

## Description

The NIK (MAP3K14) Kinase Assay Kit is designed to measure Mitogen-activated protein kinase kinase kinase 14 (MAP3K14, also known as NF-kappa-B-inducing kinase, NIK) activity for screening and profiling applications using ADP-Glo™ as a detection reagent. The assay kit comes in a convenient 96-well format, with enough purified recombinant NIK (amino acids 318-947), kinase substrate, ATP and kinase assay buffer for 100 enzyme reactions.

## Background

NF-kappa-beta-inducing kinase, NIK (also known as Mitogen-activated protein kinase kinase kinase 14, or MAP3K14), is a serine/threonine kinase of the MAPKK kinase family. This kinase is known for its non-canonical activation of transcription factor NFκB. Expressed in immune cells, it is activated by the interleukin-1 receptors and by receptors of the tumor-necrosis/nerve-growth factor (TNF/NGF) family and plays a role in the innate and adaptive immune response and regulates inflammation. Loss of MAP3K14 expression is associated with immune defects, whereas overexpression correlates with inflammation, metabolic diseases, or cancer.

## Application(s)

- Study enzyme kinetics and screen small molecular inhibitors for drug discovery and high throughput (HTS) applications.

## Supplied Materials

Catalog #	Name	Amount	Storage
40090	NIK (MAP3K14), GST-Tag, His-Tag*	2.5 µg	-80°C
79334	5x Kinase Assay Buffer 1	1.5 ml	-20°C
79686	500 µM ATP	100 µl	-20°C
78514	Myelin Basic Protein (MBP), 5 mg/ml	100 µl	-20°C
79696	White 96-well plate	1	Room Temperature

*\*The concentration of the protein is lot-specific and will be indicated on the tube*

## Materials Required but Not Supplied

Name	Catalog #
ADP-Glo™ Kinase Assay	Promega #V6930
DTT (Dithiothreitol), 1M, optional	
Microplate reader capable of reading luminescence	
Adjustable micropipettor and sterile tips	
30°C incubator	

## Storage Conditions



This assay kit will perform optimally for up to **6 months** from date of receipt when the materials are stored as directed.

**Safety**

This product is for research purposes only and not for human or therapeutic use. This product should be considered hazardous and is harmful by inhalation, in contact with skin, eyes, clothing, and if swallowed. If contact occurs, wash thoroughly.

**Assay Principle**

The **ADP-Glo™ Kinase Assay (Promega, #V6930)** quantifies the amount of ADP produced by a kinase upon phosphorylation of a substrate. First, addition of the ADP-Glo™ reagent terminates the reaction and quenches the remaining ATP. Second, addition of the Kinase Detection reagent converts the produced ADP to ATP. The newly generated ATP is quantified by a luciferase reaction. The luminescent signal correlates with the amount of ADP generated by the kinase and is linear to 1 mM ATP.

**Contraindications**

The final concentration of DMSO in the assay should not exceed 1%.

**Assay Protocol**

- All samples and controls should be performed in duplicate.
  - The assay should include “Blank”, “Positive Control” and “Test Inhibitor” conditions.
  - We recommend maintaining the diluted protein on ice during use.
  - For detailed information on protein handling please refer to [Protein FAQs \(bpsbioscience.com\)](http://bpsbioscience.com).
  - We recommend using BO22 (MedChemExpress #HY-120501) as internal control. If not running a dose response curve for the control inhibitor, we recommend running the control inhibitor at 0.1X, 1X and 10X the IC<sub>50</sub> value shown in the validation data below.
  - For instructions on how to prepare reagent dilutions please refer to [Serial Dilution Protocol \(bpsbioscience.com\)](http://bpsbioscience.com).
1. Thaw **5x Kinase Assay Buffer 1**, **500 μM ATP**, and **Myelin Basic Protein (MBP)**, **5 mg/ml**.

*Optional: If desired, add DTT to 5x Kinase Assay Buffer 1 to make a 10 mM DTT concentration (for example, add 10 μl of 1 M DTT to 1 ml of 5x Kinase Assay Buffer 1).*

2. Prepare 3 ml of **1x Kinase Assay Buffer 1** by mixing 600 μl of **5x Kinase Assay Buffer 1** with 2,400 μl of distilled water.

*Note: Three (3 ml) of 1x Kinase Assay Buffer 1 is sufficient for 100 reactions.*

3. Prepare a **Master Mix** (12.5 μl/well): N wells x (7 μl of **1x Kinase Assay Buffer 1** + 0.5 μl of **500 μM ATP** + 1 μl of **MBP** (5 mg/ml) + 4 μl of distilled water).
4. Add 12.5 μl of Master Mix to every well.
5. Prepare the **Test Inhibitor** (2.5 μl/well): for a titration, prepare serial dilutions at concentrations 10-fold higher than the desired final concentrations. The final volume of the reaction is 25 μl.

5.1 If the Test Inhibitor is water-soluble: Prepare serial dilutions in 1x Kinase Assay Buffer 1, 10-fold more concentrated than the desired final concentrations.

For the positive and negative controls, use 1x Kinase Assay Buffer 1 (Diluent Solution).

**OR**

5.2 If the Test inhibitor is soluble in DMSO: Prepare the test inhibitor at 100-fold the highest desired concentration in 100% DMSO, then dilute the inhibitor 10-fold in 1x Kinase Assay Buffer 1 to prepare the highest concentration of the 10-fold intermediate dilutions. The concentration of DMSO is now 10%.

Prepare serial dilutions of the Test Inhibitor at 10-fold the desired final concentrations using 10% DMSO in 1x Kinase Assay Buffer 1 to keep the concentration of DMSO constant.

For positive and negative controls, prepare 10% DMSO in Kinase Assay Buffer 1 (vol/vol) so that all wells contain the same amount of DMSO (Diluent Solution).

*Note: The final concentration of DMSO should not exceed 1%.*

6. Add 2.5 µl of **Test Inhibitor** to each well labeled "Test Inhibitor".
7. Add 2.5 µl of **Diluent Solution** to the "Positive Control" and "Blank" wells.
8. To the wells designated as "Blank," add 10 µl of **1x Kinase Assay Buffer 1**.
9. Thaw **NIK (MAP3K14) kinase** on ice. Briefly spin the tube to recover its full content.
10. Dilute the protein kinase (10 µl/well) to 2.5 ng/µl using **1x Kinase Assay Buffer**.
11. Initiate the reaction by adding 10 µl of diluted Kinase to the wells designated "Positive Control" and "Test Inhibitor".

<b>Component</b>	<b>Blank</b>	<b>Positive Control</b>	<b>Test Inhibitor</b>
Master Mix	12.5 µl	12.5 µl	12.5 µl
Test Inhibitor	-	-	2.5 µl
Diluent Solution	2.5 µl	2.5 µl	-
1x Kinase Assay Buffer 1	10 µl		
Diluted NIK (MAP3K14) (2.5 ng/µl)	-	10 µl	10 µl
<b>Total</b>	<b>25 µl</b>	<b>25 µl</b>	<b>25 µl</b>

12. Incubate at 30°C for 45 minutes.

13. During the incubation, thaw the ADP-Glo™ reagent. At the end of the 45-minute reaction, add 25 µl of ADP-Glo™ reagent to each well.

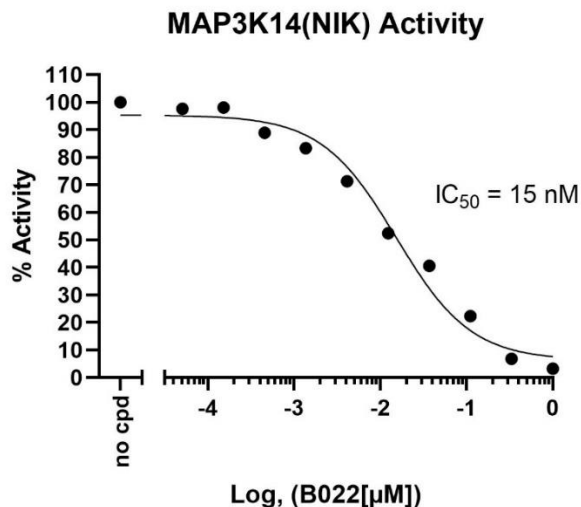
14. Cover the plate with aluminum foil and incubate at Room Temperature (RT) for 45 minutes.
15. Thaw the Kinase Detection Reagent.
16. Add 50  $\mu$ l of Kinase Detection reagent to each well.
17. Cover the plate with aluminum foil and incubate at RT for another 45 minutes.
18. Immediately read in a luminometer or a microplate reader capable of reading luminescence.
19. The “Blank” value should be subtracted from all other readings.

### Reading Luminescence

Luminescence is the emission of light resulting from a chemical reaction. The detection of luminescence requires no wavelength selection because the method used is emission photometry and not emission spectrophotometry.

To properly read luminescence, make sure the plate reader is set for LUMINESCENCE mode. Typical integration time is 1 second, delay after plate movement is 100 msec. Do not use a filter when measuring light emission. Typical settings for the Synergy 2 BioTek plate reader: use the “hole” position on the filter wheel; Optics position: Top; Read type: endpoint. Sensitivity may be adjusted based on the luminescence of a control assay without enzyme (typically we set this value as 100).

### Example Results



*Figure 1: Inhibition of NIK (MAP3K14) kinase activity by B022.*

The inhibition of NIK (MAP3K14) kinase activity was measured in the presence of increasing of B022 (MedChemExpress #HY-120501). The “Blank” value was subtracted from all other values. Results are expressed as the percent of control (kinase activity in the absence of inhibitor, set at 100%).

*Data shown is representative. For lot-specific information, please contact BPS Bioscience, Inc. at*

[support@bpsbioscience.com](mailto:support@bpsbioscience.com).

### Troubleshooting Guide

For questions, please email [support@bpsbioscience.com](mailto:support@bpsbioscience.com)

### References

Pflug K.M. and Sitcheran R., 2020 *Int J Mol Sci.* 21(22): 8470.

### Related Products

<i>Products</i>	<i>Catalog #</i>	<i>Size</i>
Chemi-Verse™ MAPKAPK5 Kinase Assay Kit	82236	96 reactions
Chemi-Verse™ HPK1 (MAP4K1) Kinase Assay Kit	82576	96 reactions
MNK1 Kinase Assay Kit	78032	96 reactions
ERK1 Kinase Assay Kit	82282	96 reactions

*Version 032425*