SIGMA-ALDRICH®

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Product Information

**ERK2, active, GST-tagged, human
PRECISIO® Kinase
recombinant, expressed in *E. coli* cells**

Catalog Number **E1283**
Lot Number 041M1005
Storage Temperature –70 °C

Synonyms: MAPK1, P42MAPK, MAPK2, PRKM2,
PRKM1, p41mapk, ERT1, p40, p41, ERK

Product Description
ERK2 is a protein serine/threonine kinase that is a
member of the extracellular signal-regulated kinases
(ERKs) which are activated in response to numerous
growth factors and cytokines.[1] Activation of ERK2
requires both tyrosine and threonine phosphorylation
that is mediated by MEK. ERK2 is ubiquitously
distributed in tissues with the highest expression in the
heart, brain, and spinal cord. Activated ERK2
translocates into the nucleus, where it phosphorylates
various transcription factors (e.g., Elk-1, c-Myc, c-Jun,
c-Fos, and C/EBP beta).

This recombinant product was expressed by *E. coli*
cells using an N-terminal GST-tag. The gene accession
number is NM 002745. It is supplied in 50 mM Tris-HCl,
pH 7.5, with 150 mM NaCl, 0.25 mM DTT, 0.1 mM
EGTA, 0.1 mM EDTA, 0.1 mM PMSF, and 25%
glycerol.

Molecular mass: ~68 kDa

Purity: ≥70% (SDS-PAGE, see Figure 1)

Specific Activity: 613–829 nmole/min/mg (see Figure 2)

Precautions and Disclaimer
This product is for R&D use only, not for drug,
household, or other uses. Please consult the Material
Safety Data Sheet for information regarding hazards
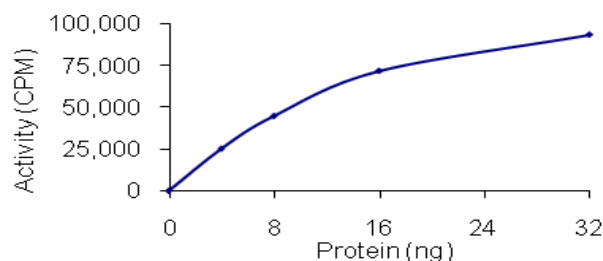and safe handling practices.

Storage/Stability
The product ships on dry ice and storage at –70 °C is
recommended. After opening, aliquot into smaller
quantities and store at –70 °C. Avoid repeated handling
and multiple freeze/thaw cycles.

Figure 1.
SDS-PAGE Gel of Lot Number 041M1005:
>95% (densitometry)
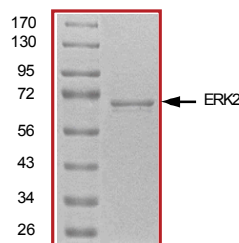
Figure 2.
Specific Activity of Lot Number 041M1005:
700 nmole/min/mg

Procedure
Preparation Instructions
Kinase Assay Buffer – 25 mM MOPS, pH 7.2, 12.5 mM
glycerol 2-phosphate, 25 mM $MgCl_2$, 5 mM EGTA, and
2 mM EDTA. Just prior to use, add DTT to a final
concentration of 0.25 mM.

Kinase Dilution Buffer – Dilute the Kinase Assay Buffer
5-fold with distilled water.

Kinase Solution – Dilute the active ERK2 (0.1 μg/μl) with Kinase Dilution Buffer to the desired concentration. Note: The lot-specific specific activity plot may be used as a guideline (see Figure 2). It is recommended the researcher perform a serial dilution of active ERK2 kinase for optimal results.

10 mM ATP Stock Solution – Dissolve 55 mg of ATP in 10 ml of Kinase Assay Buffer. Store in 200 μl aliquots at –20 °C.

γ-^{32}P-ATP Assay Cocktail (250 μM) – Combine 5.75 ml of Kinase Assay Buffer, 150 μl of 10 mM ATP Stock Solution, 100 μl of γ-^{32}P-ATP (1 mCi/100 μl). Store in 1 ml aliquots at –20 °C.

Substrate Solution – Dissolve the synthetic peptide substrate (MBP) in water at a final concentration of 1 mg/ml.

1% phosphoric acid solution – Dilute 10 ml of concentrated phosphoric acid to a final volume of 1 L with water.

Kinase Assay

This assay involves the use of the ^{32}P radioisotope. All institutional guidelines regarding the use of radioisotopes should be followed.

1. Thaw the active ERK2, Kinase Assay Buffer, Substrate Solution, and Kinase Dilution Buffer on ice. The γ-^{32}P-ATP Assay Cocktail may be thawed at room temperature.
2. In a pre-cooled microcentrifuge tube, add the following solutions to a volume of 20 μl:
    10 μl of Kinase Solution
    5 μl of Substrate Solution
    5 μl of cold water (4 °C)
3. Set up a blank control as outlined in step 2, substituting 5 μl of cold water (4 °C) for the Substrate Solution.
4. Initiate each reaction with the addition of 5 μl of the γ-^{32}P-ATP Assay Cocktail, bringing the final reaction volume to 25 μl. Incubate the mixture in a water bath at 30 °C for 15 minutes.
5. After the 15 minute incubation, stop the reaction by spotting 20 μl of the reaction mixture onto an individually precut strip of phosphocellulose P81 paper.

6. Air dry the precut P81 strip and sequentially wash in the 1% phosphoric acid solution with constant gentle stirring. It is recommended the strips be washed a total of 3 times of ~10 minutes each.
7. Set up a radioactive control to measure the total γ-^{32}P-ATP counts introduced into the reaction. Spot 5 μl of the γ-^{32}P-ATP Assay Cocktail on a precut P81 strip. Dry the sample for 2 minutes and read the counts. Do not wash this sample.
8. Count the radioactivity on the P81 paper in the presence of scintillation fluid in a scintillation counter.
9. Determine the corrected cpm by subtracting the blank control value (see step 3) from each sample and calculate the kinase specific activity

Calculations:
1. Specific Radioactivity (SR) of ATP (cpm/nmole)

$$SR = \frac{\text{cpm of 5 μl of } \gamma\text{-}^{32}\text{P-ATP Assay Cocktail}}{\text{nmole of ATP}}$$

cpm – value from control (step 7)
nmole – 1.25 nmole (5 μl of 250 μM ATP Assay Cocktail)

2. Specific Kinase Activity (SA) (nmole/min/mg)

$$\text{nmole/min/mg} = \frac{\Delta\text{cpm} \times (25/20)}{SR \times E \times T}$$

SR = specific radioactivity of the ATP (cpm/nmole ATP)
Δcpm = cpm of the sample – cpm of the blank (step 3)
25 = total reaction volume
20 = spot volume
T = reaction time (minutes)
E = amount of enzyme (mg)

References

1. Boulton, T.G. et al., Purification and properties of extracellular signal-regulated kinase 1, an insulin-stimulated microtubule-associated protein 2 kinase. Biochemistry, **30,** 278-286 (1991).

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