

MT(PEG)₄ CT(PEG)₁₂

Methyl- and carboxy-thiol PEGylation reagents

26132 26133

2341.0

Number	Description	
26132	MT(PEG) ₄ , 100mg	
	Molecular Weight: 224.32	
	Spacer Arm Length: 15.8Å H ₃ C' V 10' V V 10' V	
26133	CT(PEG) ₁₂ , 100mg ← 47.8 Å ←	
	Molecular Weight: 634.77	
	Spacer Arm Length: 47.8Å H0 SH	
	Storage: Upon receipt store at -20°C protected from moisture. Products shipped at ambient temperature.	nt

Introduction

The Thermo Scientific $MT(PEG)_4$ (methyl-PEG₄-thiol) and $CT(PEG)_{12}$ (carboxy-PEG₁₂-thiol) are monodentate thiol-terminated polyethylene glycol (PEG)-containing reagents with either a methyl ether or carboxylic acid. These reagents have defined molecular weights and spacer lengths and are used for modifying surfaces such quantum dots, self-assembled monolayers and magnetic particles. Functionalization of solid surfaces with polyethylene glycol spacers significantly reduces nonspecific protein binding. $^{1-6}$

The use of MT(PEG)₄ with CT(PEG)₁₂ in surface modification can form a hydrophilic "lawn" of methyl ether-terminated PEGs with periodic exposed carboxylic acid-containing PEGs. The exposed carboxylic acid groups can be coupled to affinity ligands using the carbodiimide coupling reaction with EDC and sulfo-NHS.

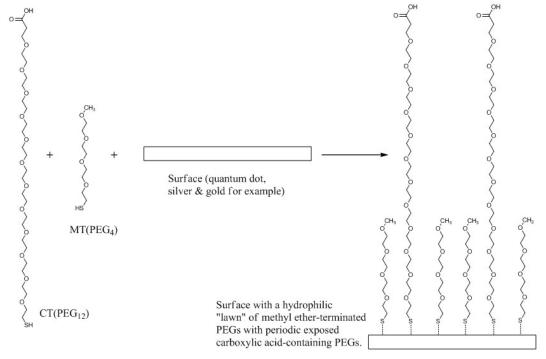


Figure 1. Surface modification with MT(PEG)₄ and CT(PEG)₁₂.



Important Product Information

- Use MT(PEG)₄ and CT(PEG)₁₂ in combination to modify surfaces and minimize nonspecific binding.
- The PEG-thiol reagents are low-melting solids that are difficult to weigh and dispense. To facilitate handling, make a stock solution by dissolving the reagent in dimethylsulfoxide (DMSO) or dimethylformamide (DMF).
- Store unused stock solution at -20°C. Equilibrate reagent vial to room temperature before opening to avoid moisture condensation. To minimize air exposure, keep the stock solution under an inert gas such as argon or nitrogen. Cap the stock solution with a septum and use a syringe to remove the solution.
- The ratio of MT(PEG)₄ to CT(PEG)₁₂ and the reagent mixture-to-surface ratio in the reaction affect the number of carboxylic acid residues available for further modification. Optimize these ratios to obtain the modification level needed for the specific application.
- Use non-amine-containing buffers at pH 7-9 such as PBS (20mM sodium phosphate, 150mM NaCl; pH 7.4) (Product No. 28372); 100mM carbonate/biocarbonate; or 50mM borate. Do not use buffers that contain primary amines, such as Tris or glycine, which compete with acylation.

Procedure for Surface Modification with MT(PEG)₄ and CT(PEG)₁₂

Materials Required

- Water-miscible organic solvent (molecular sieve-treated) such as DMSO or DMF
- Small-volume, non-coring syringes for dispensing the reagent stock solution while minimizing exposure to air
- Buffer A: Phosphate-buffered saline, PBS (20mM sodium phosphate, 0.15M NaCl; pH 7.2, Product No. 28372) or other non-amine, lone-pair sulfur-free buffers
- Buffer B: MES-buffered saline (0.1M MES, 0.5M NaCl; pH 6.0 or 0.1M MES, 0.9% NaCl; pH 4.7; Product No. 28390) or other non-amine, non-carboxy, lone-pair sulfur-free buffers
- EDC (Product No. 77149)
- NHS or Sulfo-NHS (Product No. 24500 and 24510, respectively)
- Hydroxylamine HCl (Product No. 26103)

Procedure

- Equilibrate the MT(PEG)₄ and CT(PEG)₁₂ reagents to room temperature before opening bottles.
- 2. Prepare stock solutions by dissolving 100mg of each reagent in the desired amount of DMF or DMSO. Cap, store and handle stock solutions as directed in the Important Product Information Section.
- 3. Prepare the appropriate amount of surface in Buffer A.
- 4. Prepare a mixture of MT(PEG)₄ and CT(PEG)₁₂ in Buffer A and add it to the surface. Incubate the reaction for 2 hours at room temperature.
- 5. Wash the surface with Buffer A to remove excess reagent.
- 6. The newly introduced carboxylic acid groups can be activated by adding appropriate amounts of EDC and NHS or sulfo-NHS to the modified surface in Buffer B and reacting for 15 minutes at room temperature. For best results, perform this reaction at pH 5-6.
 - **Note:** The activation reaction with EDC and sulfo-NHS is most efficient at pH 4.5-7.2; however, the reaction of sulfo-NHS-activated molecules with primary amines is most efficient at pH 7-8.
- 7. Wash the surface with Buffer B to remove any remaining EDC and NHS.
- 8. Add the desired amine-containing substrate, prepared in Buffer A, to the activated surface and react for 2 hours at room temperature. For best results, raise the pH of the reaction solution to 7.2-7.5 with Buffer A immediately before adding the amine-containing substrate.
- 9. To quench the conjugation reaction, add hydroxylamine or another amine-containing buffer. Hydroxylamine hydrolyzes non-reacted NHS. Other quenching compounds include Tris, lysine, glycine or ethanolamine; however, these primary amine-containing compounds modify carboxylic acids.



Related Thermo Scientific Products

26134	ML(PEG) ₄ (methyl-PEG ₄ -lipoamide), 100mg
26135	CL(PEG) ₁₂ (carboxy-PEG ₁₂ -lipoamide), 100mg
28390	BupH TM MES Buffered Saline, 10 packs, makes 5L
28372	BupH Phosphate Buffered Saline, 40 packs, makes 20L
77149	EDC , 10mg
24500	NHS (N-hydroxysuccinimide), 25g
24510	Sulfo-NHS (sulfo-N-hydroxysuccinimide), 500mg
20290	DTT, 5g
20291	DTT, No-Weigh TM Format, 48 tubes × 7.7mg
26103	Hydroxylamine, 25g
26120	CA(PEG) ₄ (carboxy-PEG ₄ -amine), 100mg
26122	CA(PEG) ₈ , 100mg
26124	CA(PEG) ₁₂ , 100mg
26126	CA(PEG) ₂₄ , 100mg
26110	MA(PEG) ₄ (methyl-PEG ₄ -amine), 100mg
26112	MA(PEG) ₈ , 100mg
26114	MA(PEG) ₁₂ , 100mg
26116	MA(PEG) ₂₄ , 100mg

References

- Prime, K.L. and Whitesides, G.M. (1991). Self-assembled organic monolayers: model systems for studying absorption of proteins at surfaces. Science 252:1164.
- 2. Bentzen, E.L., et al. (2005). Surface modification to reduce non-specific binding of quantum dots in live cell assays. Bioconjugate Chem 16:1488-94.
- 3. Lin, P-C., et al. (2006). Ethylene glycol-protected magnetic nanoparticles for a multiplexed immunoassay in human plasma. Small 2(4):485-9.
- 4. Zheng, M., et al. (2003). Ethylene glycol monolayer protected nanoparticles for eliminating nonspecific binding with biological molecules. J Am Chem Soc 125:7790-1
- 5. Verma, A. and Rotello, V.M. (2005). Surface recognition of biomacromolecules using nanoparticle receptors. Chem Commun 3:303-12.
- Kidambi, S., et al. (2004). Selective depositions on polyelectrolyte multilayers: self-assembled monolayers of m-dPEG acid as molecular template. J Am Chem Soc 126:4697-03.

This product ("Product") is warranted to operate or perform substantially in conformance with published Product specifications in effect at the time of sale, as set forth in the Product documentation, specifications and/or accompanying package inserts ("Documentation") and to be free from defects in material and workmanship. Unless otherwise expressly authorized in writing, Products are supplied for research use only. No claim of suitability for use in applications regulated by FDA is made. The warranty provided herein is valid only when used by properly trained individuals. Unless otherwise stated in the Documentation, this warranty is limited to one year from date of shipment when the Product is subjected to normal, proper and intended usage. This warranty does not extend to anyone other than the original purchaser of the Product ("Buyer").

No other warranties, express or implied, are granted, including without limitation, implied warranties of merchantability, fitness for any particular purpose, or non infringement. Buyer's exclusive remedy for non-conforming Products during the warranty period is limited to replacement of or refund for the non-conforming Product(s).

There is no obligation to replace Products as the result of (i) accident, disaster or event of force majeure, (ii) misuse, fault or negligence of or by Buyer, (iii) use of the Products in a manner for which they were not designed, or (iv) improper storage and handling of the Products.

Current product instructions are available at www.thermoscientific.com/pierce. For a faxed copy, call 800-874-3723 or contact your local distributor. © 2011 Thermo Fisher Scientific Inc. All rights reserved. Unless otherwise indicated, all trademarks are property of Thermo Fisher Scientific Inc. and its subsidiaries. Printed in the USA.