BOC

REDOX TECHNOLOGIES

KB03002

Lipid Peroxidation Assay Kit

96 well plate
100/200/400 tests

Table of contents

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

100 µL/test

Compatible samples

Plasma, tissue homogenates and cell lysates

Type of detection

Colorimetric (586 nm)

3. Materials and storage

MATERIALS SUPPLIED

Item	No. Tests	Units	Storage
Solvent	100	1	RT
	200	2	
	400	4	
Reagent A	100	1	RT
	200	2	
	400	4	
Reagent B	100	1	RT
	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)
- Microtube heater
- Microcentrifuge
- Colorimetric microplate reader – equipped with filter for OD 586 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. Prepare a fresh set of standards for every use.

4. Introduction

Lipid peroxidation (LPO) is a well-known example of oxidative damage in cell membranes, lipoproteins, and other lipid-containing molecules in conditions with oxidative stress. Lipid peroxidation may contribute to the pathology of many diseases including cardiovascular diseases, cancer, and neurodegenerative diseases.

Non-enzymatic LPO is a complex process whereby polyunsaturated lipids are oxidized via free-radical intermediates to a variety of products. Briefly, unsaturated fatty acids react with molecular oxygen via a free radical mechanism producing hydroperoxides. These primary products of lipid oxidation are highly unstable and rapidly decompose resulting in the formation of secondary compounds such as aldehydes, ketones, alkanes, carboxylic acids, and polymerization products. These secondary products are also highly reactive with other cellular components /extracellular matrix and can be used as biomarkers for LPO.

Among reactive aldehydes, 4-hydroxynonenal (4-HNE) and malondialdehyde (MDA) have been extensively used as an index of LPO.

4-HNE is produced as a major product of the peroxidative decomposition of ω-6 polyunsaturated fatty acids (PUFAs) such as arachidonic acid and linoleic acid. 4-HNE is considered one of the most toxic products of lipid peroxidation due to its rapid reaction with proteins and other macromolecules. 4-HNE also possesses cytotoxic, hepatotoxic, mutagenic, and genotoxic properties.

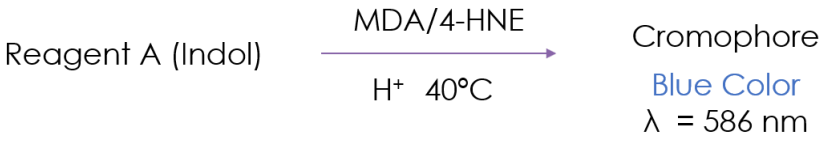
MDA is also a toxic aldehydic end product of lipid peroxidation originated from PUFAs containing at least two C=C double bonds flanking a single C-C link. MDA can react with several functional groups on molecules including proteins, lipoproteins, RNA and DNA.

BQC LPO Assay Kit is a selective, easy, and quick test to measure MDA and 4-HNE, as lipid peroxidation markers, in several biological samples.

5. Assay principle

BQC LPO Assay Kit measures MDA and 4-HNE concentrations as an index of lipid peroxidation. This Assay Kit is based on the reaction between indoles and aldehydes. Under specific acidic conditions, both MDA and 4-HNE, react with an indole compound to give the same chromophore with a maximum absorption wavelength of 586 nm.

This kit uses MDA as standard for the determination of both MDA and 4-HNE. As MDA is not stable, the MDA standard is provided as an acetal (1,1,3,3-Tetramethoxypropane, TMOP). MDA is generated from TMOP during the acid incubation step at 40 °C required for the assay.



Principle of LPO 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.A. Working Solution: Add 33 mL of Solvent in each bottle of Reagent A and mix well.

CAUTION: R.A. Working Solution must be prepared immediately before use

STANDARD CALIBRATION

Prepare the TMOP standards for the calibration curve from the Standard solution according to the following Table. Prepare the standards immediately prior to each assay. Vortex tubes thoroughly. Discard standard solutions after use.

Standard	Standard solution (µL)	ddH_2O (µL)	Standard (µM TMOP)
Std 1 (Reagent Blank)	0	1000	**0**
Std 2	5	995	**5**
Std 3	10	990	**10**
Std 4	20	980	**20**
Std 5	40	960	**40**
Std 6	60	940	**60**

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 LPO 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. Samples should be frozen at -70 °C to prevent loss of MDA and 4-HNE, and/or new sample oxidation.

LPO Assay Kit can be used to determine LPO in plasma, tissue homogenates and cell lysates.

Plasma. Concentrate plasma samples by ultrafiltration with 10 kDa cut-off filters.

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.

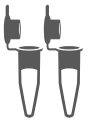
Cell culture. Wash cells with ice-cold buffer (e.g. PBS) before lysis. Lyse cells by sonication or freeze-thaw cycles. Centrifuge cell lysis suspension at 10000 x g for 15 minutes at 4 °C and collect the supernatant. It is recommended to use lysates of approximately 10^7 cells.

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. It is recommended to add an antioxidant (e.g. BHT final concentration 5 mM) to the buffer(s) used for sample preparation in order to avoid new lipid peroxidation.

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.

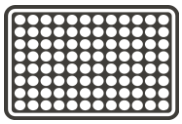
1  Add **100 µL** of **standard** or **sample** in 1.5 mL microcentrifuge tubes (not included)

2  Add **325 µL** of **R.A. Working Solution** in each tube

3  Add **75 µL** of **Reagent B** in each tube and mix thoroughly

4  **Incubate** the mixture for **40 minutes** at **40 °C**

5  If the mixture is cloudy, centrifuge it at 5000 x g for 5 minutes at RT

6  Set up the plate design

7  Transfer **200 µL** of the liquid from each tube into a 96-well plate

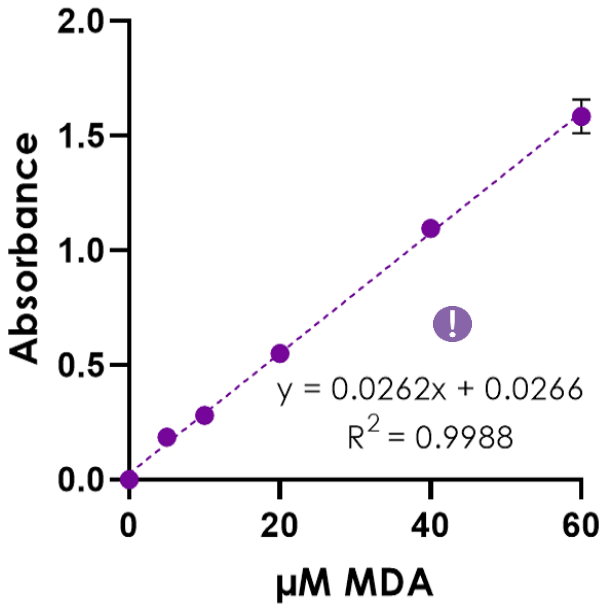
8  Read the **absorbance** of all wells at **586 nm** in end point mode at **RT**

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.



Standard curve for LPO 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 LPO 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 aldehyde concentration (MDA + 4-HNE) of the samples using the following equation. Slope and intercept values are obtained from the standard curve.

$$[\text{MDA+4-HNE}]\ (\mu\text{M MDA}) = \left(\frac{A_S - \text{intercept}}{\text{slope}}\right)$$

When working with diluted samples the concentration values obtained must be multiplied by the dilution factor to obtain the aldehyde content (MDA + 4-HNE) expressed as µM MDA 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 LPO Assay Kit is a quick (< 60 minutes) and precise (RSD < 10%) assay for determining lipid peroxidation in a wide variety of samples.

Sugars (fructose and sucrose) and hydrogen peroxide 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
KB03016	TBARS Assay Kit (MDA Determination)
KB03007	Thiol Quantification Assay Kit
KF01001	DMPD Antioxidant Capacity 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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REDOX TECHNOLOGIES

Vivero Ciencias de la Salud

C. Colegio Santo Domingo de Guzmán

33011 Oviedo, Asturias, Spain

www.bioquochem.com