p38 MAPK (Total) ELISA Kit

Catalog Number KHO0061 (96 tests)

Pub. No. MAN0014939 **Rev.** 1.0 (30)

CAUTION! This kit contains materials with small quantities of sodium azide. Sodium azide reacts with lead and copper plumbing to form explosive metal azides. Upon disposal, flush drains with a large volume of water to prevent azide accumulation. Avoid ingestion and contact with eyes, skin and mucous membranes. In case of contact, rinse affected area with plenty of water. Observe all federal, state, and local regulations for disposal.

Note: For safety and biohazard guidelines, see the "Safety" appendix in the *ELISA Technical Guide* (Pub. no. MAN0006706). Read the Safety Data Sheets (SDSs) and follow the handling instructions. Wear appropriate protective eyewear, clothing, and gloves.

Product description

The Invitrogen™ p38 MAPK (Total) ELISA Kit is a solid-phase sandwich Enzyme-Linked Immunosorbent Assay (ELISA). This assay is designed to detect and quantify the level of p38 MAPK (total) in cell lysates. The assay recognizes both natural and recombinant p38 MAPK (total).

p38 MAP kinase (MAPK), also known as RK (CDC2-related protein kinase) or CSBP (cytokine suppressive anti-inflammatory drug binding protein), is the mammalian homologue of the yeast HOG kinase (high osmolarity glycerol response kinase).

p38 MAPK is expressed broadly in normal tissues and various cell lines. There are three alternatively spliced forms of p38 (CSBP2/p38α, CSBP1, and Mxi2) as well as several homologues including p38β, p38β2, p38γ and p38Δ. These homologues are expressed at different levels in human tissues and can be activated by different, although sometimes overlapping, stress stimuli.

Contents and storage

Upon receipt, store the kit at 2°C to 8°C.

Contents	Cat. No. KHO0061 (96 tests)
p38 MAPK (Total) Standard, lyophilized; contains 0.1% sodium azide. Refer to vial label for quantity and reconstitution volume	2 vials
Standard Diluent Buffer; contains 0.1% sodium azide	25 mL
Antibody Coated Plate, 96-well strip-well plate	1 plate
p38 MAPK (Total) Detection Antibody; contains 0.1% sodium azide	11 mL
Anti-Rabbit IgG HRP (100X); contains 3.3 mM thymol	0.125 mL
HRP Diluent; contains 3.3 mM thymol	25 mL
Wash Buffer Concentrate (25X)	100 mL
Stabilized Chromogen, Tetramethylbenzidine (TMB)	25 mL
Stop Solution	25 mL
Plate Covers, adhesive strips	3

Materials required but not supplied

- Distilled or deionized water
- Calibrated adjustable precision pipettes and glass or plastic tubes for diluting solutions; beakers, flask and cylinders for preparation of reagents
- Microtiter plate reader with software capable of measurement at or near 450 nm
- Plate washer–automated or manual (squirt bottle, manifold dispenser, or equivalent)

Before you begin

IMPORTANT! Reagents are lot-specific. Do not mix or interchange different reagent lots from various kit lots.

- Review the **Procedural guidelines** and **Plate washing directions** in the *ELISA Technical Guide* available at **thermofisher.com**.
- Allow reagents to reach room temperature before use. Mix to redissolve any precipitated salts.

Prepare 1X Wash Buffer

1. Dilute 16 mL of Wash Buffer Concentrate (25X) with 384 mL of deionized or distilled water. Label as 1X Wash Buffer.
2. Store the concentrate and 1X Wash Buffer in the refrigerator. Use the diluted buffer within 14 days.

Prepare Cell Extraction Buffer

Note: See the *ELISA Technical Guide* for detailed information on preparing Cell Extraction Buffer.

1. Prepare Cell Extraction Buffer.

   Cell Extraction Buffer consists of 10 mM Tris (pH 7.4), 100 mM NaCl, 1 mM EDTA, 1 mM EGTA, 1 mM NaF, 20 mM $Na_4P_2O_7$, 2 mM Na_3VO_4, 1% Triton™ X-100, 10% glycerol, 0.1% SDS, and 0.5% deoxycholate.
2. Immediately before use, add PMSF (0.3 M stock in DMSO) to 1 mM and 50 µL protease inhibitor cocktail (e.g., Sigma Cat. No. P-2714) for each 1 mL of Cell Extraction Buffer.

Prepare cell lysate

1. Collect cells by centrifugation (non-adherent cells) or scraping from culture flasks (adherent cells), then wash cells twice with cold PBS.
2. Remove and discard the supernatant and collect the cell pellet. The pellet can be stored at −80°C and lysed at a later date if desired.
3. Lyse the cell pellet in Cell Extraction Buffer for 30 minutes, on ice. Vortex at 10-minute intervals.

   Note: The volume of Cell Extraction Buffer used depends on the number of cells in the cell pellet, and expression levels of p38 MAPK (total). FOR EXAMPLE, X × 10^6 Jurkat cells can be extracted in X mL of Cell Extraction Buffer. Researchers must optimize the extraction procedures for their own applications.
4. Transfer the lysate into microcentrifuge tubes and centrifuge at 13,000 rpm for 10 minutes at 4°C.
5. Transfer the supernatant into clean microcentrifuge tubes. Samples can be stored at −80°C (avoid multiple freeze-thaw cycles).

Pre-dilute samples

Sample concentrations should be within the range of the standard curve. Because conditions may vary, each investigator should determine the optimal dilution for each application.

- Dilute samples prepared in Cell Extraction Buffer 1:10 or greater in Standard Diluent Buffer (e.g., 10 µL sample into 90 µL buffer).

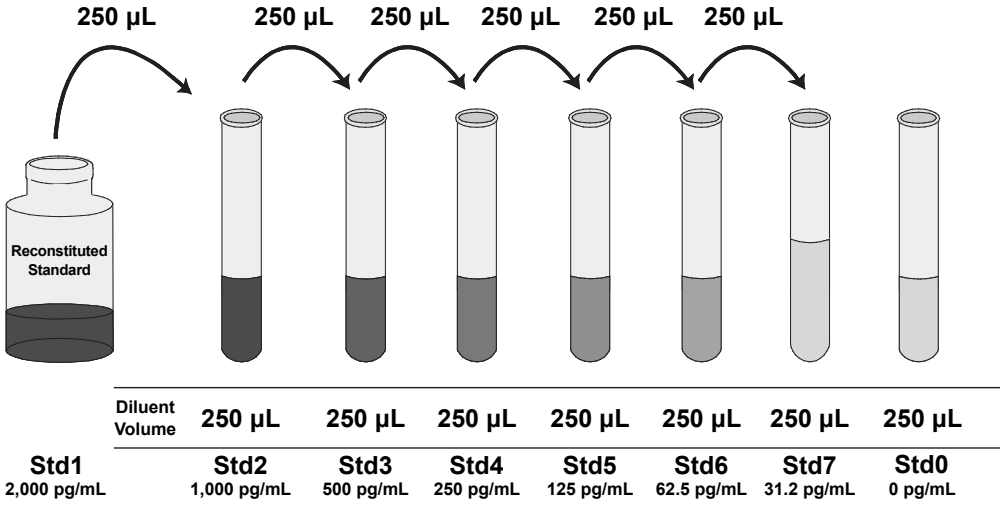
  While a 1:10 sample dilution has been found to be satisfactory, higher dilutions such as 1:25 or 1:50 are found to be optimal for sample resolution.
- Dilute samples with Standard Diluent Buffer.

Dilute standards

Note: Use glass or plastic tubes for diluting standards.

Note: This p38 MAPK (Total) standard is prepared from purified, full length, recombinant human p38 MAPK protein expressed in *E. coli*.

1. Reconstitute p38 MAPK (Total) Standard to 2,000 pg/mL with Standard Diluent Buffer. Refer to the standard vial label for instructions. Swirl or mix gently and allow the contents to sit for 10 minutes to ensure complete reconstitution. Label as 2,000 pg/mL p38 MAPK (Total). **Use the standard within 1 hour of reconstitution.**
2. Add 250 µL Standard Diluent Buffer to each of 7 tubes labeled as follows: 1,000, 500, 250, 125, 62.5, 31.2 and 0 pg/mL p38 MAPK (Total).
3. Make serial dilutions of the standard as shown in the following dilution diagram. Mix thoroughly between steps.
4. Remaining reconstituted standard should be discarded or frozen at −80°C. for further use. Standard can be frozen and thawed one time only without loss of immunoreactivity.



Prepare 1X Anti-Rabbit IgG HRP solution

Note: Prepare 1X Anti-Rabbit IgG HRP solution within 15 minutes of usage.

The Anti-Rabbit IgG HRP (100X) is in 50% glycerol, which is viscous. To ensure accurate dilution:

1. For each 8-well strip used in the assay, pipet 10 µL Anti-Rabbit IgG HRP (100X) solution, wipe the pipette tip with clean absorbent paper to remove any excess solution, and dispense the solution into a tube containing 1 mL of HRP Diluent. Mix thoroughly.
2. Return the unused Anti-Rabbit IgG HRP (100X) solution to the refrigerator.

Perform ELISA (Total assay time: 4 hours)

IMPORTANT! Perform a standard curve with each assay.

- Allow all components to reach room temperature before use. Mix all liquid reagents prior to use.
- Determine the number of 8-well strips required for the assay. Insert the strips in the frames for use. Re-bag any unused strips and frames, and store at 2°C to 8°C for future use.

1 Bind antigen

a. Add 100 µL of standards, controls, or samples (see "Pre-dilute samples"on page 2) to the appropriate wells. Leave the wells for chromogen blanks empty.
b. Cover the plate with a plate cover and incubate 2 hours at room temperature.
c. Thoroughly aspirate the solution and wash wells 4 times with 1X Wash Buffer.

2 Add detector antibody

a. Add 100 µL of p38 MAPK (Total) Detection Antibody solution into each well except the chromogen blanks.
b. Cover the plate with a plate cover and incubate 1 hour at room temperature.
c. Thoroughly aspirate the solution and wash wells 4 times with 1X Wash Buffer.

3 Add IgG HRP

a. Add 100 µL 1X Anti-Rabbit IgG HRP Solution into each well except the chromogen blanks.
b. Cover the plate with plate cover and incubate for 30 minutes at room temperature.
c. Thoroughly aspirate the solution and wash wells 4 times with 1X Wash Buffer.

4 Add Stabilized Chromogen

a. Add 100 µL Stabilized Chromogen to each well. The substrate solution begins to turn blue.
b. Incubate for 30 minutes at room temperature in the dark.

Note: TMB should not touch aluminum foil or other metals.

5 Add Stop Solution

Add 100 µL Stop Solution to each well. Tap the side of the plate to mix. The solution in the wells changes from blue to yellow.

Read the plate and generate the standard curve

1. Read the absorbance at 450 nm. Read the plate within 2 hours after adding the Stop Solution.
2. Use curve-fitting software to generate the standard curve. A four parameter algorithm provides the best standard curve fit. Optimally, the background absorbance may be subtracted from all data points, including standards, unknowns and controls, prior to plotting.
3. Read the concentrations for unknown samples and controls from the standard curve. Multiply value(s) obtained for sample(s) by the appropriate factor to correct for the sample dilution.

   Note: Dilute samples producing signals greater than the upper limit of the standard curve in Standard Diluent Buffer and reanalyze. Multiply the concentration by the appropriate dilution factor.

Performance characteristics

Standard curve example

The following data were obtained for the various standards over the range of 0 to 2,000 pg/mL p38 MAPK (total).

Standard p38 MAPK (Total) (pg/mL)	Optical Density (450 nm)
2,000	2.24
1,000	1.47
500	0.89
250	0.61
125	0.45
62.5	0.36
31.2	0.31
0	0.25

Inter-assay precision

Samples were assayed 48 times in multiple assays to determine precision between assays.

Parameters	Sample 1	Sample 2	Sample 3
Mean (pg/mL)	934	232	70
Standard Deviation	63	14	7
% Coefficient of Variation	6.7	5.8	9.5

Intra-assay precision

Samples of known p38 MAPK (total) concentration were assayed in replicates of 16 to determine precision within an assay.

Parameters	Sample 1	Sample 2	Sample 3
Mean (pg/mL)	881	242	67
Standard Deviation	37	9	5
% Coefficient of Variation	4.2	3.9	7.3

Linearity of dilution

Jurkat lysate prepared in Cell Extraction Buffer was diluted in Standard Diluent Buffer over the range of the assay and measured for p38 MAPK (total) content. Linear regression analysis of samples versus the expected concentration yielded a correlation coefficient of 0.99 in both cases.

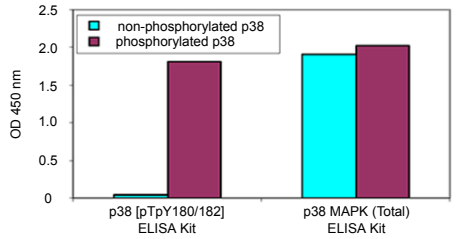
Dilution	Measured (pg/mL)	Expected (pg/mL)	% Expected
Neat	966	966	100
1/2	494	483	102
1/4	232	246	94
1/8	120	116	103
1/16	66	60	109

Sensitivity

The analytical sensitivity of this assay is <16 pg/mL of human p38 MAPK (total). This was determined by adding two standard deviations to the mean O.D. obtained when the zero standard was assayed 30 times. In Jurkat cells cultured in complete medium, this sensitivity corresponded to the p38 MAPK (total) protein extractable from 1,000 cells/well.

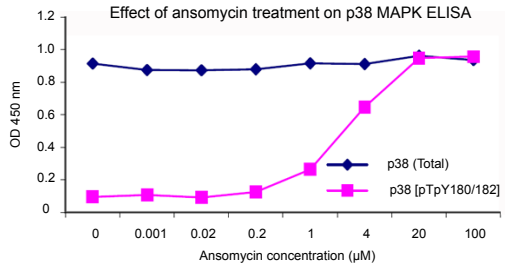
Specificity

The p38 MAPK (Total) ELISA Kit is specific for measurement of human or mouse p38 MAPK protein. Recombinant human p38 MAPK was phosphorylated using MKK6 enzyme *in vitro*. Non-phosphorylated p38 MAPK was used as control. The phosphorylated and non-phosphorylated p38 MAPK were analyzed with the p38 MAPK [pTpY180/182] ELISA Kit and the p38 MAPK (Total) ELISA Kit.



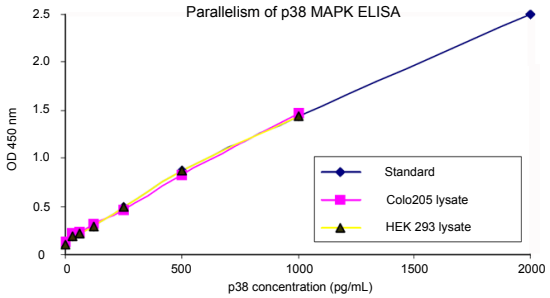
This p38 MAPK (Total) ELISA Kit assay is designed to allow normalization of p38 MAPK (total) content among samples to permit interpretation of results from Phosphorylation Site-Specific p38 MAPK kits.

The figure below shows the results obtained from a dose response of anisomycin treatment on Jurkat cells. The data indicate that the p38 MAPK (Total) ELISA Kit detects both phosphorylated and non-phosphorylated p38 MAPK (total) in Jurkat cells, whereas the p38 MAPK [pTpY180/182] ELISA detects phosphorylated p38 MAPK (total) in anisomycin treated cells. ELISA and western blot results yield equivalent data.



Parallelism

Natural p38 MAPK (total) from colo205 and 293 cell lysates were serially diluted in Standard Diluent Buffer. The optical density of each dilution was plotted against the p38 MAPK (total) standard curve. Parallelism demonstrates that the standard accurately reflects p38 MAPK (total) content in samples.



Recovery

To evaluate recovery, rat brain tissue was extracted with cell lysate buffer and the extract adjusted to 200 µg/mL total protein. Recombinant p38 MAPK (total) was spiked into the extract at 3 levels and the percent recovery over endogenous levels calculated. On average, 93% recovery was observed.

Limited product warranty

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Product label explanation of symbols and warnings

REF	Catalog Number	LOT	Batch code		Temperature limitation		Use by		Manufacturer		Consult instructions for use		Caution, consult accompanying documents

Manufacturer's address: Bender MedSystems GmbH | Campus Vienna Biocenter 2 | 1030 Vienna, Austria

The information in this guide is subject to change without notice.

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