

**Description**

The Chemi-Verse™ CDK8/Cyclin C Kinase Assay is a luminescent assay designed to measure CDK8 (cyclin-dependent kinase 8)/Cyclin C 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 complex of CDK8/Cyclin C, kinase substrate, ATP, and kinase assay buffer for 100 enzyme reactions.

**Background**

CDK8 (cyclin dependent kinase 8) is a member of the cyclin-dependent protein kinase family involved in cell cycle regulation, transcription and splicing. CDK associates with cyclins, which induce a conformational change that results in a dramatic increase of the kinase activity. Cyclin levels vary during the cell cycle, which allows cyclins to regulate CDK activity in the cell. Dissociation of the complex returns CDK to its basal activity, and CDK is degraded by ubiquitin mediated proteolysis. In addition to cyclin, CDK8 is part of a Mediator complex that includes CDK19, MED12 and MED13 and acts as a negative regulator of RNA Polymerase II. CDK8 regulates several pathways, such as Notch, Wnt/ $\beta$ -catenin and Sonic Hedgehog (Shh) and has been described as an oncogenic driver and implicated in several cancer types (breast, ovarian, gastric cancer and leukemia). The understanding of the mechanisms involved in cell cycle regulation, and its control via the use of small molecule inhibitors will open new therapeutic avenues for the treatment of cancer.

**Applications**

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

**Supplied Materials**

Catalog #	Name	Amount	Storage
100433	CDK8/Cyclin C, GST-Tag Recombinant*	15 $\mu$ g	-80°C
79334	5x Kinase Assay Buffer 1	1.5 ml	-20°C
79686	500 $\mu$ M ATP	50 $\mu$ l	-20°C
79604	CDK Substrate Peptide 2	125 $\mu$ l	-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	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 new ATP generated 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 **CDK Substrate Peptide 2**.

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

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 of 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 + 1.25 μl of CDK Substrate Peptide 2 + 4.75 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 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 **CDK8/Cyclin C kinase** on ice. Briefly spin the tube to recover its full content.
10. Dilute CDK8/Cyclin C kinase (10 µl/well) to 15 ng/µl using 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".

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 CDK8/Cyclin C (15 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. Thaw the ADP-Glo™ reagent.
14. 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.

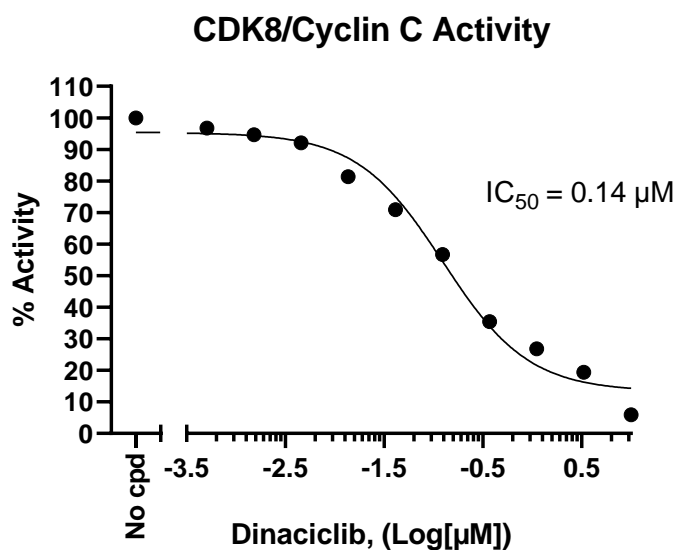
17. Add 50  $\mu$ l of Kinase Detection reagent to each well.
18. Cover the plate with aluminum foil and incubate at RT for 45 minutes.
19. Immediately read in a luminometer or a microplate reader capable of reading luminescence.
20. The “Blank” value should be subtracted from all other readings.

### 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 CDK8/Cyclin C kinase activity by Dinaciclib.*

The inhibition of CDK8/Cyclin C kinase activity was measured in the presence of increasing concentrations of Dinaciclib (Selleck Chemicals #SCH727965). 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%).

*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**

Lukasik P. *et al.*, 2021, *In J Mol Sci* 22(6): 2935

**Related Products**

<i>Products</i>	<i>Catalog #</i>	<i>Size</i>
CDK8/Cyclin C, GST-Tag Recombinant	100433	20 µg
CDK12/Cyclin C Kinase Assay Kit	78298	96 reactions
CDK6/CyclinD3 Kinase Assay Kit	78395	96 reactions
Chemi-Verse™ CDK17/Cyclin Y Kinase Assay Kit	78885	96 reactions
Chemi-Verse™ CDK3/CyclinE1 Kinase Assay Kit	78884	96 reactions
Chemi-Verse™ CDK16/Cyclin Y Kinase Assay Kit	78887	96 reactions
Chemi-Verse™ CDK18/Cyclin Y Kinase Assay Kit	78888	96 reactions
Chemi-Verse™ CDK14/Cyclin Y Kinase Assay Kit	78889	96 reactions