16	S16	S24	S24	S32	S32	S40	S40
H	S1	S1	S9	S9	S17	S17	S25	S25	S33	S33	S41	S41

Example of plate layout for the Catalase Assay Kit

7. Sample preparation

The following sample preparation protocols are intended as a guide only. The optimal conditions for sample preparation must be determined by the end user. It is recommended to use fresh samples. If it is not possible, aliquot and store samples appropriately with minimal freeze/thawing.

Catalase Assay Kit can be used to determine the catalase activity in a wide variety of samples like biological fluids, cell lysates and tissue homogenates.

Biological samples. Biological samples like serum or plasma, can be directly measured with appropriate dilutions.

Tissue Homogenates. Dissect the tissue of interest and place it on a homogenizer tube with an appropriate amount of an ice-cold buffer (i.e. 1 g tissue per 10 mL PBS pH 7.4). Homogenize the tissue and then centrifuge the homogenate at 10000 x g for 15 minutes at 4 °C. Collect the supernatant.

Cell culture. Wash cells with ice-cold buffer (i.e. PBS, Tris-HCl) before lysis. Lyse cells by sonication or freeze-thaw cycles. Centrifuge cell lysis suspension at 10000 x g for 15 minutes at 4 °C and collect the supernatant. It is recommended to use lysates from $2 \cdot 10^6$ cells.

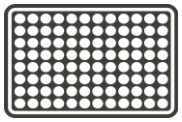
Erythrocyte lysate. Lyse RBCs by adding four times its volume of ice cold ultra-pure water. Centrifuge at 10000 x g for 15 minutes at 4 °C and collect the supernatant.

Reagents and materials required for sample preparation are not supplied with the kit. Before doing sample preparation, consider the volume of sample required per test; see **Technical specifications** section.

Make sure that interfering substances present in the sample do not give a significant background. Run proper blanks as necessary (e.g. sample blank should be always evaluated when working with highly colored samples). It is recommended to assay different sample dilutions to ensure the values fall within the standard curve.

8. Assay protocol

Prepare and mix all reagents thoroughly before use. Each standard, sample or blank should be assayed at least in duplicate.

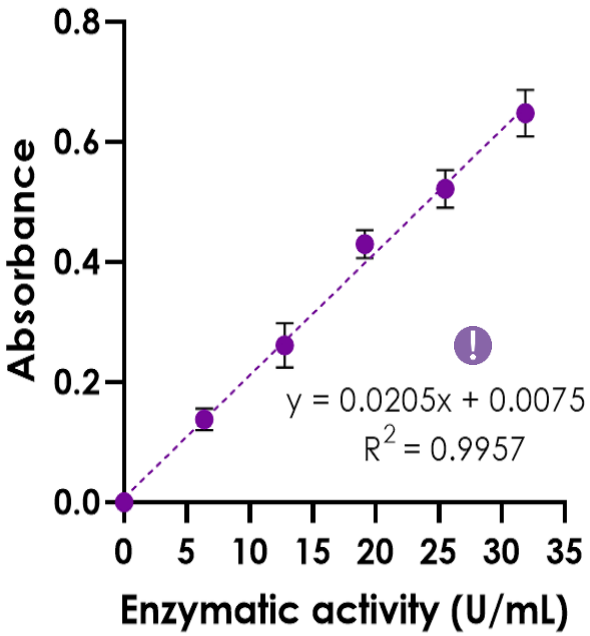
1		Set up the plate design
2		Add **20 µL** of **standard**, **positive control**, or **sample** in each well
3		- Add **100 µL** of **Reagent B** in each well. Avoid the formation of bubbles - Add **30 µL** of **Reagent C** in each well
4		Add **20 µL** of **R.E. Working Solution** in each well to initiate the reaction
5		**Incubate** for **20 minutes** at **RT**
6		Add **30 µL** of **Reagent F** to each well to stop the reaction
7		Add **30 µL** of **Reagent G** in each well. A slightly purple color can be observed
8		**Incubate** for **10 minutes** at **RT**
9		Add **20 µL** of **Reagent H** in each well
10		**Incubate** for **5 minutes** at **RT**
11		Read the **absorbance** of all wells at **540 nm** in end point mode at **RT**

If you need to **adapt this kit** for another form of the assay (for example cuvette), **contact us** at **info@bioquochem.com**

9. Data analysis

ANALYSIS OF THE STANDARDS

- Calculate the average absorbance of the standards.
- Subtract the average absorbance of the reagent blank (Std 1) from the average absorbance of the standards to obtain the blank-corrected absorbance of the standards.
- Create a standard curve by plotting the blank-corrected absorbance of the standards as a function of the standard enzymatic activity (see **STANDARD CALIBRATION** section). A typical standard curve (**y**=slope·**x** ± intercept) for this assay is shown below.



Standard curve for Catalase Activity Assay Kit

This standard curve is an example of the data typically obtained with this kit. **DO NOT USE** this standard curve to calculate the enzymatic activity of your samples. A new standard curve must be performed by the end user.

ANALYSIS OF THE SAMPLES

- Calculate the average absorbance of the samples.
- Subtract the average absorbance of the reagent blank (Std 1) from the average absorbance of each sample to obtain the blank-corrected absorbance of the samples (A_S).
- Calculate the catalase enzymatic activity (U/mL) of the samples using the following equation. Slope and intercept values are obtained from the standard curve.

$$\text{Catalase Enzymatic activity (U/mL)} = \left(\frac{A_S - \text{intercept}}{\text{slope}}\right)$$

When working with diluted samples the concentration values obtained must be multiplied by the dilution factor to obtain the enzymatic activity value of the undiluted sample.

10. Troubleshooting

This troubleshooting table provides potential sources and solutions for common problems observed with BQC Assay Kits. **The problems listed below could occur when using any BQC Assay Kit.** They are not specific for this assay kit.

Problem	Possible Cause	Recommended Solution
Wells have color but there is no reading	Plate read at incorrect wavelength	Check the wavelength used in the assay
	Incorrect microplate	Use the correct microplate for your application UV/Vis: transparent Fluorescence: black wells/transparent bottom
Standard readings do not follow a linear pattern	Pipetting errors in preparation of standards	Avoid pipetting small volumes (<5 µL) Be careful not to splash from well to well
	Air bubbles formed in well(s)	Use reverse pipetting technique
	Standard stock is at incorrect concentration	Always refer to dilutions described in **Assay preparation**
	Improperly thawed reagents	Thaw all components completely and mix well before use
	Use of improperly stored reagents	Store the components appropriately Use fresh components from the standard curve
	Incorrect incubation times or temperatures	Refer to **Assay protocol**
Dispersion of standard and sample readings	Pipetting errors	Avoid pipetting small volumes (<5 µL) Be careful not to splash from well to well
	Air bubbles formed in well(s)	Use reverse pipetting technique

Problem	Possible Cause	Recommended Solution
Sample erratic values	Samples contain interfering substances	Dilute sample further (if possible)
	Inappropriately stored samples or samples used after multiple freeze-thaw cycles	Use fresh samples or store appropriately until use
	Samples not deproteinized	Use an appropriate deproteinization protocol
	Cells/Tissue samples not homogenized completely	Repeat the sample homogenization
	Inappropriate sample dilution buffer	Refer to **Assay preparation**
Sample reading fall outside the detection range	Samples are too diluted/concentrated No analyte/activity is observed in the sample	Re-assay using different sample dilutions

STILL HAVING PROBLEMS?

Contact BQC if you have any further questions, our team will be pleased to help you:

	Phone	+ 34 985 26 92 92
	E-mail	info@bioquochem.com
	Business hours	Monday-Thursday: 8.30 to 17.00 (CEST) Friday: 8.00 to 15.00 (CEST)

11. Additional information

BQC Catalase Activity Assay Kit allows catalase activity determination from 6 to 31 U/Ml. RSD < 15%.

Sodium dodecyl sulfate (SDS) has been reported to interfere with this assay kit.

If unexpected results are obtained running your samples, please contact us at info@bioquochem.com

12. Related products

More products available on bioquochem.com

Reference	Product
KF01004	ORAC Antioxidant Capacity Assay Kit
KB03011	Superoxide Dismutase Activity Assay Kit
KB03007	Thiol Quantification Assay Kit

13. Warranties and limitation of liability

BQC shall not in any event be liable for incidental, consequential or special damages of any kind resulting from any use or failure of the products, even if BQC has been advised of the possibility of such damage including, without limitation, liability for loss of use, loss of work in progress, downtime, loss of revenue or profits, failure to realize savings, loss of products of buyer or other use or any liability of buyer to a third party on account of such loss, or for any labor or any other expense, damage or loss occasioned by such product including personal injury or property damage is caused by BQC´s gross negligence. Any and all liability of BQC hereunder shall be limited to the amounts paid by the buyer for the product.

Buyer´s exclusive remedy and BQC´s sole liability hereunder shall be limited to a refund of the purchase price, or the replacement of all material that does not meet our specifications.

Said refund or replacement is conditioned on buyer giving written notice to BQC within 30 days of shipment.

Expiration date: 1 year from the date of fabrication. Expiration date is indicated on the outside of the box.

For further details, please refer to our website **bioquochem.com**

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