

Fluorimetric Hydrogen Peroxide Assay Kit (Red)

Product Information

Cat

Kit-0984

Common Name

H₂O₂

Cat.No.

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Product Overview

This Fluorimetric Hydrogen Peroxide Assay Kit uses our non-fluorescent Red peroxidase substrate to quantify hydrogen peroxide in solutions and cell extracts. It can also be used to detect a variety of oxidase activities through enzyme-coupled reactions. The kit is an optimized "mix and read" assay that is compatible with HTS liquid handling instruments. It provides a sensitive, one-step fluorometric assay to detect as little as 3 picomoles of H₂O₂ in a 100 µL assay volume (30 nM). The assay can be performed in a convenient 96-well or 384-well microtiter-plate format and readily adapted to automation. Its signal can be easily read by either a fluorescence microplate reader at Ex/Em = ~540/590 nm or an absorbance microplate reader at ~570 nm.

Description

Hydrogen peroxide (H₂O₂) is a reactive oxygen metabolic by-product that serves as a key regulator for a number of oxidative stress-related states. It is involved in a number of biological events that have been linked to asthma, atherosclerosis, diabetic vasculopathy, osteoporosis, a number of neurodegenerative diseases and Down's syndrome. Perhaps the most intriguing aspect of H₂O₂ biology is the recent report that antibodies have the capacity to convert molecular oxygen into hydrogen peroxide to contribute to the normal recognition and destruction processes of the immune system. Measurement of this reactive species will help to determine how oxidative stress modulates a variety of intracellular pathways.

Storage

Keep in freezer and avoid exposure to light.

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Size

500 Tests

Kit Components

Component A: Red Peroxidase Substrate 1 vial

Component B: H₂O₂ 1 vial (3% stabilized solution, 200 μ L)

Component C: Assay Buffer 1 bottle (100 mL)

Component D: Horseradish Peroxidase 1 vial (20 units)

Component E: DMSO 1 vial (1 mL)

Features & Benefits

Broad Application: Can be used for quantifying hydrogen peroxide in solutions, in cell extracts and in live cells; and can also be used for detecting a variety of oxidase activities through enzyme-coupled reactions.

Sensitive: Detect as low as 10 picomoles of H₂O₂ in solution.

Continuous: Easily adapted to automation without a separation step.

Convenient: Formulated to have minimal hands-on time. No wash is required.

Non-Radioactive: No special requirements for waste treatment.

Preparation

1. Prepare stock solutions:

1.1 100X Red peroxidase substrate stock solution: Add 250 μ L of DMSO (Component E) into the vial of Red Substrate (Component A). The stock solution should be used promptly; any remaining solution should be aliquoted and refrozen at -20°C.

Note: Avoid repeated freeze-thaw cycles and protect from light.

1.2 20 U/mL Peroxidase stock solution: Add 1 mL of Assay Buffer (Component C) into the vial of Horseradish Peroxidase (Component D).

Note: The unused HRP solution should be divided into single use aliquots and stored at -20°C.

1.3 20 mM H₂O₂ stock solution: Add 22.7 μ L of 3% H₂O₂ (0.88 M, Component B) into 977 μ L of Assay Buffer (Component C).

Note: The diluted H₂O₂ solution is not stable. The unused portion should be discarded.

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2. Prepare H₂O₂ reaction mixture: Prepare the H₂O₂ reaction mixture according to the following table and keep from light:

Table 1 H₂O₂ Reaction mixture for one 96-well plate (2X)

Red Peroxidase Substrate Stock Solution (100X, from Step 1.1) 50 μ L

20 U/ml Peroxidase Stock Solution (from Step 1.2) 200 μ L

Assay Buffer (Component C) 4.75 mL

Total volume 5 mL

3. Prepare serial dilutions of H₂O₂ standard (0 to 10 μ M):

Warning 1: The component A is unstable in the presence of thiols such as DTT and β -mercaptoethanol. Thiols higher than 10 μ M (final concentration) would significantly decrease the assay dynamic range.

Warning 2: NADH and glutathione (reduced form: GSH) may interfere with the assay.

3.1 Add 1 μ L of 20 mM H₂O₂ solution (from Step 1.3) into 1999 μ L of Assay Buffer (Component C) to get a 10 μ M H₂O₂ standard.

3.2 Take 200 μ L of 10 μ M H₂O₂ standard to perform 1:3 serial dilutions to get 3, 1, 0.3, 0.1, 0.03, 0.01 and 0 μ M serial dilutions of H₂O₂ standard.

3.3 Add serial dilutions of H₂O₂ standard and H₂O₂-containing test samples into a solid black 96-well microplate as described in Tables 2 and 3.

Table 2 Layout of H₂O₂ standards and test samples in a solid black 96-well microplate

BL BL TS TS

HS1 HS1

HS2 HS2

HS3 HS3

HS4 HS4

HS5 HS5

HS6 HS6

HS7 HS7

Note: HS= H₂O₂ Standards; BL=Blank Control; TS=Test Samples

Table 3 Reagent composition for each well

H₂O₂ Standard: Serial dilutions*: 50 μ L

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Blank Control: Assay Buffer (Component C): 50 μ L

Test Sample: 50 μ L

*Note: Add the serially diluted H₂O₂ standards from 0.01 μ M to 10 μ M into wells from HS1 to HS7 in duplicate. High concentration of H₂O₂ (e.g., > 100 μ M, final concentration) may cause reduced fluorescence signal due to the overoxidation of Red (to a non-fluorescent product).

Assay Protocol

4. Run H₂O₂ assay in supernatants reaction:

4.1 Add 50 μ L of H₂O₂ reaction mixture (from Step 2) into each well of H₂O₂ standard, blank control, and test samples (see Step 3.3) to make the total H₂O₂ assay volume of 100 μ L/well.

Note: For a 384-well plate, add 25 μ L of sample and 25 μ L of H₂O₂ reaction mixture in each well.

4.2 Incubate the reaction at room temperature for 15 to 30 minutes, protected from light.

4.3 Monitor the fluorescence increase with a fluorescence plate reader at Ex/Em = 540 \pm 10 / 590 \pm 10 nm (optimal Ex/Em = 540/590 nm).

Note: The contents of the plate can also be transferred to a white clear bottom plate and read by an absorbance microplate reader at the wavelength of 576 \pm 5 nm. The absorption detection has lower sensitivity compared to fluorescence reading.

5. Run H₂O₂ assay for cells:

The Fluorimetric Hydrogen Peroxide Assay Kit can be used to measure the release of H₂O₂ from cells. The following is a suggested protocol that can be modified to meet the specific research needs.

5.1 The H₂O₂ reaction mixture should be prepared as Step 2 except that the Assay Buffer (Component C) should be replaced with the media that is used in your cell culture system. Suggested media including (a) Krebs Ringers Phosphate Buffer (KRPB); (b). Hanks Balanced Salt Solution (HBSS); or (c) Serum-free media.

5.2 Prepare cells in a 96-well plate (50 - 100 μ L/well), and activate the cells as desired.

Note: The negative controls (media alone and non-activated cells) are included for measuring background fluorescence.

5.3 Add 50 μ L of H₂O₂ reaction mixture (from Step 5.1) into each well of cells and H₂O₂ standards (from Step 3.3).

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Note: For a 384-well plate, add 25 μ L of cells and 25 μ L of H₂O₂ reaction mixture into each well.

5.4 Incubate the reaction at room temperature for 15 to 30 minutes, protected from light.

5.5 Monitor the fluorescence increase with a fluorescence plate reader at Ex/Em= 540 \pm 10/590 \pm 10 nm (optimal Ex/Em = 540/590 nm).

Analysis

The fluorescence in blank wells (with the assay buffer only) is used as a control, and is subtracted from the values for those wells with the H₂O₂ reactions.

Note: The fluorescence background increases with time, thus it is important to subtract the fluorescence intensity value of the blank wells for each data point.
