# Cathepsin S Activity Fluorometric Assay Kit

**(Catalog #K144-100; 100 assays; Store kit at –20˚C)**

## I. Introduction:

Apoptosis can be mediated by mechanisms other than the traditional caspase-mediated cleavage cascade. There is growing recognition that alternative proteolytic enzymes such as the lysosomal cathepsin proteases may initiate or propagate proapoptotic signals. Cathepsins are lysosomal enzymes that are also used as sensitive markers in various toxicological investigations. The Cathepsin-S Activity Assay kit is a fluorescence-based assay that utilizes the preferred cathepsin-S substrate sequence VVR labeled with AFC (amino-4-trifluoromethyl coumarin). Cell lysates or other samples that contain cathepsin-S will cleave the synthetic substrate Z-VVR-AFC to release free AFC. The released AFC can easily be quantified using a fluorometer or fluorescence plate reader. The cathepsin-S assay is simple, straightforward, and can be adapted to 96-well plate assays. Assay conditions have been optimized to obtain the maximal activity.

## II. Kit Contents:

| Components | K-140-100 | Cap Code | Part No. |
|---|---|---|---|
| CS Cell Lysis Buffer | 25 ml | WM | K144-100-1 |
| CS Reaction Buffer | 5 ml | NM | K144-100-2 |
| CS Substrate Z-VVR-AFC (10 mM) | 0.2 ml | Brown | K144-100-3 |
| CS Inhibitor (1 mM) | 20 µl | Red | K144-100-4 |

## III. Storage and Stability:

- Store kit at –20˚C (Store CS Cell Lysis Buffer and CS Reaction Buffer at 4˚C after opening). Protect CS Substrate Z-VVR-AFC from light. All reagents are stable for 6 months under proper storage conditions.

## IV. Cathepsin S Assay Protocol:

1. Collect cells (1-5 x $10^6$) by centrifugation.

   Note: Use 50-200 µg cell lysates (in 50 µl of CS Cell Lysis Buffer) if protein concentration has been measured.
3. Lyse cells in 50 µl of chilled CS Cell Lysis Buffer. Incubate cells on ice for 10 min.
4. Centrifuge at top speed in a microcentrifuge for 5 min, transfer the supernatant to a new tube. Add 50 µl of cell lysate to a 96-well plate.
5. Add 50 µl of CS Reaction Buffer to each sample.
6. Add 2 µl of the 10 mM Z-VVR-AFC substrate (200 µM final concentration).

   Note: For negative control, add 2 µl of CS Inhibitor prior to adding CS Substrate, or make a reaction mixture that does not contain sample as control.
7. Incubate at 37˚C for 1-2 hour.
8. Read samples in a fluorometer equipped with a 400-nm excitation filter and 505-nm emission filter. For a plate-reading set-up, transfer the samples to a 96-well plate. You may also perform the entire assay directly in a 96-well plate.

***FOR RESEARCH USE ONLY! Not to be used on humans.***

Fold-increase in Cathepsin S activity can be determined by comparing the relative fluorescence units (RFU) with the level of the uninduced control or the negative control sample. If desired, the units of cathepsin S can be determined by generating a standard curve using free AFC under your assay conditions. Free AFC is available from BioVision (Cat.# 1077-100).

**RELATED PRODUCTS:**

Apoptosis Detection Kits & Reagents
- Annexin V Kits & Bulk Reagents
- Caspase Assay Kits & Reagents
- Mitochondrial Apoptosis Kits & Reagents
- Nuclear Apoptosis Kits & Reagents
- Additional Apoptosis Kits & Reagents

Cell Fractionation System
- Mitochondria/Cytosol Fractionation Kit
- Nuclear/Cytosol Fractionation Kit
- Membrane Protein Extraction Kit
- Cytosol/Particulate Rapid Separation Kit
- Mammalian Cell Extraction Kit
- FractionPREP Fractionation System

Cell Proliferation & Senescence
- Quick Cell Proliferation Assay Kit
- Senescence Detection Kit
- High Throughput Apoptosis/Cell Viability Assay Kits
- LDH-Cytotoxicity Assay Kit
- Bioluminescence Cytotoxicity Assay Kit
- Live/Dead Cell Staining Kit

Cell Damage & Repair
- HDAC Fluorometric & Colorimetric Assays & Drug Discovery Kits
- HAT Colorimetric Assay Kit & Reagents
- DNA Damage Quantification Kit
- Glutathione Fluorometric & Colorimetric Assay Kits
- Nitric Oxide Fluorometric & Colorimetric Assay Kits

Signal Transduction
- cAMP & cGMP Assay Kits
- Akt & JNK Activity Assay Kits
- Beta-Secretase Activity Assay Kit

Adipocyte & Lipid Transfer
- Recombinant Adiponectin, Survivin, & Leptin
- CETP and PLTP Activity Assay & Drug Discovery Kits
- Total Cholesterol Quantification Kit

Molecular Biology & Reporter Assays
- siRNA Vectors
- Cloning Insert Quick Screening Kit
- Mitochondrial & Genomic DNA Isolation Kits
- 5 Minutes DNA Ligation Kit
- 20 Minutes Gel Staining/Destaining Kit



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## GENERAL TROUBLESHOOTING GUIDE FOR CATHEPSIN FLUOROMETRIC KITS:

| Problems | Cause | Solution |
|---|---|---|
| Assay not working | • Cells did not lyse completely | • Resuspend the cell pellet in the lysis buffer and incubate as described in the datasheet |
| | • Experiment was not performed at optimal time after apoptosis induction | • Perform a time-course induction experiment for apoptosis |
| | • Plate read at incorrect wavelength | • Check the wavelength listed in the datasheet and the filter settings of the instrument |
| High Background | • Increased amount of cell lysate used | • Refer to datasheet and use the suggested cell number to prepare lysates |
| | • Increased amounts of components added due to incorrect pipetting | • Use calibrated pipettes |
| | • Incubation of cell samples for extended periods | • Refer to datasheet and incubate for exact times |
| | • Use of expired kit or improperly stored reagents | • Always check the expiry date and store the individual components appropriately |
| | • Contaminated cells | • Check for bacteria/ yeast/ mycoplasma contamination |
| Lower signal levels | • Cells did not initiate apoptosis | • Determine the time-point for initiation of apoptosis after induction (time-course experiment) |
| | • Very few cells used for analysis | • Refer to datasheet for appropriate cell number |
| | • Use of samples stored for a long time | • Use fresh samples or aliquot and store and use within one month for the assay |
| | • Incorrect setting of the equipment used to read samples | • Refer to datasheet and use the recommended filter setting |
| | • Allowing the reagents to sit for extended times on ice | • Always thaw and prepare fresh reaction mix before use |
| Samples with erratic readings | • Uneven number of cells seeded in the wells | • Seed only equal number of healthy cells (correct passage number) |
| | • Samples prepared in a different buffer | • Use the cell lysis buffer provided in the kit |
| | • Adherent cells dislodged and lost at the time of experiment | • Perform experiment gently and in duplicates/triplicates; apoptotic cells may become floaters |
| | • Cell/ tissue samples were not completely homogenized | • Use Dounce homogenizer (increase the number of strokes); observe efficiency of lysis under microscope |
| | • Samples used after multiple freeze-thaw cycles | • Aliquot and freeze samples, if needed to use multiple times |
| | • Presence of interfering substance in the sample | • Troubleshoot as needed |
| | • Use of old or inappropriately stored samples | • Use fresh samples or store at correct temperatures until use |
| Unanticipated results | • Measured at incorrect wavelength | • Check the equipment and the filter setting |
| | • Cell samples contain interfering substances | • Troubleshoot if it interferes with the kit (run proper controls) |
| General issues | • Improperly thawed components | • Thaw all components completely and mix gently before use |
| | • Incorrect incubation times or temperatures | • Refer to datasheet & verify the correct incubation times and temperatures |
| | • Incorrect volumes used | • Use calibrated pipettes and aliquot correctly |
| | • Air bubbles formed in the well/tube | • Pipette gently against the wall of the well/tubes |
| | • Substituting reagents from older kits/ lots | • Use fresh components from the same kit |
| | • Use of a different 96-well plate | • Fluorescence: Black plates; Absorbance: Clear plates |
| **Note:** The most probable cause is listed under each section. Causes may overlap with other sections. | | |



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