

FT-M1473A



INTERFINE CHEMICALS

ANALYTICAL SCIENCES

BIOCHROMATOGRAPHY

BIOSCIENCES

DMNP-EDTA, NP-EGTA

Non-Fluorescent Caged Ca^{2+} photolabile chelator

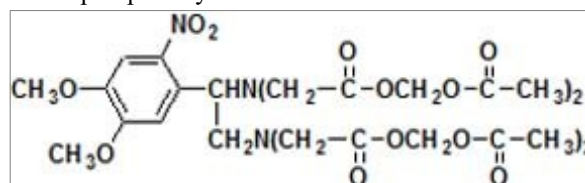
Product Information

Name : **DMNP-EDTA, AM ester** Cell permeable
 1-(4,5-dimethoxy-2-nitrophenyl)-1,2-diaminoethane- N,N,N',N' -tetraacetic acid, tetra(acetoxymethyl ester) ; DMNPE, BNPE
 Also called called DM-Nitrophen., a trademark of Calbiochem-Novabiochem Corp.
 K_d for Ca^{2+} increases from 5 nM to 3 mM upon photolysis.

Catalog Number : FP -M1437A, 1 mg

Structure : $\text{C}_{30}\text{H}_{39}\text{N}_3\text{O}_{20}$

Molecular Weight : 761.66



Specifications : Appearance: Yellow oil
 HPLC Purity: >95%
 TLC (in 1:1 Hexane/Ethyl acetate): conform
 NMR (CDCl_3): conform to reference structure

Soluble in: DMSO, Methanol, DMF, CH_3CN and CHCl_3

Excitation/Emission : $\lambda_{\text{exc}}/\lambda_{\text{em}}$ (EtOH) = 332 nm/ N/A

Extinction Coefficient : $4\ 550\ \text{M}^{-1}\ \text{cm}^{-1}$

Storage : -20°C (M). Protected from light and moisture.

Name : **DMNP-EDTA** Cell impermeable

Catalog Number : FP -44506A, 5 mg

Structure : $\text{C}_{18}\text{H}_{23}\text{N}_3\text{O}_{12}$

Molecular Weight : 473,4

Soluble in: DMSO, Methanol, DMF and basic water

Storage : -20°C (M). Protected from light and moisture.

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Name : **DMNP-EDTA, tetrapotassium salt (caged calcium)** Cell impermeable

Catalog Number : FP –OO5460, 5 mg

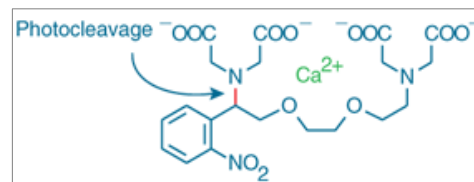
Structure : $C_{18}H_{19}K_4N_3O_{12}$
Molecular Weight : 626

Storage : $-20^{\circ}C$ (M). Protected from light and moisture.

Name : **NP-EGTA, AM ester *Cell permeable***
 O-NitroPhenyl EGTA TetraPotassium Salt.

Catalog Number : FP –M1433A, 1 mg
 Also available as K salt # 52902A

Structure : $C_{32}H_{43}N_3O_{20}$
Molecular Weight : 789.7

Soluble in : DMSO, Methanol, DMF, CH_3CN and $CHCl_3$
Storage : $-20^{\circ}C$ (M). Protected from light and moisture.


Introduction

● DMNP-EDTA

1-(4,5-dimethoxy-2-nitrophenyl)ethyl EDTA (DMNPE) is a caging group with long-wavelength absorption (absorption maximum ~355 nm), developed by Ellis-Davies and Kaplan [Kaplan 1988](#), [Morad 1988](#). It absorbs 340–360 nm light very efficiently. We provide the salted acid form, and the AM ester to ease cell loading.

DMNP-EDTA is used to raise or lower the intracellular Ca^{2+} concentration in cells, in order to study the resulting effects. It also can be used as an effective caged Mg^{2+} source, with even faster photorelease of Mg^{2+} , and furthermore for photolytic release of other divalent cations such as Sr^{2+} , Ba^{2+} , Mn^{2+} , Co^{2+} and Cd^{2+} .

Upon illumination, DMNP-EDTA is cleaved and dissociation constant (K_d) for Ca^{2+} increases from 5 nM to 3mM for the two iminodiacetic acid photolysis products (~600,000-fold lower than that of DMNP-EDTA). Using DMNP-EDTA complexed to Ca^{2+} , this results in a pulse of free Ca^{2+} . Using the AM form, Ca^{2+} can be scavenged in cells upon photolysis. Additionally, DMNP-EDTA has significantly higher affinity for Mg^{2+} ($K_d = 2.5 \mu M$) than does NP-EGTA ($K_d = 9 mM$), increasing after photolysis to K_d for Mg^{2+} to ~3 mM. Photorelease of Ca^{2+} is rapid, occurring in <180 microseconds, with even faster photorelease of Mg^{2+} . EDTA prevents the potentially cytotoxic reaction between amines and the 2-nitrosobenzoyl photolytic by-products.

See use and limitation of DMNP-EDTA in the literature (reviews [Ellis-Davies 2007, 2008](#)).

Literature – DMNP-EDTA

- **Bollmann JH et al.** "Control of synaptic strength and timing by the release-site Ca^{2+} signal.", *Nat Neurosci* 8, 426-34 (2005) PN56193. [DMNP-EDTA] [PubMed](#) ·
- **Ellis-Davies GC.** Caged compounds: photorelease technology for control of cellular chemistry and physiology. *Nat Methods* (2007) 4:619-628
- **Ellis-Davies GC.** Neurobiology with caged calcium. *Chem Rev* (2008) 108:1603-1613 (Review of neuroscience applications of photoactivatable ("caged") calcium reagents)
- **Faas GC et al.** "Kinetic properties of DM-nitrophen binding to calcium and magnesium.", *Biophys J* 88, 4421-33 (2005) PN57135. [DMNP-EDTA] [PubMed](#) · [Article](#) ·
- **Girouard H. et al.**, Astrocytic endfoot Ca^{2+} and BK channels determine both arteriolar dilation and constriction, *PNAS*, 2010; 10.1073/pnas. 0914722107 [Abstract](#)

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- **Gusev K.** *et al.*, Angiotensin II–Mediated Adaptive and Maladaptive Remodeling of Cardiomyocyte Excitation–Contraction Coupling, *Circ. Res.*, 105: 42 - 50 (2009) [Article](#)
- **Kaplan JH**, Ellis-Davies GC, Photolabile chelators for the rapid photorelease of divalent cations. *Proc Natl Acad Sci U S A* (1988) 85:6571-6575
- **Morad M**, Davies NW, Kaplan JH, Lux HD. Inactivation and block of calcium channels by photo-released Ca²⁺ in dorsal root ganglion neurons. *Science* (1988) 241:842-844

● NP-EGTA AM

NP-EGTA AM is loaded in cells where intracellular esterases cleaves the AM group, preventing release from cells. It acts then as a chelator with a high selectivity for Ca²⁺. Upon UV illumination, its K_d raises from 80 nM to >1 mM (affinity decrease by 12 500-fold). It is also a high photochemical quantum yield ref (~0.2). Furthermore, NP-caged EGTA does not perturb physiological levels of Mg²⁺ (K_d for Mg²⁺ is 9 mM).

The NP-EGTA salt can be complexed with Ca²⁺ to generate a caged calcium complex that will rapidly deliver Ca²⁺ upon photolysis. The cell-permeant AM ester of NP-EGTA does not bind Ca²⁺ unless the AM esters are removed. It can potentially serve as a photolabile buffer in cells because, once converted to NP-EGTA by intracellular esterases, it will bind Ca²⁺ with high affinity until photolyzed with UV light. NP-EGTA has been used to measure the calcium buffering capacity of cells.

Related products

- Fluo-3 AM, [FP-78932C](#)
- Fluo-8 AM, [CP7502](#)
- TPEN (Tetrakis-(2-pyridylmethyl)ethylenediamine), [FP-44736A](#)
- Pluronic acid, [FP-37361A](#)
- Caged Ca: NP-EGTA, [FP-52902A](#)
- Trivalent lanthanide terbium (III), a luminescent analog of Ca²⁺ that can be used to study structure–function relationships in Ca²⁺-binding proteins such as calmodulin, oncomodulin, lactalbumin and ATPases.
- Thapsigargin, a sesquiterpene lactone that promotes releases Ca²⁺ from intracellular stores but does not directly affect plasma membrane Ca²⁺-ATPases, Ins 1,4,5-P₃ production or protein kinase C activity.
- DMNP-EGTA, [FP-44506A](#) and –AM [FP-M1437A](#)
- Ionomycin, [FP-53989A](#)
- Fluo-3 AM, [FP-78932A](#)
- Fluo-8 NW, [CJ2560](#)
- Calcium Calibration Kit, [FP-21527A](#)

Ordering information

Catalog size quantities and prices may be found at <http://www.interchim.com>.

Please inquire for higher quantities (availability, shipment conditions).

For any information, please ask : FluoProbes® / Interchim; Hotline : +33(0)4 70 03 73 06

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