BQC

REDOX TECHNOLOGIES

KB03040

Gluthatione Reductase 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

Sample volume Required

40 µL/test

Compatible samples

Biological fluids, tissue homogenates and cell lysates

Type of detection

Colorimetric (412 nm)

3. Materials and storage

MATERIALS SUPPLIED

Item	No. Tests	Units	Storage
Reagent A	100	1	4 °C
	200	2	
	400	4	
Reagent B	100	1	4 °C
	200	2	
	400	4	
Reagent C	100	1	4 °C
	200	2	
	400	4	
Reagent D	100	1	-20 °C
	200	2	
	400	4	
Reagent E	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 412 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 indicated on the outside of the box.

4. Introduction

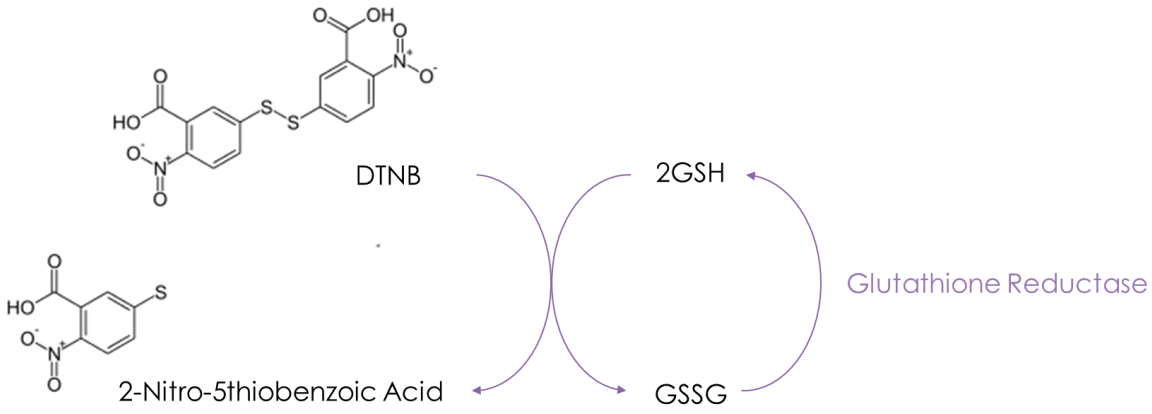
Glutathione reductase (GR, EC 1.8.1.7) is a flavoprotein that catalyzes the reduction of glutathione disulfide (GSSG) to reduced glutathione (GSH), with the participation of NADPH as electron donor. Glutathione reductase has a key role in the antioxidant system. In the cell, glutathione reductase is one of a chain of enzymes which serves to maintain glutathione in the reduced form. Reduced glutathione plays an important role in the cellular control of reactive oxygen species.

BQC Glutathione Reductase Activity Assay Kit is a quick, easy, and reproducible assay for determining glutathione reductase activity in different biological samples.

5. Assay principle

BQC Glutathione Reductase Activity Assay Kit is based on the reduction of glutathione disulfide (GSSG) to reduced glutathione (GSH) by the enzyme. The GSH generated during the enzymatic reaction reduces DTNB [5,5'-Dithiobis (2-nitrobenzoic acid)] to a yellow-colored product with a maximum of absorbance at 412 nm. The activity of the enzyme can be, therefore, measured by recording the increase of the absorbance at 412 nm.

The activity of glutathione reductase in a sample is calculated from a standard curve generated from known concentrations of the enzyme.



Principle of Glutathione Reductase 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.

R.B. Working Solution: Add 10 mL of Reagent A to the Reagent B bottle and mix thoroughly.

R.C. Working Solution: Add 5 mL of Reagent A to the Reagent C bottle and mix thoroughly.

R.D. Working Solution: Add 1 mL of Reagent A to the Reagent D vial and mix thoroughly.

CAUTION: All the Working solutions must be prepared immediately before use.

Standard Solution (Glutathione reductase): Add 960 µL of Reagent E to the Standard vial and mix carefully by inversion. Dilute this enzyme solution 1:100 with Reagent E (e.g. 10 µL of enzyme solution with 990 µL of Reagent E). The enzyme solutions must be prepared immediately before use.

STANDARD CALIBRATION

Prepare Glutathione reductase standards for the calibration curve from the 1:100 diluted Standard solution according to the following Table. Prepare the standards immediately prior to each assay. Mix tubes carefully. Discard standard solutions after use.

Standard	1:100 diluted Standard Solution (µL)	Reagent E (µL)	Concentration (U/mL)
Std 1 (Reagent Blank)	0	1000	0
Std 2	25	975	0.0025
Std 3	50	950	0.0050
Std 4	100	900	0.0100
Std 5	200	800	0.0200
Std 6	400	600	0.0400

PLATE SET UP

BQC recommends running the standards and samples at least in duplicate (triplicate recommended). There is no specific pattern for using the wells on the plate. A proposed layout of standards (Std) and samples (S) to be measured in duplicate 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	S3	S3	S11	S11	S19	S19	S27	S27	S35	S35
B	Std 2	Std 2	S4	S4	S12	S12	S20	S20	S28	S28	S36	S36
C	Std 3	Std 3	S5	S5	S13	S13	S21	S21	S29	S29	S37	S37
D	Std 4	Std 4	S6	S6	S14	S14	S22	S22	S30	S30	S38	S38
E	Std 5	Std 5	S7	S7	S15	S15	S23	S23	S31	S31	S39	S39
F	Std 6	Std 6	S8	S8	S16	S16	S24	S24	S32	S32	S40	S40
G	S1	S1	S9	S9	S17	S17	S25	S25	S33	S33	S41	S41
H	S2	S2	S10	S10	S18	S18	S26	S26	S34	S34	S42	S42

Example of plate layout for the Glutathione Reductase 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 properly with minimal freeze/thawing.

Glutathione Reductase Activity Assay Kit can be used to determine glutathione reductase activity in a wide variety of samples like biological fluids, tissue homogenates or cell lysates.

Biological samples. Biological samples like plasma or serum 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 (e.g. 0.1 g tissue per 1 mL buffer). Homogenize the tissue and then centrifuge the homogenate at 10000 x g for 15 minutes at 4 °C. Collect the supernatant.

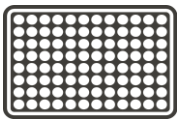
Cell culture. Wash cells with ice-cold buffer (e.g. PBS) before lysis. Lyse cells by sonication or freeze-thaw cycles. Centrifuge cell lysis suspension at 10000 x g for 15 minutes at 4 °C and collect the supernatant. It is recommended to use lysates from $5 \cdot 10^6$ cells.

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.

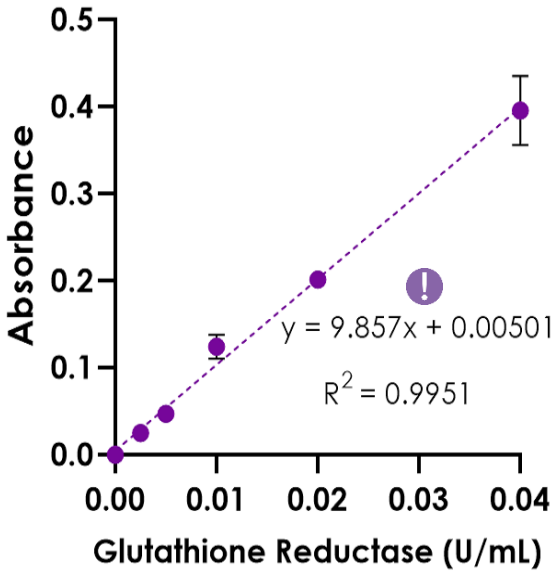
1		Set up the plate design
2		Add **40 µL** of **standard** or **sample** in each well
3		Add **100 µL** of **R.B. Working Solution** in each well **Optional:** Sample blank, add **100 µL** of **Reagent A.**
4		Add **50 µL** of **R.C. Working Solution** in each well
5		Add **10 µL** of **R.D. Working Solution** in each well
6		**Incubate** the plate for **10 minutes** at RT
8		Read the **absorbance** of all wells at **412 nm** in end point mode at **RT**

If you need to **adapt this kit** for use in cuvette, **please 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 all 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 concentration (see **STANDARD CALIBRATION** section). A typical standard curve (**y**=slope·**x** ± intercept) for this assay is shown below.



Glutathione reductase standard curve with Glutathione Reductase Activity Assay Ki

This standard curve is an example of the data typically obtained with this kit. **DO NOT USE** this standard curve to calculate the glutathione reductase 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).
- If sample blanks are assayed and they are significant, subtract them from the blank-corrected absorbance of the samples.
- Calculate the glutathione reductase activity of the samples using the following equation by substituting blank-corrected absorbance for each sample (A_S). Slope and intercept values are obtained from the standard curve.

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

When working with diluted samples the glutathione reductase activity values obtained must be multiplied by the dilution factor to obtain the glutathione reductase 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 (CET) Friday: 8.00 to 15.00 (CET)

11. Additional information

Glutathione Reductase Activity Assay Kit is a quick (< 30 minutes) assay for determining glutathione reductase activity in a wide variety of samples. This kit allows the determination of glutathione reductase activity from 0.0025 to 0.04 U/mL. Other substances absorbing at 412 nm have been reported to interfere with this assay.

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
KB03038	Glutathione and Oxidazed Glutathione Quantification Assay Kit
KB03041	Ascorbic Acid Determination Assay Kit
KB03012	Catalase Activity 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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