

**Description**

The Chemi-Verse™ SIK1 Kinase Assay Kit is designed to measure SIK1 (salt-inducible kinase 1) kinase 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 SIK1 kinase, kinase substrate, ATP, and kinase assay buffer for 100 enzyme reactions.

**Background**

SIK (salt-inducible kinases) are serine/threonine kinases of the AMPK (AMP-activated protein kinase) family. They are involved in gluconeogenesis and lipid metabolism inhibition. Dysfunction of SIK has been linked to cancer, due to its association with the TGFβ (transforming growth factor β)-Smad, AKT (protein kinase B), Hippo and NF-κB (nuclear factor kappa-light chain enhancer of activated B cells) pathways. The role of SIK proteins in cancer is complex, with some family members acting as oncogenes while others functioning as suppressors. SIK1 is present at high levels in the adrenal cortex, adipose and neural tissues. SIK1 acts as tumor suppressor in ovarian, lung, colorectal and breast cancer, pancreatic and hepatocellular carcinoma. It inhibits the epithelial-mesenchymal transition (EMT) by downregulating transcription factors involved in inhibition of E-cadherin expression, such as ZEB1 (zinc-finger E-box binding homeobox 1) and ZEB2. MicroRNAs, such as miR-141 and miR17, target SIK1 and promote cancer progression. The development of SIK inhibitors is the focus of intense research, but further studies are needed to identify isoform-specific inhibitors that can be used in cancer therapy.

**Applications**

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

**Supplied Materials**

Catalog #	Name	Amount	Storage
	SIK1	1.25 µg	-80°C
79334	5x Kinase Buffer 1	1.5 ml	-20°C
79686	500 µM ATP	50 µl	-20°C
	Amara Peptide (1 mg/ml)	500 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	Ordering Information
ADP-Glo™ Kinase Assay DTT (Dithiothreitol), 1M, optional Microplate reader capable of reading luminescence Adjustable micropipettor and sterile tips 30°C incubator	Promega #V6930

**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, the 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 tested in duplicate.
- The assay should include “Blank”, “Positive Control” and “Test Inhibitor” conditions.

1. Thaw **5x Kinase Assay Buffer 1**, **500 μM ATP**, and **Amara Peptide (1 mg/ml)**.

*Optional: If desired, make 5x Kinase Assay Buffer 1 with 10 mM.*

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 (6 μl of 5x Kinase Assay Buffer 1 + 0.5 μl of 500 μM ATP + 5 μl of 1 mg/ml Amara Peptide + 1 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 the 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 1x 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. Add 10 µl of 1x Kinase Assay Buffer 1 to the "Blank" wells.
9. Thaw **SIK1** on ice. Briefly spin the tube to recover its full content.
10. Dilute the protein kinase (10 µl/well) to 1.25 ng/µl with 1x Kinase Assay Buffer 1.

*Note: The concentration of protein is lot-specific and is indicated on the tube. Verify the initial concentration and dilute accordingly. This kinase is particularly sensitive to freeze/thaw cycles. Avoid multiple freeze/thaw cycles. Do not re-use the thawed protein and do not re-use the diluted kinase.*

11. Initiate the reaction by adding 10 µl of diluted kinase to the wells designated "Positive Control" and "Test Inhibitor".
12. Incubate at 30°C for 45 minutes.
13. Thaw the ADP-Glo™ reagent.
14. At the end of the 45-minute reaction, add 25 µl of ADP-Glo™ reagent to each well.
15. Cover the plate with aluminum foil and incubate at Room Temperature (RT) for 45 minutes.
16. Thaw the Kinase Detection Reagent.
17. Add 50 µl of Kinase Detection reagent to each well.
18. Cover the plate with aluminum foil and incubate at RT for another 45 minutes.
19. Immediately read in a luminometer or a microplate reader capable of reading luminescence.

20. The “Blank” value should be subtracted from all other readings.

Component	Blank	Positive Control	Test Inhibitor
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 SIK1 (1.25 ng/µl)	-	10 µl	10 µl
<b>Total</b>	<b>25 µl</b>	<b>25 µl</b>	<b>25 µl</b>

### 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

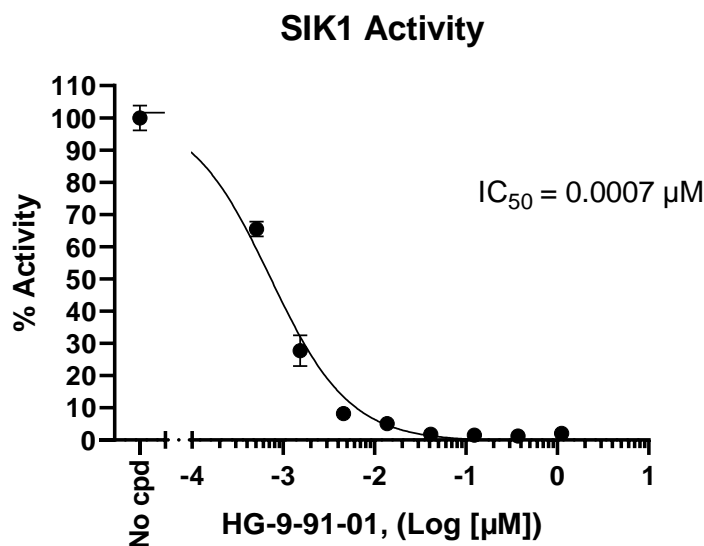


Figure 1: Inhibition of SIK1 kinase activity by HG-9-91-01.

The inhibition of SIK1 kinase activity was measured in the presence of increasing concentrations of HG-9-91-01 (SelleckChem #58393). 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**

Visit [bpsbioscience.com/assay-kits-faq](https://bpsbioscience.com/assay-kits-faq) for detailed troubleshooting instructions. For all further questions, please email [support@bpsbioscience.com](mailto:support@bpsbioscience.com)

**References**

Sun Z., *et al.*, 2020, *Signal Transduction and Targeted Therapy* 5:150.

**Related Products**

<i>Products</i>	<i>Catalog #</i>	<i>Size</i>
SIK (SNF1LK), His-Tag Recombinant	40274	10 µg
NF-κB (GFP)- Reporter Hek293 Recombinant Cell Line	79402	2 vials
NF-κB Reporter (Luc) Jurkat Recombinant Cell Line	60651	2 vials
Chemi-Verse™ SIK2 Kinase Assay Kit	82106	96 reactions